



2018 MASTER PLAN FOR THE CONSOLIDATION OF THE U.S. FDA HEADQUARTERS AT THE FEDERAL RESEARCH CENTER AT WHITE OAK LOCATED IN SILVER SPRING MARYLAND

Final Environmental Impact Statement: Appendix G

August 2018

Prepared by:



In cooperation with:



APPENDIX G – Transportation Technical Report

Appendices

FDA Master Plan

Traffic Technical Report



General Services Administration



November 2017

PROJECT SUMMARY

INTRODUCTION

This Traffic Technical Report has been prepared for the United States General Services Administration (GSA) and the United States Food and Drug Administration (FDA) to assess and report potential transportation impacts resulting from the proposed expansion of the Federal Research Center (FRC) campus in White Oak, Maryland (White Oak campus). The proposed expansion would consist of an increase in the number of employees and support staff assigned to the campus from 10,987 to up to approximately 18,000, through a combination of internal growth as well as the consolidation of approximately 2,495 employees from other leased locations in Montgomery County and Prince George's County, Maryland. To accommodate the planned growth, an additional 1,550,000 gross square feet (GSF) of building space and approximately 7,463 additional parking spaces for a total of 10,094 spaces (about 1 parking space for every 1.8 employees), is proposed.

EXISTING CONDITIONS

The existing roadway networks within the vicinity of FRC were assessed to provide a baseline to compare to future conditions. Twenty-seven intersections were analyzed as part of the study area, five (5) of which are internal to the campus. All study area intersections operate at an overall level of service (LOS) D or better, except for six intersections which operate at a LOS E or F in at least one peak hour.

FUTURE NO ACTION ALTERNATIVE

The future No Action Alternative evaluates the future transportation network with future volumes, excluding FDA Master Plan growth. It includes traffic growth due to nearby developments, increases in background traffic, and future development and infrastructure enhancements recommended in the *White Oak Science Gateway Local Area Transportation Review (2016)*, prepared by Sabra, Wang & Associates for Montgomery County. It should be noted that if the White Oak Campus is not expanded to accommodate FDA growth needs, it is likely that growth would occur at other sites. However, analyzing this potential offsite growth is outside the scope of the study and not analyzed as part of the No Action Alternative.

Under the No Action Alternative, delay and queuing are anticipated to increase at all study area intersections. Twelve of the 27 study area intersections would operate at an overall LOS E or F in one or more peak hours.

FUTURE ACTION ALTERNATIVE

While there are currently multiple massing alternatives that would provide the additional 1,550,000 GSF and approximately 7,463 parking spaces, all the alternatives locate the proposed buildings and parking garages in the same approximate location on the campus. Therefore, one Future Action Alternative is being considered as part of this traffic analysis. The Future Action Alternative

examines future anticipated volumes on the study area roadway network, taking into consideration traffic volumes and infrastructure improvements under the No Action Alternative as well as traffic that would be generated by the expansion and consolidation on the White Oak Campus.

Under the Action Alternative, most intersections would continue to operate at an overall LOS that is similar to that of the No Action Alternative. Fifteen of the 27 study area intersections would operate at an overall LOS E or F in one or more peak hours. In addition to the external intersections, internal intersections adjacent to the primary entry points on Mahan Road and Michelson Road would operate at LOS F in both peak hours.

EMPLOYEE SURVEY

Online surveys of existing on-campus and off-campus employees were conducted to determine current commuting patterns and how they might change after the consolidation. The survey examined the modes by which employees travel to work, working hours, telecommuting, origin/destination, possible improvements to transit options, and reasons for mode choice. The results show that approximately 25% of existing on-campus employees commute by modes other than driving alone, while only 14% of off-campus employees commute by modes other than driving alone. If consolidated to the White Oak Campus, approximately 21% of off-campus employees would commute by modes other than driving alone. In addition to commuting by other modes, FDA offers a robust telework program. Only 31% of on-campus employees typically work all five days on campus, and 87% of off-campus employees report telecommuting at least one day per week, on average.

CONCLUSIONS AND MITIGATION

The results of the study show that the consolidation and expansion at the White Oak Campus would have an adverse impact on traffic conditions within the study area. Given the congested nature of the study area corridors, the additional development in the area, combined with trips generated by the proposed consolidation and expansion, would require a combination of intelligent transportation technology, transportation demand management programs, additional roadway capacity, and improved transit, pedestrian, and bicycle facilities. Recommended mitigation measures include:

Intelligent Transportation Technology

- Evaluate the installation of traffic adaptive/demand responsive signal systems along Columbia Pike (US 29), New Hampshire Avenue (MD 650), and Cherry Hill Road.
- Install Dynamic Message Signs (DMS) along Columbia Pike (US 29).

Transportation Demand Management

- Enhance the existing transportation demand management (TDM) program to encourage more employees to commute via modes other than driving alone. A transportation management plan (TMP) will be developed for the site as a separate document in 2018.
- Expand the commuter shuttle system to include direct shuttle service to and from Park and Ride facilities along the I-270 corridor.
- Work with Montgomery County and the Maryland Department of Transportation State Highway Administration (MDOT SHA) to identify the potential for new park-and-ride facilities near major interchanges to reduce localized impacts.

Additional Roadway Capacity

The following table lists the intersections that require mitigation, the recommended mitigation measures, as well as the lead agency that would be needed to implement the recommendations. However, it should be noted that, due to existing and projected No Action Alternative congestion on the study area roadway network, not all increases in delay and queuing could be mitigated. Several intersections along Columbia Pike (US 29), as well as the intersection of New Hampshire Avenue (MD 650) and Powder Mill Road could not be fully improved given the existing geometry and ROW constraints. Improvements like grade separation, which was previously planned by MDOT SHA for signalized intersections along Columbia Pike (US 29), would need to be coordinated through MDOT SHA and Montgomery County. Conversion of the at-grade intersections to interchanges is a long-term project; therefore, the Action with Mitigation evaluates alternative enhancements only. It is assumed that delay and queuing at those intersections would be mitigated once they are converted to interchanges.

| Intersection | Description of Mitigation | Agency |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| New Hampshire Avenue (MD 650) & Powder Mill Road | <p>Optimize signal phase lengths.</p> <p>Significant modifications are required to address existing and future anticipated capacity deficiencies. Mitigation would require significant ROW acquisitions for additional northbound and southbound left-turn and right-turn lanes and/or grade separation. Potential improvements noted in the White Oak Local Area Transportation Review Intersection Improvement Cost Evaluation prepared by Sabra, Wang & Associates included an additional northbound right-turn lane.</p> | MDOT SHA and Montgomery County for long-term improvements. |
| New Hampshire Ave (MD 650) & Schindler Drive/Mahan Road | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Restripe westbound Mahan Road to provide two left-turn lanes, a shared through-right and a right-turn lane. This is required to accommodate the heavier right-turn movement (621 vph) with the reduced cycle length. The anticipated left-turn volume (527 vph) from Mahan Road would be accommodated with two left turn lanes.</p> <p>Consider lead pedestrian intervals to accommodate pedestrians in advance of the double right turn.</p> | FDA/GSA in coordination with Montgomery County. |
| SW Loop Road/NW Loop Road & Mahan Road/FDA Circle | Restripe eastbound Mahan Road to provide one left-turn lane, one shared through/right-turn lane and one free-flow right-turn lane. | FDA/GSA |
| NW Loop Road & Michelson Road | Add a separate right-turn lane on northbound NW Loop Road. | FDA/GSA |

| Intersection | Description of Mitigation | Agency |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <p>New Hampshire Ave (MD 650) & Northwest Drive/Michelson Road</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Provide two right-turn lanes on westbound Michelson Road. This is required to accommodate the heavier right-turn movement (756 vph) with the reduced cycle length. The anticipated left-turn volume (253 vph) from Mahan Road would be accommodated with two left turn lanes. The right-turn will be overlapped with the southbound left-turn movement and the curb lane will be permitted to turn right on red.</p> <p>To avoid cut-through traffic from the FRC via Northwest Drive, a “No Thru Traffic” sign should be posted.</p> <p>Consider lead pedestrian intervals to accommodate pedestrians in advance of the double right turn.</p> | <p>FDA/GSA in coordination with Montgomery County.</p> |
| <p>New Hampshire Ave (MD 650) & Lockwood Drive</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Restrict the eastbound Lockwood Drive left-turn movement to northbound New Hampshire Avenue (MD 650). Reroute vehicles wishing to travel northbound on New Hampshire Avenue (MD 650) along westbound Lockwood Drive to Columbia Pike (US 29) and then to the New Hampshire Avenue (MD 650) interchange. The peak period left turn volume is less than 200 vph. Eliminating the left-turn allows for improved operation of the opposing approach, as well as New Hampshire Avenue (MD 650).</p> <p>Restripe westbound Lockwood Drive to provide three left-turn lanes, one through lane, and one right-turn lane.</p> | <p>FDA/GSA</p> <p>Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP.</p> |
| <p>Columbia Pike (US 29) & Lockwood Drive</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> | <p>MDOT SHA and Montgomery County</p> |
| <p>Columbia Pike (US 29) and Stewart Lane</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Convert to a grade-separated interchange (long-term).</p> | <p>MDOT SHA and Montgomery County</p> |
| <p>Columbia Pike (US 29) & Tech Road and Industrial Parkway</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Provide three left-turn lanes on southbound Columbia</p> | <p>Coordinate with Montgomery County for improvements. These should be</p> |

| Intersection | Description of Mitigation | Agency |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>Pike (US 29) at Industrial Parkway.</p> <p>Widen Industrial Parkway to three lanes in each direction.</p> <p>Provide three right-turn lanes from northbound Old Columbia Pike to eastbound Industrial Parkway.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> | <p>added into planned upgrades currently included in the White Oak LATR/LATIP.</p> <p>MDOT SHA for grade-separation.</p> |
| Tech Road & Industrial Parkway | <p>Add an additional northbound left-turn lane.</p> <p>Stripe the additional eastbound lane added from the Columbia Pike (US 29) intersection to become a right-turn only lane to Tech Road.</p> | <p>Coordinate with Montgomery County improvements. These should be added into planned upgrades currently included in the White Oak LATR/LATIP.</p> |
| Columbia Pike (US 29) & Musgrove Road | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> | <p>MDOT SHA for grade-separation.</p> |
| Columbia Pike (US 29) & Fairland Road | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Remove the Columbia Pike (US 29) northbound left-turn movement and direct vehicles to turn right onto Fairland Road and access westbound Fairland Road via a U-turn at the downstream traffic circle or by turning left at Musgrove Road.</p> <p>Provide two eastbound and two westbound left-turn lanes and eliminate split phasing.</p> <p>Provide a separate northbound right-turn lane.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> | <p>Coordinate with Montgomery County and MDOT SHA for improvements.</p> <p>MDOT SHA for grade-separation.</p> |
| Cherry Hill Road & Broadbirch Drive/Calverton | <p>Optimize signal phase lengths.</p> | <p>Coordinate with Montgomery County as part of planned upgrades currently included</p> |

| Intersection | Description of Mitigation | Agency |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Boulevard | | in the White Oak LATR/LATIP. |
| Cherry Hill Road & FDA Boulevard | Provide a second left turn lane for northbound Cherry Hill Road. Provide a free-flow right-turn movement from southbound Cherry Hill Road to westbound FDA Boulevard that ties into the additional lane recommended for the intersection of FDA Boulevard and Future Roadway B-5. | Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP. |
| FDA Boulevard & Future Roadway B-5 | Widen westbound FDA Blvd to three lanes between Cherry Hill Road and Future Roadway B-5. The additional lane becomes a right-turn only lane at Future Roadway B-5. | Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP. |
| FDA Boulevard & Industrial Parkway | Monitor the operation of the proposed roundabout. Consideration should be given to northbound and westbound right-turn bypasses to minimize volume in the circulating roadway. | Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP. |
| Cherry Hill Road & Powder Mill Road (MD 212) | Optimize signal phase lengths. | Coordinate with Prince George's County |

Transit, Pedestrian, and Bicycle Facilities

Several enhancements are recommended to provide better connections for alternative modes, such as transit, pedestrians, and bicyclists. These recommendations include:

- Provide a 10-foot wide multi-use path and/or five-foot, protected, directional bike lanes along the campus loop roads that connect pedestrian and bicycle facilities on the external roadway network to the on-campus facilities (Figure 33).
- Utilize bicycle lanes or sharrows on minor streets to connect the loop road facilities with bicycle parking near building entrances.
- Ensure that sidewalks are a minimum of six feet. Wider sidewalks are recommended in areas with higher pedestrian volumes.
- Provide a minimum five-foot buffer between the sidewalk/multi-use path and the travel lanes along loop roadways.

- Pedestrian/bicycle-accessible security gates.
- Provide pedestrian crosswalks at all intersections, as well as mid-block where needed to connect origins and destinations (i.e. parking garage to building). Rectangular rapid flashing beacons should be considered at all crosswalks.
- Enhance lighting for sidewalks and shared-use paths. Utilize attractive but security-conscious landscaping and provide emergency call boxes throughout campus, as well as along Dahlgren Drive.
- Provide secure, covered bicycle parking near building entrances and/or U-racks if such facilities are infeasible. FDA currently provides locker room and shower facilities as well as bicycle repair stations throughout the campus.
- Provide bikeshare docks adjacent to Building 1 as well as the transit center. Work with Montgomery County to determine how many bikeshare docks should be provided.
- Construct a new transit hub as close to Building 1 as possible. Incorporate features including, but not limited to:
 - A climate-controlled waiting area with amenities, such as benches, wi-fi, and real-time transit information;
 - Defined boarding and alighting areas for bus, BRT, and shuttle services;
 - A taxi/ridesharing waiting area that could be converted for use by automated vehicles in the future; and,
 - Public bike share stations.
- Enhance transit and shuttle services (see the Transportation Management Plan).
- Consider a pedestrian and bicycle connection to Lockwood Drive and the White Oak Transit Center.
- Upgrade the bikeway on the FDA side of New Hampshire Avenue to a ten-foot-wide shared-use path with a minimum five-foot-wide buffer to the travel lanes.
- Work with Montgomery County, MDOT SHA, and Prince George's County to enhance pedestrian and bicycle connections to nearby residential and commercial centers, as well as to regional pedestrian/bicycle path networks, including:
 - Enhance existing pedestrian crossings at signalized intersections within ½ miles of the campus, including lead pedestrian intervals and countdown signal heads.
 - Improved/shorter connection to the Northwest Branch Trail.
 - Expand the shared-use path to the north and south along New Hampshire Avenue.

The Transportation Management Plan (TMP) discusses other enhancements to the existing FDA shuttle program. The proposed enhancements would result in intersections that operate at similar, or better, levels of service when compared to the Action Alternative. Furthermore, the recommended intelligent transportation technology, transportation demand management, and additional pedestrian, bicycle, and transit facilities would provide additional benefits to reduce the transportation impacts of the proposed consolidation and expansion. While the benefits cannot be directly tied to the capacity analysis results, it can be assumed that these improvements would further help to mitigate the deficiencies identified in the Action Alternative.

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List of Acronyms

| | |
|-----------------|--------------------------------------------------------------------|
| ADA | Americans with Disabilities Act |
| FDA | Food and Drug Administration |
| FRC | Federal Research Center |
| GSA | General Services Administration |
| HCM | Highway Capacity Manual |
| ITE | Institute of Transportation Engineers |
| LATR | Local Area Transportation Review |
| LOS | Level of Service |
| MARC | Maryland Area Regional Commuter |
| M-NCPPC | Maryland-National Capital Park and Planning Commission |
| NADMS | Non-Auto Driver Mode Share |
| MDOT SHA | Maryland Department of Transportation State Highway Administration |
| TDM | Transportation Demand Management |
| TMP | Transportation Management Plan |
| TPAR | Transportation Policy Area Review |
| VRE | Virginia Railway Express |
| WMATA | Washington Metropolitan Area Transit Authority |

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CHAPTER 1: INTRODUCTION

This Traffic Technical Report has been prepared for the United States General Services Administration (GSA) and the United States Food and Drug Administration (FDA) to assess and report potential transportation impacts resulting from the proposed expansion of the Federal Research Center (FRC) campus in White Oak, Maryland (Figure 1). The proposed expansion would consist of an increase in the number of employees and support staff assigned to the campus from 10,987 to up to approximately 18,000 through a combination of internal growth, as well as the consolidation of approximately 2,495 employees from other lease locations in Montgomery County and Prince George's County, Maryland. To accommodate the additional employees, an additional 1,550,000 gross square feet (GSF) of building space and approximately 7,463 additional parking spaces, for a total of 10,094 spaces (about 1 parking space for every 1.8 employees), is proposed.

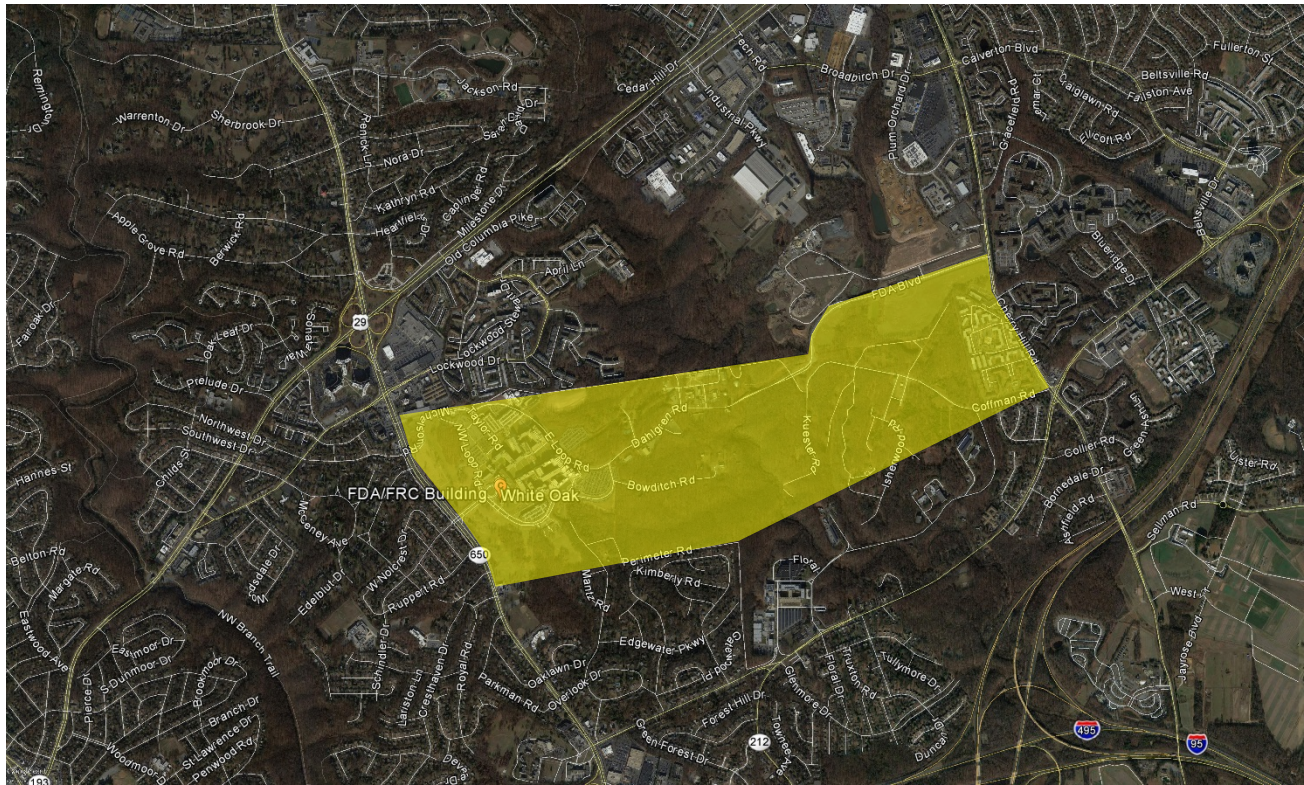


Figure 1: FDA FRC Project Area Map

This Traffic Technical Report will assess and evaluate the potential transportation impacts the proposed consolidation and expansion of the FDA White Oak Campus. While there are multiple massing alternatives currently being considered for the White Oak Campus, they consist of the same amount of GSF and parking spaces. Thus, only one Action Alternative and a No Action Alternative are being analyzed as part of this traffic report. The No Action Alternative evaluates the future transportation network with future volumes, excluding FDA Master Plan growth. It includes traffic growth due to nearby developments, increases in background traffic, and future development and infrastructure enhancements recommended in the *White Oak Science Gateway Local Area Transportation Review* (2016), prepared by Sabra, Wang & Associates for Montgomery County. The Action Alternative examines future anticipated volumes on the study area roadway network, taking into consideration traffic volumes and infrastructure improvements under the No Action Alternative

as well as traffic that would be generated by the expansion and consolidation on the White Oak Campus.

The report is divided into several sections. Chapter 2 will document the results of a supporting commuter survey of on- and off- campus employees. Chapter 3 will discuss the transportation network and the capacity analysis conducted for the study. Finally, Chapter 4 will summarize the findings and conclusions.

CHAPTER 2: EMPLOYEE TRANSPORTATION SURVEY

An employee survey was conducted via the internet from June 20, 2017 to July 14, 2017 to evaluate the commuting patterns of existing employees that are assigned to the White Oak Campus to estimate how future employees would commute to/from the campus and identify opportunities to enhance non-auto modes. A separate survey was also distributed to existing employees that currently work in off-campus leased buildings and that are anticipated to be consolidated to the White Oak Campus. The surveys investigated the modes by which employees travel to work, working hours, telecommuting, origin/destination, possible improvements to transit options, and reasons for mode choice. Copies of the surveys are in Appendix A.

ON-CAMPUS EMPLOYEE SURVEY RESULTS

An email containing a link to the on-line survey was distributed to 9,127 employees. For this population, a sample size of 1,538 responses would make the results statistically significant; 1,834 or approximately 20%, responded. Therefore, it was determined that the survey results would be statistically significant. Furthermore, FDA provided population per building in which to compare to the response rates from each building to validate the results. As can be seen in Table 1, below, the survey responses rates from each building are consistent with the overall population distribution.

Table 1: Comparison of On-Site Population Distribution to the Distribution of Survey Results

| Building | Percentage of Employee Population | Percentage of Survey Responses |
|----------------------------------------------|-----------------------------------|--------------------------------|
| White Oak Building 1 | 2.62% | 2.35% |
| White Oak Building 130 - Office/Machine Shop | 0.03% | 0.05% |
| White Oak Building 2 | 3.85% | 0.60% |
| White Oak Building 21 | 5.34% | 4.32% |
| White Oak Building 22 | 18.27% | 18.16% |
| White Oak Building 31 | 2.26% | 2.30% |
| White Oak Building 32 | 8.47% | 9.68% |
| White Oak Building 51 | 12.65% | 15.26% |
| White Oak Building 52/72 | 4.33% | 3.88% |
| White Oak Building 62 | 2.03% | 1.86% |
| White Oak Building 64 | 1.38% | 1.31% |
| White Oak Building 66 | 13.21% | 14.93% |
| White Oak Building 71 | 10.00% | 10.23% |
| White Oak Building 75 | 15.55% | 15.04% |

The survey results for each question are summarized below.

Questions 1 through 3: Employee Demographics

Questions 1 through 3 asked employees about their role at FDA, the location of their current office, and the zip code of their residence. All but two respondents indicated they are employed by FDA. The two respondents are employed by GSA. Figure 2A shows that a similar percentage of employees work in Buildings 51, 66, and 75. Figure 2B shows the location of the buildings. Approximately 18.2% of employees are assigned to Building 22, which is occupied by CDER. Finally, Figure 3 illustrates the density of employee residences, with a darker color indicating a greater density. The results show high concentrations of employees along the I-270 and I-95/US 29 corridors, as well as within the Silver Spring area. A map with an overlay of zip codes, existing transit routes, and park-and-ride facilities is provided in the Transportation Management Plan.

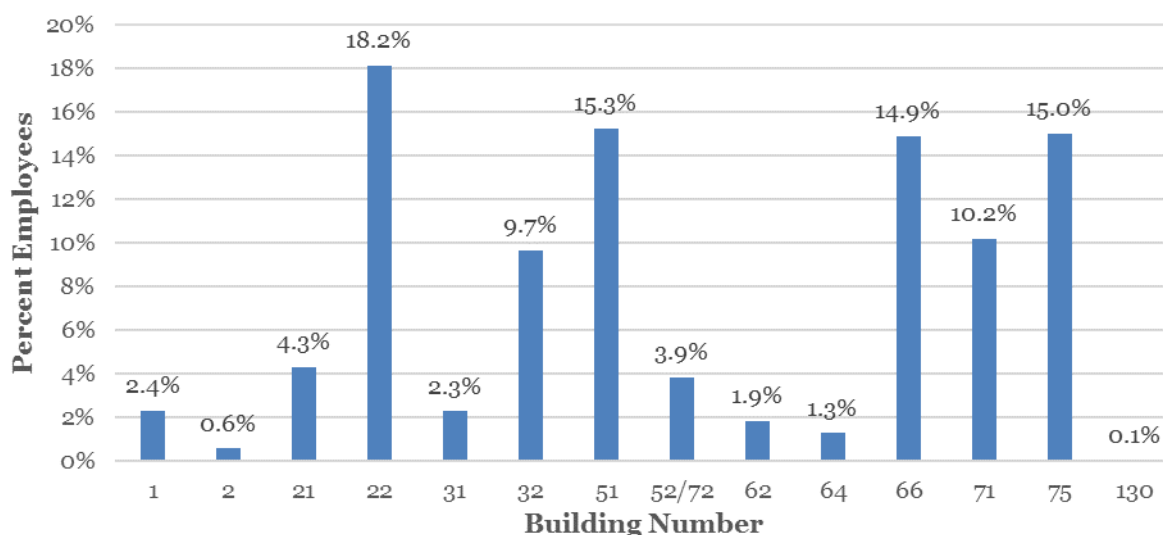


Figure 2A: On-Campus Respondent Work Location

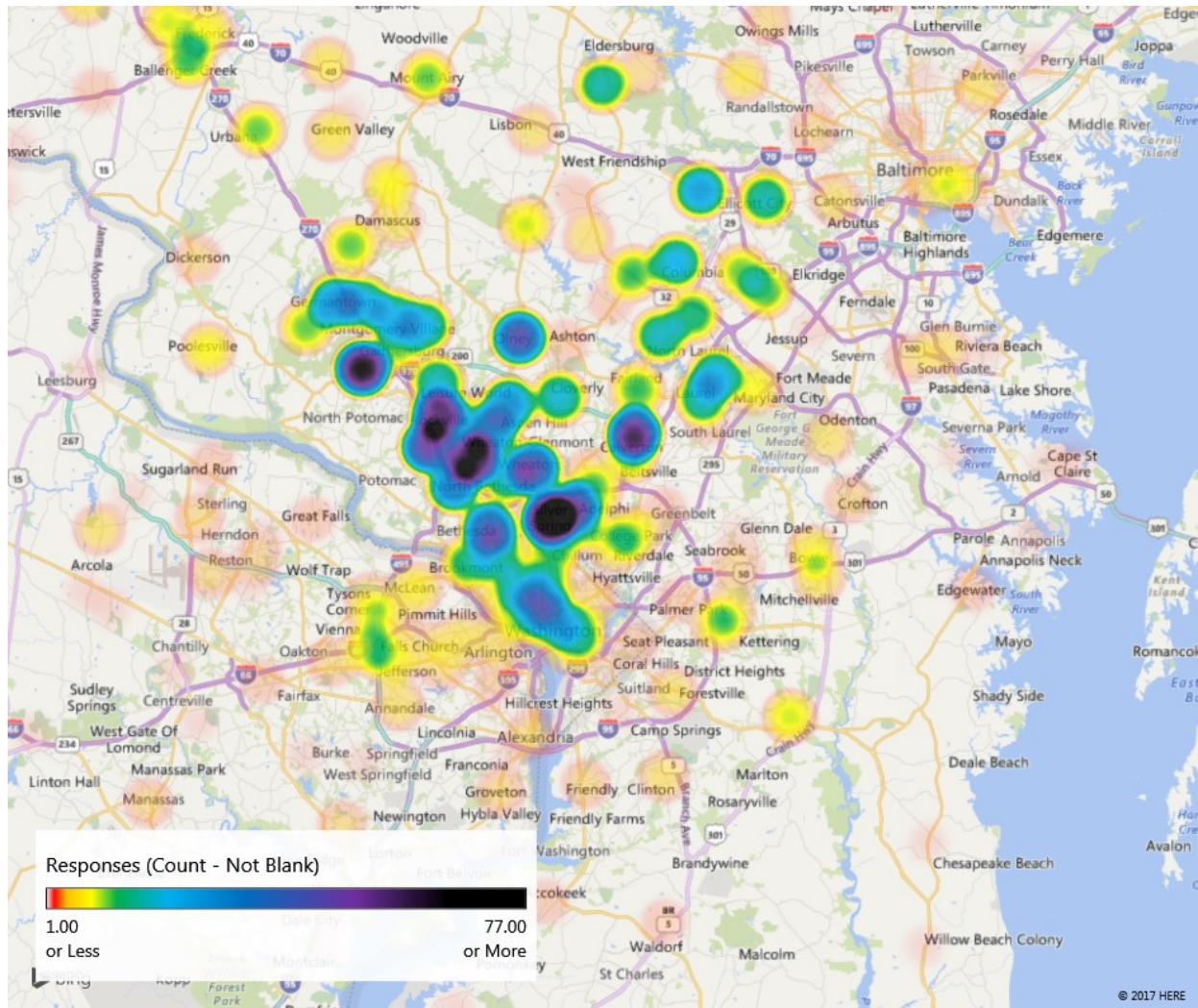


Figure 3: On-Campus Respondent Home Location

Questions 4 through 6: Work Habits

Questions 4 through 6 asked employees about their work habits including work schedule, arrival and departure times, and days of week that they work in the office. Most (about 86.7%) respondents work a typical 5 day/40 hours per week work schedule. However, less than a third (about 31.1%) of respondents are on campus every work day, which reflects the telework and compressed work week programs offered to employees (Figure 4). In addition, a majority, 62.3%, of employees arrive between 7:00 AM and 9:00 AM and 61.2% depart between 3:30 PM and 5:30 PM.

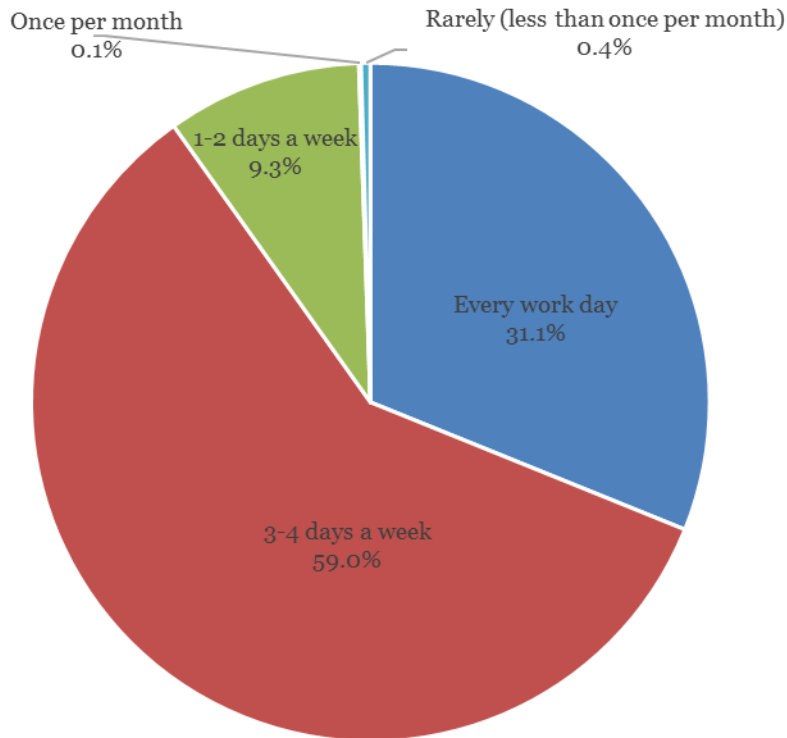


Figure 4: Frequency of Respondent on Campus

Question 7: Primary Commute Mode

Approximately 75% of respondents commute via personal vehicle. Of the remaining commute modes, almost 12% of respondents indicate that they carpool or vanpool to the office (Figure 5). This speaks to the robust carpool and vanpool program that has been implemented by FDA for the White Oak Campus. Other modes, including bus, rail, and shuttle make up the remaining 13%. Less than 1% of respondents commute via walking or biking.

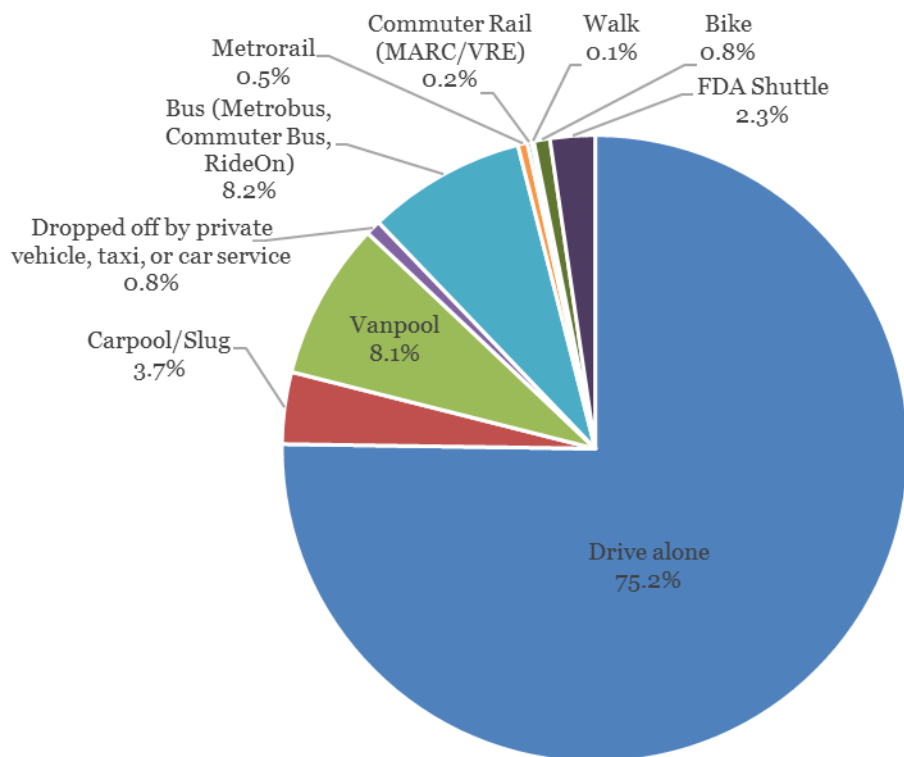


Figure 5: Current Commute Mode Split for On-Campus Respondents

Questions 8 through 10: Probability of Changing Commute Mode

Question 8 asked respondents that drive alone to work if they would be willing to consider alternatives mode of transportation. The results of the survey show that the majority of respondents (approximately 70%) would not be willing to consider any alternative mode of travel. Question 9 asks why these respondents would not consider an alternative mode of travel. One-third of respondents indicated that they had an unpredictable schedule. Other respondents (28.8%) need a car for childcare drop-off/pick-up and 25.9% like the comfort/convenience of their own vehicle (see Figure 6).

Question 10 asked employees if improvements to transit services would increase the likelihood that they would consider utilizing transit for commuting. It should be noted that this question allowed the selection of more than one answer. The results of the question are summarized in Figure 7. The results show that the largest percentage (approximately 37.5%) of respondents indicated that they would like more mass transit options from their home. Other significant responses included increasing the frequency, reliability, safety, and/or comfort of public transit (30%) and providing direct door-to-door service (29%). Some (30.4%) respondents were unwilling to consider mass transit.

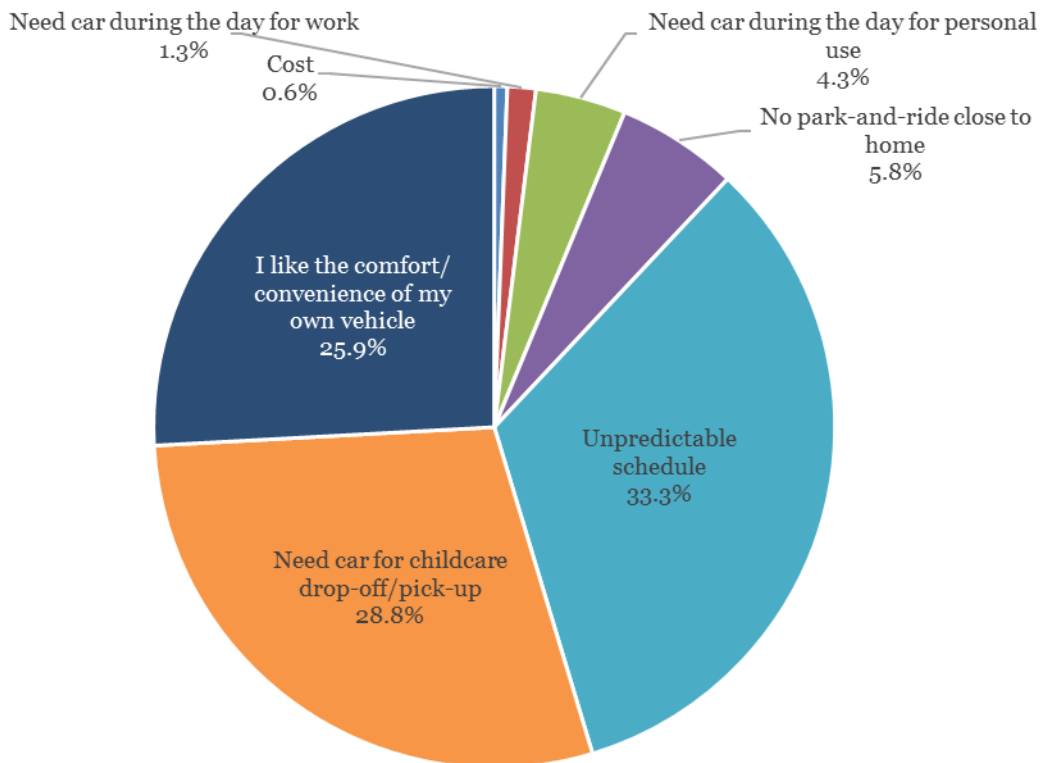


Figure 6: Reasons Why On-Campus Drive Alone Commuters Would Not Consider Alternative Commute Modes

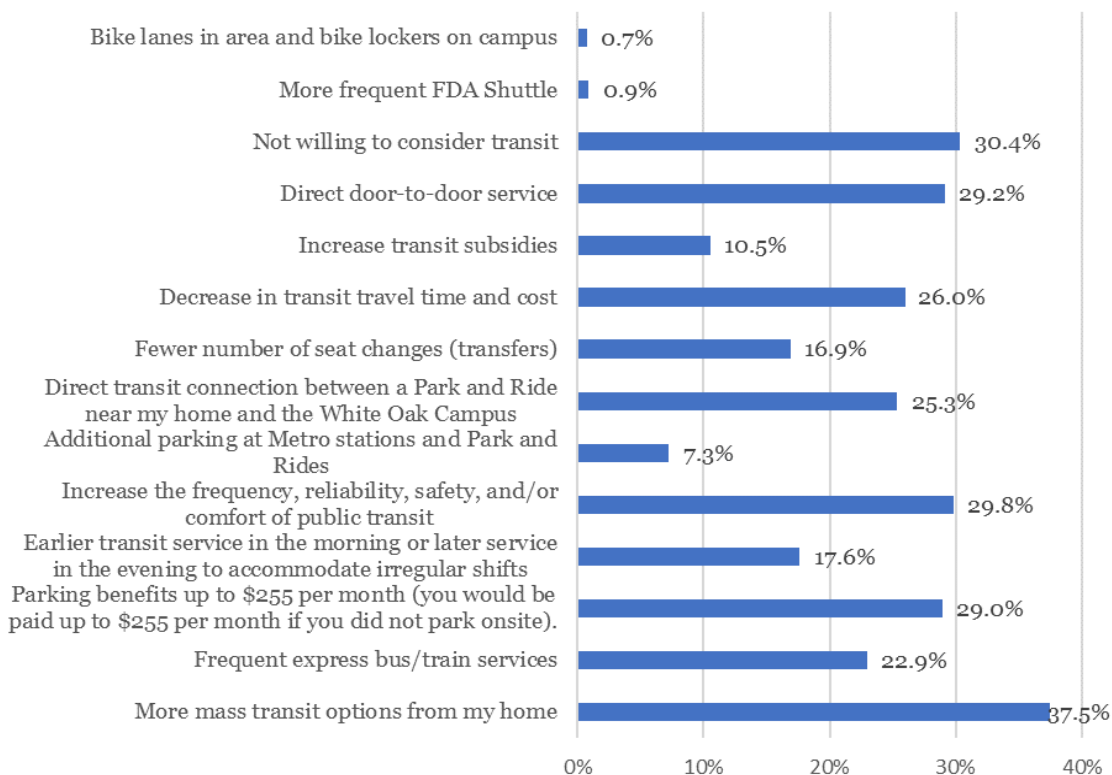


Figure 7: Improvements to Transit Services that would Encourage Drive Alone On-Campus Commuters to Consider Alternative Modes

Questions 11 and 12: Number of Respondents in a Carpool or Vanpool

Questions 11 and 12 asked those on-campus employees who indicated that they primarily carpool or vanpool to work about the number of persons in their carpool or vanpool. No carpool exceeded six persons, and the majority (approximately 81%) were two persons. Vanpool size varied from two to 17 persons, but the most common response was seven persons (about 26%).

Questions 13 through 15: On-Campus Parking for Drive Alone or Carpool/Vanpool Commuters

Questions 13 through 15 asked employees who drive alone or carpool/vanpool to work about parking on campus. Responses in Figure 8 reveal that the most popular parking facilities are the Northeast Parking Garage (18.6%), North Parking Garage (14.6%), Southwest Parking Garage (27.3%), and Southeast Surface Parking (14.6%). However, the results of Question 14 indicate that 75.9% of respondents feel that there is not enough parking available. A follow-up question (15) asked how an employee’s commute would change if more on-campus parking were provided. Just over half (56.3%) of respondents would not change their commute while 25% would be able to leave later but arrive to work at the same time (Figure 9).

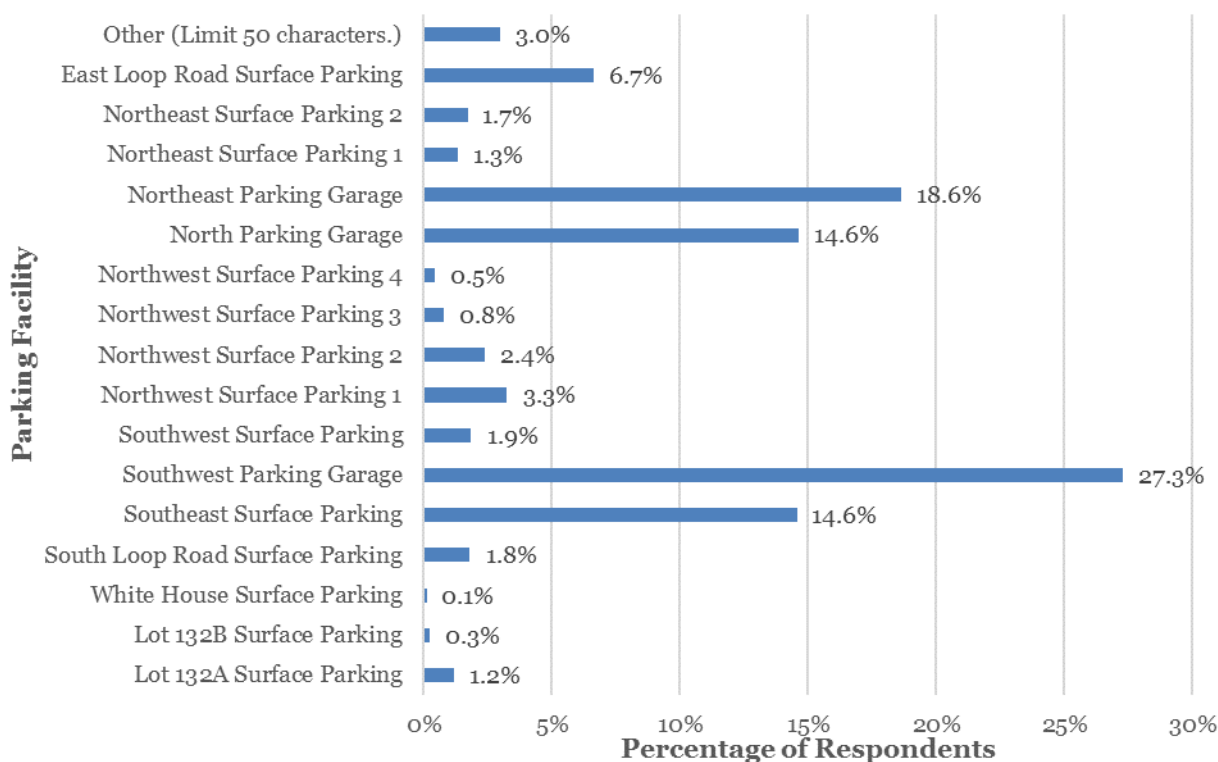


Figure 8: On-Campus Employee Parking Location

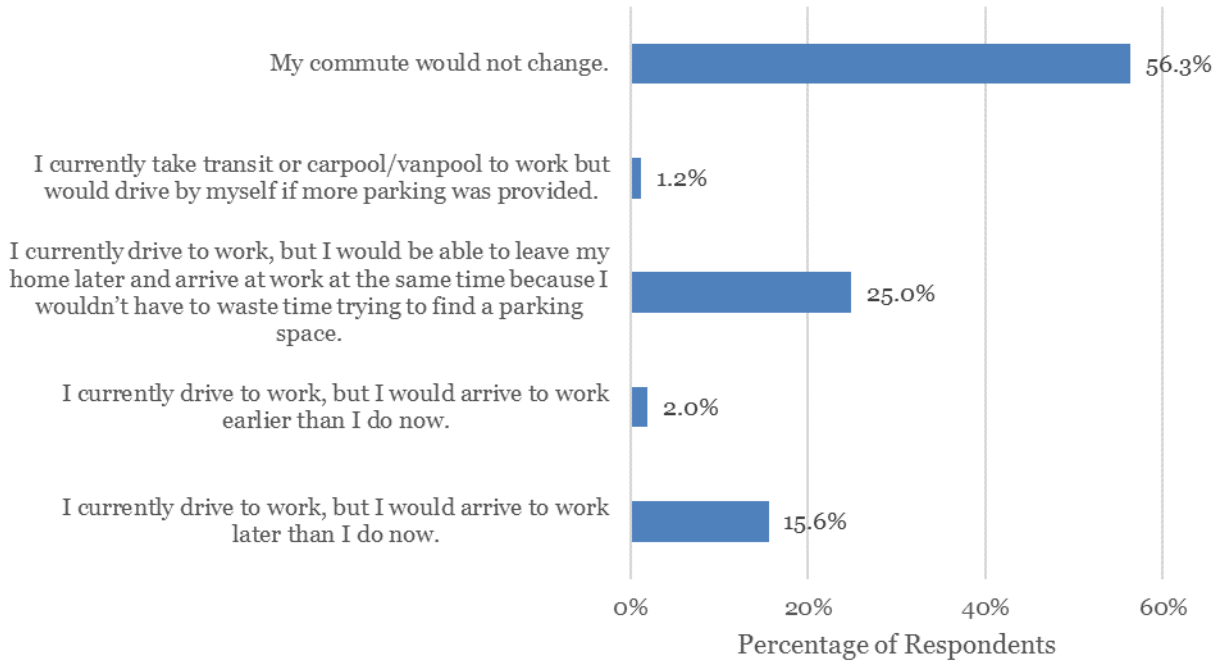
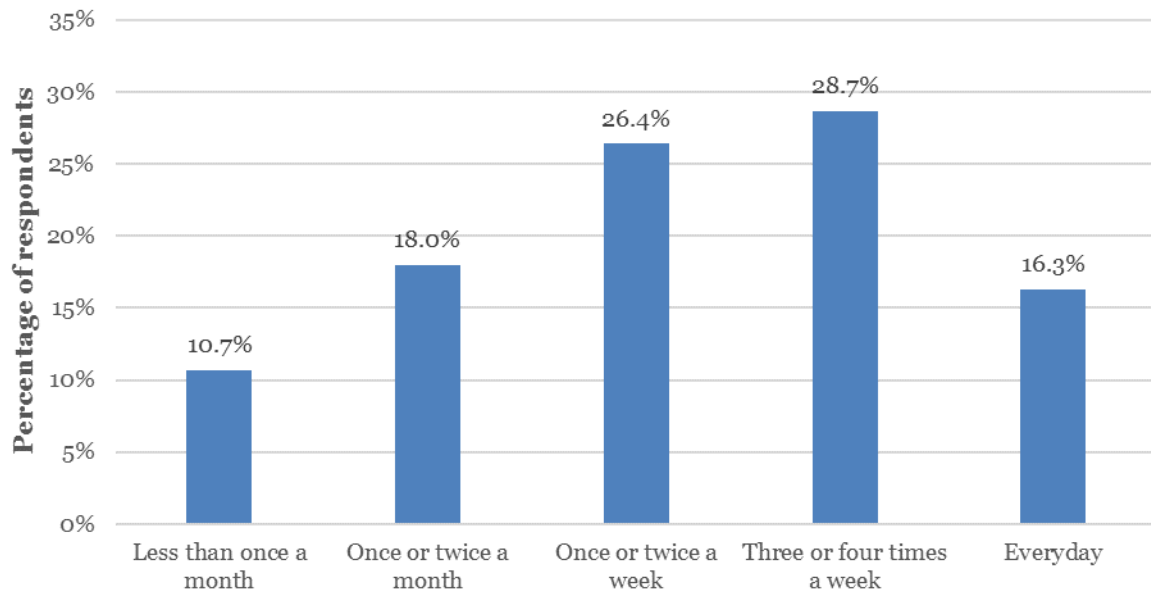


Figure 9: On-Campus Respondent Commute Change Due to Additional Parking

Questions 16 through 18: On-Campus and Commuter Employee FDA Shuttle Use

Questions 16 through 18 asked employees about their usage of the on-campus and commuter shuttles provided by FDA. The on-campus shuttle provides connection between buildings and parking areas on campus, while the commuter shuttle runs between the campus and six Metrorail stations on the Red and Green Lines from 6:00AM to 8:45PM. Based on the survey results, only 8.2% of respondents use shuttle as part of their commute. Figure 10 shows that of these riders, 16.3% of respondents use the FDA commuter shuttle on an everyday basis and 28.7% of respondents use it three to four times a week.



FDA Shuttle Use

Figure 10: On-Campus Respondent Shuttle Usage

Of the respondents who indicated that they do not use the on-campus or commuter shuttles, 67.3% indicated that they do not need to travel between locations during the workday or walk to other campus buildings, and 12.1% indicated that the commuter shuttle is not frequent enough to meet their needs (Figure 11).

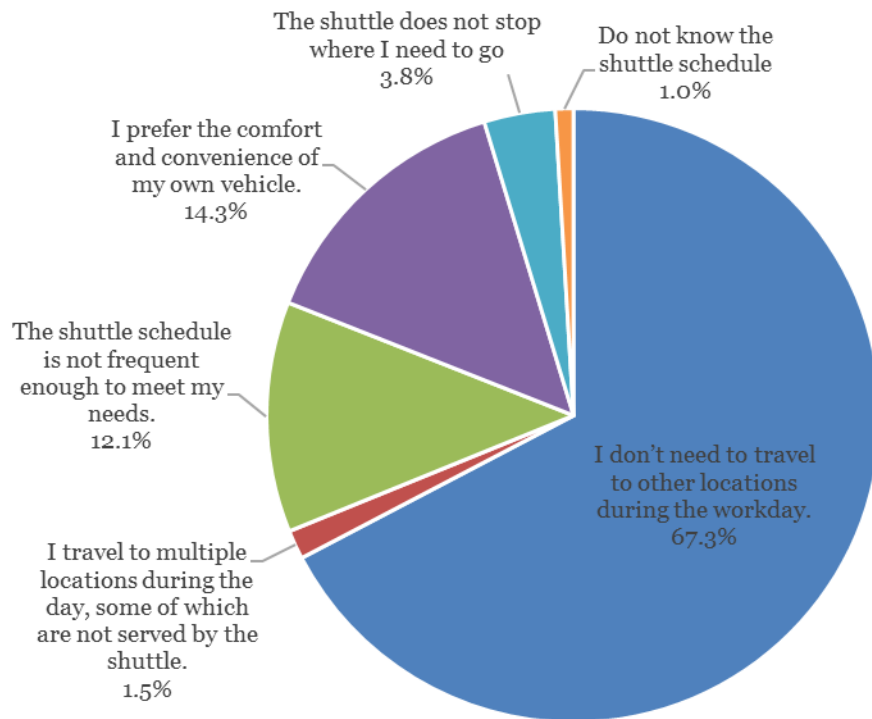


Figure 11: On-Campus Respondent Reasons for Not Using the FDA Shuttle

Questions 19 through 24: On-Campus Employee Telework Trends

Questions 19 through 24 asked employees about their current teleworking activities. Approximately 50.5% of respondents telework one or two days per week, mostly on Thursdays and Fridays (see Figure 12). Approximately 40% of respondents telework because they enjoy working out of their home or other off-campus location, while 40% telework because their commute to the White Oak Campus is too long and/or too stressful (Figure 13). Just over half of respondents, 53.4%, feel that they telework just the right amount while 45.4% feel that they don't telework enough.

For Question 23 and 24, employees were asked about the difficulties of telework, specifically if they ever felt that it was difficult to conduct their work when teleworking (Figure 14) and the reason they felt that way (Figure 15). Most (79.4%) respondents indicated that it is never or rarely difficult for them to conduct their work while teleworking, but 22.7% indicated that IT/AV/telecommunications/network issues are the main reasons for having trouble teleworking.

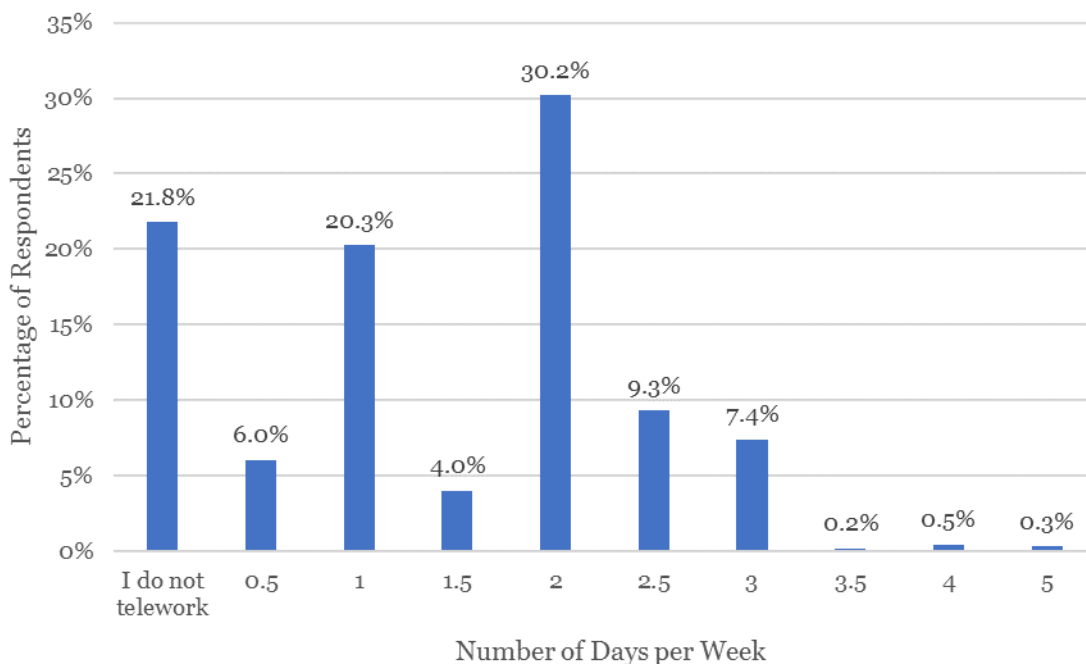


Figure 12: Days per Week On-Campus Respondents Typically Telework

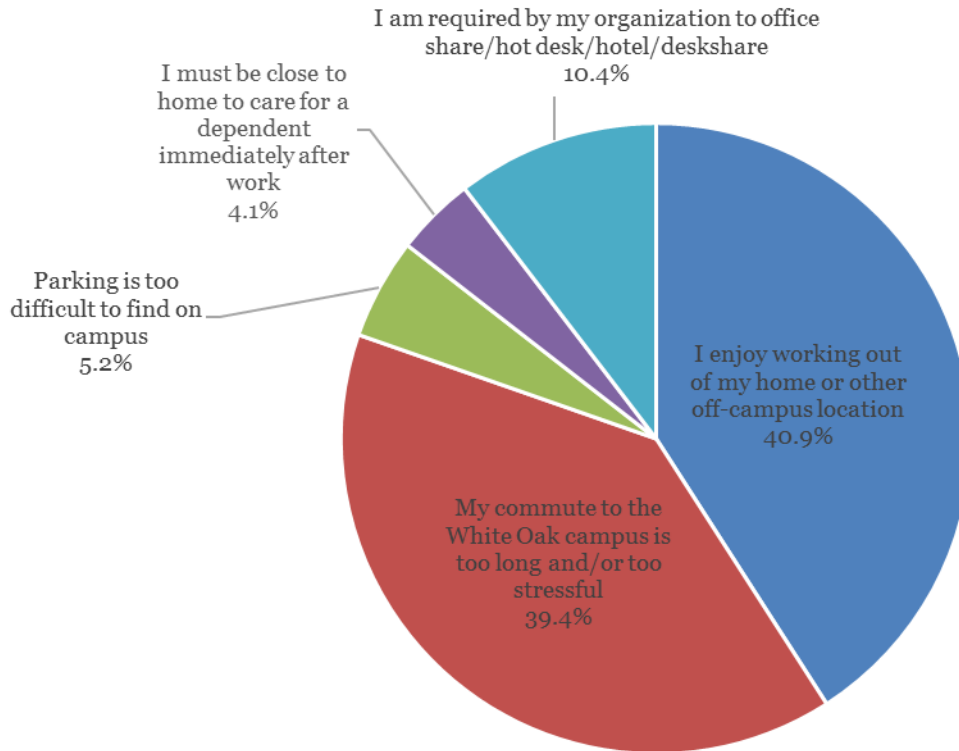


Figure 13: On-Campus Respondent Reasons for Teleworking

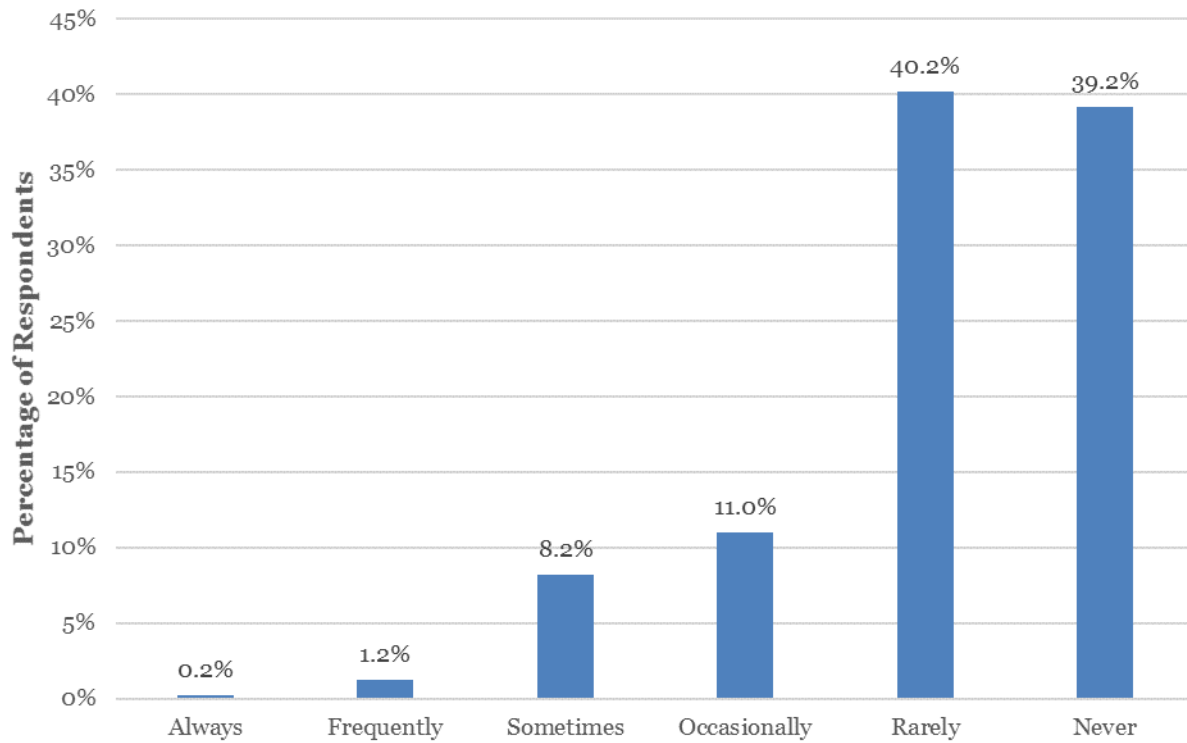


Figure 14: How Often On-Campus Respondents Feel it is Difficult to Telework

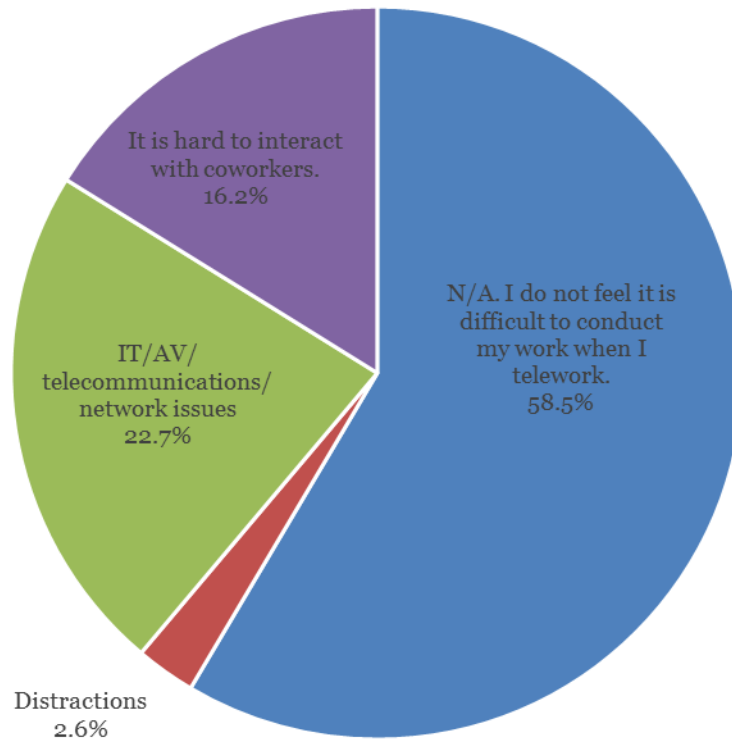


Figure 15: Reasons Why On-Campus Respondents Feel that Teleworking is Difficult

Questions 25 through 27: Walking and Biking to Work

Question 25 through 27 discussed walking and/or biking to work. Approximately 4% of respondents walk or bike to work at least one time per year. Of the 4% of respondents who walk or bike, almost half (approximately 48% of the 4%) walk or bike rarely or once per month (Figure 16).

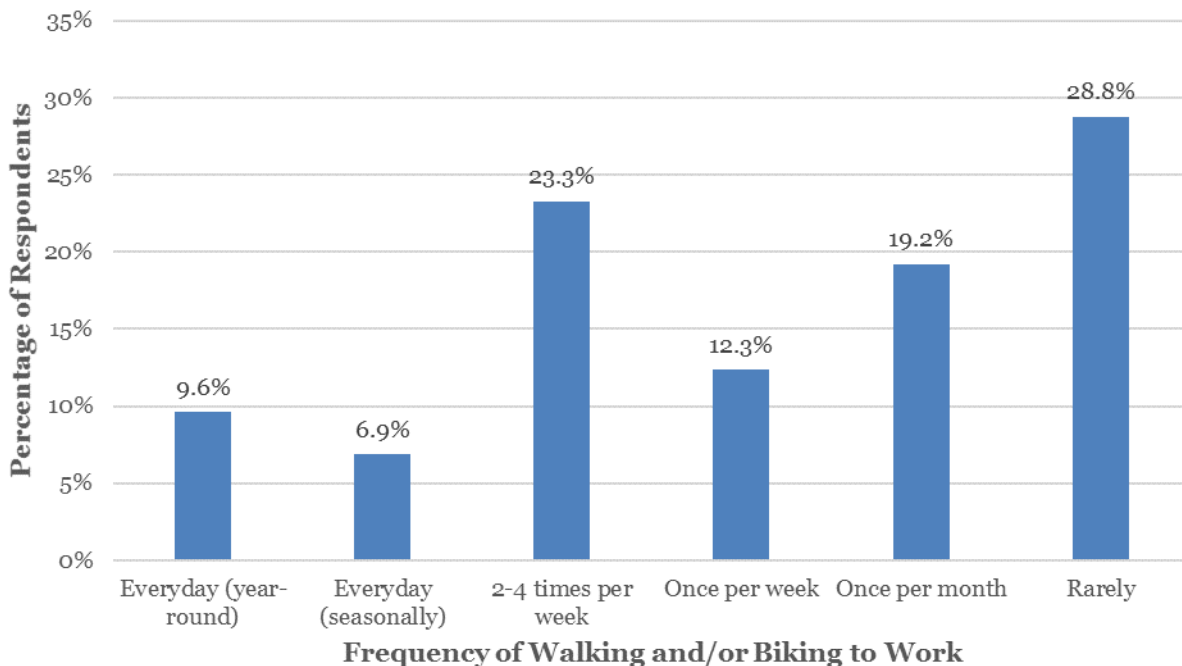


Figure 16: Frequency at which On-Campus Respondents Walk and/or Bike to Work

Question 27 asked employees if there are any on- or off-campus issues they encounter when walking and/or biking to work. This question was an open response to allow respondents to be specific. Although 27.4% of respondents have no issues biking and/or walking to work, 46.6% of respondents expressed concern about the lack of bicycle lanes and poor sidewalk conditions on surrounding roadways, especially on Columbia Pike (US 29), Cherry Hill Road, and FDA Boulevard. Respondents also noted that they feel it is dangerous for them to enter vehicular traffic at a campus checkpoint to enter the White Oak Campus when biking to work. Furthermore, perceived aggressive driving on local and campus roadways makes respondents who walk and/or bike to work feel unsafe.

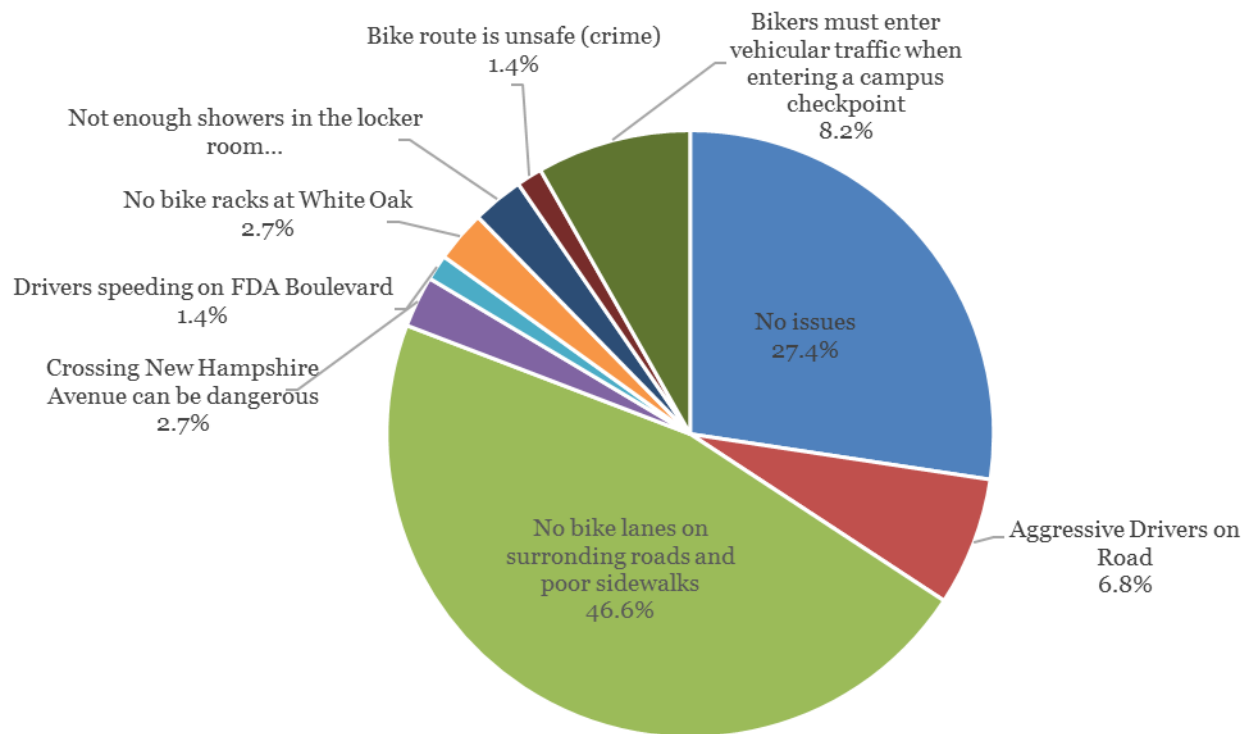


Figure 17: Concerns of On-Campus Respondents Who Walk and/or Bike to Work

Questions 28 through 32: Miscellaneous Questions

Questions 28 through 32 asked respondents to indicate their opinion on services, such as car sharing, direct shuttle service, guaranteed ride home services, and asked respondents to provide any general comments. The questions and their responses are indicated below:

- Question 28: If a Zip-Car (carsharing service) or an equivalent service was provided at your office location for a fee, would you use it?

Only 12.8% of respondents said they would use a carsharing service if offered at the White Oak Campus.

- Question 29: Would you consider parking your car at a Park-and-Ride lot near your home if FDA shuttle service was provided to and from the White Oak Campus?

About half (53.3%) of respondents said they would consider parking their car at a park-and-ride near home if a FDA shuttle was offered from there.

- Question 30: Are you currently registered with Commuter Connections Guaranteed Ride Home Service or any other commuter assistance program?

Approximately 83.5% of respondents said they are not registered with a commuter assistance program.

- Question 31: If you presently drive to work alone, would you be willing to carpool or vanpool if you were provided Guaranteed Ride Home service? A Guaranteed Ride Home service

provides free rides to registered carpool or vanpool participants that must leave work early due to an emergency, such as personal illness or a sick child.

Only 22.5% of respondents would be willing to carpool or vanpool if a guaranteed ride home service was offered to them.

- Question 32: Do you have any other comments, questions, or concerns?

This question was an open response to allow employees to be specific. Comments that were similar in content were summarized and categorized. The results, summarized in Figure 18, highlight similar concerns of two or more respondents. Most responses talked about more parking on campus, more shuttle routes, and more frequent shuttles. Others were concerned about the ability to telework more and constructing bike lanes on FDA Boulevard and Cherry Hill Road.

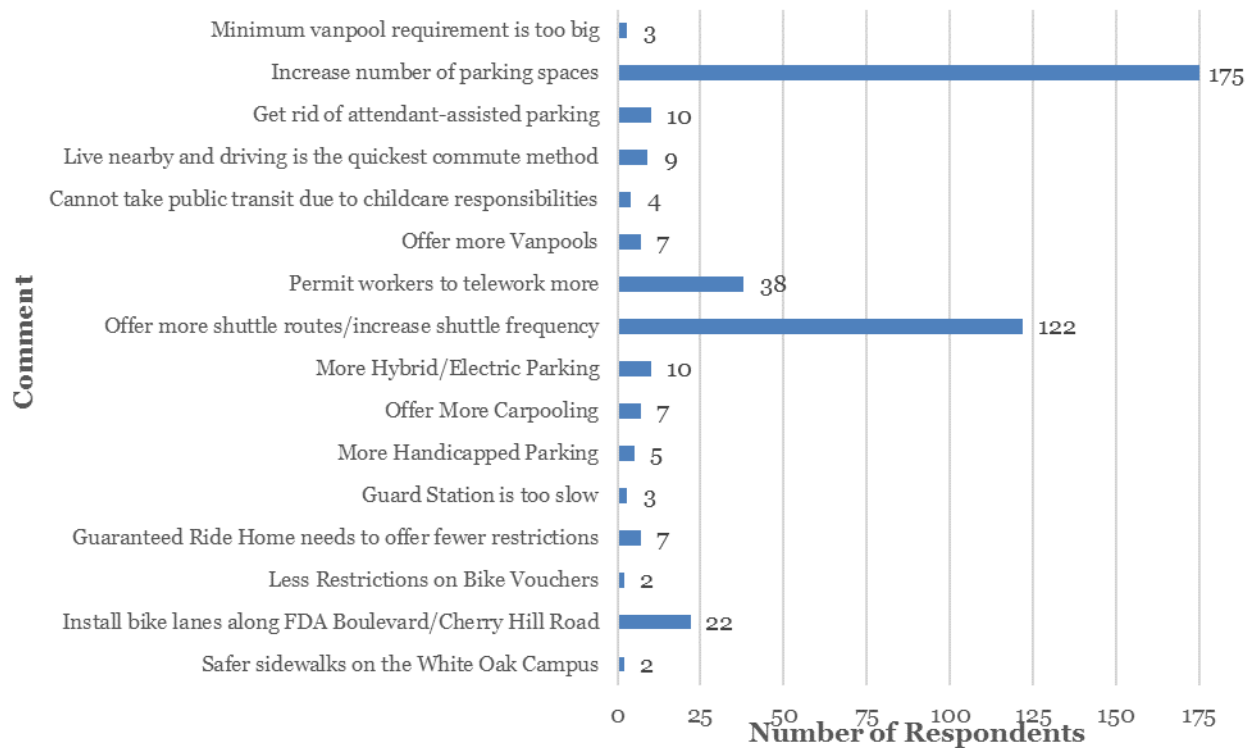


Figure 18: FDA On-Campus Employees Open Ended Response

OFF-CAMPUS EMPLOYEE SURVEY RESULTS

An email containing a link to the on-line survey was distributed to 2,297 off-campus employees and 547, approximately 24%, responded. Therefore, it was determined that the survey results would be statistically significant. Furthermore, FDA provided population per building in which to compare to the response rates from each building to validate the results. As can be seen in Table 2, below, the survey responses rates from each building are consistent with the overall population distribution.

Table 2: Comparison of Off-Site Population Distribution to the Distribution of Survey Results

| Building | Percentage of Employee Population | Percentage of Survey Responses |
|------------------------------------------|-----------------------------------|--------------------------------|
| 11601 Landsdown Street | 32.56% | 23.90% |
| 8455 Colesville Road | 8.65% | 6.8% |
| 12420 Parklawn Drive | 19.39% | 13.24% |
| 5630 Fishers Lane | 6.57% | 6.43% |
| 10001 New Hampshire Ave | 7.73% | 12.50% |
| Montrose Metro II - 11919 Rockville Pike | 2.30% | 2.76% |
| 7500 Standish Place | 13.90% | 20.22% |
| 7519 Standish Place | 4.42% | 9.01% |
| 7620 Standish Place | 0.15% | 2.21% |
| 1451 Rockville Pike | 3.65% | 1.47% |
| 16071 Industrial Drive | 0.55% | 1.29% |
| 12100 Parklawn Drive | 0.12% | 0.18% |

The survey results for each question are summarized below.

Questions 1 through 3: Employee Demographics

Questions 1 through 3 asked employees about their role at FDA, the address of their current office, and the ZIP code of their residence. All respondents indicated that they are employed by FDA. Figure 18 indicates that around 68% of employees are located at one of the FDA's Rockville, Maryland offices. Forty-four percent of employees responded that they are assigned to either the office at 11601 Lansdown Street or the office at 7500 Standish Place. Figure 20 illustrates the density of employee residences, with a darker color indicating a greater density. The map indicates a high concentration of employees along the I-270 corridor. A map with an overlay of zip codes, existing transit routes, and park-and-ride facilities is provided in the Transportation Management Plan.

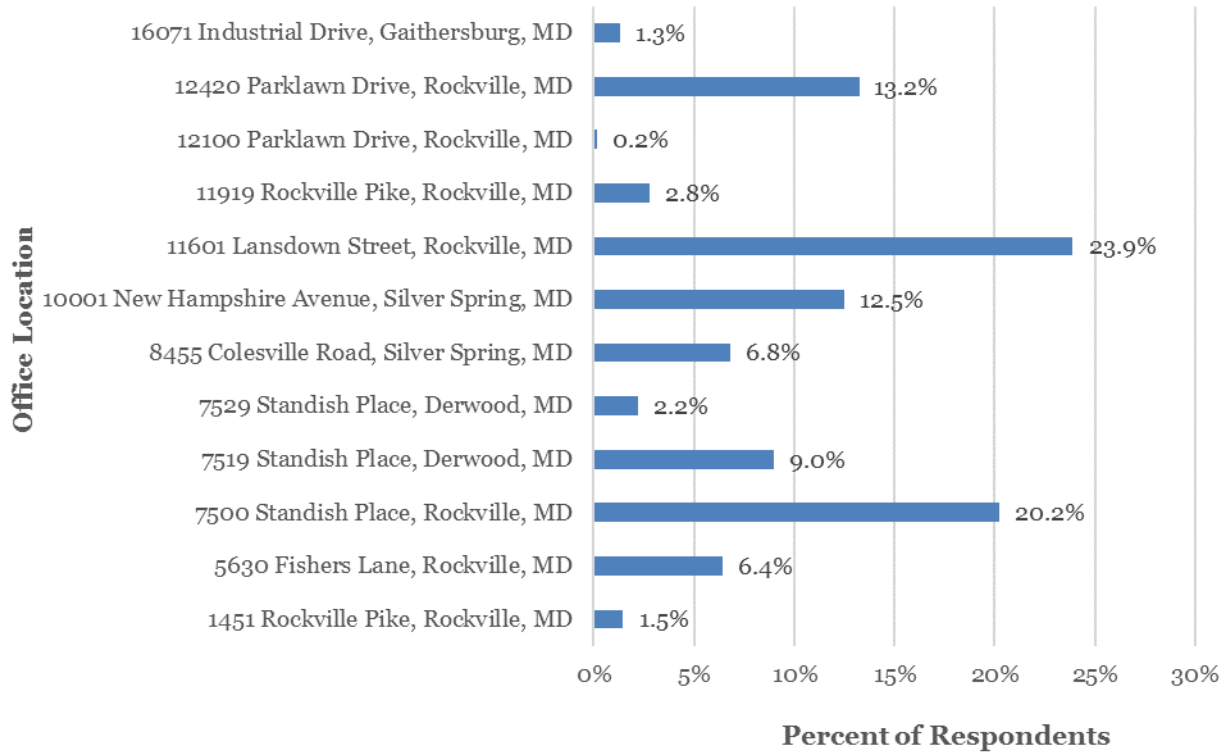


Figure 19: Off-Campus Respondent Office Location

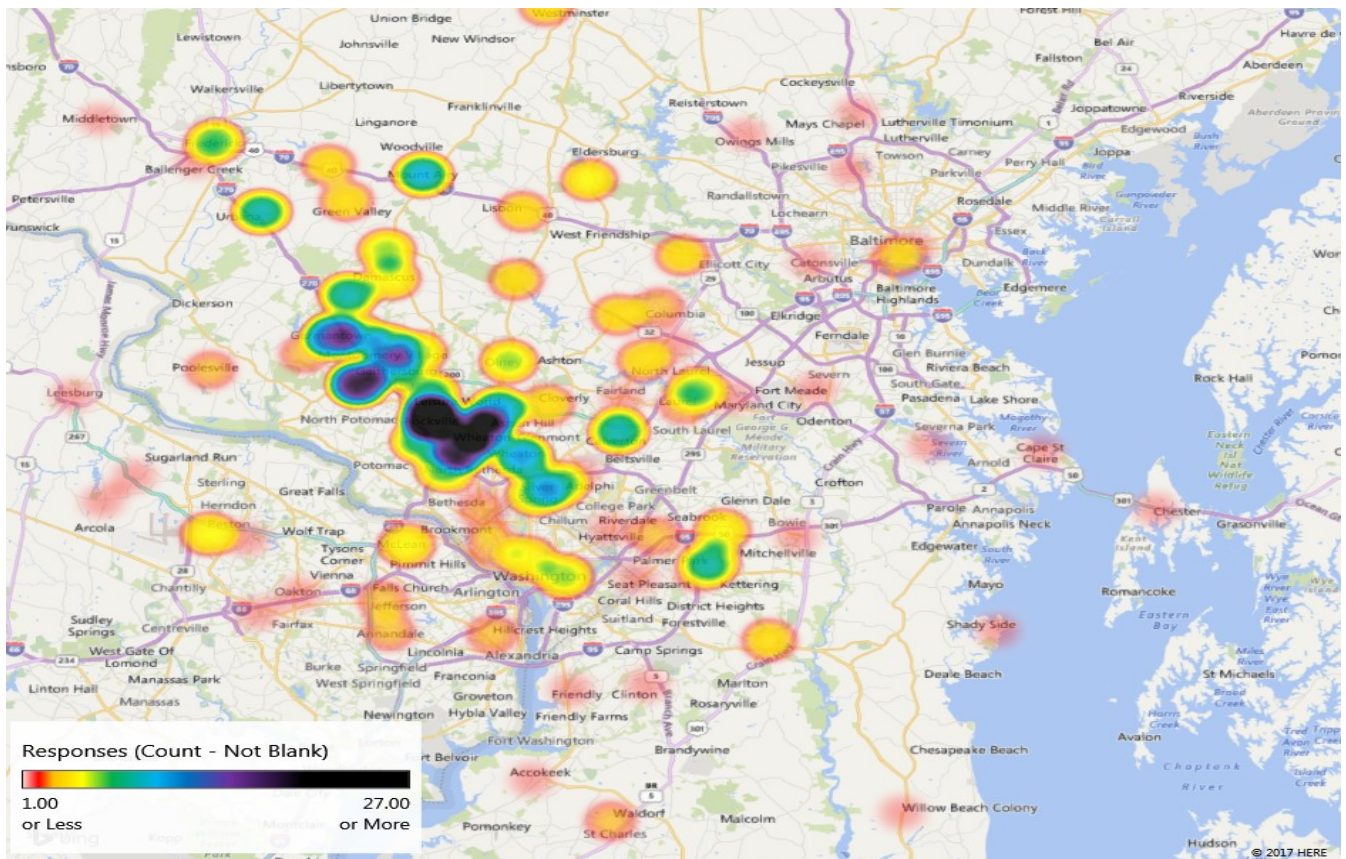


Figure 20: Off-Campus Respondent Home Location

Questions 4 and 5: Work Schedule

Questions 4 and 5 asked employees about their typical work schedule. Approximately 86% of employees work a consistent schedule of 5 day/40 hours per week. Approximately 53% of employees typically arrive between 7:00 AM and 8:30 AM and about 50% depart between 3:30 PM and 5:00 PM. The peak arrival time is between 8:00 AM and 8:30 AM and the peak departure time is between 4:30 PM and 5:00 PM.

Questions 6 through 9: Employee Commute Characteristics

Questions 6 through 9 asked employees about their typical daily commute. Approximately 68% of employees commute 60 minutes or less, while 11% of employees have a commute of more than 90 minutes (Figure 21). However, due to FDA’s telework policy it is unlikely that employees that live more than 90 minutes from their place of work commute on a daily basis. According to the results of Question 7, shown in Figure 22, about 86% of employees drive alone to work. The percentage of off-campus carpool and vanpool riders is lower compared to the percentage of on-campus employees that carpool and vanpool. However, rail use is higher, likely due to the proximity of Metrorail stations to the leased office locations. Only 18 respondents indicated that they carpool to work and all 18 indicated that there are two passengers in their carpool, including themselves. Only one respondent indicated that they vanpool to work in a six-person vanpool, including themselves.

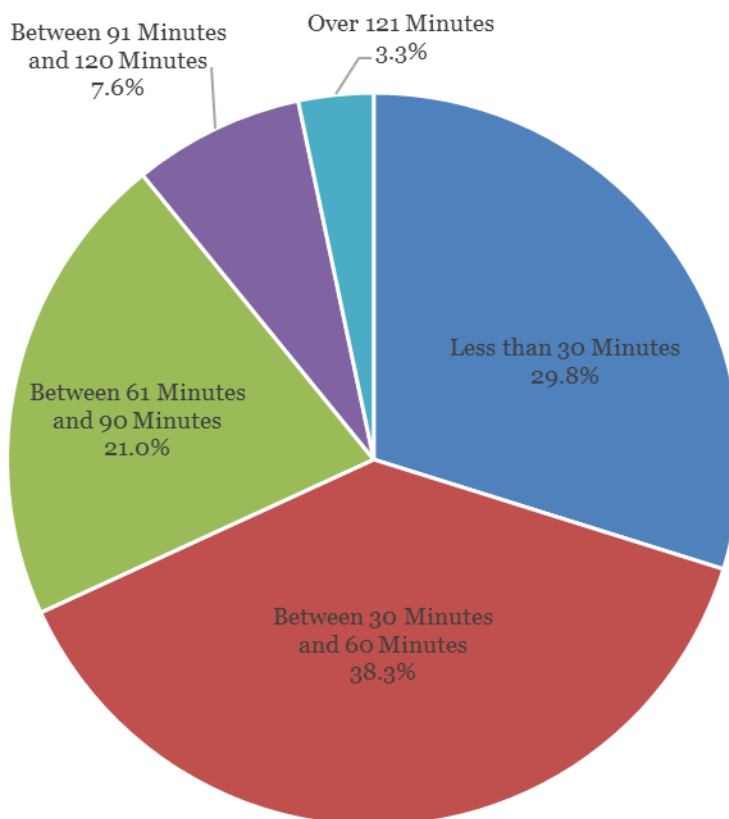


Figure 21: Off-Campus Respondent Typical Commute Time

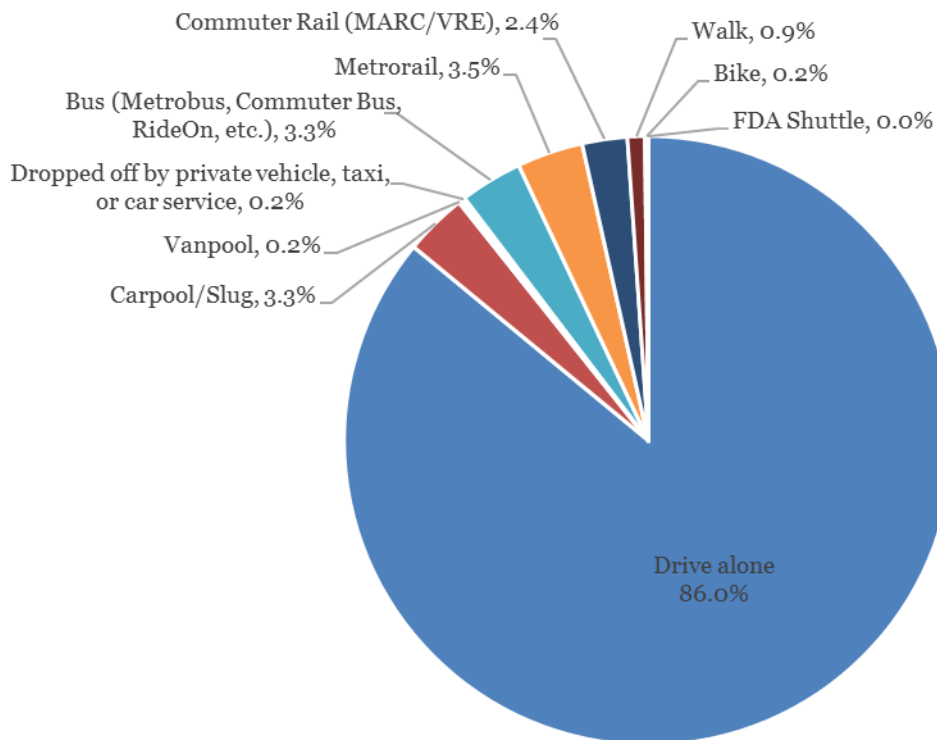


Figure 22: Off-Campus Respondent Primary Mode of Travel

Questions 10 and 11: Transit Benefits/Programs

Question 10 asked employees if they receive a transit subsidy, and only 50 employees, or 9.3%, indicated that they receive a transit subsidy. In addition, based on the responses to Question 11, only 35 respondents, or 6.5%, indicated that they are currently registered with Commuter Connections Guaranteed Ride Home service or any other commuter assistance program.

Questions 12 through 15: Employee Teleworking Characteristics

Questions 12 through 15 asked employees about their teleworking arrangements. An overwhelming majority of employees, approximately 84.7%, indicated that they currently telework from home or an offsite location at least one day per week. Figure 23 shows that approximately 43% of respondents indicated that they telework two days per week, and others indicated that they telework more. Monday and Friday are the two most popular days that respondents telework; Wednesday is the least popular day for teleworking. Figure 24 shows the results of Question 15, indicating that most employees telework because their commute is too long and/or stressful or that they enjoy working from home.

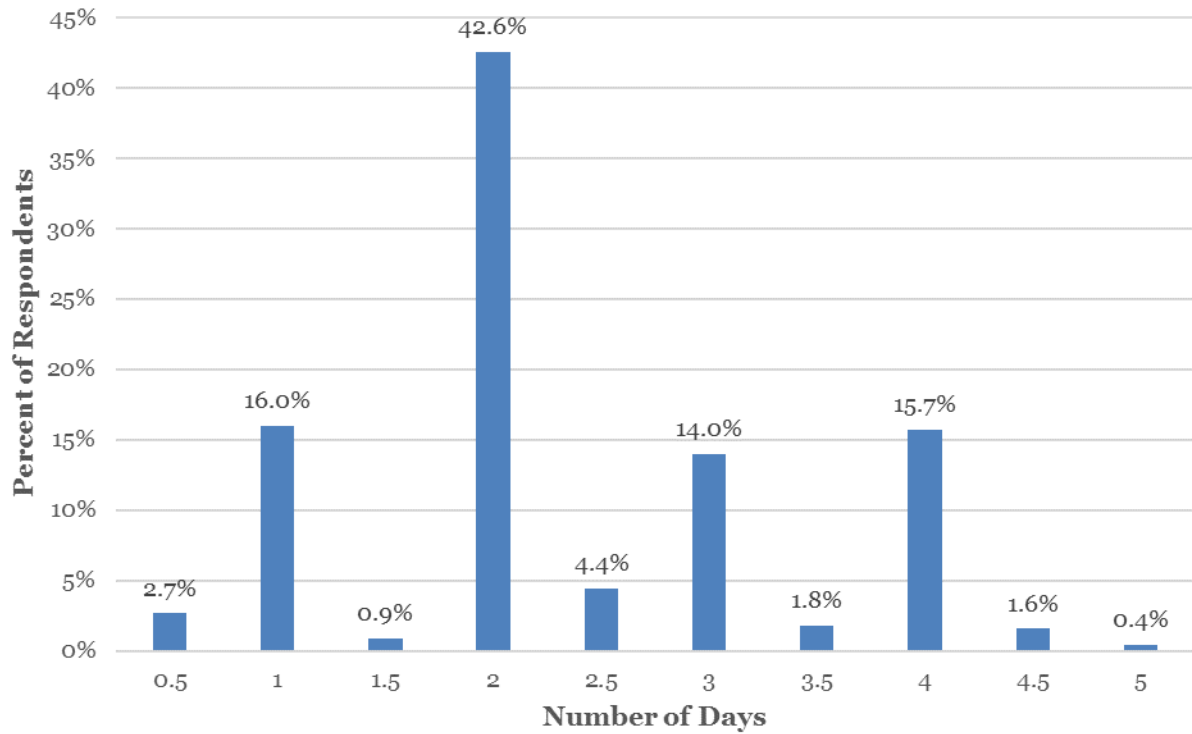


Figure 23: Days per Week Off-Campus Respondents Telework

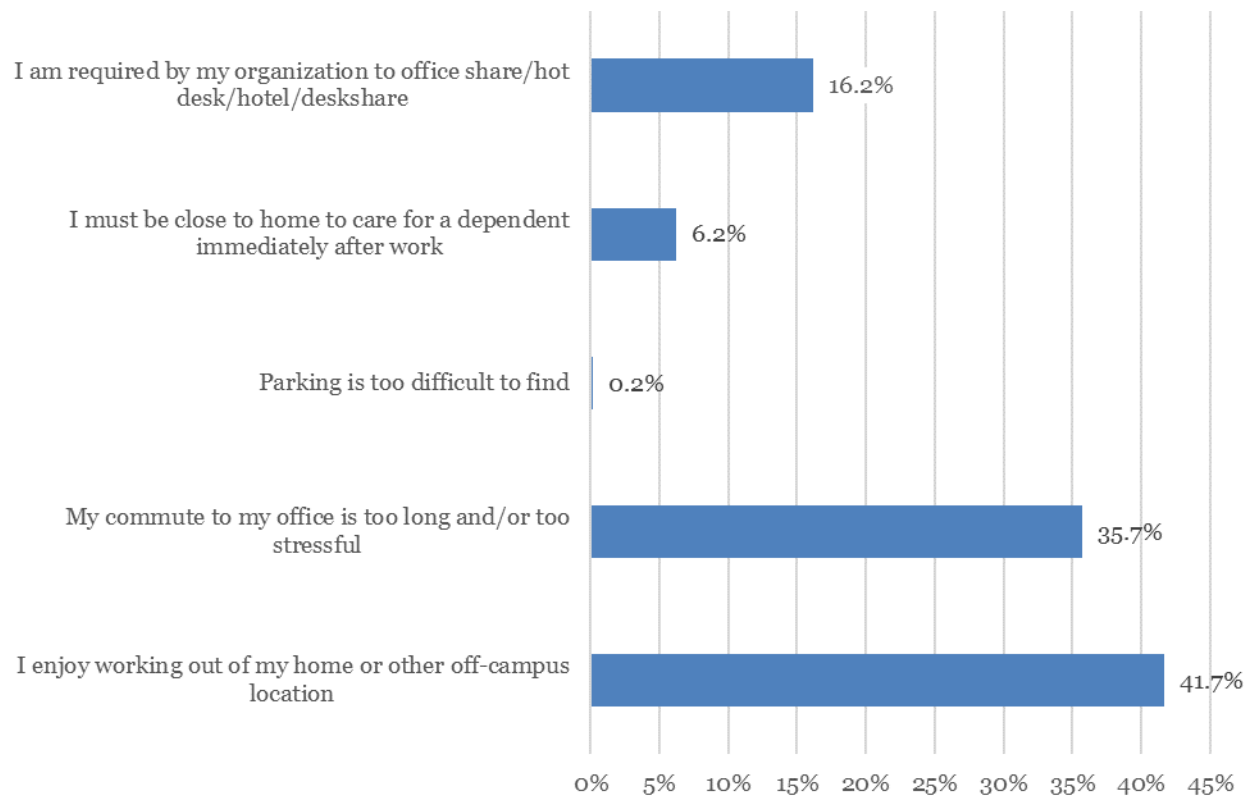


Figure 24: Primary Reason Off-Campus Respondent Teleworks

Questions 16 through 19: Impacts of Relocation to the White Oak Campus

Questions 16 through 19 asked employees about how their commute would be impacted if their office was relocated to White Oak. About 62% of respondents indicated that their commute time would be longer than it is now, including 43% that indicated their commute time would increase by 21 minutes or more (Figure 25). Only 2.6% of respondents said that they would relocate their place of residence to a ZIP code that is about 30 minutes or less from the White Oak Campus.

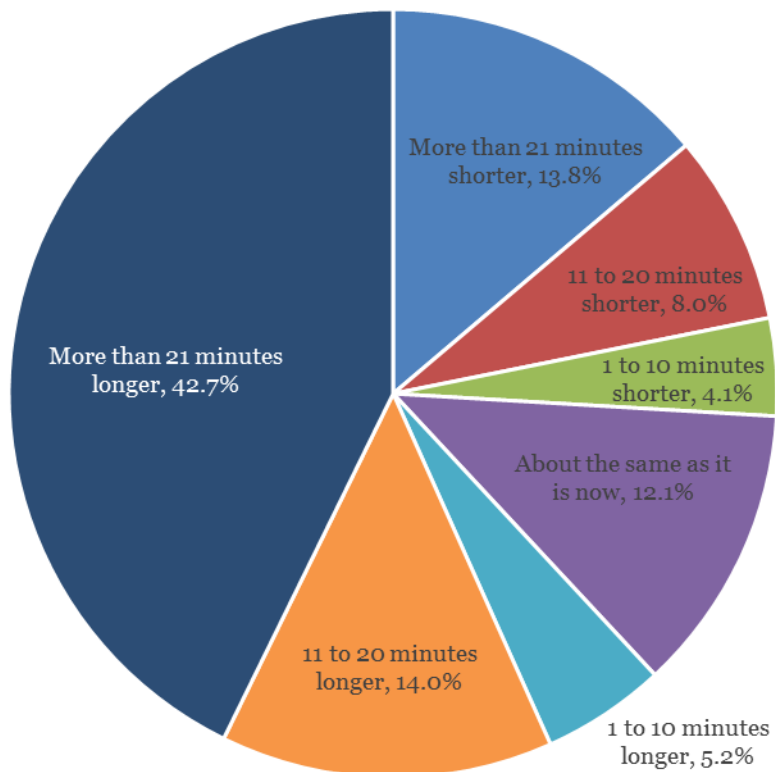


Figure 25: Off-Campus Respondent Change in Commute Time

Question 19 asked employees what they would anticipate being their primary mode of travel to work if their office is relocated to the White Oak Campus. The results are summarized in Figure 26. Approximately 79% of respondents indicated that they would drive alone. Ten percent would travel with at least one other person, whether carpooling, vanpooling, or being dropped off. About 9.4% would take public transit, including bus, Metrorail, MARC/VRE, and the FDA commuter shuttle. Only about 2% of respondents said they would walk or bike to work.

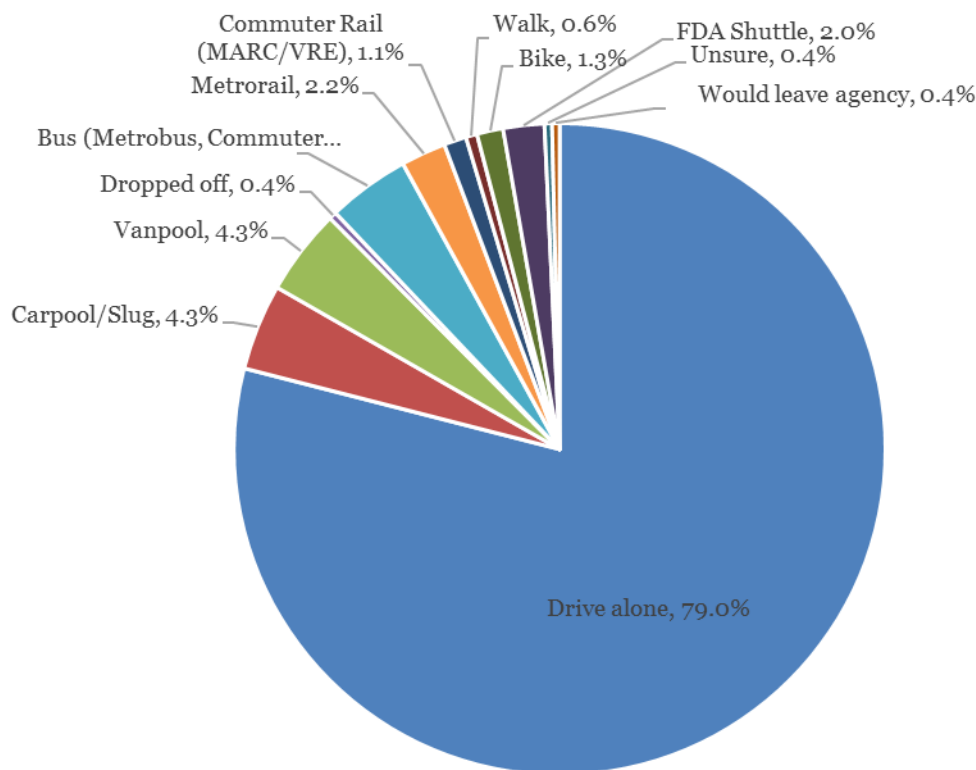


Figure 26: Off-Campus Respondent Potential Mode of Transportation to White Oak Campus

Questions 20 through 22: Commuting by Alternative Mode Instead of Driving Alone

Question 20 asked employees that planned to drive alone to work if they would be willing to consider any alternative forms of travel. Approximately 68% of respondents indicated that they would not be willing to consider an alternative form of travel. Of the 68%, about 30% cited that they would not consider alternative modes because they had unpredictable schedules, 26% said that they needed their vehicle for childcare, and 23% liked the comfort of their own vehicle (Figure 27). Figure 28 shows what service improvements would encourage more people to commute via transit. It should be noted that respondents could select more than one improvement from the choices given.

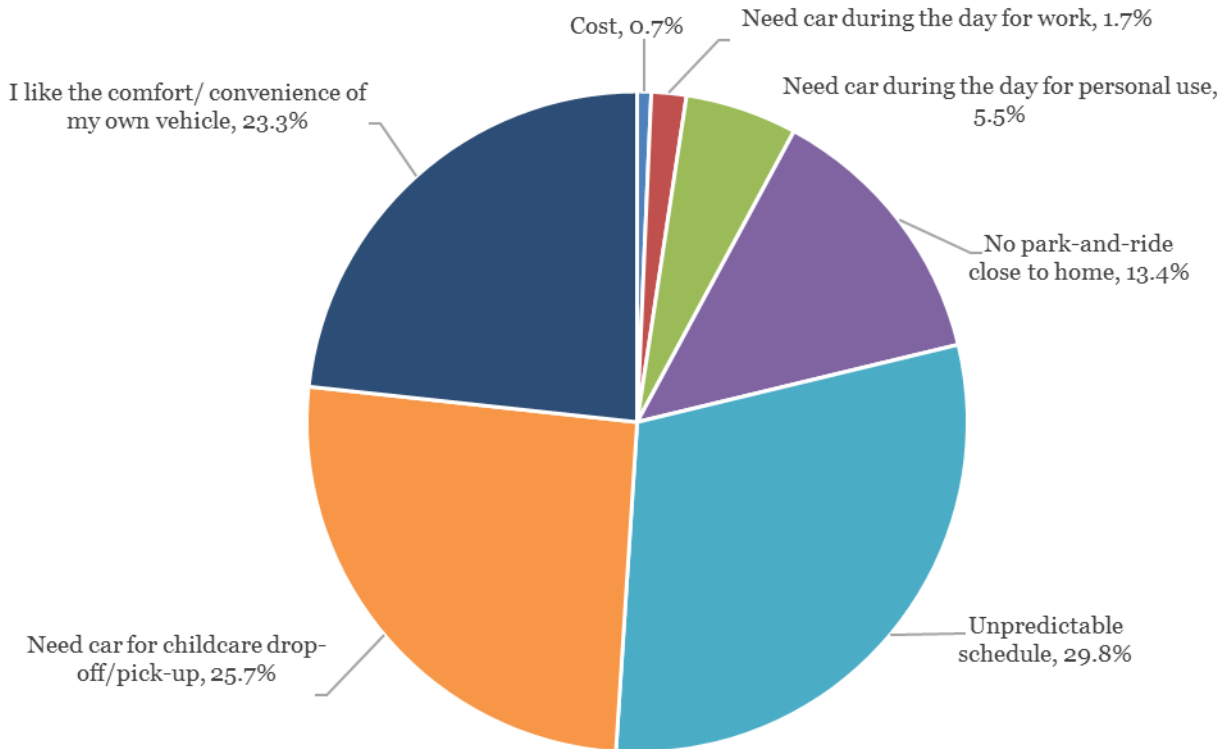


Figure 27: Off-Campus Respondent Reasons for Not Considering an Alternative Form of Travel

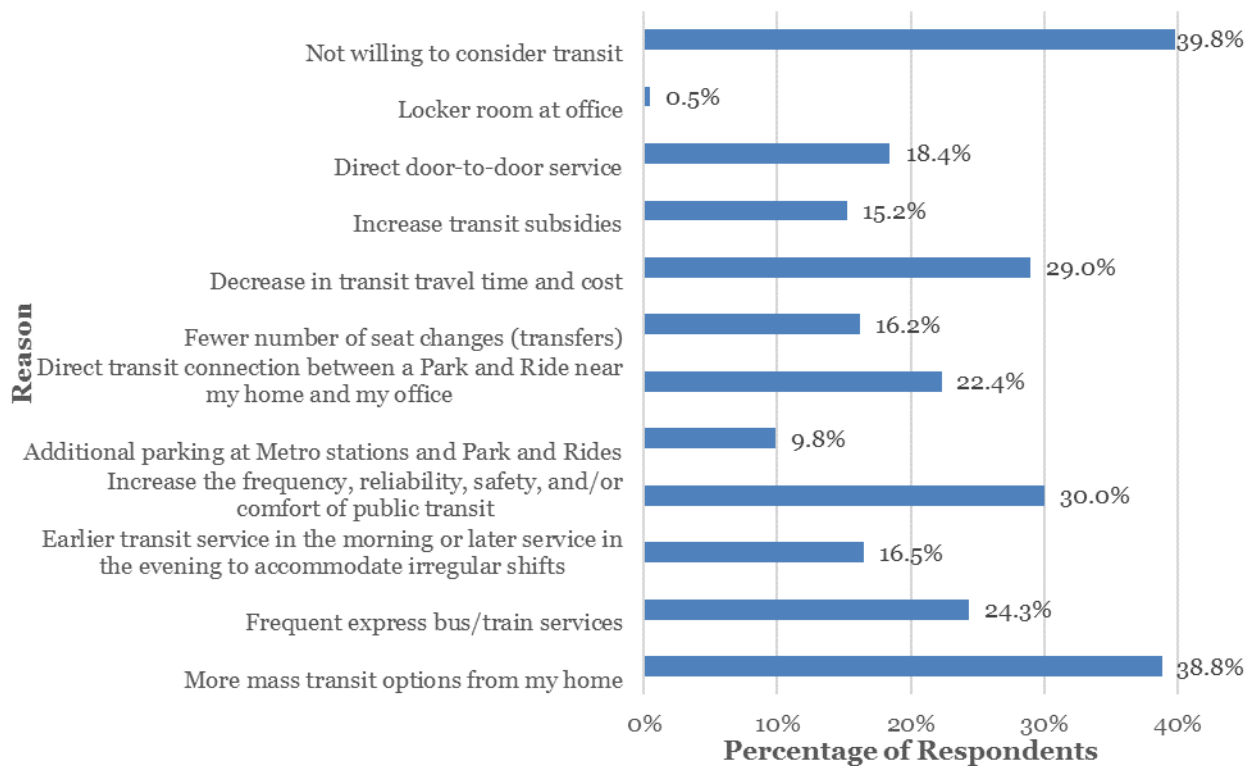


Figure 28: Off-Campus Respondent Reasons that Would Encourage an Alternative Form of Travel

Questions 23 through 25: Respondents Who Would Use Other Options if Offered

Questions 23 through 25 asked employees if they would use Guaranteed Ride Home, Zip Car, or FDA commuter shuttle services if those options were offered as a convenient way to avoid driving alone. Most respondents (64.6%) indicated that they would not be willing to carpool even if provided a Guaranteed Ride Home. About 83% of respondents would not use a Zip-Car. However, 61% respondents would consider using the FDA shuttle if that service were offered from a Park-and-Ride lot near their home.

Question 26: Do you have any other comments, questions, or concerns?

This question was an open response which allowed employees to be specific. Many employees had the same concerns and the results were summarized in Figure 29 to highlight concerns that received two or more responses. Most concerns were related to relocating, parking supply at the White Oak Campus, change in commuting mode, and telework.

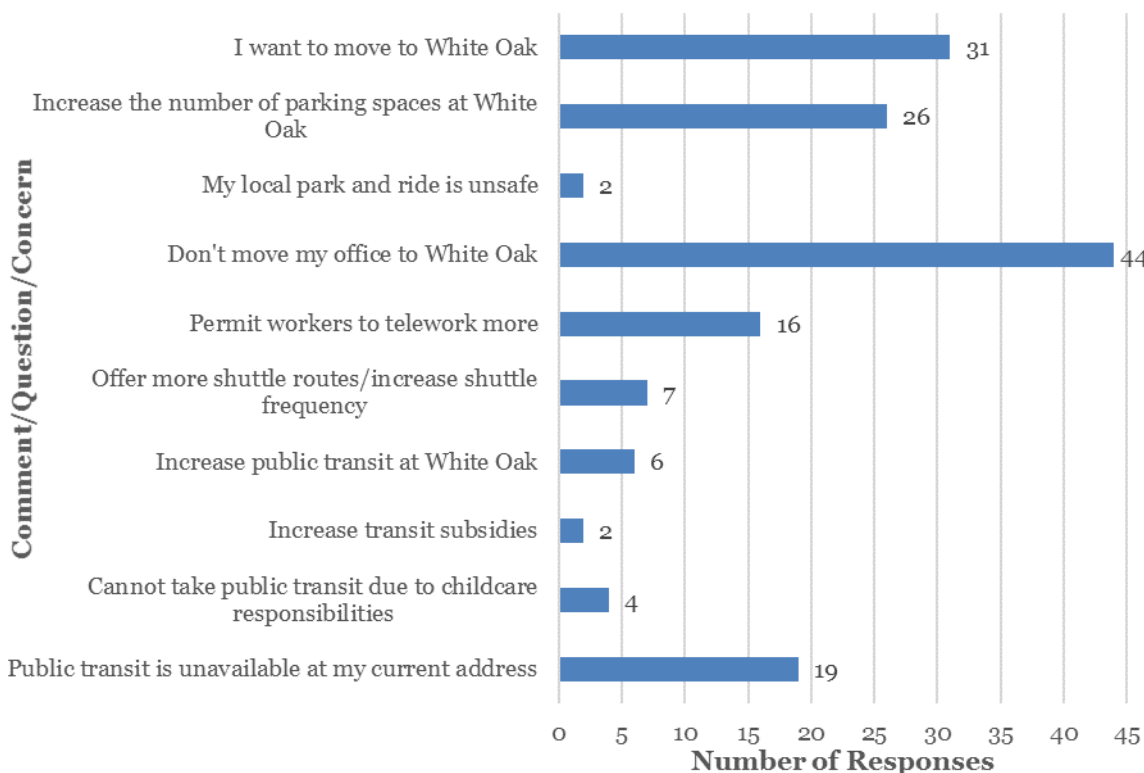


Figure 29: Off-Campus Employees Open-Ended Responses

SURVEY CONCLUSIONS

The results of the FDA employee commuter survey indicate a reliance on driving alone as a commuting mode for most employees. Approximately 75% of respondents who work on-campus currently drive alone to work. This is indicative of the lack of a high-frequency and high-capacity transit service in White Oak. The addition of the proposed BRT lines on New Hampshire Avenue and Columbia Pike may help to increase the attractiveness of transit. However, the impact of those services may be limited as they do not serve some of the areas along the I-270 corridor that have a

higher concentration of employees. A shuttle service directed to park-and-ride facilities along the I-270 corridor may be more effective at reducing the number of employees that commute via driving alone.

However, despite the reliance on driving alone for most employees, the results of the on-campus employee survey demonstrate the relative success of the FDA's robust carpool and vanpool program. Approximately 12% of respondents participate in the carpool or vanpool program, and there is evidence that additional employees, including those at the leased locations, could be integrated into the program. While some respondents who drive alone indicated that they have difficulty finding other interested colleagues who live close and have similar working hours, it is evident through the survey that there is the ability to coordinate large numbers of employees along the I-270 and Columbia Pike (US 29) corridors.

There are also respondents who live relatively close to White Oak but who feel pressured to drive alone to work. Carpooling or taking public transportation would take significantly longer than their otherwise short commute. Some respondents said they were interested in biking and walking to work; however, poor biking facilities on area roads, primarily Columbia Pike (US 29), Cherry Hill Road, and FDA Boulevard, prevent them from doing so. Other respondents feel that more frequent shuttle service from more Metro and MARC stations will increase the likelihood of them utilizing public transit. Respondents who live close to the campus also expressed interest in a commuter shuttle transporting workers to and from work locally. Some workers even indicated that a FDA shuttle went by their house locally but does not stop there.

Some respondents indicated that they lived near a Metrorail or MARC station; however, connecting to a Metrobus to go to the White Oak Campus takes too long. Some respondents requested more bus pickups and a direct FDA shuttle from the Silver Spring Metro station. Respondents also requested more pickups from Metro stations on different lines, along with MARC stations. The completion of the proposed Purple Metro line was also seen as a potential supporter for drivers to commute via train to work.

CHAPTER 3: TRANSPORTATION SYSTEM

This section describes the assessment of potential transportation impacts resulting from the proposed consolidation of off-campus employees in leased buildings, as well as organic growth on the White Oak Campus.

The FRC is generally bordered on the north by Lockwood Drive, on the south by Powder Mill Road (MD 212), on the east by Cherry Hill Road, and on the west by New Hampshire Avenue (MD 650). The site contains a mix of uses including the FDA campus, which is generally contained on the northwest corner of the property, and the Air Force which has several buildings to the east and south of the FDA campus. The FDA campus contains approximately 3,766,605 GSF of building space and 6,817 parking spaces. Approximately 10,987 employees and support staff are currently assigned to the campus, with up to approximately 8,000 working on campus on an average weekday. The proposed plan would accommodate up to 18,000 total employees and support staff resulting in the need for approximately 1,550,000 GSF of additional building space, and 11,709 total parking spaces (1 parking space per 1.8 employees). Approximately 4,273 of the 6,817 existing parking spaces will remain; thus, approximately 7,463 parking spaces (2,598 relocated from existing parking facilities and 4,865 new) would be required to reach the total parking need of 11,709.

EXISTING CONDITIONS

This section describes the existing transportation facilities in the vicinity of the White Oak Campus, including traffic conditions and the availability of public transportation facilities.

EXISTING PUBLIC TRANSPORTATION FACILITIES

Existing public transportation facilities which service the White Oak Campus include bus and FDA shuttles. Descriptions of the available transit services are provided below.

Several bus routes serve the White Oak Campus with stops along New Hampshire Avenue (MD 650) or internally within the campus. Table 3 provides information regarding each bus route. The majority of bus routes provide service during typical FDA operating hours at 15 to 30-minute headways.

Table 3: Existing Transit Services

| Route | Operation | Frequency | Metro Connections | Stops within Campus? |
|------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------|-----------------------------|
| Montgomery County Ride-On Route 10 | Weekdays, Saturday, Sunday | Weekday Peak: 30 min Weekday Off-Peak: 30 min Weekend: 30 min | Twinbrook Glenmont | No |
| Montgomery County Ride-On Route 22 | Weekday Peak Hours | Weekday Peak: 30 – 40 min | Silver Spring | Yes |
| Metrobus Route C8 | Weekday, Saturday (Does not enter White Oak Campus after 6:30 PM or on Saturdays) | Weekday Peak: 30 min Weekday Off-Peak: 30 min Weekend: 30 min | White Flint Glenmont College Park | Yes |
| Metrobus Route K6 | Weekdays, Saturday, Sunday | Weekday Peak: 15 min Weekday Off-Peak: 20 min Weekend: 15 - 30 min | Fort Totten Station | No |
| Metrobus Route K9 (Express Bus) | Weekday Peak Hours | Weekday Peak: 15 min Weekday Off-Peak: 20 min Weekend: 15 - 30 min | Fort Totten Station | Yes |
| MDOT MTA Commuter Bus Route 204 | Weekday Peak Hours (5 buses in the AM, 6 buses in the PM) | Weekday Peak: 30 min | College Park | Yes |

Three MDOT MTA Commuter Bus routes, including 305 (Columbia-Washington via US 29) 315 (Columbia-Washington via US 29) and 325 (Columbia-Washington via US 29), pass near the White Oak campus.

In addition to the bus services listed above, FDA operates six commuter shuttle routes that serve local Metro stations. All shuttles run during peak and normal business hours with the exception of the Shady Grove Metro shuttle, which only runs during peak hours. These shuttles are intended to fill gaps in the existing public transit network. Table 4 provides information regarding each shuttle route. Circulator shuttles are also provided internally to link the buildings and parking lots on the White Oak Campus.

Table 4: Existing Shuttle Routes (External)

| Route | Number of Trips* | Metro Connections | Average Weekly Ridership** |
|-------------------------------|----------------------------------------|--------------------------------------------------------------------------|-----------------------------------|
| White Oak-Hillandale | AM Peak: 4 Midday: 7 PM Peak: 4 | None | 124 |
| Twinbrook to White Oak | AM Peak: 4 Midday: 4 PM Peak: 5 | Twinbrook (All shuttles) Glenmont (4 Departures, 6 Arrivals) | 338 |
| Medical Center to White Oak | AM Peak: 3 Midday: 6 PM Peak: 4 | Medical Center (All Shuttles) Silver Spring (4 Departures, 1 Arrival) | 435 |
| College Park to White Oak | AM Peak: 3 Midday: 3 PM Peak: 3 | College Park | 106 |
| Shady Grove to White Oak | AM Peak: 3 Midday: 1 PM Peak: 2 | Shady Grove | 429 |
| Silver Spring to White Oak*** | AM Peak: 1 Midday: 11 PM Peak: 4 | Silver Spring | 399 |

*AM Peak: Before 10:00 AM, Midday 10:00 PM – 4:00 PM, PM Peak: 4:00 PM or Later

**Based on the average of weekly ridership for January-February 2016

***Additional AM, Midday, and PM peak service provided by Ride-On Route 22

PEDESTRIAN AND BICYCLE FACILITIES

Four- to five-foot wide sidewalks are provided along most roadways within the study area, providing a network that connects the White Oak Campus to nearby residential and retail areas. Sidewalks are provided along northbound and southbound Cherry Hill Road and southbound New Hampshire Avenue (MD 650). An eight-foot wide multi-use pathway is provided along northbound New Hampshire Avenue (MD 650). The White Oak Campus is connected to the facilities on New Hampshire Avenue (MD 650) via sidewalks along Michelson Road and Mahan Road. A sidewalk and multi-use path are provided along FDA Boulevard and the multi-use path continues along Dahlgren Road to connect the White Oak Campus with the facilities on FDA Boulevard and Cherry Hill Road. However, the distance between Cherry Hill Road and the campus (1.6 miles) makes it unlikely that pedestrians access the existing campus via Cherry Hill Road.

Bicycle facilities are relatively limited within the study area. A narrow, five-foot wide bicycle lane is provided along northbound New Hampshire Avenue (MD 650) along the FDA site frontage that begins just south of the FDA site and continues to an area just north of Columbia Pike (US 29). Given the narrow width of the bicycle lane, its proximity to a heavily traveled roadway, and limited connections, it is not likely to encourage FDA employees to commute via bicycle. As discussed

earlier, a multi-use path is provided along the northside of FDA Boulevard that extends to the campus along Dahlgren Road. However, there are limited facilities on Cherry Hill Road, which would not make the multi-use path an attractive bicycle route.

Within the campus, pedestrian sidewalks and walkways are provided between parking areas and buildings, as well as along Northwest Loop Road and Southwest Loop Road. Sheltered bicycle parking is provided within parking garages and adjacent to building entrances. Tool and pump stations are also provided at most bike parking areas, and shower facilities and lockers are provided for bicycle commuters. However, bicycle lanes are not provided on the internal roadway network.

STRATEGIC PLANNING ELEMENTS

Several regional plans and studies were provided by Montgomery County and reviewed to inform the development of this traffic report. Brief summaries of the plans, as well as the impact of the proposed White Oak Campus development on the plans, are provided in the sections below.

White Oak Science Gateway Local Area Transportation Review (LATR) Cost Estimating Analysis White Paper (2016)

The 2016 White Oak Science Gateway LATR Cost Estimating Analysis White Paper was developed following approval of the White Oak Science Gateway Master Plan to estimate planning-level costs for identified future transportation improvements. Each improvement cost will be used to develop a pro-rata fee that will be applied for every new vehicle-trip a planned development generates within the White Oak Science Gateway. However, it should be noted that federal agencies, including the GSA, are not required to pay the impact fee. Therefore, in lieu of the fee, this traffic technical report will identify mitigation measures needed to address site-generated impacts.

White Oak Local Area Transportation Review Intersection Improvement Cost Evaluation (2016)

The 2016 White Oak LATR/LATIP Intersection Improvement Cost Evaluation identifies potential LATR-scale costs for inclusion in a proposed per-trip fee that may be paid by new development part of the White Oak Science Gateway Master Plan. This fee would be in lieu of performing a complete LATR analysis and independently mitigating an individual development's traffic impacts. The Evaluation analyzes existing and future conditions in White Oak, Maryland for the years 2016 and 2040, respectively, with and without the proposed development of the White Oak Sciences Gateway master Plan. It includes concept plans for all proposed mitigation and cost estimates to better estimate potentially necessary right-of-way acquisitions and environmental impacts.

White Oak Science Gateway Master Plan (2014)

The White Oak Science Gateway Master Plan provides the foundation upon which the area can evolve into a community that offers more local opportunities to live, work, and play. The Plan envisions White Oak's major centers – Hillandale, White Oak, and the Life Sciences/FDA Village – evolving from conventional, auto-dependent suburban shopping center, business parks, and light industrial areas into vibrant, mixed use, transit-served nodes. The consolidation of the FDA at White Oak FRC provided an opportunity for the county to re-examine its long-term goals and objectives for the area. The Master Plan includes a traffic technical report which was conducted to evaluate the transportation impacts of proposed development in the area, as well as outline recommendations for

transportation improvements. The improvements proposed are incorporated into this traffic technical report under the No Action condition.

U.S. Food and Drug Administration Headquarters Consolidation Master Plan Update (2009)

This Technical Report was prepared by the U.S. General Services Administration (GSA) to assess and report potential transportation impacts resulting from revisions to the U.S. Food and Drug Administration (FDA) Master Plan for the consolidation of FDA's headquarters facilities at the Federal Research Center (FRC) at White Oak. This report identifies the existing and future traffic conditions at 18 roadway intersections in the vicinity of the site. Measures to mitigate the impacts on the roadway system are also evaluated and presented in the report.

GSA proposed to update the FDA Headquarters Master Plan to accommodate an increase of 1,170 FDA employees due to Congressional mandates. The project involved the development of 1,254,922 additional GSF of office and laboratory space, construction of a fitness center, and expansion of the Central Utility Plant to serve the FDA White Oak Campus. In addition, GSA planned to relocate the Child Care Center and the Broadcast Studio from their locations proposed in the 2006 FDA Master Plan. GSA updated the FDA Headquarters Master Plan to determine how best to accommodate the additional growth on the FDA White Oak Campus.

Potential Impact of Proposed Development on Plans

The expansion of the White Oak campus up to an approximate 18,000 employees/support staff was not considered in the above-referenced study. Given the levels of congestion currently experienced on the roadway network, as well as the impact of future development, a separate traffic study would be required to evaluate specific site impacts and develop additional transportation system improvements. However, the proposed consolidation and expansion considers the character and history of the site and will contribute to increasing activity and walkability within the area. It would also increase the density of employment in White Oak and increase the viability of White Oak as a major transit node.

EXISTING ROADWAY NETWORK

VEHICLE STUDY AREA

Although the FDA complex is officially located in the community of White Oak, Maryland, the limits of the study area encompass all or part of six neighborhoods (White Oak, Hillandale, Calverton, Beltsville, Silver Spring, and Fairland) and two counties (Montgomery County and Prince George's County). As such, both counties were coordinated with to establish the study area limits for this traffic technical report through the EIS scoping phase. As a result, a study area was defined that is primarily bounded by Columbia Pike (US 29) & Cherry Hill Road/Randolph Road to the north, Power Mill Road to the south, Columbia Pike (US 29) & New Hampshire Avenue (MD 650) (NW and NE) to the west, and Powder Mill Road (MD 212) & Beltsville Drive to the east. However, it also extends in three directions to include segments of major corridors that the proposed development would affect:

- Northbound New Hampshire Avenue (MD 650) to the intersection with Heartfields Drive/Quaint Acres Drive,
- Eastbound Columbia Pike (US 29) to the intersection with Lockwood Drive, and
- Westbound Columbia Pike (US 29) to the intersection with Fairland Road.

Characteristics of the major corridors within the study area were obtained from maps on the MDOT SHA website denoting functional classification, 2016 AADT, number of lanes, speed limits, and truck routes/loading zones. This information is summarized in Table 5.

DATA COLLECTION AND HOURS OF ANALYSIS

Stantec conducted a data collection and analysis program to establish "average day" baseline conditions for vehicular, transit, pedestrian, and cyclist traffic within the study area shown in Figure 1. The program consisted of automatic traffic recorder counts and manual turning movement counts. All data were collected on typical weekdays when County schools were in session.

Automatic Traffic Recorder Counts

Automatic traffic recorder (ATR) counts were collected on Friday, March 24th, 2017 through Thursday, March 30th, 2017 for at the Michelson Road Security Checkpoint, Dahlgren Road Security Checkpoint, and the Southwest Loop Road Security Checkpoint on the FDA campus. Appendix C contains the count location map and the raw count data.

Table 5: Study Area Major Corridor Characteristics

| Roadway | Functional Class | 2016 AADT (1,000 vpd) | Number of Lanes, Median | Speed Limit (mph) | Primary Truck Route |
|--------------------------------------|-----------------------------------------|------------------------------|--------------------------------|--------------------------|----------------------------|
| New Hampshire Avenue (MD 650) | Principal Arterial | 54.1/60.5/44.6 | 6-7, Grass/Concrete | 40/35 | Yes |
| Power Mill Road (CR 104) | Minor Arterial | 12.4 | 2, Concrete | 35 | No |
| Power Mill Road (MD 212) | Minor Arterial | 22.0 | 2, Concrete | 40 | Yes |
| Mahan Road/Schindler Drive | Local Road | N/A | 2, None | 25 | No |
| Michelson Road/Northwest Drive | Local Road | N/A | 2, None | 25 | No |
| Lockwood Drive | Minor Arterial | 12.1 | 2, None | 30 | No |
| Heartfields Drive/Quaint Acres Drive | Local Road | N/A | 2, None | 25 | No |
| Cherry Hill Road/Randolph Road | Minor Arterial | 20.6/34.0 | 4, Concrete | 30 | No |
| Columbia Pike (US 29) | Principal Arterial – Freeway Expressway | 61.3/64.3/67.5/59.6 | 6, Grass | 40/45/50 | Yes |
| Industrial Parkway | Local | N/A | 2, None | 30 | No |
| Tech Road | Local | N/A | 4, None | 30 | No |
| Old Columbia Pike/Prosperity Drive | Local | N/A | 2, None | 30 | No |
| Broadbirch Drive | Local | N/A | 4, None | 25 | No |
| Plum Orchard Drive | Local | N/A | 2, None | 30 | No |
| Musgrove Road | Major Collector | 3.5 | 2, None | 30 | No |
| Fairland Road | Minor Arterial | 7.3 | 4, None | 30 | No |
| Calverton Boulevard | Minor Arterial | 14.7 | 4, Striped | 30 | No |
| FDA Boulevard | Local | N/A | 4, Concrete | 30 | No |
| Beltsville Drive | Minor Arterial | 23.2 | 4, Concrete | 35 | No |

Turning Movement Counts

Manual turning movement counts obtained by Sabra, Wang & Associates for the *White Oak LATR/LATIP* were utilized for all study area intersections, except for the intersection of Beltsville Drive and Calverton Boulevard. Montgomery County Planning Department provided permission to utilize these counts for this traffic technical report. These counts were performed during the AM peak period (6:00AM – 10:00AM) and PM peak period (4:00PM – 7:00PM) for the following 22 intersections:

- Tuesday, May 6th, 2014: Columbia Pike (US 29) and Tech Road (Signalized)
- Thursday, May 8th, 2014: New Hampshire Avenue (MD 650) and Heartfields Drive/Quaint Acres Drive (Signalized)
- Thursday, June 5th, 2014: New Hampshire Avenue (MD 650) and Lockwood Drive (Signalized)
- Thursday, September 11th, 2014: Columbia Pike (US 29) and Lockwood Drive (Signalized)
- Thursday, February 5th, 2015: New Hampshire Avenue (MD 650) and Powder Mill Road (Signalized)
- Tuesday, April 28th, 2015: Powder Mill Road (MD 212) and Beltsville Drive (Signalized)
- Wednesday, April 29th, 2015: Powder Mill Road (MD 212) and Cherry Hill Road (Signalized)
- Tuesday, May 12th, 2015: Old Columbia Pike and Industrial Parkway (Unsignalized)
- Wednesday, May 13th, 2015: Cherry Hill Road and Plum Orchard Drive (Signalized)
- Thursday, May 14th, 2015:
 - Old Columbia Parkway/Prosperity Road and Tech Road (Unsignalized)
 - Tech Road and Industrial Parkway (Unsignalized)
- Wednesday, May 20th, 2015: Cherry Hill Road and FDA Boulevard (Signalized)
- Wednesday, May 27th, 2015:
 - Cherry Hill Road and Broadbirch Road (Signalized)
 - Cherry Hill Road/Randolph Road and Columbia Pike (US 29) Ramps (Signalized)
- Thursday, September 18th, 2015: Columbia Pike (US 29) and Fairland Road (Signalized)
- Tuesday, September 29th, 2015: New Hampshire Avenue (MD 650) and Mahan Road/Schindler Drive (Signalized)
- Wednesday, September 30th, 2015: New Hampshire Avenue (MD 650) and Michelson Road/Northwest Drive (Signalized)
- Tuesday, October 20th, 2015:
 - Columbia Pike (US 29) and Industrial Parkway (Signalized)
- Wednesday, December 9th, 2015: Columbia Pike (US 29) and Musgrove Road (Signalized)
- Wednesday, April 20th, 2016: Columbia Pike (US 29) and Stewart Lane (Signalized)
- Tuesday, March 28th, 2017: Beltsville Drive and Calverton Boulevard (Signalized)

Appendix D contains the raw count data and maps of all the count locations. An analysis of the data revealed that the individual intersection AM and PM peak period hours varied throughout the study area. To be conservative, individual peaks were utilized. Volumes were balanced between intersections where appropriate. In addition, queue observations were conducted during peak periods to identify locations of unmet demand. Where unmet demand was encountered, volume was added to the TMC data.

ANALYSIS METHODOLOGY

Capacity analyses performed for the signalized and unsignalized intersections in the study area used Synchro 9 traffic analysis software. This software package provides average control delay, queues, and level of service (LOS) for each lane group and for the overall intersection. LOS is an evaluation of the quality of operation of an intersection and is a measure of the average delay a driver experiences while traveling through the intersection. LOS is dependent upon a range of defined operating conditions such as traffic demand, lane geometry, and traffic signal timing and phasing.

The v/c ratio relates the demand at a particular intersection (traffic volume, v) to the available capacity (c). The available capacity for each movement varies depending on number of lanes, lane width, perception/reaction time, green time, and cycle length, among others. A v/c ratio of 1.0 indicates that the demand for a particular movement is equal to the capacity. A movement with a v/c ratio at or over 1.0 is considered undesirable because the movement volume exceeds the capacity, which results in queuing, indicating unmet demand along that approach.

LOS is an evaluation of the quality of operation of an intersection and is a measure of the average delay a driver experiences while traveling through the intersection. LOS is dependent on a range of defined operating conditions such as traffic demand, lane geometry, and traffic signal timing and phasing.

LOS can range from A to F and is based on the average control delay per vehicle in seconds. For a signalized intersection, LOS A indicates operations with an average control delay less than 10 seconds per vehicle, while LOS F describes operations with an average control delay in excess of 80 seconds per vehicle. For an unsignalized intersection, LOS A indicates operations with an average control delay less than 10 seconds per vehicle, while LOS F describes operations with an average control delay in excess of 50 seconds per vehicle. The delay criteria for signalized and unsignalized intersections are summarized in Table 6.

Table 6: LOS Thresholds

| Level of Service | Average Control Delay (seconds/vehicle) | |
|------------------|----------------------------------------------|----------------------------------------------|
| | Signalized | Unsignalized |
| A | Less than or equal to 10.0 | Less than or equal to 10.0 |
| B | >10.0 and ≤20.0 | >10.0 and ≤15.0 |
| C | >20.0 and ≤35.0 | >15.0 and ≤25.0 |
| D | >35.0 and ≤55.0 | >25.0 and ≤35.0 |
| E | >55.0 and ≤80.0 | >35.0 and ≤50.0 |
| F | Greater than 80.0 or v/c greater than 1.0 | Greater than 50.0 or v/c greater than 1.0 |

2017 EXISTING CONDITIONS CAPACITY ANALYSIS

2017 Existing Condition volumes for the AM and PM peak hours, shown in Exhibits 1 and 2 in Appendix C, were modeled in Highway Capacity Software (HCS) 2010 and Synchro 9 to produce capacity analysis results, summarized in Exhibits 3 and 4 in Appendix C. All HCS and Synchro capacity analysis outputs are in Appendix D. The results show that most intersections currently operate at an overall LOS D or better, except for the intersections shown in Table 7 that operate at an

overall LOS of E or F (failing condition). The overall intersection delay (in seconds) is shown in parentheses.

Table 7: Existing Condition Intersections Operating at Overall LOS E or F

| Intersection | 2017 Existing Condition | |
|-----------------------------------------------------------|-------------------------|-----------|
| | AM | PM |
| New Hampshire Ave (MD 650) and Mahan Road/Schindler Drive | - | F (174.8) |
| New Hampshire Avenue (MD 650) and Lockwood Drive | E (60.4) | - |
| Columbia Pike (US 29) and Stewart Lane | - | F (97.4) |
| Columbia Pike (US 29) and Tech Road | F (111.7) | F (139.3) |
| Columbia Pike (US 29) and Cherry Hill Road/Randolph Road | E (75.0) | - |
| Cherry Hill Road and Broadbirch Drive/Calverton Boulevard | F (275.8) | F (155.4) |

TRANSPORTATION IMPACTS

It was assumed that the proposed consolidation and expansion would be completed and occupied by 2040. Therefore, this traffic analysis will evaluate a future year of 2040.

FUTURE NO ACTION ALTERNATIVE

The future No Action Alternative evaluates the future transportation network with future volumes, excluding FDA Master Plan growth. It includes traffic growth due to nearby developments, increases in background traffic, and future development and infrastructure enhancements recommended in the *White Oak Science Gateway Local Area Transportation Review* (2016), prepared by Sabra, Wang & Associates for Montgomery County. It should be noted that if the White Oak Campus is not expanded to accommodate FDA growth needs, it is likely that growth would occur at other sites. However, analyzing this potential offsite growth is outside the scope of the study and not analyzed as part of the No Action Alternative.

WHITE OAK LOCAL TRANSPORTATION REVIEW

Montgomery County recently completed a LATR for the White Oak area to plan for the anticipated development within the White Oak area. Sabra, Wang & Associates (SWA) conducted a traffic analysis which was utilized to project future traffic volumes and identify and recommend improvements to the transportation network. The SWA volume projections as well as the recommended transportation network improvements were incorporated into this study in the No Action condition because they are assumed to be completed regardless of the status of the White Oak campus. The anticipated increase in employees and support staff up to approximately 18,000 was not anticipated in the SWA analysis. Exhibits 5 and 6 in Appendix C show the base No Action Alternative volumes that were obtained from the SWA study.

STUDY NETWORK INTERSECTION IMPROVEMENTS

The following are a list of intersection improvements recommended by SWA in *White Oak LATR/LATIP*. Sketches of the proposed roadway improvements can be seen in Appendix F. Treatments identified in the White Oak LATR/LATIP/LATIP can be found in Appendix G.

Columbia Pike (US 29) & Lockwood Drive

An additional through lane is proposed in both the northbound and southbound Columbia Pike (US 29) approaches.

New Hampshire Avenue (MD 650) & Powder Mill Road

A 300-foot right turn lane is proposed for the northbound New Hampshire Avenue (MD 650) approach.

New Hampshire Avenue (MD 650) & Lockwood Drive

An additional through lane is proposed for the eastbound Lockwood Drive approach. Additionally, an additional left turn lane is proposed in the northbound direction along New Hampshire Avenue (MD 650).

Old Columbia Pike/Prosperity Drive & Tech Road

Both northbound and southbound Old Columbia Pike/Prosperity Drive approaches are proposed to be modified to right-turn only.

Columbia Pike (US 29) & Industrial Parkway and Old Columbia Pike & Industrial Parkway

SWA proposed to remove a portion of the right turn lanes and prohibit right turns from northbound Columbia Pike (US 29) to Industrial Parkway. Instead, a slip ramp would be provided south of this intersection to a new signalized intersection with a realigned Old Columbia Pike. The right-turning vehicles would then make a left turn on Old Columbia Pike, come to the signalized intersection at Industrial Parkway, and complete their right turn movement onto eastbound Industrial Parkway. Additionally, a second left turn lane for the southbound Columbia Pike (US 29) approach is proposed.

The intersection of Old Columbia Pike and Industrial Parkway is proposed to be widened, reconfigured, and signalized. A second right-turn only lane is proposed for the northbound approach and a shared thru-right lane is proposed for the southbound approach for Old Columbia Pike. A right turn lane is also proposed for the eastbound Industrial Parkway approach.

SWA provided a sketch for the intersection improvements for Columbia Pike (US 29) & Industrial Parkway and Old Columbia Pike & Industrial Parkway shown in Figure 30.

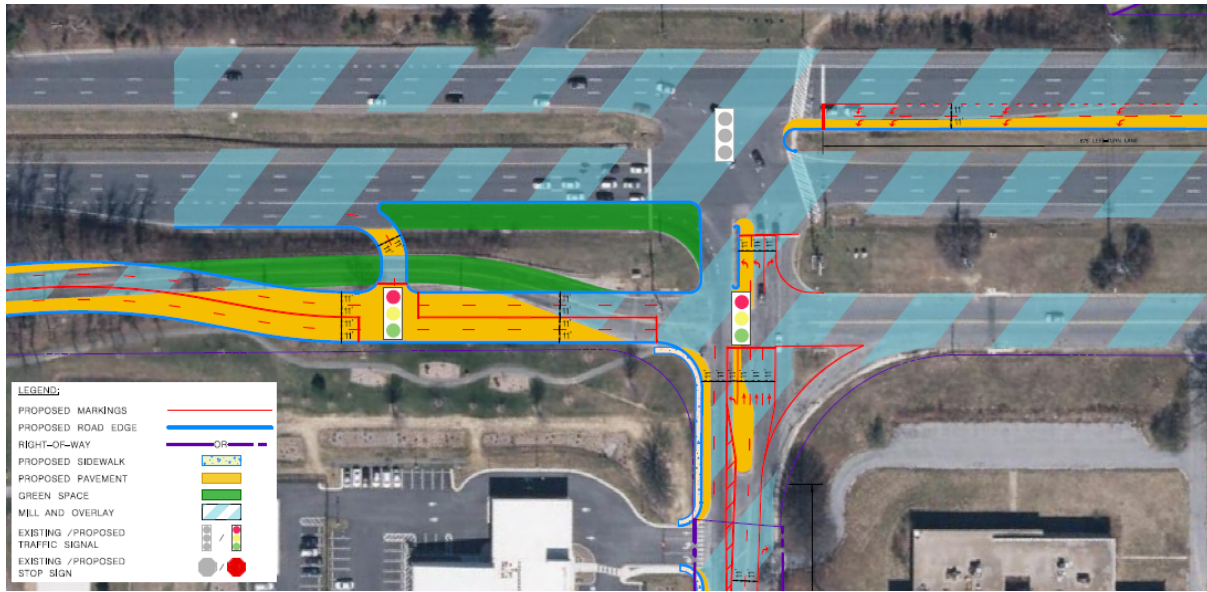


Figure 30: Columbia Pike (US 29) & Industrial Parkway and Old Columbia Pike & Industrial Parkway Proposed Improvements

Columbia Pike (US 29) and Tech Road

The intersection is currently at-grade and signalized. The LATR recommends that the intersection be replaced as a grade-separated intersection as part of MDOT SHA’s plans to convert most at-grade intersections on Columbia Pike (US 29) to grade-separated interchanges.

Tech Road & Industrial Parkway

Currently, the intersection is a four-way stop-controlled intersection. It is proposed to be modified to a signalized intersection. Two 425-foot right turn bays are proposed to be added on the eastbound Industrial Parkway approach. A 500-foot right turn bay is also proposed on the westbound Industrial Parkway approach. Lastly, an additional left turn lane is proposed on the southbound Tech Road approach.

Cherry Hill Road & Broadbirch Drive/Calverton Boulevard

For the southbound Cherry Hill Road approach, a 100-foot one-lane right turn bay is proposed along with a through lane. For the eastbound Broadbirch Drive approach, a through lane and a 500-foot one-lane right turn bay are proposed. In the westbound Calverton Boulevard approach, an additional through lane is proposed.

SWA provided a sketch for the intersection improvements for Cherry Hill Road & Broadbirch Drive/Calverton Boulevard shown in Figure 31.

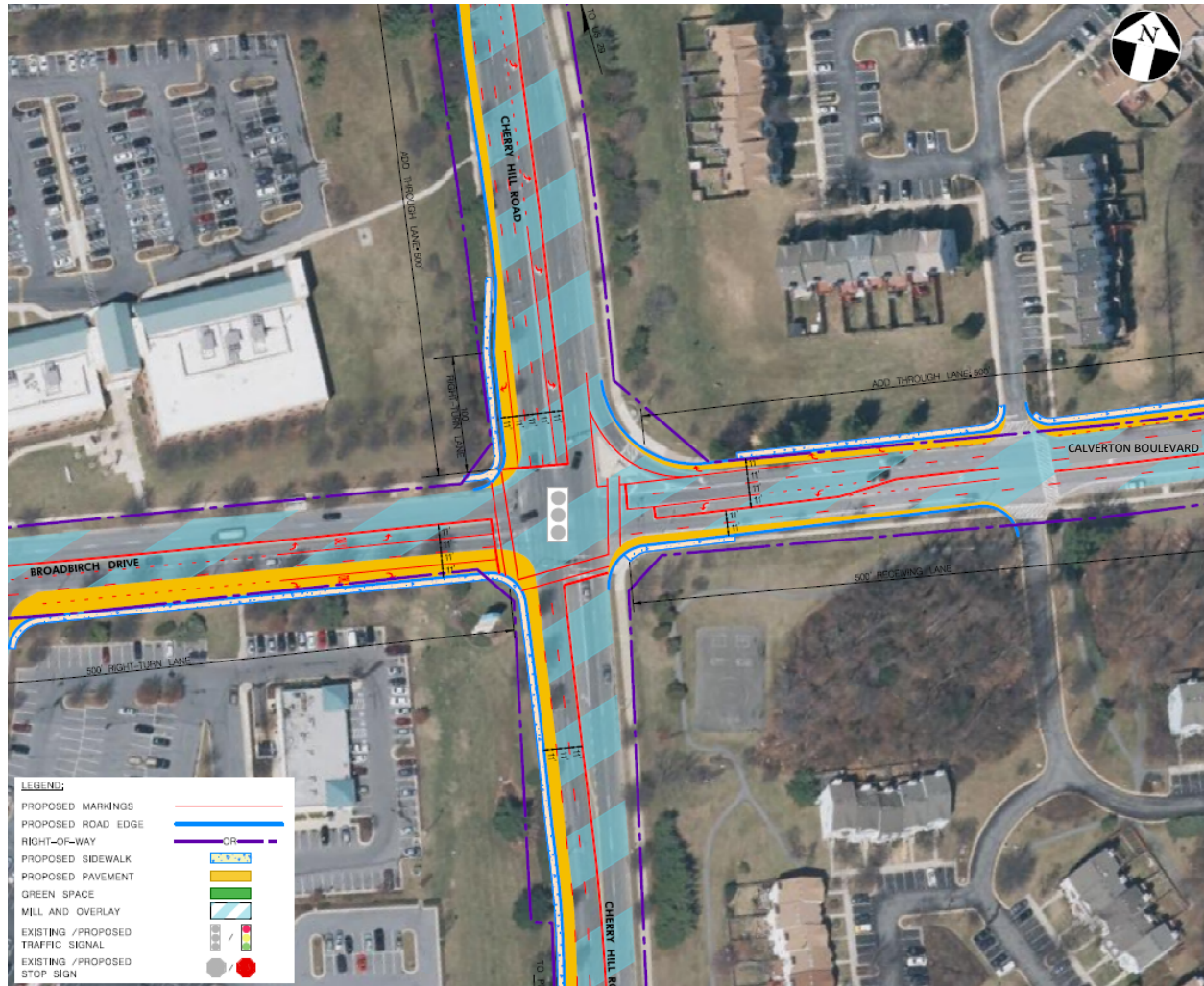


Figure 31: Cherry Hill Road & Broadbirch Drive/Calverton Boulevard Intersection Improvements

Cherry Hill Road & Plum Orchard Drive/Clover Patch Drive

A 500-foot right turn lane is proposed for the southbound Cherry Hill Road approach.

FDA Boulevard & Future Roadway B-5

The intersection of FDA Boulevard & Future Roadway B-5 is a proposed intersection for the Viva White Oak Complex. SWA recommends for the intersection to be a signalized intersection. A free movement right turn lane is proposed for the southbound Future Roadway B-5 approach with a 100-foot turn bay length. A 600-foot one lane left turn bay is also proposed for the westbound FDA Boulevard approach.

Columbia Pike (US 29) Ramps & Cherry Hill Road/Randolph Road

The southbound right-turn lane on the Columbia Pike (US 29) off-ramp is proposed to be modified to a left/right turn lane. An additional through lane is also proposed on the southbound Randolph Road approach.

Non-Auto Enhancements

The White Oak LATR/LATIP also includes several non-auto enhancements to transit, pedestrian, and bicycle service and infrastructure. These projects include:

- Hillandale Transit Center: A new transit center that will include layover areas and a restroom for bus operators, located along the Powder mill road cul-de-sac, west of MD 650.
- Additional Ride-On Service:
 - Increased frequency on Ride-On Routes 10, 21, and 22 to 10-minute, 15-minute, and 10-minute headways, respectively.
 - A new Ride-On route that will serve Washington Adventist Hospital, Cherry Hill Road, Viva White Oak, Riderwood, and the Silver Spring Transit Center with 15-minute headways. Upon completion of the US 29 BRT, this route will be converted to a circulator route.
- White Oak Circulator: A new route connecting Viva White Oak to the Silver Spring Transit Center, converting to a circulator after the construction of the US 29 BRT.
- Bus Stop Enhancements: Upgraded landing areas, ADA treatments, and improved amenities.
- Bikeshare Stations: A total of 67 bikeshare stations will be placed over the full lifetime of the plan.
- Bikeway Projects: Eight total projects that consist of a combination of shared-use paths, bike lanes, intended to enhance local and regional connections (see Figure 32).

The potential impact of these improvements has been factored into the White Oak LATR/LATIP vehicular analysis and will be considered as part of the amenities needed to reach the FDA's trip reduction goals (see Transportation Management Plan).

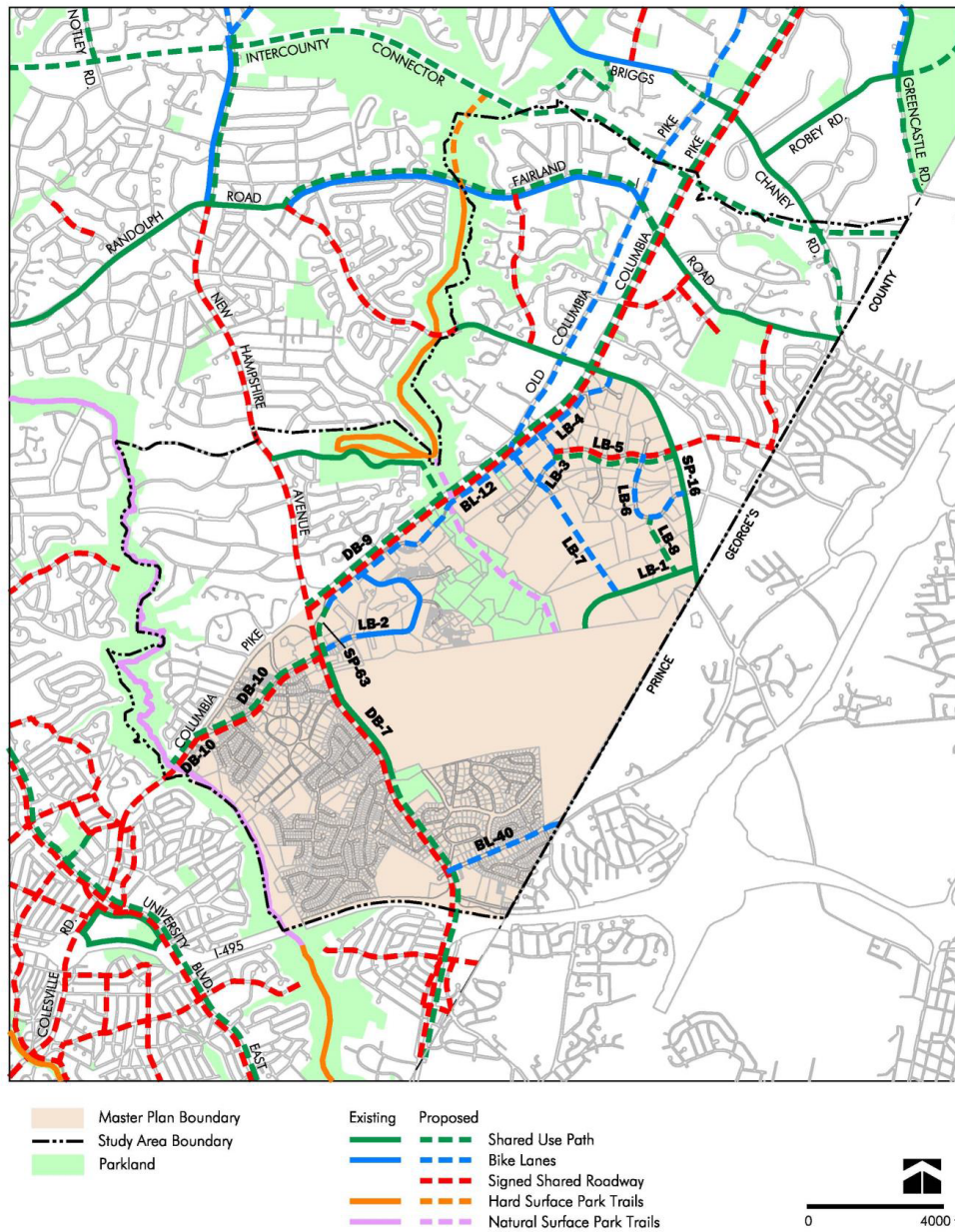


Figure 32: Existing and Proposed Bicycle Facilities

(Source: White Oak Science Gateway Master Plan)

ADDITIONAL BACKGROUND DEVELOPMENTS

During the scoping of this traffic study with Montgomery and Prince George’s Counties, staff from Montgomery County identified several planned developments which were recently identified and not included in the analysis performed by SWA. Therefore, these developments had to be taken into consideration separately. The developments are listed with their site plan numbers for the Montgomery County Planning Board. The trip distribution for the following developments can be seen in Exhibits 1 through 26 in Appendix E. No traffic studies were available for the proposed

developments; therefore, Stantec utilized the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (9th Edition). A 25% transit credit was utilized to reflect the predicted future Non-Auto Drive Mode Share (NADMS) for White Oak, predicted in the *White Oak Science Gateway Master Plan*.

Washington Adventist Hospital, Site Plan Amendment No. 82008021E and Special Exception Case No. S-2721.

The Washington Adventist Hospital was approved for an 803,570-square-foot hospital (or 722,357 square feet of equivalent office space that equals 964 AM peak-hour trips and 948 PM peak-hour trips). These trips were determined to be already included in the projected future volumes of the *White Oak LATR/LATIP*, and thus were not added to the roadway network.

Additionally, intersection improvements were required at the intersection of Cherry Hill Road & Plum Orchard Drive/Clover Patch Drive which included an additional westbound through lane, a southbound right-turn lane, and the upgrading of the existing traffic signal system.

West Farm (I-1), Preliminary Plan No. 119820680

West Farm is a proposed light industrial or office space building located on Plum Orchard Drive. Table 8 below shows the trip generation for the proposed site.

Table 8: West Farm Trip Generation

| | Land Use Code | Unit | | AM | | | PM | | |
|--------------------------------|---------------|---------|----|------------|-----------|------------|-----------|------------|------------|
| | | | | Entering | Exiting | Total | Entering | Exiting | Total |
| General Office Building | 710 | 265,426 | SF | 368 | 50 | 418 | 64 | 312 | 376 |
| Transit Credit | | | | 92 | 13 | 105 | 16 | 78 | 94 |
| Total | | | | 276 | 37 | 313 | 48 | 234 | 282 |

The AM and PM peak hour trip distribution for West Farm can be seen in Exhibits 1 through 4 in Appendix E, respectively.

Darcars at Montgomery Industrial Park Lot 33, Site Plan Amendment No. 81994026B

Darcars is a proposed expansion of an existing car dealership located on Prosperity Drive. Table 9 below shows the trip generation for the proposed expansion.

Table 9: Darcars Trip Generation

| | Land Use Code | Unit | | AM | | | PM | | |
|-------------------------|---------------|-------|----|----------|----------|----------|----------|-----------|-----------|
| | | | | Entering | Exiting | Total | Entering | Exiting | Total |
| Automobile Sales | 841 | 2,505 | SF | 4 | 1 | 5 | 12 | 17 | 29 |
| Transit Credit | | | | 1 | 0 | 1 | 3 | 4 | 7 |
| Total | | | | 3 | 1 | 4 | 9 | 13 | 22 |

The AM and PM peak hour trip distribution for Darcars can be seen in Exhibits 5 through 8 in Appendix E, respectively.

White Oak Town Center, Preliminary Plan No. 120150100,

The White Oak Town Center is a proposed mixed-use five story structure at the northeast corner of the intersection of Old Columbia Pike and Industrial Parkway. Table 10 below shows the trip generation for the proposed site.

Table 10: White Oak Town Center Trip Generation

| | Land Use Code | Unit | | AM | | | PM | | |
|--------------------------------|---------------|--------|----------------|------------|------------|------------|------------|------------|------------|
| | | | | Entering | Exiting | Total | Entering | Exiting | Total |
| General Office Building | 710 | 90,000 | SF | 155 | 21 | 176 | 30 | 149 | 179 |
| Transit Credit | | | | 39 | 5 | 44 | 8 | 37 | 45 |
| Subtotal | | | | 116 | 16 | 132 | 22 | 112 | 134 |
| Mid-Rise Apartments | 223 | 289 | Dwelling Units | 33 | 72 | 105 | 74 | 54 | 128 |
| Transit Credit | | | | 8 | 18 | 26 | 19 | 14 | 32 |
| Subtotal | | | | 25 | 54 | 79 | 55 | 40 | 96 |
| Supermarket | 850 | 65,000 | SF | 137 | 84 | 221 | 289 | 277 | 566 |
| Transit Credit | | | | 34 | 21 | 55 | 72 | 69 | 142 |
| Pass By | | | | - | - | - | 76 | 76 | 152 |
| Subtotal | | | | 103 | 63 | 166 | 141 | 132 | 272 |
| Total | | | | 244 | 133 | 377 | 218 | 284 | 502 |

The AM and PM peak hour trip distribution for the White Oak Town Center can be seen in Exhibits 9 through 13 in Appendix E, respectively.

White Oak Property, Preliminary Plan No. 119910990

White Oak Property is a proposed townhouse complex located on Stewart Lane, south of Columbia Pike (US 29). Table 11 below shows the trip generation for the proposed complex.

Table 11: White Oak Property Trip Generation

| | Land Use Code | Unit | | AM | | | PM | | |
|-----------------------|---------------|------|----------------|----------|----------|----------|----------|-----------|-----------|
| | | | | Entering | Exiting | Total | Entering | Exiting | Total |
| Townhouses | 230 | 128 | Dwelling Units | 4 | 1 | 5 | 12 | 17 | 29 |
| Transit Credit | | | | 1 | 0 | 1 | 3 | 4 | 7 |
| Total | | | | 3 | 1 | 4 | 9 | 13 | 22 |

The AM and PM peak hour trip distribution for White Oak Property can be seen in Exhibits 14 through 17 in Appendix E, respectively.

Victory Housing, Preliminary Plan No. 120140210D

Victory Housing is a proposed senior housing apartment complex on Stewart Lane, north of Columbia Pike (US 29). Table 12 below shows the trip generation for the proposed complex.

Table 12: Victory Housing Trip Generation

| | Land Use Code | Unit | | AM | | | PM | | |
|-----------------------------------|---------------|------|----------------|----------|-----------|-----------|-----------|----------|-----------|
| | | | | Entering | Exiting | Total | Entering | Exiting | Total |
| Senior Mid-Rise Apartments | 2520 | 105 | Dwelling Units | 7 | 14 | 21 | 15 | 12 | 27 |
| Transit Credit | | | | 2 | 4 | 5 | 4 | 3 | 7 |
| Total | | | | 5 | 10 | 16 | 11 | 9 | 20 |

The AM and PM peak hour trip distribution for Victory Housing can be seen in Exhibits 18 through 21 in Appendix E, respectively.

Hillandale Gateway, Plan No. 520170050

Hillandale Gateway is a proposed mixed-use complex located on Powder Mill Road, east of New Hampshire Avenue (MD 650). Table 13 below shows the trip generation for the proposed mixed-use complex.

Table 13: Hillandale Gateway Trip Generation

| | Land Use Code | Unit | | AM | | | PM | | |
|-----------------------------------|---------------|--------|----------------|-----------|-----------|------------|-----------|-----------|------------|
| | | | | Entering | Exiting | Total | Entering | Exiting | Total |
| Shopping Center | 820 | 24,500 | SF | 41 | 25 | 66 | 112 | 121 | 233 |
| Transit Credit | | | | 10 | 6 | 17 | 28 | 30 | 58 |
| Pass By | | | | | | | 51 | 51 | 102 |
| Subtotal | | | | 31 | 19 | 49 | 33 | 40 | 73 |
| Mid-Rise Apartments | 223 | 235 | Dwelling Units | 26 | 57 | 83 | 59 | 43 | 102 |
| Transit Credit | | | | 7 | 14 | 21 | 15 | 11 | 26 |
| Subtotal | | | | 19 | 43 | 62 | 44 | 32 | 76 |
| Senior Mid-Rise Apartments | 252 | 96 | Dwelling Units | 6 | 13 | 19 | 13 | 12 | 25 |
| Transit Credit | | | | 2 | 3 | 5 | 3 | 3 | 6 |
| Subtotal | | | | 4 | 10 | 14 | 10 | 9 | 19 |
| Total | | | | 54 | 72 | 125 | 87 | 81 | 168 |

The AM and PM peak hour trip distribution for Hillandale Gateway can be seen in Exhibits 22 through 26 in Appendix E, respectively.

The cumulative number of additional AM and PM peak hour trips added by the above-referenced developments are shown in Exhibits 27 and 28 in Appendix E, respectively.

MARYLAND TRAFFIC RELIEF PLAN

In September 2017, Maryland Governor Larry Hogan, announced the Traffic Relief Plan which calls for the addition of four new express lanes on I-270 and I-495, as well as the widening of the Baltimore-Washington Parkway. These planned improvements are in the preliminary stages; however, it is likely that they will have a significant impact on traffic congestion on major commuter corridors that would ultimately provide access to the White Oak Campus.

While the proposed corridors are outside the study area, it is likely that these improvements would impact vehicle arrivals to, and departures from, the study area, particularly along New Hampshire Avenue, which connects to I-495 and serves as one of two primary access corridors to/from the White Oak Campus. Depending on access between the express lanes and the New Hampshire Avenue (MD 650) interchange, an increase in throughput may result in additional queueing on the corridor. However, the timing and impacts are unknown at this time. Therefore, while the potential impacts should be considered, they are not factored into the overall No Build Condition on the New Hampshire Avenue corridor.

STUDY AREA TRANSIT ENHANCEMENTS

In addition to the roadway network enhancements planned in the area by Montgomery County and MDOT SHA, a number of non-auto projects have been included in the White Oak LATR/LATIP: a

new White Oak circulator, new Ride-On service, increased Ride-On 10 and 22 service, the Hillandale Transit Center, bus stop improvements, and bikeshare. It should be noted that these improvements factor in to the 46% NADMS credit taken within this TTR.

In addition, there are several bus rapid transit (BRT) projects are anticipated to serve the White Oak area. Montgomery County has identified seven potential BRT corridors that would provide enhanced transit mobility within the County through express, limited-stop, bus service. The BRT system would operate like a light rail system with branded stations, off-board fare collection, and priority at key intersections. The proposed Columbia Pike and New Hampshire Avenue corridors would operate near the White Oak Campus and have stations within a half mile. Currently, the terminal station of the Randolph Road corridor would be located on Tech Road, approximately 1.5 miles from the White Oak Campus, but future plans may extend this corridor to split at Old Columbia Pike & Randolph Road and terminate at VIVA White Oak.

The Columbia Pike corridor is one of three selected by Montgomery County to advance to implementation and is expected to be in operation within the next five years. The timing of the other corridors, including New Hampshire Avenue and Randolph Road is less certain. However, it would not be unreasonable to anticipate that those corridors would come online within the next ten to fifteen years. The impact of the proposed BRT facilities is factored into the No Action analysis through the 25% NADMS credit that is applied in the *White Oak LATR/LATIP*, as well as the trip generation conducted for this study.

NO ACTION ALTERNATIVE

The projected volumes obtained from the SWA analysis were added to the site-specific trip generation conducted for other nearby developments as part of this study to develop No Action Alternative volumes for the AM and PM peak hours, shown in Exhibits 7 and 8 in Appendix C. These volumes were modeled in Synchro 9 to produce capacity analysis results, summarized in Exhibits 3 and 4 in Appendix C. These models also included all proposed signalized intersections and roadway improvements recommended in the transportation impact studies for the above-referenced *White Oak LATR/LATIP*.

All HCS and Synchro capacity analysis outputs are located in Appendix D.

The results show that all intersections would continue to operate at an overall LOS D or better. Table 14 below indicates the intersections that would operate at an overall LOS of E or F (failing condition). Overall intersection delay in seconds is noted in parentheses.

Table 14: No Action Alternative Intersections Operating at Overall LOS E or F

| Intersection | Existing Condition | | No Action Alternative | |
|-----------------------------------------------------------|--------------------|--------------|-----------------------|--------------|
| | AM | PM | AM | PM |
| New Hampshire Ave (MD 650) and Mahan Road/Schindler Drive | - | F (174.8) | - | F (144.6) |
| New Hampshire Ave (MD 650) and Powder Mill Road | - | - | F (101.6) | E (75.3) |
| New Hampshire Ave (MD 650) and Lockwood Drive | E (60.4) | - | F (81.9) | E (70.2) |
| Columbia Pike (US 29) and Stewart Lane | - | F (97.4) | F (99.2) | F (230.3) |
| FDA Boulevard and Industrial Parkway | - | - | - | F (221.3) |
| Columbia Pike (US 29) and Industrial Parkway | - | - | E (67.6) | F (137.2) |
| Columbia Pike (US 29) and Tech Road | F (111.7) | F (139.3) | F (344.5) | F 565.1 |
| Columbia Pike (US 29) and Cherry Hill Road/Randolph Road | E (75.0) | - | - | - |
| Old Columbia Pike and Industrial Parkway | - | - | E (74.2) | E (66.7) |
| Tech Road and & Industrial Parkway | - | - | F (86.0) | - |
| Cherry Hill Road and Broadbirch Drive/Calverton Boulevard | F (275.8) | F (155.4) | F (126.8) | F (223.9) |
| Columbia Pike (US 29) and Musgrove Road | - | - | F (201.7) | F (123.9) |
| Columbia Pike (US 29) and Fairland Road | - | - | F (193.5) | F (145.4) |

FUTURE ACTION ALTERNATIVE

The Action Alternative analysis examines future anticipated volumes, taking into consideration traffic under the No Action Alternative as well as traffic that would be generated by the proposed consolidation and expansion on the White Oak campus.

SITE TRIP GENERATION

The White Oak campus is a complex trip generator with a lot of variables that relate directly to how many vehicles enter and exit the campus during an average weekday. Visitors, contractors, FDA employees, and GSA staff arrive and depart during the peak hours. Factors like teleworking, meetings, vacation, and illness, can result in daily fluctuations in trip generation. For example, while there are 10,987 employees and support staff assigned to the White Oak Campus, the daily attendance typically ranges from 6,000 to 8,000 employees/support staff. Therefore, given the complex nature of the trip generation onsite, as well as the limited parking (the site only provides 1 parking space for every 1.8 employees), the *ITE Trip Generation Manual* would not be an appropriate source of trip generation information.

To estimate the number of trips that would be generated by the additional 7,013 employees, a site-specific trip generation rate was calculated utilizing ATR data collected over a one-week period from Friday, March 24th, 2017 through Thursday, March 30th, 2017 at all three guard stations. This time period was selected because it represented historical peaks in on-site attendance based on data provided by FDA. The average number of AM and PM peak hour trips entering and exiting the White Oak Campus on a Tuesday, Wednesday, or Thursday was divided by the number of employees currently assigned to the campus (Table 15) to generate an AM and PM peak hour trip per employee rate (Table 16). These rates account for the effect of site constraints, like parking capacity, as well as employees that telecommute or take transit. It is anticipated that the ratio of employees that telecommute or take transit would remain relatively consistent; therefore, the rates developed based on existing activity likely provide a fair estimate of future vehicular trip generation.

Construction on the White Oak Campus is not anticipated for at least ten years. Therefore, it is possible that at least two, if not all three of the proposed BRT corridors serving the White Oak area would be operational once the expansion of the campus is underway. However, suburban to suburban transit routes, even those located in higher density areas, tend to have a limited impact on journey to work trips for office sites, like the White Oak campus. The proposed BRT routes serve specific areas and do not operate along some of the corridors with the heaviest concentrations of employee residences. Furthermore, utilizing the BRT services would require multi-seat rides to reach the White Oak campus for most employees, reducing the potential ridership base of FDA employees. Furthermore, the results of the survey indicate an NADMS for the White Oak campus of 25%, which matches that utilized in the LATR and *Master Plan for the White Oak Science Gateway*. Thus, to be conservative, no additional transit credit was taken for the BRT.

Table 15: Campus Growth

| | Number of Employees and Support Staff |
|---------------------------|----------------------------------------------|
| Existing Condition | 10,987 |
| Future Condition | 18,000 |
| Growth | 7,013 |

Table 16: Existing Trip Generation Rates

| Peak Hour | Entering Trips (per Employee) | Exiting Trips (per Employee) |
|---------------------|--------------------------------------|-------------------------------------|
| AM Peak Hour | 2,144 (0.195) | 196 (0.018) |
| PM Peak Hour | 91 (0.008) | 1,840 (0.168) |

The number of AM and PM peak hour entering and exiting trips was then calculated for the proposed 7,013 additional employees based on these rates. The resulting vehicle trips for the existing and proposed future condition can be seen in Table 17 below.

Table 17: Future Trip Generation

| Peak Hour | New Trips In | New Trips Out |
|---------------------|---------------------|----------------------|
| AM Peak Hour | 1,369 | 125 |
| PM Peak Hour | 58 | 1,175 |

SITE TRIP DISTRIBUTION

A trip distribution analysis was conducted to estimate how the new vehicle trips would travel to and from the site. Employee home ZIP code data for off-campus and on-campus was obtained as part of the FDA White Oak Campus Transportation Surveys. Utilizing typical weekday traffic conditions from Google Maps, a preferred route from off-campus was established for each given zip code. The following network entrance/exit points were established:

- New Hampshire Avenue (MD 650) North
- New Hampshire Avenue (MD 650) South
- Columbia Pike (US 29) South
- Columbia Pike (US 29) North
- Cherry Hill Road South
- Powder Mill Road (MD 212) East
- Fairland Road East
- Musgrove Road East

The designated routes were summarized by direction of arrival and departure to the study area network for both off-campus and new employees (Figure 33). Utilizing the off-campus and on-campus preferred routes of travel, percentages for each potential arrival/departure route were created for off-campus employees moving to the White Oak Campus and organic growth from within the FDA, respectively. The resulting trip distribution diagrams for the Action Alternative can be found in Exhibits 29 through 32 in Appendix E.

Figure 33: Trip Distribution Origin Map



ACTION ALTERNATIVE CAPACITY ANALYSIS RESULTS

The No Action traffic volumes and the proposed site-generated traffic volumes were summed to obtain Action Alternative volumes for the AM and PM peak hours, shown in Exhibits 9 and 10 in Appendix C. These volumes were modeled in HCS 2010 and Synchro 9 to produce capacity analysis results, summarized in Exhibits 3 and 4 in Appendix C. All HCS and Synchro capacity analysis outputs are located in Appendix D.

The results of the capacity analysis indicate that the proposed site would generate additional delay and queuing on multiple intersection approaches. All intersections would operate at an overall LOS D or better with the exception of the intersections shown in Table 18 that would operate at an overall LOS of E or F (failing condition).

Table 18: Action Alternatives Intersections Operating at Overall LOS E or F

| Intersection | No Action Alternative | | Action Alternative | |
|----------------------------------------------------------------------------|-----------------------|--------------|--------------------|--------------|
| | AM | PM | AM | PM |
| New Hampshire Ave (MD 650) and Mahan Road/Schindler Drive | - | F (144.6) | - | F (172.8) |
| SW Loop Road/NW Loop Road and Mahan Road/Mahan Court | - | - | F (116.9) | F (119.4) |
| NW Loop Road & Michelson Road | - | - | - | F (158.8) |
| New Hampshire Ave (MD 650) and Powder Mill Road | F (101.6) | E (75.3) | F (118.2) | F (84.6) |
| New Hampshire Ave (MD 650) and Lockwood Drive | F (81.9) | E (70.2) | F (146.0) | F (109.0) |
| Columbia Pike (US 29) and Colesville Business Park Driveway/Lockwood Drive | - | - | - | E (56.5) |
| Columbia Pike (US 29) and Stewart Lane | F (99.2) | F (230.3) | F (98.0) | F (230.3) |
| FDA Boulevard and Industrial Parkway | - | F (221.3) | - | F (328.1) |
| Cherry Hill Road and FDA Boulevard | - | - | E (65.0) | - |
| Columbia Pike (US 29) and Industrial Parkway | E (67.6) | F (137.2) | E (74.4) | F (137.0) |
| Columbia Pike (US 29) and Tech Road | F (344.5) | F (565.1) | F (354.7) | F (576.0) |
| Old Columbia Pike and Industrial Parkway | E (74.2) | E (66.7) | F (84.6) | E (71.1) |

| Intersection | No Action Alternative | | Action Alternative | |
|-----------------------------------------------------------|-----------------------|--------------|--------------------|--------------|
| | AM | PM | AM | PM |
| Tech Road and Industrial Parkway | F (86.0) | - | F (100.9) | E (71.5) |
| Cherry Hill Road and Broadbirch Drive/Calverton Boulevard | F (126.8) | F (223.9) | F (155.5) | F (234.6) |
| Columbia Pike (US 29) and Musgrove Road | F (201.7) | F (123.9) | F (224.6) | F (139.4) |
| Columbia Pike (US 29) and Fairland Road | F (193.5) | F (145.4) | F (210.6) | F (158.1) |

In addition to the capacity analysis results shown in Table 18, an evaluation of the percentage increase (influence) of the site generated traffic on the study area intersections was also evaluated. The results shown in Table 19 indicates that, with the exception of the access points, the proposed Action Alternative would result in an overall average increase in intersection volumes of approximately 5%.

Table 19: Action Alternative Influence Area Summary

| Intersection | Action Condition Total Future Volumes | | Site-Generated Volumes | | % Site Generated Traffic | |
|--------------------------------------------------------------------------|---------------------------------------|--------|------------------------|-----|--------------------------|-----|
| | AM | PM | AM | PM | AM | PM |
| New Hampshire Ave (MD 650) & Schindler Drive/Mahan Road | 5,999 | 6,108 | 645 | 458 | 11% | 7% |
| New Hampshire Ave (MD 650) & Powder Mill Road | 7,079 | 6,698 | 282 | 159 | 4% | 2% |
| New Hampshire Ave (MD 650) & Northwest Drive/Michelson Road | 5,965 | 6,343 | 865 | 676 | 15% | 11% |
| New Hampshire Ave (MD 650) & Lockwood Drive | 6,900 | 7,818 | 725 | 598 | 11% | 8% |
| Columbia Pike (US 29) & Colesville Business Park Driveway/Lockwood Drive | 8,669 | 9,931 | 492 | 406 | 6% | 4% |
| New Hampshire Ave (MD 650) & Quaint Acres Drive/Heartfields Drive | 4,579 | 4,598 | 233 | 192 | 5% | 4% |
| Columbia Pike (US 29) & Stewart Lane | 7,527 | 9,464 | 0 | 0 | 0% | 0% |
| FDA Boulevard & Industrial Parkway | 3,203 | 2,948 | 488 | 403 | 15% | 14% |
| FDA Boulevard & Future Roadway B-5 | 3,364 | 2,867 | 390 | 322 | 12% | 11% |
| Cherry Hill Road & FDA Boulevard | 4,676 | 4,788 | 390 | 322 | 8% | 7% |
| Cherry Hill Road & Plum Orchard Drive/Clover Patch Drive | 4,063 | 4,344 | 197 | 163 | 5% | 4% |
| Cherry Hill Road & Powder Mill Road (MD 212) | 5,441 | 5,209 | 193 | 159 | 4% | 3% |
| Columbia Pike (US 29) & Industrial Parkway | 6,622 | 8,142 | 66 | 54 | 1% | 1% |
| Columbia Pike (US 29) & Tech Road | 8,014 | 9,435 | 98 | 81 | 1% | 1% |
| Columbia Pike (US 29) & Cherry Hill Road/Randolph Road | 10,884 | 11,149 | 295 | 244 | 3% | 2% |
| Old Columbia Pike/Prosperity Drive & Tech Road | 2,648 | 3,830 | 32 | 27 | 1% | 1% |
| Old Columbia Pike & Industrial Parkway | 4,447 | 5,434 | 66 | 54 | 1% | 1% |
| Old Columbia Pike & Columbia Pike (US 29) Right Turn Lane | 2,357 | 2,889 | 0 | 0 | 0% | 0% |
| Tech Road & Industrial Parkway | 5,206 | 5,460 | 98 | 81 | 2% | 1% |
| Prosperity Drive & Cherry Hill Road | 4,915 | 4,533 | 197 | 163 | 4% | 4% |
| Cherry Hill Road & Broadbirch Drive/Calverton Boulevard | 5,802 | 5,730 | 197 | 163 | 3% | 3% |
| Columbia Pike (US 29) & Musgrove Road | 8,861 | 9,420 | 295 | 244 | 3% | 3% |
| Columbia Pike (US 29) & Fairland Road | 9,572 | 9,721 | 275 | 226 | 3% | 2% |
| Centerpark Driveway/Beltsville Drive & Powder Mill Road (MD 212) | 4,535 | 4,737 | 179 | 147 | 4% | 3% |
| Beltsville Drive & Calverton Boulevard/Calverton Tower Driveway | 2,111 | 2,114 | 0 | 0 | 0% | 0% |

FUTURE ACTION ALTERNATIVE WITH MITIGATION

The results of the Action Alternative capacity analysis revealed that the additional site generated trips would result in an increase in intersection delay of more than 10 seconds per vehicle and/or degradation of level of service to LOS E or F at most study area intersections. Therefore, mitigation measures would be required. Given the built-out nature of the transportation network within the study area, emphasis was placed on improving overall intersection operations through adjustments to signal timing and phasing. In addition, physical capacity improvements were evaluated for movements that would experience an increase in delay of at least ten seconds per vehicle. Improvements to pedestrian, bicycle, and transit facilities are also recommended as part of a robust and comprehensive mitigation strategy that attempts to reduce and mitigate the impact of peak hour vehicle trips.

Recommended mitigation measures include:

Intelligent Transportation Technology

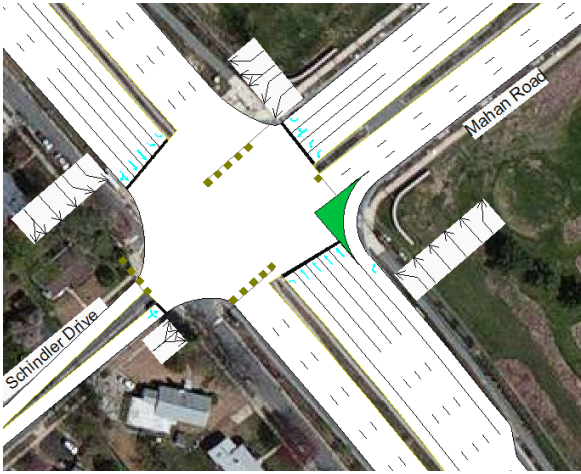
- Evaluate the installation of traffic adaptive/demand responsive signal systems along Columbia Pike (US 29), New Hampshire Avenue (MD 650), and Cherry Hill Road.
- Install Dynamic Message Signs (DMS) along Columbia Pike (US 29) to provide travel time information that would allow drivers to assess the most efficient travel path through the study area.
- Coordinate all ITS-related improvements with MDOT SHA and Montgomery County.

Transportation Demand Management

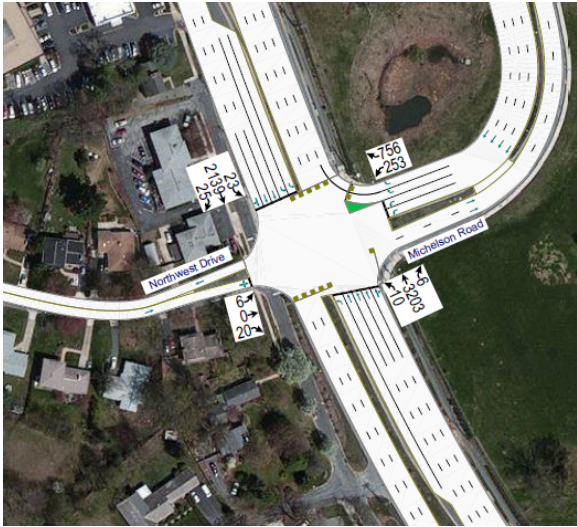
- Enhance the existing transportation demand management (TDM) program to encourage more employees to commute via modes other than driving alone. A transportation management plan (TMP) will be developed for the site as a separate document in 2018.
- Expand the commuter shuttle system to include direct shuttle service to and from Park and Ride facilities along the I-270 corridor.
- Work with Montgomery County and the Maryland Department of Transportation State Highway Administration (MDOT SHA) to identify the potential for new park-and-ride facilities near major interchanges to reduce localized impacts.

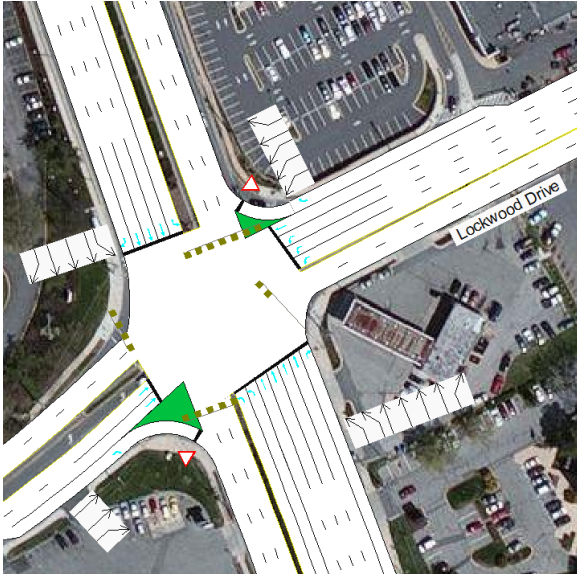
Additional Capacity

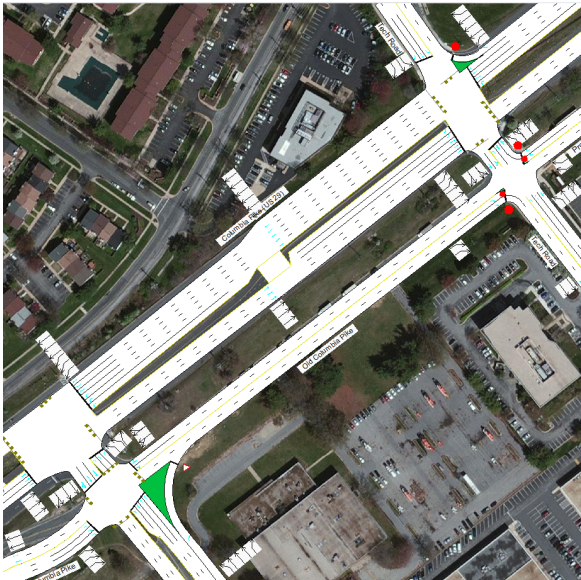
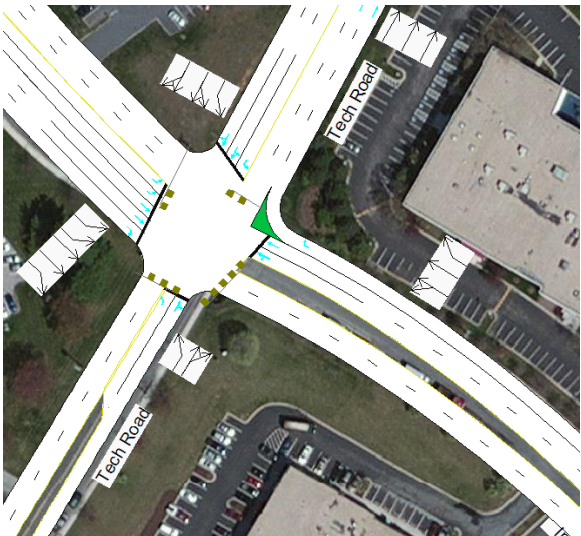
The following table lists the intersections that require mitigation, the recommended mitigation measures, as well as the lead agency that would be needed to implement the recommendations. However, it should be noted that, due to existing and projected No Action Alternative congestion on the study area roadway network, not all increases in delay and queuing could be mitigated. Several intersections along Columbia Pike (US 29), as well as the intersection of New Hampshire Avenue (MD 650) and Powder Mill Road could not be fully improved given the existing geometry and ROW constraints. Improvements like grade separation, which was previously planned by MDOT SHA for signalized intersections along Columbia Pike (US 29), would need to be coordinated through MDOT SHA and Montgomery County. Conversion of the at-grade intersections to interchanges is a long-term project; therefore, the Action with Mitigation alternative enhancements only. It is assumed that delay and queuing at those intersections would be mitigated once they are converted to interchanges.

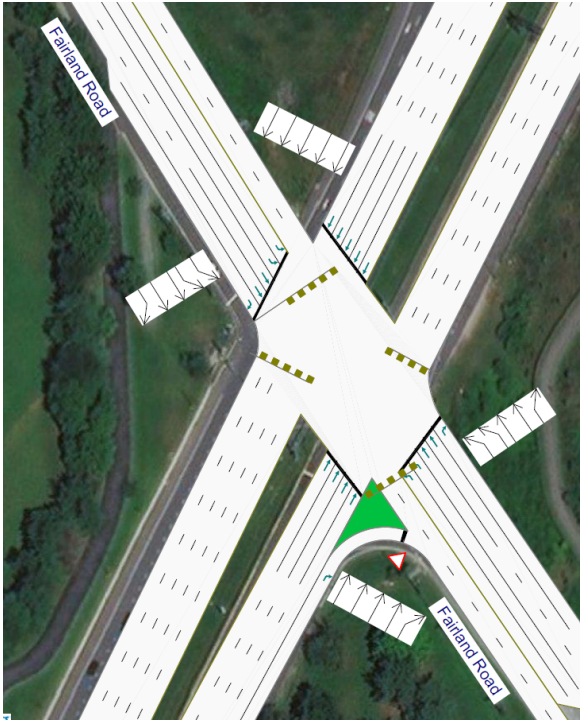
| Intersection | Description of Mitigation | Diagram | Agency |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------|
| <p>New Hampshire Avenue (MD 650) & Powder Mill Road</p> | <p>Optimize signal phase lengths.</p> <p>Significant modifications are required to address existing and future anticipated capacity deficiencies. Mitigation would require significant ROW acquisitions for additional northbound and southbound left-turn and right-turn lanes and/or grade separation. Potential improvements noted in the White Oak Local Area Transportation Review Intersection Improvement Cost Evaluation prepared by Sabra, Wang & Associates included an additional northbound right-turn lane.</p> | <p>N/A</p> | <p>MDOT SHA and Montgomery County.</p> |
| <p>New Hampshire Ave (MD 650) & Schindler Drive/Mahan Road</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Restripe westbound Mahan Road to provide two left-turn lanes, a shared through-right and a right-turn lane. This is required to accommodate the heavier right-turn movement (621 vph) with the reduced cycle length. The anticipated left-turn volume (527 vph) from Mahan Road would be accommodated with two left turn lanes. Utilize a lead-pedestrian interval, and/or permit pedestrian movement only with Schindler Drive.</p> <p>Consider lead pedestrian intervals to accommodate pedestrians in advance of the double right turn.</p> |  | <p>FDA/GSA</p> |


| Intersection | Description of Mitigation | Diagram | Agency |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------|
| <p>SW Loop Road/NW Loop Road & Mahan Road/Mahan Court</p> | <p>Restripe eastbound Mahan Road to provide one left-turn lane, one shared through/right-turn lane and one free-flow right-turn lane.</p> | | <p>FDA/GSA</p> |
| <p>NW Loop Road & Michelson Road</p> | <p>Add a separate right-turn lane on northbound NW Loop Road.</p> | | <p>FDA/GSA</p> |


| Intersection | Description of Mitigation | Diagram | Agency |
|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|
| <p>New Hampshire Ave (MD 650) & Northwest Drive/Michelson Road</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Provide two right-turn lanes on westbound Michelson Road. This is required to accommodate the heavier right-turn movement (756 vph) with the reduced cycle length. The anticipated left-turn volume (253 vph) from Michelson Road would be accommodated with two left-turn lanes. The right-turn will be overlapped with the southbound left-turn movement and the curb lane will be permitted to turn right on red.</p> <p>To avoid cut-through traffic from the FRC via Northwest Drive, a “No Thru Traffic” sign should be posted.</p> <p>Consider lead pedestrian intervals to accommodate pedestrians in advance of the double right turn.</p> |  | <p>FDA/GSA</p> |

| Intersection | Description of Mitigation | Diagram | Agency |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <p>New Hampshire Ave (MD 650) & Lockwood Drive</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Restrict the eastbound Lockwood Drive left-turn movement to northbound New Hampshire Avenue (MD 650). Reroute vehicles wishing to travel northbound on New Hampshire Avenue (MD 650) along westbound Lockwood Drive to Columbia Pike (US 29) and then to the New Hampshire Avenue (MD 650) interchange. The peak period left turn volume is less than 200 vph. Eliminating the left-turn allows for improved operation of the opposing approach, as well as New Hampshire Avenue (MD 650).</p> <p>Restripe westbound Lockwood Drive to provide three left-turn lanes, one through lane, and one right-turn lane.</p> |  | <p>FDA/GSA</p> <p>Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP.</p> |
| <p>Columbia Pike (US 29) & Lockwood Drive</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> | <p>N/A</p> | <p>MDOT SHA and Montgomery County</p> |
| <p>Columbia Pike (US 29) and Stewart Lane</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Convert to a grade-separated interchange (long-term).</p> | <p>N/A</p> | <p>MDOT SHA and Montgomery County</p> |

| Intersection | Description of Mitigation | Diagram | Agency |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Columbia Pike (US 29) & Tech Road and Industrial Parkway</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Provide three left-turn lanes on southbound Columbia Pike (US 29) at Industrial Parkway.</p> <p>Widen Industrial Parkway to three lanes in each direction.</p> <p>Provide three right-turn lanes from northbound Old Columbia Pike to eastbound Industrial Parkway.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> |  | <p>Coordinate with Montgomery County. These should be added into planned upgrades currently included in the White Oak LATR/LATIP.</p> <p>MDOT SHA for grade-separation.</p> |
| <p>Tech Road & Industrial Parkway</p> | <p>Add an additional northbound left-turn lane.</p> <p>Stripe the additional eastbound lane added from the Columbia Pike (US 29) intersection to become a right-turn only lane to Tech Road.</p> |  | <p>Coordinate with Montgomery County. These should be added into planned upgrades currently included in the White Oak LATR/LATIP.</p> |
| <p>Columbia Pike</p> | <p>Change AM and PM peak period cycle length to 150</p> | <p>N/A</p> | <p>MDOT SHA for</p> |

| Intersection | Description of Mitigation | Diagram | Agency |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <p>(US 29) & Musgrove Road</p> | <p>seconds and optimize phasing and offsets.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> | | <p>grade-separation.</p> |
| <p>Columbia Pike (US 29) & Fairland Road</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Remove the Columbia Pike (US 29) northbound left-turn movement and direct vehicles to turn right onto Fairland Road and access westbound Fairland Road via a U-turn at the downstream traffic circle or by turning left at Musgrove Road.</p> <p>Provide two eastbound and two westbound left-turn lanes and eliminate split phasing.</p> <p>Provide a separate northbound right-turn lane.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> |  | <p>Coordinate with Montgomery County and MDOT SHA for improvements.</p> <p>MDOT SHA for grade-separation.</p> |

| Intersection | Description of Mitigation | Diagram | Agency |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Cherry Hill Road & Broadbirch Drive/Calverton Boulevard | Optimize signal phase lengths. | N/A | Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP. |
| Cherry Hill Road & FDA Boulevard | <p>Provide a second left turn lane for northbound Cherry Hill Road.</p> <p>Provide a free-flow right-turn movement from southbound Cherry Hill Road to westbound FDA Boulevard that ties into the additional lane recommended for the intersection of FDA Boulevard and Future Roadway B-5.</p> |  | Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP. |

| Intersection | Description of Mitigation | Diagram | Agency |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <p>FDA Boulevard & Future Roadway B-5</p> | <p>Widen westbound FDA Blvd to three lanes between Cherry Hill Road and Future Roadway B-5. The additional lane becomes a right-turn only lane at Future Roadway B-5.</p> |  | <p>Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP.</p> |
| <p>FDA Boulevard & Industrial Parkway</p> | <p>Monitor the operation of the proposed roundabout. Consideration should be given to northbound and westbound right-turn bypasses to minimize volume in the circulating roadway.</p> | <p>N/A</p> | <p>Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP.</p> |
| <p>Cherry Hill Road & Powder Mill Road (MD 212)</p> | <p>Optimize signal phase lengths.</p> | <p>N/A</p> | <p>Coordinate with Prince George's County</p> |

Transit, Pedestrian, and Bicycle Facilities

Several enhancements are recommended to provide better connections for alternative modes, such as transit, pedestrians, and bicyclists both on and off-site. These enhancements would support FDA efforts to reduce drive-alone commute trips, as well as reduce auto trips during the day by providing needed connections to nearby residential and retail development. Recommendations include:

On-Site

- Provide a 10-foot wide multi-use path and/or five-foot, protected, directional bike lanes along the campus loop roads that connect pedestrian and bicycle facilities on the external roadway network to the on-campus facilities (Figure 34).
- Utilize bicycle lanes or sharrows on minor streets to connect the loop road facilities with bicycle parking near building entrances.
- Ensure that sidewalks are a minimum of six feet. Wider sidewalks are recommended in areas with higher pedestrian volumes.
- Provide a minimum five-foot buffer between the sidewalk/multi-use path and the travel lanes along loop roadways.
- Pedestrian/bicycle-accessible security gates.
- Provide pedestrian crosswalks at all intersections, as well as mid-block where needed to connect origins and destinations (i.e. parking garage to building). Rectangular rapid flashing beacons should be considered at all crosswalks.
- Enhance lighting for sidewalks and shared-use paths. Utilize attractive but security-conscious landscaping and provide emergency call boxes throughout campus, as well as along Dahlgren Drive.
- Provide secure, covered bicycle parking near building entrances and/or U-racks if such facilities are infeasible. FDA currently provides locker room and shower facilities as well as bicycle repair stations throughout the campus.
- Provide bikeshare docks adjacent to Building 1 as well as the transit center. Work with Montgomery County to determine how many bikeshare docks should be provided.
- Construct a new transit hub as close to Building 1 as possible. Incorporate features including, but not limited to:
 - A climate-controlled waiting area with amenities, such as benches, wi-fi, and real-time transit information;
 - Defined boarding and alighting areas for bus, BRT, and shuttle services;
 - A taxi/ridesharing waiting area that could be converted for use by automated vehicles in the future; and,
 - Public bikeshare stations.
- Enhance transit and shuttle services (see the Transportation Management Plan).
- Consider a pedestrian and bicycle connection to Lockwood Drive and the White Oak Transit Center.

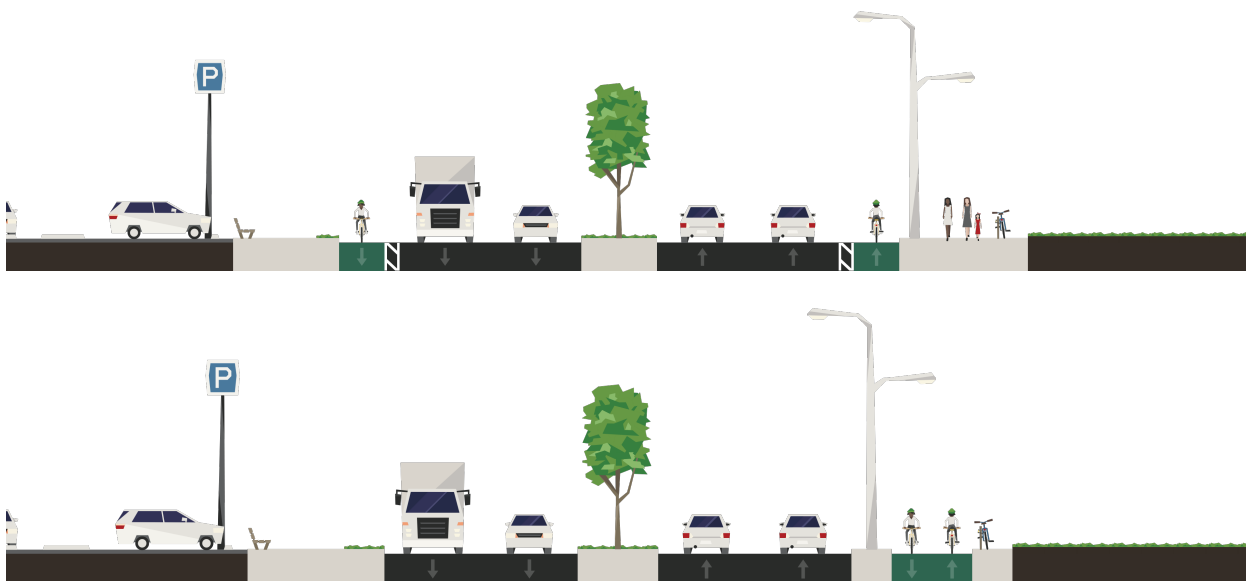


Figure 34: Potential Loop Road Configurations

Off-Site

- Work with Montgomery County to provide a connection from the new transit center to Lockwood Drive so that New Hampshire Avenue BRT vehicles can enter the site, utilize the FDA transit center and then connect directly to the White Oak transit center.
- Upgrade the bikeway on the FDA side of New Hampshire Avenue to a ten-foot-wide shared-use path with a minimum five-foot-wide buffer to the travel lanes.
- Work with Montgomery County, MDOT SHA, and Prince George’s County to enhance pedestrian and bicycle connections to nearby residential and commercial centers, as well as to regional pedestrian/bicycle path networks, including:
 - Enhance existing pedestrian crossings at signalized intersections within 1/2 miles of the campus, including lead pedestrian intervals and countdown signal heads.
 - Improved/shorter connection to the Northwest Branch Trail.
 - Expand the shared-use path to the north and south along New Hampshire Avenue.

ACTION ALTERNATIVE WITH MITIGATION CAPACITY ANALYSIS RESULTS

The proposed enhancements would result in intersections that operate at similar, or better, levels of service when compared to the Action Alternative (see Exhibits 3 and 4 in Appendix C). Table 20 identifies the intersections that would continue operate at an overall LOS E or F. The overall intersection delay (in seconds) is noted below the LOS.

Furthermore, the recommended intelligent transportation technology, transportation demand management, and additional pedestrian, bicycle, and transit facilities would provide additional benefits to reduce the transportation impacts of the proposed consolidation and expansion. While the benefits cannot be directly tied to the capacity analysis results, it can be assumed that these improvements would further help to mitigate the deficiencies identified in the Action Alternative.

Table 20: Action Alternative with Mitigation Intersections Operating at Overall LOS E or F

| Intersection | Action Alternative | | Action Alternative with Mitigation | |
|----------------------------------------------------------------------------|--------------------|--------------|------------------------------------|--------------|
| | AM | PM | AM | PM |
| New Hampshire Ave (MD 650) and Mahan Road/Schindler Drive | - | F (172.8) | - | - |
| SW Loop Road/NW Loop Road and Mahan Road/Mahan Court | F (116.9) | F (119.4) | E (39.7) | - |
| NW Loop Road & Michelson Road | - | F (158.5) | - | F (126.4) |
| New Hampshire Ave (MD 650) and Powder Mill Road | F (118.2) | F (84.6) | F (118.2) | F (81.4) |
| New Hampshire Ave (MD 650) and Lockwood Drive | F (146.0) | F (109.0) | E (71.9) | E (55.1) |
| Columbia Pike (US 29) and Colesville Business Park Driveway/Lockwood Drive | - | E (56.5) | - | F (80.5) |
| Columbia Pike (US 29) and Stewart Lane | F (98.0) | F (230.3) | - | F (138.2) |
| FDA Boulevard and Industrial Parkway | - | F (328.1) | - | F (328.1) |
| Cherry Hill Road and FDA Boulevard | E (65.0) | - | - | E (65.0) |
| Columbia Pike (US 29) and Industrial Parkway | E (74.4) | F (137.0) | - | F (126.1) |
| Columbia Pike (US 29) and Tech Road | F (354.7) | F (576.0) | F (333.0) | F (559.4) |
| Old Columbia Pike and Industrial Parkway | F (84.6) | E (71.1) | - | - |
| Tech Road and Industrial Parkway | F (100.9) | E (71.5) | E (78.3) | - |
| Cherry Hill Road and Broadbirch Drive/Calverton Boulevard | F (155.5) | F (234.6) | - | - |
| Columbia Pike (US 29) and Musgrove Road | F (224.6) | F (139.4) | F (199.0) | F (103.7) |
| Columbia Pike (US 29) and Fairland Road | F (210.6) | F (158.1) | F (116.5) | F (113.3) |

CHAPTER 4: CONCLUSIONS

The results of the study show that the consolidation and expansion at the White Oak Campus would have an adverse impact on traffic conditions within the study area. Given the congested nature of the study area corridors, the additional development in the area, combined with trips generated by the proposed consolidation and expansion would require a combination of intelligent transportation technology, transportation demand management programs, additional roadway capacity, and improved transit, pedestrian, and bicycle facilities. Recommended mitigation measures include:

Intelligent Transportation Technology

- Evaluate the installation of traffic adaptive/demand responsive signal systems along Columbia Pike (US 29), New Hampshire Avenue (MD 650), and Cherry Hill Road.
- Install Dynamic Message Signs (DMS) along Columbia Pike (US 29).

Transportation Demand Management

- Enhance the existing transportation demand management (TDM) program to encourage more employees to commute via modes other than driving alone. A transportation management plan (TMP) will be developed for the site as a separate document in 2018.
- Expand the commuter shuttle system to include direct shuttle service to and from Park and Ride facilities along the I-270 corridor.
- Work with Montgomery County and the Maryland Department of Transportation State Highway Administration (MDOT SHA) to identify the potential for new park-and-ride facilities near major interchanges to reduce localized impacts.

Additional Roadway Capacity

The following table lists the intersections that require mitigation, the recommended mitigation measures, as well as the lead agency that would be needed to implement the recommendations. However, it should be noted that, due to existing and projected No Action Alternative congestion on the study area roadway network, not all increases in delay and queuing could be mitigated. Several intersections along Columbia Pike (US 29), as well as the intersection of New Hampshire Avenue (MD 650) and Powder Mill Road could not be fully improved given the existing geometry and ROW constraints. Improvements like grade separation, which was previously planned by MDOT SHA for signalized intersections along Columbia Pike (US 29), would need to be coordinated through MDOT SHA and Montgomery County. Conversion of the at-grade intersections to interchanges is a long-term project; therefore, the Action with Mitigation evaluates alternative enhancements only. It is assumed that delay and queuing at those intersections would be mitigated once they are converted to interchanges.

| Intersection | Description of Mitigation | Agency |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| New Hampshire Avenue (MD 650) & Powder Mill Road | <p>Optimize signal phase lengths.</p> <p>Significant modifications are required to address existing and future anticipated capacity deficiencies. Mitigation would require significant ROW acquisitions for additional northbound and southbound left-turn and right-turn lanes and/or grade separation. Potential improvements noted in the White Oak Local Area Transportation Review Intersection Improvement Cost Evaluation prepared by Sabra, Wang & Associates included an additional northbound right-turn lane.</p> | MDOT SHA and Montgomery County for long-term improvements. |
| New Hampshire Ave (MD 650) & Schindler Drive/Mahan Road | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Restripe westbound Mahan Road to provide two left-turn lanes, a shared through-right and a right-turn lane. This is required to accommodate the heavier right-turn movement (621 vph) with the reduced cycle length. The anticipated left-turn volume (527 vph) from Mahan Road would be accommodated with two left turn lanes. Utilize a lead-pedestrian interval, and/or permit pedestrian movement only with Schindler Drive.</p> <p>Consider lead pedestrian intervals to accommodate pedestrians in advance of the double right turn.</p> | FDA/GSA |
| SW Loop Road/NW Loop Road & Mahan Road/Mahan Court | Restripe eastbound Mahan Road to provide one left-turn lane, one shared through/right-turn lane and one free-flow right-turn lane. | FDA/GSA |
| NW Loop Road & Michelson Road | Add a separate right-turn lane on northbound NW Loop Road. | FDA/GSA |

| Intersection | Description of Mitigation | Agency |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <p>New Hampshire Ave (MD 650) & Northwest Drive/Michelson Road</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Provide two right-turn lanes on westbound Michelson Road. This is required to accommodate the heavier right-turn movement (756 vph) with the reduced cycle length. The anticipated left-turn volume (253 vph) from Mahan Road would be accommodated with two left turn lanes. The right-turn will be overlapped with the southbound left-turn movement and the curb lane will be permitted to turn right on red.</p> <p>To avoid cut-through traffic from the FRC via Northwest Drive, a “No Thru Traffic” sign should be posted.</p> <p>Consider lead pedestrian intervals to accommodate pedestrians in advance of the double right turn.</p> | <p>FDA/GSA</p> |
| <p>New Hampshire Ave (MD 650) & Lockwood Drive</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Restrict the eastbound Lockwood Drive left-turn movement to northbound New Hampshire Avenue (MD 650). Reroute vehicles wishing to travel northbound on New Hampshire Avenue (MD 650) along westbound Lockwood Drive to Columbia Pike (US 29) and then to the New Hampshire Avenue (MD 650) interchange. The peak period left turn volume is less than 200 vph. Eliminating the left-turn allows for improved operation of the opposing approach, as well as New Hampshire Avenue (MD 650).</p> <p>Restripe westbound Lockwood Drive to provide three left-turn lanes, one through lane, and one right-turn lane.</p> | <p>FDA/GSA</p> <p>Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP.</p> |
| <p>Columbia Pike (US 29) & Lockwood Drive</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> | <p>MDOT SHA and Montgomery County</p> |
| <p>Columbia Pike (US 29) and Stewart Lane</p> | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Convert to a grade-separated interchange (long-term).</p> | <p>MDOT SHA and Montgomery County</p> |

| Intersection | Description of Mitigation | Agency |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Columbia Pike (US 29) & Tech Road and Industrial Parkway | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Provide three left-turn lanes on southbound Columbia Pike (US 29) at Industrial Parkway.</p> <p>Widen Industrial Parkway to three lanes in each direction.</p> <p>Provide three right-turn lanes from northbound Old Columbia Pike to eastbound Industrial Parkway.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> | <p>Coordinate with Montgomery County. These should be added into planned upgrades currently included in the White Oak LATR/LATIP.</p> <p>MDOT SHA for grade-separation.</p> |
| Tech Road & Industrial Parkway | <p>Add an additional northbound left-turn lane.</p> <p>Stripe the additional eastbound lane added from the Columbia Pike (US 29) intersection to become a right-turn only lane to Tech Road.</p> | <p>Coordinate with Montgomery County. These should be added into planned upgrades currently included in the White Oak LATR/LATIP.</p> |
| Columbia Pike (US 29) & Musgrove Road | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> | <p>MDOT SHA for grade-separation.</p> |
| Columbia Pike (US 29) & Fairland Road | <p>Change AM and PM peak period cycle length to 150 seconds and optimize phasing and offsets.</p> <p>Remove the Columbia Pike (US 29) northbound left-turn movement and direct vehicles to turn right onto Fairland Road and access westbound Fairland Road via a U-turn at the downstream traffic circle or by turning left at Musgrove Road.</p> <p>Provide two eastbound and two westbound left-turn lanes and eliminate split phasing.</p> <p>Provide a separate northbound right-turn lane.</p> <p>Convert the at-grade intersection to an interchange (long-term).</p> | <p>Coordinate with Montgomery County and MDOT SHA improvements.</p> <p>MDOT SHA for grade-separation.</p> |
| Cherry Hill Road & | <p>Optimize signal phase lengths.</p> | <p>Coordinate with Montgomery</p> |

| Intersection | Description of Mitigation | Agency |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Broadbirch Drive/Calverton Boulevard | | County as part of planned upgrades currently included in the White Oak LATR/LATIP. |
| Cherry Hill Road & FDA Boulevard | Provide a second left turn lane for northbound Cherry Hill Road. Provide a free-flow right-turn movement from southbound Cherry Hill Road to westbound FDA Boulevard that ties into the additional lane recommended for the intersection of FDA Boulevard and Future Roadway B-5. | Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP. |
| FDA Boulevard & Future Roadway B-5 | Widen westbound FDA Blvd to three lanes between Cherry Hill Road and Future Roadway B-5. The additional lane becomes a right-turn only lane at Future Roadway B-5. | Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP. |
| FDA Boulevard & Industrial Parkway | Monitor the operation of the proposed roundabout. Consideration should be given to northbound and westbound right-turn bypasses to minimize volume in the circulating roadway. | Coordinate with Montgomery County as part of planned upgrades currently included in the White Oak LATR/LATIP. |
| Cherry Hill Road & Powder Mill Road (MD 212) | Optimize signal phase lengths. | Coordinate with Prince George's County |

Transit, Pedestrian, and Bicycle Facilities

Several enhancements are recommended to provide better connections for alternative modes, such as transit, pedestrians, and bicyclists. These recommendations include:

- Provide a 10-foot wide multi-use path and/or five-foot, protected, directional bike lanes along the campus loop roads that connect pedestrian and bicycle facilities on the external roadway network to the on-campus facilities (Figure 33).
- Utilize bicycle lanes or sharrows on minor streets to connect the loop road facilities with bicycle parking near building entrances.
- Ensure that sidewalks are a minimum of six feet. Wider sidewalks are recommended in areas with higher pedestrian volumes.

- Provide a minimum five-foot buffer between the sidewalk/multi-use path and the travel lanes along loop roadways.
- Pedestrian/bicycle-accessible security gates.
- Provide pedestrian crosswalks at all intersections, as well as mid-block where needed to connect origins and destinations (i.e. parking garage to building). Rectangular rapid flashing beacons should be considered at all crosswalks.
- Enhance lighting for sidewalks and shared-use paths. Utilize attractive but security-conscious landscaping and provide emergency call boxes throughout campus, as well as along Dahlgren Drive.
- Provide secure, covered bicycle parking near building entrances and/or U-racks if such facilities are infeasible. FDA currently provides locker room and shower facilities as well as bicycle repair stations throughout the campus.
- Provide bikeshare docks adjacent to Building 1 as well as the transit center. Work with Montgomery County to determine how many bikeshare docks should be provided.
- Construct a new transit hub as close to Building 1 as possible. Incorporate features including, but not limited to:
 - A climate-controlled waiting area with amenities, such as benches, wi-fi, and real-time transit information;
 - Defined boarding and alighting areas for bus, BRT, and shuttle services;
 - A taxi/ridesharing waiting area that could be converted for use by automated vehicles in the future; and,
 - Public bikeshare stations.
- Enhance transit and shuttle services (see the Transportation Management Plan).
- Consider a pedestrian and bicycle connection to Lockwood Drive and the White Oak Transit Center.
- Work with Montgomery County to provide a connection from the new transit center to Lockwood Drive so that New Hampshire Avenue BRT vehicles can enter the site, utilize the FDA transit center and then connect directly to the White Oak transit center.
- Upgrade the bikeway on the FDA side of New Hampshire Avenue to a ten-foot-wide shared-use path with a minimum five-foot-wide buffer to the travel lanes.
- Work with Montgomery County, SHA, and Prince George's County to enhance pedestrian and bicycle connections to nearby residential and commercial centers, as well as to regional pedestrian/bicycle path networks, including:
 - Enhance existing pedestrian crossings at signalized intersections within ½ miles of the campus, including lead pedestrian intervals and countdown signal heads.
 - Improved/shorter connection to the Northwest Branch Trail.
 - Expand the shared-use path to the north and south along New Hampshire Avenue.

The Transportation Management Plan (TMP) discusses other enhancements to the existing FDA shuttle program. The proposed enhancements would result in intersections that operate at similar, or better, levels of service when compared to the Action Alternative. Furthermore, the recommended intelligent transportation technology, transportation demand management, and additional pedestrian, bicycle, and transit facilities would provide additional benefits to reduce the transportation impacts of the proposed consolidation and expansion. While the benefits cannot be

directly tied to the capacity analysis results, it can be assumed that these improvements would further help to mitigate the deficiencies identified in the Action Alternative.

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REFERENCES

Institute of Transportation Engineers (ITE)

2012 *Trip Generation, 9th Edition*, Washington, DC.

Maryland Department of Transportation State Highway Administration

2016 *Montgomery County Truck Volume Map 2013-2015*. (Accessed online: www.roads.maryland.gov/index.aspx?PageId=792 , April 11, 2017).

2015 *Prince George Truck Volume Map 2012-2014*. (Accessed online: www.roads.maryland.gov/index.aspx?PageId=792 , April 11, 2017).

Montgomery County Department of Transportation

2016 *White Oak Science Gateway LATR Cost Estimating Analysis White Paper*. December 2016.

Montgomery County Planning Department

2015 *Darcars at Montgomery Industrial Park Lot 33, Site Plan Amendment No. 81994026B*.
September 2015

2017 *Hillandale Gateway, Plan No. 520170050*. July 2017.

2013 *Victory Housing, Preliminary Plan No. 120140210*. December 2013.

2016 *Washington Adventist Hospital, Site Plan Amendment No. 82008021E*. June 2016.

2009 *West Farm, Preliminary Plan No. 119820680*. January 2009.

2005 *White Oak Property, Preliminary Plan No. 119910990*. March 2003.

2014 *White Oak Science Gateway Master Plan*. July 2014.

2015 *White Oak Town Center, Preliminary Plan No. 120150100*. September 2015.

Sabra, Wang & Associates, Inc.

2016 *White Oak Local Area Transportation Review Intersection Improvement Cost Evaluation*.
September 2016.

U.S. General Services Administration (GSA)

2009 *U.S. Food and Drug Administration Headquarters Consolidation Master Plan Update*.
March 2009.

Appendix A: Traffic Technical Report Exhibits

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Appendix B: Employee Commute Surveys

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Appendix C: Trip Distribution Diagrams

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Appendix D: Raw Traffic Data

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Appendix E: Traffic Analysis Outputs

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Appendix F: White Oak Master Plan Proposed Roadway Alternatives

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