

# Campus Mobility Recommendations

## #1: MAIN CAMPUS TO CENTENNIAL CAMPUS

### ALIGN CAMPUS DEVELOPMENT AND MOBILITY

Main and Centennial campuses continue to experience substantial physical growth through new and redevelopment opportunities. These two campuses are also home to the highest concentration of campus buildings, including housing, research, recreation, and related academic learning. As these environs change over time, changes to the transit network will need to adapt to these changes to move more people, more efficiently and offer more access opportunities to transit service between these two major destinations.

#### Recommendations:

Institutionalize the decision-making process around campus (re)development and requiring transit considerations at all phases of planning, development, construction, and maintenance. This requires inter-departmental coordination to identify opportunities to bring new and/or modified transit service to these buildings or other activity areas. Such efforts ensure that transit access and service will be directly associated with all aspects of the process, and new development and redevelopment opportunities will support transit enhancements.

#### Benefits:

- Increased transparency between transit service programming and development
- Opportunity to plan, design, and operate new transit facilities at building location(s), such as bus stop siting, passenger loading amenities, and mobility hub integration
- Heightened awareness of transit service modification and/or expansion to campus community
- Prioritizes “front-door” service opportunity to put riders next to buildings, including most patronized buildings and gathering spaces
- Reduced need to drive, park, re-park to destinations within both campuses
- Encourages active mobility (walking, biking, micromobility) on and between both campuses

## #2: NORTH CAMPUS IMPROVEMENTS

### PARKING IMPACTS + BROUGHTON, CURRENT, STINSON, LAMPE CLOSURES

Broughton, Current, Stinson, and Lampe have a combined parking supply of approximately 180 spaces. While the configuration of these spaces is split between parallel and perpendicular parking, they are all designated as employee parking. As of the 2021-2022 academic year, the parking demand along these roadways recorded a utilization rate of approximately 175 spaces in use, with nearly every space occupied. Based on parking utilization data from the same period, the Coliseum Deck, North Hall Lot, and Ferndell Lot recorded having collectively approximately 600 available spaces, which could easily accommodate the displaced parkers along Broughton, Current, Stinson, and Lampe. Furthermore, there are also discussions regarding the construction of a SAS Hall parking deck that could accommodate these parkers.

The spaces along Broughton, Current, Stinson, and Lampe are in direct proximity to several key destinations on campus, including several academic buildings and residence halls that many students frequently go in and out of. Dedicating a large portion of North Campus roadways to parking precludes space being used to increase and enhance transit, bike, and pedestrian amenities, making it a less comfortable and pleasant experience for many of the people accessing these destinations most. Furthermore, the availability of parking for staff along key roadways such as these increases the number of employees who park and re-park when traveling to and from campuses, increasing traffic/congestion within the NC State campus overall.

#### Recommendations:

- Eliminate parking along Current, Stinson, and Lampe and convert to pedestrian paths
- Eliminate parking along Broughton and use as an all-campus connector path

- Maintain select loading zones along Broughton, and ensure they are used for short-term freight loading/unloading
- Provide employees with free or reduced transit fare and/or bike incentives to encourage the use of other modes to/from work and when traveling between NC State campuses
- Encourage existing employee permit users who do wish to park to relocate to the planned (new) SAS Hall parking deck, Coliseum Deck, North Hall Lot, or Ferndell Lot
- Increase parking permit oversell rate until Coliseum deck consistently experiences a parking utilization rate of 85% to 90% to ensure the garage is meeting its optimal capacity level
- Consider reducing the number of spaces dedicated to student parking in the Coliseum deck to create additional space for employee parkers. Students could be located on peripheral lots or be encouraged to use alternative modes when commuting and traveling between campuses.
- Consider not allowing first year students to have cars on campus to increase supply and reduce demand

#### Benefits:

- Create more walkable, friendly, comfortable environment in the core of North Campus
- Support campus goals of prioritizing a more walkable and bikeable campus
- Increase roadway capacity and frequency of transit in North Campus
- Discourages re-parking on campus
- Reduces traffic, congestion, and associated vehicle emissions on campus

#### CIRCULATION IMPACTS + BROUGHTON, CURRENT, STINSON, LAMPE CLOSURES

Broughton, Current, Stinson, and Lampe are exemplary of the dominant arrangement of short, narrow streets that are primarily used for on-street parking adjacent to campus buildings. This type of street network largely defines North Campus, as these streets are generally designed to prioritize pedestrians, bicyclists, and other non-vehicular modes, offering little capacity for more than one travel lane in most cases. Based on these current designs, these campus streets are key connections for those on foot, biking, gathering, and socializing as well as place for car storage.

There are approximately 180 on-street parking spaces located along these four campus streets. At full capacity, this equates to a maximum of 180 vehicles traversing these streets on a daily basis. Additionally, Stinson Drive, west of Current Drive experiences an average of 700 vehicles per day<sup>1</sup>.

There is an opportunity to transform North Campus into a “car-free” zone, prioritizing pedestrians, bicyclists, personal mobility devices, transit, and emergency vehicles. The potential to close Broughton, Current, Lampe, and Stinson (west of Current Drive) while introducing a new parking deck at SAS Hall would result in changing vehicular traffic pattern. From the south and east, those who used to park along these streets would be redirected to park at the new SAS Hall parking deck which will only be accessible by vehicle via Pullen Road onto Stinson Drive. From the north, those entering from Hillsborough Street would continue to enter onto Founders Drive but would be prohibited to continue east onto Lampe Drive or Current Drive but can continue to travel west along Founders Drive. Those seeking access to this part of North Campus from Hillsborough Street will be required to continue along Hillsborough Street to Pullen Road, and then onto Stinson Drive to access the new parking deck.

Diverting most of the traffic to the planned SAS parking deck would result in additional vehicular demand along Stinson Drive, Pullen Road, and portions of a future (planned) future Yarbrough Drive-Baver Drive. It is likely that traffic coming from Hillsborough Street would be reduced as access to the northern portion of North Campus would be significantly limited to service/emergency vehicles and general traffic would be prohibited.

Stinson Drive, west of Current Drive does not experience large vehicle traffic volumes per day (average of 700 vehicles per day). The street can accommodate 15,000 vehicles within a 12-hour period and double that during an entire 24-hour day. Pullen Road, south of Cates Avenue, experiences significant traffic, averaging 16,000 vehicles per day. Given the two-lane orientation of the street, Pullen Road is utilized between 50% to 80% of the day, which generally reflects a consistent level of congestion during most of the day (i.e., during typical campus hours of activity). The diversion of additional traffic to Pullen Road to access

<sup>1</sup> Daily vehicle traffic counts were collected April 19 – 21, 2022.

the planned SAS parking deck would likely exacerbate congestion levels.

**Recommendations:**

**Close Broughton, Current, Stinson, and Lampe streets.** Closing Broughton, Current, Stinson, and Lampe streets will create a unique space for the campus community and enable people to move freely within a comfortable, convenient place while providing ample connectivity to campus buildings.

The current street network can handle the potential traffic diversion; however, measures will need to be in place to maintain and/or improve traffic circulation along Stinson Drive, Pullen Road, and Hillsborough Avenue considering potential traffic changes.

**Establish Digital Wayfinding and Signage** – it is recommended that advanced communications be established to alert drivers of parking locations and available parking. Digital wayfinding and signage should be placed along Pullen Road prior to the intersection of Stinson Drive, showing directions to the new SAS parking deck and number of parking spaces available. This will significantly reduce driver confusion and excess circulation along Pullen Road, Stinson Drive, or other campus streets.



Source: <https://www.parkassist.com/solutions-2/wayfinding-signage/>

**Provide Turnaround Area in SAS Parking Deck / Cul-de-Sac Design** – Boney Drive is also recommended to be closed, eliminating an existing vehicular access road in this part of North Campus. Those who mistakenly turn onto Stinson Drive and do not wish to enter the SAS parking deck will require ample turnaround space either within the new SAS parking deck or cul-de-sac (or related feature) at the end of Stinson Drive to head back eastbound along Stinson Drive and onto Pullen Road. Providing a turnaround area in the proposed SAS parking garage would address this issue.

**Ensure adequate NC State Communications prior to any street closures,** NC State will need to properly communicate these changes to all NC State community members and visitors. It needs to be made clear how general traffic will be restricted along these streets and only emergency/service vehicles are permitted to drive/park along these streets. All general traffic will need to be directed towards the planned SAS parking deck.

**Benefits:**

- Concentrates general traffic to the SAS parking deck and along periphery of campus
- Reduces traffic circulation and potential conflicts with vulnerable roadway users
- Reduces vehicle congestion along North Campus and focuses more traffic controls along Hillsborough Street and Pullen Road
- Provides “car-free” environment along North Campus, creating an open, safe, convenient environment for campus community members
- Manages service/emergency vehicle access to North Campus, allowing for more opportunities for concentrated delivery centers
- Offer more opportunities for mobility hubs and gathering spaces for campus community

**CONNECTING YARBROUGH: DAN ALLEN DRIVE TO PULLEN ROAD**

Today, Yarbrough Drive between Pullen Road and Dan Allen Drive is disconnected and primarily serves as a “back of lot” parking area with limited access and mobility opportunities for campus members. Transforming Yarbrough Drive to extend between Pullen Road and Dan Allen Drive will create a brand-new campus connection for multiple modes and create new access opportunities to key points along North Campus. Furthermore, this will create a new opportunity for a seamless experience for those using the tunnels between

North and Main campuses, introducing a more convenient, comfortable environment for those who traverse these pathways.

### Recommendations:

**Connect Yarbrough Drive between Pullen Road and Dan Allen Drive.** Yarbrough Drive will play a more significant role in moving people across North Campus once fully connected between Pullen Road and Dan Allen Drive. It is critical that the redesign of this street prioritizes pedestrians, bicyclists, transit, and other personal mobility devices, while limiting on-street parking and mitigating excessive “cut-through” travel behavior by motorists.

Redesign Yarbrough to maintain vehicular access, intermittent on-street parking, other essential mobility improvements. Approximately 65 striped parking spaces that currently exist would be eliminated but could be absorbed in nearby parking facilities. Right-of-way should be granted for dedicated bikeways along the south side of Yarbrough, thereby elevating the current biking infrastructure from a shared street (with stenciled sharrows) to dedicated, protected bike lanes within the roadway. Dedicated sidewalks and narrow travel lanes should also be considered. Given the proximity to several buildings in this part of North Campus, there are opportunities to create new bus stops along Yarbrough Drive and make this newly-connected street operate frequent bus service and introduce a necessary east-west route. Note that permitting continuous vehicle movement along the street will require a redesign of pedestrian access (stairwell) to the underground tunnel; see example in **Appendix A**.

### Benefits:

- Established multimodal street that offers convenient, safe space for walking, biking, micromobility, potential for increased transit service, and reduction in vehicular traffic and parking congestion
- Enhanced connections to tunnels, including a continuous “pedestrian experience” at the north end of tunnel
- Supports concentration of vehicle and related circulation patterns towards planned SAS parking deck
- Reduces conflict points between moving vehicles and vulnerable roadway users, while creating multiple non-auto access points to campus buildings

## #3: CENTRAL CAMPUS IMPROVEMENTS

### PARKING IMPACTS + CATES AVENUE REDESIGN

Cates Avenue currently has approximately 232 spaces between Pullen Road and Dan Allen Drive. While the configuration of these spaces is split between parallel and perpendicular parking, they are all designated as employee parking. As of the 2021-2022 academic year, the parking demand along Cates Avenue recorded a utilization rate of 60% or 140 spaces being used when most full. Based on parking utilization data from the same period, the Coliseum Deck, North Hall Lot, and Ferndell Lot recorded having collectively approximately 600 available spaces, which could easily accommodate the misplaced parkers along Cates Avenue.

In addition to being used for long-term employee parking, there are several freight loading zones along this street segment. While these spaces are helpful in delivering goods and resources to campus buildings, they are often used for their intended purpose. A detailed curbside management study was completed in April of 2022 and revealed that many of the freight loading zones in this area were more commonly used for private rideshare or passenger pick-up/drop-off; experienced illegal parking; and saw many cars parked for extended periods of time.

These spaces are in close proximity to several key destinations on campus, including Talley Student Union, the Wellness and Recreation Center, and several residence halls that many students frequent. Dedicating a large portion of the Central Campus roadway network to parking prevents this space from being used to increase and enhance transit, bike, and pedestrian amenities, making it more difficult and time consuming for many of the people accessing these destinations most. Furthermore, the availability of parking for staff along key roadways increases the number of employees who park and re-park when traveling to and from campuses, as opposed to taking the bus or using an alternative mode. However, when bus and active transportation infrastructure is reliable, abundant, comfortable, and convenient, it encourages the use of these modes.

#### 4. Cates Avenue at Talley Student Union



**Cates Avenue Curbside Activity (HNTB, 2022).**

#### Recommendations:

- Eliminate parking along Cates Avenue to create more spaces dedicated to transit, active transportation, and pedestrian amenities
- Maintain select loading zones along Cates Avenue, and ensure they are in used for short-term freight loading/unloading
- Provide employees with free or reduced transit fare, and bike incentives to encourage the use of other modes to/from work and when traveling between NC State campuses
- Encourage existing employee permit users who do wish to park to relocate to the Coliseum Deck, Dan Allen Deck, or possibly North Hall Lot or Ferndale Lot
- Increase parking permit oversell rate until Coliseum deck consistently experiences a parking utilization rate of 85% to 90% to ensure the garage is meeting its optimal capacity level
- Consider reducing the number of spaces dedicated to student parking in the Coliseum deck to create additional space for employee parkers. Students could be located on peripheral lots or encouraged to use alternative modes when commuting and traveling between campuses.
- Consider not allowing first year students to have cars on campus freshmen year to increase supply and reduce demand for other users

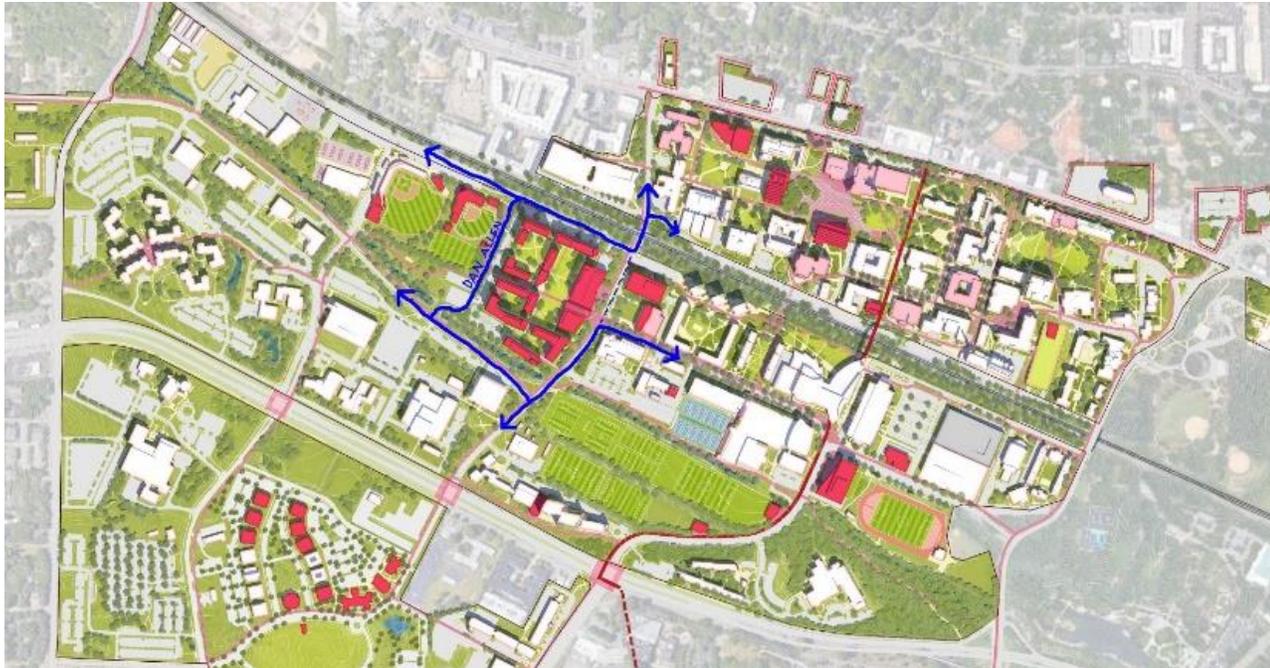
#### Benefits:

- Supports campus goals of prioritizing a more walkable and bikeable campus
- Increase roadway capacity and frequency of transit in core campus
- Discourages re-parking on campus
- Reduces traffic, congestion, and associated vehicle emissions on campus
- Could allow bus stop to be located in proximity to key Talley Student Union and other key destinations along Cates Avenue

#### CIRCULATION IMPACTS + DAN ALLEN REDESIGN

The permanent closure of Dan Allen Drive between Cates Avenue and Thurman Drive to all vehicles , with the exception of bus transit vehicles and emergency vehicles, will create a “car free” environment, while introducing a transit-pedestrian mall feature that provides a seamless connection between campus buildings and active gathering space along the western portion of Main Campus. Bus transit service would be maintained along Dan Allen Drive.

Dan Allen Drive, north of Western Boulevard experiences an average of 6,100 vehicles per day and experiences about 3,800 vehicles per day, south of Hillsborough Street<sup>2</sup>. Dan Allen Drive has a carrying capacity of 17,000 to 19,000 vehicles within a 12-hour period and double the capacity over a 24-hour period. As a result, during normal (typical) hours of campus activity (i.e., 7:00am-7:00pm), this street is utilized to its fullest potential approximately 17% to 25% of the time. Ultimately, Dan Allen Drive does not experience constant vehicle congestion during the day.



Closing this part of Dan Allen Drive would result in changing vehicle travel patterns. Those destined to Hillsborough Street would be required to travel onto Sullivan Drive, Varsity Drive, and Thurman Drive, and then back onto Dan Allen Drive—and vice versa. Unless prohibited to general traffic, motorists would also be diverted onto Cates Avenue but would have to travel a considerable distance in order to access Hillsborough Street, which would be less optimal.

Sullivan Drive, Varsity Drive, and Thurman Drive are designed similarly to Dan Allen Drive, comprising of two-lane travel lanes and can essentially handle the same carrying capacity as Dan Allen Drive. These streets would be able to accommodate diverted traffic from Dan Allen Drive without resulting in any measurable or significant congestion. Further, motorists may opt to shift their travel routes away from Dan Allen Drive and choose Varsity Drive as their main north-south route of choice. Varsity Drive currently experiences 5,900 vehicles per day, resulting in a maximum utilization of 12% over a 12-hour period and 7% over a 24-hour period. In the unlikely scenario that all existing traffic along Dan Allen Drive (roughly 9,000 vehicles) is diverted onto Varsity Drive, it would increase the maximum utilization to approximately 25% during periods of highest transportation activity on campus. Essentially, Varsity Drive would be able to handle this influx of vehicular demand without resulting in significant traffic congestion.

**Recommendations:**

- Modify “Road Closed Ahead M-F 9am – 5pm” to “Road Closed Ahead for All Traffic. Buses and Emergency Vehicles Only”
- Relocate “Road Closed” signage further south along Dan Allen Drive to give motorists advanced notice
- Maintain Wolfline Bus Transit along Dan Allen Drive at all times
- Potential for Traffic Signalize installation at Dan Allen Drive at Sullivan Drive to manage vehicular traffic controls and avoid spillback onto Western Boulevard
- Consider additional closure to general traffic south of Cates Avenue to complement potential for transit-pedestrian mall concept along Cates Avenue and keep general traffic further south

<sup>2</sup> Daily vehicle traffic counts were collected April 19 – 21, 2022.

**Benefits:**

- Supports a “car free” zone for pedestrians, bicyclists, other personal mobility devices, and transit passengers
- Opportunity for transit/mobility hub while support a transit-pedestrian mall feature to this part of Main Campus
- Supports opportunity to expand and enhance existing transit, biking, and pedestrian facilities
- Concentrates vehicular traffic away from major transit and pedestrian routes on Main Campus
- Maintain vehicular access to existing and future buildings along west side of Dan Allen Drive

**CATES WEST PARKING DEMAND**

One of the PMP recommendations includes reactivating Cates West to be a ‘Campus Living Room’, with a new dining/student service building and renovation to the Witherspoon building. This renovation could increase the volume and frequency of students and staff accessing Cates West on a regular basis, and potentially increasing its parking demand. A centralized parking facility adjacent to Cates West could also absorb a portion of displaced parkers from several roadways that are replacing on-street parking for bike/ped or transit, including Lampe, Morrill, and Cates among others.

**Recommendations:**

- Complete in-depth parking study of existing and future parking demand in the area to accurately determine the parking supply need
- Consider constructing surface lot west of Sullivan/Lee Residence Hall, if supply need is identified
- Install clear, consistent, and visually appealing signage to direct incoming drivers to this facility
- If parking facility is constructed, allow both commuter and student permittees to access; and oversell until an 85% utilization rate is consistently recorded
- Encourage facility to connect with bike parking and micromobility to encourage a park-once experience for drivers

**Benefits:**

- Supports campus goals of creating a more walkable and bikeable core campus
- Creates a safer campus environment
- Discourages re-parking on campus

**MORRILL DRIVE PARKING REMOVAL**

Morrill Drive currently has approximately 65 spaces between Western Boulevard and Cates Avenue. With the exception of 35 perpendicular spaces adjacent to the Dail Softball Stadium, parking along Morrill Drive is parallel. Each of the spaces along this corridor are dedicated to Commuter (C) parking and designated for long-term employee parking. These spaces are in close proximity to several key destinations on campus, including Talley Student Union and several sporting facilities. And while it is convenient for those who park there, dedicating these spaces as parking prevents this roadway space being used for other modes, such as bikes or transit, which can be used by all campus community members. Furthermore, the availability of parking along these key roadways increases the number of employees who park and re-park when traveling to and from campuses, as opposed to taking the bus or using an alternative mode. However, when bus and active transportation infrastructure is reliable, abundant, comfortable, and convenient, it encourages the use of these modes.

As of the 2021-2022 academic year, the parking demand along Morrill Drive recorded a utilization rate of 5% or three spaces in use when most full. Based on parking utilization data from the same period, the Coliseum Deck, North Hall Lot, and Ferndell Lot recorded having collectively approximately available 600 spaces, which could easily accommodate the displaced parkers along Morrill Drive. Given the low occupancy of these spaces and high need of roadways space for transit, bike, and pedestrian users, dedicating this critical space to individual parking is misaligned with the master plan goals and should accordingly be reconsidered.

**Recommendations:**

- Eliminate parking along Morrill Drive to create more space for transit, active transportation, and pedestrians

- Encourage existing Morrill Drive permit users to relocate to the Coliseum Deck, North Hall Lot, or Ferndale Lot
- Provide employees with free or reduced transit fare and bike incentives to encourage the use of other modes to/from work and when traveling between NC State campuses
- Ensure dedicated, continuous pedestrian experience at intersection of Morrill Drive and Cates Avenue and Western Boulevard

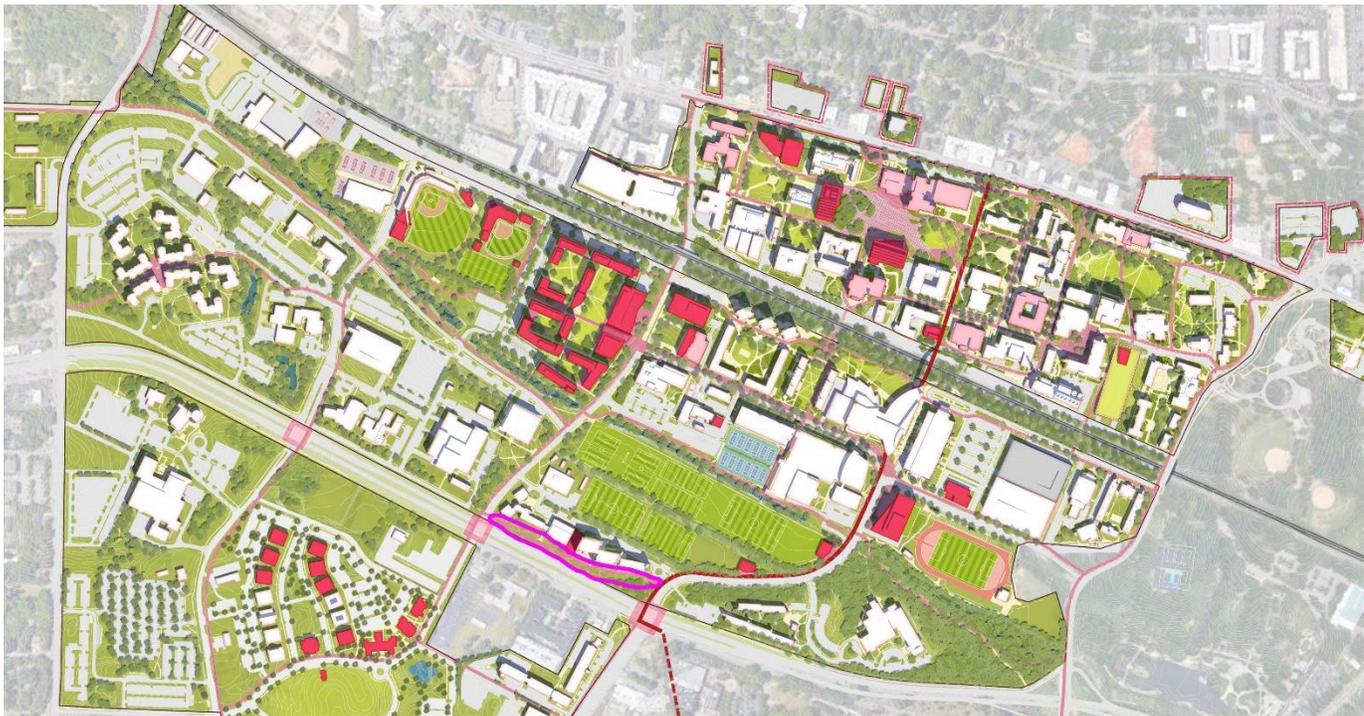
**Benefits:**

- Supports campus goals of prioritizing a more walkable and bikeable core campus
- Creates a safer campus environment
- Discourages re-parking on campus
- Reduces vehicle emissions on campus

**FAUCETTE DRIVE REMOVAL: MORRILL DRIVE TO VARSITY DRIVE**

Faucette Drive between Morrill Drive and Dan Allen Drive currently serves as a frontage road with the bulk of the street right-of-way dedicated to travel and intermixed parallel and perpendicular parking, giving little space to pedestrians and no space for to cyclists.

The restriction of Faucette Drive to only emergency vehicles would divert vehicular traffic along Morrill Drive and Dan Allen Drive. This reprioritization of the street opens up several opportunities to advance multimodal investments, including the potential widening of sidewalks, the introduction of dedicated bikeways, running bus transit operations with bus stops adjacent to campus buildings, and maintaining emergency access.



**Recommendations:**

- Remove one-way vehicle orientation
- Create a “woonerf”, shared street design pattern
- Widen sidewalks on the north side of roadway
- Introduce bikeway elements into shared street concept (e.g., signage, pavers, paint, etc.)
- Introduce Wolfline Bus Transit operations and dedicated bus stops along the north side of the street
- Install drop-down gates with sensors to only permit transit and emergency vehicles and further prohibit general traffic

**Benefits:**

- Supports a “car free” area for pedestrians, bicyclists, and other active transportation users
- Opportunity to introduce transit service with “front door” service to campus buildings
- Opportunity to increase the safety, comfort, and overall accessibility to campus buildings by those on foot, bike, and transit
- Shared street concept to activate public/gathering space
- Supports opportunity to expand and enhance existing transit, biking, and pedestrian facilities

**CATES AVENUE + PULLEN ROAD: ROUNDABOUT**

Pullen Road is a popular north-south roadway connection in and around NC State University campus, providing direct access to key east-west streets (e.g., Hillsborough Street, Western Boulevard) and several campus destinations. A roundabout orientation at the intersection of Pullen Road and Cates Avenue would modify the current all-way STOP-controlled intersection into a free-flow orientation for vehicular traffic.

Pullen Road currently experiences some of the highest hourly and daily vehicle traffic in and around campus. Given the current two-lane roadway design, this heavy traffic demand often results in significant congestion near the intersection at Cates Avenue and leads to spillback onto intersecting campus streets as well as major east-west roadways, including Hillsborough Street and Western Boulevard.

Regardless of the existing geometrics and physical constraints, there is a desire to improve multimodal conditions along Pullen Road and its key intersections, particularly at Cates Avenue.

**Recommendations:**

- Complete a detailed traffic simulation analysis of Pullen Road and Cates Avenue to determine potential operational results (upstream and downstream) from an all-way STOP-controlled intersection to a free-flow, three-legged roundabout
- Identify potential right-of-way needs and land acquisitions required to install roundabout
- Determine affects to bus transit operations due to intersection modifications
- Convert Cates Avenue, from Jeter Drive to Pullen Road, from one-way eastbound traffic to two-way, east-westbound traffic to enable westbound turns from north/southbound Pullen Road

**Benefits<sup>3</sup>:**

- Roundabouts often result in fewer crashes, injuries, and fatalities
- Roundabouts generally require motorists to slow down to 15mph or less
- The design of roundabouts tends to be safer to navigate for beginner and elderly drivers
- The free-flow orientation can increase intersection traffic capacity by 30% to 50%, which results in less delay waiting at stops or signals
- Improved traffic flows can reduce pollution from cars idling/waiting at stops or signals, reduce noise and reduce fuel consumption
- Roundabouts offer more landscaping and green infrastructure opportunities, such as landscaped islands, native plants and trees
- Depending on the design, roundabouts can consume less land than traditional intersections as they do not require turning lanes
- Roundabouts can save money on operations and maintenance as there is no cost to traffic signals or related infrastructure and utilities
- Roundabouts can continue to operate during power outage or severe weather conditions; eliminating the need for police to direct traffic
- Roundabouts can act as a marker or signify a designated space or provide character to its surroundings, such as a campus, business, or downtown environment

<sup>3</sup> <https://www.fdot.gov/agencyresources/roundabouts/benefits.shtm>

## #4: CENTENNIAL CAMPUS IMPROVEMENTS

### MOBILITY HUBS

The fundamental principle of mobility hubs is to dedicate space to host a variety of mobility devices and travel information in an accessible, convenient location for as many people as possible. Today, various factors impact the overall design of mobility hubs, including physical requirements, the number of mobility providers, the availability of services/modes, utilities, and infrastructure. Mobility hubs can be instrumental within the larger transportation ecosystem, often being the crux of addressing “first/last-mile” challenges, better connecting people to transit and major destinations, and encouraging sustainable mobility options for short-distance trips (e.g., less than 3 miles) and at a lower user cost.



Mobility Hub example: I-710 North Mobility Hubs Plan in Los Angeles.  
<https://710mobilityhubs.com/>

Centennial Campus offers several opportunities to install, scale, and expand mobility hubs. Given current resources, mobility hubs can consist of e-scooters, bikeshare (dock and dockless pedal and e-bikes), digital wayfinding, real-time Wofline Transit information, and dedicated curbside passenger zones for rideshare services. It is best to place mobility hubs both in areas adjacent to major campus destinations as well as peripheral areas to overcome “first/last-mile” issues.

### Recommendations:

- Place Mobility Hubs located at:
  - Oval Drive (north side of EBII Building on the opposite end of where secured bike parking is located), depending on Innovation District final, approved plans
  - Partners Way (adjacent to Hunt Library)
  - Varsity Drive at Partners Way (east side of intersection)
  - Capability Drive at Cold Creek Place (northeast corner)
  - Main Campus Drive at Research Drive (southeast corner)
  - Initiative Way at West Street (in The Greens at Centennial Campus)
  - Entrepreneur Drive, north of Tower Hall

### Benefits:

- Concentrates sustainable mobility options near campus residences and major destinations
- Creates an opportunity to bring together awareness and “sense of place” for transit, micromobility, bikes, and rideshare
- Provides a cost-effective, clear, reliable, comfortable, and faster travel option between Centennial and Main Campus, and beyond
- Reduces feeling of being disconnected and breaks down barriers to transportation
- Provides “front door” mobility services and options for all campus members; provides a community amenity
- Supports campus sustainability and equitable modes by reducing the need/dependence on using a private car and
- Reduces harmful environmental elements related to air quality, carbon emissions, social exclusion

## #5: WESTERN BOULEVARD INTERSECTION IMPROVEMENTS

The future functionality of Western Boulevard along NC State University boundaries is critical to evolving the overall campus environ. As the campus grows, intersections along Western Boulevard will need to serve more people of all abilities and modes in the safest, most convenient, and reliable way possible. At-grade intersections designed to protect vulnerable roadway users (those not in a vehicle) will foster a safer, connected experience that makes motorists aware that those on foot, bike, scooter, or assisted device (e.g., wheelchair) are a priority to NC State.

As planned Bus Rapid Transit (BRT) is considered along Western Boulevard combined with the evident need to improve crossing conditions between Main and Centennial campuses (and adjacent destinations), it is critical for NC State to coordinate with NCDOT and the City of Raleigh to identify mutual benefits for the future of Western Boulevard. Furthermore, the costs associated with at-grade intersection improvements would yield greater benefits to vulnerable roadway users and improve current traffic safety concerns—all of which can be done in a timely manner and in alignment with other planned projects, such as BRT.

### Recommendations:

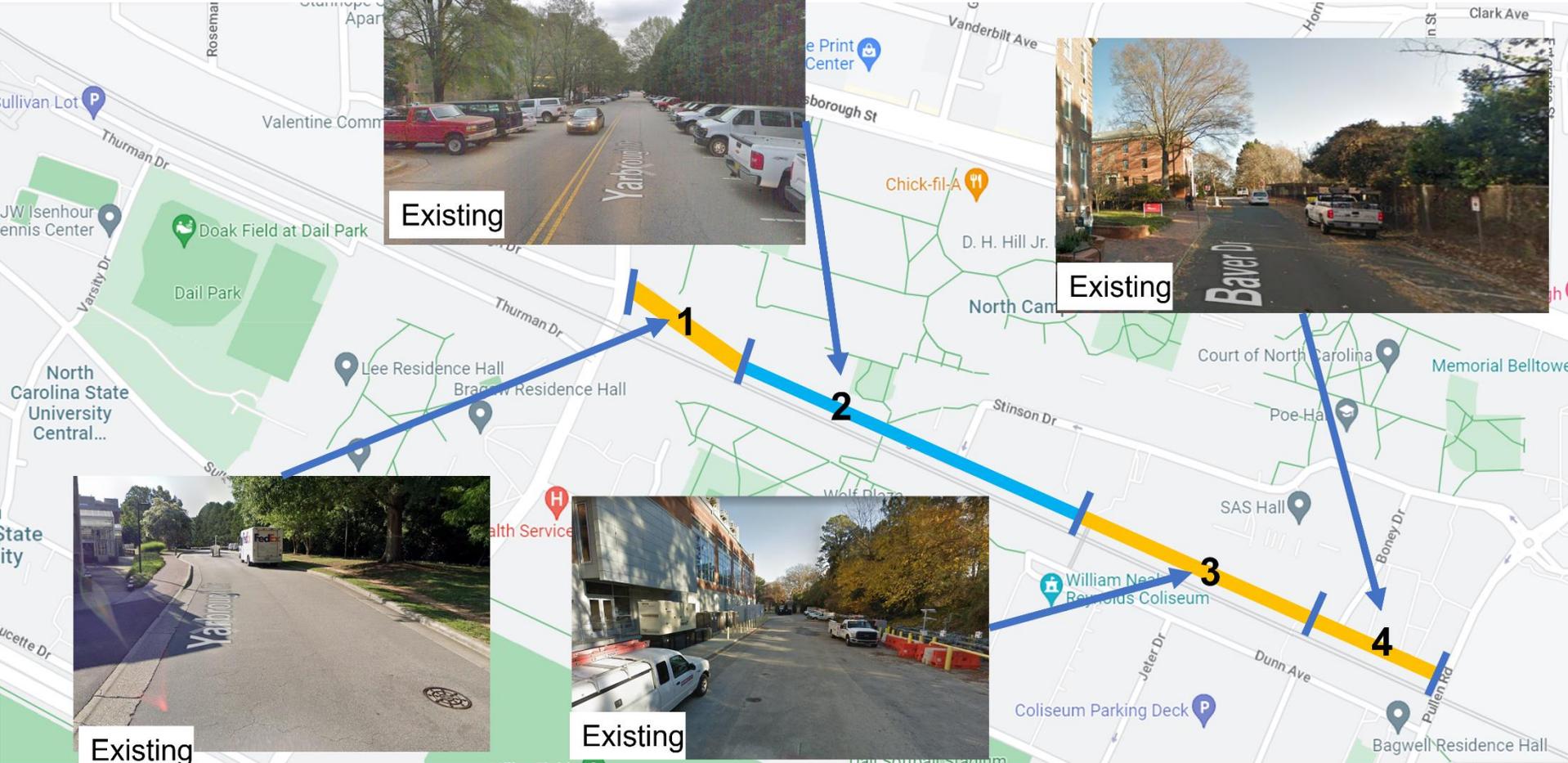
- Modify all at-grade intersections along Western Boulevard, between Gorman Street and Pullen Road, to “protected” intersections with improved safety measures that prioritize vulnerable roadway users.
- Design shorter crossing distances when crossing Western Boulevard for non-auto users through bump-outs and other safety enhancements.
  - Tools to achieve the above recommendations include traffic calming devices, pedestrian and bicycle crossing markings, curb extensions, advanced pedestrian signal priority, pedestrian actuated signals, hardened centerlines, rubber median bumps, dedicated/widened pedestrian pathways and bikeways, signage, and speeding cameras to provide safer, connected facilities for non-auto users while also notify motorist to slow down, stop or yield, and be aware of heightened crossing activity

### Benefits:

- Supports established goals and policies by NC State, City of Raleigh, and NCDOT
- Supports future Transit Oriented Development (TOD) opportunities
- Supports future, planned BRT operations
- At-grade treatments provide greater protection, maintained crossing time, and heightened awareness to motorists, while also supporting long-term projects (BRT and TOD) and support NC State and citywide policies related to transportation safety
- Create opportunity to support “sense of place” and placemaking measures that give roadway users awareness they have entered NC State’s campus.
- Capital and operating costs are significantly less than constructing, operating, and maintaining major infrastructure improvements, such as over/underpasses

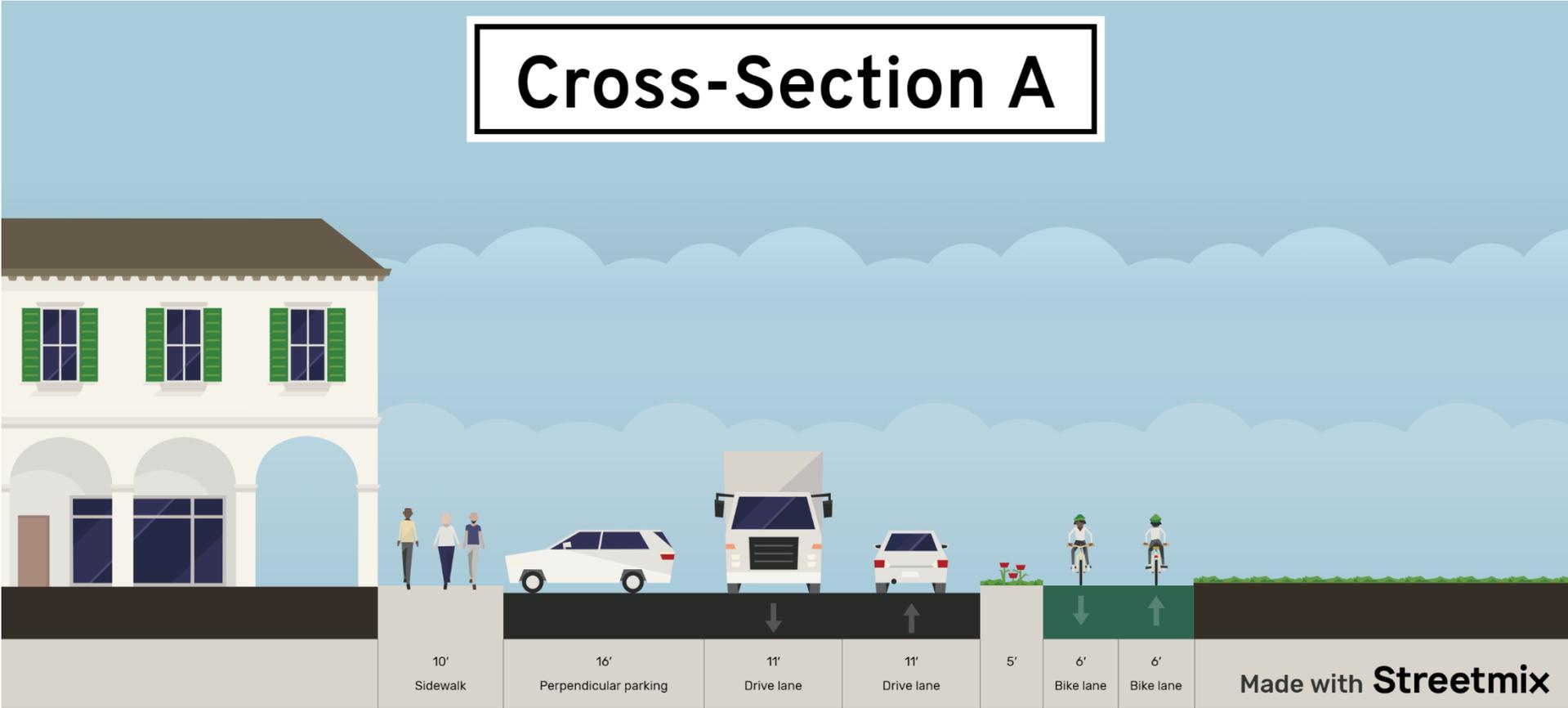
## **Appendix A: Yarbrough Redesign Recommendations**

# Yarbrough Cross Section Map



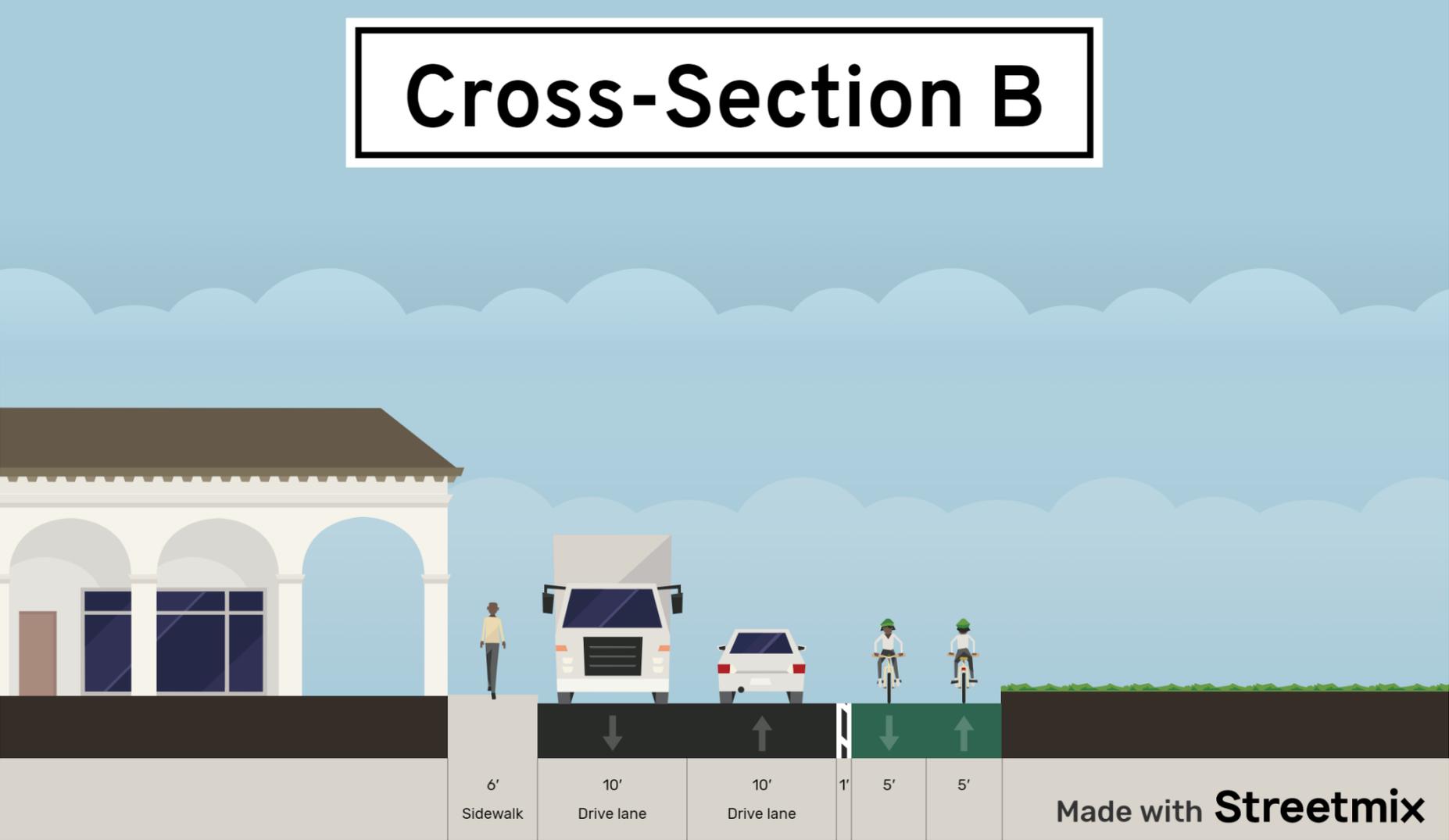
# Yarbrough Cross Section A

## Cross-Section A



Expand sidewalk on north side, maintain row of perpendicular parking closest to building, and place sidewalk-grade cycle track on south side. Design does not require any roadway widening.

# Yarbrough Cross Section B



- Remove parking and place sidewalk-mounted two-way cycle track on south side.
- May require slight roadway widening into grass areas in some segments.

# Yarbrough: New Tunnel Entrance Concept



Design concept plan view



Example: Lake Shore Drive (Chicago)

- Alignment of pedestrian tunnel stairs can be rotated to get people further down in less space, allowing people on foot to get under the new Yarbrough Drive (i.e., vehicles moving above)