FEASIBILTY REPORT

Campus Bikeways Project

University of Maryland Bike Lanes, Paths, and Trails Network & Safety Enhancements Concept Designs

UNIVERSITY OF MARYLAND 18 56

April 2024

PREPARED BY

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1. Introduction

Over the past two decades, The University of Maryland at College Park (UMD) has grown both its building footprint and student population, with most of this residential and academic building construction occurring on existing on-campus and off-campus surface parking lots. This substantial reduction in parking spaces has been the primary driver for a reduction in vehicle trips through campus. Simultaneously, new residential construction for students, both on campus and just off-campus, have also substantially reduced the *need* for commuting vehicle trips. These trips are more likely to made by walking, biking, or other micromobility devices, such as personal and shared scooters. Both of these factors have created a surge in demand short "last-mile" walking, biking, skateboarding, and scootering trips. This demand will only increase with additional pending off-campus housing along the Baltimore Ave corridor, as well as the completion of the Purple Line and its accompanying side path that runs east-west through the entire campus.

Current on-campus cyclists and micromobility users are competing with larger, and heavier vehicles for limited roadway space. While the Purple Line east-west side path will alleviate some of this roadway demand, there are limited north south connections for bike lanes, and separated trails – and no direct link between this side path and Paint Branch trail, which runs north-south and serves many students that live along the Baltimore Ave corridor. A more integrated network of on-campus trails and dedicated bike infrastructure will leverage the future Purple Line transit stops and campus-wide trails, while also avoiding the need for cyclists and scooter rides to share roadways with vehicles or narrow sidewalks with walkers. Such a network would also integrate the existing and planned trail networks on campus and branch them off to primary generators like north campus residential halls or academic building clusters. Accordingly, the goal of this study is to define and develop new on-campus infrastructure to reduce intermodal conflict while enhancing multimodal connectivity.

To initiate these goals, the UMD Department of Transportation Services (DOTS) applied for and received a *Kim Lamphier Bikeways Grant* from the State to expand its multimodal network for bikes, walkers, and scooters into a larger grid of shared-use path and bike lane facilities, similar to the existing street grid. Specifically, UMD is utilizing the grant to conduct a feasibility study and develop 30% design plans for preferred options for new trails/lanes for four segments to increase the on-campus multimodal transportation grid. As shown in Figure 1, the four segments under review are:

- **Segment #1:** Mowatt Lane between Presidential Drive (future extended Campus Drive) and Knox Road, and north to Fieldhouse Drive
    - *During the Study, this segment was extended north along Alumni Drive, terminating just south of Denton Quad , at the roundabout in front of Byrd Stadium*
- **Segment #2**: Paint Branch Drive / Regents Drive north/south corridor from MD 193 (University Blvd) to Campus Drive
- **Segment #3:** Regents Drive from the intersection of College Ave/Baltimore Ave to Campus Drive
- **Segment #4:** Additional east-west connections from the Paint Branch Trail *spine* to the Paint Branch Drive corridor in the campus's Engineering Quadrant.

Taken together, these four segments greatly extend the reach of the existing and proposed trail network throughout campus, as shown below in **Figure 1**.

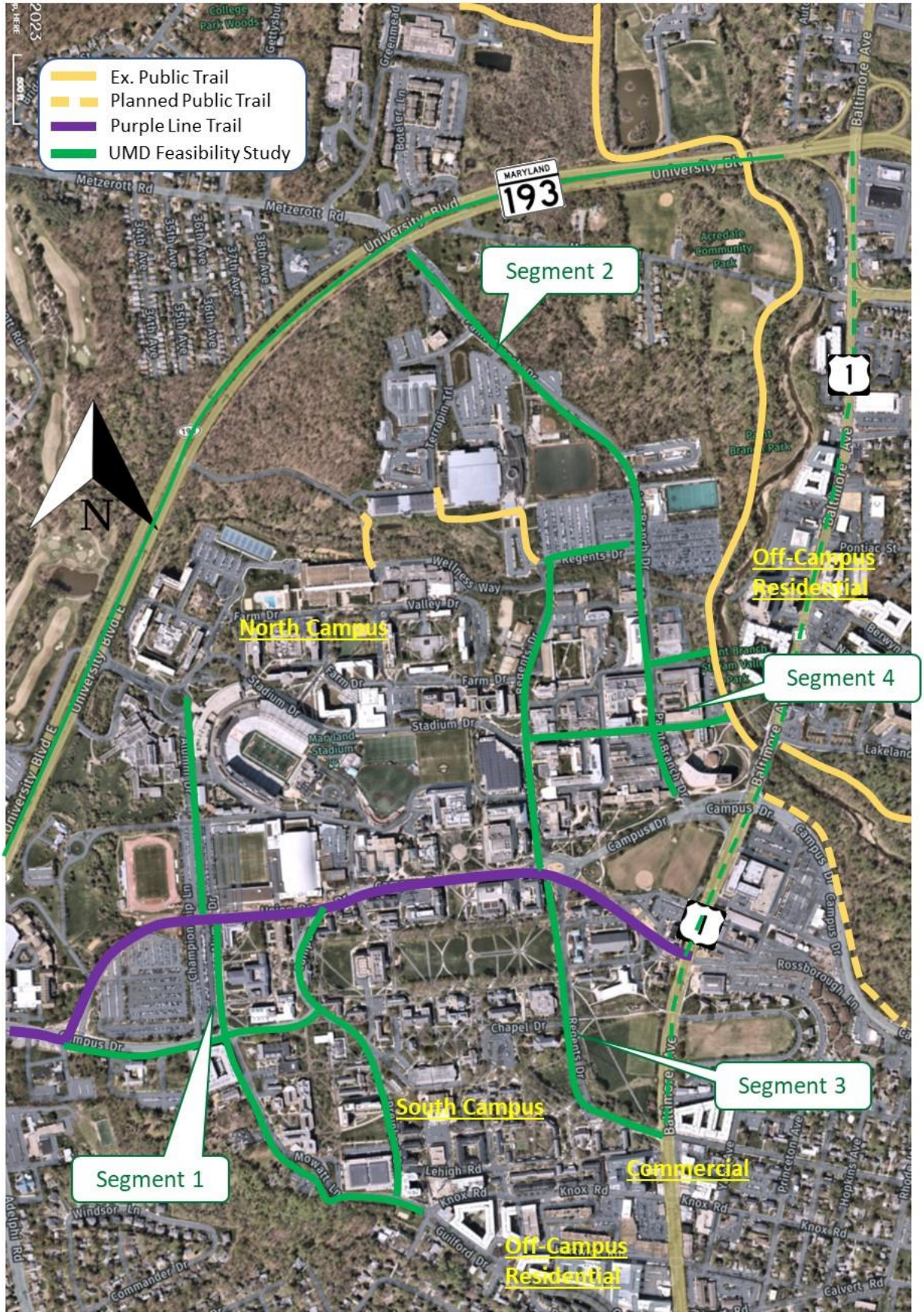


FIGURE 1: EXISTING AND PROPOSED BIKE FACILITY NETWORK

2. Study Methodology and Design Guidance

Conducting the feasibility study begins with an assessment of expected near-term future conditions as they relate to transportation infrastructure, specifically related to trails, side paths and bike lanes in and around the UMD campus. Figure 2 shows the feasibility study's general methodology, and this report represents the beginning of the final steps – the selected concepts that will be proceed into the 30% design stage.

FIGURE 2: STUDY METHODOLOGY

For this study, the year 2026 serves as an anchor for all baseline conditions since this is the timeframe that the Campus's largest construction project – the Purple Line light rail and side trial – is expected to be completed. Year 2026 base conditions were developed initially from existing CAD design files for the campus. These CAD files were then modified to highlight all existing transportation infrastructure across all modes. Then, recent construction projects and pending construction projects were added to the base mapping to have a full understanding of what the Campus will look like in 2026. Some of these changes – under construction currently – will result in new trails, new intersection alignments, new traffic control devices, fewer pedestrian crossings and fewer parking lot driveways. In total these changes provide the base line conditions to which we can apply and test multiple new conceptual design for increasing the multimodal infrastructure grid.

A. Design Principles and Guidance

Based on discussions with UMD Department of Transportation Services (DOTS) staff, as well as staff from Facilities Management and the Planning departments, several design principles were established that would carry over from the conceptual ideas stage through to preferred options for each of the four segments identified. These principles and guidance included:

- Designing to promote safety of multimodal users.
- Designing to reduce conflict points between walkers, multimodal users, and drivers.
- Separating walkers, multimodal users, and drivers where the density of one, or all modes, is high (e.g., in the campus core and around academic building clusters and residence hall quads.
    - Where student activity is less concentrated (e.g., near the campus perimeter), a shared walking/micromobility is sufficient – given ample width, as shown in Figure 3.
- Recommended off-road shared-use facility width is 14 feet.
- Where separate parallel facilities are proposed, place dedicated cycling infrastructure in between walkers and drivers to keep slowest speeds away from fastest speeds.
    - Examples of various dedicated cycling infrastructure are shown in Figure 4.
- At uncontrolled junctions, prioritize walkers over micromobility users over vehicles.
- Design to minimize modal crossing at junctions/intersections.
- Minimize vehicle turning conflicts where feasible.
- Provide direct and efficient micromobility routes.
- Design network segments for ease of use and continuity throughout the campus setting.
- Apply International Best Practices in designs.

FIGURE 3: SHARED-USE PATH, NORTH OF TECHNOLOGY DRIVE

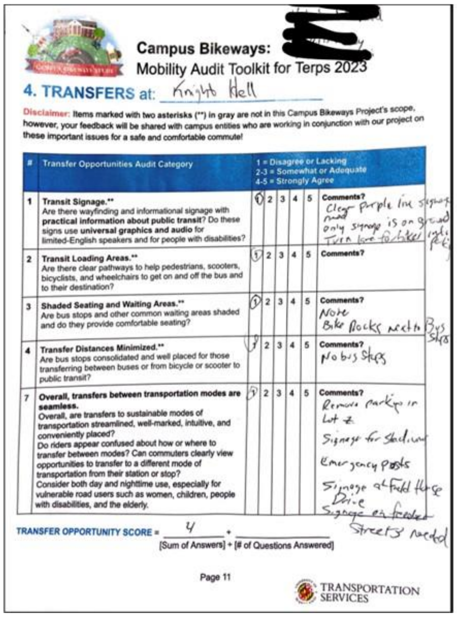
FIGURE 4: VARIOUS ON-ROAD CYCLETRACK VERTICAL PROTECTION ELEMENTS

B. Data gathered

The feasibility study began with an extensive

- Micromobility Report & Heatmap (https://public.ridereport.com/).
- *Numina*™ in-house multimodal sensor data.
- 2018 traffic counts and 2023 multimodal traffic estimations.
- New 2023 multimodal traffic counts at select locations.

  - Traffic Count data included in Appendix, with count summaries.
- Purple Line Construction drawings.
- Campus CAD drawings.
- Site visits and Field measurements.
- Site plans and construction drawings for academic, recreational, and residential building recently constructed or currently in construction.
- Campus Facilities Plan (latest update).
- UMD DOTS Mobility Audits - Bike/Walk Site Visit and Community Survey.
  - Appendix C contains the Mobility Audit Summary Chart



Campus Bikeways: [redacted]
Mobility Audit Toolkit for Terps 2023

4. TRANSFERS at: Knight Hall

Disclaimer: Items marked with two asterisks (**) in gray are not in this Campus Bikeways Project's scope, however, your feedback will be shared with campus entities who are working in conjunction with our project on these important issues for a safe and comfortable commute!

#	Transfer Opportunities Audit Category	1 = Disagree or Lacking 2-3 = Somewhat or Adequate 4-5 = Strongly Agree					
1	**Transit Signage.**** Are there wayfinding and informational signage with **practical information about public transit**? Do these signs use **universal graphics and audio** for limited-English speakers and for people with disabilities?	1	2	3	4	5	Comments?
2	**Transit Loading Areas.**** Are there clear pathways to help pedestrians, scooters, bicyclists, and wheelchairs to get on and off the bus and to their destination?	1	2	3	4	5	Comments?
3	**Shaded Seating and Waiting Areas.**** Are bus stops and other common waiting areas shaded and do they provide comfortable seating?	1	2	3	4	5	Comments? None
4	**Transfer Distances Minimized.**** Are bus stops consolidated and well placed for those transferring between buses or from bicycle or scooter to public transit?	1	2	3	4	5	Comments? No bus stops
7	**Overall, transfers between transportation modes are seamless.** Overall, are transfers to sustainable modes of transportation streamlined, well-marked, intuitive, and conveniently placed? Do riders appear confused about how or where to transfer between modes? Can commuters clearly view opportunities to transfer to a different mode of transportation from their station or stop? Consider both day and nighttime use, especially for vulnerable road users such as women, children, people with disabilities, and the elderly.	1	2	3	4	5	Comments? Emergency Posts

TRANSFER OPPORTUNITY SCORE = 4 ÷ ____
[Sum of Answers] ÷ [# of Questions Answered]

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TRANSPORTATION SERVICES

FIGURE 5: MOBILITY AUDIT TOOLKIT AND FIELD VISIT

<u>Appendix A contain full conceptual drawings of each of the proposals discussed herein – that will be advance into the 30% design stage</u>.

3. Segment 1: West Side of Campus

Segment 1, identified by UMD in its grant application, consisted of a north-south connection from Fieldhouse Drive, through lot 1 / lot Z, south to the intersection Mowatt/Knox Rd, just east of Preinkert Drive, as shown in the yellow lines on Figure 6. Note that during this study, Segment 1 was extended northward beyond Fieldhouse Drive to the area near the entrance to Byrd Stadium. Segment 1 also included tying into the West Campus Purple Line station, along Campus Drive, to Mowatt Circle. While Preinkert Lane was not identified specifically as a location/corridor for future bike facilities, future traffic conditions along it are expected to be minimal, such that it could be a location for on-road bike facilities, providing a direct connection between the new South Campus residences and the Student Union area. Accordingly, it was evaluated for one-way conversion, with the remaining travel lane being reconfigured for a two-way on-road cycletrack.

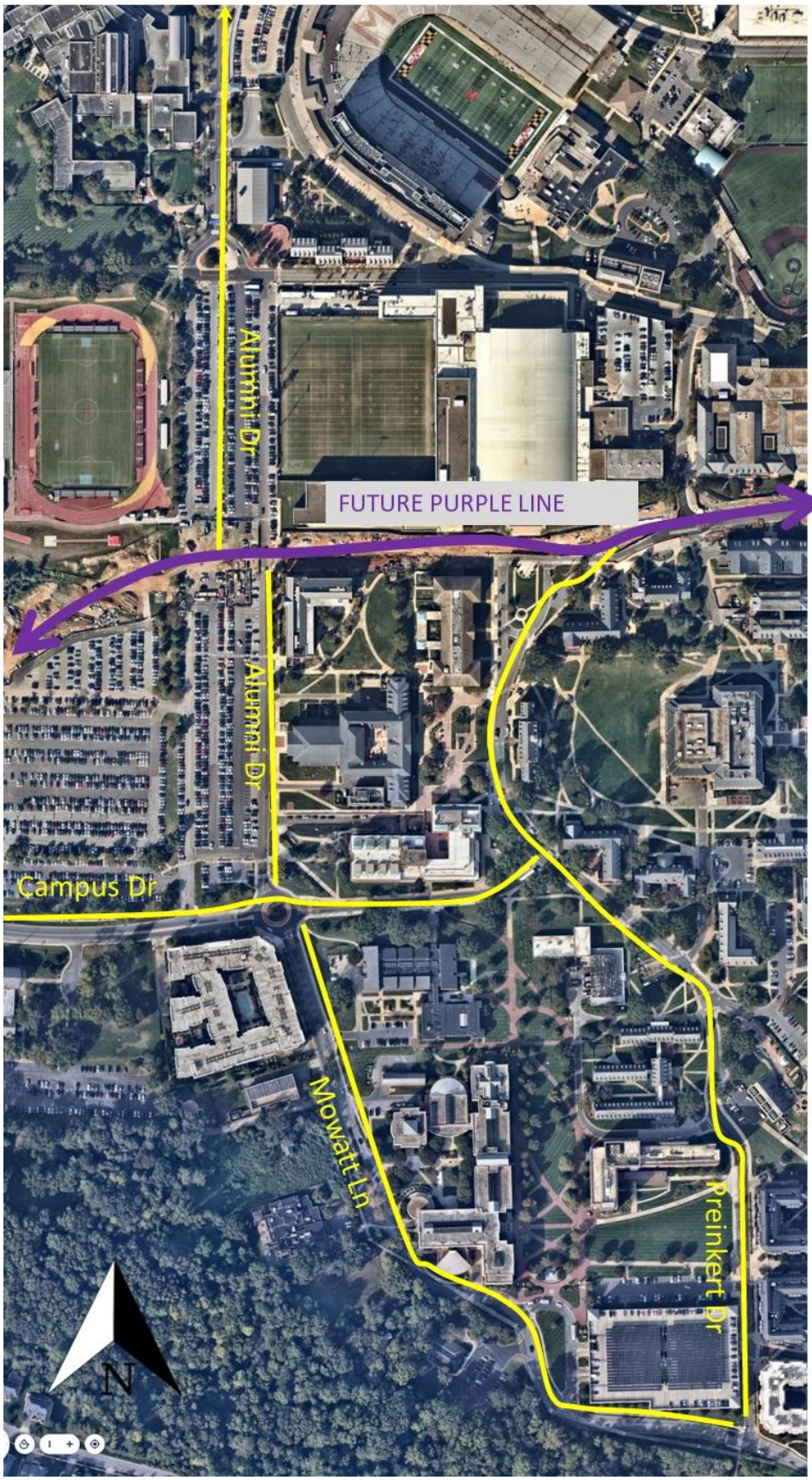

FIGURE 6: SEGMENT 1 LOCATIONS

A. Segment 1 through Lot 1 / Z Design, North of Campus Drive

An evaluation of the proposed parking lot layouts for Lot 1 / Z, due to the Purple Line Construction reveal several constraints to developing a new contiguous path or trail from Fieldhouse Drive to Mowatt Circle. As shown in Figure 6, there are four (4) drive aisles through the Lots 1 / Z, both north and south of the proposed Purple Line alignment. Each of these drive aisles exits onto Campus Drive. However, once the Purple Line is constructed, all but one of the drive aisles will be blocked off, and a signal will be provided at Alumni Drive, as shown in Figure 7.

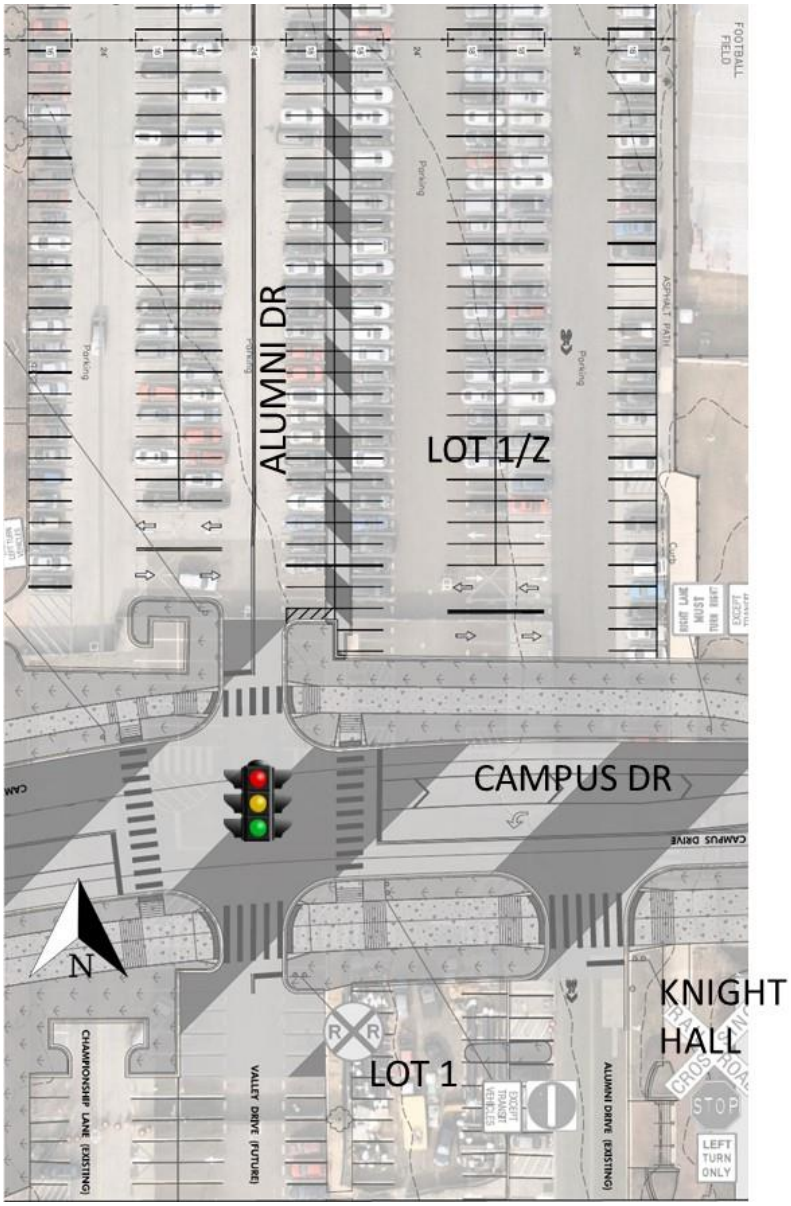

FIGURE 7: FUTURE INTERSECTION OF CAMPUS DRIVE AT ALUMNI DRIVE

Additionally, only this intersection will provide a marked crossing for walkers/cyclists to cross Campus Drive. An additional crosswalk to cross Campus Drive, aligned with Knight Hall and the Football practice fields, cannot be installed, as this crosswalk would be blocked by a westbound Purple Line train waiting at the traffic signal. These factors led to a proposed new trail alignment, north of Campus Drive that was parallel and adjacent to Alumni Drive. However, current plans for the Cole Fieldhouse expansion show two preliminary issues with installing a trail on Alumni Drive:

1) Alumni Drive would see an increase in vehicle traffic (since none of the other drive aisles go through to Campus Drive) and in order to maintain a similar number of parking spaces, the head-in perpendicular spaces would be a substandard length of 16' deep[1] (as shown in Figure 8). This would result in vehicles that will encroach into a more heavily-traveled Alumni Drive. Furthermore, current plans show the removal of the sidewalk inside of Lot 1/ Z in order to maintain perpendicular spaces, east of Alumni Drive.
2) Alumni Drive at Fieldhouse Drive has no receiving sidewalk, trails, or bike lanes, based on current design plans. As shown in Figure 9, the existing modified traffic will be replaced with a standard 4-legged intersection with a channelized westbound right turn, no sidewalks, and stormwater management facilities on the northwest and northeast quadrants.

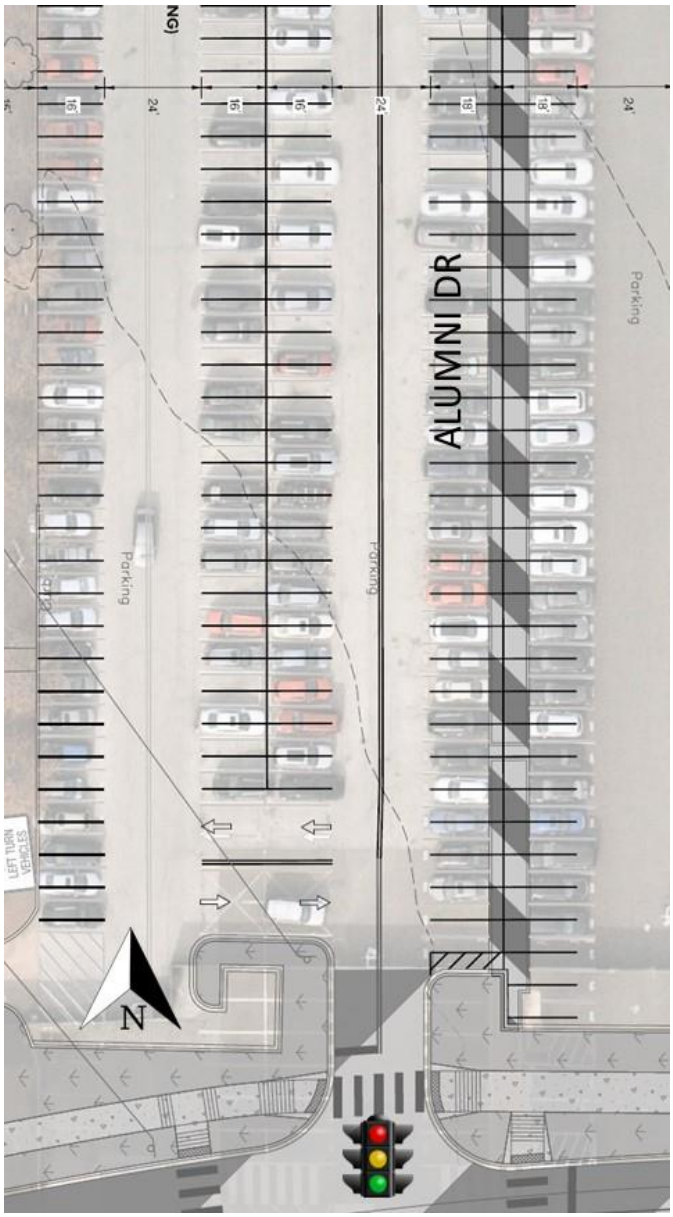

FIGURE 8: ALUMNI DRIVE, NORTH OF CAMPUS DRIVE

[1] Standard guidelines for stall depth for a perpendicular parking spot is 18 feet.

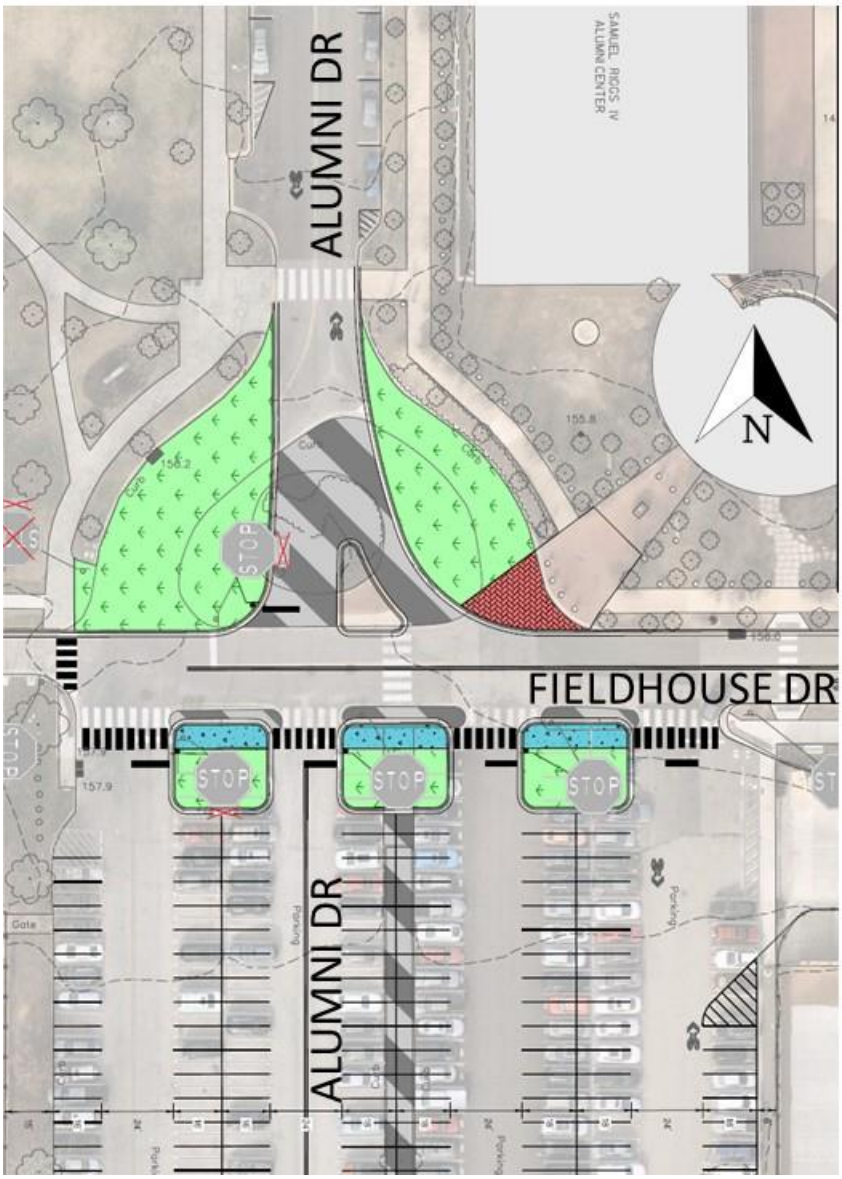

FIGURE 9: EXISTING PLANS FOR THE INTERSECTION OF ALUMNI DR AT FIELDHOUSE DR

In summary, the only connection between Fieldhouse Drive and Campus Drive through Lot 1 / Z would be via Alumni Drive, which will see increased vehicle traffic, have parked vehicles encroaching into the roadway and have connecting facilities for multimodal users on the north end of the lots. In order to provide biking (and walking) facilities between Campus Drive and Fieldhouse Drive, it was determined that parking spaces would have to repurposed. Additionally, the intersection of Fieldhouse Drive at Alumni Drive would have to be modified to connect these facilities northward beyond Fieldhouse Drive (while still maintaining the MDE-approved stormwater management facilities, needed for the Cole Fieldhouse expansion project).

Campus Planning and DOTS staff evaluated several iterations for Lot 1 / Z, north of Campus Drive, that would provide for walking and biking facilities, minimize parking spaces loss, yet still maintaining user safety and making efficient use of the repurposed parking spaces. Additionally, south of Campus Drive the biking walking destinations such as Knight Hall or Tawes are all along eastern edge of Lot 1, resulting in a need

to transition from the signalized intersection in the middle of Lot 1 to the eastern edge of Lot 1, as students travel from north to south. Based on these needs, Figure 10 shows the preferred walk/biking alignment through Lot 1 / Z, north of Campus Drive to and through Fieldhouse Drive, while Figure 11 shows a closer plan view of Lot 1 /Z north of Campus Drive and the corresponding proposed cross-section view.

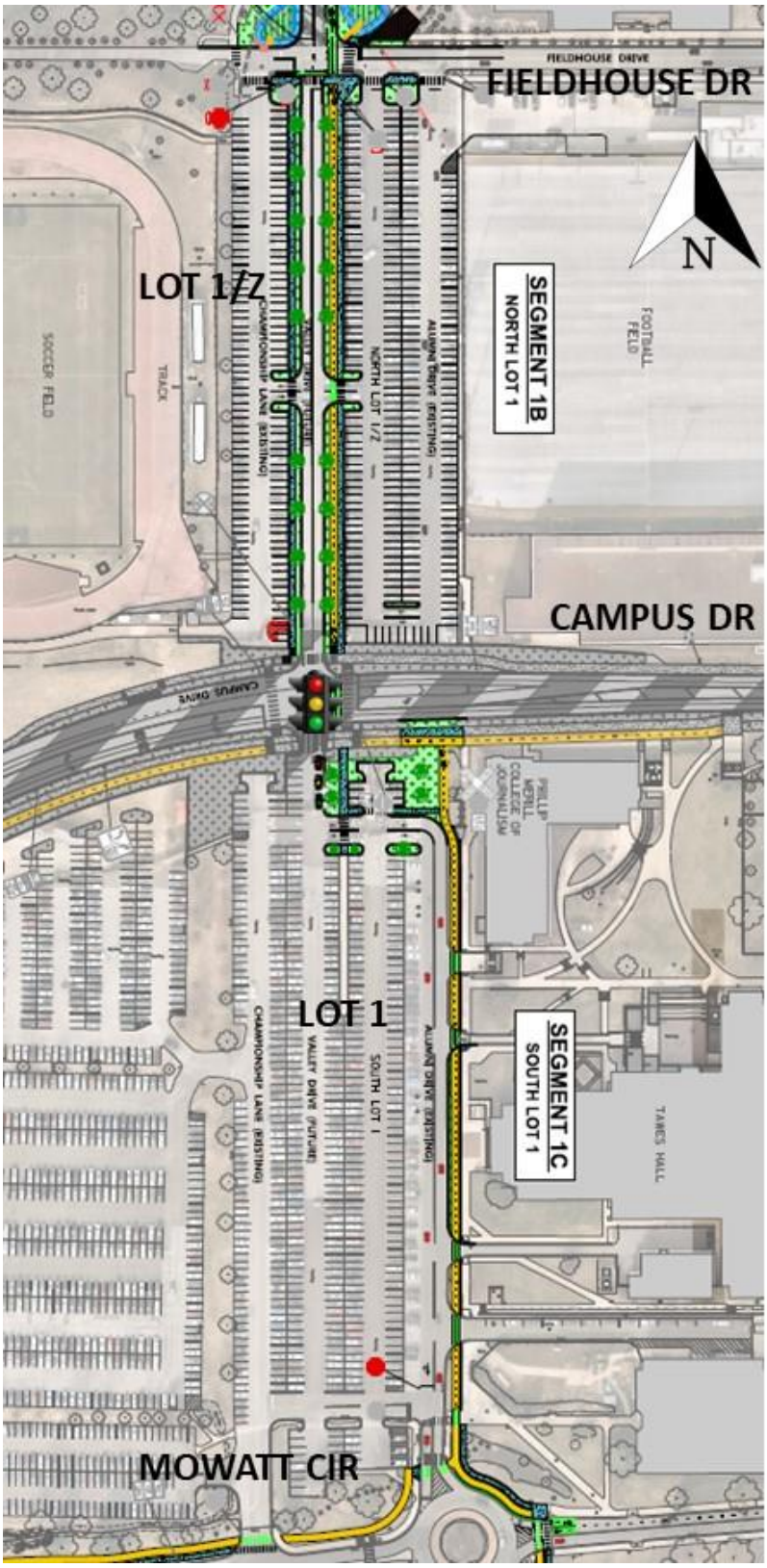

FIGURE 10: PROPOSED ALUMNI DR RECONFIGURATION THROUGH LOT 1 / Z

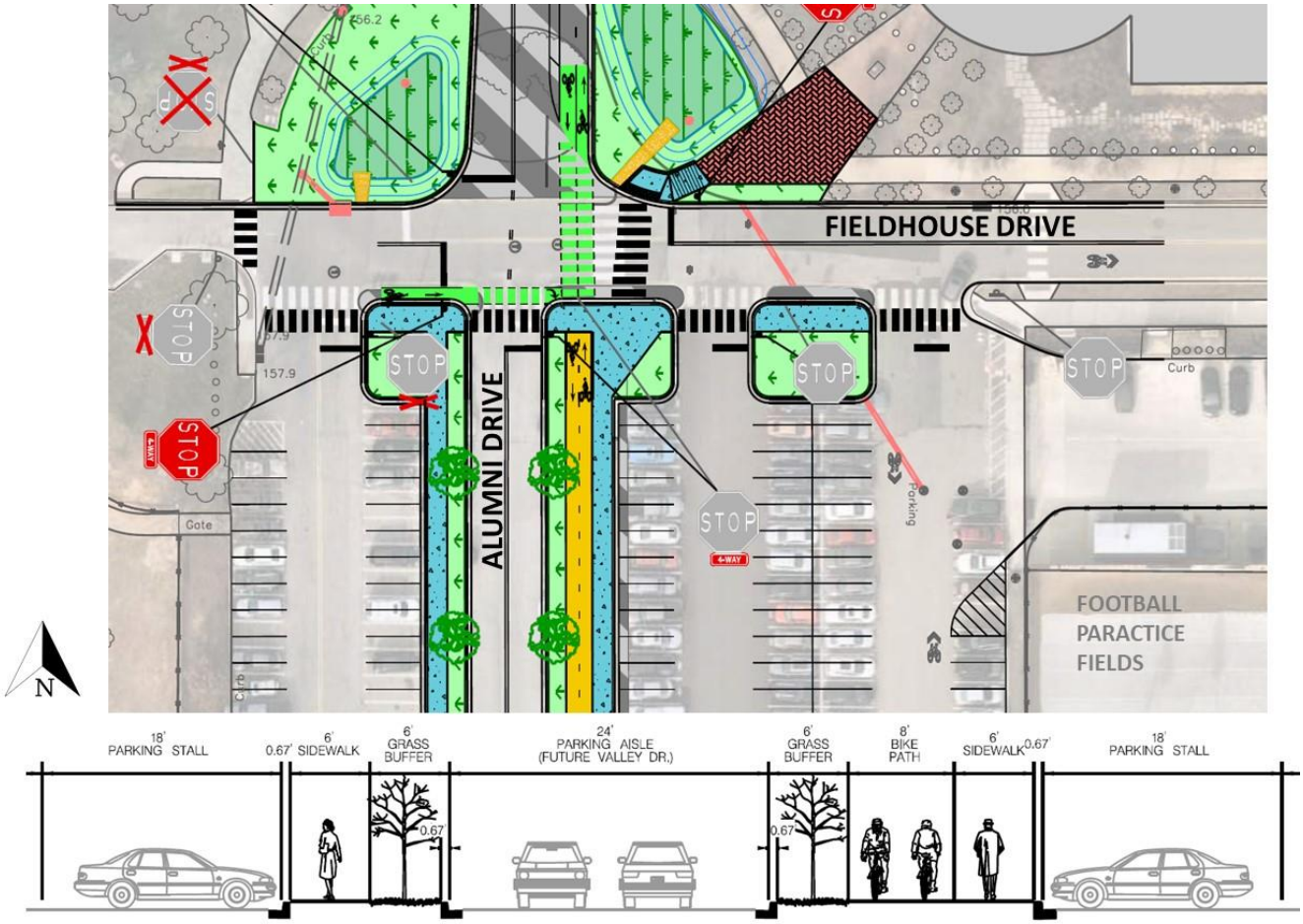

FIGURE 11: PROPOSED PLAN VIEW AND CROSS-SECTION VIEW OF ALUMNI DRIVE THROUGH LOT 1/Z, NORTH OF CAMPUS DRIVE

As shown in Figure 10 and Figure 11, all drive aisles remain, however the head-in parking along the Alumni Drive is replaced with a tree-lined boulevard with 6-foot wide sidewalk on *both* sides and a dedicated 8-foot wide 2-way biking/scooter facility. This configuration allows for on-campus students to have separated facilities for getting to and from class, while also allowing drivers to park and walk through Lot 1/Z – all in a shaded route, buffered from vehicle traffic. The dedicated biking/scooter lanes transition to the existing shared laned north of Fieldhouse Drive. Of note, the intersection of Alumni Drive at Fieldhouse is proposed to be reconfigured to:

1) retain the existing approved stormwater management practices and design;
2) remove the proposed channelization island;
3) better align walking facilities north and south of Fieldhouse Drive; and
4) shrink the size of the intersection to reduce pedestrian and biking/scooter crossing time inside the intersection.
    a. The intersection still retains the size needed for buses and delivery trucks to access the football practice fields and Stamp Student Union delivery bays.

Also, this option still retains ~400 parking spaces in Lot 1 /Z.

Finally, the project team evaluated different parking lot options (e.g. diagonal parking spaces; one-way drive aisles; etc.) to determine if more parking stalls could be retained, even at the expense of trees or vegetated

buffers; however, there was no configuration that provided more parking spaces than the option shown in Figure 10 and Figure 11, while still retaining sidewalk and bike/scooter facilities.

B. Segment 1 through Lot 1 / Z Design, South of Campus Drive

Unlike the north side of Lot 1, south of Campus Drive has academic building frontage (Knight Hall, Tawes, etc.) which represents a natural destination for students on bike or scooter. Accordingly, the preferred location for north-south bike lanes is not through the center of the parking lot, but rather on the eastern perimeter, abutting the existing sidewalk. Therefore, continuing bike infrastructure south along the academic building cluster toward Mowatt Lane is preferrable.

Currently, Alumni Drive in front of Knight Hall and Tawes is a two-lane road that terminates at Campus Drive; however, once the Purple Line is completed, there will be limited ability or need to travel in the northbound direction – as shown in Figure 12.

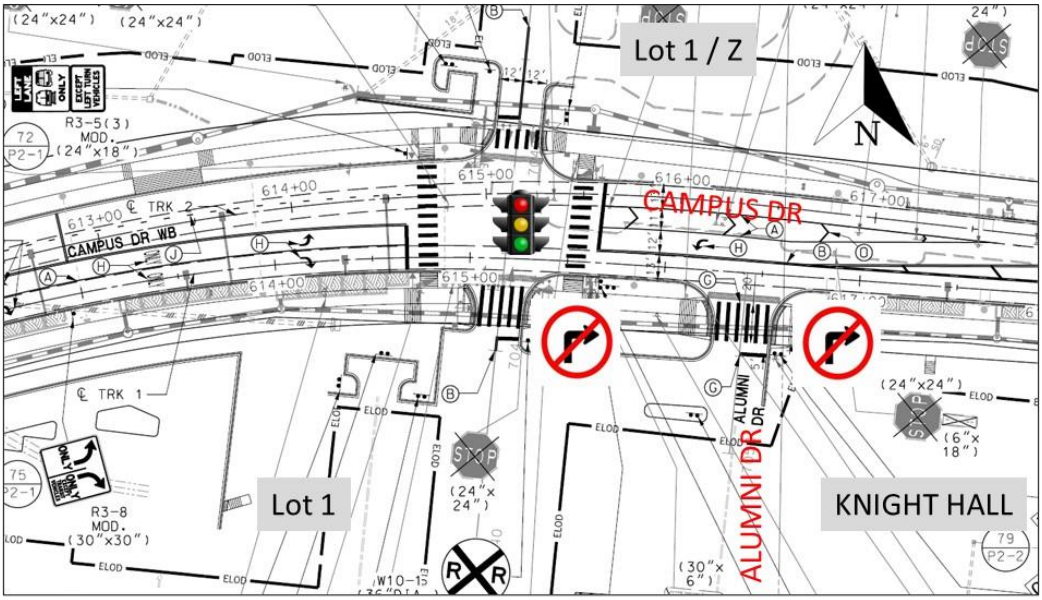

FIGURE 12: FUTURE CAMPUS DR INTERSECTION AT LOT 1/Z

As can be seen in Figure 12, no northbound right turns will be allowed heading east towards the Campus core and northbound left turns will be much more difficult than today, given the adjacent traffic signal and the need to cross two lanes of westbound Campus Drive. Accordingly, the proposed transition of biking facilities through Campus Drive includes closing off northbound Alumni Drive adjacent to the School of Journalism, as shown in Figure 13.

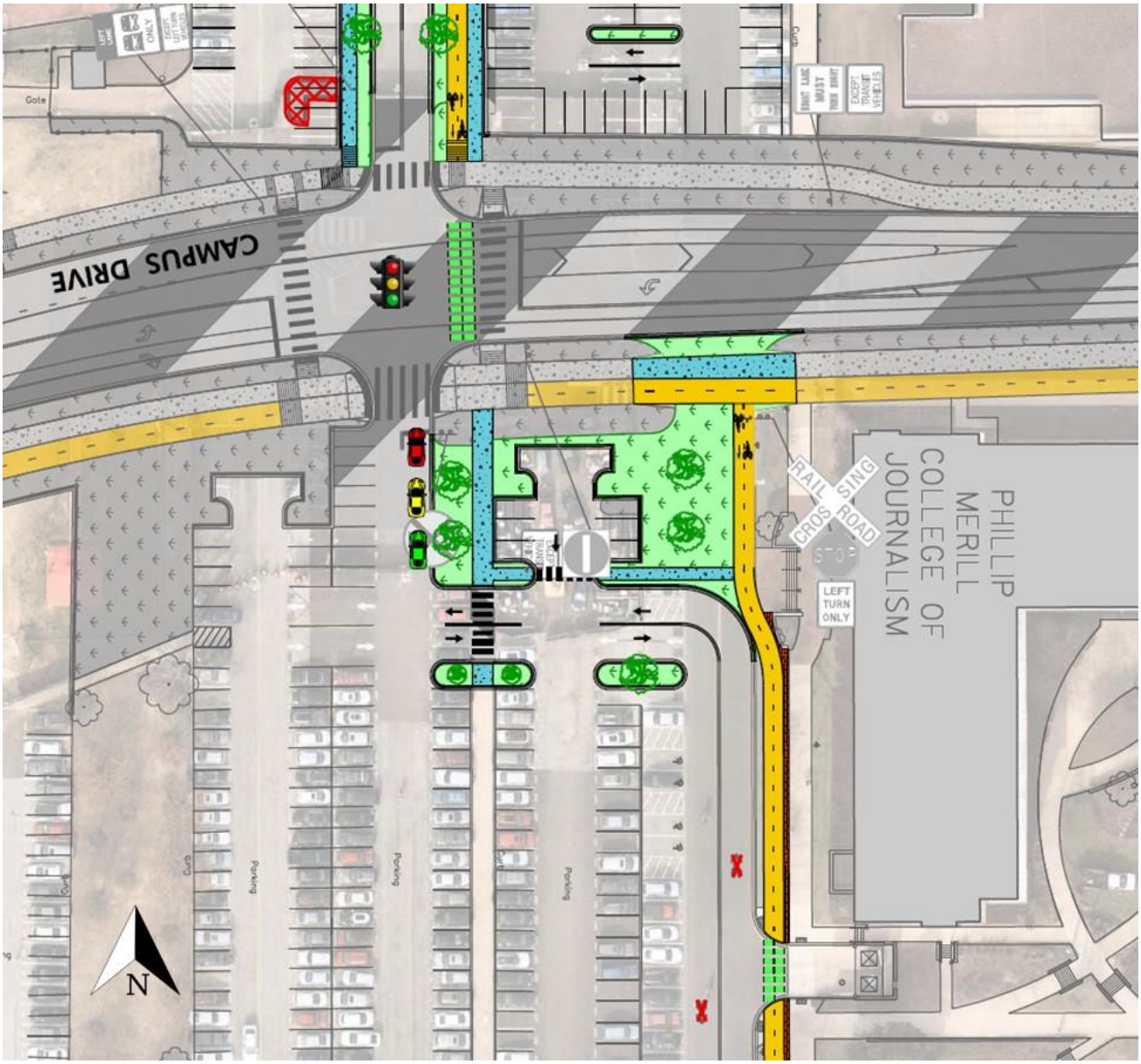

FIGURE 13: PROPOSED BIKE LANE TRANSITION IN LOT 1 THROUGH CAMPUS DRIVE

Figure 13 shows the transition for cyclists and scooter riders between north and south of Campus Drive. This transition will occur along a 10-foot wide asphalt trail parallel to the proposed sidewalk; both the trail and sidewalk are being constructed as part of the Purple Line light rail project. Cyclists traveling south, for example, would cross Campus Drive during the green light, proceed along the trail eastward for about 100 feet, before entering the two-way cycle-track near Knight Hall. Note that the proposed bike path along Alumni Drive is *outside* of the proposed sidewalk; this allows both walkers and cyclists to cross Campus Drive onto the sidewalk and trail, respectively, without having to merge or yield to each other. Additionally, since southbound left turns and northbound right turns are prohibited to vehicles at the intersection of Alumni Drive and Campus Drive, there is expected to be negligible bike/vehicle conflicts[2]. Cyclists will then have a side path along Campus Drive to travel east-west and also have a north-south bike path that runs along the frontage of Tawes and the College of Journalism, heading toward Mowatt Circle, as shown in

[2] Based on the current Purple Line design plans, only WMATA/ShuttleUM buses are allowed eastbound along Campus Drive within the Campus Core, between Regents Drive and Alumni Drive.

Figure 14.

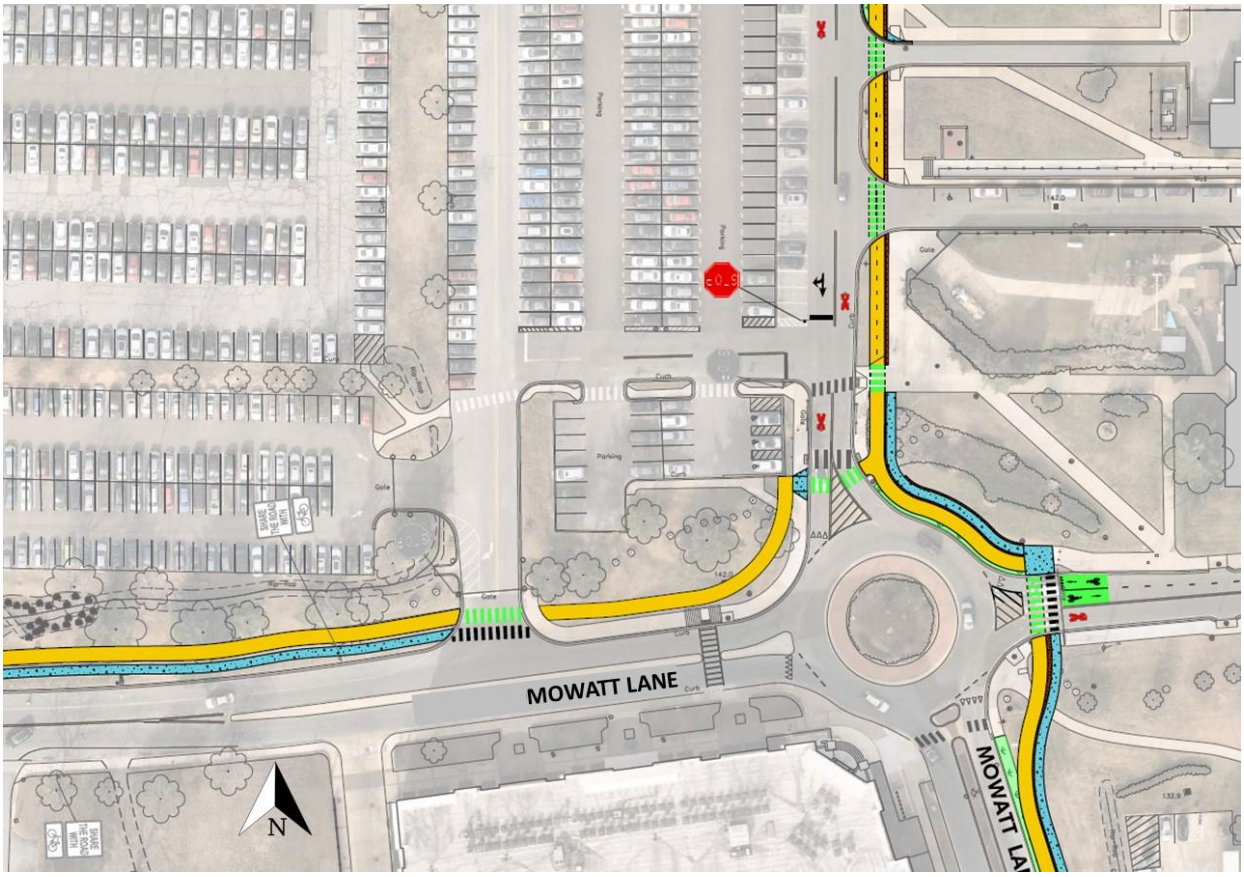

FIGURE 14: PROPOSED BIKE LANES BETWEEN CAMPUS DR AND MOWATT LN

Figure 14 shows that there are minimal changes to Lot 1, south of Campus Drive. Additionally, overall traffic through this lot – particularly in front of Tawes and Knight Hall – is expected to drop dramatically once the Purple Line is complete. This is because current roadway traffic patterns require commuters from MD 193 and points west to access Lot 1 and Lot Z from Mowatt Circle. Existing traffic counts confirm that the large majority of traffic entering Lot 1 from Mowatt circle, originates from the west. However, the completed Purple Line will extend Campus Drive south through to present-day Presidential Drive, providing more direct access to both lots from MD 193. The completion of this extension will result in far less vehicle traffic entering Lot 1 from Mowatt Lane.

C. Alumni Drive cycletrack extension to Denton Quad

During the feasibility study, the University Project Team recommended extending dedicated bike facilities north from Fieldhouse Drive to the area around Byrd Stadium, such that students in the North Campus dormitories would have direct access to biking infrastructure and not have to share the roadway. To accomplish this, a two-way cycletrack is proposed along the east side of Alumni Drive, beginning at its intersection with Fieldhouse Drive. This cycletrack replaces existing on-street parking and curb bump outs. Just south of the Stadum Drive roundabout, the cycletrack transitions to an off-road bike/scooter path, terminating just north of Byrd Stadium, as shown in Figure 15.

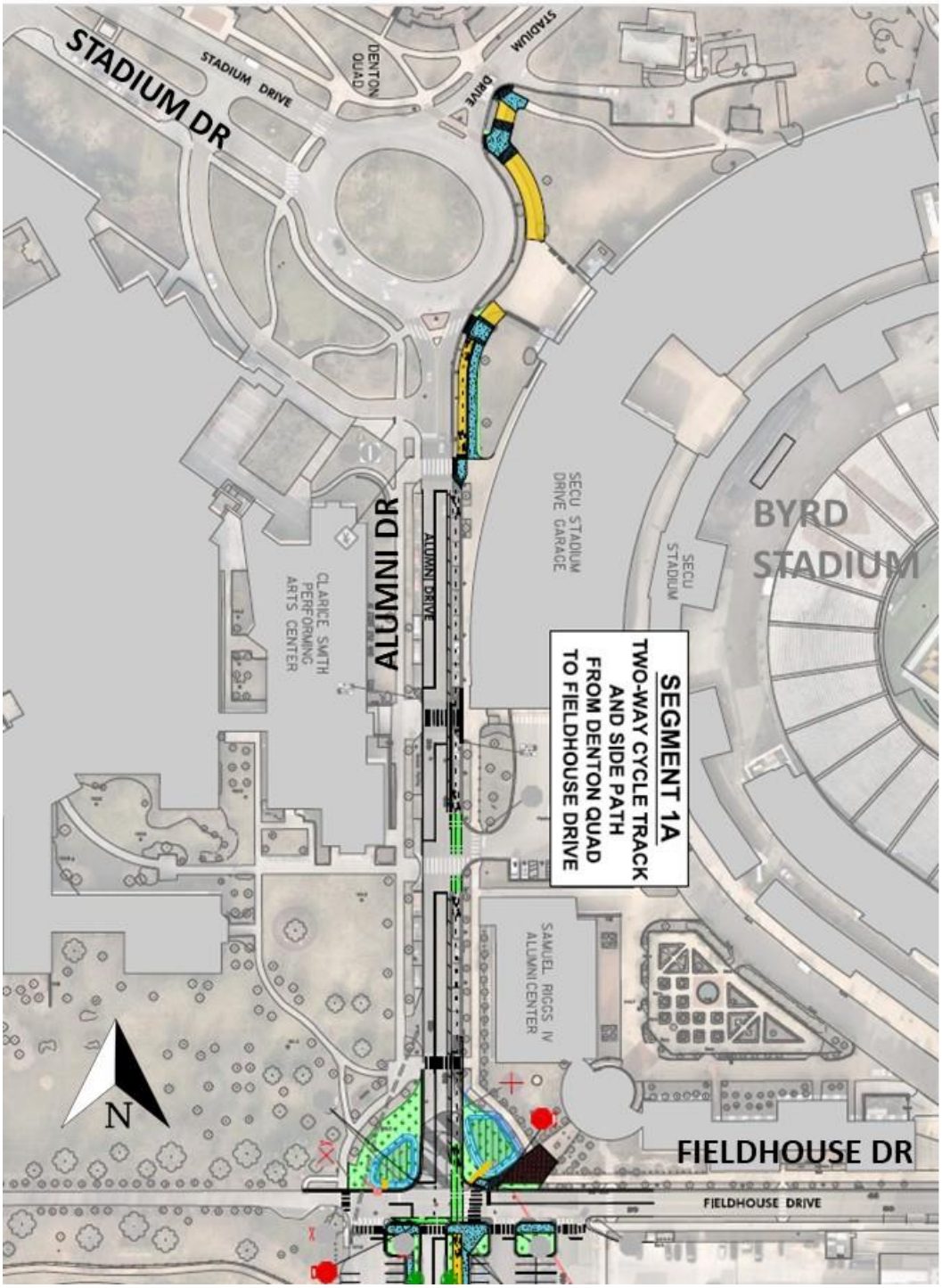

FIGURE 15: CYCLETRACK AND BIKE PATH FROM DENTON QUAD TO FIELDHOUSE DR

D. Mowatt Lane / Campus Drive

Segment 1 also identifies Mowatt Lane as a location for dedicated cycle/scooter facilities. Specifically, separated bike lanes or bike path is desired between Knox Road and Mowatt Circle. Initially, one-way couplets were evaluated for Preinkert Lane and Mowatt Lane, where both roadways would be converted into one-directional travel, with the remaining directional lane, converted to on-road bike/scooter facilities. However, a review of traffic data on Mowatt Lane (on the perimeter of campus) showed about 10,000 cars per day, while Preinkert Drive had less than 2,000 vehicles per day. Accordingly, converting these two

roads to one-way couplets would add about 4,000 vehicles to Preinkert Drive, which is an internal campus roadway. These additional vehicles would decrease the safety of students traversing in the roadway and across it. As a result, the two-way conversion concept was abandoned in favor of a side path adjacent to Mowatt Lane, along its eastern side, from Knox Road to Mowatt Circle, as shown in Figure 16.

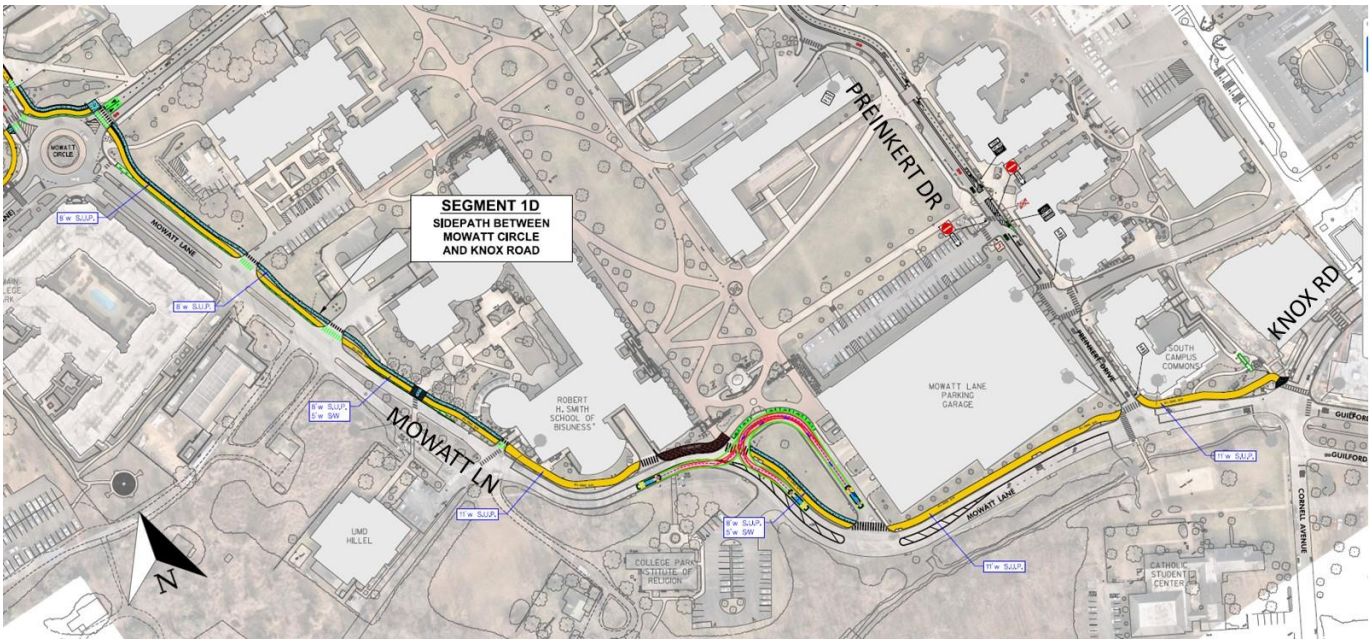

FIGURE 16: MOWATT LANE BIKE PATH

Based on prior design guidance, this location calls for either a shared-use path of about 14 feet in width or separate parallel facilities for walkers and for cycling/scooters. Starting the side path at Knox Road and heading west to the Mowatt Garage, there is ample space along the north side of Mowatt Lane for a shared-use facility to replace the existing sidewalk, as shown in Figure 17.

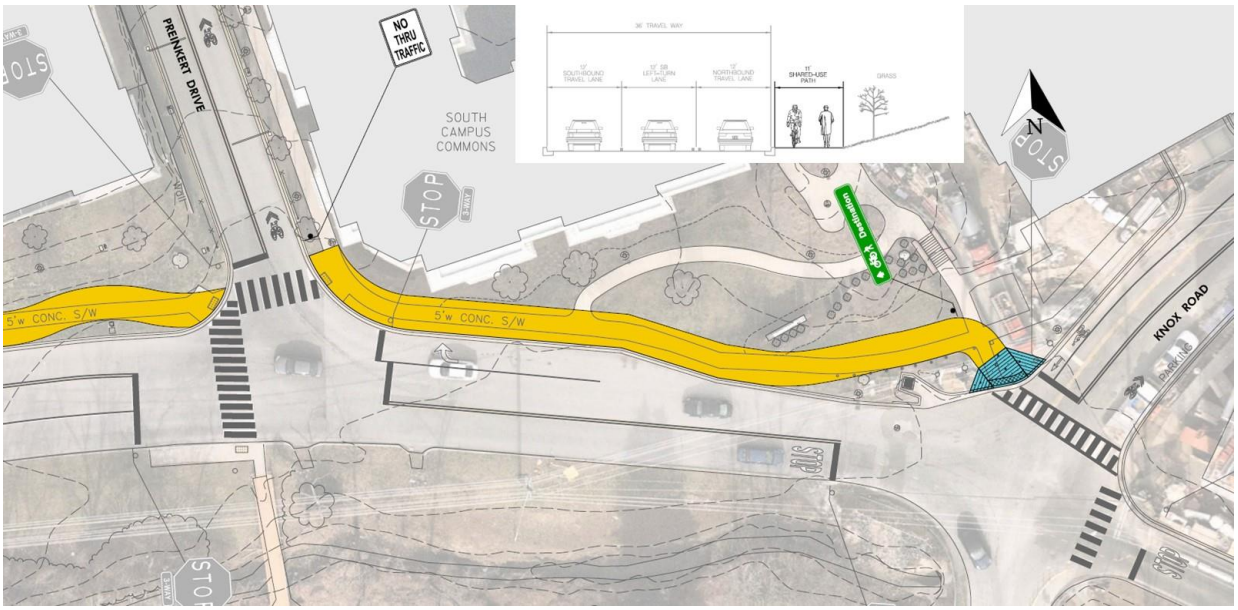

FIGURE 17: PROPOSED MOWATT LANE SIDE PATH, NEAR KNOX ROAD

The terrain is flat through this portion of Mowatt Lane, with little grading needed to install the wider facility.

Of note, Knox Road is planned for westbound bike lanes that terminate at the end of the proposed shared use path.

Near the west end of the parking garage and the Smith School of Business, there is an opportunity to separate the biking and walking facilities, as shown in Figure 18, which will allow easy passing for cyclists and scooters. This is a critical design element as there is a short segment in front of the School of Business where there is only a 7-foot wide brick sidewalk that is not conducive to shared biking and walking. In order to maintain the aesthetics of the brick pathway at this location, it is recommended that it be widened from 7 feet to 12 feet, reducing the roadway from 29 feet wide down to 24 feet wide at this location and widening the brick walkway as shown.

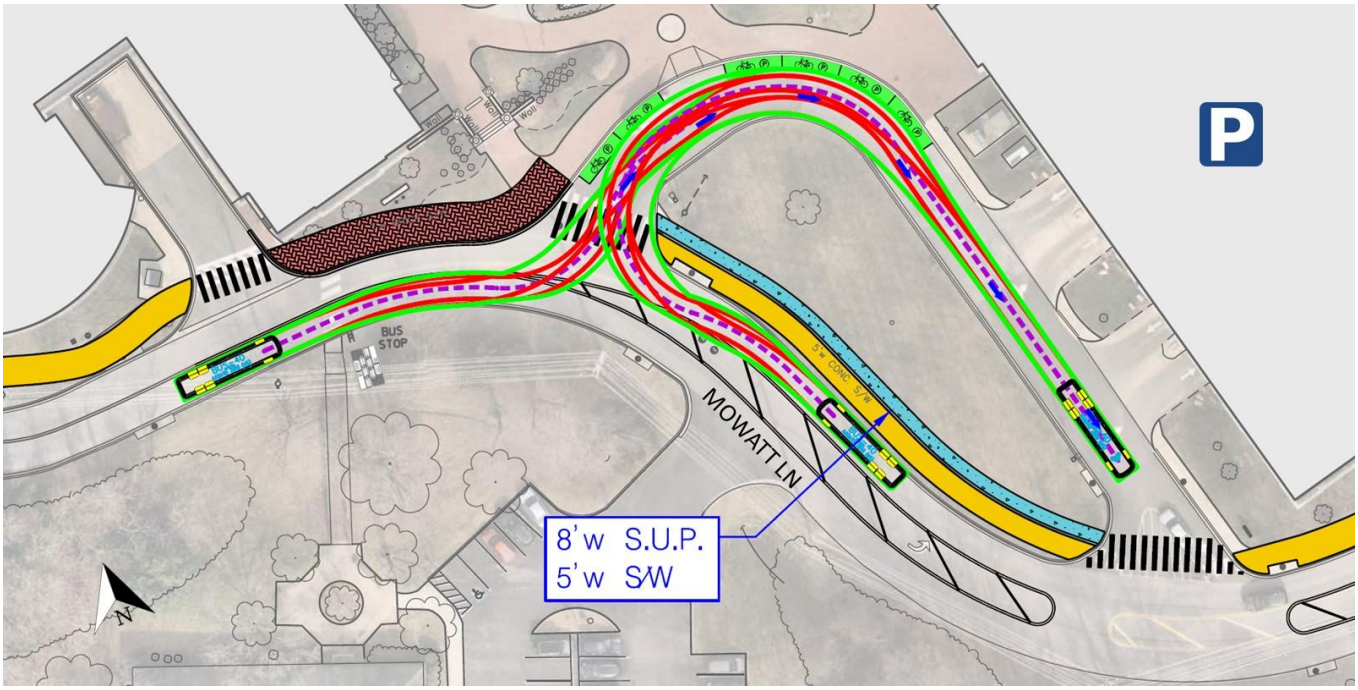

FIGURE 18: PROPOSED SEPARATED BIKING AND WALKING PATHS NEAR MOWATT GARAGE

Additionally, Figure 18 shows reversal of the travel direction for the garage access and bus layby in front of the Mowatt Lane parking garage. This operational change allows for five new bike parking corrals along the access driveway for use by students and visitors to the Smith School of Business, where bike and scooter parking is in high demand.

North of the School of Business building, there are four on-street short-term parking spaces that prevent a direct side path connection. As shown in Figure 19, in order to keep the existing plaza and amenity space intact, the existing curbside parking spaces are recommended for removal and replacement with a new sidewalk and bike path. This also shortens the roadway crossing and removes the possibility that a parked vehicle would obscure the visibility of a crossing pedestrian from oncoming traffic.

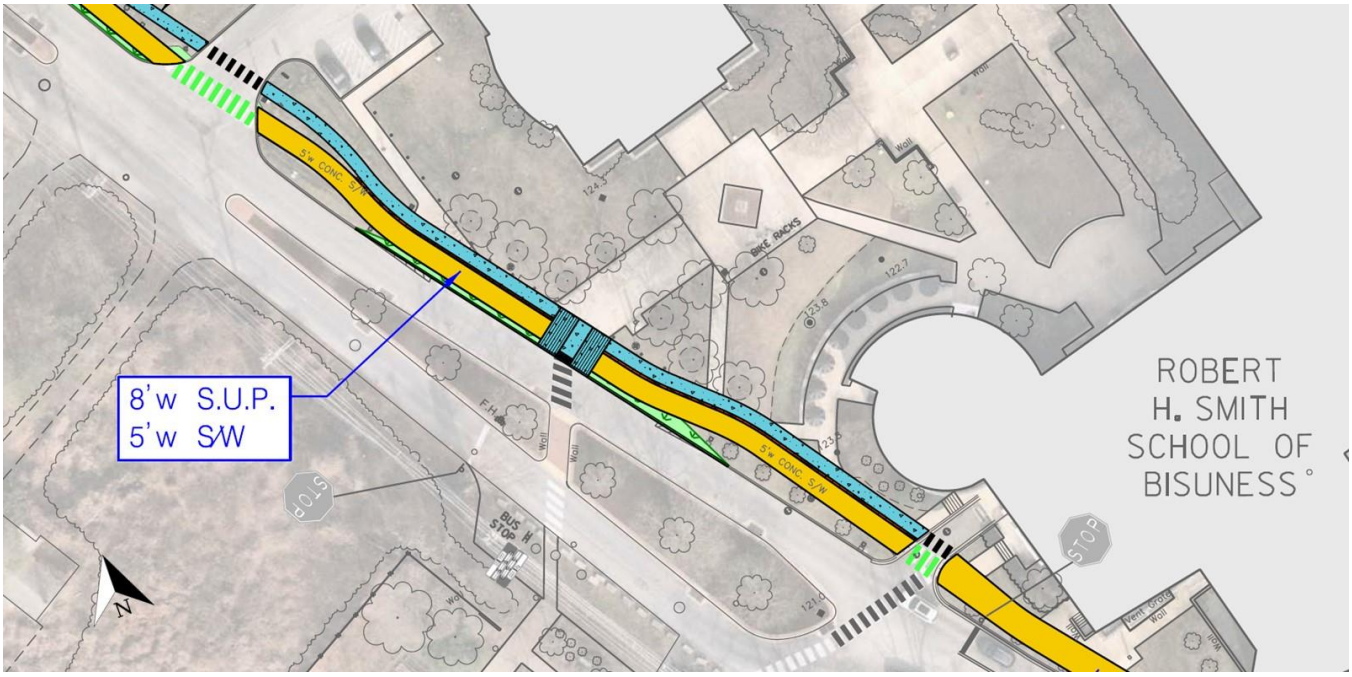

FIGURE 19: MOWATT LANE SIDE PATH, NORTH OF BUSINESS SCHOOL

Between this location and Mowatt Circle, there is ample right of way and clear space along Mowatt Lane for a new side path adjacent to the existing sidewalk, as shown in Figure 20. Some modest regrading will be needed in this area to accommodate a level path.

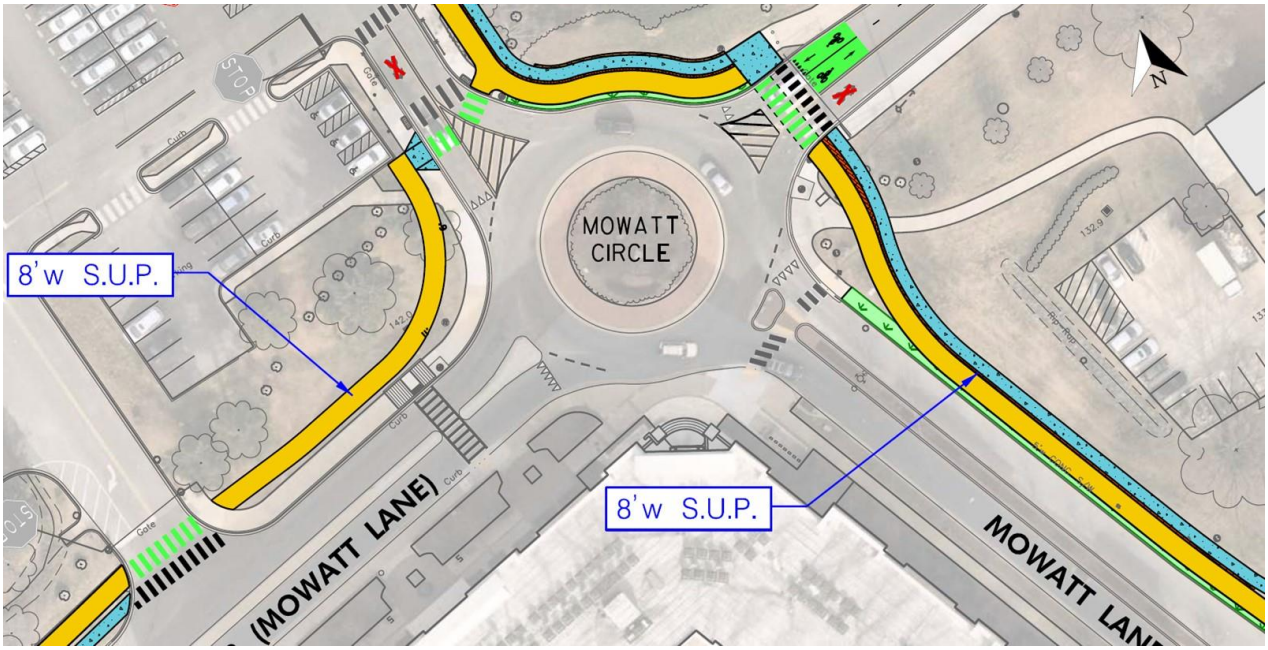

FIGURE 20: PROPOSED SIDE PATH APPROACHING MOWATT CIRCLE

Additionally, Figure 20 shows a proposed side path from the circle, heading west toward Presidential Lane, where the West Campus Purple Line station will be located. Again, there is ample flat terrain for a cycling path adjacent to the existing sidewalk. This bike path is proposed to jog around existing trees, stormwater management facilities, and utility poles along the north side of Campus Drive, between Presidential Drive and Mowatt Circle. Finally, the east leg of Mowatt Circle, heading toward Preinkert Drive, is proposed as

one-way eastbound roadway (complementing the one-way *westbound* alignment for vehicles along Union Drive to the north, which is part of the Purple Line construction). The remaining travel lane is proposed as a two-way cycle track that ties into the Mowatt Circle, but also branches off via a side path to and from Lot 1, as shown in Figure 20. This cycletrack ties into proposed bike lanes along Preinkert Drive, as discussed in the next section.

E. Preinkert two-way cycletrack

Preinkert Drive is a two-lane roadway with low daily and peak hour volumes prior to the Purple Line construction, which makes it suitable for sharing the lane with vehicles and bikes and scooters – if not for the hilly and windy terrain that it follows. Recent counts taken in the Fall of 2023 continue to show even lower volumes now that there is limited access to Preinkert Drive from Campus Drive due to the Purple Line construction. Additionally, as shown in Figure 21, the eastern leg of Preinkert will not extend and "T" with Campus Drive once the Purple Line is completed, meaning that in order for Preinkert Drive to remain a two-way facility, the seven ADA compliant parking spaces in front of the Benjamin Building will have to be removed. Even in this case, northbound traffic cannot turn left to head toward the Student Union, as right turns are prohibited. Accordingly, a cycletrack is proposed that begins in the north at the abandoned eastern leg of Preinkert Drive, as shown in Figure 21, and utilizes the existing northbound travel lane, resulting in the roadway being *southbound only* from Campus Drive toward Mowatt Lane. Note that this configuration allows all of the ADA parking spaces to remain in front of the Benjamin Building.

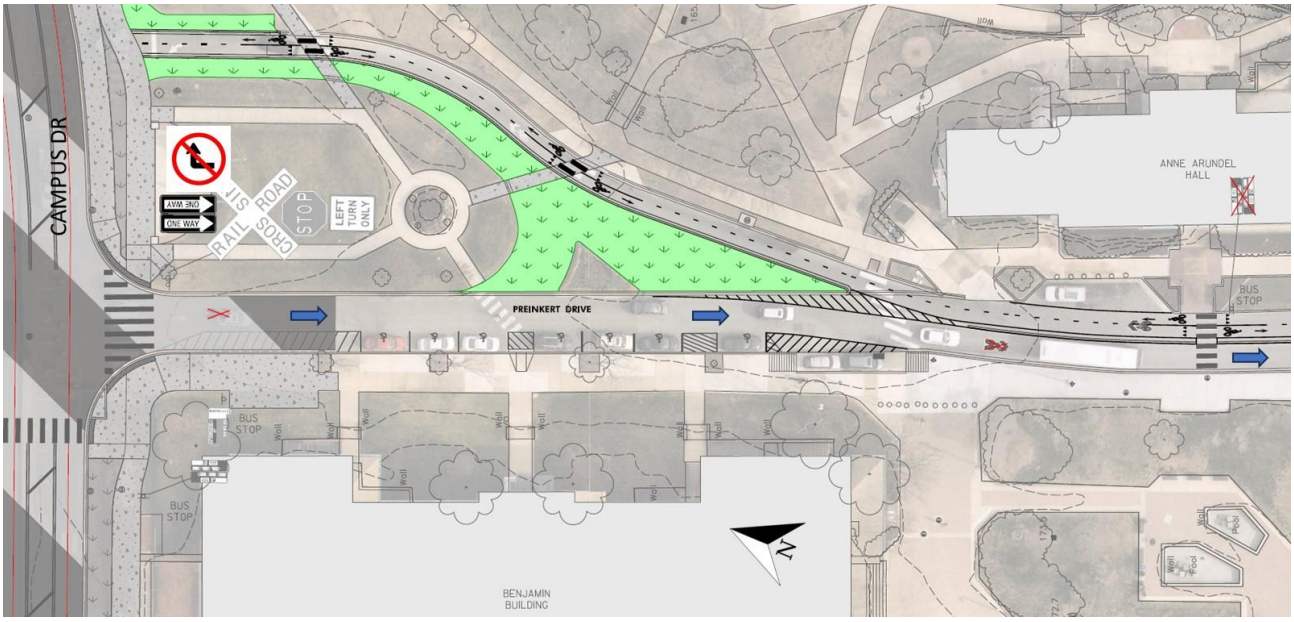

FIGURE 21: PROPOSED PREINKERT DRIVE CYCLETRACK TERMINATION AT CAMPUS DRIVE

At the southern end of Preinkert Drive, the cycletrack terminates near the visitor lot, just north of Mowatt Garage. At this point, southbound cyclists stop and merge into a shared southbound Preinkert Drive, heading toward the Mowatt Lane side path.

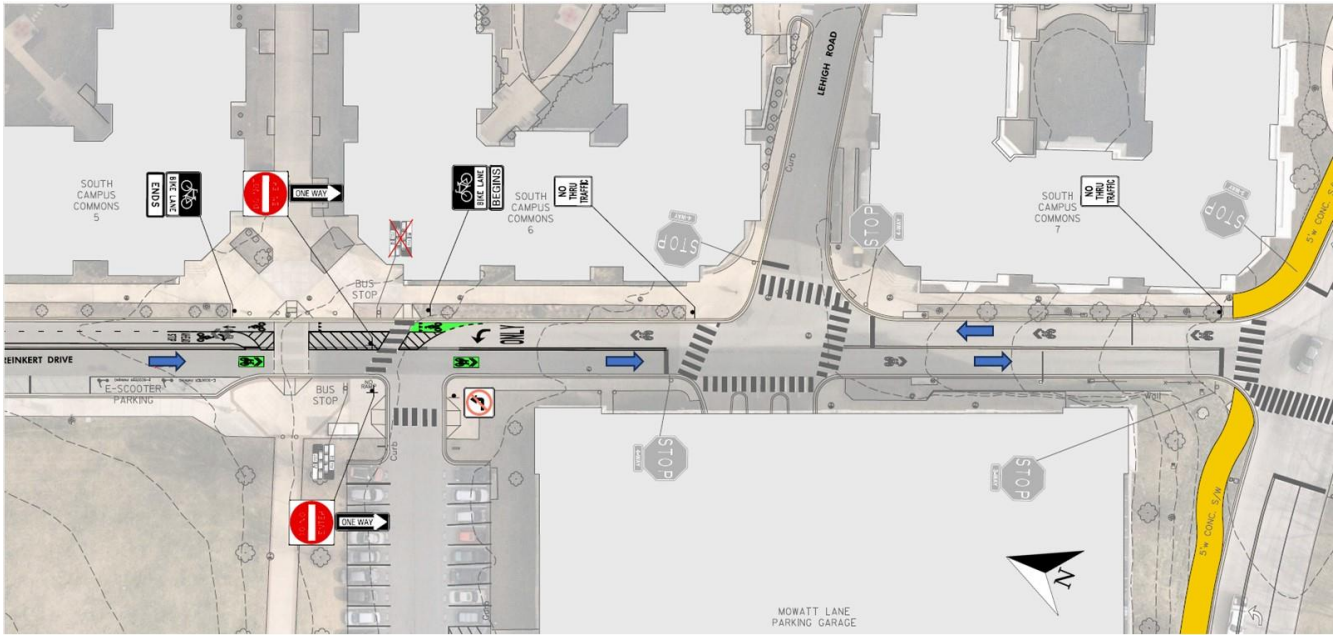

FIGURE 22: PROPOSED PREINKERT DRIVE CYCLETRACK TERMINATION AT MOWATT LN

Original iterations of the Preinkert two-way cycletrack had it continuing south to terminate at Mowatt Lane, however, based on discussions with Planning and DOTS staff, the cycletrack was terminated prior to Lehigh Road due to:

- The desire to maintain two-way access in front of both Mowatt Garage and the adjoining visitor lot; and
- The need for large delivery trucks to access Mowatt Lane directly from the south campus dining hall loading docks, via Lehigh Road.

To support the concept for lane removal of northbound Preinkert Drive and reconfiguration for cyclists, traffic counts were conducted at the intersection of Campus Drive at Preinkert Drive in order to quantify the number of vehicles impacted. Counts were conducted and recorded at the highest peak hours – one for the morning and one for the evening. A review of these counts showed 111 southbound vehicles and 59 northbound vehicles in the morning, and 83 southbound vehicles and 71 northbound vehicles in the evening peak hour. While both these direction peak volumes are low, the northbound vehicles only equate to about one vehicle minute, which can easily be absorbed by Mowatt Lane – the likely parallel route for these drivers. These traffic volumes are slightly lower than in 2018, when they were previously counted[3]. Over the past five years, however, a review of walking activity and micromobility activity revealed much larger changes. For example, in 2018 peak pedestrian activity at Preinkert/Campus Dr intersection was 122 crossings in the AM and 203 in the PM[4], while 240 AM pedestrians and 220 PM pedestrians were counted last Fall. Finally, bike activity went from a combined 28 bikes in both the AM and PM peaks in 2018, to 123 micromobility devices (54 bikes and 69 scooters) last Fall.

Note that a final design for the two-way cycletrack will likely have to allow for occasional temporary conversion back to two-way vehicle operations for isolated events, such as student “move-in” and “move-out” weekends.

[3] *5 Year Campus-wide Transportation Impact Study, 2018 to 2023*. Sabra & Associates, 2018.
[4] Ibid

4. Segment 2 Paint Branch Drive / Regents Drive Couplet

Segment 2 represents the north/south corridor of Paint Branch Drive from MD 193 to Regents Drive Extension (south of Lot 9) and also the dual parallel north-south corridors of Regents Drive and Paint Branch that frame the perimeter of the campus's *engineering quad* between Lot 9 and Campus Drive.

A. Paint Branch Drive from MD 193 to Regents Dr Extension

Beginning at the intersection of MD 193 and Paint Branch Drive, there is an available sidewalk along the west side of Paint Branch Drive that leads past Terrapin Trail and commuter Lot 4 to the Softball Fields. This sidewalk is proposed for widening to easily accommodate walkers, cyclists, and scooter riders. As shown in Figure 23, there is ample space behind the curb for parallel sidewalk and bike path facilities; however, the trail approach to MD 193 will require guard rail removal/relocation and minor re-grading to accommodate a level path.

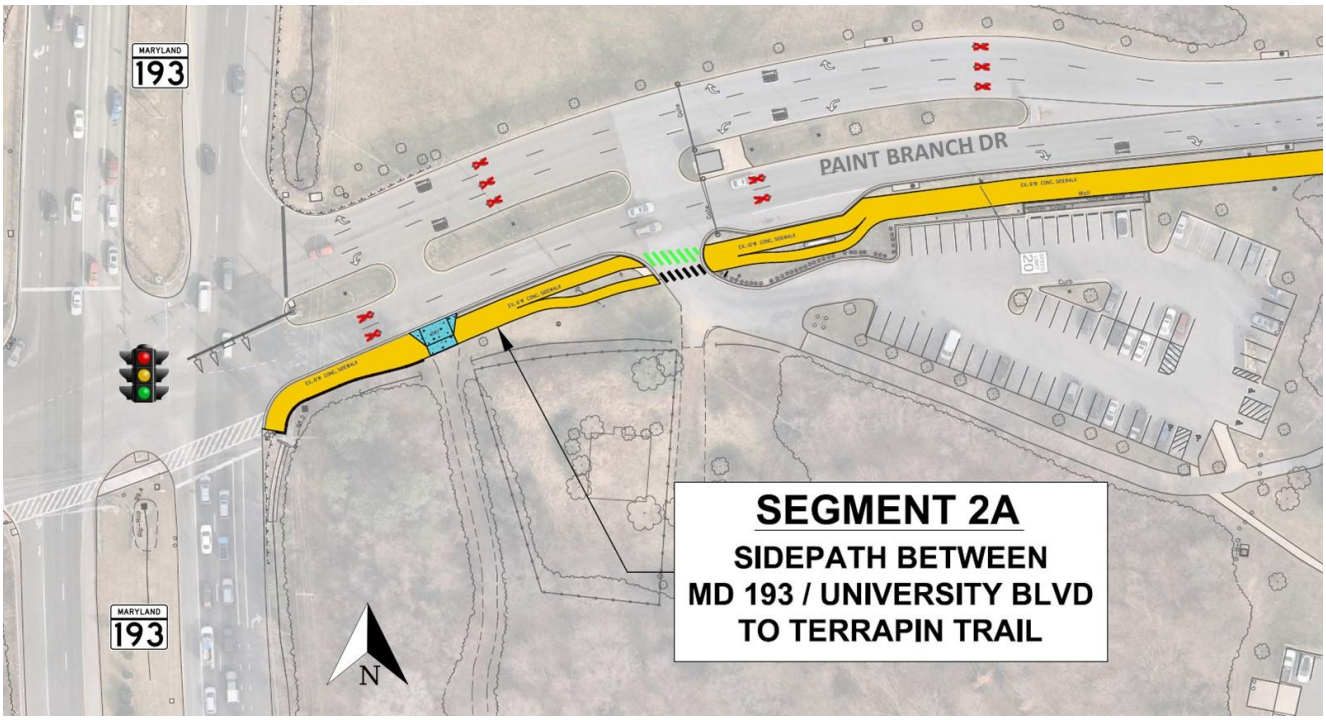

FIGURE 23: PROPOSED SIDE PATH ALONG SOUTH SIDE OF PAINT BRANCH DR NEAR MD 193

The proposed new path would be a wider shared used path or dual parallel facilities for walking and for biking. Further east along Paint Branch, interior to campus by the Softball Field, the existing sidewalk diverges into two facilities:

1) A 6-foot wide sidewalk that follows Paint Branch Drive south to Lot 11b, and;
2) A 10-foot wide sidewalk that passes by Xfinity Center toward Lot UU, near Regents Drive and the farm.

A review of UMD micromobility device data (provided by *RideReport*[5]) shows that cyclists and scooters traveling to campus from the MD 193 corridor and beyond prefer the latter option to get to Regents Drive. Accordingly, as shown in Figure 24 and Figure 25, a widened shared use path is proposed from the Softball Fields, past Xfinity Center and Lot UU to the intersection of Regents Drive at Regents Drive extended – just

[5] https://public.ridereport.com/university-of-maryland

north of Wellness Way. Figure 24 also shows an alternative alignment that traverses along Paint Branch Drive as a wide buffered shared-use path toward Lot 11b.

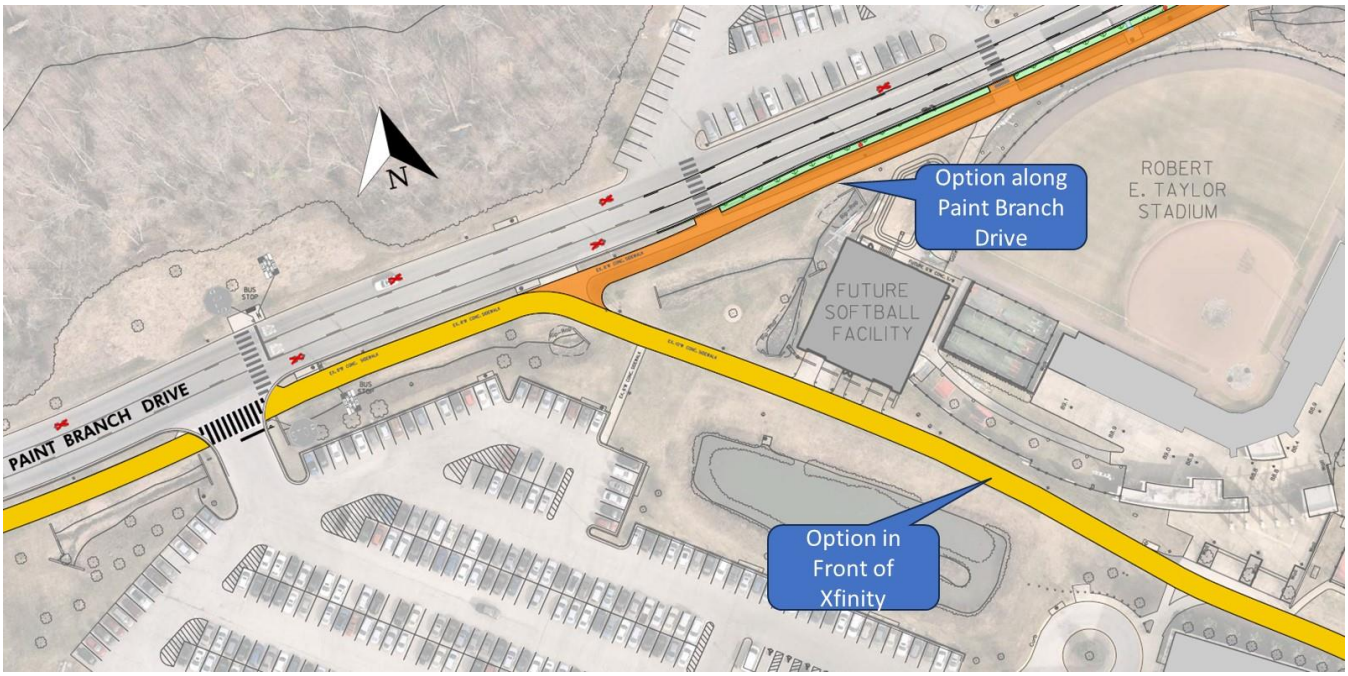

FIGURE 24: PROPOSED WIDE SIDE PATH BETWEEN SOFTBALL FIELD AND LOT UU

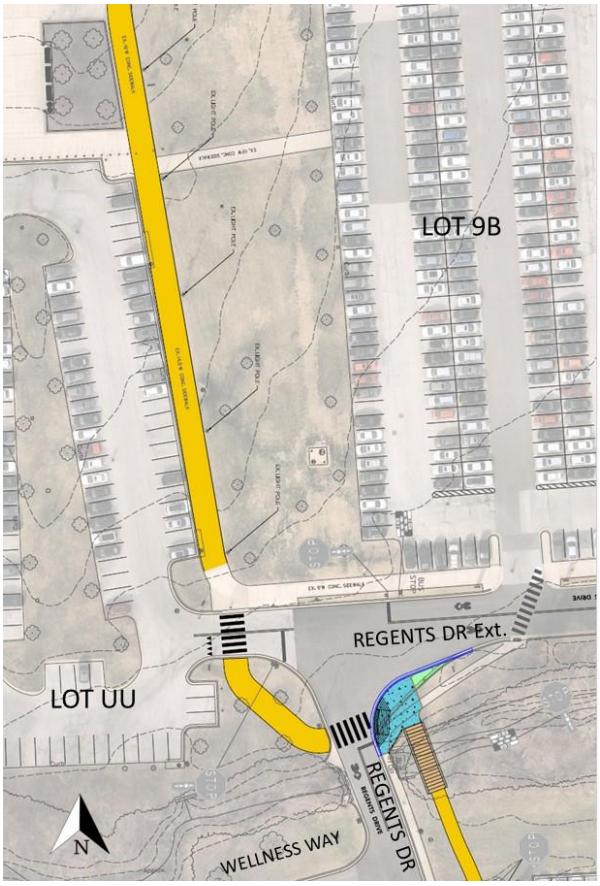

FIGURE 25: PROPOSED SIDE PATH EXTENDING TO REGENTS DR BY LOT UU

As shown in Figure 25, a 14-foot wide side path is shown terminating near the entrance to lot UU, where it would cross Regents Drive. The shared-use facility would then split into two separated facilities: 1) existing sidewalk for walkers, and 2) proposed pedestrian bridge and bike path heading south to Technology Drive. As discussed previously, separated facilities for walkers and for cyclists are preferred in areas of the campus where student activity increases.

A long-term option for the intersection of Regents Drive at its extension/approach to lot UU is for a reconfiguration that narrows its footprint, while also realigning it as a more traditional grid street with 90º angled approaches, as shown in Figure 26.

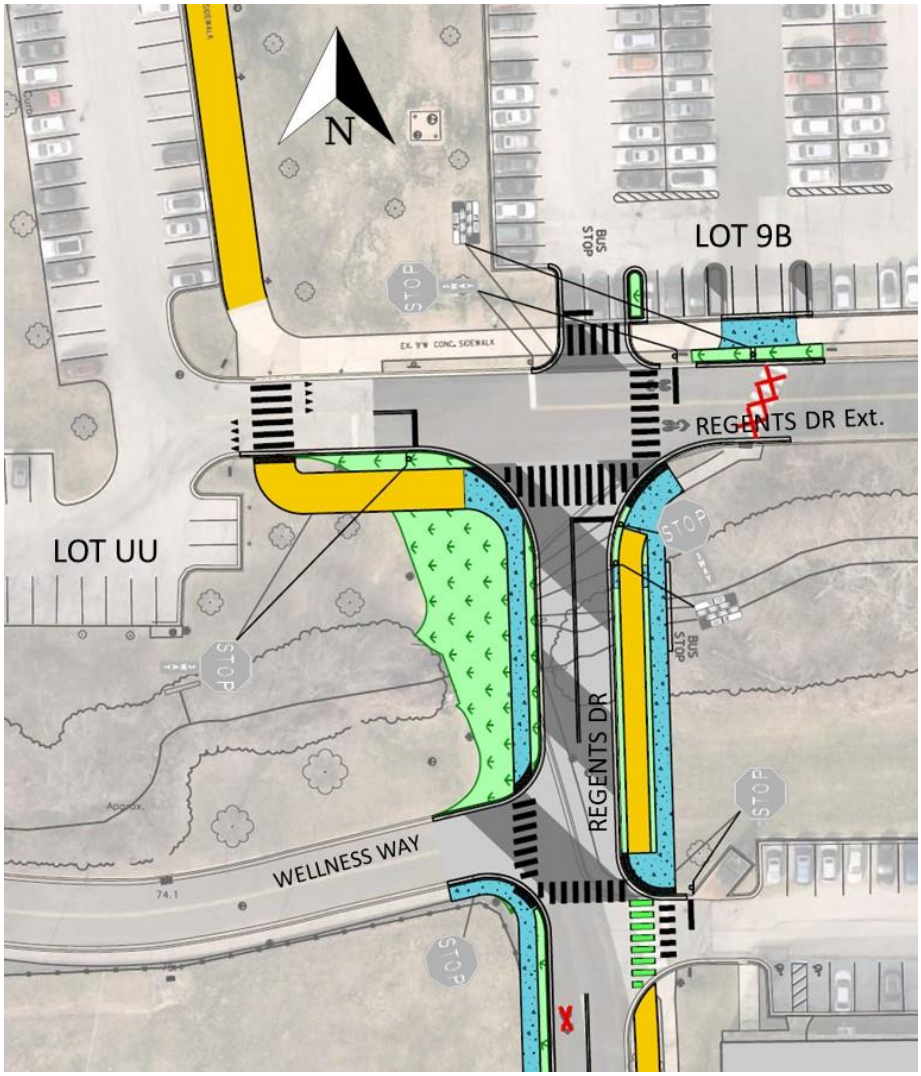

FIGURE 26: LONG-TERM FUTURE REALIGNMENT OF REGENTS DRIVE AT LOT 9B

This realignment provides new sidewalk along the west side of Regents Drive, while also providing sidewalks and a bike path behind the curb, along the east side. Finally, per the November 2023 Campus *Facilities Plan* update[6], Regents Drive Extended will ultimately traverse eastward through lot 11b and connect to Baltimore Ave (US 1), providing a new campus entrance – aligning with Berwyn House Road.

[6] https://facilities.umd.edu/ projects-programs/campus-facilities-plan

(1) Interim quick-build Cycletrack Pilot Project for 2024

Based on the long lead times for permitting and stormwater design and approval, plans are currently being developed for an interim pilot project to be constructed in the summer of 2024 along this segment of Paint Branch Drive (MD 193 to Regents Drive extended), that will reconfigure the existing striping for the majority of this roadway from a 3-lane section to a two lane section, with a buffered two-way cycletrack. Figure 27 shows the current iteration of the interim pilot project with an 11-ft wide cycletrack and a 5-ft buffer. Minor design changes are expected between the time of this report writing and final design for implementation of the pilot project, based on discussions with the Fire Marshal, UMPD, EMS, Shuttle-UM, as well as event management staff. Additionally, the proposed buffer shown in the figure will have a vertical separation component for added safety for cyclists and clear demarcation between drivers and cyclists/scooter riders. Based on conversations with event staff, there will be times during the school year (e.g., basketball games at Xfinity Center) where the interim bike lanes are used for vehicle egress.

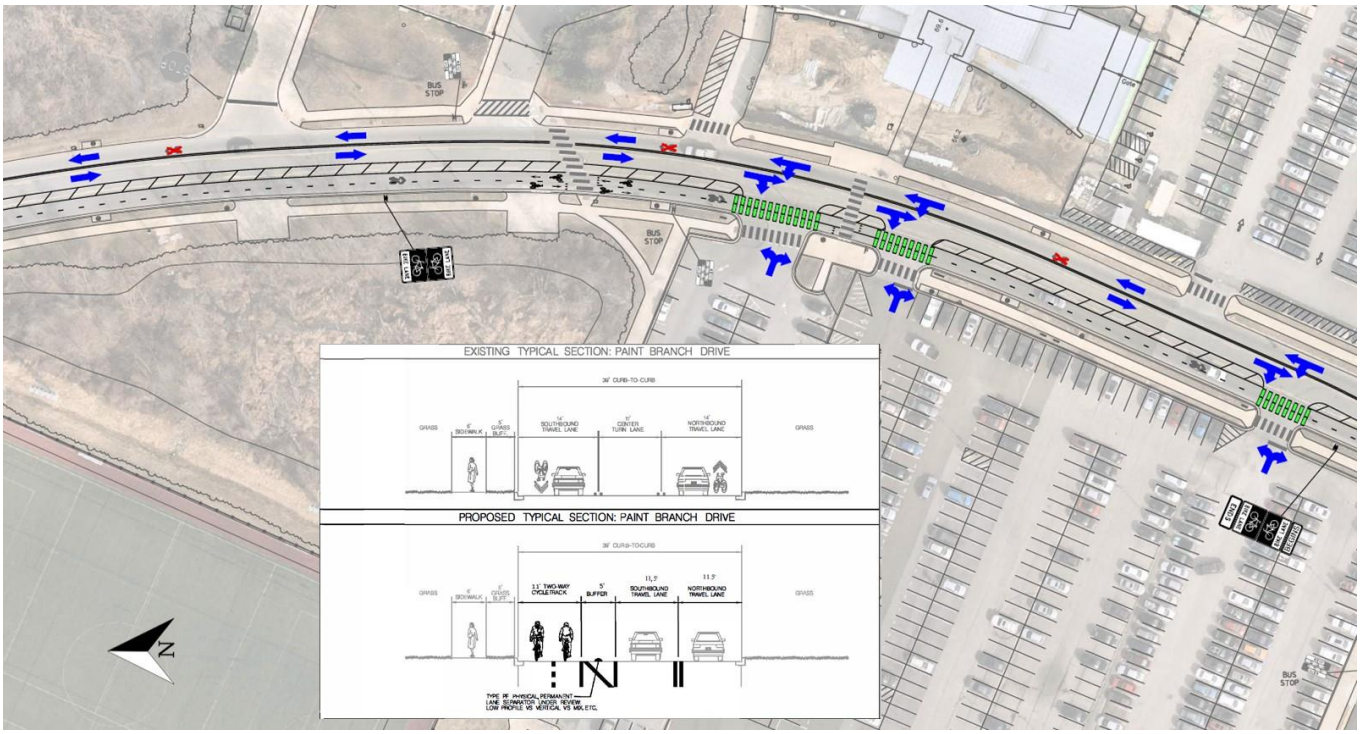

FIGURE 27: PROPOSED PLAN AND CROSS-SECTION FOR INTERIM 2-WAY CYCLETRACK ON PAINT BRANCH DRIVE

B. Paint Branch Drive, Stadium Drive & Technology Drive Cycletracks

South of Technology Drive, there is limited opportunity for a continuous dedicated bike path separate from existing sidewalks – on either Regents Drive or Paint Branch Drive. This is due to several physical constraints along both Paint Branch Drive and Regents Drive – namely:

- Academic buildings with narrow setbacks from the road
- Mature trees, plazas, or other dedicated infrastructure between building faces and road edges
- Utility poles or parking facilities

Accordingly, Paint Branch Drive and Regents Drive, between Stadium Drive and Technology Drive were evaluated for a proposed two-way in-road cycletrack loop, wherein one travel lane of each roadway would be converted to two-way on-road bike/scooter facilities – similar to Figure 28. Based on discussions with

Planning and DOTS staff, widening of Regents Drive – between Stadium Drive and Technology Drive was recommended to both incorporate a two-way cycletrack *and* also retain Regents Drive as a two-way facility – given that it will ultimately be extended through Lot 11b and terminate at Baltimore Ave as a two-way facility.

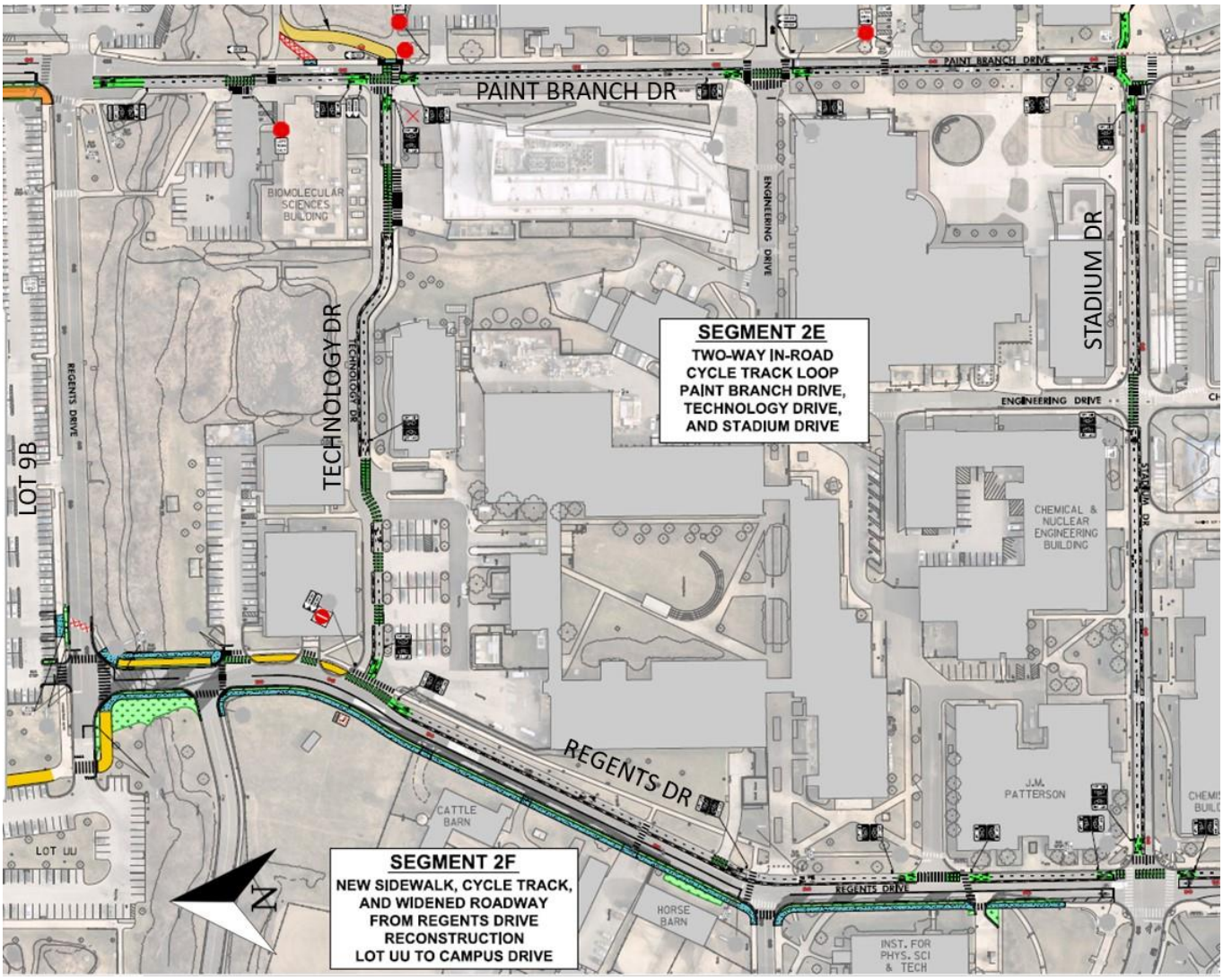

FIGURE 28: MULTIPLE PROPOSED ON-ROAD CYCLETRACKS IN THE ENGINEERING QUAD

Figure 28 shows a preliminary concept for a cycletrack loop that joins the proposed bike path, south of Wellness Way, having the following characteristics:

- Technology Drive is one-way westbound for vehicles, with the eastbound lane converted to a protected two-way cycletrack.
- Stadium Drive is one-way eastbound for vehicles, with the westbound lane converted to a protected two-way cycletrack, which also ties into a larger pedestrian plaza leading to and from the Paint Branch Trail and Baltimore Ave corridor (as shown in Figure 29 below)
- Regents Drive remains as a two-way roadway for vehicles, but is widened along west side - with the current northbound lane converted to a protected two-way cycletrack that ties into the proposed side path, south of Wellness Way
- Paint Branch Drive is one-way northbound for vehicles, between Stadium Drive and Regents Drive

extended, with the southbound lane converted to a protected two-way cycletrack.

- Engineering Drive remains a two-way roadway, shared by all users.

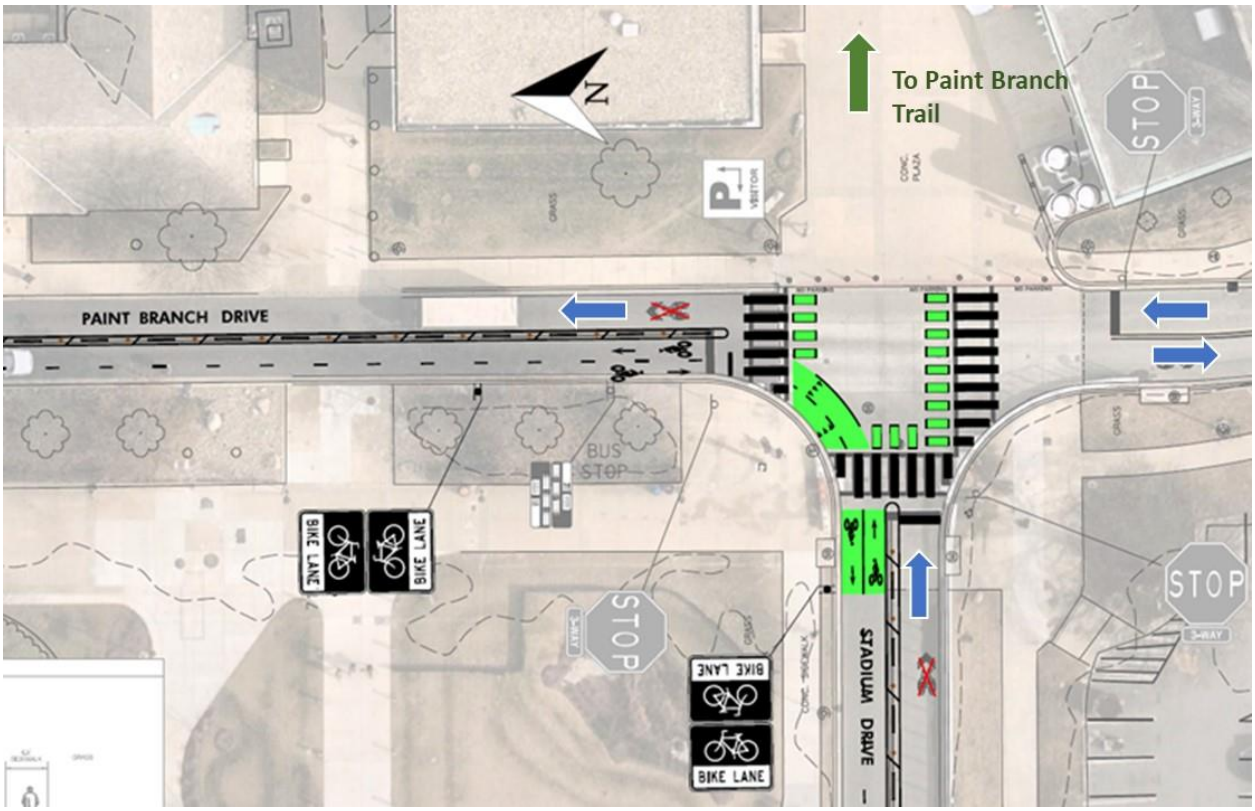

FIGURE 29: PROPOSED CYCLETRACKS AT STADIUM DR & PAINT BRANCH DR

There are several reasons, why converting the above-referenced roadways to on-road cycletracks is feasible. First, the engineering quad, south of Lot UU down to Campus Drive, consists of a grid network of north/south streets and east/west streets. Second, a review of estimated multimodal traffic projections for 2023 shows that most of the traffic is expected to be walkers and cyclists rather than vehicles[7]. New multimodal traffic counts on Regents Drive and Paint Branch Drive, conducted in the Fall of 2023, confirmed these projections. In fact, vehicle counts were slightly below those projected in 2018, while pedestrian and bike/scooter counts were slightly higher than projected[8]. A review of these counts showed that *combined* Paint Branch Drive and Regents Drive have the following peak hour vehicles volumes:

TABLE 1: VEHICLE VOLUMES ON REGENTS & PAINT BRANCH DRIVES

Direction	AM peak hour	PM peak hour
Northbound	325 cars	325
Southbound	375 cars	325

This peak-hour vehicle traffic can be accommodated in one travel lane – either by Paint Branch Drive *or* by Regents Drive – the extra lanes are superfluous and can be converted to other uses. Both roadways see little cross-traffic from other vehicles and there are no signalized intersections to slow travel; only pedestrian crossings limit vehicle throughput along with roadway. To confirm this, the proposed one-way network of

[7] *5 Year Campus-wide Transportation Impact Study, 2018 to 2023*. Sabra & Associates, 2018.
[8] Traffic counts were conducted in September 2023, when Stadium was closed off entirely for traffic between Regents Drive and Paint Branch Drive. Additionally, Campus Drive was closed off entirely, west of Preinkert Drive.

roads was modeled in industry-standard Vissim™ multimodal traffic modeling software that inputs cyclist, pedestrian, and vehicles volumes and then models their interactions and traffic flow to evaluate delay, average speed and queuing impacts to motorists (note that walkers have the right of way over vehicles on-campus at all crosswalk locations). Multimodal traffic data was collected in 15-minute increments during the AM and PM peak hours in the area and inputted into a Vissim™ traffic model of the engineering quad. Applying multimodal data in 15 minute time periods (as opposed to *one-hour* time periods traditionally used in traffic engineering analysis) is a critical element of the model because the large majority of all traffic within a given hour occurs during the ~10-15 minutes between classes. This traffic model also incorporated future planned changes to the roadway grid due to the Purple Line construction – namely the planned traffic signal at the intersection of Regents Drive and Campus Drive. A review of the model output shows reasonable and expected vehicle delay and queuing, with no spillbacks off campus onto State roads and no lengthy queuing (beyond what is seen today during class changeover). The primary reasons that the model output – with one-way traffic conditions – shows similar traffic operations to today's conditions is as follows:

- There is extra vehicle capacity in the northbound and southbound roadways.
- There is ample capacity in the eastbound and westbound roadways.
- Paint Branch Drive is remaining two-way between Campus Drive and Stadium Drive
- Regents Drive (off of which, Regents Garage is located) is remaining two-way between Campus Drive and Stadium Drive
- Once the Purple Line is completed and the signal at Regents/Campus is operational, most of the northbound and southbound traffic will divert away from Paint Branch Drive to that signal – as it will provide more reliable and repeatable vehicle throughput for commuters between Regents Garage and the Baltimore Ave corridor. Previously, drivers had to wait at a roundabout for other cars and also wait through a succession of crosswalks in order to traverse between Regents Garage and Baltimore, which caused considerable diversion to Paint Branch and Stadium Drive.

C. Two-way Regents Drive Cycletrack – Stadium Drive to Campus Drive

The final proposal for Segment 2 ties the cycletrack loop discussed in the previous section to the proposed Campus Drive trail being constructed with the Purple Line light rail. This piece of Segment 2 proposes a an in-road two-way cycletrack along the east side of Regents Drive – fronting the Chemistry and Physics buildings – between Stadium Drive and the planned Campus Drive side path, as shown in Figure 30. To implement a cycle track in this location, the existing northbound lanes is reconfigured for protected bike lanes, while the inner most southbound lane is converted to a northbound travel lane. The outer southbound lane and the DOTS' ShuttleUM bus layby area remains. This results in a single shared southbound travel lane for vehicle and buses, like the rest of campus roadways.

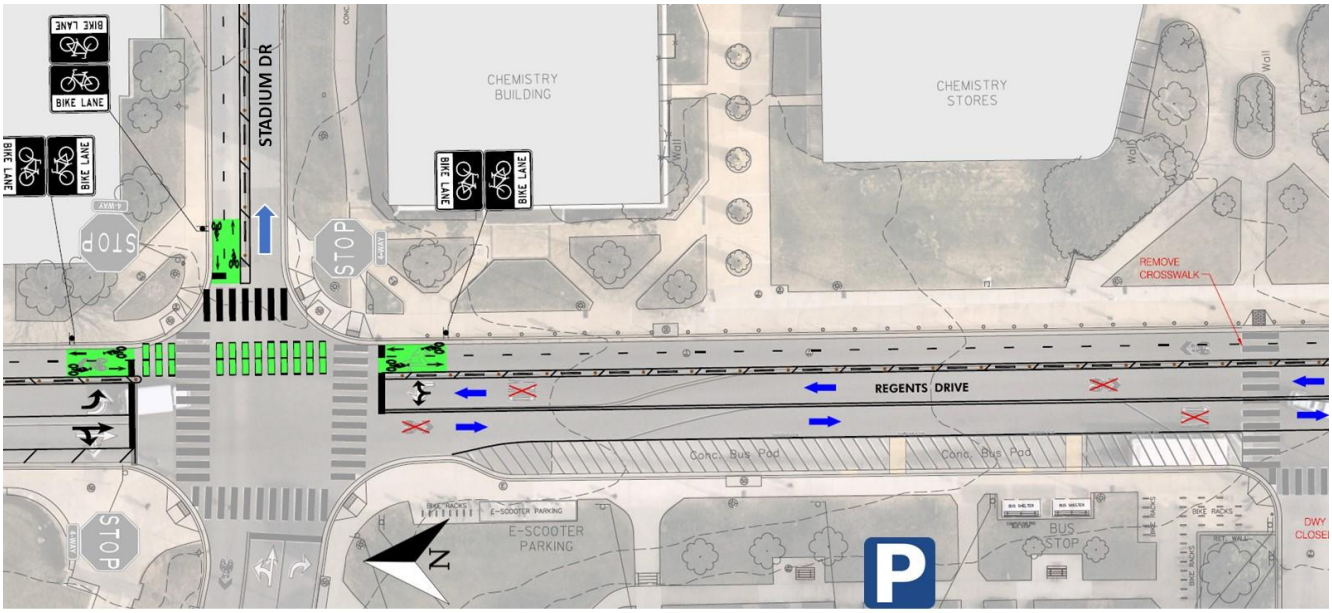

FIGURE 30: PROPOSED REGENTS DR CYCLETRACK SOUTH OF STADIUM DR

South of Fieldhouse Drive and the Regents Garage, Regents Drive narrows down to only two lanes; accordingly, to retain the inroad cycletrack south of Fieldhouse Drive to Campus Drive, widening of the west curb of Regents Drive is proposed – as shown in Figure 31.

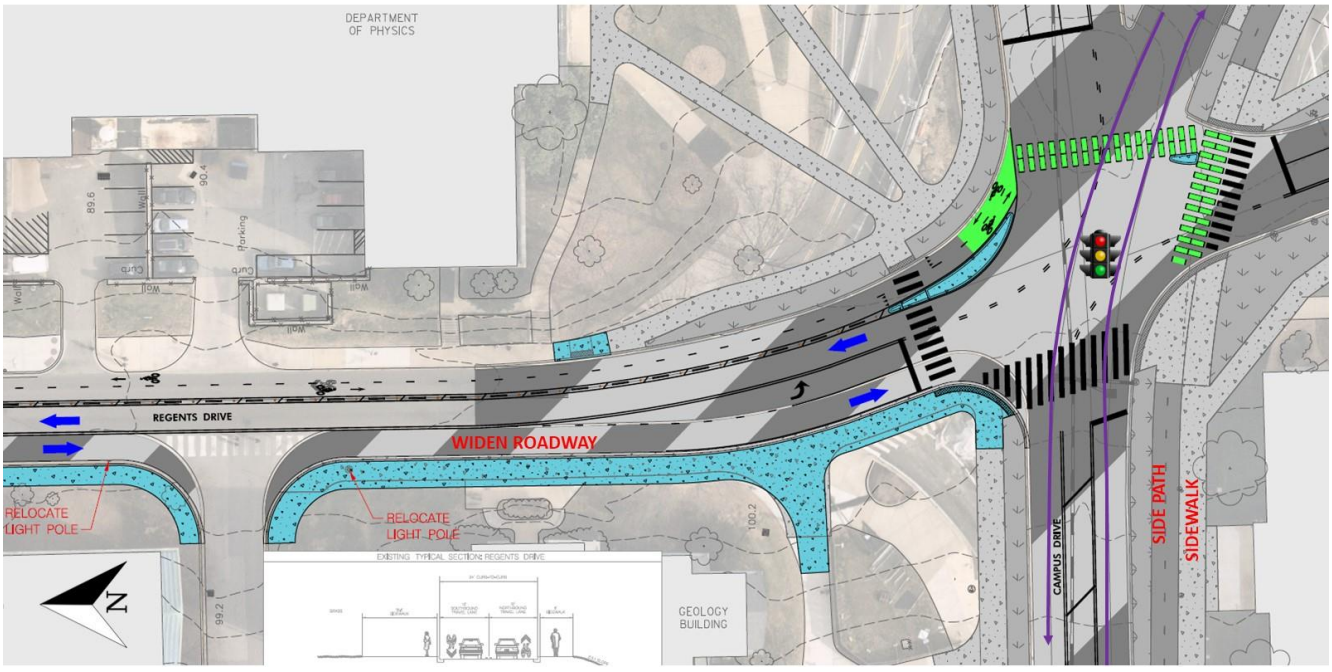

FIGURE 31: PROPOSED REGENTS DRIVE CYCLETRACK AND LANE WIDENING NEAR CAMPUS DR

Figure 31 shows the cycle track extending to and through Campus Drive, which will be signalized once the Purple Line is completed, and connecting to the planned side path that parallels Campus Drive. Widening this segment of Regents Drive will push the sidewalk closer to the Geology building, as shown, but there is still ample setback and even space for a grass buffer between the road and proposed sidewalk, if desired. This detail will be refined in the next design phase. Additionally, there is room for a larger pedestrian receiving area at the northwest quadrant of the intersection, or additional pervious surface for trees and landscaping (not shown), due the intersection being generally smaller in the Year 2026 base condition, than

the prior “M” roundabout. Finally, Figure 31 shows additional concrete islands within the intersection that serve as protection for cyclists from vehicle turn movements. At this time, a protected movement for cyclists is not proposed, and cyclists/scooter riders will traverse the intersection in conjunction with the WALK indication. This is because, westbound right turns on red from Campus Drive to northbound Regents Drive will be prohibited, eliminating a potential conflict point. Additionally, the smaller concrete island in the southeast quadrant, forces a slow wide right turn movement from drivers turning right onto eastbound Campus Drive. Additionally, the southbound left turn movement from Regents Drive to eastbound Campus Drive is a slower longer turn movement, where both vehicles and cyclists are in each other’s cone of vision throughout the turn. Finally, due to the many demands upon this signal, including signal prioritization for trains, any dedicated phase for cyclists would be relatively short in duration, resulting in signal noncompliance, regardless.

5. Segment 3: Bike Trail from South Gate to Purple Line Trail

Segment #3 represents a dedicated biking infrastructure gap between the South Gate entrance (Regents Drive at Baltimore Ave) and Campus Drive / planned Purple Line trail. As shown in Figure 32, there are two potential on-campus alignments to traverse from South Gate entrance to the Purple Line Side Trail:

- Regents Drive corridor, past the Chapel and past the front of the Administration Building to the intersection of Regents Dr at Campus Dr
- Existing walkway network through Chapel Field to connect to Purple Line trail behind the Administration Building.

FIGURE 32: AERIAL SHOWING LOCATION OF SEGMENT 3

Initial discussions with DOTS staff revolved around either a cycletrack or a side path for the Regents Drive corridor option. While an on-road Regents Drive cycletrack (at the expense of a travel lane) is likely feasible, it was considered undesirable to have a primary entrance to the University be a one-way facility. Additionally, a side path along Regents was initially evaluated and was deemed feasible between South gate and the Administration Building. However, as shown in Figure 33, there is insufficient unprogrammed public space in front of the Administration Building to repurpose for bike/scooter-only facilities, particularly given the activity levels in this location.

FIGURE 33: PUBLIC SPACE IN FRONT OF ADMINISTRATION BUILDING

Accordingly, new and widened paths through Chapel Field were evaluated for feasibility. A review of the 2023 Facilities Plan highlighted a planned 5k Wellness Loop trail around campus, part of which would traverse Chapel Field, as shown in Figure 34.

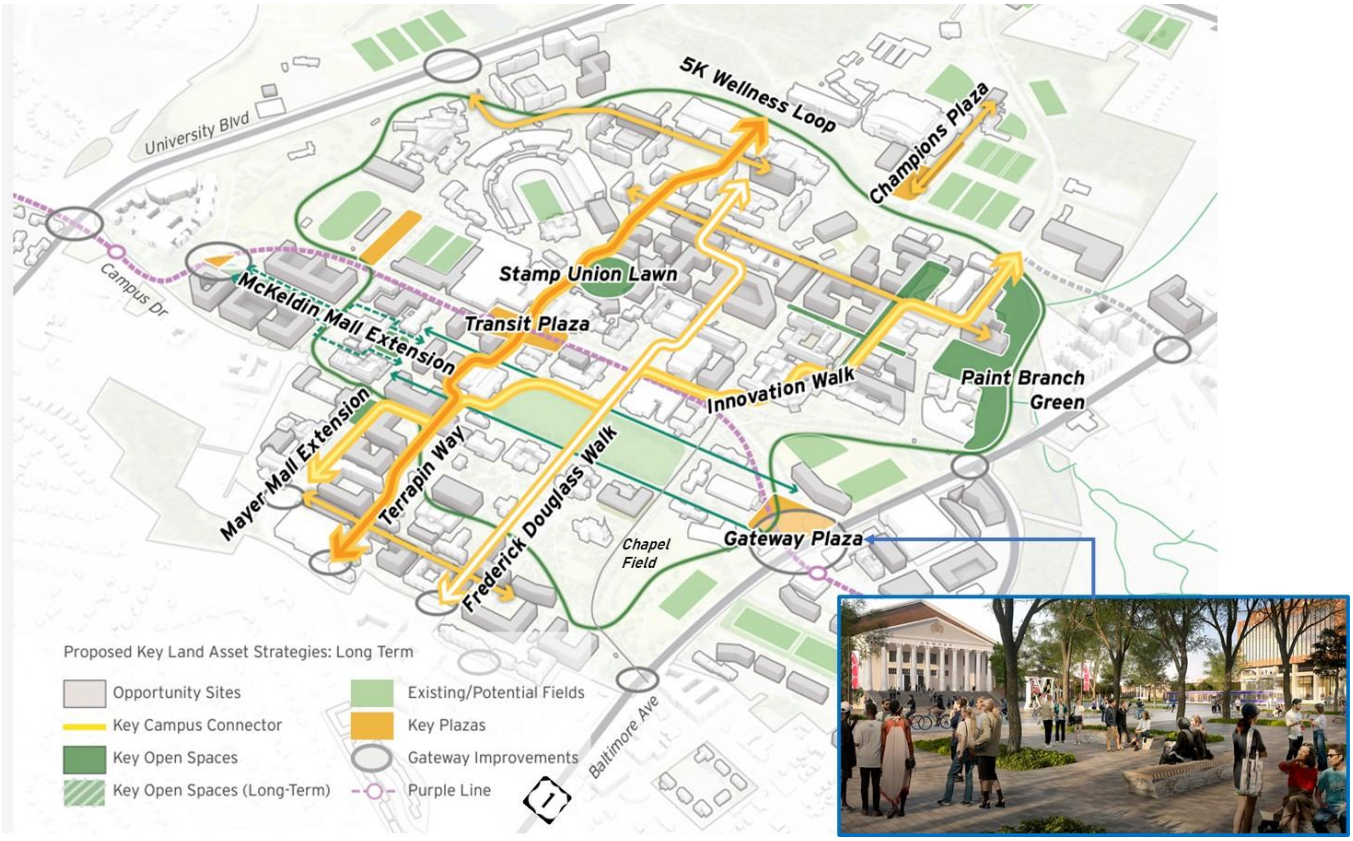

FIGURE 34: PLANNED 5K WELLNESS LOOP TRAIL, PER 2023 UMD FACILITIES PLAN

Figure 35 show the termination of the Purple Line side path and the proposed northern end of Segment 3 connecting to it. Of note, a gateway plaza is planned for the area south of Rossborough Lane, in between the Armory and Baltimore Ave (US 1). By tying Segment 3 into the Purple Line behind the Armory, any interruption to the future Gateway Plaza construction is avoided. The current concept for Segment 3 shows a parallel sidewalk for walkers and dedicated bike path for cyclists and scooter riders. Combined, the width of the parallel paths would be about 14 feet.

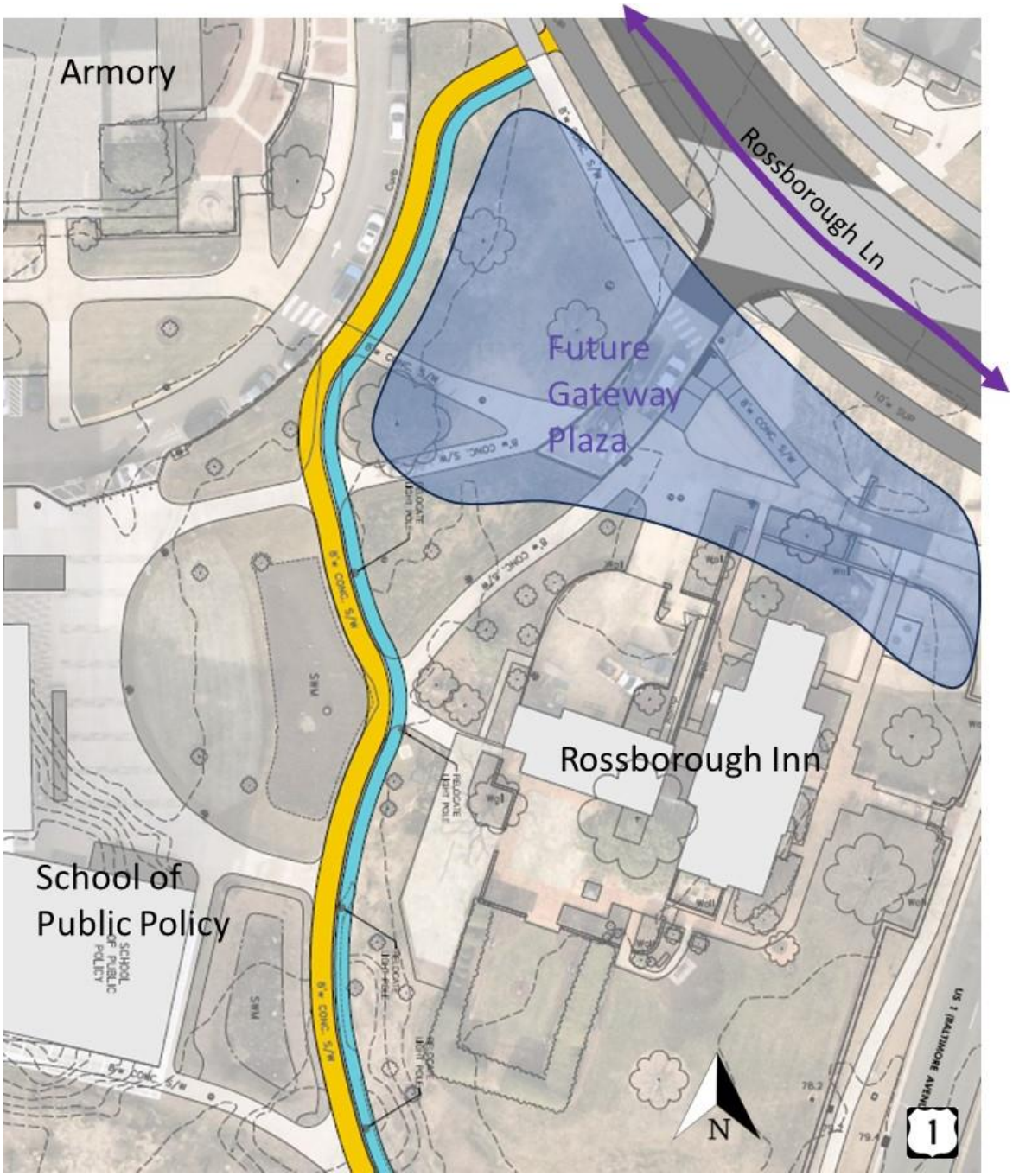

FIGURE 35: PROPOSED BIKE PATH AND SIDEWALK CONNECTING TO THE PURPLE LINE TRAIL

South of the School of Public Policy, heading towards the South Gateway at the intersection of Regents Drive at Baltimore Ave (US 1), two options were identified for continuing the Segment 3 alignment from the School of Public Policy to Southgate – one following the existing sidewalks and another creating a shortcut that parallels the Chapel Fields. As shown in Figure 36, the former alignment was chosen to minimize

disruption in contiguous green space, minimize stormwater management needs, and to take advantage of the existing overhead lighting and call boxes. Additionally, the bike path is shown connecting to Regents Drive, just south of the Lee Building for cyclists and scooter riders that choose to travel a more direct route in-road, as opposed to utilizing the Purple Line trail to head to points north.

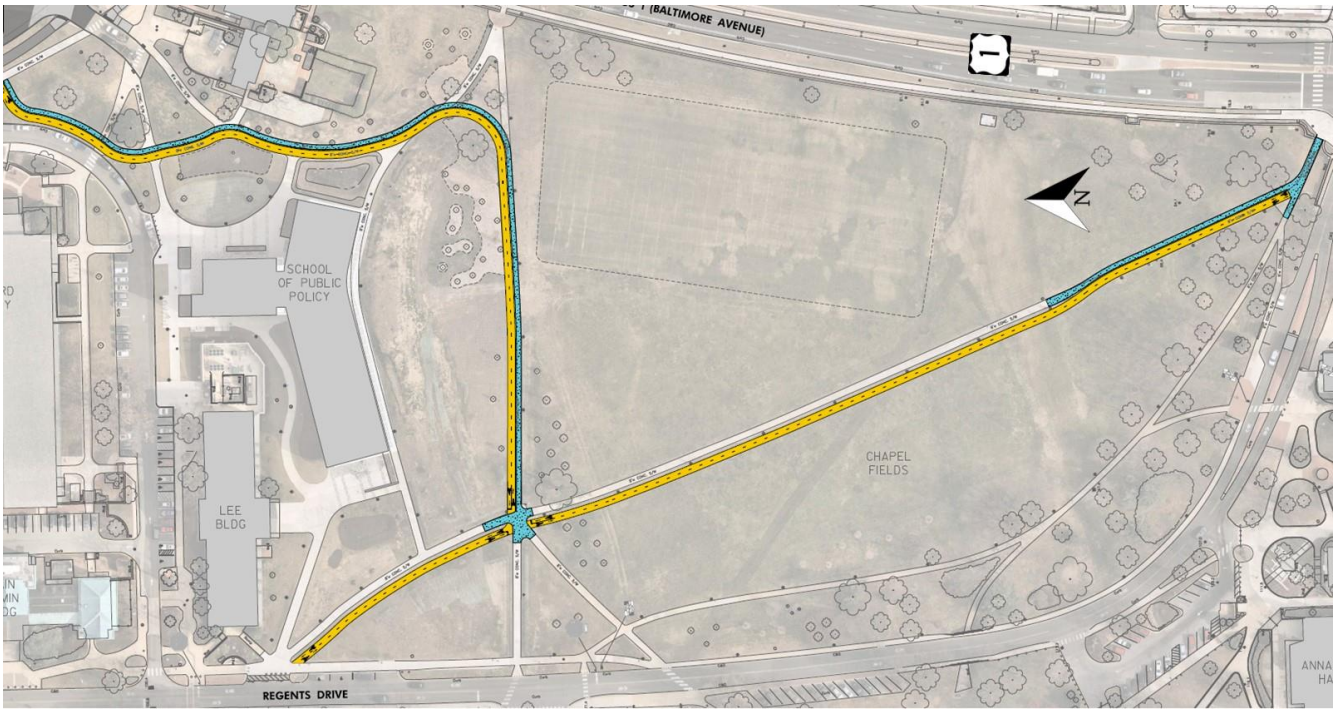

FIGURE 36: SEGMENT 3 – SIDEWALK AND BIKE PATH ALIGNMENT

Additionally, a concrete walking/biking "hub" is proposed (shown in blue in Figure 36), where are all north-south and east-west sidewalk and bike path connections intersect. This space has the potential for follow-on placemaking amenities – such as additional shade trees, public art, and benches/tables. Finally, this alignment is generally in agreement with the conceptual alignment of the Planned 5k Wellness loop that will surround the campus.

6. Segment 4: Connection Improvements to Paint Branch Trail

Segment 4 plans for improved connections from the Paint Branch Trail to the Paint Branch Drive Corridor and adjacent planned biking facilities (e.g., Segment 2). Three connections were identified for improvement:

1. Between Paint Branch Trail and the intersection of Paint Branch Drive at Technology Drive
2. Between Paint Branch Trail and the intersection of Paint Branch Drive at Engineering Drive
3. Between Paint Branch Trail and the intersection of Paint Branch Drive at Stadium Drive

A. Technology Drive Connector

As shown in Figure 37, a 9-foot wide trail connects Paint Branch Drive, near the Biomolecular Building, to the Paint Branch Trail and bridge across Paint branch – which provides access to off campus residential building lining the Baltimore Ave corridor. At Paint Branch Drive, the trail splits into two closely-spaced uncontrolled crosswalks – one at the driveway for the Biomolecular Sciences Building and one about 40 feet to the south (midblock).

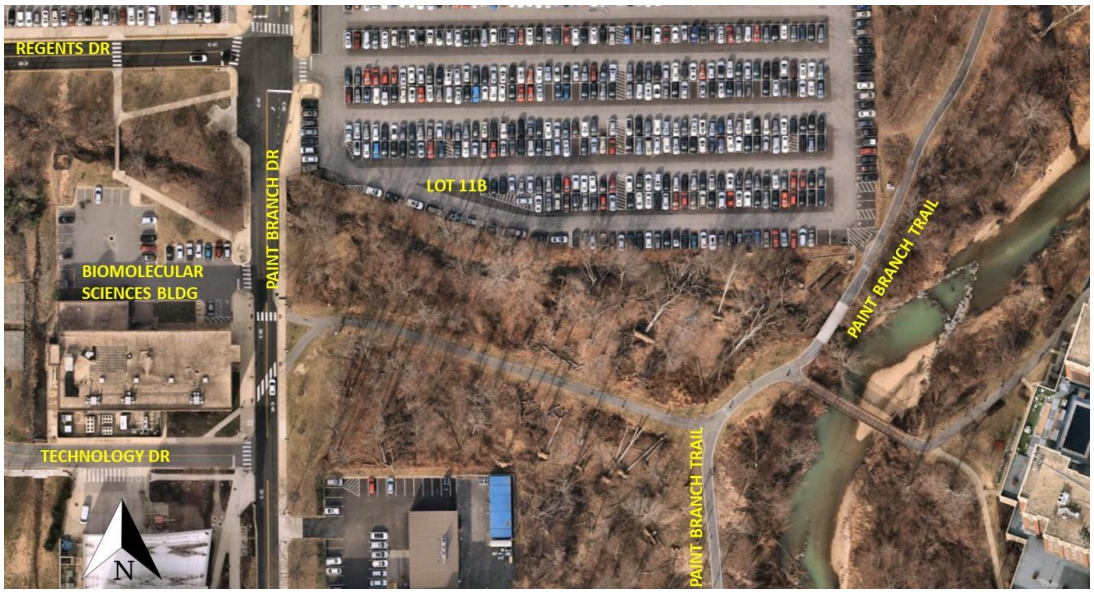

FIGURE 37: EXISTING CONNECTOR BETWEEN PAINT BRANCH TRAIL AND PAINT BRANCH DRIVE

In order to tie into Segment 2 facilities more seamlessly and improve trail crossing safety, proposed is a new southern trail alignment that replaces the southern crossing of Paint Branch with a new one, opposite Technology Drive, as shown in Figure 38.

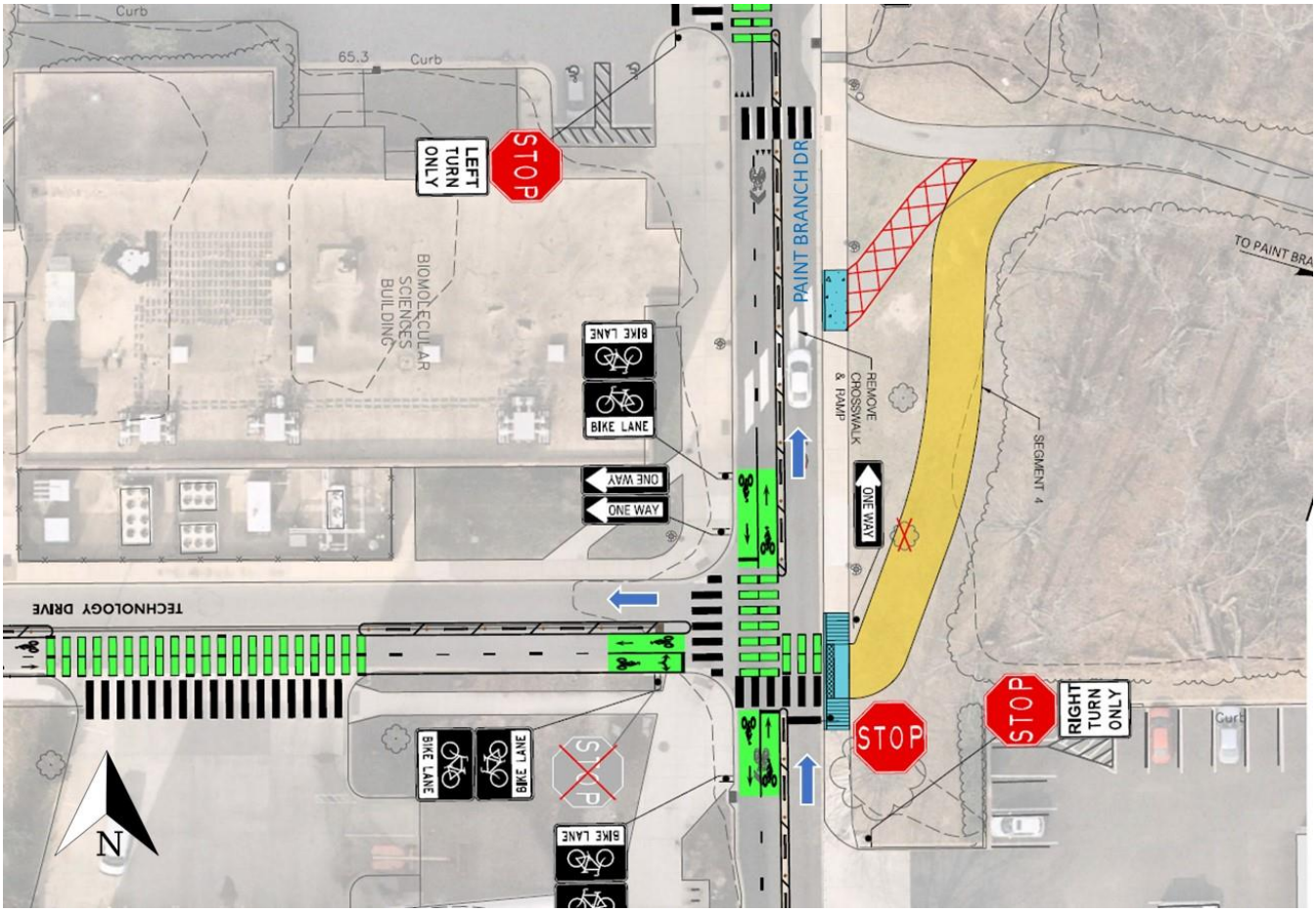

FIGURE 38: PROPOSED CONNECTION FROM PAINT BRANCH TRAIL TO TECHNOLOGY DRIVE

Figure 38 shows the existing diagonal crosswalk removed in favor of a shorter one, leading to Technology Drive and the proposed two-way cycletracks along Paint Branch Drive. This crossing is also proposed to have stop control for the northbound vehicle lane, to add a layer of safety for walkers and cyclists from Paint Branch Trail. The realigned connection is shown in orange in Figure 38 and is wider to allow for cyclists and walkers to travel in separated space. While the diagonal crossing and associated trail is removed and relocated to Technology Drive, the northern connection to the Molecular Biosciences building is retained.

B. Connection to Engineering Drive

Behind the AV Williams building is a short trail connection from the Paint Branch Trail into Lot GG, as shown in Figure 39. Trail users that enter at Lot GG utilize the lot's access road to get to Engineering Drive and Paint Branch Drive; this road curves behind the building, obscuring the view of walkers and cyclists from inbound vehicle traffic.

FIGURE 39: EXISTING CONNECTION BETWEEN PAINT BRANCH TRAIL AND ENGINEERING DRIVE

Accordingly, proposed is a new connector from the Paint Branch Trail, along a different alignment, which avoids the back lot GG and provides greater visibility between trail users and drivers. Shown in Figure 40 is a new hard-surface trail connection for walkers and cyclists that avoids the lower lot GG and its access road and is aligned with Engineering Drive.

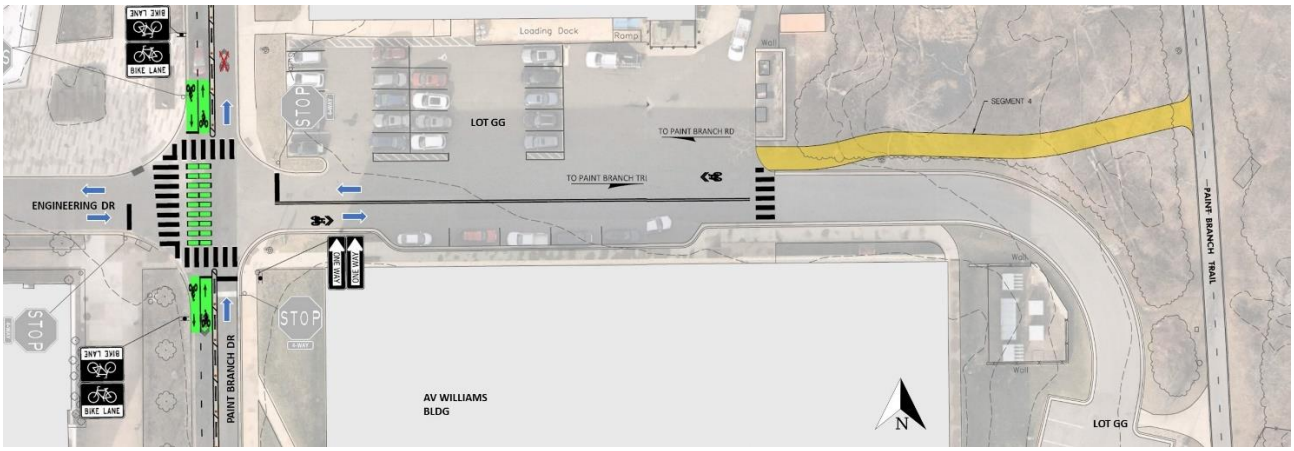

FIGURE 40: PROPOSED NEW PAINT BRANCH TRAIL CONNECTION TO ENGINEERING DRIVE

A crosswalk to existing sidewalk is also proposed along with a double yellow center line and sharrows along the access road. The access road has existing overhead lighting adjacent to the proposed path and there is additional wall pack lighting on the AV Williams building facing the proposed path.

Finally, there is an elevation change between the Lot GG access road and the Paint Branch Trail of about 8 feet over the course of the proposed 200-foot long trail. However, proper trail design following PROWAG[9] can ensure ADA compliance.

C. Paint Branch Trail Connection to Stadium Drive

This well-established connection consists of sidewalk and concrete plaza and is and one of the busiest pathways on campus for walking and biking. However, there is a desire by DOTS to establish a delineated travel way at its approach to Stadium Drive that separates walkers from cyclists and scooter riders – particularly if Stadium Drive will have proposed separated facilities for biking and scooters. Accordingly, as shown in Figure 41, proposed are texture and visual improvements to the approach from the concrete walkway to the intersection of Stadium Drive at Paint Branch.

[9] Public Right of Way Access Guidelines, https://www.access-board.gov/prowag/

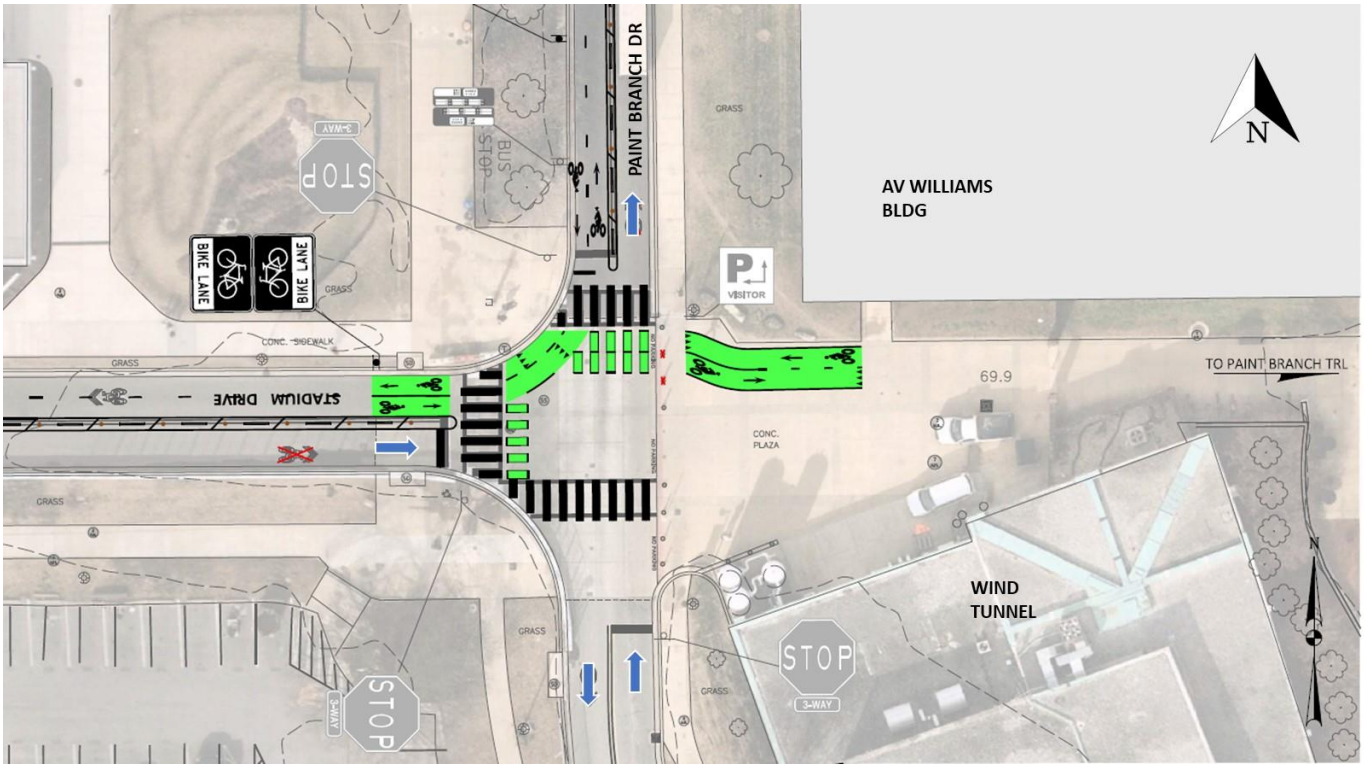

FIGURE 41: PROPOSED DELINEATION MARKINGS ON CONCRTE PLAZA, OPPOSITE STADIUM DR

While Figure 41 shows an example of coloring the concrete to denote dedicated biking/walking facilities, there are options where parallel walking and biking facilities coexist with different pavement types, textures, or colors. An example of differing pavement textures can be seen in Figure 42, where smooth green painted concrete was used for cycling/scooters, while stamped concrete was applied to designate space for walkers. The chosen form of modal delineation will be determined during the 30% design phase.

FIGURE 42: PARALLEL BIKING AND WALKING FACILITIES IN SEVILLE (SOURCE: DUTCH CYCLING EMBASSY.)

7. Estimated Project Cost

Cost estimates at the conceptual design stage can differ vastly from final construction cost, as there are still many design details to be determined. Additionally, some projects can be combined into other overlapping plans on campus. For example, the proposed bike path in Segment 1 traverses through Lot 1 and Lot Z, which is currently in being re-designed under a separate contract/project.

Generally, in-roadway designs have lower cost than side paths or roadway widening projects, because no modifications are proposed for the pavement or adjacent sidewalk, curb and gutter, as well as any overhead

or underground utilities. These designs usually consist of removing existing pavement markings and related signage and replacing them with new markings and signage. Additionally, protected cycletrack have a vertical element to them, in addition to a horizontal buffer between them and the roadway. Examples of such barriers can vary in price from $2 and $20 per linear foot to install, depending on the type and spacing between elements. Lane markings (e.g., hatched buffer striping, dashed center line striping, and bike symbol pavement markings) on aggregate can be approximated at $5 per linear foot)

In addition to cycletracks, new side paths are proposed in this study – both in-road and behind existing curbs. Side paths that are elevated and replace existing travel lanes are generally much more expensive than side paths that are constructed behind curbs, where they replace turf or a narrow sidewalk. The former tends to have larger stormwater management requirements, higher excavation costs, and more utility relocations, as well as a need for new curb and gutter to provide user safety and drainage for stormwater runoff. Additionally, constructing paths on grass or over narrow sidewalk can sometimes require additional re-grading of adjacent land, but the benefit is that designs can be modified as needed to gently jog around utility poles and lights that can be expensive to otherwise relocate. Side paths typically are constructed at a shallow depth and don't interfere underground utilities. Generally, the cost to construct a shared use path is about $100 per linear foot. Other additional costs related to new paths can include new lighting, permitting costs, stormwater management mitigation, landscaping, earthwork, and mobilization of construction equipment.

Based on MDOT's *Planning Level Cost Estimating Tool For Bicycle Infrastructure Projects,* along with recent construction bid tabulations, using the quantities from the concepts in their current form, the estimated cost for each segment is shown in Table 2.

TABLE 2: PLANNING-LEVEL CONSTRUCTION COSTS FOR PROPOSED CONCEPTS

Segment	Sub-segment	Unloaded Construction Cost	Contingency Cost	Design Cost
Segment 1	UMD Segment 1A: Two-way Cycle Track and Side Path from Denton Quad to Fieldhouse Drive (Lot 1/Z):	$ 54,300	-	$ 27,200
	Segment 1B: Alumni Drive - North Lot 1:	$ 657,000	-	$ 328,500
	Segment 1C: Alumni Drive South Lot 1:	$ 369,800	-	$ 184,900
	UMD Segment 1D: Sidepath between Mowatt Circle and Knox Road:	$ 580,300	-	$ 203,100
	UMD Segments 1E: Sidepath between Mowatt Circle and Presidential Drive:	$ 136,200	-	$ 68,100
	UMD Segment 1F: Preinkert Drive:	$ 129,000	-	$ 45,200
Subtotal for Segment 1		*$ 1,926,600*		*$ 857,000*
Segment 2	UMD Segment 2A: Sidepath between MD-193/University Blvd. & Terrapin Trail:	$ 207,600	-	$ 103,800
	UMD Segment 2B: Interim in-road Paint Branch Drive between Terrapin Trail and Regents Drive Extended:	$ 54,600	-	$ 19,100
	UMD Segment 2C: Sidepath Option between Terrapin Trail and Lott 11B (replaces Interim Segment 2B):	$ 635,800	-	$ 286,100
	UMD Segment 2D: Sidepath Option between Lots 4b and Lott UU:	$ 333,700	-	$ 116,800
	Segment 2E: Two-way in-road Cycle Track Loop: Paint Branch Drive, Technology Drive and Stadium Drive all one-way travel lanes:	$ 90,100	-	$ 31,500
	Segment 2F: Regents Drive Reconstruction Lot UU to Campus Drive: new sidewalk, new cycletrack, widened roadway at select locations	$ 1,389,800	-	$ 416,900
Subtotal for Segment 2		*$ 2,711,600*		*$ 974,200*
Segment 3	UMD Segment 3: Parallel Bike Only Path:	$ 388,100	-	$ 194,000
Subtotal for Segment 3		*$ 388,100*		*$ 194,000*
Segment 4	UMD Segment 4A: Paint Branch Trail Connector to Technology Drive:	$ 64,100	-	$ 32,100
	UMD Segment 4B: Paint Branch Trail Connector to Engineering Drive:	$ 171,900	-	$ 85,900
	UMD Segment 4c: Paint Branch Trail Connector to Stadium Drive:	$ 6,100	-	$ 6,100
Subtotal for Segment 4		*$ 242,100*		*$ 124,100*
	Subtotal all segments	$ 5,268,400		$ 2,149,300
	Design Contingency @ 15% Design Subtotal	$ -		$ 322,400
	Construction Escalation @ 5% of Subtotal	$ 263,400		$ -
	Owner's Contingency Costs @ 20% of Subtotal & Escalation	$ 1,106,400		$ -
	Other Construction Costs @ 2% of Subtotal & Escalation	$ 110,600		$ -
	Testing & Inspection Cost	$ 275,000		$ -
	Project Manager Expense Recovery	$ 450,000.00		$ -
		$7,473,800 Total Construction Cost		$2,471,700 Total Design Cost
	TOTAL PROJECT COST		**$ 9,950,000**	

8. Next Steps and Project Phasing

Combined, the proposed paths and bike lanes would add approximately 4 miles of dedicated cycling/scooter infrastructure on the UMD campus, splicing together a network of existing and planned trails to develop an off-road and protected-lane multimodal grid network. The concepts shown in this report and its appendix are the first step in a multiphase process. The next step is to refine the concepts and choose between multiple options based on practicality, cost, constructability, and cohesion with near-term and long-term planning efforts detailed in the UMD *Facilities Plan* update.

Next, project phasing will be determined. Several projects are likely to proceed into 30% design, however, some projects can proceed quicker than others, because they are easier to build and design, align with scheduled construction activities, or require little in the way additional permitting or stormwater mitigation.

Additionally, some of the concepts will be combined with other projects already in the design phase. For example, Lot 1 and Lot Z, north of Campus Drive, where a proposed bike path and sidewalk is recommended for segment 1, is currently in design under a different contract and project purpose and need. Additionally, any design that overlaps with Campus Drive will require input and concurrence by the Maryland Department of Transportation, as it is now a State-owned and maintained roadway. Another factor that plays a role in project phasing is continuity; for example, constructing a segment that does not join with another segment that is under construction or an existing trail, doesn't serve the cycling community. Finally, during the 30% design phase, UMD will begin obtaining funding for 100% design packages and for facility construction.

A. Project Phasing Recommendations

Recommended phasing for construction, based on ease of design, ease of construction, overlap with existing unrelated projects in design, and connectivity to existing biking infrastructure, is as follows:

- Phase 1:
  - Segment #2: Two-way Cycletrack loop for Stadium Drive, Paint Branch Drive, Technology Drive, and Regents Drive
  - Segment #4: Technology Drive to Paint Branch Trail Connector
  - Segment #4: Stadium Drive to Paint Branch Trail Connector Plaza improvements.
  - Segment #2: Regents Drive Cycletrack from Stadium Drive to Campus Drive
- Phase 2:
  - Segment #3: Entirety of either option
  - Segment #1: Mowatt Lane Side Path
  - Segment #1: Side Path between Presidential Drive and Mowatt Circle
  - Segment #2: Side path from MD 193 to Regents Drive
  - Segment #4: Engineering Drive to Paint Branch Trail
- Phase 3:
  - Segment #1: Lot 1 and Lot Z bike paths
  - Segment #1: Preinkert Drive cycletrack.

Note that an interim road diet and two-cycle track pilot project is planned for construction in the summer of 2024 for Paint Branch Drive from MD 193 to Regents Drive.

In the Spring of 2024, 30% design will commence for the projects that the University intends to fund for construction by the time that Purple Line is completed. During this process, the conceptual designs will be refined with specific details determined, such as precise path widths and locations, bike lane protection elements, and other related features, such as colored pavement markings, typical cross-sections, and conceptual stormwater design. In addition, a more robust cost estimate will be developed.