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1. Previous Studies/Planned Developments

This section reviews and summarizes recent plans, and studies for Ride On and Metrobus service on, to, and near the US 29 corridor. Plans and studies reviewed in this section are listed in **Table 1**.

Table 1 | Plans and Studies Reviewed for Service Integration Recommendations

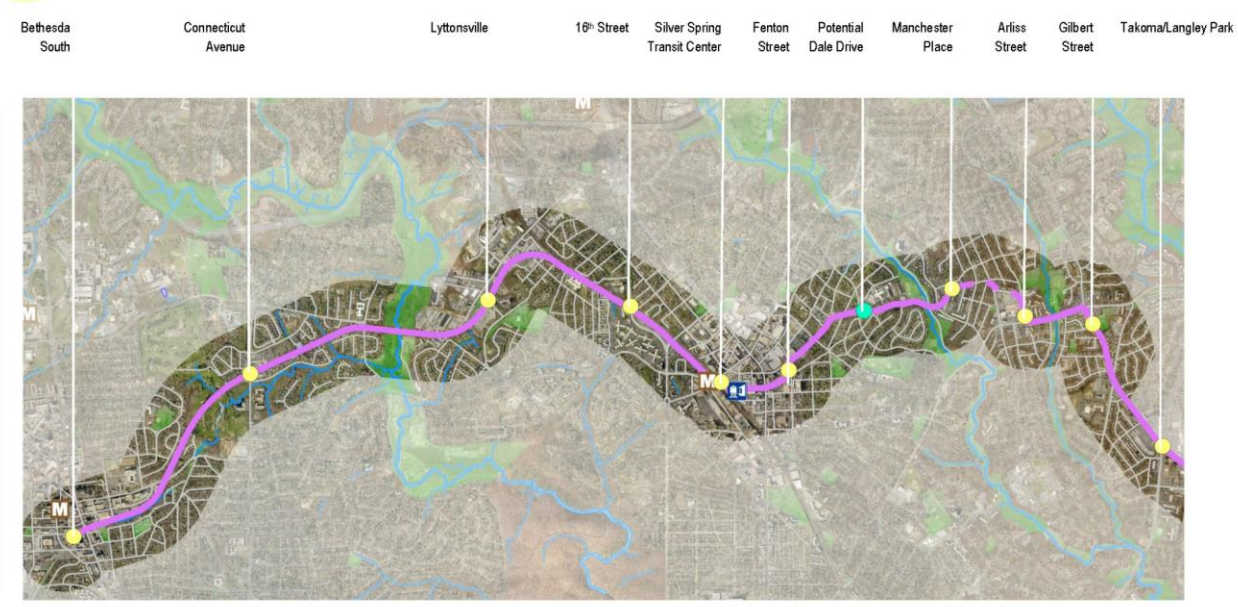
Study/Plan	Proposed Implementation Time Frame	Year	Local Bus Service Recommendations
Purple Line Functional Plan	Montgomery County Planning	2010	No
Countywide Bus Rapid Transit Study	Montgomery County DOT	2011	No
Burtonsville Crossroads Neighborhood Plan	Montgomery County Planning	2012	No
Countywide Transit Corridors Functional Master Plan	Montgomery County Planning	2013	MARC service recommendations
Montgomery County RTS Service Planning and Integration Report	Montgomery County DOT	2014	Yes
White Oak Gateway Master Plan	Montgomery County Planning	2014	Yes
Metrobus Priority Corridor Study: The Z Lines	WMATA	2015	Yes

1.1 PURPLE LINE FUNCTIONAL PLAN[1]

This plan does not address potential changes in land use, or new Metrobus or Ride On connections. The Purple Line Functional Plan identifies Purple Line alignment and station locations within Montgomery County; two purple line station are planned on or near the US 29 corridor: the Silver Spring Transit Center station (also a stop on US 29 BRT) and the Fenton Street Station (approximately ½ mile east of the Silver Spring Transit Center) (**Figure 1**).

[1] Purple Line Functional Plan, Montgomery County Planning Department, 2010. http://montgomeryplanning.org/wp-content/uploads/2016/09/PurpleLineapprovedandadoptedWEB.pdf

Figure 1 | Purple Line Functional Plan - Alignment and Stations in Montgomery County



Note: The Takoma/Langley Park Station is in Prince George's County.

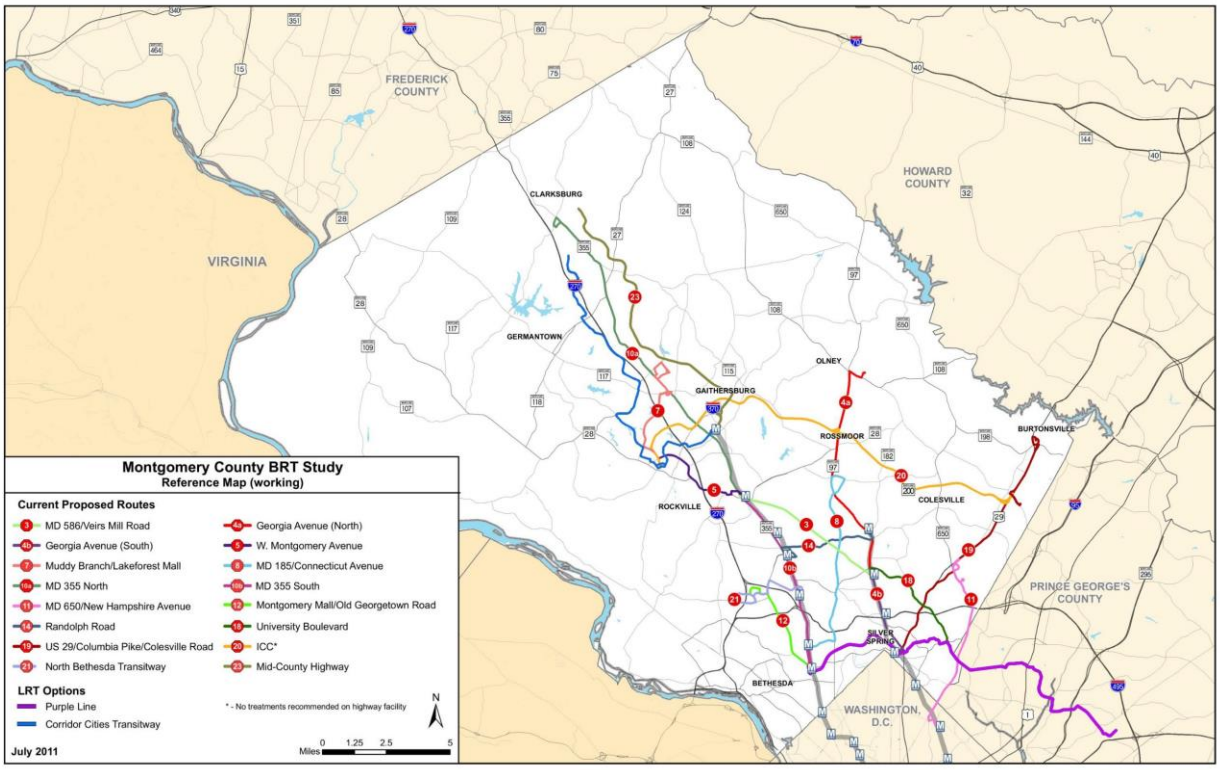
1.2 COUNTYWIDE BUS RAPID TRANSIT STUDY[2]

This plan has no specific Metrobus or Ride On recommendations, outside of proposed BRT network alignments (**Figure 2**). However, the plan makes general land use recommendations related to the success of BRT, including:

- **Transit-Oriented Development:** Transit-oriented development is a key component for successful BRT. BRT takes advantage of the pedestrian and customer activity found in areas with higher land use densities and a mixture of types of development, including residential, retail, employment, and entertainment.
- **Density:** For this study, a threshold of at least six households or five employees per acre was used during early analysis as a method for identifying corridors where BRT service may be appropriate.

[2] Countywide Bus Rapid Transit Study, Montgomery County Department of Transportation, 2011. http://montgomerycountymd.gov/dot/resources/files/mcbrtstudyfinalreport110728.pdf

Figure 2 | Countywide Bus Rapid Transit Study - Proposed Bus Rapid Transit Network

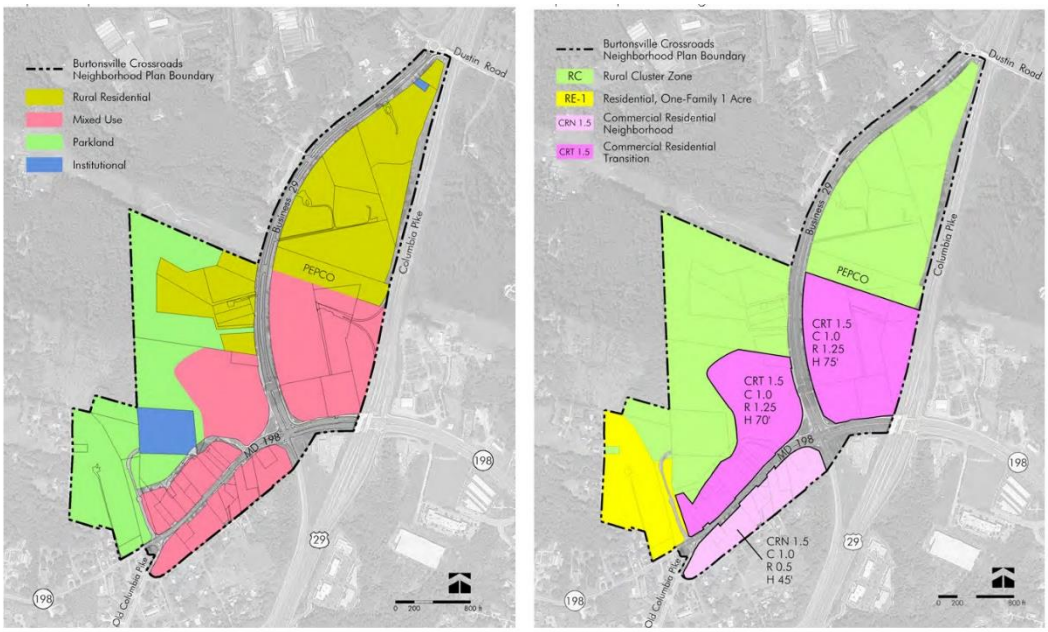


1.3 BURTONSVILLE CROSSROADS NEIGHBORHOOD PLAN[3]

This plan has no specific Metrobus or Ride On recommendations, but the Burtonsville Park and Ride (the planned northern terminus of the US 29 BRT route) is presented as an opportunity to link local businesses in Burtonsville to the larger region, including access to US 29 and the planned Montgomery County Bus Rapid Transit (BRT) network. The park-and-ride lot, which has 500 parking spaces, is located behind the existing Burtonsville Crossing Shopping Center with access from US 29, Business 29, and MD 198; it's served by Metrobus, Maryland Transit Authority (MTA) Commuter Bus, University of Maryland Shuttle, and ICC Bus to and from Baltimore-Washington International Airport. Two Metrobus routes connect to Silver Spring, Amtrak, and Metrorail stations. In addition, the plan calls for a shift from single-use to mixed-use zoning; the area around the Park and Ride, which is currently zoned for commercial and office buildings, would change to a "Commercial Residential Transition" zones, which would provide a mix of commercial and housing opportunities, support infill, and require privately owned public use space to be accessible to the public (**Figure 3**).

[3] Burtonsville Crossroads Neighborhood Plan, Montgomery County Planning, 2012. http://montgomeryplanning.org/planning/communities/area-3/burtonsville-crossroads/

Figure 3 | Burtonsville Crossroads Neighborhood Plan - Proposed Land Use and Zoning



1.4 COUNTYWIDE TRANSIT CORRIDORS FUNCTIONAL MASTER PLAN

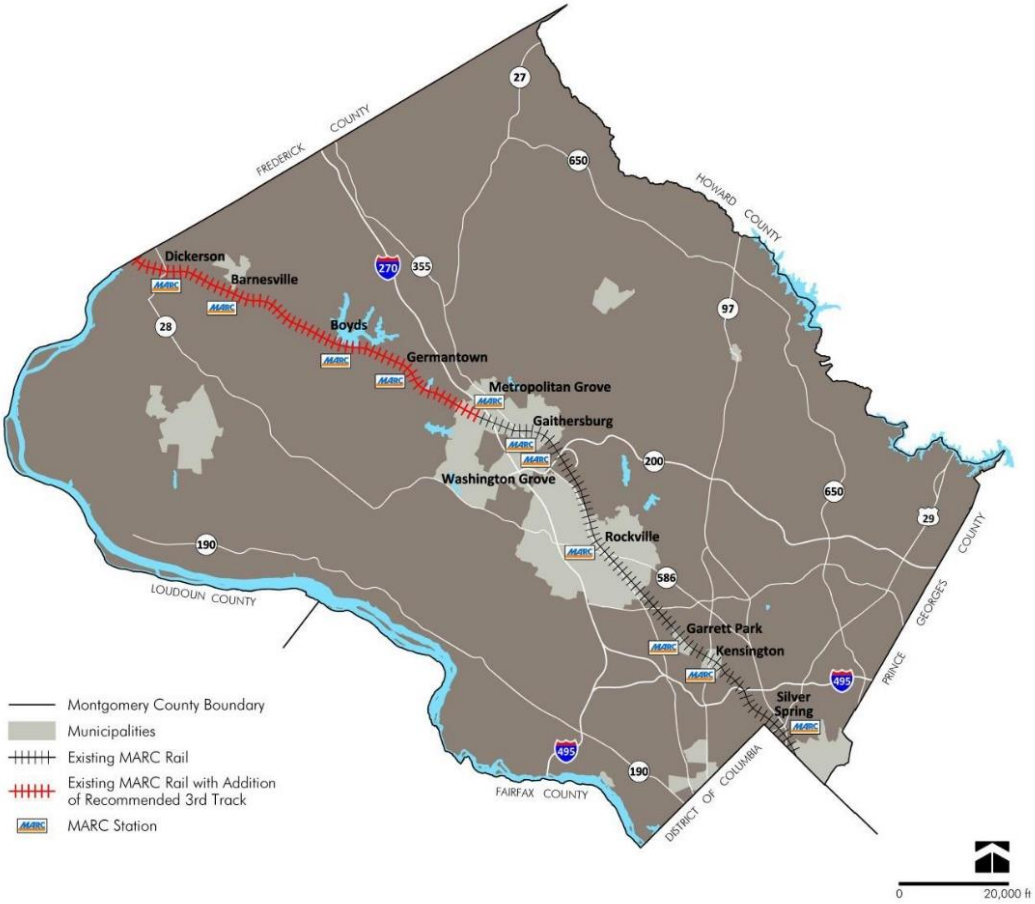
This plan has no specific Metrobus or Ride On recommendations, but the plan recommends a network of BRT transit corridors that will be integrated with the Corridor Cities Transitway (CCT). Within this plan, five of the recommended BRT corridors intersect with the US 29 BRT corridor: Randolph Road, New Hampshire Avenue, Georgia Avenue North, Georgia Avenue South, and University Boulevard (**Figure 4**).

The plan also recommends adding a third track to MARC's Brunswick Line (MTA Commuter Rail), which connects with US 29 BRT at the Silver Spring Transit Center. This plan recommends adding a third track between the Frederick County line and the Metropolitan Grove station to reduce freight conflicts and create more frequent, all-day service on the line, as well as weekend service (**Figure 5**).

Figure 4 | Countywide Transit Corridors Plan - Recommended Bus Rapid Transit Corridors

Corridor 1: Georgia Avenue North
Corridor 2: Georgia Avenue South
Corridor 3: MD 355 North
Corridor 4: MD 355 South
Corridor 5: New Hampshire Avenue
Corridor 6: North Bethesda Transitway
Corridor 7: Randolph Road
Corridor 8: University Boulevard
Corridor 9: US 29
Corridor 10: Veirs Mill Road
Corridor CCT: Corridor Cities Transitway

Figure 5 | Countywide Transit Corridors Plan - Proposed MARC Brunswick Line Expansion



1.5 MONTGOMERY COUNTY RTS SERVICE PLANNING AND INTEGRATION REPORT[4]

In 2014, Montgomery County conducted an assessment of Ride On and Metrobus service on the US 29 this corridor as part of a countywide Service Planning and Integration study for the planned Rapid Transit System. This assessment included recommendations for integration with other planned BRT[5] and local bus service, as well as a summary of regional land use plans.

[4] Service Planning and Integration Report, Montgomery County Department of Transportation, 2014. http://www.montgomerycountymd.gov/brt/Resources/Files/ServiceandIntegrationStudyFinalReport.pdf

[5] Within this service planning report, planned Montgomery County BRT services are referred to as "RTS"; this summary changes the name to "BRT" for consistency.

1.5.1 US 29 BRT: Local Bus Service Connections

- **Commuter Bus Service:** US 29 BRT service would supplement the commuter bus service that already exists along the corridor, including Metrobus Commuter Route service and MTA's commuter service from north of Montgomery County.
- **BRT Connections:** As currently planned, the US 29 BRT service would provide connections to the planned Randolph Road, New Hampshire, University Boulevard, Georgia Avenue, and Veirs Mill BRT services.
- **Local Service Modifications**
  - All Metrobus Z routes and MTA commuter buses would take advantage of the proposed BRT infrastructure, where accessible, at any time they are operating on US 29.
  - Metrobus Route Z8 would continue with half the headways of service today.
  - Ride On would continue service and not be impacted, but would use US 29 BRT infrastructure.

1.5.2 US 29: Integration with Planned BRT Service

Table 2 | RTS Service Integration and Planning - Planned Bus Rapid Transit Connections

Name	Description	Span	Headways	Trunk/Branches
Randolph Road (Corridor 7)	Provide faster cross-county connections, including Montgomery Mall, White Flint, and White Oak, as well as the Glenmont and Wheaton Metro stations.	Weekday Span: 6am-12am	Trunk service (peak and off-peak): 10	Trunk service between the Montgomery Mall Transit Center and Randolph Road at New Hampshire Avenue, with two branches to White Oak.
New Hampshire Avenue (Corridor 5)	Provide faster connection between Fort Totten with Takoma/Langley Park, White Oak, and Colesville.	Weekday Span 6am-12am	Trunk service (peak): 10 Trunk service (off-peak): 20	Trunk service between the White Oak and Fort Totten Metrorail stations, with additional service north of White Oak to Colesville.
Georgia Avenue / University Boulevard (Corridor 1)	Provide a faster transit option for people traveling along Georgia Avenue, connecting major activity and multimodal centers, including: Montgomery General Hospital, Glenmont, Wheaton, Four Corners, Silver Spring, and Langley Park.	Weekday Span 6am-12am	Headways (peak and off-peak): 10	Trunk service between the Montgomery Hospital and the Wheaton Metro station, with additional service provided from Wheaton to both Silver Spring Transit Center and the Takoma Langley Transit Center.

Name	Description	Span	Headways	Trunk/Branches
Veirs Mill (Corridor 6)	Provide a new faster east-west transit option in the county connecting Wheaton, Rockville, Montgomery College, Silver Spring and Takoma/Langley Park.	Weekday Span 6am-12am	Headways (peak and off-peak): 10	Trunk service between Montgomery College and Wheaton Metro Station, with additional service from Wheaton to Silver Spring and Takoma / Langley Park.

1.5.3 Summary of Regional Land Use Plans[6]

Burtonsville Sector Plan (2012)

The Burtonsville Sector Plan is focused on creating a neighborhood identity for the area where MD 198 and US 29-Business intersect. This plan acknowledges the challenges presented by the creation of the US 29-Bypass, but does not focus on development along this corridor. The plan does discuss connecting the existing park and ride with regional transit as an opportunity to link local businesses with the region. The park and ride is located behind the Burtonsville Crossing Shopping Center and has 500 spaces.

Fairland Sector Plan (1997)

The Fairland Sector Plan is focused on preserving the lower intensity development patterns characteristic of this area of the county. The plan recommends grade separating all of the east-west roads that intersect with US 29 in the study area. These interchanges have further changed this segment of US 29 from an expressway to a freeway, making transit accessibility a challenge.

White Oak Sector Plan (2014 – in process at time of Service Integration Study)

The consolidation of the Federal Drug Administration (FDA) on the grounds of the old Naval Surface Weapons Research facility has provided an opportunity to develop the area into a more vibrant and transit friendly community. The vision is to take advantage of the existing major developments of Hillandale, White Oak, and the FDA campus, and promote infill development of a mixed use and transit oriented character that integrates with the existing residential neighborhoods. The master plan covers an area of roughly 3,000 acres on the eastern side of US 29 from Cherry Hill Road to the Northwest Branch Stream and the Capital Beltway. Expansion of the FDA's campus is expected to occur in the near term. The development of a life sciences center, including relocation of the Washington Adventist Hospital along with redevelopment of the White Oak Shopping Center can transform this area, but will increase the demand on the existing transportation network. The US 29 RTS service concept recognizes the importance of providing a high-quality transit service to help mitigate the demand on the existing transportation infrastructure.

[6] Summaries taken directly from the Montgomery County RTS Service Planning and Integration Report

Four Corners Sector Plan (1996)

The Four Corners Sector Plan calls for preservation of the existing residential neighborhoods and commercial corridors, as well as improvements to the transportation network that reduces the amount of through traffic on residential streets while improving pedestrian safety along major corridors. The plan also promotes increased use of public transit to connect Four Corners to Metrorail.

1.6 WHITE OAK GATEWAY MASTER PLAN[7]

Summary: In addition to land use and US 29 BRT station recommendations, this plan recommends "enhanced local bus service, perhaps a circulator bus loop," to "link the communities of White Oak to the BRT stations to better serve the entire area." The plan also calls for a "Robust transit network that connects the area to the rest of the eastern County and the region's transit and highways."

The plan envisions White Oak's major centers — Hillandale, White Oak and the Life Sciences/FDA Village — evolving from "conventional, auto-dependent suburban shopping centers, business parks and light industrial areas" into "vibrant, mixed-use, transit-served nodes."

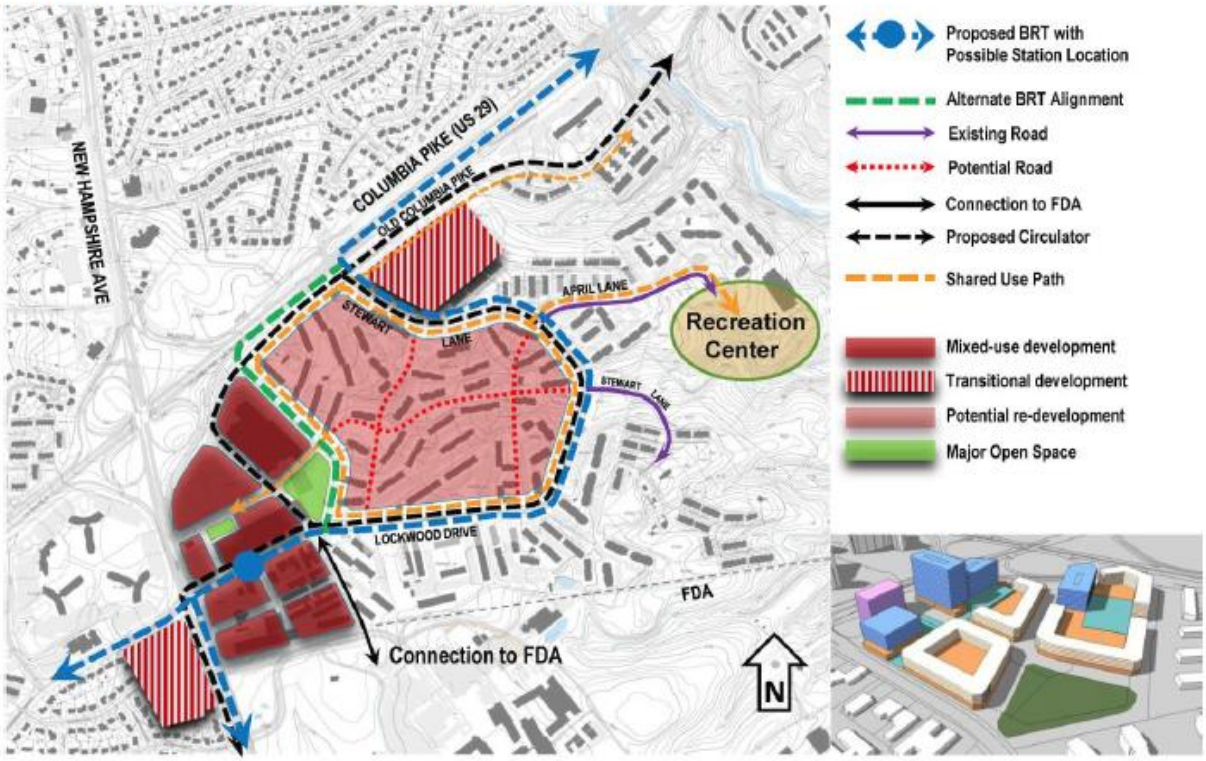
1.6.1 US 29 BRT Corridor: Transit Network

The plan notes that a "Bus Rapid Transit system is essential to achieve the vision of this Master Plan," and that the goal is for "future growth to be supported by a BRT system that will serve the local area while connecting it to major destinations and to the existing and proposed transit services in the region." In this plan, the following BRT transit Corridors serve the White Oak plan area: US 29, New Hampshire Avenue, and Randolph Road. For BRT and other local transit, this plan recommends (**Figure 6**):

- **BRT transit station at the White Oak Center** that could serve as a transfer hub between the BRT routes on US 29 and New Hampshire Avenue.
- **BRT stations along New Hampshire Avenue**, at FDA's main entrance and at Hillandale.
- **BRT along Randolph Road and Cherry Hill Road** connecting White Oak with Glenmont and White Flint/Rockville Pike.
- **Enhanced local bus service**, perhaps a circulator bus loop, to link the communities of White Oak to the BRT stations.
- **Robust transit network** that connects the area to the rest of the eastern County and the region's transit and highways.
- **Extension of the Randolph Road BRT** from its current planned terminus at US 29/Randolph Road east along Cherry Hill Road to FDA Boulevard, with the potential to extend further into Prince George's County. This extension includes a spur off of the mainline US 29 BRT route into Life Sciences/FDA Village via Tech Road/Industrial Parkway. One or more BRT stations should be planned for Life Sciences/FDA Village.

[7] White Oak Science Gateway Master Plan, Montgomery County Planning Department, 2014. http://montgomeryplanning.org/planning/communities/area-2/white-oak-science-gateway/

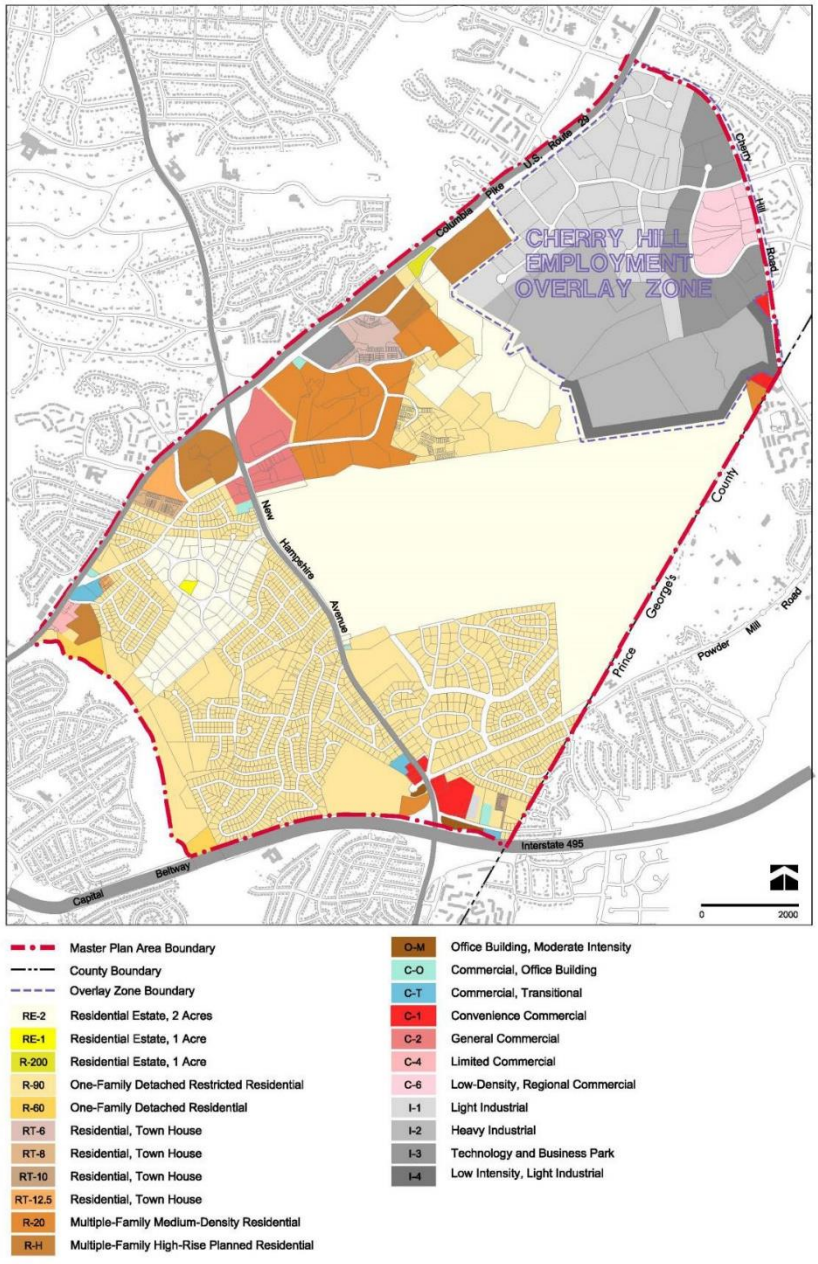
Figure 6 | White Oak Center Illustrative Concept



1.6.2 Existing Land Use

The plan envisions the White Oak area transitioning from an auto-centric, 3,000-acre regional activity center north of Silver Spring to an urban focused development. Current land uses in White Oak -- residential, retail, and employment -- are separated; the existing commercial centers at White Oak, Hillandale, and Burnt Mills provide neighborhood retail services in grocery store-anchored shopping centers primarily serving the surrounding residential communities. Located along major roads and intersections, The Life Sciences/FDA Village Center includes offices, service industry uses (automotive, contractors), public facilities, and some retail (**Figure 7**).

Figure 7 | White Oak Science Gateway Master Plan - Existing Zoning (2014)

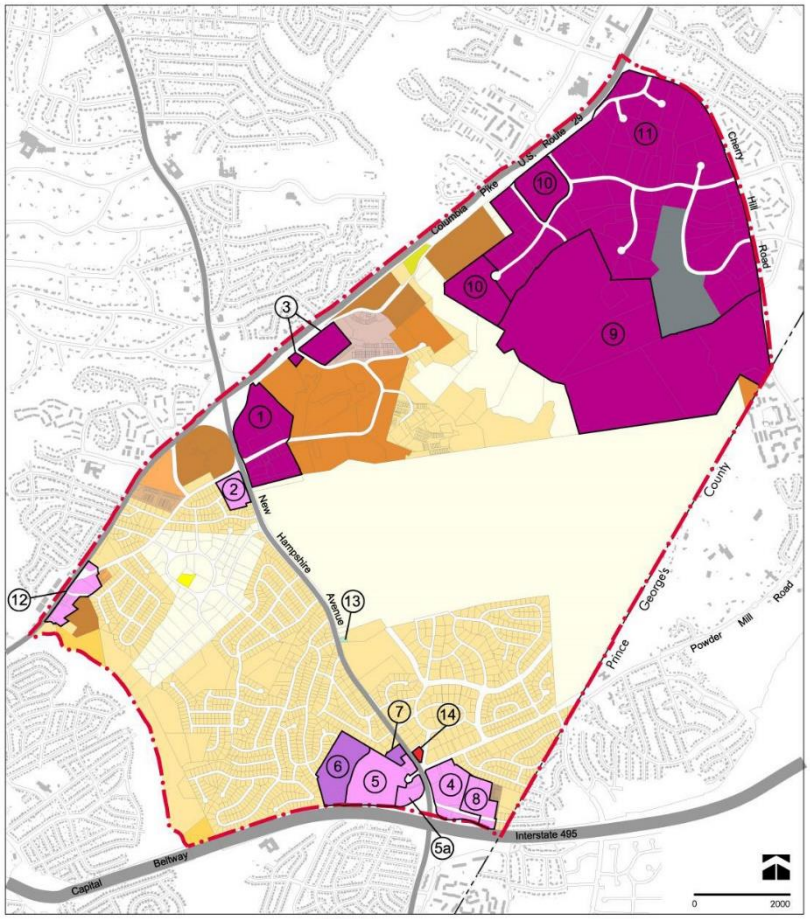


1.6.3 Future Land Use

The Plan recommends rezoning most commercial properties to the Commercial/Residential zone or Commercial/Residential Town zone. The Commercial/Residential zones allow a range of uses; the plan recommends removing narrow bands of "buffer strips" in several residential zones, and applying

Commercial/Residential zoning to properties adjacent to those strip areas. BRT routes and stations are planned for the mixed-use White Oak centers. (**Figure 8**).

Figure 8 | White Oak Science Gateway Master Plan - Proposed Zoning



	Master Plan Area Boundary	CR	Commercial Residential	EOF	Employment Office
	County Boundary	1	CR-2.5 C-1.5 R-1.5 H-200	13	EOF-0.75 H-45
RE-2	Residential Estate, 2 Acres	3	CR-1.0 C-1.0 R-0.25 H-65		
RE-1	Residential Estate, 1 Acre	9	CR-1.0 C-1.0 R-0.50 H-220	NR	Neighborhood Retail
R-200	Residential Estate, 1 Acre	10	CR-1.0 C-0.75 R-0.75 H-75	14	NR-0.75 H-45
R-90	One-Family Detached Restricted Residential	11	CR-0.75 C-0.75 R-0.25 H-75		
R-60	One-Family Detached Residential	CRT	Commercial Residential Town		
RT-6	Residential, Town House	2	CRT-1.5 C-1.5 R-0.25 H-60		
RT-8	Residential, Town House	4	CRT-1.5 C-1.0 R-1.0 H-75		
RT-10	Residential, Town House	5	CRT-1.5 C-1.0 R-0.75 H-75		
RT-12.5	Residential, Town House	5a	CRT-1.75 C-0.5 R-1.5 H-85		
R-20	Multiple-Family Medium-Density Residential	8	CRT-1.0 C-0.75 R-0.25 H-45		
R-H	Multiple-Family High-Rise Planned Residential	12	CRT-0.75 C-0.5 R-0.25 H-45		
LSC	Life Sciences Center	CRN	Commercial Residential Neighborhood		
		6	CRN-0.25 C-0.0 R-0.25 H-45		
		7	CRN-1.0 C-1.0 R-0.0 H-45		

1.7 METROBUS PRIORITY CORRIDOR STUDY - THE Z LINES[8]

Summary: In 2015, WMATA completed a Z Line Priority Corridor Network Study, with input from Montgomery County. The Z Lines are seven Metrobus routes that provide connections to Silver Spring and other locations along the US 29 corridor. This plan's recommendations were developed through public outreach and technical analysis conducted between April 2014 and January 2015. **Table 3** details the recommendations, improvement types, and proposed implementation timeframe. **Figure 9** through **Figure 12** illustrate the recommendations below.

This Z Line Priority Corridor Network Study acknowledges long-term plans for BRT along US29, as part of Montgomery County's BRT Master Plan, but notes that the BRT Master Plan will have a "fairly long implementation time frame" and that "MetroExtra service in the corridor can be an effective precursor to the proposed longer-term BRT service."

Table 3 | Summary of Z Lines Service Improvement

Recommendation	Description	Proposed Implementation Time Frame / *June 2017 Status*
#1 - Add trips to Z8[9] weekday mid-day service	Add one additional trip per hour in each direction to the Z8 Line during the mid-day on weekdays. These additional trips would be in service between 8:30 AM and 4:00 PM and would address overly crowded buses on both the Z6 and Z8 Lines. The trips would run only between White Oak and Silver Spring, which is the segment of the line where the heaviest crowding occurs.	Short-Term (1-2 years) *Combined Z6 and Z8 have same level of midday service between White Oak to Silver Spring as time of study[10] (Not Implemented)*

[8] Metrobus Priority Corridor Study – The Z Lines, WMATA, 2015. http://www.metrobus-studies.com/Z_Line/Z_Line.html
[9] Z8 Timetables and Maps at the time of the Metrobus Z Line Study, 2015. http://www.metrobus-studies.com/Z_Line/z8_timetable.pdf
[10] Z8 Timetables and Maps, Effective March 27, 2016. https://www.wmata.com/schedules/timetables/upload/Z6,Z8_160327.pdf

Recommendation	Description	Proposed Implementation Time Frame / *June 2017 Status*
#2 - Add trips to Z8 Saturday service	Add one additional trip per hour in each direction to the Z8 Line on Saturdays to address overly crowded Saturday Z8 buses. The additional trips would be in service between 8:00 AM and 7:00 PM and would run between White Oak and Silver Spring, the portion of the Line where the heaviest crowding occurs. Saturday service routing would be the same as it is on weekdays.	Short-Term (1-2 years) *Combined Z6 and Z8 have one additional trip per hour in each direction (Implemented)*
#3 - Add an additional Z6[11] weekday evening trip	Add one additional weekday northbound trip on the Z6 Line between 6:30 PM and 8:00 PM in order to address bus crowding during evening hours.	Short-Term (1-2 years) *Combined Z6 and Z8 have same level of NB Wkdy 6:30pm-8:00pm service as time of study (Not Implemented)*[12]
#4 - Adjust schedules to reflect current observed run times	The actual recommendation to address potential inadequate run times includes two steps. The first step will be for the WMATA schedules department to review the run time issues identified in this analysis in order to confirm the issues are present. The second step will be to adjust the schedules during the time periods where issues were confirmed."	Short-Term (1-2 years)

[11] Z6 Timetables and Maps at the time of the Metrobus Z Line Study, 2015. http://www.metrobus-studies.com/Z_Line/z2-6_timetable.pdf
[12] Z6 Timetables and Maps, Effective March 27, 2016. https://www.wmata.com/schedules/timetables/upload/Z6,Z8_160327.pdf

Recommendation	Description	Proposed Implementation Time Frame / *June 2017 Status*
#5 - Implement Z6 service on Saturdays and modify current Z8 service frequency in order to reflect the new Z6 service	Implement Z6 service on Saturday, which currently runs only on weekdays. This new Z6 service would run every 30 minutes, between 6:00 and 8:00 PM and would follow the same routing as the weekday Z6 service. *Saturday Z6 service was one of the most common requests received during the public outreach process.* Modify current Z8 Saturday service frequencies from 20 minutes to 30 minutes. The combination of the Z6 and Z8 services, each running every 30 minutes, would result in a 15-minute frequency in the common portions of the two lines, south of Industrial Parkway. This combined service frequency would be an improvement to the current 20-minute frequency in this section and would address current Saturday crowding issues. Remove trips between White Oak and Silver Spring added under Recommendation #2. These trips would no longer be necessary because the combination of Z6 and Z8 service would provide enough capacity relative to passenger demand to address current crowding issues.	Mid-Term (3-4 years) • Z6 Saturday Service: *Implemented* • Modify Z8 Saturday Service: *Implemented* • Combine Z6 and Z8: *Implemented*
#6 - Implement new peak period MetroExtra service: White Oak to Silver Spring in the mid-term and Briggs Chaney Park-and-Ride to Silver Spring in the long-term	The service would run in both directions during the weekday AM and PM peak periods, with a 15-minute service frequency. No changes to current local service would be made. This proposed service would benefit heavy ridership portions of the Z Lines along Stewart Lane and Lockwood Drive, which currently do not reap the benefits of the extensive express service on the US 29 corridor. By operating MetroExtra service, it is estimated that riders would save between 4-5 minutes on trips between White Oak and Silver Spring (approximately 18% of the total current travel time).	Mid-Term (3-4 years) • *Not implemented*

Recommendation	Description	Proposed Implementation Time Frame / *June 2017 Status*
#7 - Expand service to portions of the Z Line service area not served during the mid-day on weekdays or on Saturdays	Saturday bus service between Briggs Chaney Park and Ride and Burtonsville – this recommendation would entail running a bus route between the Briggs Chaney Park and Ride and the Burtonsville Park and Ride on Saturdays. This would extend Saturday service to Burtonsville, which is currently not available (**Mid-Term**). Implement new Z10 service between Briggs Chaney Park & Ride/Burtonsville, and Laurel, on mid-day weekdays and on Saturdays. This recommendation would entail implementation of a new service between the Briggs Chaney Park & Ride or Burtonsville, and Laurel. Currently the Z29 Line provides weekday peak period service between the US 29 corridor and Laurel but this transit connection is not available during the mid-day on weekdays, or on Saturdays. The proposed Z10 service would provide this connection when service between the US 29 corridor and Laurel is not currently available. The weekday service would run between Burtonsville and Laurel and is proposed for implementation in the long-term time frame. The Saturday service would run between the Briggs Chaney Park and Ride and Laurel, and is also proposed for implementation in the long-term time frame. This Saturday Z10 service would replace the feeder service to Burtonsville that was proposed for implementation in the short-term time frame. (**Short Term**). Provide Z2 Service during the mid-day on weekdays. Currently the Z2 service between Olney and Silver Spring via New Hampshire Avenue runs only during peak periods on weekdays. This recommendation would expand Z2 service to also run in the mid-day on weekdays, though this mid-day service would run only between Olney and White Oak.	Long-Term (5-6 years) • Saturday Service (Briggs Chaney to Burtonsville): *Not Implemented* • New Z10 Service: *Not implemented* • Z2 Service: *Not implemented*

Figure 9 | WMATA Service Improvement Recommendation #1 and #2

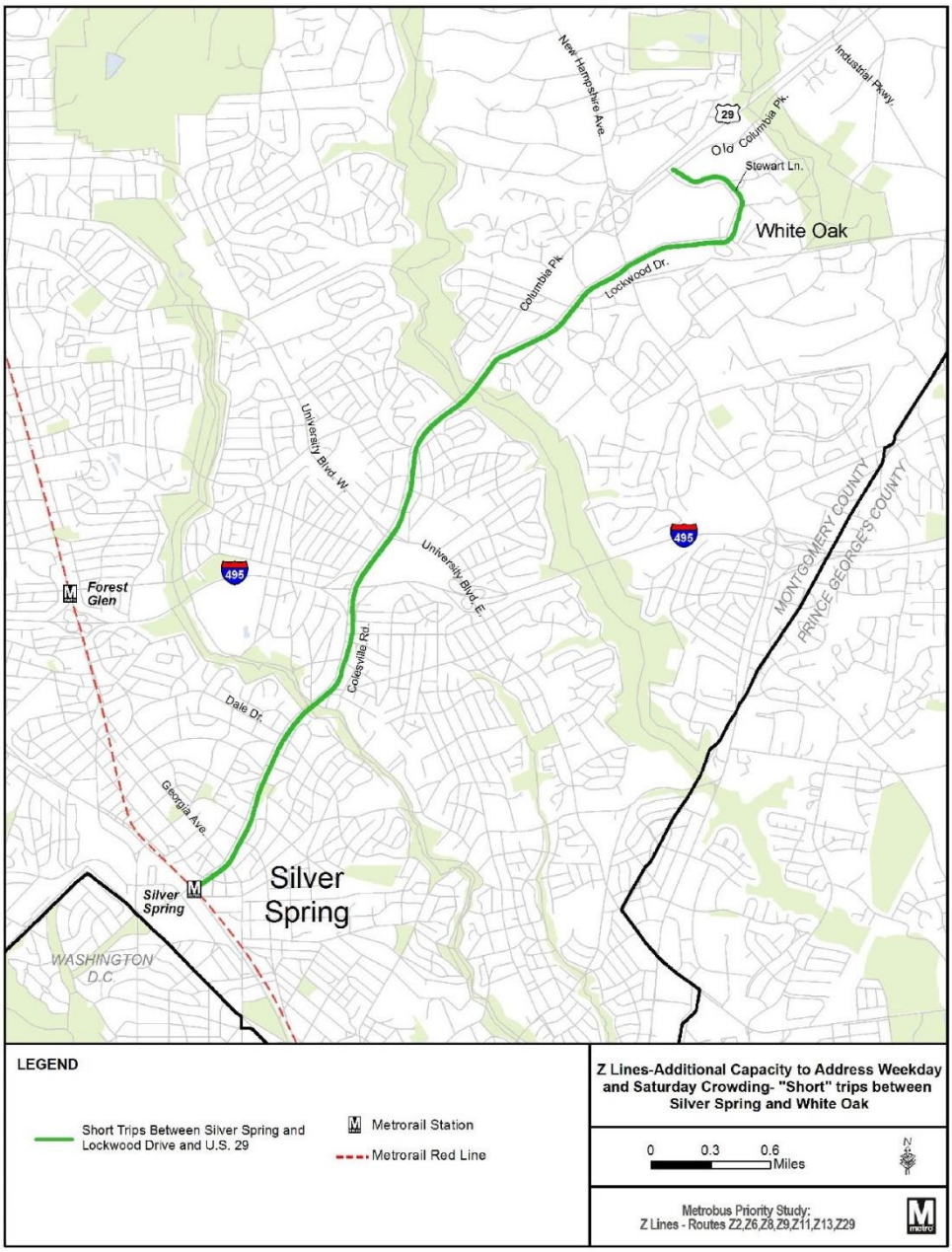


Figure 10 | WMATA Service Improvement Recommendation #6

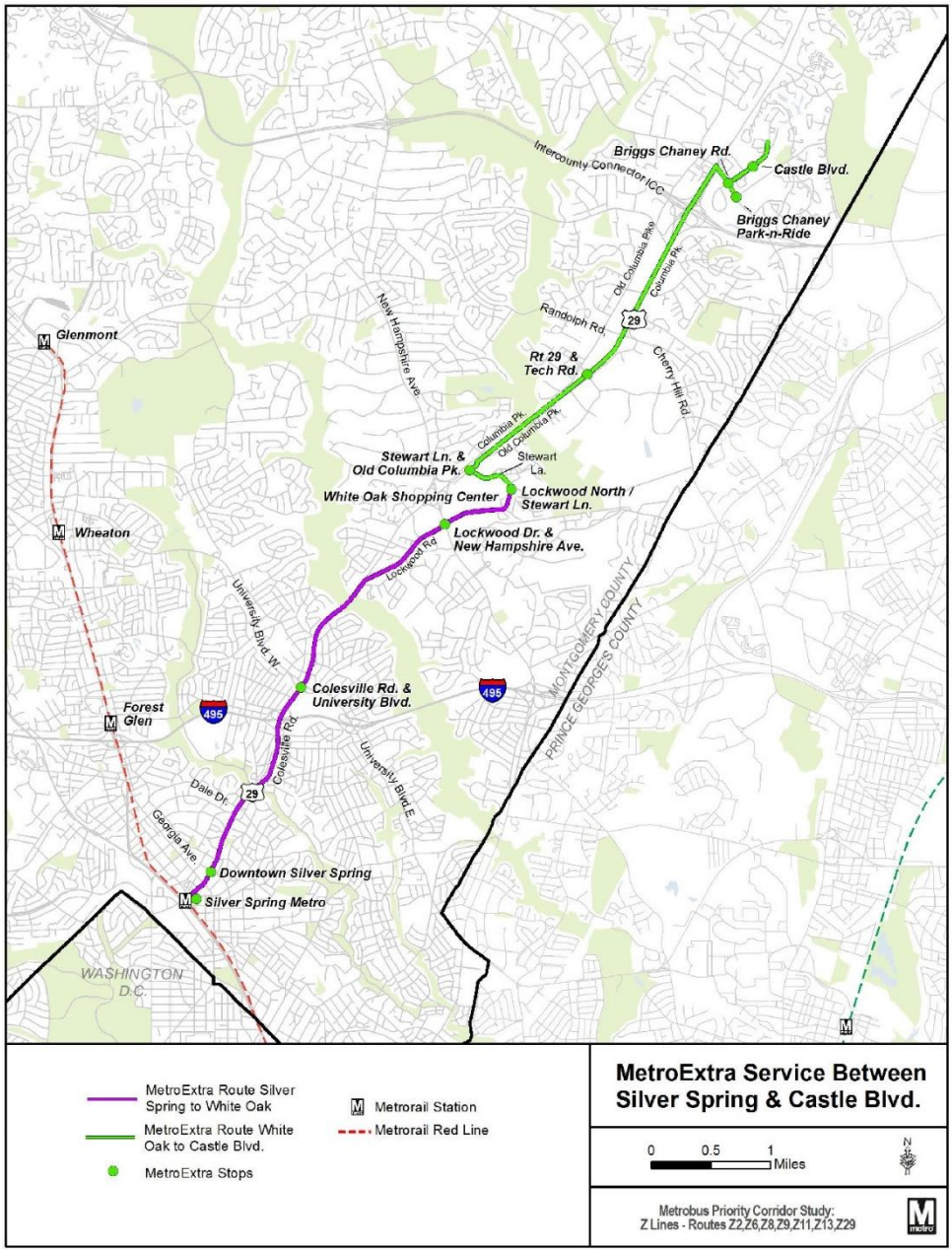


Figure 11 | WMATA Service Improvement Recommendation #7: Saturday service between Briggs Chaney and Burtonsville Park and Rides

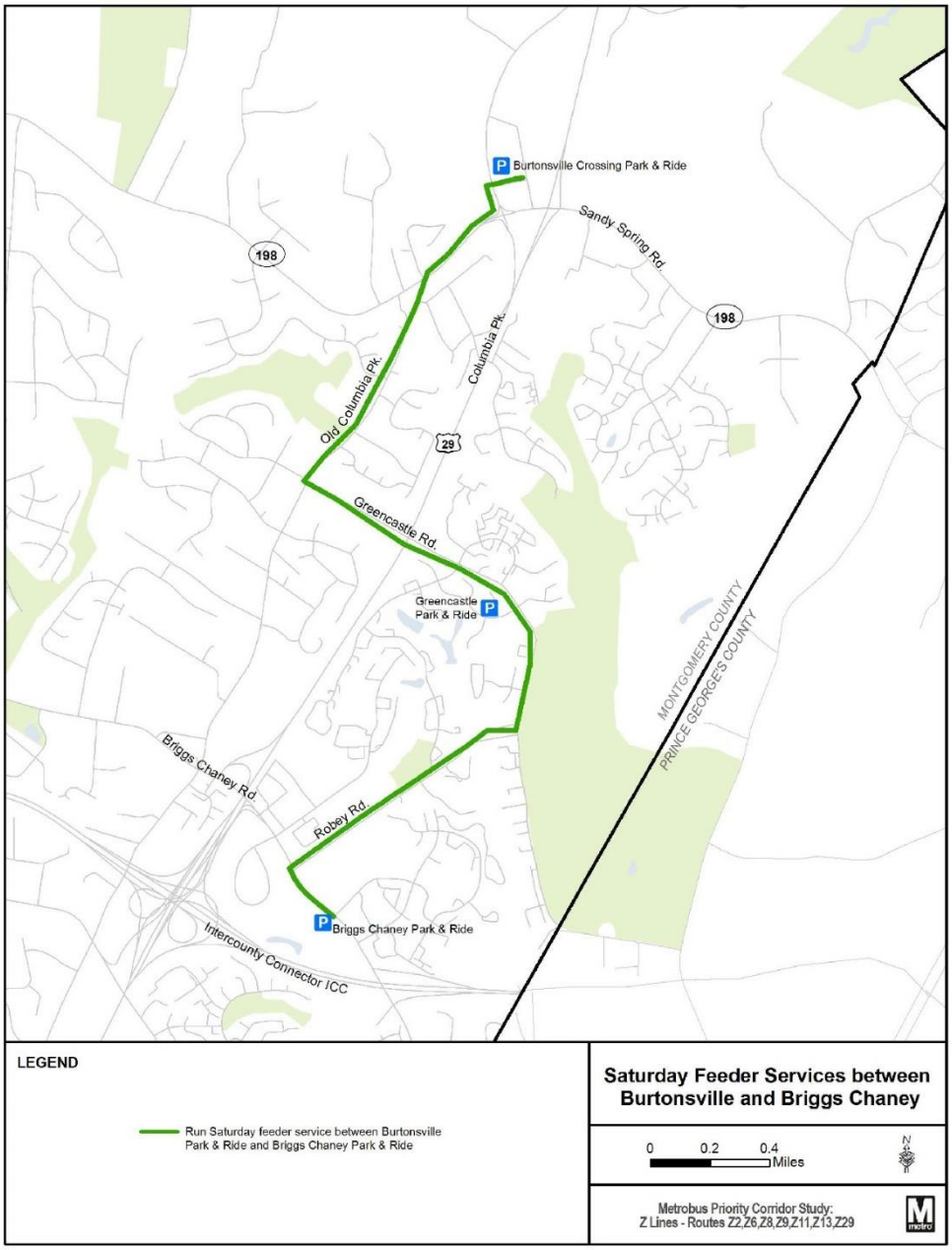
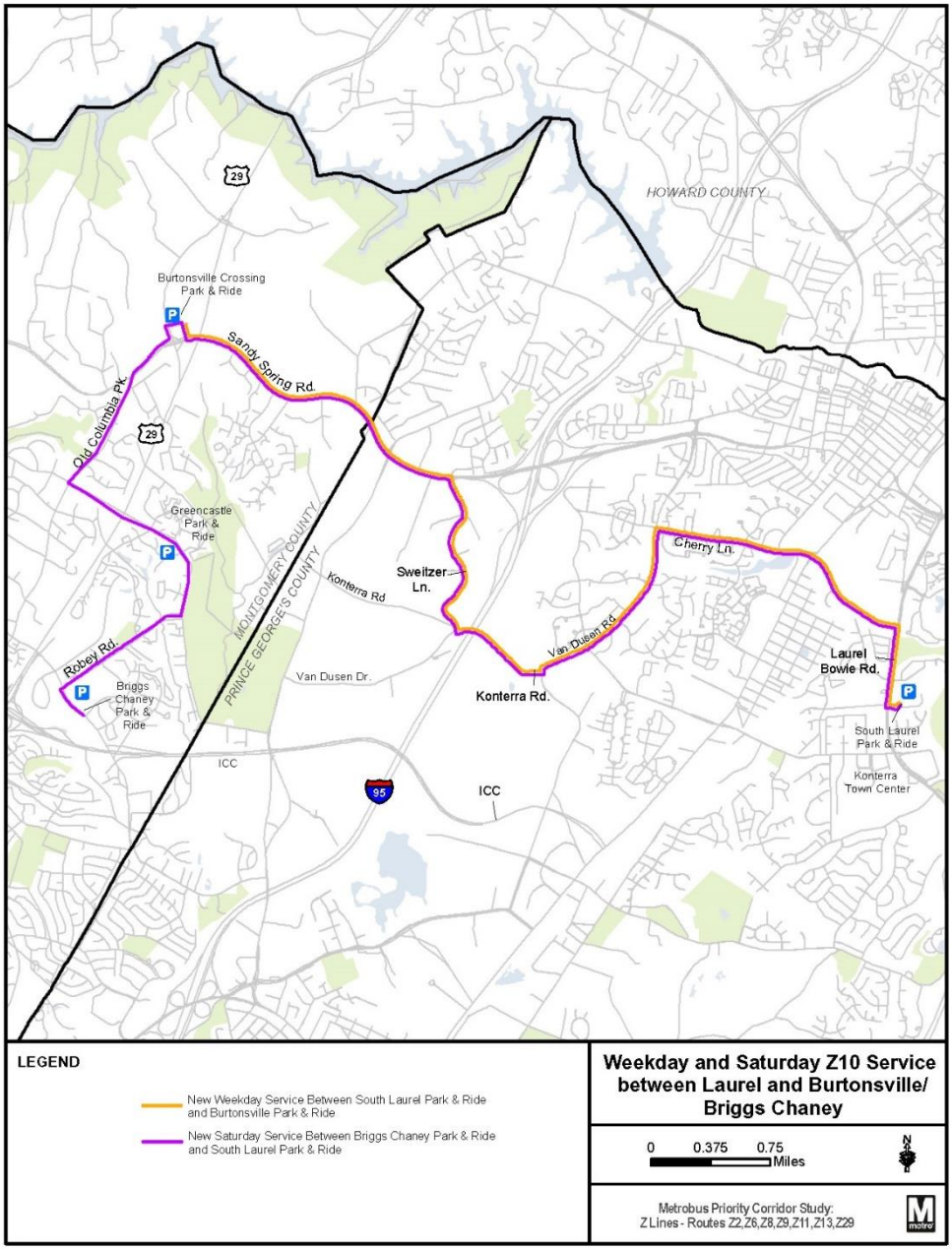


Figure 12 | WMATA Service Improvement Recommendation #7: Weekday/Saturday service between South Laurel and Burtonsville Park and Rides



1.7.1 Proposed Operational Improvements

Table 4 | Proposed Operational Improvements

Recommendation	Description
#1 – Implement Dedicated Supervision	Serious congestion in the US 29 corridor results in on-time performance and reliability issues, especially bus bunching. The use of supervisors dedicated solely to the Z Lines, deployed at strategic locations along the Lines to proactively manage bus departures, is recommended and would help ensure adequate separation between buses and better on-time performance. This improved reliability would help address excessive wait times and crowded buses, which were key issues identified during the public outreach process. Dedicated supervision is recommended for implementation in the short-term time frame.
#2 – Additional stops on Z Lines express services (Z9, Z11, Z13, Z29)	This recommendation proposes adding one stop to the Z Lines express services at a location between the Lockwood Drive/US 29 intersection and University Boulevard. Currently riders wishing to transfer between an express service and a local service must walk a fairly long distance between Lockwood Drive and the US 29 in order to make this transfer. This new stop would be located along the portion of the US 29 corridor south of Lockwood Drive where both express and local Z Lines run along a common route. Adding a stop in the common portion of the corridor would preclude the currently required walk between US 29 and Lockwood Drive. This recommendation is proposed for implementation in the short-term time frame.

1.7.2 Proposed Passenger Facility Improvements

Table 5 | Proposed Passenger Facility Improvements

Recommendation	Description
#1 – Installation of ADA Compliant Bus Stop Pads	An ADA compliant bus stop pad is a concrete pad at a stop that providespersons with a disability an accessible and stable surface for boarding and alighting a bus. This recommendation proposes ADA compliant pads at the 53 out of 361 Z Lines stops that do not currently have an ADA compliant pad. This recommendation is proposed for implementation to start in the short-term time frame.
#2 – Improvements to Sidewalk Accessibility	ADA compliant bus stop pads require ADA compliant sidewalk access to and from the bus stop location. This recommendation proposes installation of sidewalks at 22 stops that do not currently meet the requirements for an accessible pathway. This recommendation is proposed for implementation to start in the short-term time frame. Implementation of passenger facility recommendations #1 and #2 would likely be completed in tandem.
#3 – Installation of information cases	Information cases at stops contain a Z Lines map and schedule information. Stops with more than 50 boardings per day that do not have an information case are proposed for immediate installation of a case while stops with 20 boardings per day are proposed for longer-term installation of a case. 22 stops are proposed for immediate installation of an information case and 27 are proposed for longer-term installation.
#4 – Installation of Trash Receptacles	Trash receptacles are recommended for installation at stops with greater than 25 boardings per day that do not currently have a receptacle. There are 11 stops that are candidates for trash receptacle installation in the short-term time frame.
#5 – Installation of Benches and Shelters	A bench and shelter are recommended for installation at all stops with greater than 50 boardings per day, consistent with WMATA Bus Stop Design Guidelines that do not currently have a bench and shelter. There are 10 stops that are candidates for installation of a bench and shelter in the short-term time frame.

1.7.3 Traffic Operations Improvements

Table 6 | Traffic Operations Recommendations

Recommendation	Description
#1 – Study Signal Timing and Phasing	Poor timing of signals can result in excessive waiting and buses being required to sit through multiple signal cycles. This recommendation proposes working with Montgomery County and the State Highway Administration to conduct a more detailed analysis of the timing of identified signals to determine whether modifications can be made to optimize the signal and improve bus travel times. This detailed analysis is proposed for implementation in the short-term time frame.
#2 – Evaluate Transit Stop Relocation	Conflicts between buses and traffic sometimes make it difficult for buses to access bus stops, leading to increased bus delays. This recommendation proposes an evaluation of transit stops where issues were identified during the study process to determine if relocating these stops is physically feasible and whether stop relocations would impact riders accessing the stop. This evaluation is proposed for implementation in the short-term time frame.
#3 – Shift Bus Access to Address Safety Concerns	A challenging turn for buses impacts southbound Z8 trips entering US 29 from Old Columbia Pike. The turn onto US 29 at this location has a tight radius and is on a steep grade with very poor sight lines. This recommendation proposes access to US 29 via Tech Road rather than the current access point. An evaluation of the proposed new routing is proposed for implementation in the short-term time frame.
#4 – Address General Congestion Along US 29	The study includes a series of traffic operations recommendations to help mitigate the impacts of US 29 congestion on bus travel times and reliability. Areas identified as possible solutions to congestion include bus use of the shoulder on US 29 to bypass traffic, repurposing a general traffic lane to become a dedicated transit lane, construction of a new dedicated bus lane where space is available, and a Transit Signal Priority program that helps buses pass through signalized intersections more quickly. Each of these potential solutions can be evaluated in the short-term time frame in order to assess their implementation feasibility.

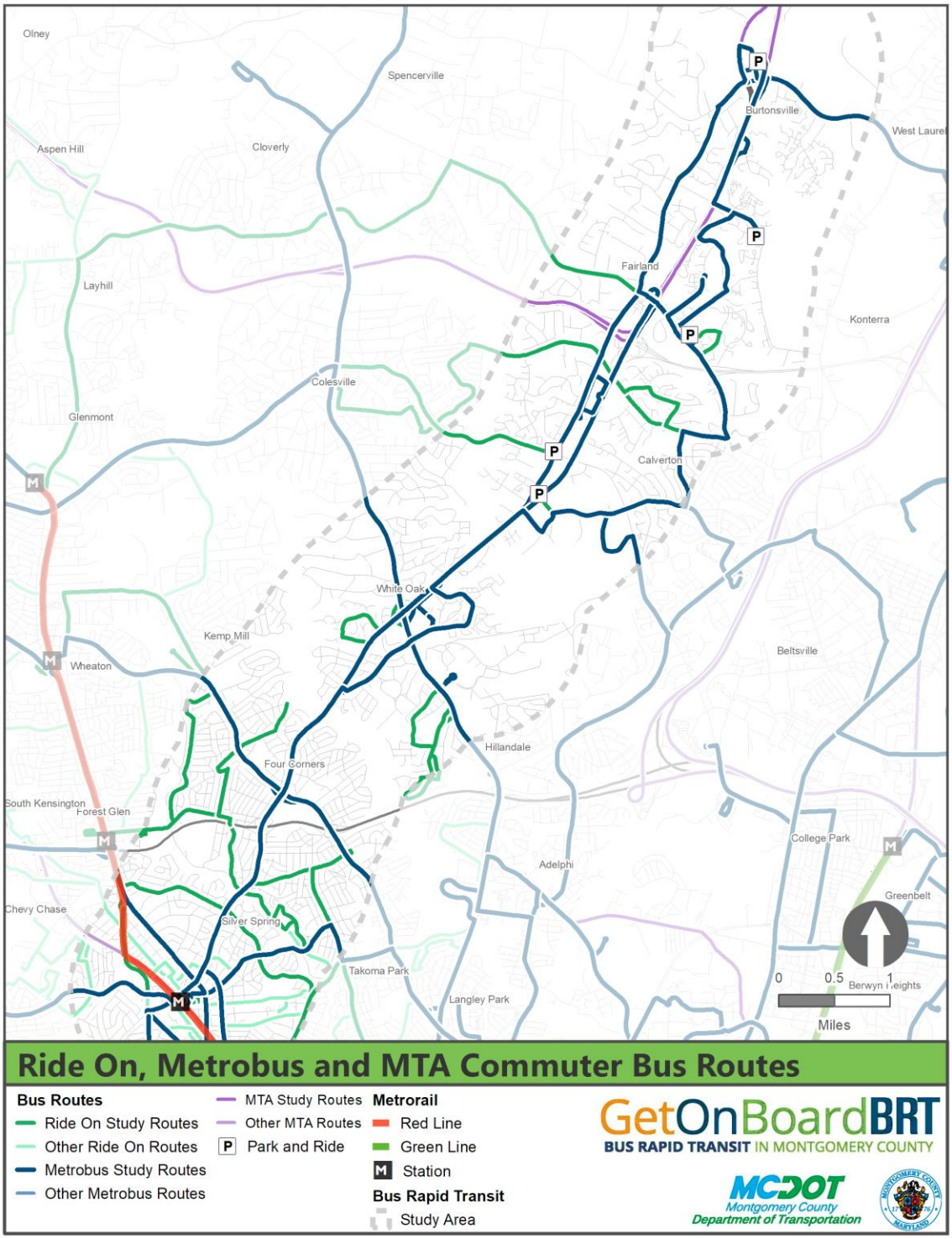
2. Existing Transit Conditions

The US 29 corridor extending from Downtown Silver Spring to the Howard County Line is being proposed for Bus Rapid Transit (BRT) service. The following report examines the Ride On and Metrobus routes that intersect and operate on the US 29 corridor and will be used to design a feeder bus network that will comprehensively and efficiently serve the communities surrounding the corridor.

The following analysis will evaluate ten Ride On routes (3, 8, 9, 10, 13, 14, 19, 21, 22, 39) and nine Metrobus routes (C2, C4, C8, K6, Z2, Z6, Z7, Z8, Z11), **Figure 13** illustrates the study corridor and associated routes. The metrics focused on will include:

- **Utilization**: daily ridership, ridership by stop and corridor, and ridership by time period
- **Reliability**: on-time performance
- **Productivity**: passengers per hour, passengers per mile and passengers per trip

Figure 13 | Study Area Routes[13]



[13] Service as of September 2016

2.1 ROUTE LEVEL OF SERVICE

2.1.1 Ride On

Currently, ten Ride On routes operate within the US 29 BRT corridor study area being evaluated in this study. Seven of the routes operate along portions of US 29 between Burtonsville and Silver Spring: **Routes 8**, **9**, **10**, **13**, **14**, **21**, and **22**. Three routes, **Routes 3**, **19**, and **39**, intersect with US 29 at various junctions.

Route 3 operates Monday through Friday, peak hours only. It connects Takoma Park and Silver Spring. It operates along Piney Branch Road, Dale Drive, 16th Street and East West Highway. During the morning peak period, the route only operates towards the Silver Spring Metrorail Station, and in the afternoon peak periods towards the Takoma Metrorail Station.

Route 8 operates Monday through Saturday. It connects Wheaton, Forest Glen, Four Corners, and Silver Spring. It operates along Veirs Mill Road, Georgia Avenue, Reedie Drive, University Boulevard West, Gabel Street, Tenbrook Drive, Forest Glen Road, Brunett Avenue, and Colesville Road. The Holy Cross hospital is only served by buses coming east from Forest Glen Metrorail Station.

Route 9 operates Monday through Sunday. The route connects Wheaton, Four Corners, and Silver Spring. It operates along Georgia Avenue, Veirs Mill Road, Reedie Drive, Amherst Avenue, Arcola Avenue, University Boulevard West, and Colesville Road, and during the midday the route has an extended limited service to Westfield Mall-Wheaton.

Route 10 operates Monday through Sunday. It connects Rockville, Glenmont Colesville, White Oak and Hillandale. It operates along Parklawn Drive, Randolph Road (with a diversion to Glenmont Metrorail Station), Old Columbia Pike, Tech Road, Industrial Parkway, Columbia Pike, Stewart Lane, Lockwood Drive, and New Hampshire Avenue.

Route 13 operates Monday through Friday during peak hours. It connects Silver Spring and Takoma Park. It operates along Bonifant Street, Wayne Avenue, Georgia Avenue, Colesville Road, Sligo Creek Parkway, Three Oaks Drive, Manchester Road, Wayne Avenue, Flower Avenue, Carroll Avenue, Carroll Street, Cedar Street, and Eastern Avenue.

Route 14 operates Monday through Saturday. It connects Silver Spring and Takoma Park. It operates along Wayne Avenue, Georgia Avenue, Franklin Avenue (with four trips making a short diversion to Eastern MS on school days), University Boulevard, Piney Branch Road, and Eastern Avenue.

Route 19 operates Monday through Friday, peak hours only. It connects Forest Glen, Four Corners and Silver Spring. It operates along Wayne Avenue, Flower Avenue, University Boulevard, Dennis Avenue, Dallas Avenue and Forest Glen Road. During the morning peak period the route only operates towards the Silver Spring Metrorail Station, and in the afternoon peak periods towards Forest Glen.

Route 21 operates Monday through Friday during peak hours. It operates in the peak direction only, the morning pattern originates at the Briggs Chaney Park and Ride while the afternoon trips originate from the Silver Spring Metrorail Station. It connects Fairland, Colesville, White Oak, Four Corners, and Silver Spring. It operates along Aston Manor Road, Gateshead Manor Drive, Briggs Chaney Road, Beethoven Boulevard, Fairland Road, Tamarack Road, Cannon Road, Kara Lane, Wolf Drive, New Hampshire Avenue, Oak Leaf Drive, Prelude Drive, Columbia Pike, and Colesville Road.

Route 22 operates Monday through Friday during peak hours. It connects Silver Spring, Four Corners, White Oak, and Hillandale. It operates along New Hampshire Avenue, Columbia Pike, and Colesville Road.

Route 39 operates Monday to Friday during peak hours only. It connects Glenmont Station, Layhill, Colesville, and Briggs Chaney Park and Ride. It operates along Aston Manor Drive, Gateshead Manor Way, Briggs Chaney Road, Good Hope Road, Piping Rock Drive, Bonifant Road, and Layhill Road.

Figure 14 Error! Reference source not found. illustrates the Ride On Routes in the study area. **Table 7Error! Reference source not found.** and Table 8Error! Reference source not found. provide detailed summaries of the average service frequencies by time period and span for each route.

Figure 14 | Ride On Routes in the Study Area

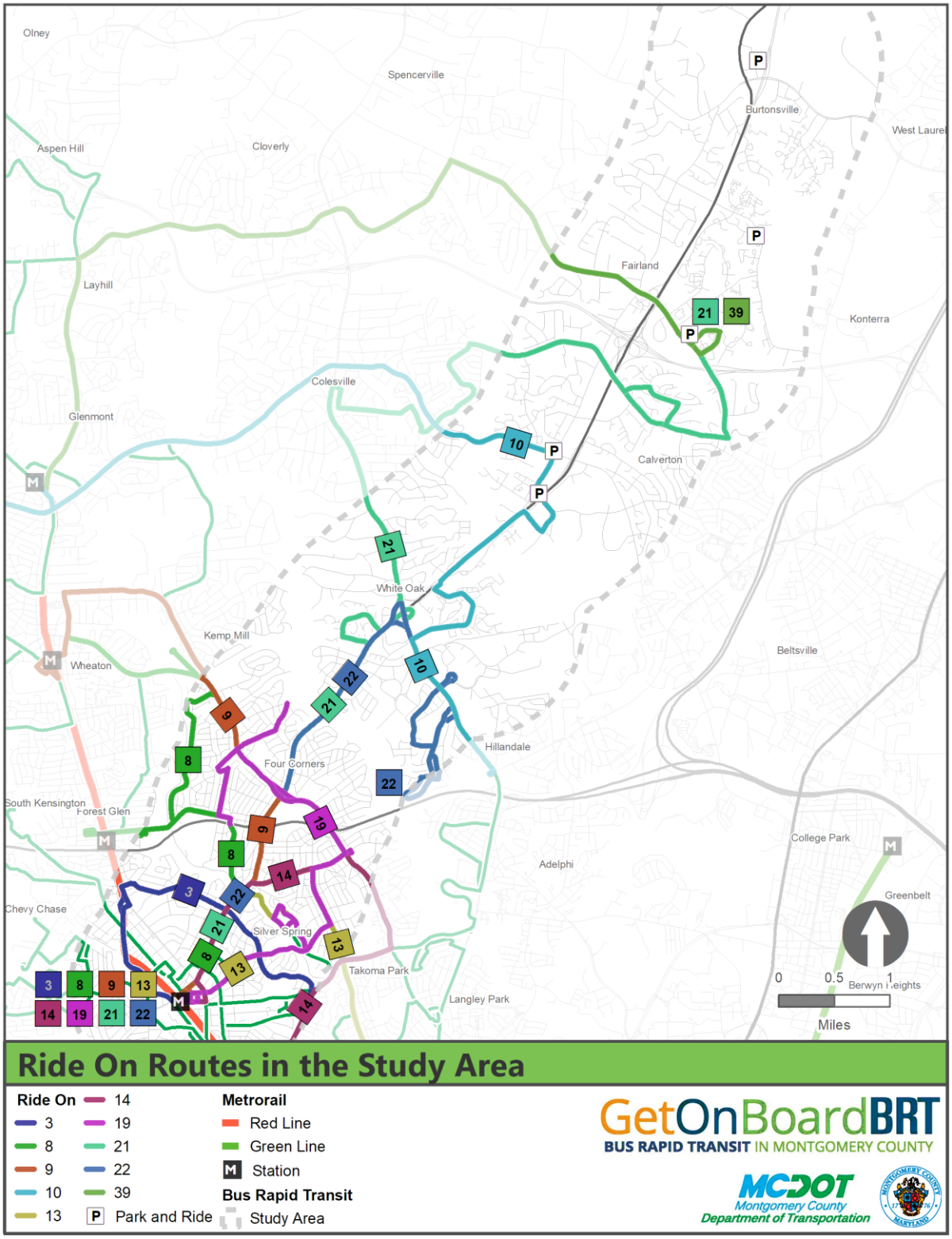


Table 7 | Weekday Ride On Scheduled Span of Service and Headways by Route

Route	Span	Headway (minutes)				
		Early Morning	Morning Peak	Midday	Afternoon Peak	Evening
3	7:02 AM – 8:43 AM; 5:08 PM – 6:57 PM	-	40	-	45	-
8	6:03 AM – 8:31 PM	-	30	30	30	30
9	4:45 AM –11:01 PM	30	30	30	30	30
10	4:39 AM –11:07 PM	30	30	30	30	30
13	5:50 AM – 9:49 AM; 4:03 PM - 7:44 PM	30	30	-	30	-
14	5:10 AM – 8:58 PM	30	30	30	30	30
19	6:14 AM – 8:50 AM; 2:48 PM – 8:20 PM	-	30	-	30	-
21	5:36 AM – 9:31 AM; 3:30 PM – 8:00 PM	30	30	-	30	-
22	5:45 AM – 9:43 AM; 3:02 PM – 7:25 PM	30	20/30	-	20/30	-
39	5:30 AM – 9:19 AM; 3:15 PM - 8:15 PM	30	30	-	30	-

Table 8 | Weekend Ride On Scheduled Span of Service and Headways by Route

Route	Saturday		Sunday	
	Span	Headway (minutes)	Span	Headway (minutes)
8	7:15 AM – 7:46 PM	30	-	-
9	6:30 AM – 9:49 PM	30	6:38 AM – 8:24 PM	30
10	6:39 AM – 11:08 PM	30	6:45 AM – 9:07 PM	30
14	7:31 AM – 7:01 PM	30	-	-

2.1.2 Metrobus

There are currently eleven Metrobus routes that operate in the US 29 corridor study area: **Routes C2**, **C4**, **C8**, **K6**, **Z2**, **Z6**, **Z7**, **Z8**, and **Z11**.

The Greenbelt-Twinbrook Line (**Routes C2** and **C4**) operates Monday through Sunday. **Route C2** connects the Greenbelt Metrorail Station to Wheaton Metrorail Station by way of Langley Park, Adelphi, and University of Maryland – College Park. It operates along Cherrywood Lane, Greenbelt Road, Baltimore Avenue, Campus Drive, Regents Drive, Stadium Drive, University Boulevard, Amherst Avenue, and Reedie Drive. On Saturdays, evening trips extend to Loehmann's Plaza. Sunday service is truncated at the Takoma Langley Crossroads Transit Center. **Route C4** operates from Prince George's Plaza to Twinbrook Metrorail Station, connecting Wheaton, Wheaton Metrorail Station, and Langley Park. This route operates along East-West Highway, Riggs Road, University Boulevard, Amherst Avenue, Reedie Drive, Veirs Mill Road, Randolph Road, and Parklawn Drive.

The College Park – White Flint Line (**Route C8**) operates Monday through Saturday. It connects White Flint Metrorail Station, Glenmont Metrorail Station, Colesville, White Oak, Hillandale, Adelphi, and College Park – University of Maryland Metrorail Station. It operates along Marinelli Road, Nicholson Lane, Rockville Pike, Parklawn Drive, Randolph Road, New Hampshire Avenue, Mahan Road, Adelphi Road, University Boulevard, Stadium Drive, Campus Drive, and River Road.

The New Hampshire Avenue – Maryland Line (**Route K6**) operates Monday through Sunday. It connects the White Oak Shopping Center, Hillandale, Northwest Park, Langley Park, Chillum, and Fort Totten Metrorail Station. It operates along Columbia Pike, Old Columbia Pike, Rear Shopping Center Roadway, Lockwood Drive, New Hampshire Avenue (with diversions at Northampton Drive, Southhampton Drive, and Lebanon Street), North Capital Street, Riggs Road, and 1st Plaza.

The Colesville – Ashton Line (**Route Z2**) operates Monday through Friday during peak hours. It connects Olney and the Silver Spring Metrorail Station. It operates along Spartan Road, Georgia Avenue, Olney Sandy Spring Road (with a diversion onto Prince Philip Drive), Doctor Bird Road, Norwood Road, MD Route 108, New Hampshire Avenue, Lockwood Road, and Colesville Road. Blake High School is served by this route during school days.

The Calverton – Westfarm Line (**Route Z6**) operates Monday through Saturday. It connects Burtonsville Cross Park and Ride Lot and the Silver Spring Metrorail Station. It operates along Old Columbia Pike, Briggs Chaney Road, Castle Boulevard, Gateshead Manor Way, Columbia Pike, Stewart Lane, Lockwood Drive, and Colesville Road.

The Laurel – Burtonsville Express Line (**Route Z7**) operates Monday through Friday during peak hours. It currently connects South Laurel Park and Ride and Silver Spring Metrorail Station; however, service changes in FY2017 will include the alignment being modified by eliminating service between Burtonsville and South Laurel, while reducing rush hour service frequency to every 35 minutes. It operates along Briarcroft Lane,

Laurel-Bowie Road, Cherry Lane, Van Dusen Road, Konterra Drive, Sweitzer Lane, MD Route 198, Sandy Spring Road, Old Columbia Pike, Columbia Pike, and Colesville Road.

The Fairland Line (**Route Z8**) operates Monday through Sunday. It connects Greencastle Park and Ride Lot and the Silver Spring Metrorail Station. It operates along Greencastle Road, Wexhall Drive, Ballinger Drive, Robey Road, Gateshead Manor Way, Briggs Chaney Road, Fairland Road, Galway Drive, Calverton Boulevard, Broadbirch Drive, Industrial Parkway, Columbia Pike, Stewart Lane, Lockwood Drive, and Colesville Road.

The Greencastle – Briggs Chaney Express Line (**Route Z11**) operates Monday through Friday during peak hours. It connects Burtonsville Crossing Park and Ride and the Silver Spring Metrorail Station. During the morning peak period, the route only operates in the peak direction from Burtonsville to the Silver Spring Metrorail Station. Peak only commute travel is provided during the evening peak period from Silver Spring Metrorail Station to Burtonsville. It operates along Columbia Pike, Greencastle Road, Wexhall Drive, Ballinger Drive, Robey Road, Gateshead Manor Way, Briggs Chaney Road, Castle Boulevard, Columbia Pike, and Colesville Road.

Error! Reference source not found. illustrates the Metrobus Routes in the study area. **Table 9** and Table **10** provide detailed summaries of the frequency by time period and span for each route. **Table 11** provides a list of the Ride On and Metrobus routes that serve the corridor's key destinations, which are organized by category (education, government, recreation, etc.).

Figure 15 | Metrobus Routes in the Study Area

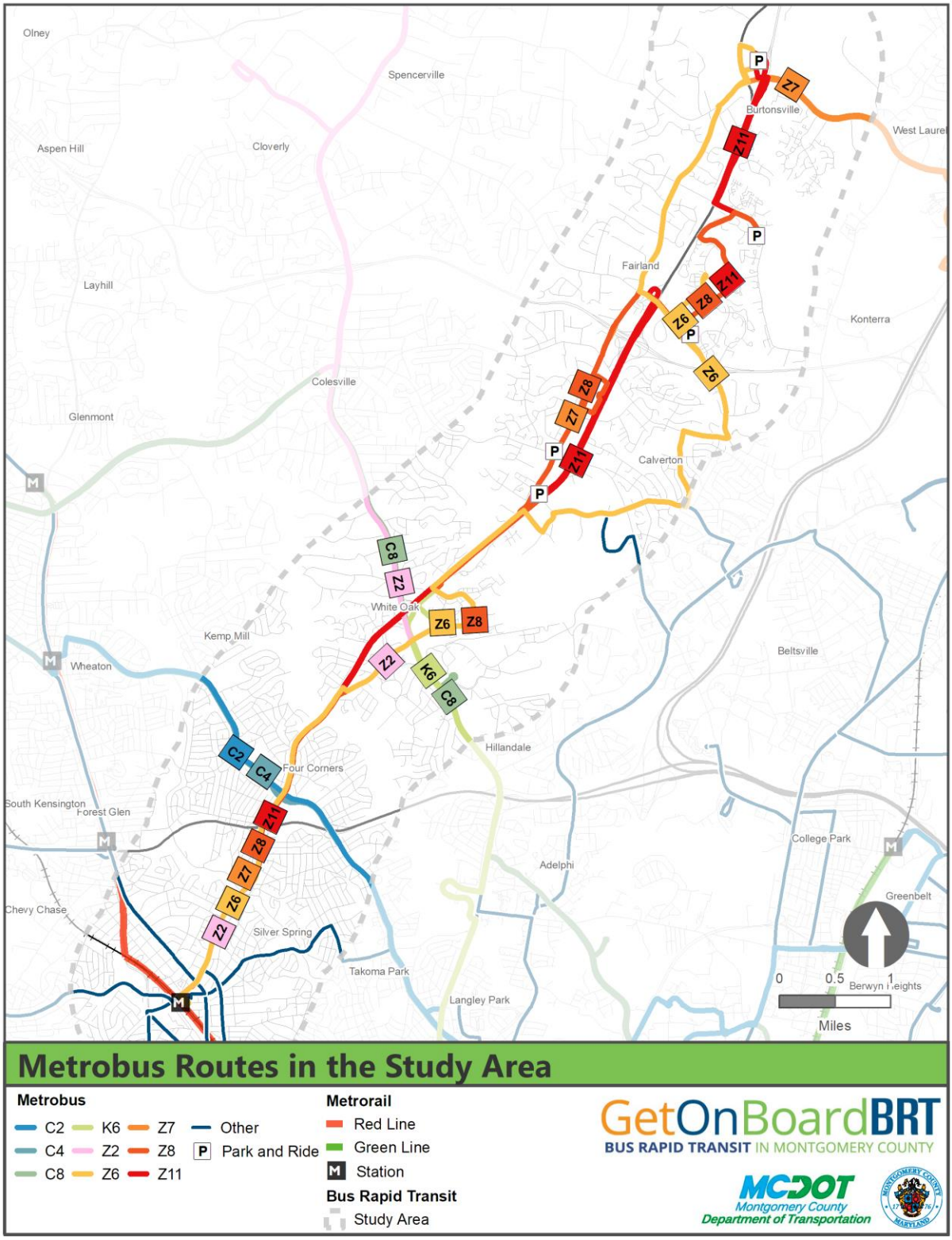


Table 9 | Weekday Metrobus Scheduled Span of Service and Headways by Route[14]

Route	Span	Headway (minutes)				
		Early Morning	Morning Peak	Midday	Afternoon Peak	Evening
C2	5:10 AM – 11:27 PM	-	20-30	25-30	15-20	30
C4	4:20 AM – 1:50 AM	10*	10	30	20-30	30
C8	5:08 AM – 10:15 PM	-	30	30	30	-[15]
K6	4:55 AM – 1:49 AM	-	12-20	20	12-20	15-20
Z2	5:26 AM – 9:41 PM; 2:01 PM – 8:06 PM	-	30	-	30	-
Z6	4:55 AM –10:48 PM	-	30	30	30	30
Z7	5:00 AM –8:55 AM; 3:22 PM – 8:54 PM	-	30	-	30-40	-
Z8	4:50 AM – 2:18 AM	-	10-30	30	10-30	30
Z11	5:09 AM – 9:27 AM; 3:35 PM – 8:21 PM	-	10-20	-	10-20	-

*between 4:20am and 5:00pm only

Table 10 | Weekend Metrobus Scheduled Span of Service and Headways by Route[16]

Route	Saturday		Sunday	
	Span	Headway (minutes)	Span	Headway (minutes)
C2	6:10 AM – 11:02 PM	25-30	8:15 AM –7:22 PM	45
C4	4:50 AM – 2:17 AM	25-30	5:55 AM – 1:59 AM	15-30
C8	5:50 AM – 10:15 PM	30	-	-
K6	5:29 AM – 1:39 AM	15-30	6:07 AM – 12:55 AM	15-20
Z6	5:45 AM – 10:40 PM	30	-	-
Z8	5:05 AM – 2:15 AM	30	5:33 AM – 1:06 AM	20-30

[14] Schedules and headways may change on June 25, 2017.
[15] The last two runs depart at 7:26 PM and 7:56 PM.
[16] Schedules and headways may change on June 25, 2017.

Table 11 | Major Activity Centers served by Local Bus Routes (Ride On and Metrobus)

Land Use	Study Route Connection	Major Destinations
Education	39	Argyle MS
	10, 21, C8, Z2	Care Xpert Academy
	9	Col. E. Brooke Lee MS
	14, 19, C2, C4	Eastern MS
	22	Francis Scott Key MS
	10, Z7, Z8, Z11	Griggs University
	Z2	James Hubert Blake HS
	10, C8	John F Kennedy HS, Thomas Edison HS of Technology, & Wheaton HS
	9, 19, 21, 22, C2, C4	Montgomery Blair HS
	10, 22, C8, K6	National Labor College George Meany Campus
	8, 9, C2, C4	Northwood HS
	3, 13, 19, J4	Silver Spring International MS
	8	Sligo MS
	3, 14	Takoma Park MS
	C2, C8	University of Maryland College Park
	13	Washington Adventist University
	21, C8, Z2	White Oak MS
Government	10, 22, C8, K6	Food & Drug Administration (FDA) / Federal Research Center (FRC) / HHS Indian Health Service
	8, 9, C2, C4	Mid County Regional Center
	8, 13, Z2, Z6, Z7, Z8, Z11	National Oceanic and Atmospheric Administration (NOAA)
Industrial	Z7	Laurel Employment Park, & Maryland 95 Corporate Park
	10, Z6	Montgomery Industrial Park
Medical	8	Holy Cross Hospital
	Z7	Laurel Regional Hospital
	Z2	Medstar Montgomery Medical Center
	13	Washington Adventist Hospital
Multimodal Connection	21, 39, Z6, Z8, Z11	Briggs Chaney Park and Ride Lot
	Z6, Z7, Z11	Burtonsville Crossing Park and Ride Lot
	C8	College Park – University of Maryland Metrorail Station
	8	Forest Glen Metrorail Station
	K6	Fort Totten Metrorail Station
	10, 39, C8	Glenmont Metrorail Station
	Z8, Z11	Greencastle Park and Ride Lot
	C4	Prince George's Plaza Metrorail Station

Land Use	Study Route Connection	Major Destinations
	3, 8,9, 13, 14, 19 ,21, 22, Z2, Z6, Z7, Z8, Z11	Silver Spring Metrorail Station
	Z7	South Laurel Park and Ride Lot
	3, 13, 14	Takoma Metrorail Station
	C2, C4	Takoma-Langley Crossroads Transit Center
	10, Z7, Z8	Tech Road Park and Ride
	10, C4	Twinbrook Metrorail Station
	8, 9, C2, C4	Wheaton Metrorail Station
	C8	White Flint Metrorail Station
Recreation	**14, C2, C4**	Long Branch Community Center
	21, C8, Z2	Martin Luther King, Jr. Indoor/Outdoor Swim Center
	10, C8	Montgomery County Department of Recreation Administration Offices
	39	National Capital Trolley Museum
	8, 19	Schweinhaut Senior Center
	8, 13, 14, 21, 22, Z2, Z6, Z7, Z8, Z11	Silver Spring Civic Building/Regional Center
	8, 13, 14, 21, 22, Z2, Z6, Z7, Z8, Z11	Silver Spring Library
	8	Sligo Creek Golf Course
	14	Takoma Park Maryland Library
	10, Z6, Z8	White Oak Community Recreation Center
	21, C8, Z2	White Oak Library
	9, 21, 22, Z2, Z6, Z7, Z8	YMCA
Retail	**39, Z6, Z7, Z8, Z11**	Briggs Chaney MarketPlace
	10, Z2	Colesville Center
	8, Z2, Z6, Z7, Z8, Z11	Downtown Silver Spring Shopping Mall
	10, 39, C8	Glenmont Shopping Center
	10, 22, C8, K6	Hillandale Shopping Center
	10, C4, C8	Loehmann's Plaza
	10, C2, C4, C8	Randolph Crossing, & Stoneymill Square
	C4	The Mall at Prince Georges
	Z7	Towne Center at Laurel
	8, 9, C4	Westfield Wheaton Plaza
	10, 22, K6, Z2, Z6, Z7, Z8	White Oak Shopping Center

Land Use	Study Route Connection	Major Destinations
	9, 19, 21, 22, C2, C4, Z6, Z7, Z8, Z11	Woodmoor Shopping Center
Social Services	**10, 22, C8, K6**	Chi Centers, Inc., Centers for the Handicapped
	21	Fairland Center
	14	Takoma East Silver Spring (TESS) Community Service Center

2.1.3 Metrorail

There are three Metrorail stops included in this study (**Table 12**). The Silver Spring Metrorail Station will be the terminus of the study corridor, while the Forest Glen and Glenmont Metrorail Stations are connected to the US 29 corridor through Ride On and Metrobus services being analyzed. All three of these stations are on the Metro Red Line. Ride On Route 8 serves all three of these stations, while Route 9 serves two of the stations, Silver Spring and Wheaton. The Silver Spring Metrorail Station is a destination for six Ride On routes (8, 9, 13, 14, 21, 22) and five Metrobus lines (Z2, Z6, Z7, Z8, Z11).

Table 12 | Metrorail Routes Served

Station	Metrorail Line	Ride On Routes	Metrobus Routes
Silver Spring	Red	**8, 9, 13, 14, 21, 22**	**Z2, Z6, Z7, Z8, Z11**
Forest Glen	Red	**8**	-
Wheaton	Red	**8, 9**	-

The Red line operates from 5:00 AM to 11:30 PM on weekdays, except for Fridays, when it operates until 1:00 AM (**Table 13**) and from 7:00 AM to 1:00 AM on Saturdays and 8:00 to 11:00 PM on Sundays (**Table 14**). It has four to eight minute headways during morning and afternoon peak periods, 5:00 AM to 9:30 AM and 3:00 PM to 7:00 PM, respectively. Six to ten-minute headways during the weekday evening period, 7:00 PM to 9:30 PM, twelve-minute headways during weekday midday period, 9:30 AM to 3:00 PM, and fifteen-minute headways during the weekday and Saturday late nights, 9:30 PM to 1:00 AM, as well as all day on Sundays.

Table 13 | Weekday Red Line Scheduled Span of Service and Headways[17]

Line	Span	Headway (minutes)				
		Morning Peak	Midday	Afternoon Peak	Evening	Late Night
Red	5:00 AM – 11:30 PM (Monday-Thursday) 5:00 AM – 1:00 AM (Friday)	4-8[18]	12	4-8[19]	6-10	15-18

Table 14 | Weekend Red Line Scheduled Span of Service and Headways

Line	Saturday		Sunday	
	Span	Headway (minutes)	Span	Headway (minutes)
Red	7:00 AM – 1:00 AM	12-15	8:00 AM – 11:00 PM	15

2.1.4 MTA Commuter Bus

There are currently six Maryland Transit Administration (MTA) Commuter Buses that operate in the service area: **Routes 201**, **202**, **204**, **305**, **315**, and **325**. **Routes 305**, **315**, and **325** are all express services that use US 29.

Route 201 operates from Gaithersburg Park and Ride to Baltimore/Washington International Thurgood Marshall Airport (BWI). It connects Gaithersburg Park and Ride, National Institution of Standards and Technology, Shady Grove Metrorail Station, Georgia Avenue Park and Ride, Burtonsville Park and Ride, Dorsey MARC Station, Arundel Mills Mall, BWI Airport, and the BWI Maryland Area Regional Commuter Train Service (MARC)/Amtrak Rail Station.

Route 202 operates from Metropolitan Grove MARC Station / Gaithersburg Park and Ride to Department of Defense / Fort Meade. It connects Metropolitan Grove MARC Station, Gaithersburg Park and Ride, Shady Grove Metro Station (East lot), Georgia Avenue. Park and Ride, Savage MARC Station, National Business Parkway, DOD, and Fort Meade

Route 204 operates between Frederick and College Park. It connects Monocacy MARC Station, Urbana Park and Ride, Gaithersburg Park and Ride, Georgia Avenue Park and Ride, US Food and Drug Administration (FDA) - White Oak, UMD - College Park, and the College Park Metrorail/MARC Station.

[17] Span of service and headway information provided in **Table 13** and **Table 14** reflects changes implemented on June 25, 2017.
[18] Additional trains operate between Grosvenor and Silver Spring during morning peak periods. Service at these stations will be every 4 minutes in both directions.
[19] Additional trains operate between Grosvenor and Silver Spring during the afternoon peak periods. Service at these stations will be every 4 minutes in both directions.

Routes 305, **315** and **325** operate between Columbia and Washington, DC. **Route 305** serves The Mall in Columbia, Broken Land Park and Ride, Scaggsville Park and Ride, Burtonsville Park and Ride, Silver Spring Metrorail Station, Washington DC. **Route 315** connects Lotte Plaza, The Mall in Columbia, Broken Land Park and Ride, Scaggsville Park and Ride, Burtonsville Park and Ride, Silver Spring Metrorail Station, Washington DC and **Route 325** serves The Mall in Columbia, Silver Spring Metrorail Station, Washington DC. **Figure 16** illustrates the MTA Commuter Bus routes in the study area. **Table 15** summarizes the major destinations and connections along each of the routes.

All MTA Commuter Bus that operates through the service area, with the exception of **Route 201**, is peak directional service during the weekday morning and afternoon peak periods.

Table 16 and **Table 17** detail the weekday and weekend span and frequencies.

Table 15 | Major Activity Centers served by MTA Commuter Bus Study Routes

Land Use	Route	Major Destinations
Commercial	**202**	National Business Parkway
Education	**204**	UMD - College Park
Government	**202**	Department of Defense, & Forte Meade
	201	National Institution of Standards and Technology
	204	US Food and Drug Administration (FDA) - White Oak
Multimodal Connection	**305,315**	Broken Land Park and Ride
	201,202,305,315	Burtonsville Park and Ride
	201	BWI Airport, BWI Airport MARC/Amtrak Rail Station, Dorsey MARC Station,
	204	College Park Metro/MARC Station, Monocacy MARC Station, & Urbana Park and Ride
	201,202,204	Gaithersburg Park and Ride, & Georgria Avenue Park and Ride
	202	Metropolitan Grove MARC Station, & Savage MARC Station
	305,315	Scaggsville Park and Ride
	201,202	Shady Grove Metrorail Station
	305,315,325	Silver Spring Metrorail Station
Retail	**201**	Arundel Mills Mall
	315	Lotte Plaza
	305,315,325	The Mall in Columbia

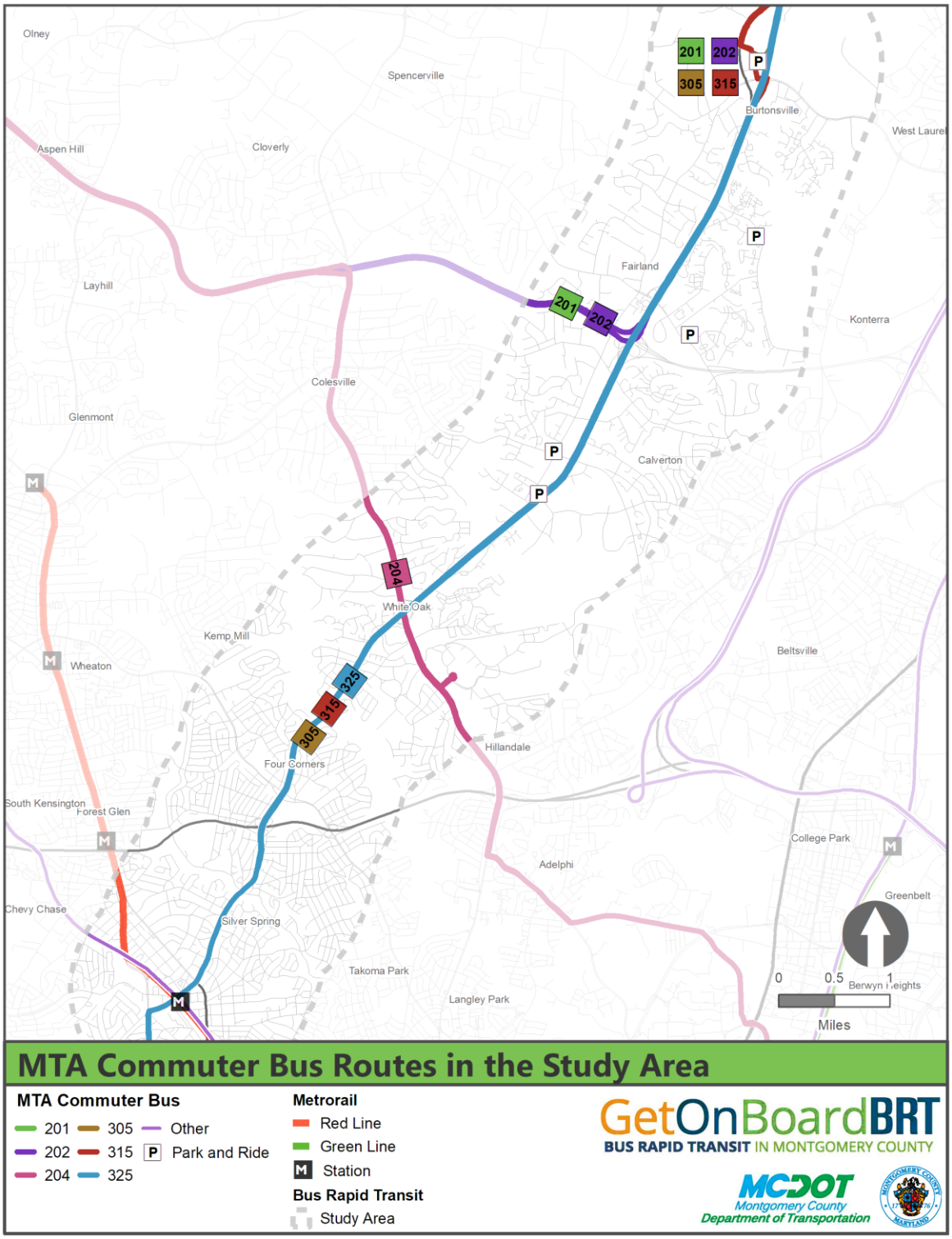
Table 16 | Weekday MTA Commuter Bus Scheduled Span of Service and Headways by Route

Route	Span	Headway (minutes)				
		Early Morning	Morning Peak	Midday	Afternoon Peak	Evening
201	4:00 AM-12:20 AM	60	60	60	60	60
202	5:00 AM – 8:35 AM 3:00 PM - 6:40 PM	60	60	-	60	-
204	5:18 AM –8:42 AM; 2:47 PM – 6:12 PM	25	25	-	25	-
305	4:30 AM –9:53 AM; 1:00 PM – 8:48 PM	20	20	-	20	-
315	4:45 AM – 9:41 AM; 2:40 PM – 7:53 PM	20	20	-	20	-
325	5:35 AM – 9:39 AM; 3:15 PM – 6:59 PM	20	20	-	15-20	-

Table 17 | Weekend MTA Commuter Bus Scheduled Span of Service and Headways by Route

Route	Saturday		Sunday	
	Span	Headway (minutes)	Span	Headway (minutes)
201	4:00 AM – 12:08 AM	60	4:00 AM – 12:08 AM	60

Figure 16 | MTA Commuter Bus Routes in the Study Area



2.2 RIDERSHIP METRICS ASSESSMENT[20]

The following assessments of ridership will evaluate the number of passengers using the Ride On and Metrobus services operating on and intersecting the US 29 corridor study area. The results of this analysis will be used as an indicator of both total activity and productivity of the routes and bus stops being analyzed.

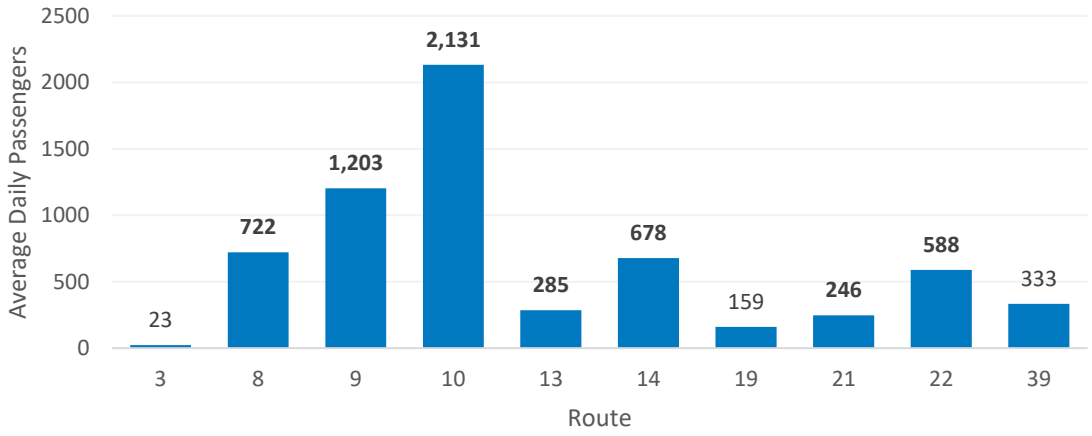
2.2.1 Ridership

Average daily ridership is an indicator of the typical daily activity for each route accessing and intersecting with the US 29 corridor. The following sections detail average daily weekday, and Saturday and Sunday ridership, where available.

Ride On

The Ride On routes that serve the US 29 corridor experienced on average over 6,300 passengers each weekday during FY 2016. Route 10 has the highest average weekday ridership (2,131 passengers), followed by Route 9, which serves almost half as many passengers each weekday (1,203 passengers). The fewest number of passengers were carried by routes that operate only during weekday peak periods: Route 3 (23 passengers) and Route 19 (159 passengers). **Figure 17** illustrates average weekday ridership by route.

Figure 17 | Ride On - Average Daily Ridership, Weekdays



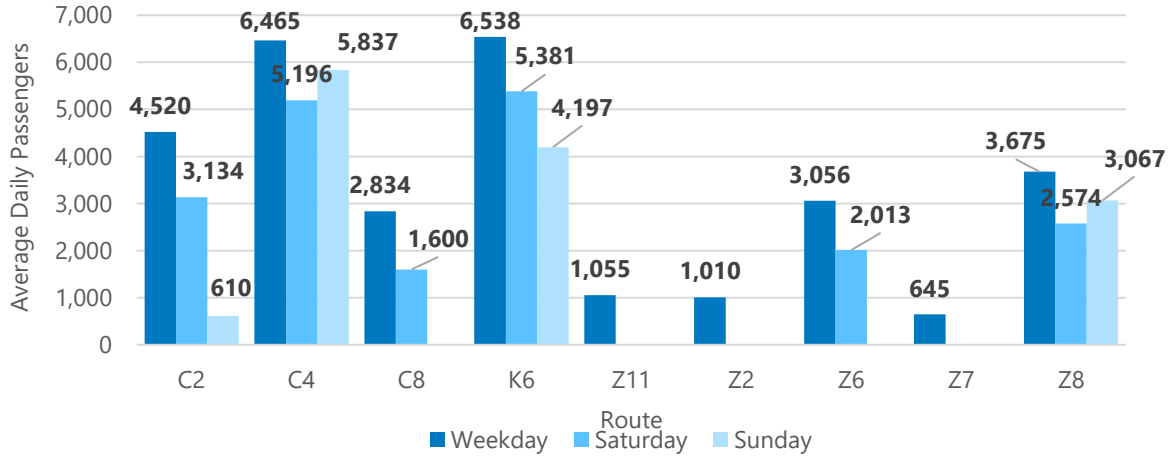
Metrobus

Metrobus routes that serve the US 29 corridor experienced on average nearly 30,000 passengers every weekday in late 2016, and approximately 20,000 and 14,000 passengers every Saturday and Sunday, respectively. Route K6 has the highest average weekday ridership (6,538 passengers) and Saturday ridership

[20] Ride On data is summarized for Fiscal Year 2016, Metrobus data is based on data from August to December 2016, and Metrorail data is from October 2016.

(5,381 passengers), while Route C4 has the highest Sunday ridership (5,837 passengers). **Figure 18** illustrates ridership by service period for each Metrobus route.

Figure 18 | Metrobus - Average Daily Ridership



Metrorail – Silver Spring

Each weekday, an average of 11,933 passengers entered the Silver Spring Metrorail Station (**Table 18**). An average of 2,192 passengers transferred from Ride On and Metrobus services combined. Of these, approximately 1,006 passengers, or 46 percent of daily transfers, occurred from the Ride On and Metrobus routes operating in the project study area, 243 transfer from Ride On routes and 763 from Metrobus routes. Overall, transfers from routes operating in the study area constitute almost nine percent of weekday station boardings. **Figure 19** and **Figure 20** detail transfers to Metrorail by route for Ride On and Metrobus, respectively.

Table 18 | Average Daily Boardings by Time Period at Silver Spring Metrorail Station

Time Period	Early Morning	Morning Peak	Midday	Afternoon Peak	Early Night	Late Night	Average Daily Total
Weekday	247	5,575	2,342	2,874	808	87	**11,933**
Saturday	0	666	1,926	1,235	779	109	**4,715**
Sunday	0	431	1,615	890	453	37	**3,427**

Figure 19 | Ride On - Average Weekday Transfers to Silver Spring Metrorail Station

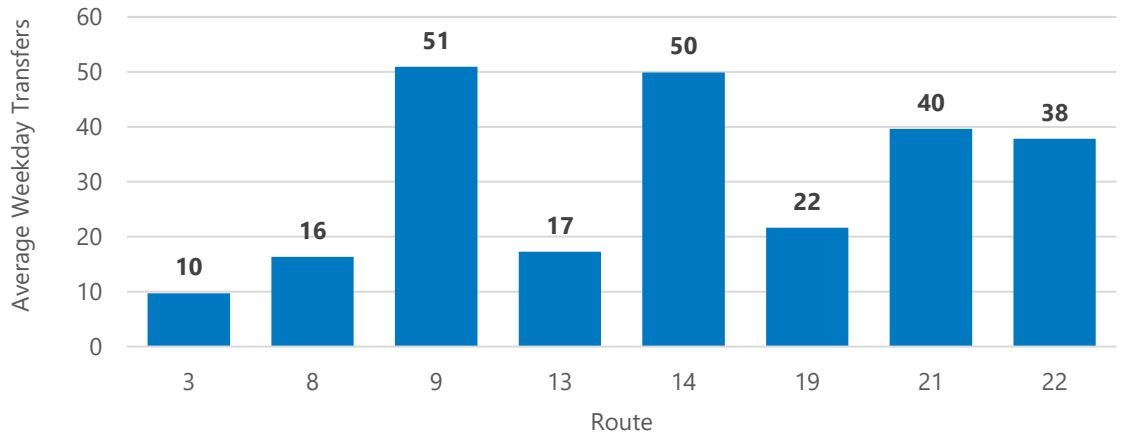
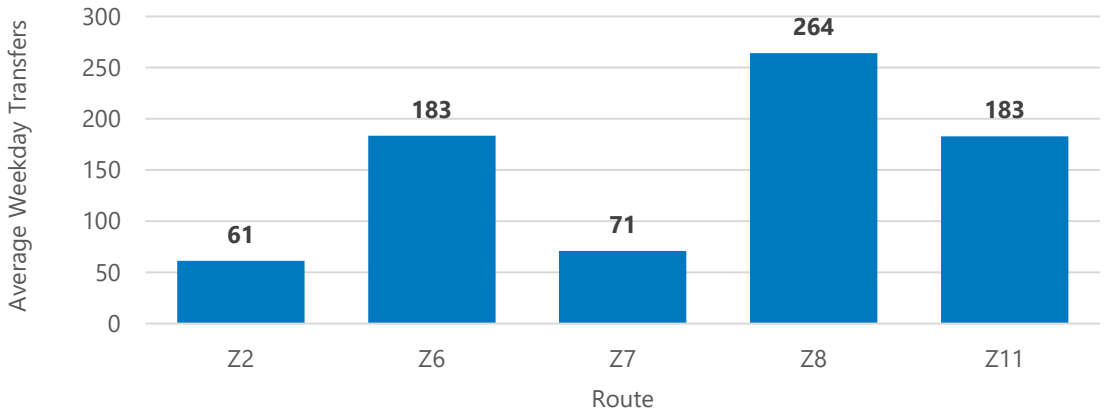


Figure 20 | Metrobus - Average Weekday Transfers to Silver Spring Metrorail Station



Several study routes also serve other Metrorail stations, including Takoma Park Metrorail Station, Wheaton Metrorail Station, and Forest Glenn Metrorail Station. Because these stations are not adjacent to the study corridor, they are excluded from this analysis.

2.2.2 Ridership by Stop/Corridor

The following section considers the total activity (boardings and alightings) at individual bus stops on and off the US 29 study corridor, as well as the average daily passenger volume between bus stops segments along each route. This analysis will identify how the US 29 corridor is being used and accessed by passengers.

Ride On

On the seven Ride On routes that serve the study corridor (Routes 8, 9, 10, 13, 14, 21, and 22), approximately 15 percent of weekday ridership activity (the sum of boardings and alightings) occurs on the US 29 study corridor, including the study corridor's deviations to Lockwood Drive and the Briggs Chaney Road Park and Ride.

Ride On bus stops in Downtown Silver Spring and along Lockwood Drive and Briggs Chaney Road show the highest levels of daily ridership activity (**Table 19**). In particular, apart from the Silver Spring Metrorail Station, the Colesville Road (US 29) & Fenton Street paired bus stops in Downtown Silver Spring, served a significant number of passengers with 199 average daily boardings and 197 average daily alightings.

Besides the bus stops in Downtown Silver Spring and on Lockwood Drive, in general Ride On stops along US 29 study corridor see far less daily activity. A notable exception occurs at the intersection of University Boulevard (MD 193) & Colesville Road (US 29), where transfers are available to Routes C2 and C4 and Route 19. Further north, stops along the study corridor's two deviations from US 29 at Lockwood Drive and at Briggs Chaney Road also see higher activity, though far less than the stops in Downtown Silver Spring. The fourth highest stop for daily activity is the northbound bus stop at Lockwood Drive & New Hampshire Avenue (90 daily boardings and 18 daily alightings). Notably, only one Ride On route serves this stop (Route 10), whereas the top three stops for daily activity are served by six Ride On routes (Route 8, 9, 13, 14, 21, 22). **Figure 21** provides an overview of overall Ride On bus stop level ridership activity that occurs on the US 29 corridor. **Appendix A** contains detailed boarding and alighting maps for each individual route.

Table 19 | Ride On - Bus Stops with Highest Daily Activity

Stop Name	Direction	Location	Boardings	Alightings	Total Activity	Study Routes
Silver Spring Station	---	Downtown Silver Spring	282	322	**604**	8, 9, 10, 13, 14, 21, 22
Colesville Road (US 29) & Fenton Street	Northbound	Downtown Silver Spring	194	8	**202**	8, 9, 13, 14, 21, 22
Colesville Road (US 29) & Fenton Street	Southbound	Downtown Silver Spring	5	189	**194**	8, 9, 13, 14, 21, 22
Colesville Road & Spring Street	Southbound	Downtown Silver Spring	9	112	**121**	8, 9, 13, 14, 21, 22
Lockwood Drive & New Hampshire Avenue	Northbound	Lockwood Deviation	90	18	**107**	10
Colesville Road (US 29) & University Blvd	Southbound	Four Corners	53	37	**90**	21, 22

Overall, far more ridership activity on the Ride On study routes occurs at the Silver Spring Metrorail Station, (703 daily boardings and 955 daily alightings) than at all the other Downtown Silver Spring bus stops combined (282 daily boardings and 322 daily alightings). The Downtown Silver Spring bus stops included

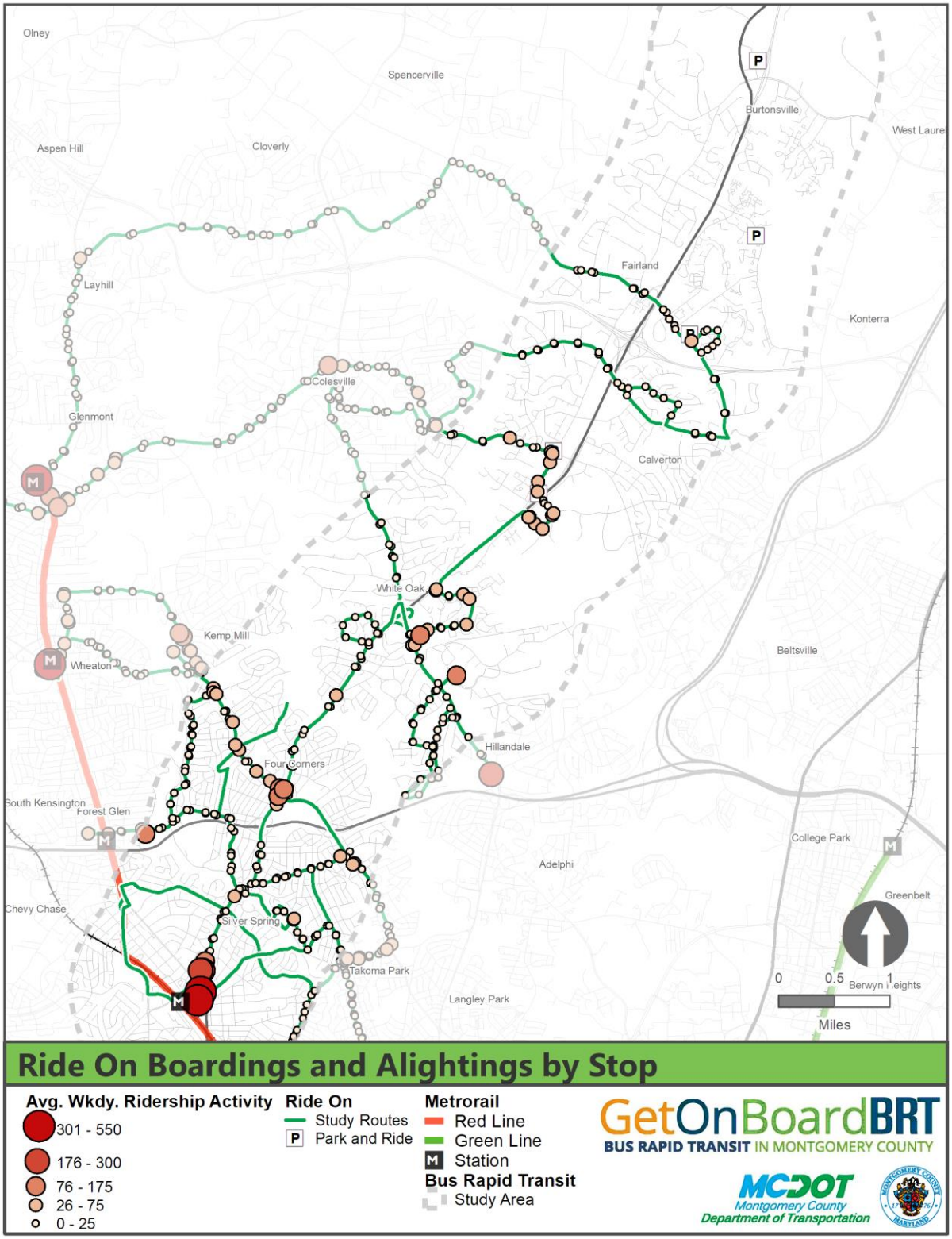
in this analysis are those served by study routes between Silver Spring Metrorail Station and Spring Street & Colesville Road (US 29), which includes the Georgia Avenue & Ellsworth Drive bus stop, and the Georgia Avenue, Spring Street, and Fenton Street bus stops on Colesville Road (US 29).

In terms of average daily ridership activity, the Silver Spring Metrorail Station accounts for 20 percent of the activity on the Ride On study routes, while the Downtown Silver Spring bus stops account for only seven percent (**Table 20**). Out of the Ride On study routes, Route 9 has the highest total activity in both Downtown Silver Spring and at the Silver Spring Metrorail Station.

Table 20 | Ride On - Daily Ridership Activity Within Downtown Silver Spring

Stop Locations		Routes						Total Activity
		8	9	13	14	21	22	
Downtown Silver Spring	Activity	105	232	40	85	41	102	**604**
	Percent of Total	*8%*	*8%*	*6%*	*5%*	*5%*	*11%*	***7%***
Silver Spring Metrorail Station	Activity	163	537	147	263	286	262	**1,658**
	Percent of Total	13%	19%	21%	16%	34%	28%	***20%***
Total Activity		**1,265**	**2,822**	**713**	**1,644**	**833**	**931**	**8,208**

Figure 21 | Ride On - US 29 Corridor Ridership by Bus Stop



Route 8

Route 8 (**Table 21**) travels Coleville Road (US 29) between Fenton Street, in Downtown Silver Spring, and Dale Drive, several blocks north of downtown. Route 8 bus stops on the US 29 corridor account for approximately nine percent of the route's daily activity. On average, the Route 8 average segment volume on the US 29 corridor is approximately 122 passengers.

Table 21 | Route 8 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Silver Spring Metrorail Station	163	13%	73
Georgia Avenue	14	1%	84
Colesville Road (US 29)	**113**	**9%**	**122**
Brunett Avenue	42	3%	125
Forest Glen Road	339	27%	113
Forest Glen Metrorail Station	50	4%	91
Tenbrook Drive	115	9%	106
Gabel Street	17	1%	98
University Blvd	172	14%	110
Amherst Avenue	20	2%	111
Reedie Drive	37	3%	92
Wheaton Metrorail Station	174	14%	82

Towards Wheaton Metrorail Station (northbound), the highest levels of boarding and alighting activity along the corridor occur at Colesville Road (US 29) & Fenton Street (32 boardings, 1 alighting). Overall, on the US 29 study corridor passenger daily passenger volume, or throughput, is fairly consistent between bus stops, with an average of 109 passengers traveling along any given segment. Off the US 29 corridor the average throughput is slightly higher at an average of 111 passengers traversing any given segment. **Figure 22** illustrates the average number of passengers traversing between northbound bus stops along Route 8 each weekday.

Overall, towards Silver Spring Metrorail Station (southbound), the average passenger volume along the corridor is approximately 140 passengers per day, but in general there is little bus stop activity on the corridor until the route reaches Colesville Road (US 29) & Fenton Street (39 alightings, 2 boardings). **Figure 23** illustrates the average number of passengers traversing southbound bus stop segments on Route 8 each weekday.

Figure 22 | Route 8 (Northbound) - Average Daily Passenger Volume by Segment

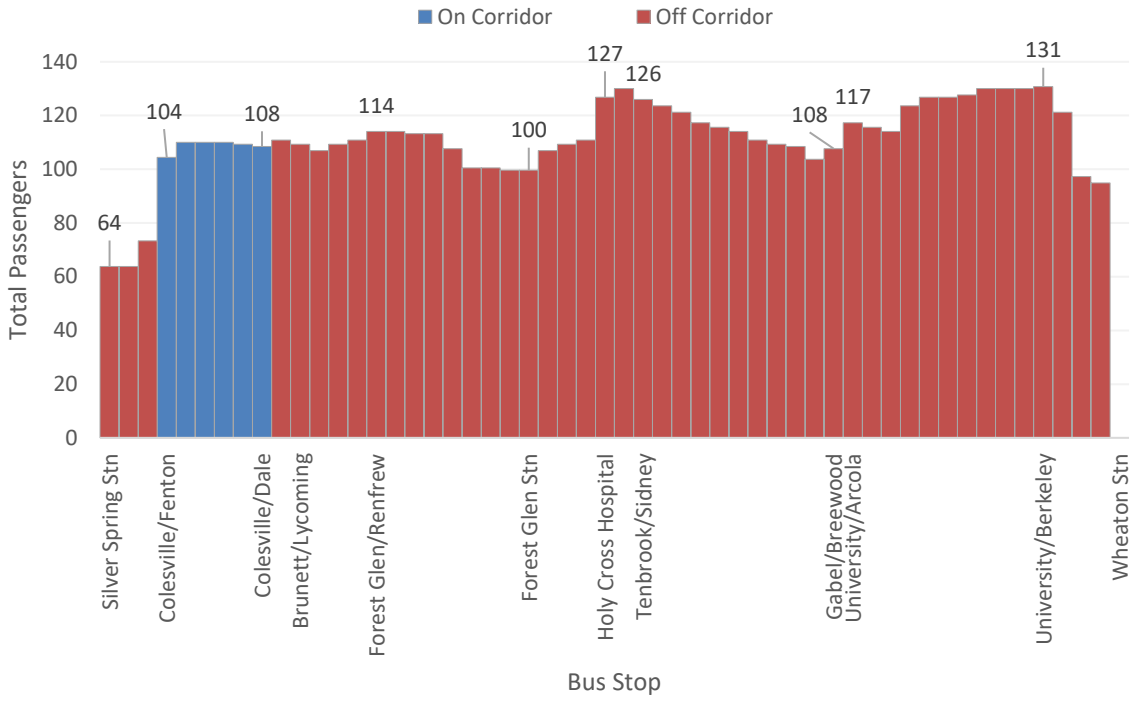
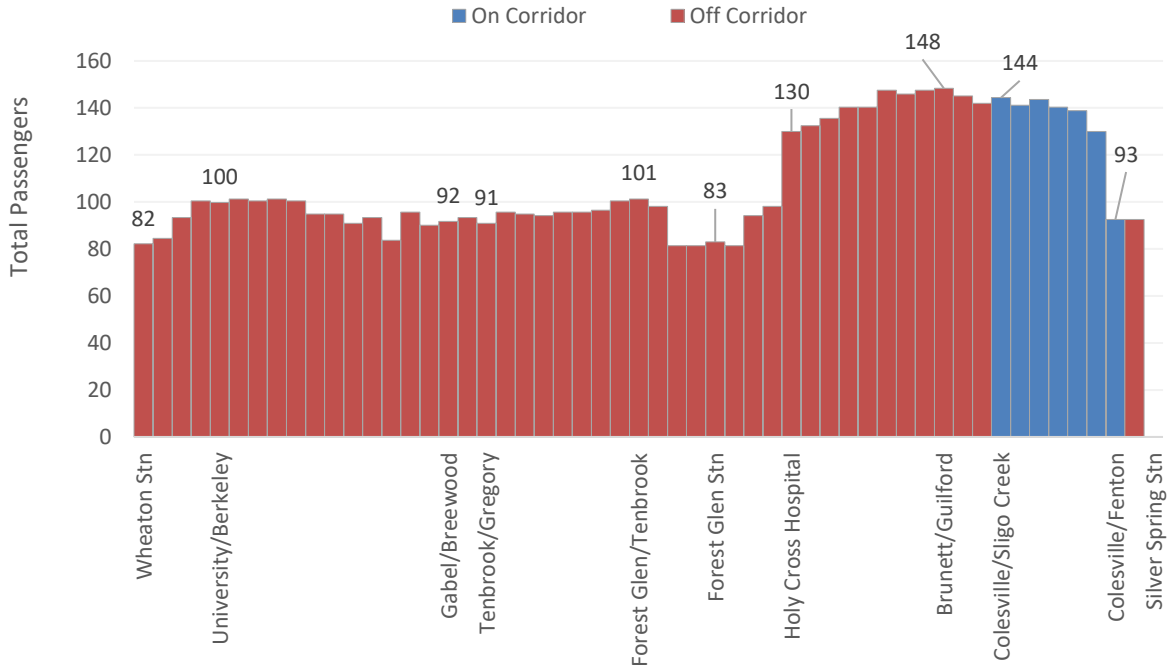


Figure 23 | Route 8 (Southbound) - Average Daily Passenger Volume by Segment



Route 9

Route 9 serves the study corridor on Colesville Road (US 29) between Fenton Street, in Downtown Silver Spring, and Lanarak Way, approximately two miles north of downtown. The Route 9 bus stops on the US 29 study corridor account for approximately 13 percent of the route's daily activity (**Table 22**). On average, the Route 9 average daily segment load on the US 29 corridor is approximately 365 passengers.

Table 22 | Route 9 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Silver Spring Metrorail Station	537	19%	261
Colesville Road (US 29)	**378**	**13%**	**365**
University Blvd	613	22%	385
Arcola Avenue	547	19%	320
Amherst Avenue	206	7%	286
Reedie Drive	20	1%	255
Georgia Avenue	58	2%	201
Wheaton Metrorail Station	465	16%	224

In the northbound direction, towards Wheaton Metrorail Station, the highest levels of ridership activity on the US 29 study corridor occurs at Colesville Road (US 29) & Fenton Street (81 boardings, 3 daily alightings), besides this first stop, there is very little activity at the other bus stops on the corridor. By the end of the US 29 corridor the passenger volume increased only slightly by two percent. **Figure 24** illustrates the average number of passengers traversing northbound bus stop segments on Route 9 each weekday.

Toward Silver Spring (southbound), the most significant levels of activity on the corridor again occurs at Colesville Road (US 29) & Fenton Street (104 alightings, 3 boardings). As in the southbound direction, there is little activity on the other bus stops along the US 29 corridor. Overall, the passenger volume by segment decreases from 390 to 291, but the overall average daily volume of passengers using each segment is 390 passengers across the US 29 corridor. **Figure 25** illustrates the average number of passengers traversing southbound bus stop segments on Route 9 each weekday.

Figure 24 | Route 9 (Northbound) - Average Daily Passenger Volume by Segment

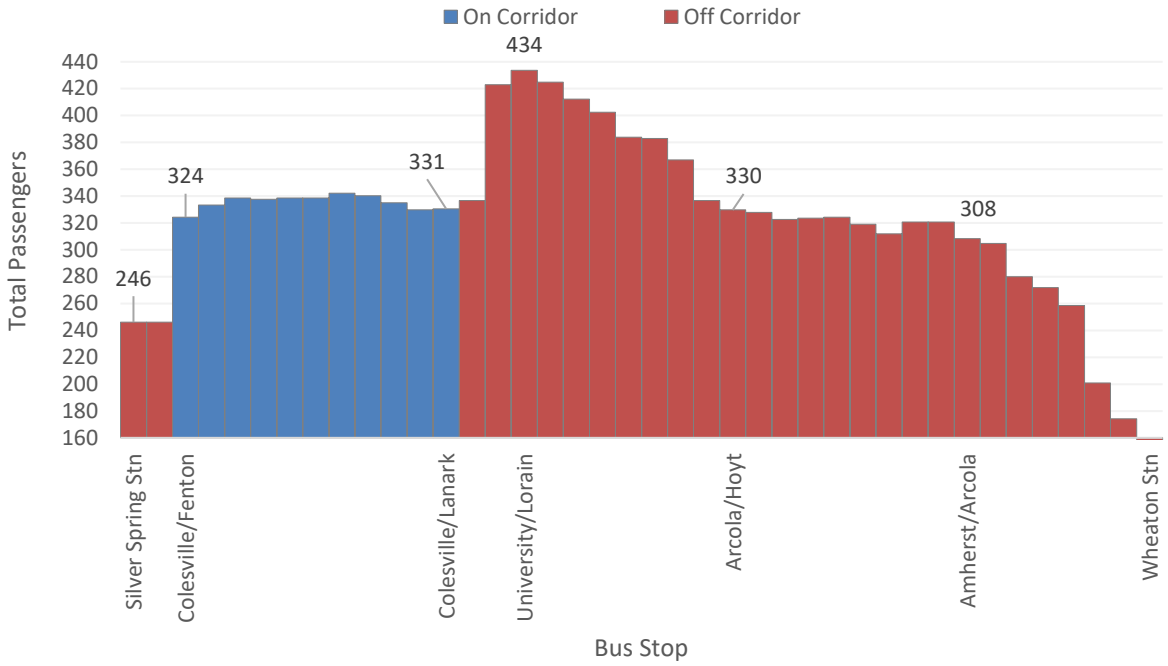
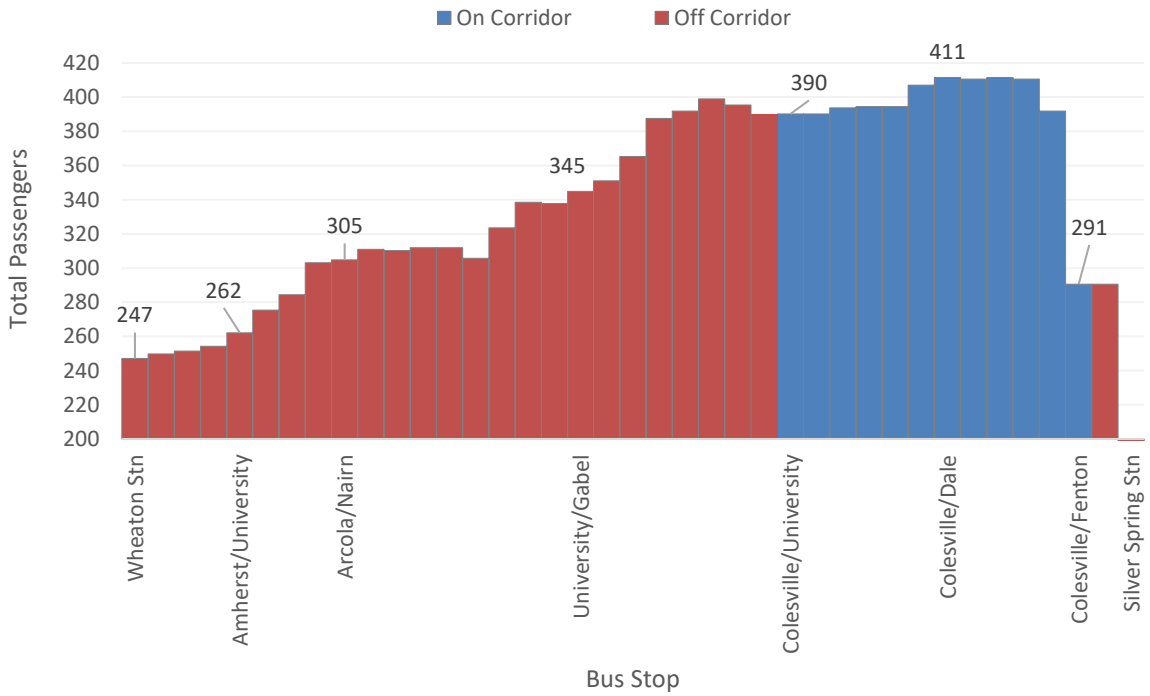


Figure 25 | Route 9 (Southbound) - Average Daily Passenger Volume by Segment



Route 10

Route 10 serves the study corridor on the Lockwood Drive deviation between the Stewart Lane & Old Columbia Pike bus stop and the Lockwood Drive & New Hampshire Avenue bus stop. The Route 10 bus stops on this deviation account for approximately 10 percent of the route's daily activity (**Table 23**). Stewart Lane and Lockwood Drive are seeing segment throughputs of approximately 245 and 211 passengers, respectively.

Table 23 | Route 10 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Twinbrook Metrorail Station	582	10%	278
Parklawn Drive	293	5%	310
Randolph Road	2508	45%	432
Georgia Avenue	199	4%	424
Glenmont Metrorail Station	526	9%	417
Old Columbia Pike	110	2%	308
Tech Road	179	3%	286
Industrial Parkway	136	2%	263
Stewart Lane	**222**	**4%**	**245**
Lockwood Drive	**327**	**6%**	**211**
New Hampshire Avenue	201	4%	135
Powder Mill Road	277	5%	118

The highest levels of activity on the study corridor towards Powder Mill Road & New Hampshire Avenue (eastbound) occurs at the first stop, Stewart Lane & Old Columbia Pike (13 boardings and 37 alightings), with the daily passenger volume on each segment steadily decreasing until the end of the route. **Figure 26** illustrates the average number of passengers traversing northbound bus stop segments on Route 10 each weekday.

Towards Twinbrook Metrorail Station (westbound), the most significant levels of activity on the study corridor again occurs at Lockwood Drive & New Hampshire Avenue (90 boardings, 18 alightings). Overall, passenger throughput increases from 253 to 308 passengers per day, approximately 22 percent, by the time the route exits the study corridor, maintaining an average volume of 275 passengers daily across the segments. **Figure 27** illustrates the average number of passengers traversing southbound bus stop segments on Route 10 each weekday.

Figure 26 | Route 10 (Eastbound) - Average Daily Passenger Volume by Segment

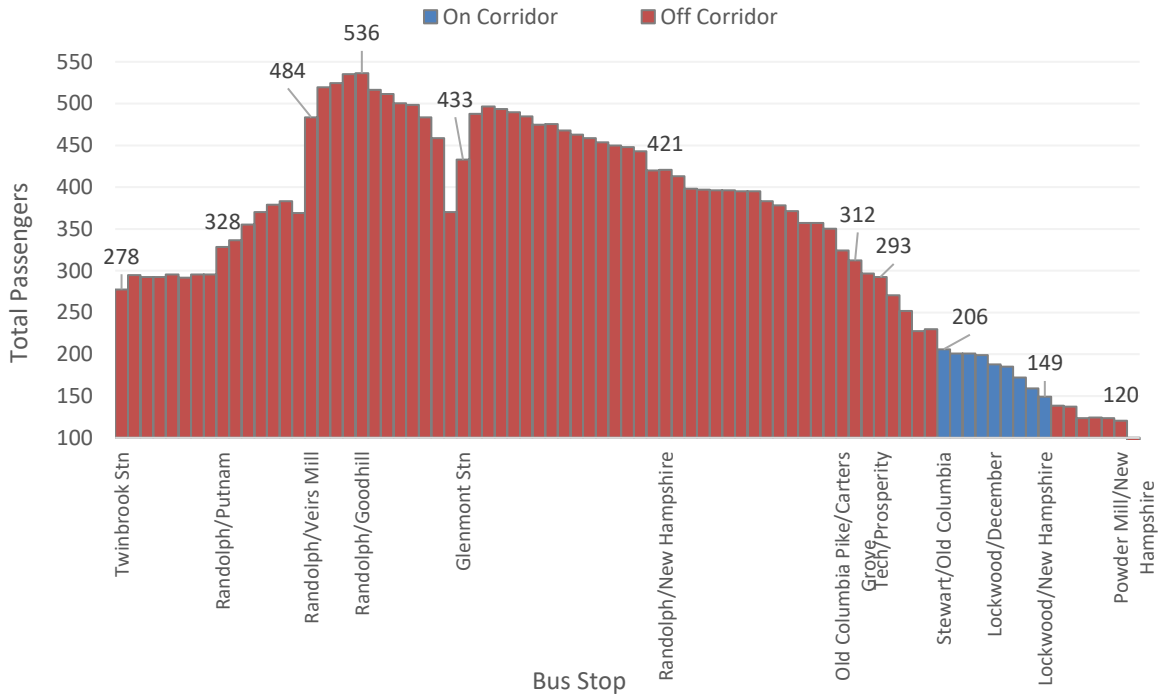
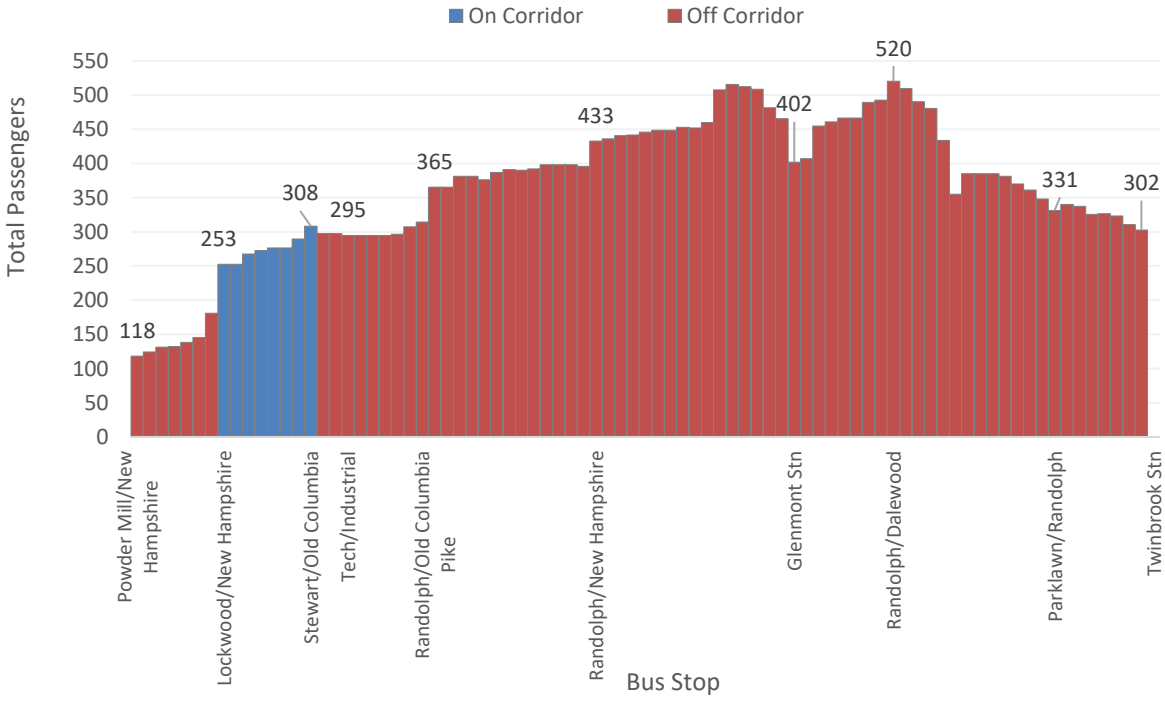


Figure 27 | Route 10 (Westbound) - Average Daily Passenger Volume by Segment



Route 13

Route 13 travels the study corridor along US 29 between the Colesville Road (US 29) & Sligo Creek Parkway bus stop and the Colesville Road (US 29) & Fenton Street bus stop. The Route 13 bus stops on the US 29 corridor account for approximately seven percent of the route's daily activity (**Table 24**), with an average of 88 passengers moving through the corridor at any given segment.

Table 24 | Route 13 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Takoma Metrorail Station	108	15%	69
Carroll Avenue	81	11%	60
Washington Adventist Hospital	13	2%	53
Flower Avenue	187	26%	58
Wayne Avenue	23	3%	65
Manchester Road	86	12%	75
Three Oaks Drive	14	2%	86
Sligo Creek Parkway	3	0%	85
Colesville Road (US 29)	**52**	**7%**	**88**
Silver Spring Metrorail Station	147	21%	72

Towards Silver Spring (northbound), relatively little boarding and alighting activity occurs along the US 29 corridor, but Route 13 does reach its maximum load at Colesville Road (US 29) & Dale Street. Passenger volume on the corridor decreases from 95 to 80 passengers, a decrease of 16 percent, by the end of the US 29 corridor, though it does carry an average volume of 93 passengers per segment. **Figure 28** illustrates the average number of passengers traversing northbound bus stop segments on Route 13 each weekday.

As in the northbound direction, relatively little ridership activity occurs along the US 29 corridor in the southbound direction (towards Takoma Metrorail Station), but Route 13 reaches its maximum load at Colesville Road (US 29) & Dale Street at the end of the corridor. Passenger volume increases from 71 to 87 passengers, an increase of 23 percent, between the beginning and end of the corridor, with an average of 85 passengers per segment. **Figure 29** illustrates the average number of passengers traversing southbound bus stop segments on Route 13 each weekday.

Figure 28 | Route 13 (Northbound) - Average Daily Passenger Volume by Segment

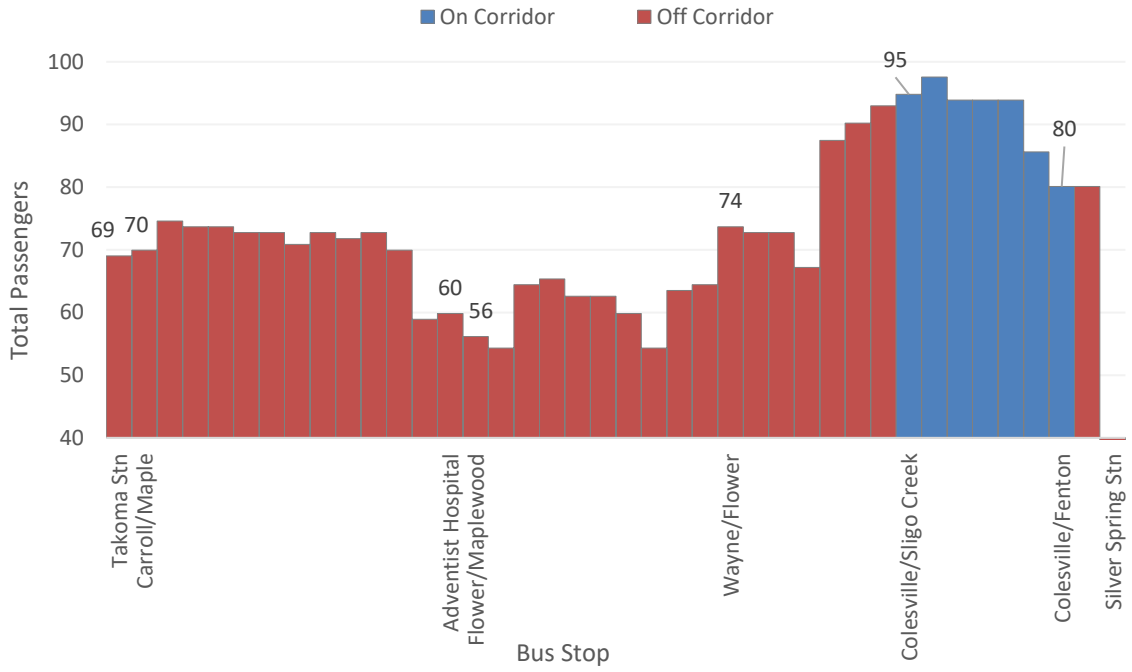
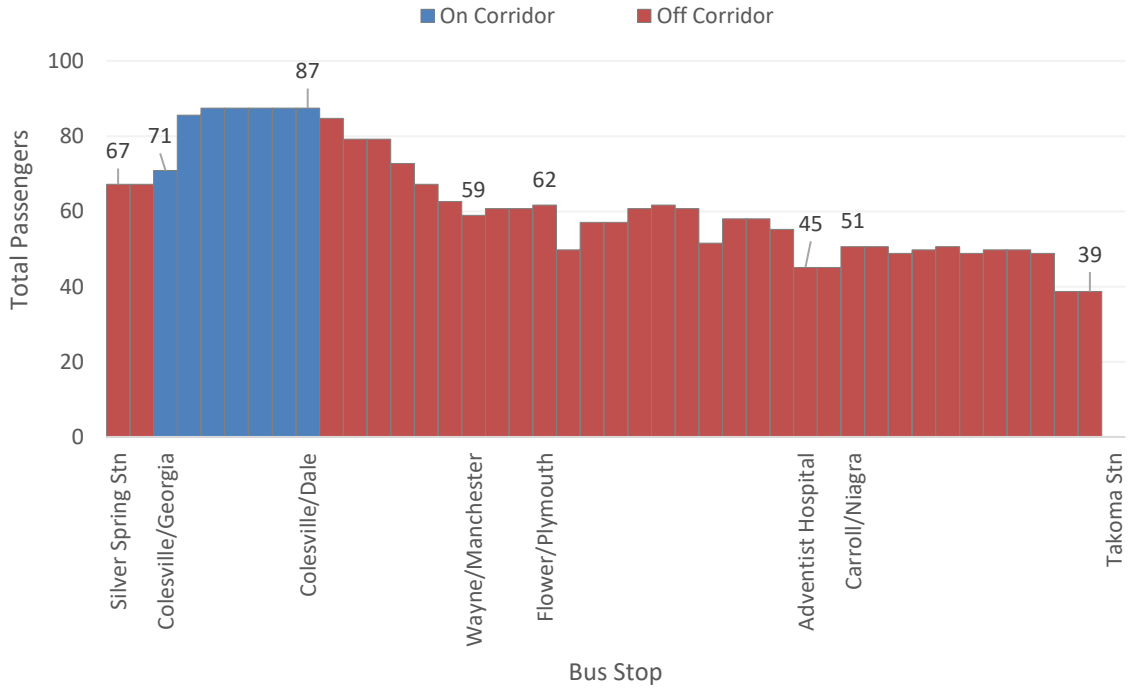


Figure 29 | Route 13 (Southbound) - Average Daily Passenger Volume by Segment



Route 14

Route 14 travels the US 29 corridor between the Colesville Road (US 29) & Street. Andrews Way bus stop and the Colesville Road (US 29) & Fenton Street bus stop. The Route 14 bus stops on the corridor account for approximately eight percent of the route's daily activity, and has an average segment volume of 160 passengers per day (**Table 25**).

Table 25 | Route 14 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Takoma Metrorail Station	288	18%	172
Eastern Avenue	7	0%	171
Piney Branch Road	374	23%	135
University Blvd	348	21%	135
Franklin Avenue	229	14%	146
Colesville Road (US 29)	**124**	**8%**	**159**
Georgia Avenue	10	1%	99
Silver Spring Metrorail Station	263	16%	118

The total volume of daily passengers on each segment increases from 185 to 196 passengers between the Franklin Avenue & Colesville Road (US 29) bus stop and the Colesville Road (US 29) & Spring Street bus stop, an increase of six percent, before falling to 173 passengers at the Colesville Road (US 29) & Fenton Street bus stop. **Figure 30** illustrates the average number of passengers traversing northbound segments on Route 14 each weekday.

Relatively little boarding and alighting activity occurs along the US 29 corridor, with the exception of the Colesville Road (US 29) & Fenton Street bus stop (30 boardings, 4 alightings) as Route 14 enters the US 29 corridor. Overall, passenger volume remains steady on the US 29 corridor, carrying an average of 128 passengers between each bus stop. **Figure 31** illustrates the average number of passengers traversing southbound segments along Route 14 each weekday.

Figure 30 | Route 14 (Northbound) - Average Daily Passenger Volume by Segment

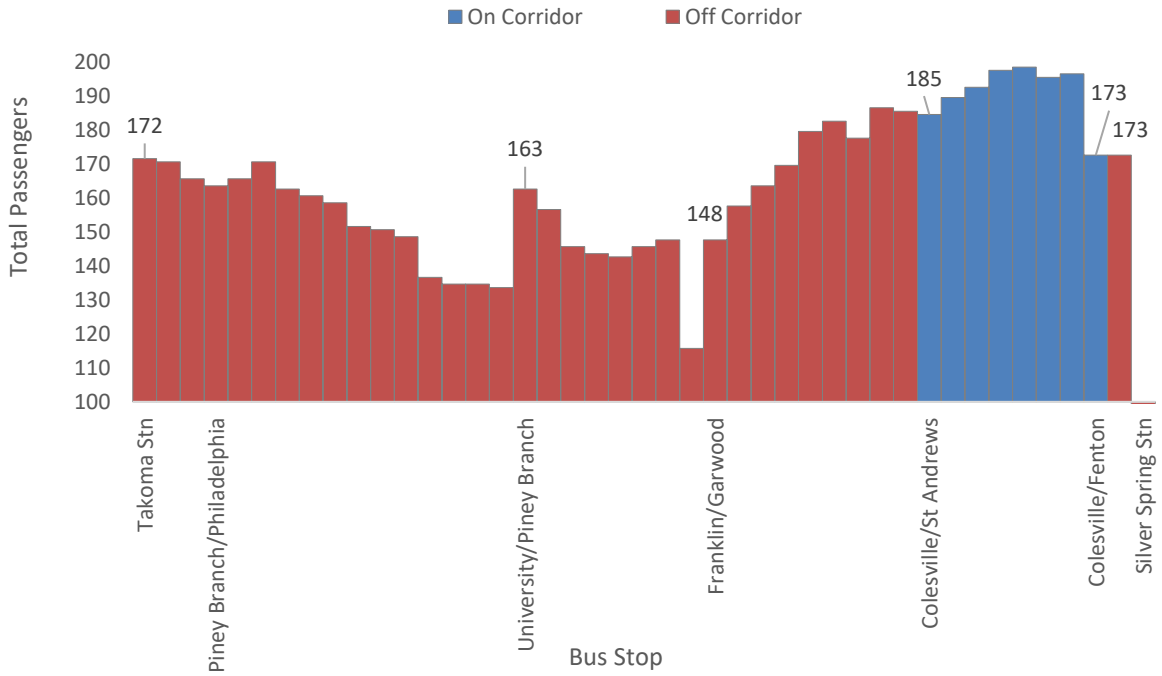
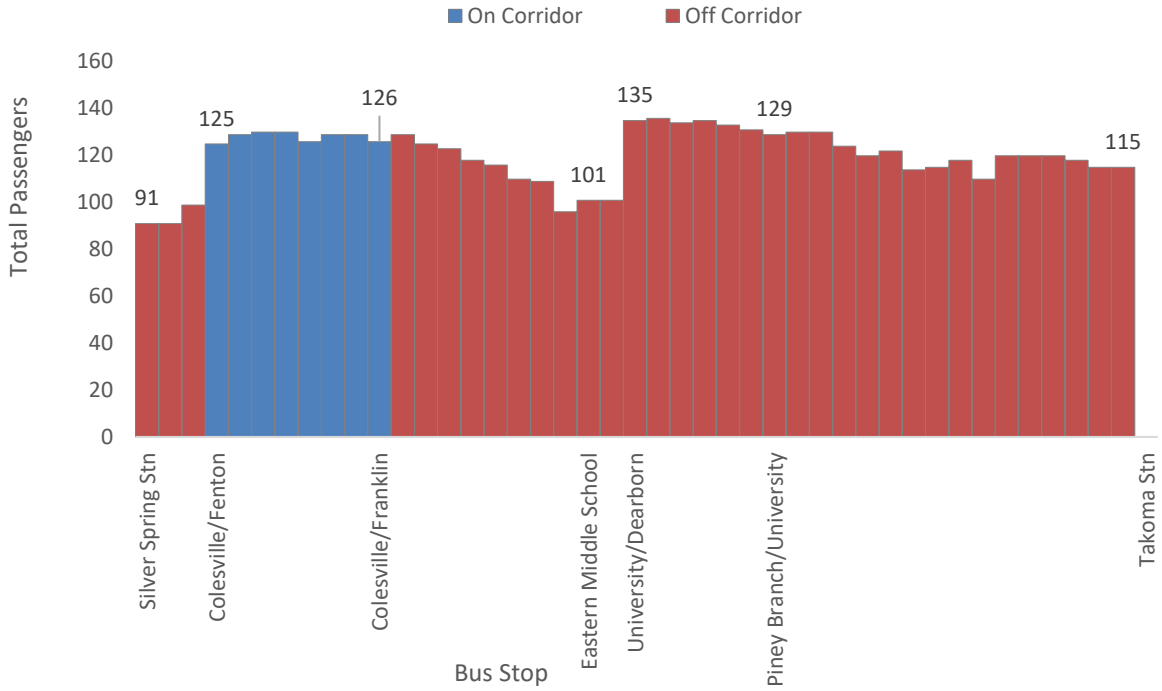


Figure 31 | Route 14 (Southbound) - Average Daily Passenger Volume by Segment



Route 21

Route 21 travels the study corridor along US 29 between the Columbia Pike (US 29) & Oak Leaf Drive bus stop and the Colesville Road (US 29) & Fenton Street bus stop. The Route 21 bus stops on the US 29 corridor account for approximately 26 percent of the route's daily ridership activity, as shown in **Table 26**, and has an average segment volume of 150 passengers per day.

Table 26 | Route 21 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Silver Spring Metrorail Station	286	34%	141
Colesville Road (US 29)	**153**	**18%**	**158**
Columbia Pike (US 29)	**66**	**8%**	**141**
Oak Leaf Drive	29	3%	113
Prelude Drive	5	1%	118
New Hampshire Avenue	55	7%	105
Wolf Drive	12	1%	92
Kara Lane	3	0%	89
Cannon Road	20	2%	82
Broadmore Road	3	0%	81
Tamarack Road	52	6%	68
Fairland Road	49	6%	46
Beethoven Blvd	23	3%	34
Brahms Avenue	12	1%	38
Schubert Drive	44	5%	25
Briggs Chaney Road	3	0%	7
Aston Manor Drive	6	1%	5
Gateshead Manor Way	2	0%	3
Briggs Chaney P&R	**11**	**1%**	**2**

In the northbound direction (towards Briggs Chaney Park and Ride), average daily passenger volume on the corridor decreases from 150 to 122 passengers, a 23 percent decrease, with a maximum segment volume of 160 passengers. **Figure 32** illustrates the average number of passengers traversing northbound bus stop segments on Route 21 each weekday.

Towards the Silver Spring Metrorail Station, daily passenger volume increases from 124 to 147 passengers, a 19 percent increase, between the Prelude Drive & Legato Way bus stop and the Colesville Road (US 29) & Fenton Street bus stop. Route 21's passenger throughput is highest at Colesville Road (US 29) & North Noyes, but activity is greatest at Colesville Road (US 29) & University Boulevard (15 boardings, 26 alightings). **Figure 33** illustrates the average number of passengers traversing segments southbound along Route 21 each weekday.

Figure 32 | Route 21 (Northbound) - Average Daily Passenger Volume by Segment

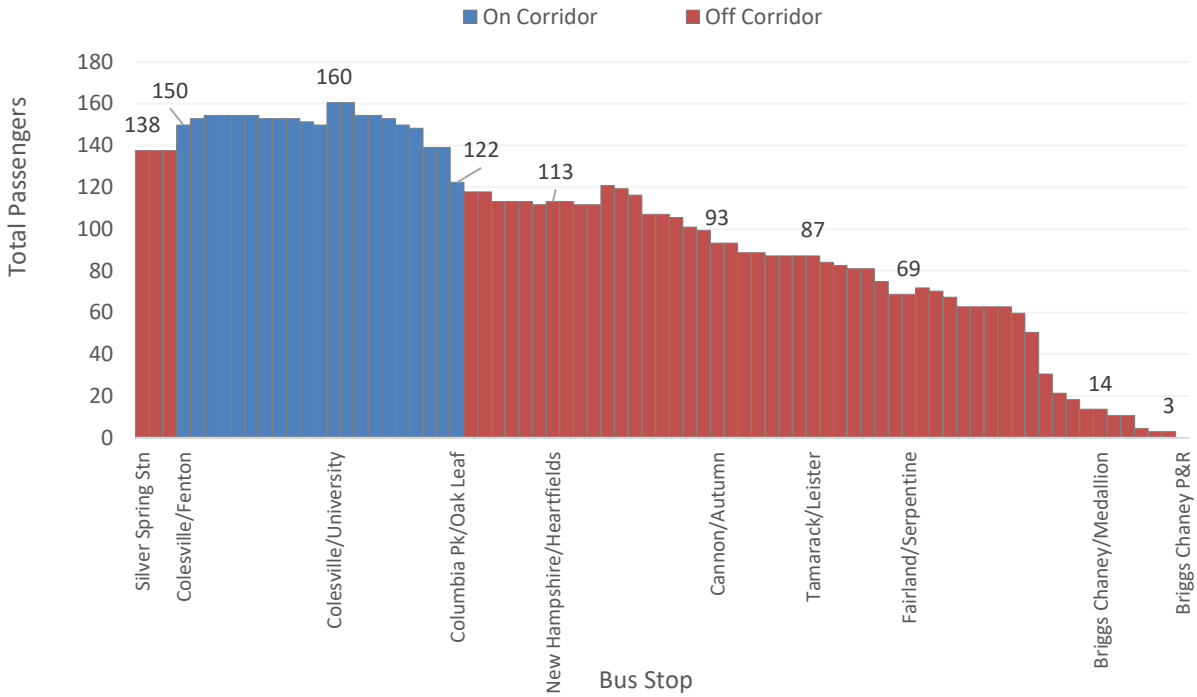
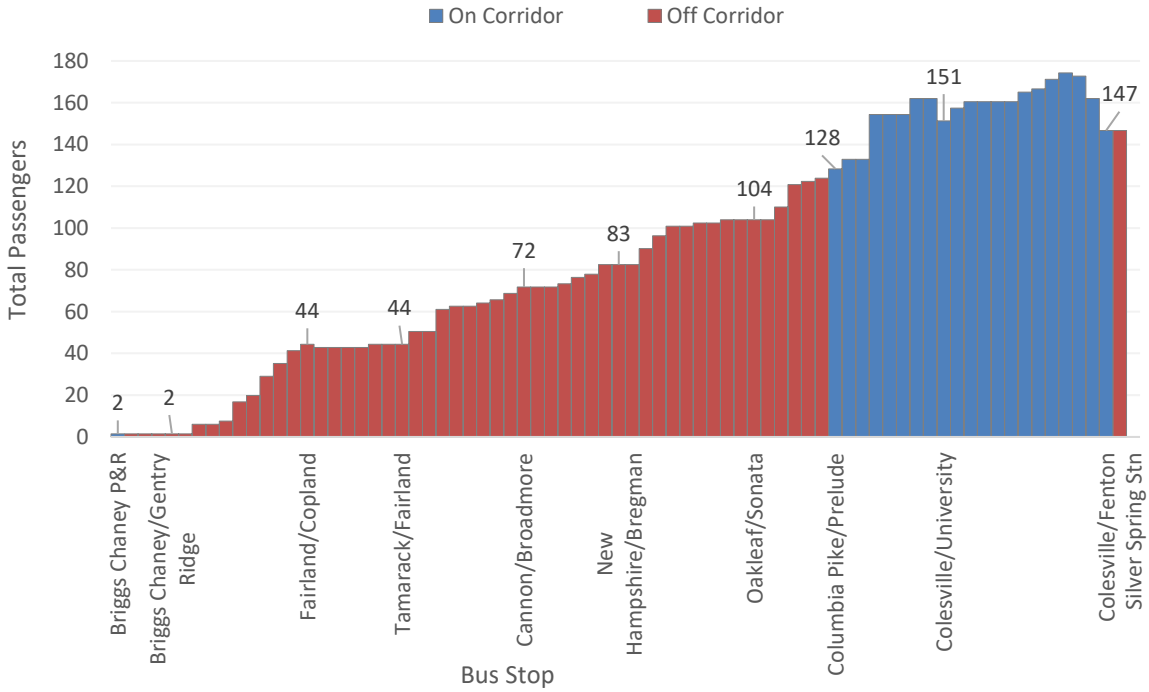


Figure 33 | Route 21 (Southbound) - Average Daily Passenger Volume by Segment



Route 22

Like Route 21, Route 22 also travels the study corridor along US 29 between the Columbia Pike (US 29) & Oak Leaf Drive bus stop and the Colesville Road (US 29) & Fenton Street bus stop. The Route 22 bus stops on the corridor account for approximately 39 percent of the route's daily activity, as detailed in **Table 27**, and carry on average 150 passengers through each segment.

Table 27 | Route 22 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Silver Spring Metrorail Station	262	28%	120
Colesville Road (US 29)	**290**	**31%**	**171**
Columbia Pike (US 29)	**76**	**8%**	**132**
New Hampshire Avenue	48	5%	76
Ericsson Road	164	18%	77
Schindler Drive	29	3%	32
Lane Grande Road	2	0%	26
Dunoon Road	5	1%	18
Mc Govern Drive	5	1%	17
Devere Drive	6	1%	17
Brock Drive	3	0%	16
Cresthaven Drive	26	3%	15
Powder Mill Road	14	1%	4

Towards Hillandale (northbound), the average volume on each segment along the US 29 corridor was 138 passengers. Route 22 hits the maximum passenger volume, 156 passengers, after the Colesville Road (US 29) & Crestmoor Drive bus stop. **Figure 34** illustrates the average number of passengers traversing the northbound bus stop segments on Route 22 each weekday.

In the southbound direction, towards Silver Spring, daily passenger volume increases from 120 to 164 passengers between the Columbia Pike (US 29) & Oak Leaf Drive bus stop and the Colesville Road (US 29) & Fenton Street bus stop. At the Colesville Road (US 29) & University Boulevard there is a spike in the passenger volumes between bus stops to approximately 222 passengers per day. **Figure 35** illustrates the average number of passengers traversing southbound bus stop segments on Route 22 each weekday.

Figure 34 | Route 22 (Northbound) - Average Daily Passenger Volume by Segment

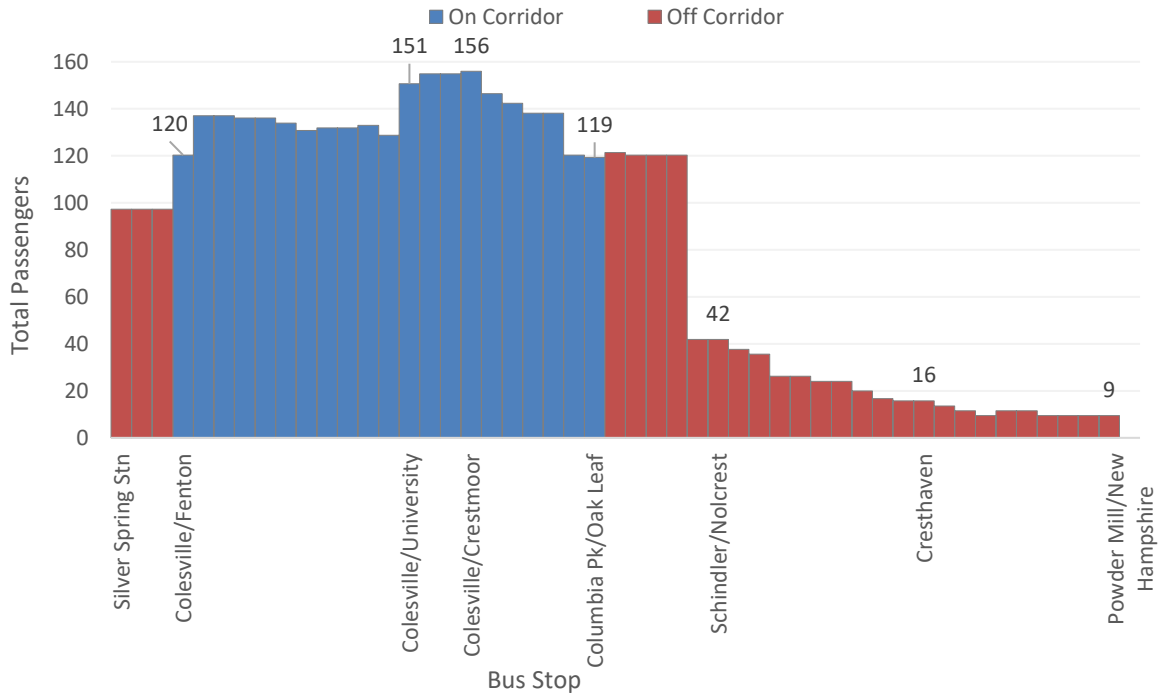
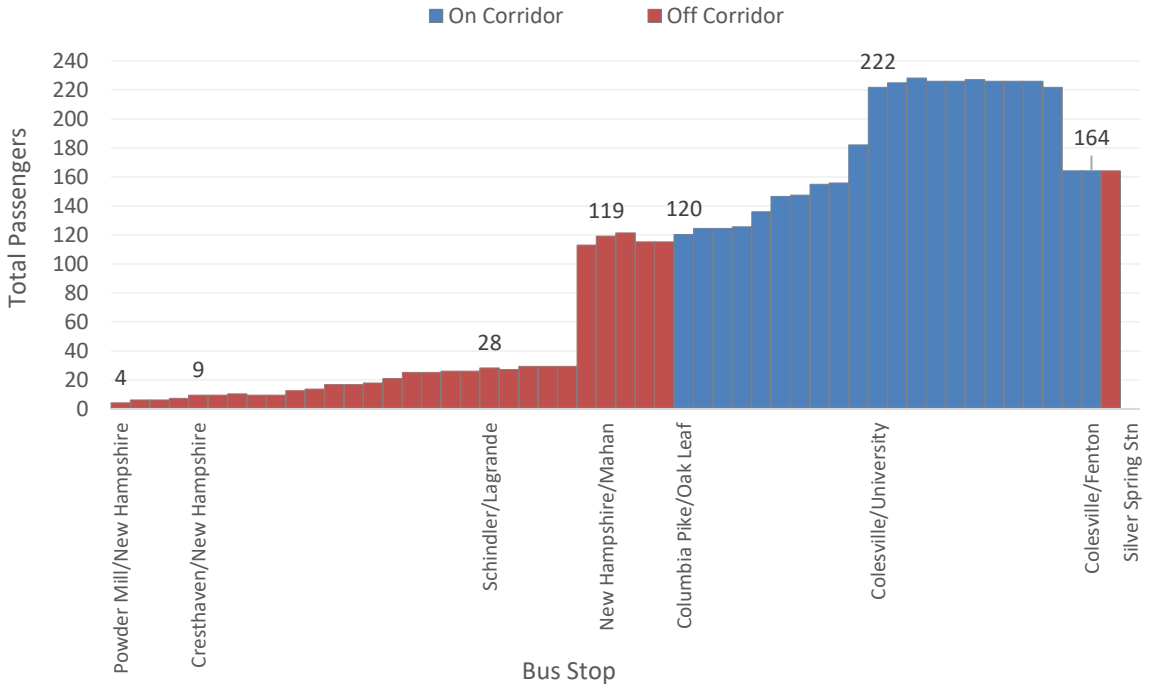


Figure 35 | Route 22 (Southbound) - Average Daily Passenger Volume by Segment



Route 39

Route 39 intersects with the US 29 corridor at Briggs Chaney Road, as well as serves the Briggs Chaney Park and Ride. The Route 39 bus stops on these segments of Briggs Chaney Road account for approximately 11 percent of the route's daily activity. Overall, daily passenger along Briggs Chaney Road is low, with the most ridership activity occurring at the Briggs Chaney Park and Ride (12 boardings, 17 alightings) and the Briggs Chaney & Outlet Drive/Castle Boulevard bus stops (12 boardings, 15 alightings).

Metrobus

Across the five Metrobus routes that operate on the study corridor (Z2, Z7, Z6, Z8 and Z11), approximately 19 percent of weekday ridership activity (boardings and alightings) occurs along the US 29 corridor, which includes deviations to Lockwood Drive and Briggs Chaney Road.

Within the study corridor, Metrobus bus stops in Downtown Silver Spring and along the two deviations show the highest levels of daily activity (**Table 28**). Apart from the Silver Spring Metrorail station, the southbound Colesville Road (US 29) & Spring Street bus stop in Downtown Silver Spring shows the highest level of activity, with 695 daily alightings and 23 daily boardings, across Metrobus study routes.

As with Ride On routes, between Downtown Silver Spring and the study corridor's deviation at Lockwood Drive, bus stops along US 29 see far less ridership activity. A notable exception occurs at the intersection of University Boulevard (MD 193) & Colesville Road (US 29), where transfers are available to Metrobus Routes C2 and C4 and Ride On Route 19. In particular, the northbound Colesville Road (US 29) & University Boulevard bus stop shows the fourth highest level of activity along the corridor, with 429 daily boardings and 129 daily alightings across the Metrobus study routes.

Further north, bus stops along the study corridor's two deviations from US 29 at Lockwood Drive and at Briggs Chaney Road also see significant activity. In general, Metrobus services on this deviation show higher ridership activity than Ride On routes, even accounting for higher ridership on Metrobus routes in general. Metrobus stops along the study route deviation on Lockwood Drive also see high levels of activity. For instance, the Metrobus stop at Lockwood Drive & New Hampshire Avenue near White Oak sees 264 daily boardings and 225 daily alightings from Routes Z6 and Z8. **Appendix A** contains detailed boarding and alighting maps for each individual route.

Table 28 | Metrobus - Bus Stops with Highest Daily Activity

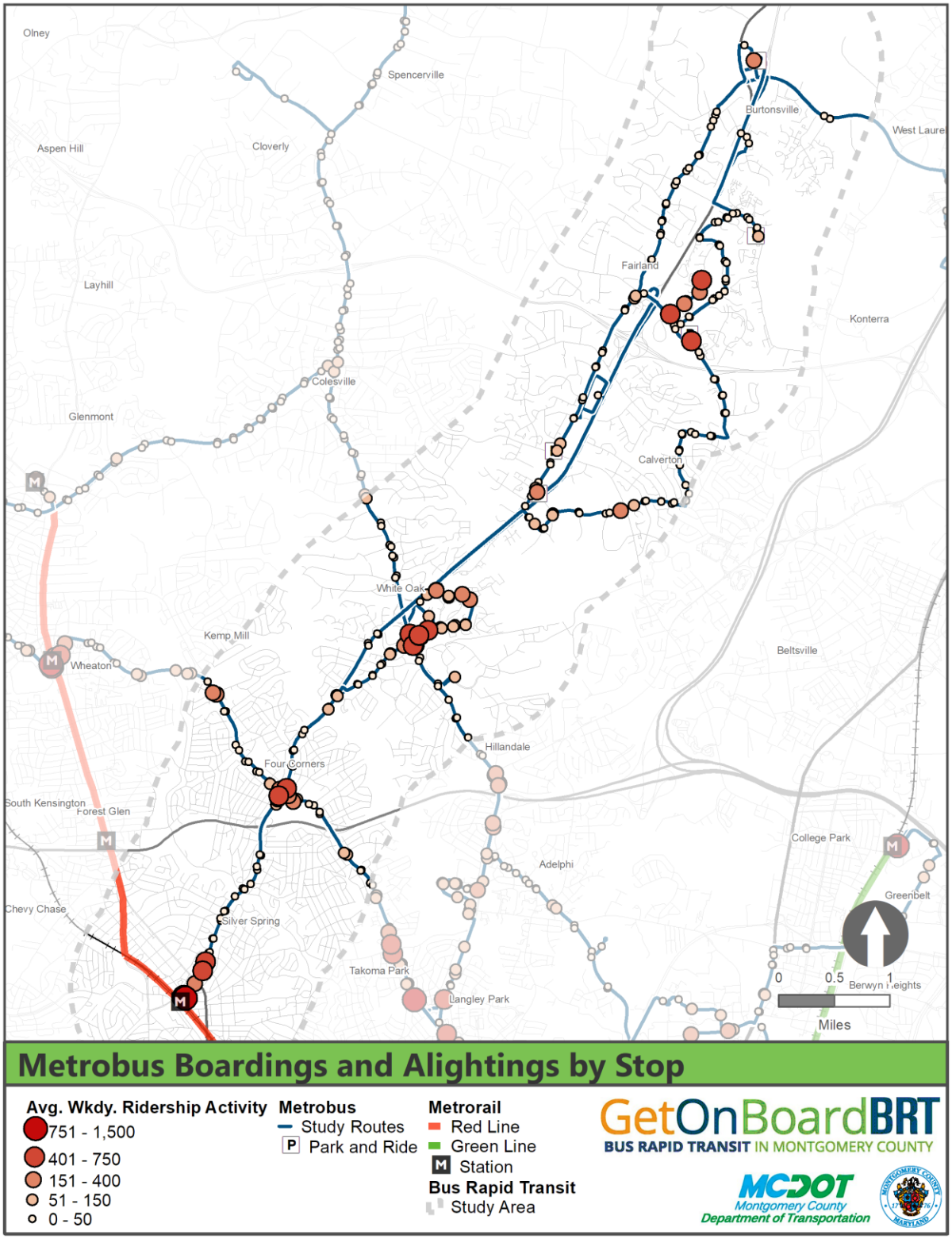
Stop Name	Direction	Location	Boardings	Alightings	Total Activity	Study Routes
Silver Spring Metrorail Station	---	Downtown Silver Spring	975	749	**1,724**	Z2, Z7, Z6, Z8, Z11
Colesville Road (US 29) & Spring Street	Southbound	Downtown Silver Spring	23	695	**718**	Z2, Z7, Z6, Z8, Z11
Castle Blvd & #14000	Northbound	Castle Blvd Deviation	256	361	**617**	Z6, Z8, Z11
Colesville Road (US 29) & University Blvd	Northbound	Four Corners	429	129	**558**	Z2, Z7, Z6, Z8, Z11
Castle Blvd & Briggs Chaney Road	Northbound	Castle Blvd Deviation	121	386	**507**	Z6, Z8, Z11
Colesville Road (US 29) & Fenton Street	Northbound	Downtown Silver Spring	475	29	**504**	Z2, Z7, Z6, Z8, Z11

However, the most ridership activity occurs just off the study corridor at the Silver Spring Metrorail Station (1,834 boardings, 560 alightings) than at all the other bus stops in Downtown Silver Spring combined (975 boardings, 749 alightings). The Downtown Silver Spring stops included in this analysis are those served by study routes between Silver Spring Metrorail Station and Spring Street & Colesville Road (US 29), which includes the Georgia Avenue, Spring Street, and Fenton Street stops on Colesville Road (US 29). In terms of average daily ridership activity, the Silver Spring Metrorail Station accounts for 15 percent of the activity on the Metrobus study routes, followed closely by the Downtown Silver Spring bus stops which account for approximately 11 percent of ridership activity (**Table 29**). The ridership by bus stop is presented in **Figure 36**.

Table 29 | Metrobus - Daily Ridership Activity Within Downtown Silver Spring

Stop Locations		Routes					Total Activity
		Z2	Z6	Z7	Z8	Z11	
Downtown Silver Spring	Activity	178	546	95	702	202	**1,724**
	Percent of Total	*10%*	*10%*	*8%*	*11%*	*11%*	***11%***
Silver Spring Metrorail Station	Activity	236	578	332	778	471	**2,394**
	Percent of Total	*13%*	*11%*	*28%*	*12%*	*26%*	***15%***
Total Activity		**1,804**	**5,295**	**1,207**	**6,252**	**1,797**	**16,355**

Figure 36 | Metrobus - US 29 Corridor Ridership by Bus Stop



The Greenbelt – Twinbrook Line (Routes C2 and C4)

Route C2 intersects the US 29 corridor on University Boulevard, north of Downtown Silver Spring. The Route C2 bus stops at this intersection, account for approximately four percent of the route's daily activity. In the eastbound direction, at this intersection there are 132 daily boardings and 84 daily alightings, the tenth highest ridership activity of the Route C2 bus stops. While, in the westbound direction, there are 28 daily boardings and 69 daily alightings.

Route C4 also intersects the US 29 corridor on University Boulevard. At the two Route C4 bus stops at this location, the boardings and alightings account for approximately three percent of the route's daily ridership activity. In the eastbound direction, there are 131 daily boardings and 111 daily alightings, the eleventh highest of Route C4 bus stops. In the westbound direction, there are 30 daily boardings and 60 daily alightings.

The College Park – White Flint Line (Route C8)

Route C8 intersects the study corridor on New Hampshire Avenue at Lockwood Drive. At the two Route C8 bus stops at this location, the ridership activity is approximately nine percent of the route's daily activity. In the eastbound direction, at the New Hampshire Avenue & Lockwood Drive bus stop there are 88 daily boardings and 153 daily alightings, the fifth highest of Route C8 bus stops. In the westbound direction, there are 159 daily boardings and 93 daily alightings at this bus stop, the fourth highest of Route C8 bus stops.

The New Hampshire Avenue – Maryland Line (Route K6)

Route K6 intersects the study corridor on New Hampshire Avenue at Lockwood Drive, serving the White Oak Shopping Center. The Route K6 bus stops at the study corridor intersection, along Lockwood Drive and within the White Oak Shopping Center, account for approximately 14 percent of the route's daily ridership activity. At the White Oak Shopping Center, there are 277 daily boardings and 100 daily alightings, the fourth highest of Route K6 stops. Nearby southbound stops also see significant activity, including the bus stop on Lockwood Drive & New Hampshire Avenue (156 boardings, 3 alightings) and the bus stop on New Hampshire Avenue & Lockwood Drive (252 boardings, 4 alightings). In the northbound direction, there are 580 daily alightings and 2 daily boardings on New Hampshire Avenue south of Lockwood Drive and an additional 265 daily alightings and 3 daily boardings at the bus stop on New Hampshire Avenue north of Lockwood Drive.

The Colesville – Ashton Line (Route Z2)

Route Z2 utilizes the US 29 study corridor between Georgia Avenue in Downtown Silver Spring until Lockwood Drive at New Hampshire Avenue. The Route Z2 stops within the study corridor account for approximately 34 percent of the route's daily ridership activity and has an average daily segment volume of 270 passengers. **Table 30** details segment level ridership activity and segment volume.

Table 30 | Route Z2 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Silver Spring Metrorail Station	236	13%	193
Georgia Avenue	10	1%	16
Colesville Road (US 29)	**407**	**23%**	**282**
Columbia Pike (US 29)	**33**	**2%**	**273**
Lockwood Drive	**165**	**9%**	**255**
New Hampshire Avenue	729	40%	131
Blake High School	6	0%	110
Olney Sandy Spring Road	115	6%	47
Norwood Road	18	1%	59
Prince Philip Drive	5	0%	25
Montgomery General Hospital	38	2%	23
Spartan Road	44	2%	4

In the northbound direction, as the Route Z2 enters the US 29 corridor it has an average volume of 193 passengers daily, which increase to 217 passengers as the route exits the corridor, a 12 percent increase in volume. The average passenger volume across the US 29 corridor segments is 274 passengers. The route reaches its maximum volume of passengers of 293 at the Colesville Road (US 29) & University Boulevard bus stop; this is an increase of 52 percent in the passenger volume from when the route entered the corridor. **Figure 37** illustrates the average number of passengers traversing northbound bus stop segments on Route Z2 each weekday.

Towards Silver Spring (southbound), Route Z2 enters the US 29 study corridor at Lockwood Drive & New Hampshire Avenue with an average volume of 225. As the Route Z2 exits the study corridor and finishes its run at the Silver Spring Metrorail Station, its average passenger volume increases only slightly to 229 passengers daily. The most significant changes in passenger segment volume within the corridor occur at: Lockwood Drive & New Hampshire Avenue (59 boardings, 4 alightings), Colesville Road (US 29) & University Boulevard (45 boardings, 18 alightings) and Colesville Road (US 29) & Spring Street (3 boardings, 84 alightings). **Figure 38** illustrates the average number of passengers traversing southbound bus stop segments on Route Z2 each weekday.

Figure 37 | Route Z2 (Northbound) - Average Daily Passenger Volume by Segment

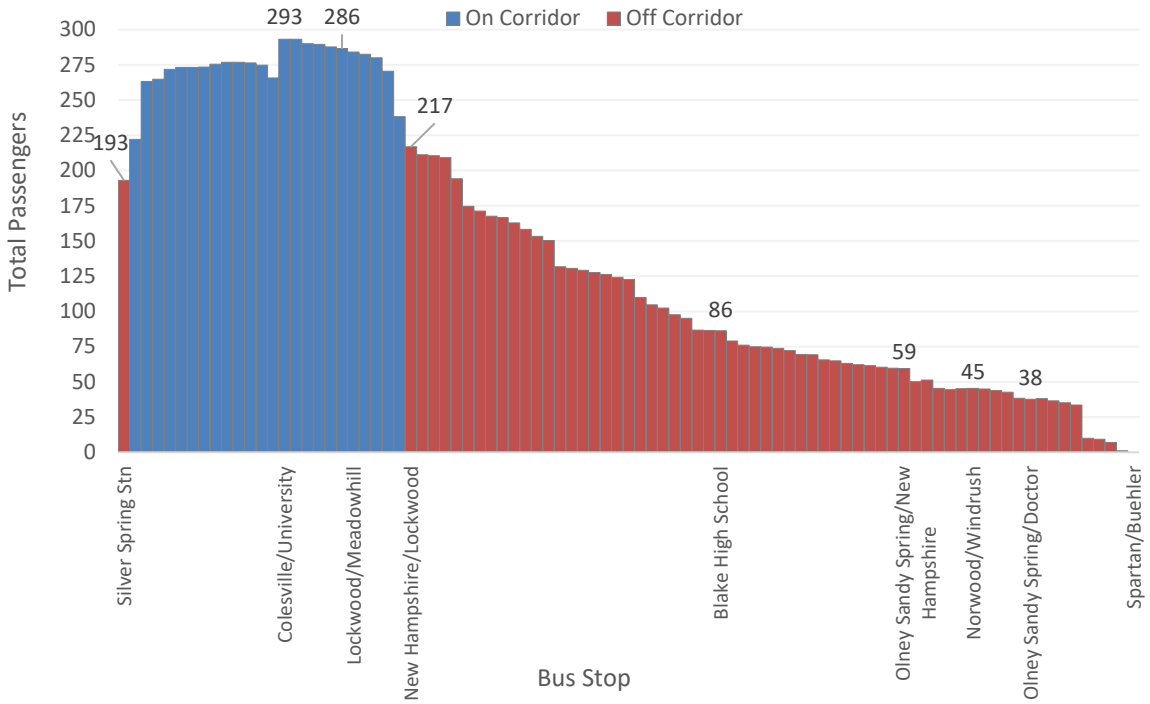
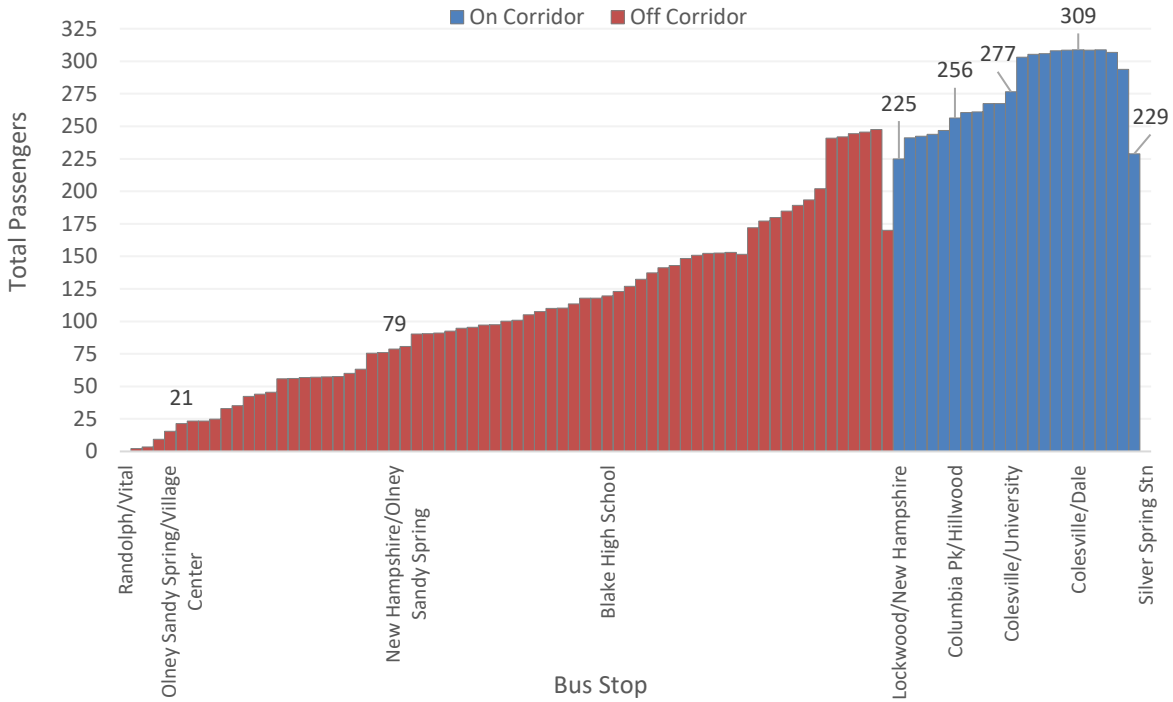


Figure 38 | Route Z2 (Southbound) - Average Daily Passenger Volume by Segment



The Calverton – Westfarm Line (Route Z6)

Route Z6 travels the US 29 study corridor between Georgia Avenue in Downtown Silver Spring until the route leaves the study corridor at Lockwood Drive at New Hampshire Avenue. It also serves a portion of the study corridor when it accesses Briggs Chaney Road at Castle Boulevard. Along the Route Z6 stops on the corridor, boarding and alighting activity accounts for approximately 61 percent of the route's daily activity and has an average segment volume of 660 passengers. **Table 31** details Route Z6's corridor level activity.

Table 31 | Route Z6 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Silver Spring Metrorail Station	578	11%	636
Colesville Road (US 29)	**1054**	**20%**	**887**
Columbia Pike (US 29)	**84**	**2%**	**952**
Lockwood Drive	**1,000**	**19%**	**878**
Stewart Lane	**399**	**8%**	**742**
Industrial Parkway	179	3%	658
Tech Road	150	3%	617
Broadbirch Drive	408	8%	571
Calverton Blvd	168	3%	474
Galway Drive	131	2%	419
Fairland Road	47	1%	395
Briggs Chaney Road	143	3%	335
Briggs Chaney P&R	**88**	**2%**	**342**
Castle Blvd	**535**	**10%**	**164**
Old Columbia Pike	144	3%	84
Burtonsville Shopping Center	189	4%	59

Towards Burtonsville Shopping Center (northbound), the highest levels of ridership activity occur at the Lockwood Drive & New Hampshire Avenue bus stops (141 boardings, 168 alightings). Overall, passenger volume increases by 48 percent by the time the route exits the US 29 corridor. At the Briggs Chaney deviation, volume, or throughput, falls from 408 to 90 passengers, with significant activity on Castle Boulevard. **Figure 39** illustrates the average number of passengers traversing northbound bus stop segments on Route Z6 each weekday.

In the southbound direction, towards Silver Spring, the most significant levels of ridership activity occur on Colesville Road (US 29) & Spring Street (6 boardings, 228 alightings). Passenger volume by stop increases from 124 to 305 along the Briggs Chaney Park and Ride deviation, and from 660 to 807 on the Lockwood Drive deviation. **Figure 40** illustrates the average number of passengers traversing the southbound bus stop segments on Route Z6 each weekday.

Figure 39 | Route Z6 (Northbound) - Average Daily Passenger Volume by Segment

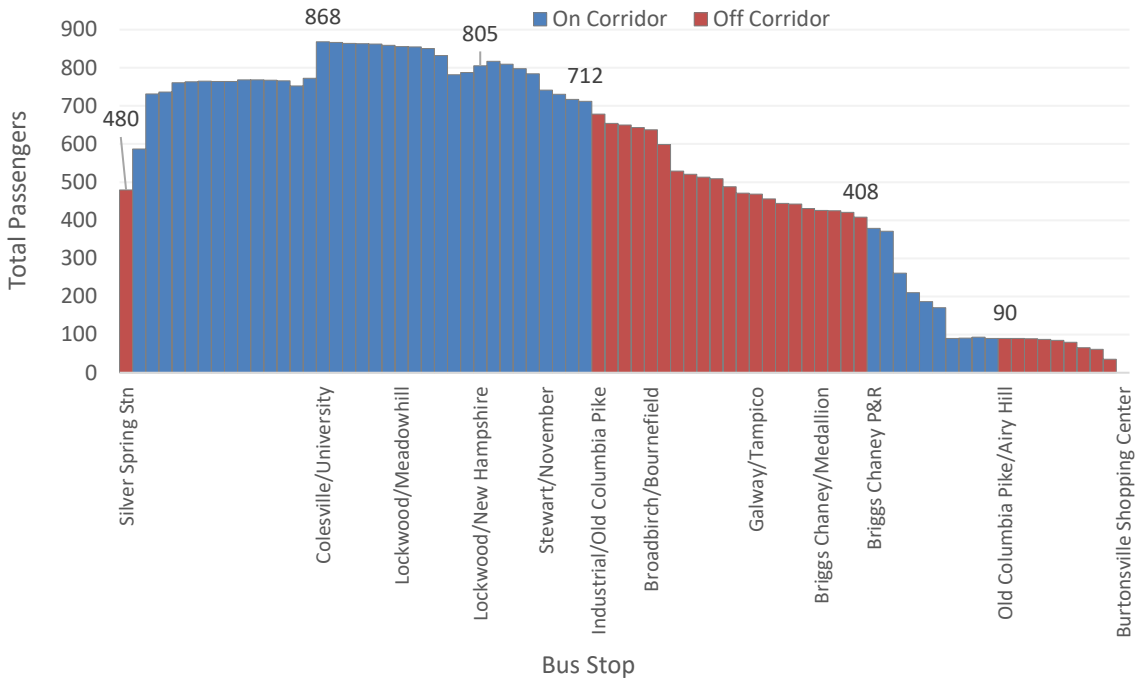
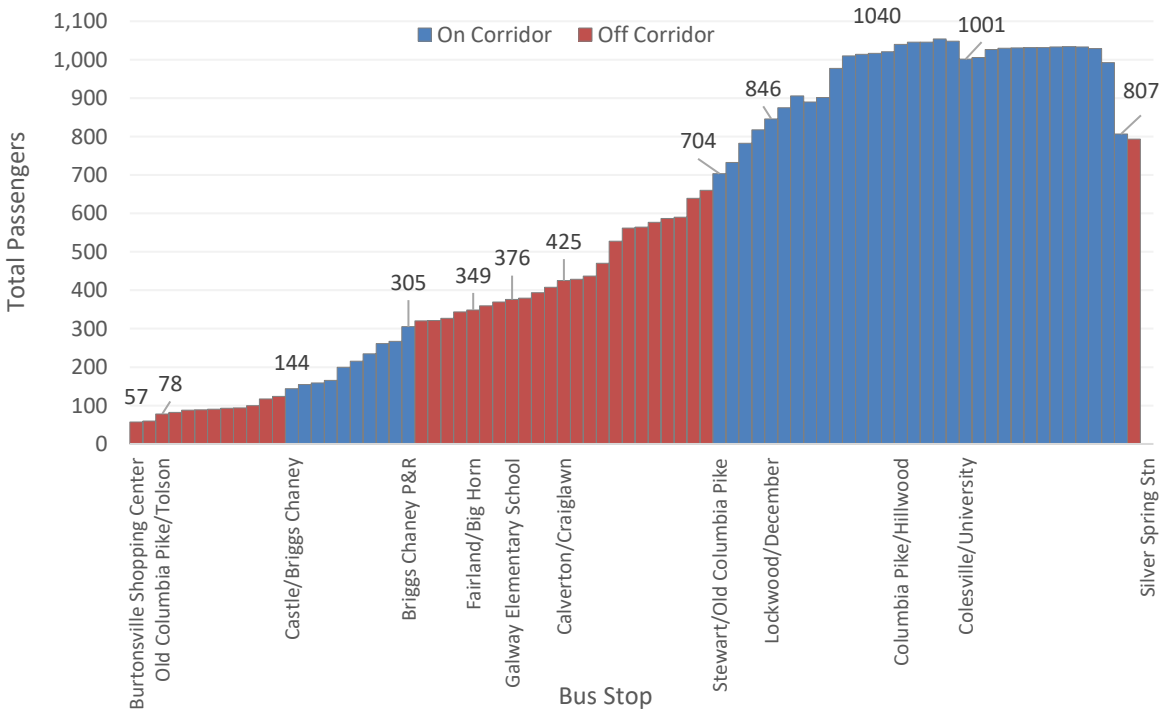


Figure 40 | Route Z6 (Southbound) - Average Daily Passenger Volume by Segment



The Laurel – Burtonsville Express Line (Route Z7)

Route Z7 travels the study corridor between Colesville Road (US 29) & Georgia Avenue in Downtown Silver Spring to Columbia Pike (US 29) & Oak Leaf Drive. The Route Z7 bus stops on the study corridor account for approximately 15 percent of the route's daily activity, with an average segment volume of 237 passengers. **Table 32** provides an overview of corridor level activity on Route Z7.

Table 32 | Route Z7 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
South Laurel P&R	46	4%	15
Laurel-Bowie Road (Rt 197)	13	1%	19
Cherry Lane	97	8%	46
Van Dusen Road	27	2%	70
Sweitzer Lane	44	4%	79
Sandy Spring Road	77	6%	98
Burtonsville Shopping Center	74	6%	128
Old Columbia Pike	248	21%	179
Tech Road	62	5%	192
Columbia Pike (US 29)	**40**	**3%**	**250**
Colesville Road (US 29)	**148**	**12%**	**224**
Silver Spring Metrorail Station	332	28%	163

In the northbound direction, towards South Laurel Park and Ride, the highest levels of ridership activity outside of the Silver Spring Metrorail Station (163 boardings) occurs on Tech Road & Columbia Pike (US 29), with 12 boardings and 50 alightings daily. This is followed by Colesville Road (US 29) & University Avenue (35 boardings, 8 alightings). Overall, passenger volume increased by 41 percent along the corridor, reaching its peak at 237 passengers at the Colesville Road (US 29) & University Boulevard bus stop. Figure **41** illustrates the average number of passengers traversing northbound bus stop segments on Route Z7 each weekday.

The highest levels of ridership activity towards Silver Spring (southbound), once again outside of the Silver Spring Metrorail Station (163 boardings), occurs on Tech Road & Columbia Pike (12 boardings, 50 alightings). Throughput falls by 14 percent along the corridor, but reaches its peak of 270 passengers at the Columbia Pike & Prelude Drive bus stop. Figure **42** illustrates the average number of passengers traversing southbound bus stop segments on Route Z7 each weekday.

Figure 41 | Route Z7 (Northbound) - Average Daily Passenger Volume by Segment

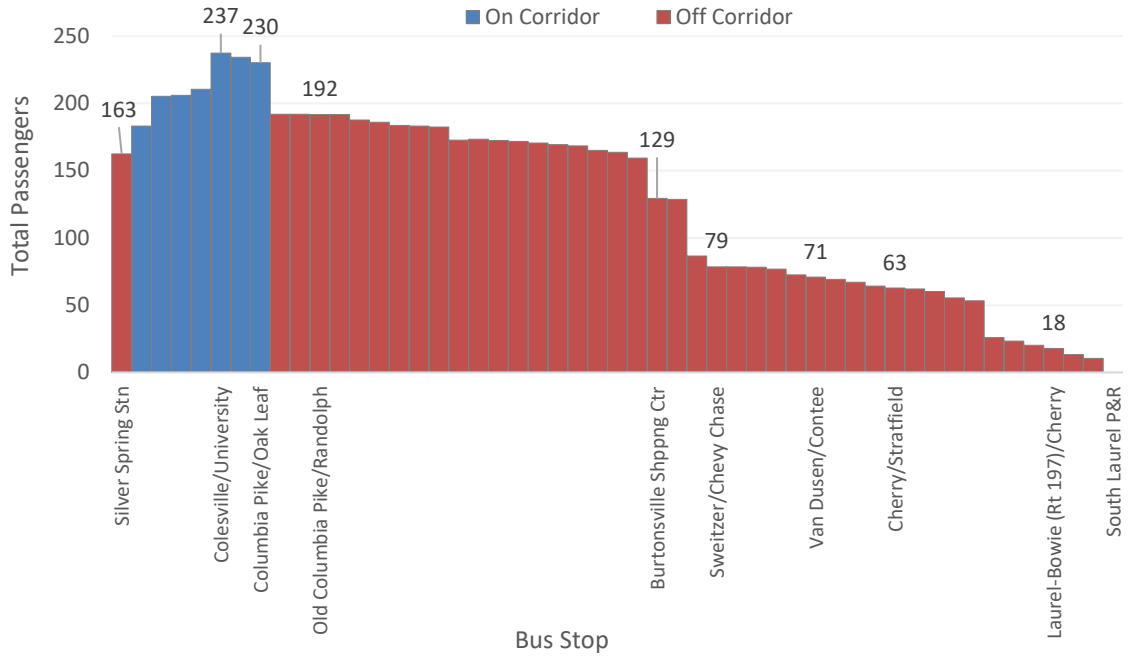
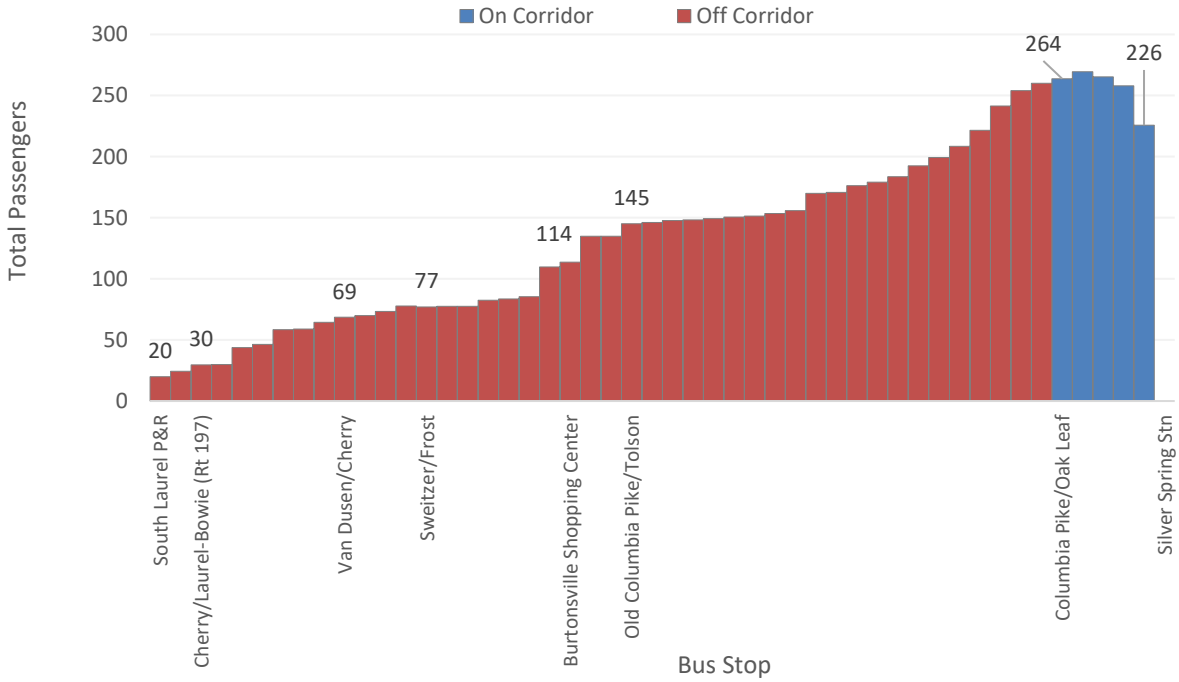


Figure 42 | Route Z7 (Southbound) - Average Daily Passenger Volume by Segment



The Fairland Line (Route Z8)

Route Z8 travels the study corridor between Colesville Road (US 29) at Georgia Avenue in Downtown Silver Spring and the end of the Lockwood Drive deviation at Stewart Lane and Old Columbia Pike. Route Z8 has several service variants, each of which serve portions of the Castle Boulevard deviation. At the Route Z8 stops within the US 29 study corridor, boarding and alighting activity is approximately 71 percent of the route's daily ridership activity (**Table 33**) and the average segment volume was 818 passengers.

Table 33 | Route Z8 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Silver Spring Metrorail Station	778	12%	700
Colesville Road (US 29)	**1363**	**22%**	**1241**
Columbia Pike (US 29)	**108**	**2%**	**1273**
Lockwood Drive	**1339**	**21%**	**1155**
Stewart Lane	**604**	**10%**	**898**
Tech Road	172	3%	777
Old Columbia Pike	663	11%	644
Castle Blvd	**893**	**14%**	**290**
Briggs Chaney Road	**27**	**0%**	**231**
Briggs Chaney P&R	**98**	**2%**	**111**
Robey Road	37	1%	93
Ballinger Drive	38	1%	75
Wexhall Drive	17	0%	62
Greencastle Road	38	1%	43
Greencastle Road P&R	77	1%	32

In the northbound direction (towards Greencastle Park and Ride), the highest level of ridership activity occurs at the Lockwood Drive & New Hampshire Avenue bus stop (169 boardings, 234 alightings). Overall, passenger volume decreases by 10 percent between the Colesville Road (US 29) & Georgia Avenue bus stop and the Stewart Lane & Old Columbia Pike (end of corridor) bus stop, reaching a peak segment volume of 1,315 passengers at Colesville Road (US 29) & University Boulevard. **Figure 43** illustrates the average number of passengers traversing segments northbound along Route Z8 each weekday.

Towards Silver Spring (southbound), the highest level of ridership activity occurs at the Lockwood Drive & New Hampshire Avenue stops (201 boardings, 92 alightings), as well. Along the US 29 corridor, the passenger volume increases from 754 to 1,027, a 36 percent increase, with a maximum segment volume at Colesville Road (US 29) & Crestmoor Drive with 1,281 passengers. **Figure 44** illustrates the average number of passengers traversing segments southbound along Route Z8 each weekday.

Figure 43 | Route Z8 (Northbound) - Average Daily Passenger Volume by Segment

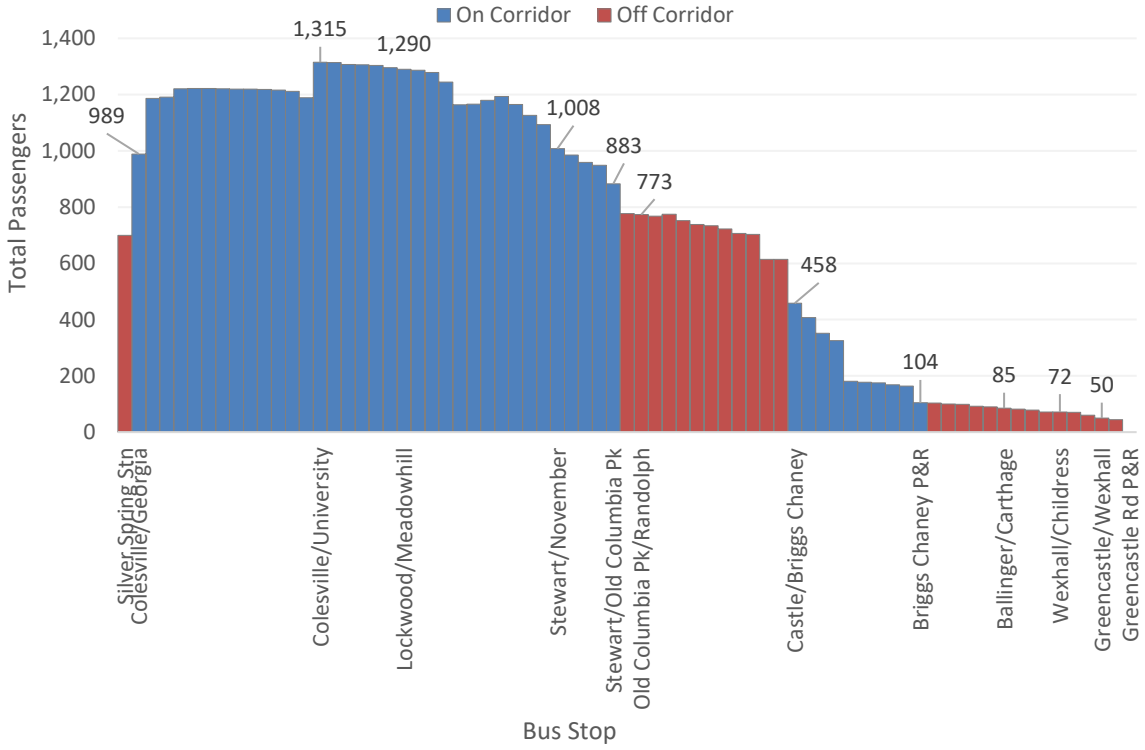
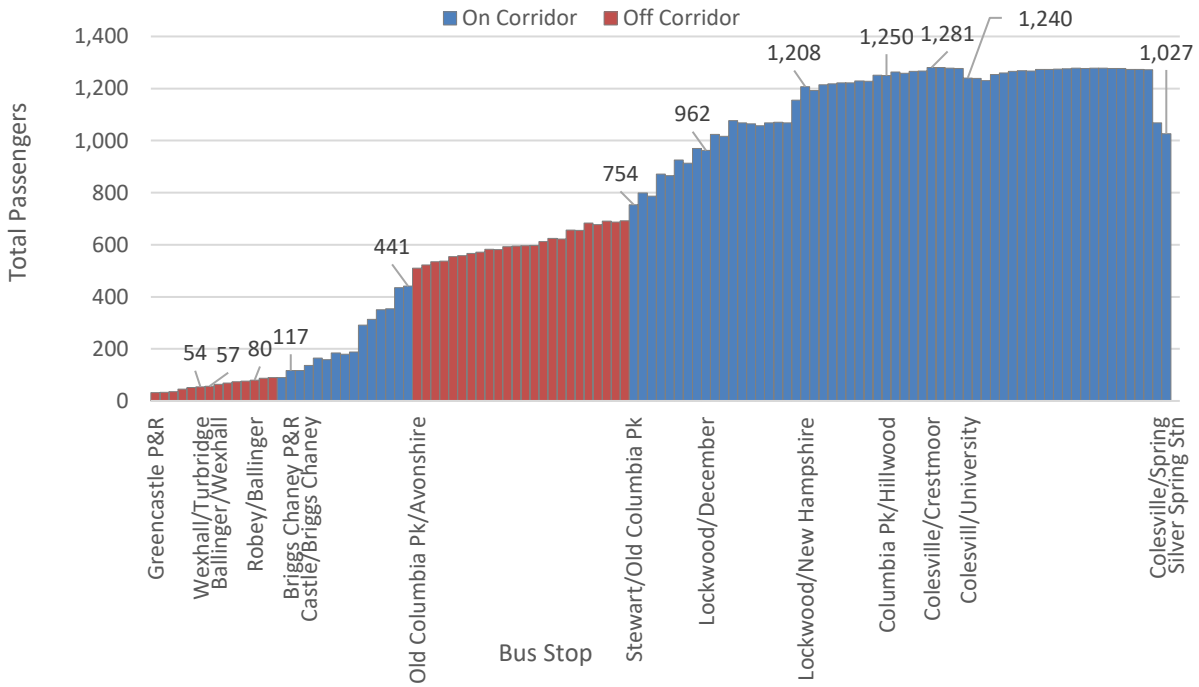


Figure 44 | Route Z8 (Southbound) - Average Daily Passenger Volume by Segment



The Greencastle – Briggs Chaney Express Line (Route Z11)

Route Z11 travels the study corridor between Colesville Road (US 29) at Georgia Avenue in Downtown Silver Spring through the end of the Briggs Chaney Road deviation, which is served by several service variants. The Route Z11 bus stops on the US 29 corridor account for approximately 59 percent of the route's daily ridership activity, with an average segment volume of 353 passengers. **Table 34** details the corridor level activity for Route Z11.

Table 34 | Route Z11 - Corridor Activity

Corridor	Average Daily Activity	Percentage of Total Activity	Average Daily Segment Volume
Silver Spring Station	471	26%	293
Colesville Road (US 29)	**252**	**14%**	**443**
Columbia Pike (US 29)	**97**	**5%**	**409**
Briggs Chaney Road	**56**	**3%**	**336**
Briggs Chaney P&R	**279**	**16%**	**377**
Castle Blvd	**368**	**20%**	**199**
Robey Road	46	3%	130
Ballinger Drive	51	3%	106
Wexhall Drive	22	1%	87
Greencastle Road	92	5%	56
Blackburn Road	17	1%	34
Burtonsville Shopping Center	46	3%	21

In the northbound direction (towards Burtonsville Shopping Center), the highest level of ridership activity on the study corridor occurs at the Briggs Chaney Park and Ride bus stop (125 alightings, 4 boardings). Along the US 29 corridor, passenger volume falls from 383 to 117 passengers, 70 percent, and reach a peak segment volume of 388 passengers at the Colesville Road (US 29) & University Boulevard bus stop. **Figure 45** illustrates the average number of passengers traversing segments northbound along Route Z11 each weekday.

Towards Silver Spring (southbound), as in the northbound direction, the highest level of ridership activity on the US 29 study corridor occurs at the Briggs Chaney Park and Ride stop (147 boardings, 3 alightings). Along the corridor, passenger volume increases from 146 to 426, reaching a peak volume of 512 passengers at the Colesville Road (US 29) & University Boulevard bus stop. **Figure 46** illustrates the average number of passengers traversing segments southbound along Route Z11 each weekday.

Figure 45 | Route Z11 (Northbound) - Average Daily Passenger Volume by Segment

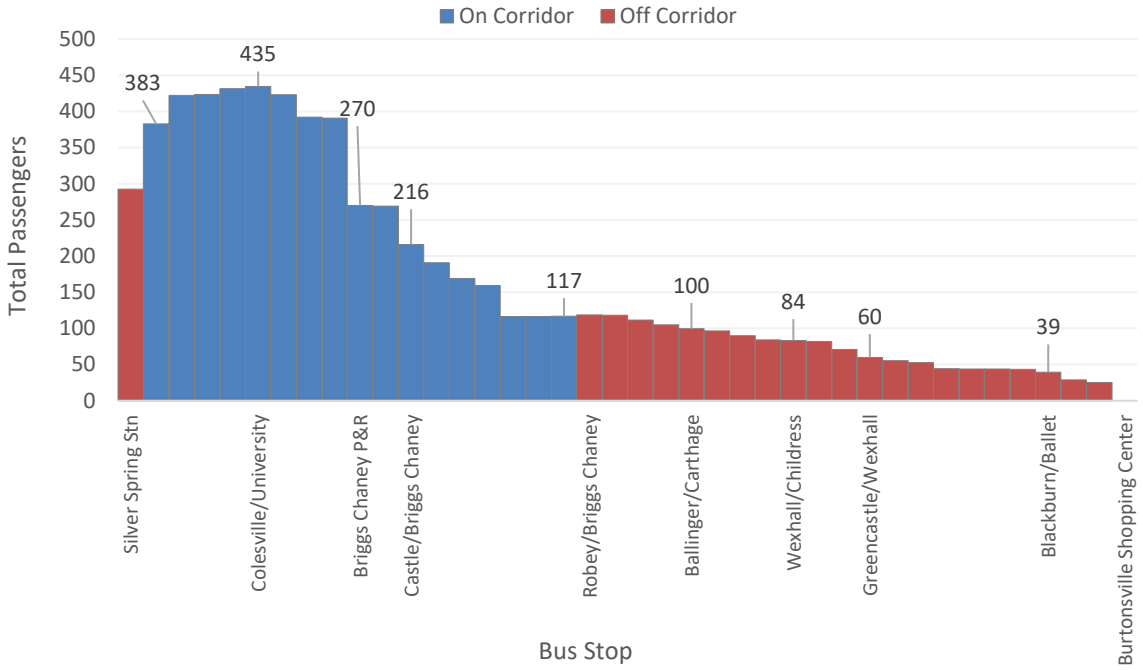
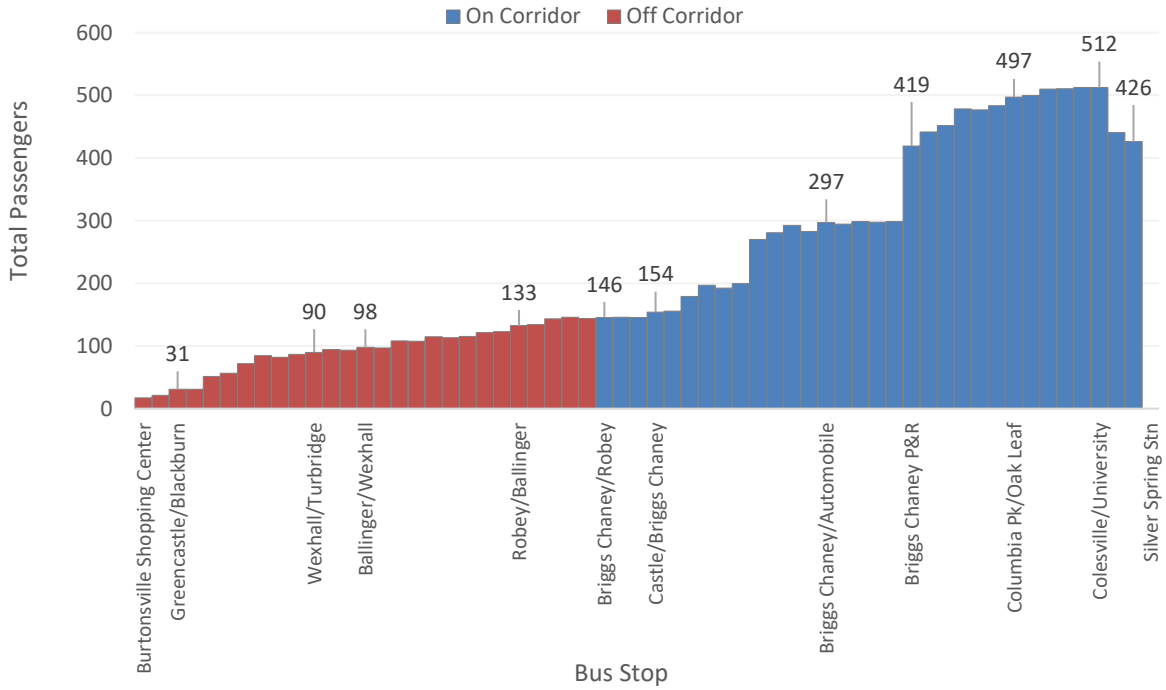


Figure 46 | Route Z11 (Southbound) - Average Daily Passenger Volume by Segment

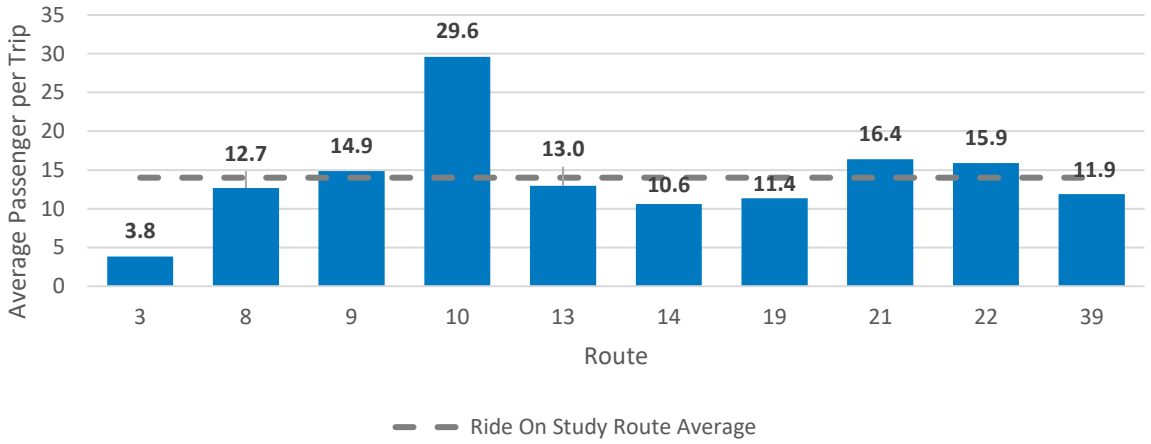


2.2.3 Ridership by Trip/Time Period

Ride On

Among the Ride On study routes, Route 10 was the most productive with the highest weekday passengers per trip (29.6) (**Figure 47**). This rate is nearly double that of both Route 29, the route with the second highest rate (16.2), and double the average for Ride On routes under study (14.0). Route 3 was the least productive, carrying approximately 3.8 passengers per trip. This is most likely a direct result of its limited service span.

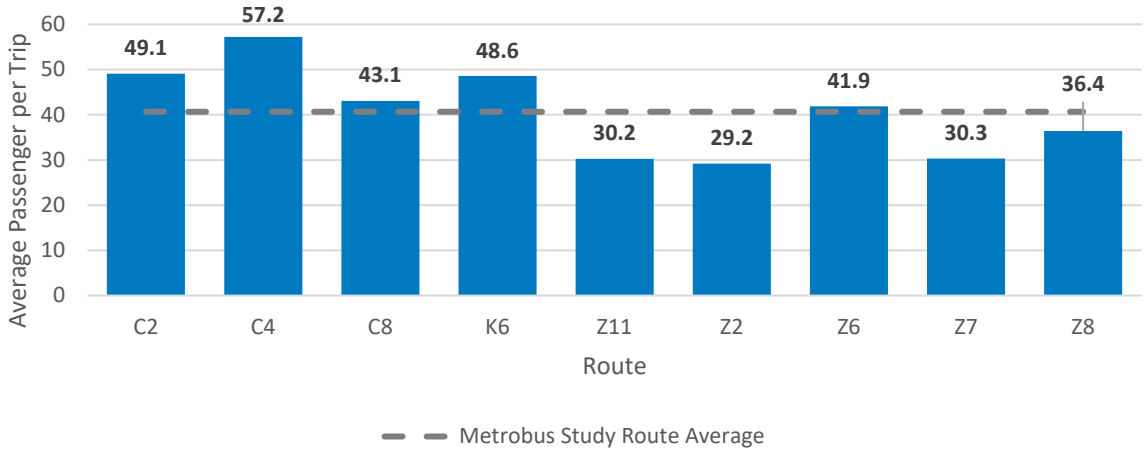
Figure 47 | Ride On - Average Passengers per Trip, Weekdays



Metrobus

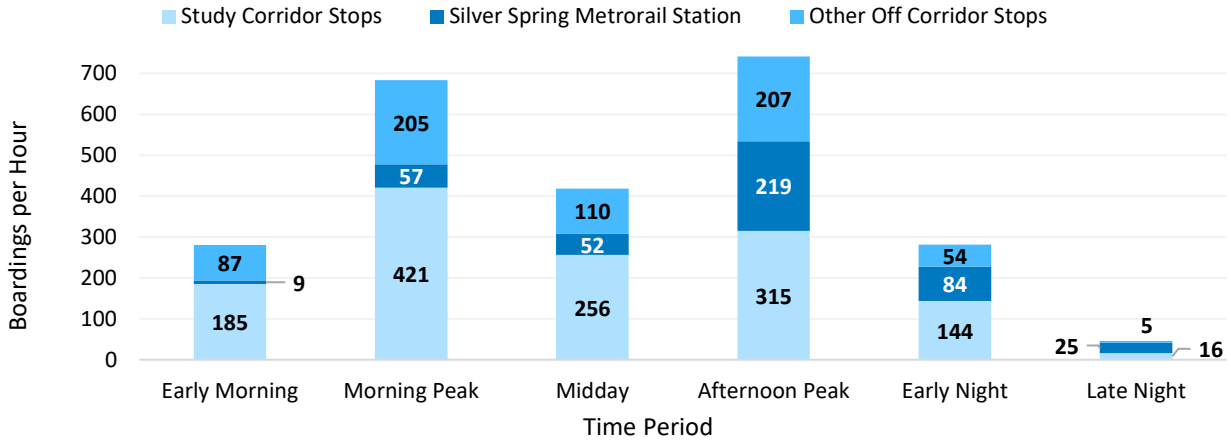
Of the Metrobus routes under study, Route C4 attracted the highest weekday passengers per trip (57.2) (**Figure 48**). Other routes above the average of 40.7 passengers per trip included: Route C2 (49.1), Route K6 (48.6), and Route C8 (43.1), though these three routes and Route C4 only briefly intersect the US 29 corridor. The rate of passengers per trip is lower along routes that travel the US 29 corridor. Route Z6 shows the highest average of passengers per trip (41.9), while Route Z2 shows the lowest, with a respectable 29.2 passengers per trip.

Figure 48 | Metrobus - Average Passengers per Trip, Weekdays



Analyzing the Metrobus routes that operate on the US 29 corridor (Z2, Z6, Z7, Z8, Z11), the highest ridership per hour occurs during the afternoon peak period (741 boardings per hour), though average boardings per hour are nearly equivalent in the morning peak period (683 boardings per hour). **Figure 49** details boardings per hour by time period for stops on corridor, off corridor and at Silver Spring Metrorail Station. This indicates that a significant level of reverse trip flow occurs along the study corridor, possibly to the Food and Drug Administration (FDA) and other major employment locations. In general, boardings per hour are higher in the peak periods, an average of 716 boardings per hour occur in the peak compared to 260 boardings per hour in the off-peak, overall, the total number of boardings in the peak periods (5,015 boardings) is similar to the total number of boardings in off-peak periods (4,426 boardings).

Figure 49 | Metrobus - Average Boardings per Hour by Time Period



2.3 ROUTE OPERATING CHARACTERISTICS

The following sections analyze the individual performance of a route to determine reliability and productivity.

2.3.1 On-Time Performance

Based on WMATA and Ride On standards, a bus is considered on-time if it arrives between two minutes early and seven minutes late. On-time Performance is indicative of the reliability of a route, it can vary based on unpredicted changes or large variability in traffic congestion, and increased dwell times.

Ride On

Route 13 arrives on-time 52 percent of the time making it the least reliable route out of all the routes being analyzed (**Table 35**). Overall, the Ride On study routes have an average on-time performance of 63 percent, while the Ride On routes that operate on the US 29 corridor have an average on-time performance of 62 percent.

Table 35 | Ride On On-Time Performance by Route, FY2016

Route	On-Time	Early	Late
8	62.5%	5.2%	32.2%
9	61.7%	3.7%	34.5%
10	64.3%	8.1%	27.6%
13	51.9%	1.1%	46.9%
14	61.5%	4.2%	34.3%
21	70.5%	3.0%	26.4%
22	60.5%	5.1%	34.5%
39	71.6%	6.6%	21.8%
Average	**63.1%**	**4.6%**	**32.3%**

Metrobus

Route C8 is only on-time an average of 59 percent of the time making it the least reliable Metrobus route being analyzed, though among the routes that operate along the US 29 corridor Route Z7 is the least reliable being on-time only 67 percent of the time. Route K6 has the highest on-time performance (77 percent) of all the study routes. **Table 36** details the on-time performance by route. Overall, the Metrobus study routes have an average on-time performance of 73 percent, and the subset of routes operating on US 29 have an average on-time performance of 74 percent, slightly better than the study routes average.

Table 36 | WMATA Metrobus On-Time Performance by Route, August 2016 Schedule Period

Route	Percent On-Time	Percent Early	Percent Late
C2	73.6%	7.4%	19.0%
C4	74.2%	6.1%	19.7%
C8	59.0%	3.6%	37.4%
K6	76.8%	6.4%	16.7%
Z11	74.1%	4.1%	21.7%
Z2	76.3%	5.2%	18.5%
Z6	75.5%	4.3%	20.2%
Z7	67.2%	5.3%	27.4%
Z8	77.3%	3.9%	18.8%
Average	**72.7%**	**5.1%**	**22.2%**

2.3.2 Productivity

Ride On

In terms of passengers per revenue hour, Route 10 is the most productive route of the Ride On routes in the study area carrying 24.7 passengers per revenue hour. Both Routes 9 and 13 are tied for the most productive in terms of passengers per revenue mile, carrying 2.3 (**Table 37**). Route 3 is the least productive of the study routes, this is most likely a result of its limited service during peak hours. Overall, routes operating on the US 29 corridor transport approximately 1.8 passengers per revenue mile and 19.9 passengers per revenue hour, both higher than the average for all Ride On study routes.

Table 37 | Ride On Productivity by Route, FY 2016

Route	Passengers Per Revenue Hour	Passengers Per Revenue Mile
3	7.7	0.7
8	16.9	1.4
9	23.5	2.3
10	24.7	1.9
13	18.8	2.3
14	19.9	1.8
19	18.9	1.8
21	15.9	1.1
22	19.7	1.8
39	19.0	1.2
Average	**18.5**	**1.6**

Metrobus

Out of all the study routes, Route K6 is the most productive in terms of both passengers per revenue hours and miles, carrying 55.1 and 5.5 respectively. This is most likely because it serves a mix of commercial and

residential areas along MD Route 650 from Fort Totten to White Oak, where it briefly travels along US 29. Of the routes that travel on the US 29 corridor, Route Z8 is the most productive, it carries on average 38.4 passengers per revenue hour and 3.8 passengers per revenue mile. Routes Z2, Z7 and Z11 are the lowest performing Metrobus study routes, this is most likely based on their limited span of service, peak hours only. **Table 38** details productivity measures by route.

Table 38 | WMATA Metrobus Productivity by Route

Route	Passengers Per Revenue Hour	Passengers Per Revenue Mile
C2	39.6	3.8
C4	41.0	3.8
C8	26.8	2.0
K6	55.1	5.5
Z11	27.2	2.2
Z2	26.5	1.8
Z6	35.8	3.0
Z7	26.0	1.7
Z8	38.4	3.2
Average	**35.1**	**3.0**

2.4 SERVICE ANALYSIS

The following service analyses will be used to determine whether a location is suitable for transit service and where gaps in transit service can be found. The first analysis, the Transit Needs Assessment, uses a series of indices that reveal locations with significant clusters of potential transit oriented users, commuters, job locations, or other non-work trip destinations that could be well-served by transit. Each index is based on a set of demographic, employment and geographic characteristics, which are weighted to reflect the effect of these characteristics on transit demand.

This analysis will be followed with a Service Gap Analysis. Based on the four transit propensity indices and their underlying data, three additional transit propensity service indices were developed. These three propensity analyses aid in identifying the types of transit service (all-day, peak period, or high capacity) potentially suitable for locations throughout the corridor.

2.4.1 Transit Needs Assessment

In order to determine the transit setting of the US 29 study area, a transit need assessment was performed. This analysis uses a number of different demographic factors to determine geographic areas of high transit origin and destination trip demand. The analysis consists of four transit indices that focus on: transit-oriented populations, commuter populations, workplaces, and non-work destinations. The analysis combines a number of different metrics that are typically used to define potential transit ridership, including population density, employment density, household density, and the locations of transit-dependent populations.

Each index is comprised of weighted categories, and each weighted category is comprised of individual data sets obtained from the 2011 – 2015 American Community Survey (ACS) and the Longitudinal Employer-Household Dynamic (LEHD). Weighting is based on the expected overall contribution of each category to the overall index, developed through the use of the MWCOG Regional Travel Survey. The analysis was performed on all block groups within one mile of the US 29 corridor to determine the transit needs within the study area.

Transit-Oriented Population Origin Index

The Transit-Oriented Population Origin Index consists of six categories: population, age, households, income, vehicle ownership, and disabled persons. The data sets that contribute to these categories are all indicative of higher population or household density, or persons that are likely to be more reliant on transit. Therefore, this index is indicative of where transit-oriented populations live. **Table 39** summarizes the categories and weights that are inputs to the Transit-Oriented Populations Origin Index.

Table 39 | Transit-Oriented Population Origin Index

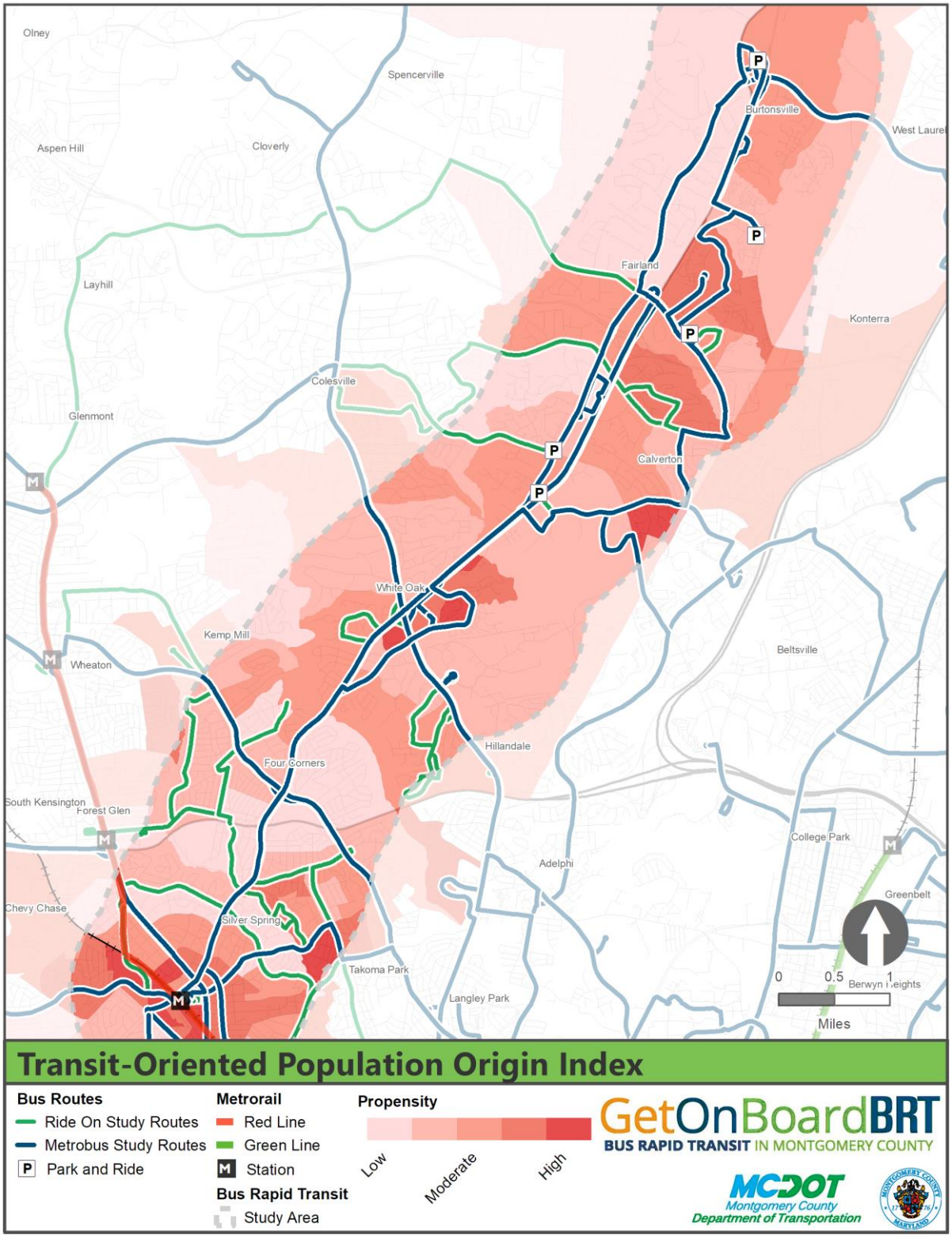
Category	Weight
Population (General / Minority)	30
Age (Youth / Senior)	10
Households	20
Income (Low)	10
Vehicle Ownership (Zero / One Car)	20
Disability Status (Yes)	10

The areas with a moderate to high transit-oriented population origin index in the US 29 corridor include the area of White Oak Shopping Center along Stewart Lane and Lockwood Drive, much of the area around Silver Spring Metrorail Station in Downtown Silver Spring, and the Briggs Chaney Road corridor in Fairland (**Figure 50**). Many of these areas also have high overall population and employment densities.

All of the areas with a moderate to high transit-oriented population index are served by Ride On routes and/or Metrobus routes. Burtonsville Park and Ride, Burtonsville Crossing, and Briggs Chaney Road in Fairland are served by Metrobus Routes Z6, Z7, and Z11. Briggs Chaney Road is also served by Ride On Routes 21 and 39. White Oak Shopping Center is served by Metrobus Routes C8, K6, Z2, Z6, Z8 and Ride On Routes 10, 21, and 22. Silver Spring Metrorail Station is served by the majority of the lines in the study – Metrobus Z2, Z6, Z7, Z8, Z11 and Ride On 8, 9, 13, 14, 21, and 22.

Developed areas with very low transit-oriented population origin indices include Four Corners along New Hampshire Avenue and Kemp Mill northwest of Colesville Road (US 29). Other areas with low transit-oriented populations along the US 29 corridor include most of Silver Spring outside of the downtown area, White Oak outside of the shopping center area, and Burtonsville outside of the Park and Ride lot and Burtonsville Crossing.

Figure 50 | Transit Oriented Population Index



Commuter Origin Index

The Commuter Origin Index consists of two categories: labor force and commute mode. Employed persons, commuters, and transit commuters all contribute to this index, which is indicative of where traditional peak hour commuters live, and where those that currently use transit to commute live. **Table 40** summarizes the Commuter Origin Index categories and weights that contribute to each category.

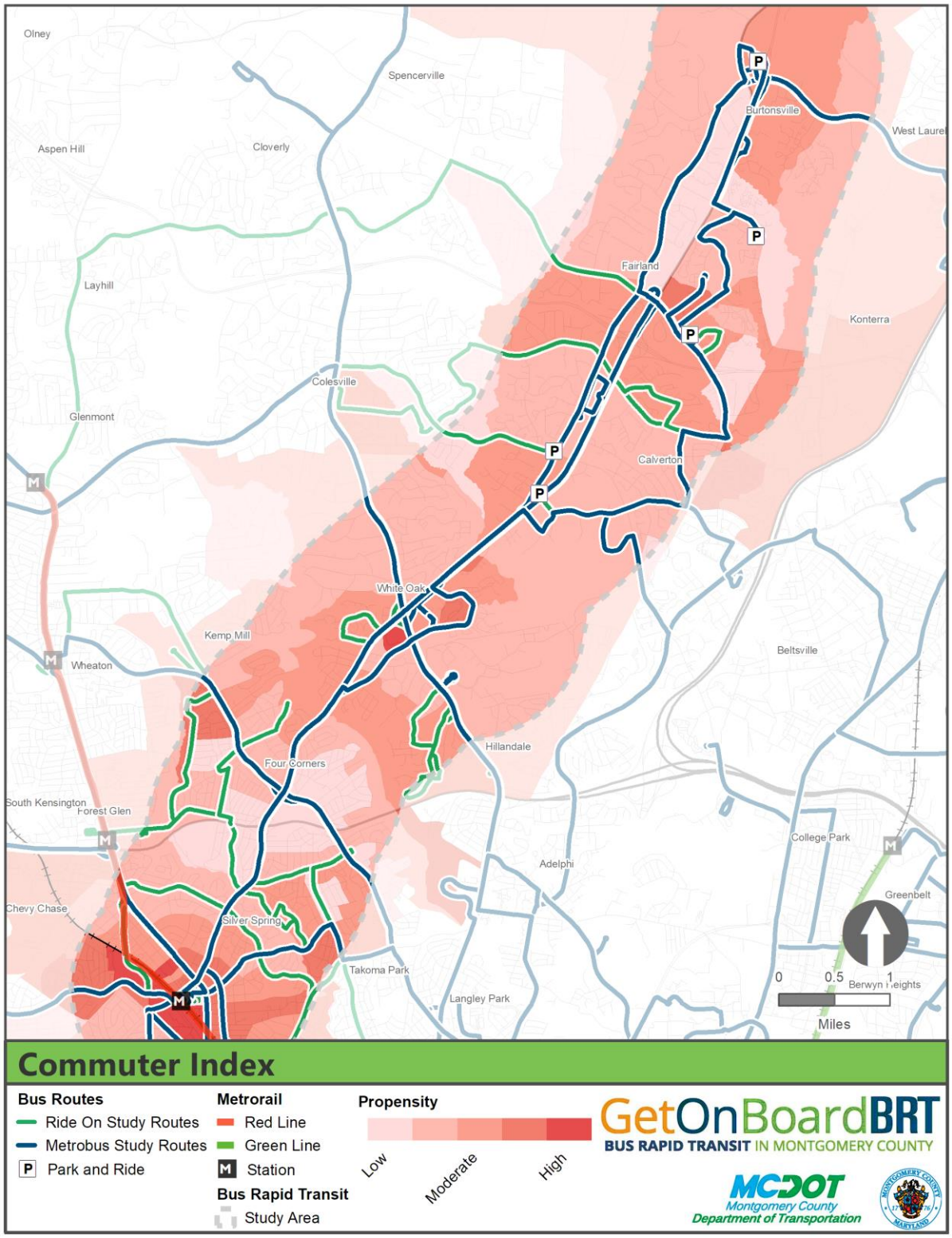
Table 40 | Commuter Index

Category	Weight
Labor Force	70
Commute Mode (Transit)	30

Several areas along the US 29 corridor have a moderate to high commuter origin propensity, including Burtonsville Park and Ride Lot, Burtonsville Crossing, Fairfield along Briggs Chaney Road between US 29 and Robey Road, White Oak Shopping Center, and Downtown Silver Spring (**Figure 51**).

Like the transit-oriented population origin index, all areas with a moderate commuter index are served by Metrobus and Ride On buses. Burtonsville Park and Ride, Burtonsville Crossing, and Briggs Chaney Road in Fairland are served by Metrobus Routes Z6, Z7, and Z11. Briggs Chaney Road is also served by Ride On Routes 21 and 39. White Oak Shopping Center is served by Metrobus Routes C8, K6, Z2, Z6, Z8 and Ride On Routes 10, 21, and 22. Silver Spring Metrorail Station is served by the majority of the lines in the study – Metrobus Z2, Z6, Z7, Z8, Z11 and Ride On 8, 9, 13, 14, 21, and 22.

Figure 51 | Commuter Index



Work Destination Index

The work destination index has a single category: employment. Total employment and employment density contribute to this index, which is indicative of where people commute to for work purposes. **Table 41** summarizes the work destination index categories and weights that contribute to each category.

Table 41 | Workplace Index

Category	Weight
Employment (All Jobs)	100

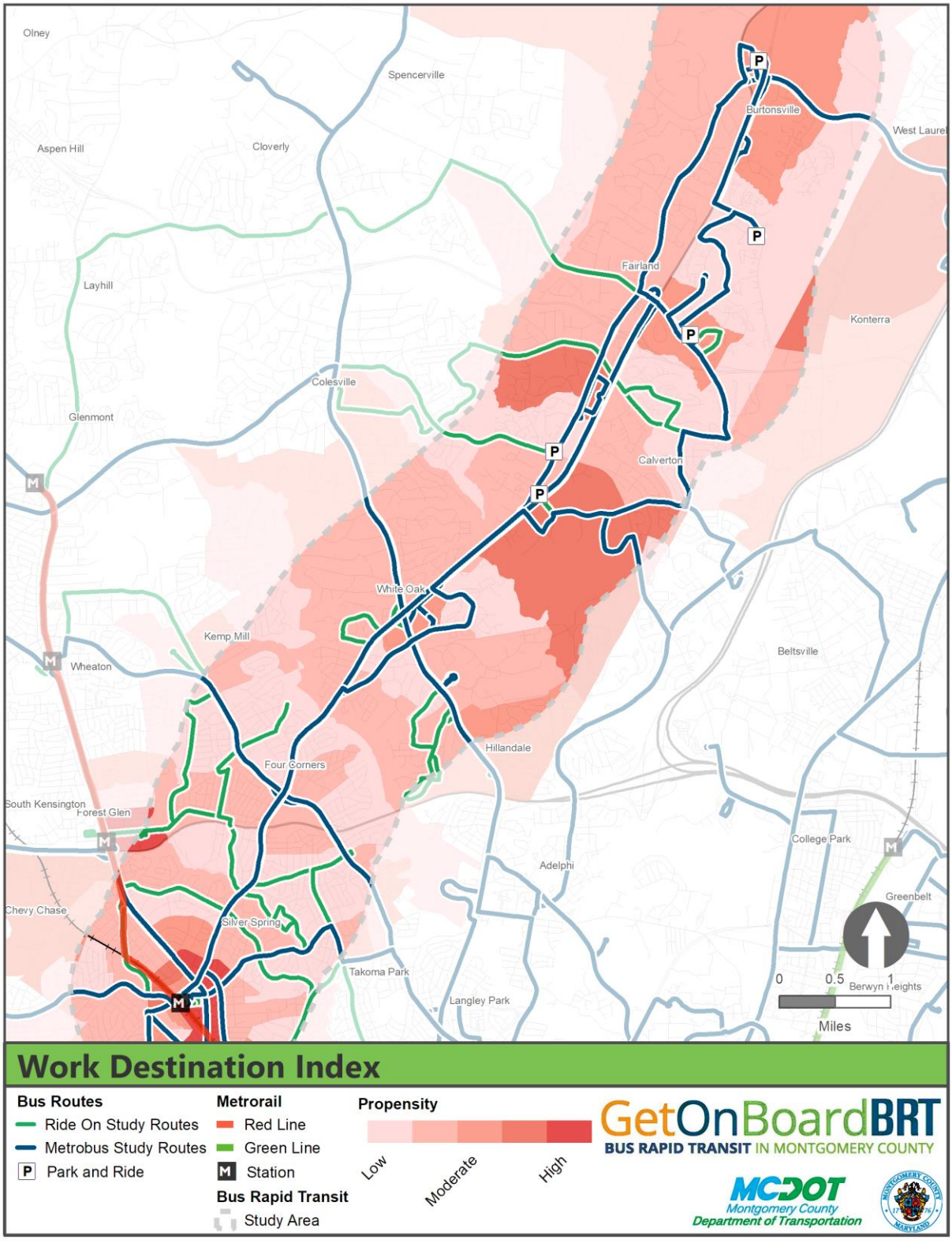
The highest propensity within the work destination index is found in Downtown Silver Spring near the Silver Spring Metrorail Station (**Figure 52**). This area contains a number of retail shopping centers as well as a number of office buildings along Georgia Avenue and Colesville Road (US 29). Silver Spring Metrorail Station is served by the majority of the lines in the study – Metrobus Z2, Z6, Z7, Z8, Z11 and Ride On 8, 9, 13, 14, 21, and 22.

Another area with a high work destination propensity is near the Forest Glen Metrorail Station due to several medical facilities. This area contains Holy Cross Hospital, Doctors' Medical Park, and Dennis Avenue Health Center. The only bus route in this study that serves Forest Glen is is Ride On's Route 8.

Areas with a moderate work destination propensity in the US 29 study area includes Sweitzer Lane in West Laurel (served by Metrobus Route Z7), an office park on the corner of Fairland Road and US 29 (served by Ride On Route 21), and Calverton along Broadbirch Drive and Cherry Hill Road (served by Metrobus Route Z6 and Ride On Route 21),

Areas with low to moderate work destination indices include Burtonsville Crossing and Forest Glen Annex. Burtonsville Crossing is served by Metrobus Routes Z6, Z7, and Z11.

Figure 52 | Workplace Index



Non-Work Destination Index

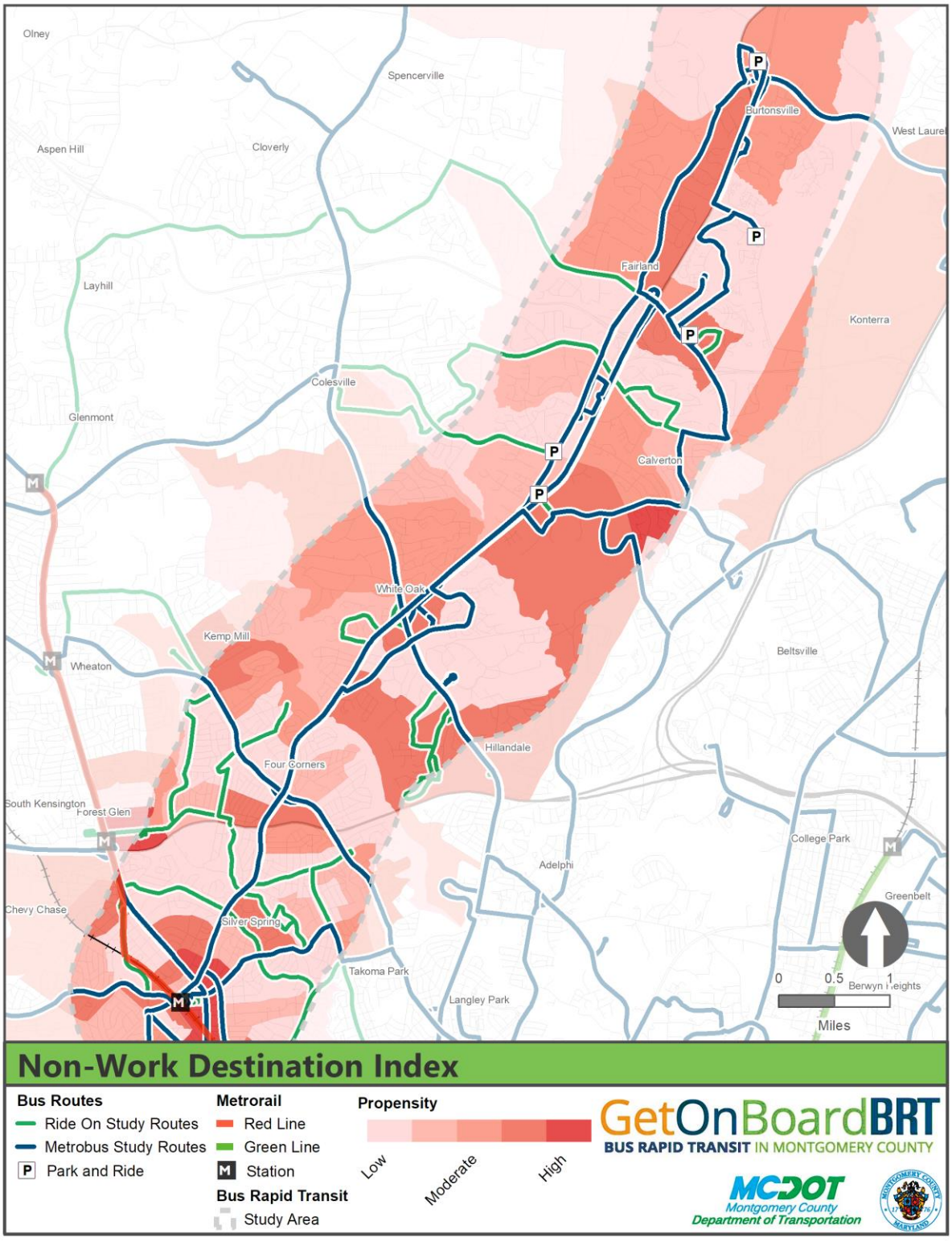
The non-work destination index has five categories: retail/restaurant, recreation, healthcare/social assistance, education, and government. These categories are weighted based on the typical trip purpose proportions for transit commuters. The data sets that make up these categories are employment in the sectors represented by these categories (i.e. the recreation category contains data sets from the entertainment sector and the recreation sector). The employment by sector data sets serve as proxies for how much travel demand businesses that fall into these sectors would produce, and therefore, this index is indicative of where people make non-work trips. **Table 42** summarizes the non-work destination index categories and weights that contribute to each category.

Table 42 | Non-Work Trip Index

Category	Weight
Retail / Restaurant	20
Recreation	10
Healthcare / Social Assistance	35
Education	25
Government	10

Several areas along the US 29 corridor have moderate to high non-work destination propensity scores, including Downtown Silver Spring, Riderwood Village in Calverton, and White Oak Shopping Center. Downtown Silver Spring is served by the Silver Spring Metrorail Station as well as Metrobus Z2, Z6, Z7, Z8, Z11 and Ride On 8, 9, 13, 14, 21, and 22. Riderwood Village has a moderately high score due to being a retirement community, placing it under the Healthcare/Social Assistance category. Forest Glen has a moderate score due to having a variety of healthcare facilities, including Holy Cross Hospital, Doctors' Medical Park, and Dennis Avenue Health Center. **Figure 53** illustrates the non-work destination index scores throughout the study area.

Figure 53 | Non-Work Trip Index



2.4.2 Service Gap Analysis

The results of the transit need analysis show that the majority of the US 29 corridor area with high transit need has existing transit services. There are a few areas, however, that have a mismatch in the type of service needed, or might need additional services based on the level of transit need in a certain index. These areas constitute "gaps" in the transit network of the area.

All Day Service Gaps

The All Day Service Index identifies locations suitable for all day transit service by combining the results of the Transit-Oriented Population Origin and Non-Work Destination Indices. At both peak and off-peak hours, locations with significant transit-oriented populations are presumed to require connections to and from jobs or non-work-related trip destinations. This results in a propensity index that identifies major origins or destinations for transit trips that would occur throughout the day.

Areas with the greatest need for all day service include White Oak Shopping Center along Stewart Lane and Lockwood Drive, Calverton and Downtown Silver Spring. While there are currently four Metrobus and three Ride On routes that serve White Oak Shopping Center, one of the Metrobus routes (Z2) and two of the Ride On routes (21, 22) only operate during peak periods. Calverton and Downtown Silver Spring are served by all day routes. **Figure 54** details all day service propensity throughout the US 29 corridor.

Peak Service Gaps

The Peak Index identifies locations suitable for peak-hour service by combining results from the Commuter Origin and Work Destination Indices. Locations with significant numbers and densities of commuters are presumed to require connections to and from locations with significant numbers and densities of jobs, especially at peak hours. This results in a propensity index that identifies major origins or destinations for transit trips that would occur during peak hours.

The two clusters of moderate to high commuter origin propensity within the US 29 study area are in Downtown Silver Spring and in Forest Glen. Ride On Route 8 currently operates every 30-minutes during the peak periods, serving Forest Glen's Holy Cross Hospital, Doctors' Medical Park, and Dennis Avenue Health Center. Holy Cross Hospital can be reached directly on Route 8; however, the medical park and health center require a transfer to/from one of the Georgia Avenue Metrobus routes. Downtown Silver Spring, is served by multiple routes that provide additional peak hour services. **Figure 55** details all day service propensity throughout the US 29 corridor.

Figure 54 | All Day Service Index

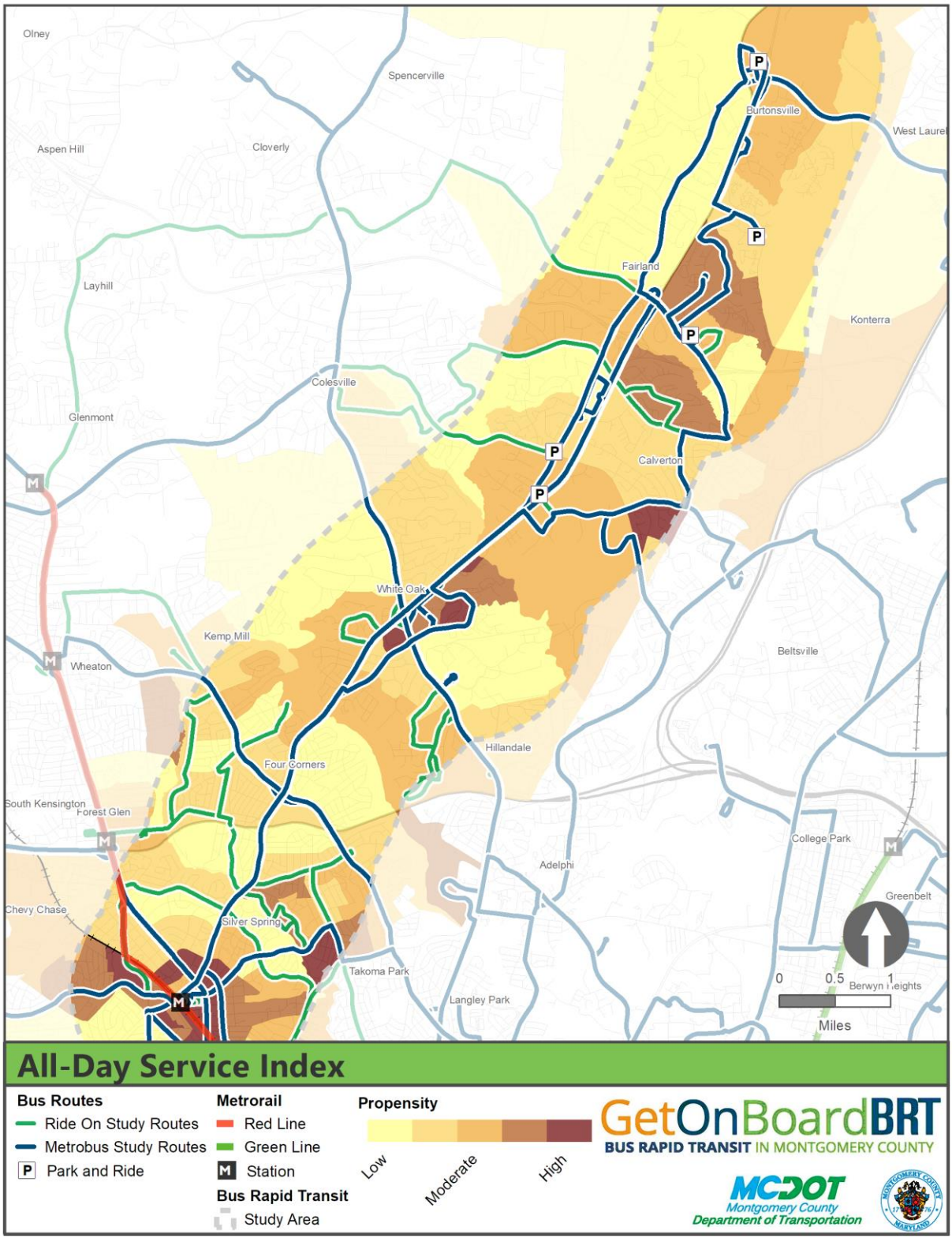


Figure 55 | Peak Service Index