Long Branch Sector Plan

Appendix 11
Transportation

Plan Context and Initiatives

The Long Branch Sector Plan presents a vision for the transition of the area to a neighborhood scale, transit-oriented, walkable neighborhood. The plan emphasizes providing reinvestment opportunities in commercial areas at the two major intersections within the plan area, while preserving the inventory of workforce housing and protecting the character and scale of the residential neighborhoods.

The catalyst for the eventual transition is the Purple Line and its two planned stations within the plan boundary – the Long Branch Station on Arliss Street and the Piney Branch Road Station on University Boulevard just south of Piney Branch Road. This appendix provides the technical basis and details for the transportation system recommendations in the Long Branch Sector Plan.

The Plan proposes or confirms several transportation initiatives intended to support the overall plan vision:

- Establishing more of a grid street network through new street connections
- Employing meaningful capacity enhancements at selected intersections to improve traffic flow
- Providing and encouraging alternate modes of travel - the two planned Purple Line stations being the primary focus
- Improving pedestrian and bicyclist accessibility to transit, shopping, schools, parks, trails, and recreational centers within and beyond the sector plan area
- Enhancing livability through new boulevards, streets, sidewalks, trails, and recreational loops

Since the early 1980s, the balance between land use and transportation system recommendations in master and sector plans has applied the procedures and general policies contained in the County's Subdivision Staging Policy[1]. The recently adopted 2012 Subdivision Staging Policy applies an area-wide measure of mobility, Transportation Policy Area Review (TPAR), and a localized measure of congestion, Local Area Transportation Review (LATR). More information on the area wide and local area analysis utilized in the development of the Long Branch Sector Plan are described later in this appendix.[2]

[1] Prior to 2010, the policy was formally referred to as the Growth Policy.

[2] The area wide measure of mobility used in the transportation analysis for the Long Branch Sector Plan was the Policy Area Mobility Review (PAMR). PAMR was County policy throughout the vast majority of time the Long Branch Sector Plan was under development as TPAR was first formally adopted by County Council on November 13, 2012. The difference between the two approaches for a master plan level analysis for small sector plan areas like Long Branch are minimal.

The plan promotes a more mixed-use community with improved access to transit and more opportunities for residents and visitors to walk and bike instead of drive.

Solution Matrix

The initial step in the staff analysis of mobility in the plan area involves the development of a "solution matrix" (see Table 1) that provides a general assessment of the applicability of various strategies for assisting in the attainment of the overall plan vision.

Table 1 Initial Solutions Matrix

	Strategy	Opportunities	Constraints	Potential
Demand Management	Increase parking management, consolidate some parking into a single centrally located structure	Lessen traffic in core area, provide revenue, integrate with private development	Parking management authority establishment, incentive for coordination, garage location, may limit development options through transition leading up to operational Purple Line	Moderate to High
	Reduce single occupant vehicle mode share	Two walk up Purple Line stations and area of high transit usage	Two state roadways and another (New Hampshire Ave.) nearby. Will remain area with large percentage of through traffic.	High
Transit Services	Construct BRT or other enhanced service through Plan area	Purple Line planned through plan area. University Blvd included in Countywide BRT Study – TLC to Wheaton	Capital costs, operational costs, and right of way .	Moderate to High
	Provide off-street boarding /alighting to accommodate high number of transfers	Two Purple Line stations in plan area where feature could be incorporated.	Nearby planned Takoma Langley Transit Center provides same function. Two off-street facilities in close proximity would reduce bus speeds. Also limited opportunities for acreage in two commercial areas in plan area.	Low to Moderate
Local Street Network	Add selected street connections	Provide alternate route, reduce walking distances, access management	Capital costs, definition of final alignment and implementation responsibility	High
	Left turn prohibitions	Reduce congestion	Requires grid for alternate routes, results in more circuitous trips (cars and buses), public acceptance	High
	Add turn lanes	Reduce congestion	Increase pedestrian crossing distances, capital cost	Moderate to High – used only when necessary
Polices	Increase residential uses	Create mixed use centers, provide housing with better job access, lower trip generation rates	Economic and market feasibility	High
	Accept higher congestion levels	Consistent with urbanizing area, no capital cost	Travel time delay, increased user costs, public acceptance	Low to Moderate

Travel Demand Management

Travel Demand Management (TDM) describes a range of programs and services designed to reduce single-occupant vehicle trips. It is an important first step in analyzing potential approaches because of scope and cost-effectiveness. TDM is the set of public policy strategies to provide travel options that reduce and spread demand by travel destination, mode, route, and time of day to most efficiently use transportation system infrastructure and resources. TDM strategies can be implemented by both public and private sector activities.

TDM strategies include:

- Infrastructure such as high quality pedestrian environments, bus or high occupancy vehicle (HOV) facilities or preferential treatments, telework centers, commuter information stores/kiosks, car-sharing (i.e., Zipcar) and bikesharing stations, and well-located transit stations or stops with real-time transit information.

- Services such as transit information services, car/vanpools, ride-sharing/matching, guaranteed ride home services, and alternative commute option information (e.g., the Metropolitan Washington Council of Governments Commuter Connections and private vendors).

- Policies that affect when and to what extent people use the infrastructure and services, including parking supply management, preferential parking treatments for carpools/vanpools, transit subsidies, flexible work schedules, tax incentives, congestion pricing, and distance-based or vehicle miles of travel pricing.

The Long Branch Sector Plan is one of a series of Purple Line station area plans. The TDM strategies most applicable in Long Branch focus on station access via bus, walking, bike and other non-auto modes. The area is characterized by high transit usage and this is expected to continue to increase. Some strategies often associated with the TDM (HOV, van-pools, preferential parking, etc.) are partly dependent on the presence of large employers that make the administration and monitoring of the program easier. Yet, since it is unlikely that multiple large employers will locate within Long Branch, the Plan endorses the elements of TDM that emphasize pedestrian safety and convenience, such as:

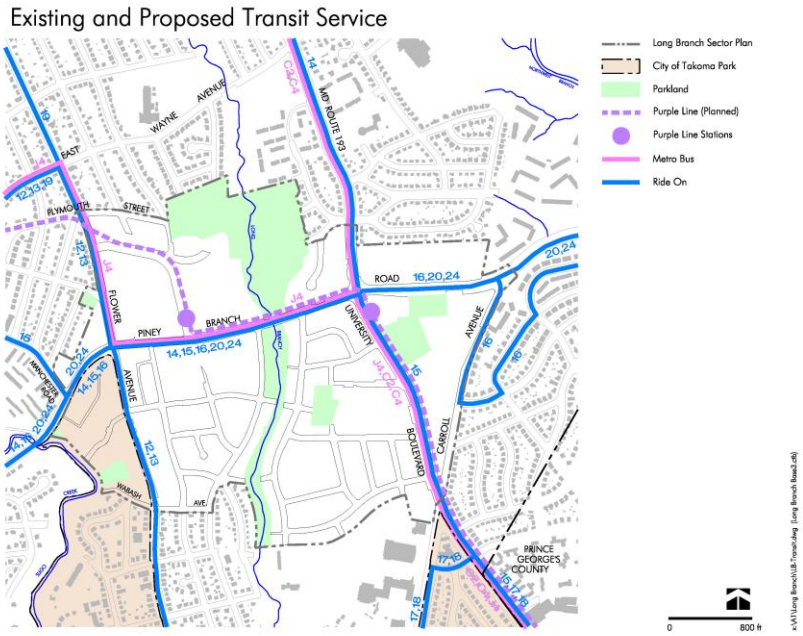
- enhanced station and bus stop access,
- transit passenger amenities like enhanced shelters, and
- bike facilities that serve both commuters and the recreational rider.

Existing Conditions - Public Transportation

The Long Branch Sector Plan area is served by eight Ride On routes, two Metrobus routes, and one University of Maryland (UM Shuttle) route. The Ride On bus routes are intended to connect neighborhoods with the Metrorail and MARC station in Silver Spring and the Metrorail station in Takoma Park. The Metrobus routes connect the Twinbrook and Wheaton Metrorail stations with the Greenbelt and Prince George's Plaza Metrorail stations.

Figure 1 depicts the existing bus service along with the planned Purple Line alignment in the Plan area.

Figure 1 Existing Bus Routes and Planned Purple Line Light Rail



The Ride On service within the Plan area is primarily along University Boulevard, Piney Branch Road, Flower Avenue, and Carroll Avenue. The Metrobus service is on University Boulevard. These routes generally have headways of approximately 10 to 30 minutes during peak periods. According to data (FY08) available from Montgomery County Department of Transportation's Division of Transit Services, the eight Ride On routes combined carry about 16,400 passengers each weekday. While not all of these passengers are boarding or alighting within the Plan area, the bus stops within the Plan area are some of the busiest in the system according to Ride On staff. There is a significant amount of passengers that transfer from one route to another, especially at or near the intersection of University Boulevard and Piney Branch Road, where a number of routes converge.

Ride On routes 12, 15, 16, and 20 account for a large segment of the total ridership. Each of these routes (especially Route 15) feature alignments that share segments with the planned Purple Line.

A summary of the 11 routes is presented in Table 2, showing the route number, operator, service frequency during peak, off-peak, and weekends, and major destinations.

Table 2 Existing Bus Route Service Characteristics

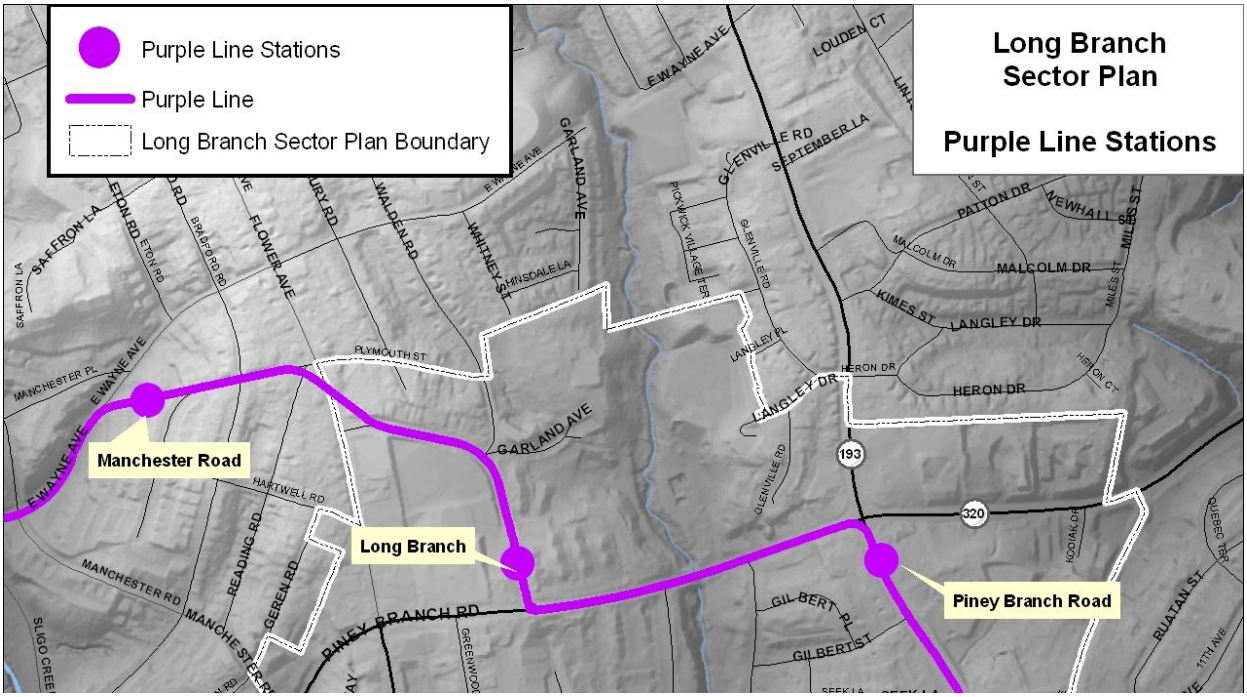
		Headway (minutes)			
Route	Operator	Peak	Off-Peak	Weekend	Major Destinations
12	Ride On	10-15	20-30	30	Takoma Station Silver Spring Station
13	Ride On	20-30	20-40	n/a	Takoma Station Silver Spring Station
14	Ride On	30	30	30	Takoma Station Silver Spring Station
15	Ride On	6-20	10-15	12-20	Takoma/Langley Crossroads Silver Spring Station
16	Ride On	10-20	20-30	15-30	Takoma Station Silver Spring Station
20	Ride On	7-10	10-15	15-30	Hillandale Silver Spring Station
24	Ride On	20-25	n/a	n/a	Hillandale Takoma Station
25	Ride On	10-30	n/a	n/a	Takoma Station Takoma/Langley Crossroads
111	Univ. of Maryland	10-30	75	n/a	University of Maryland Silver Spring Station
C2	WMATA	10-20	15-30	30	Twinbrook Station Wheaton Station Prince Georges Plaza Station
C4	WMATA	10-25	15-30	30	Wheaton Station Prince Georges Plaza Station Greenbelt Station

Ride On service in the Plan area will be adjusted once the Purple Line is operational. The actual determination of how the service will be reallocated will be done by MCDOT. The MTA developed a concept level feeder bus network as part of its Purple Line alternative analysis. The MTA concept plan indicates that the Purple Line Long Branch Station on Arliss would be served by Routes 14, 16, 20, and 24 and the Piney Branch Road Station on University Boulevard would

be served by Metrobus Routes C2 and C4. Regardless of the ultimate plan, it will be important to continue to have local bus service on University Boulevard, Carroll Avenue, Piney Branch Road, and Flower Avenue within the Plan area.

Figure 2 displays the location of the Purple Line route through the Plan area and the location of the stations.[3] The transit line will have two stops within the Plan area as included in the Locally Preferred Alternative (LPA) and later confirmed through the adoption of the Purple Line Functional Plan (September 2010): one on Arliss Street just north of Piney Branch Road and another along University Boulevard just south of Piney Branch Road.

Figure 2 Purple Line and Stations

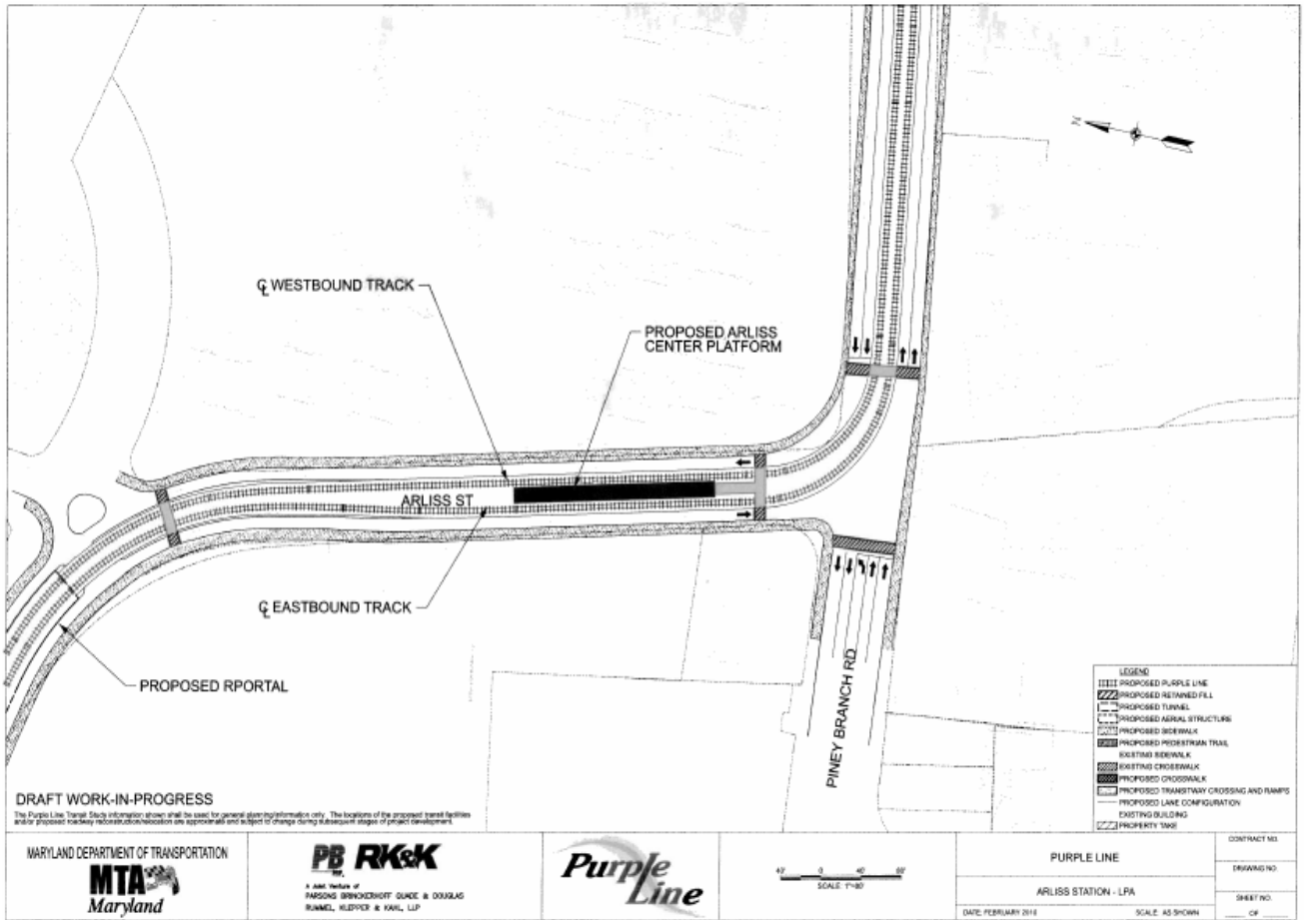


Manchester Road station is just outside of the Sector Plan boundary. The Takoma Langley Transit Center station is south of the Piney Branch Road Station and also just beyond the Sector Plan boundary.

The Purple Line is expected to operate on six-minute headways during peak periods. There are 1,800 projected daily riders at the Arliss Street station and 2,500 projected daily riders at the Gilbert Street station.[4] The projections are for the year 2040.

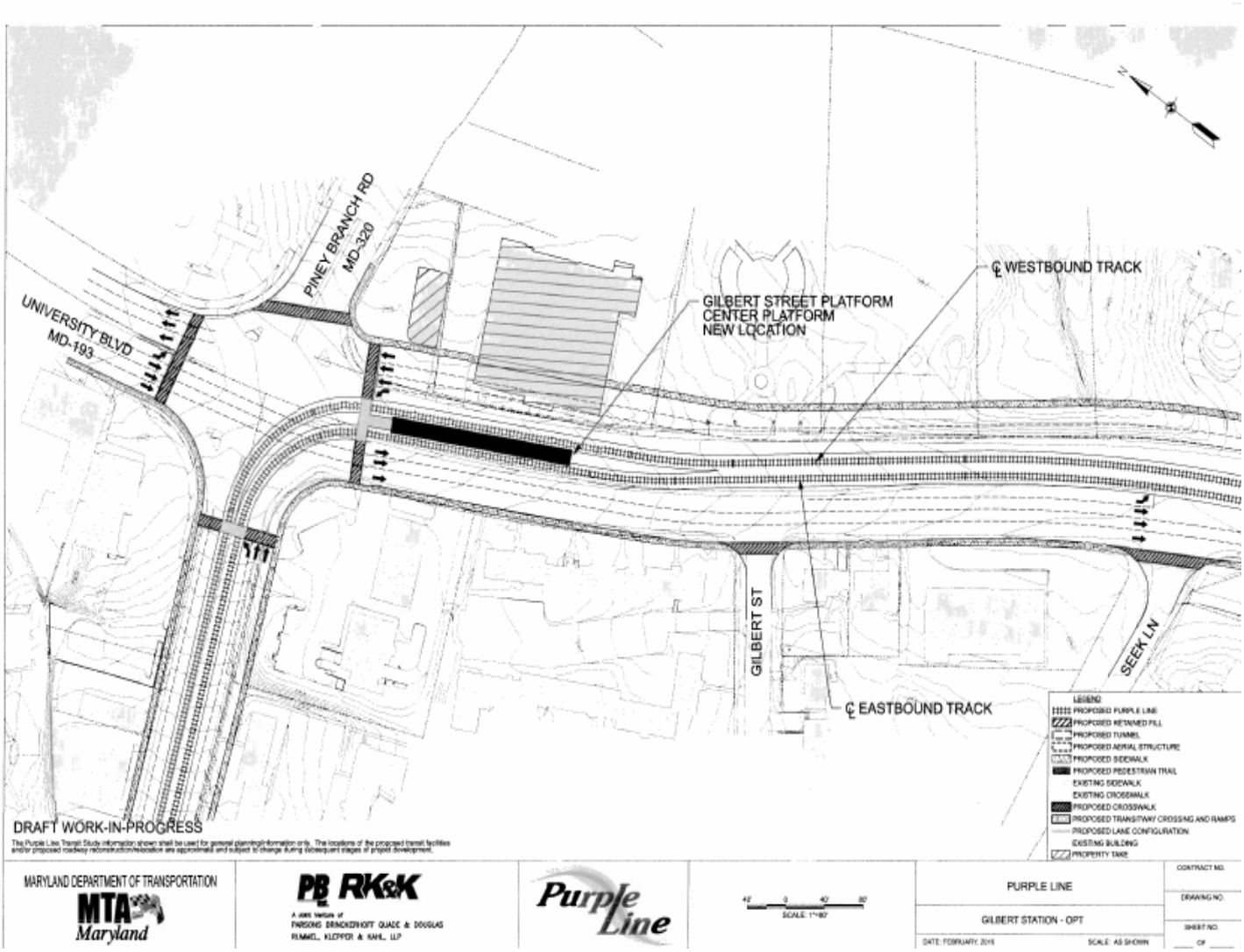
Planning for the Purple Line within the Plan area is complicated by high vehicular traffic volumes (present and future) and changes in elevation. The alignment (going west to east) will exit a tunnel into dedicated lanes on the surface of Arliss Street before continuing in dedicated lanes on both Piney Branch Road and University Boulevard. Figures 3 and 4 diagram the lane configurations at the intersections near the planned stations.

Figure 3 Arliss Street (Long Branch) Station



Total ridership – each passenger boarding and alighting – on a typical weekday in 2040.

Figure 4 Gilbert Street (Piney Branch Road) Station



Transit Supportive Density Considerations

The Planning Department has reviewed the considerable amount of research on station area densities, pedestrian accessibility and connectivity, transit mode share, and other issues related to transit-oriented development. Reconnecting America and the Center for Transit Oriented Development (see Figure 5) provide a matrix depicting how TOD can vary in size, scale, and context.

For Long Branch, the transportation analysis assumed a range of densities. The results, described later in this appendix, indicate that a balance of the land use and transportation, with the Purple Line, could be reasonably achieved at a point where the net density for the commercial sites adjacent to the major roadways generally would be in the FAR 1.5 to 3.0 range.[5]

Figure 5 Characteristics of Mixed-Use Transit-Oriented Development

		Net Density	Characteristics	Construction Type	Parking Configuration	
Mid-Rise Residential Over Commercial	MIXED USE TYPES	40-90 du/acre	3-6 stories with apartments, single- or double-loaded corridors with lobby entrance, off-street parking in structure or below grade	Type I/III (max 6 stories with building code modification/65 feet)	Groundfloor podium/ subgrade or elevated structure	
High-Rise Residential Over Commercial	MIXED USE TYPES	60+ du/acre	7+ stories, usually with base and point tower, single- or double-loaded corridors with lobby entrance, off-street parking in structure or below grade	Type I/II (max 12 stories/120 feet/no limits on Type 1)	Off-street parking in structure or below grade	
Low-Rise Office/Commercial	EMPLOYMENT TYPES	0.5-2.5 FAR	1-3 stories with lobby entrance to upper floors; retail, office or mixed-use with mix of tenant types, including limited large-footprint retail uses; parking in surface lots or structures	Type III/IV/V (max 4 stories/65 feet)	Off-street parking in groundfloor podium or surface	
Mid-Rise Office/Commercial	EMPLOYMENT TYPES	2.0-5.0 FAR	3-7 stories, with lobby entrance to upper floors, office with potential groundfloor retail, parking in structure or below grade	Type I/II (max 12 stories/160 feet)	Off-street parking in structure or below grade	
High-Rise Office/Commercial	EMPLOYMENT TYPES	4.0+ FAR	6+ stories with lobby entrance to upper floors sometimes with point tower over base, office with potential groundfloor retail, parking in structure or below grade	Type 1 (no limits)	Off-street parking in structure or below grade	
Institutional/Other Employment	EMPLOYMENT TYPES	varies	schools, civic uses, stadiums, hospitals, other entertainment uses; range of densities and sizes; parking often in structures or below grade	Varies	Parking often in structures or below grade	

Source: Station Area Planning, Reconnecting America and the Center for Transit-Oriented Development, February 2008, page 13.

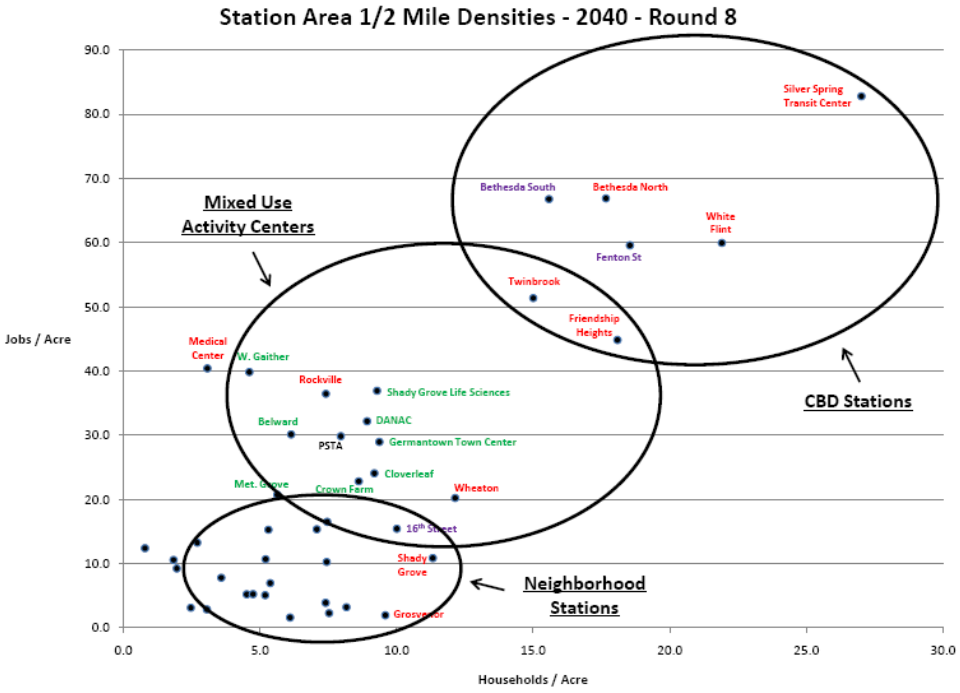
[5] FAR (Floor Area Ratio) is the ratio of the gross floor area of a commercial or mixed-use building to the area of the lot on which the building is located. Parking is generally excluded from the computation.

It is important to support the higher densities with improvements to pedestrian connectivity and access as well as enhancements to the street grid so drivers will have alternative routes for moving both within and through the Long Branch Plan area.

Another way of analyzing density around transit stations is to examine the station context and how it relates to other stations—both existing and planned—around our three fixed transitways (Red Line, Purple Line, and Corridor Cities Transitway).

One starting point involves arriving at a rough approximation of the gross densities (jobs per acre and households per acre) within ½ mile of the station areas. Figure 6 depicts the estimate of the gross densities based on the Round 8 Regional Cooperative Forecasts adopted by the Council of Governments (COG). [6]

Figure 6



The densities are arrived at by creating a ½ mile GIS buffer around each station and dividing the jobs and households in the applicable Traffic Analysis Zone(s) by the area of the TAZ(s) that falls within the ½ mile buffer. The total jobs and households forecast for the applicable TAZs are adjusted (reduced) by a percentage equal to the amount of the area of the TAZ that is outside of the ½ mile buffer. As a result, the chart is more accurately characterized as an estimate of the gross densities within ½ mile of the transit stations. One general "rule of thumb" is that minimum gross densities of 7-10 households per acre and/or 25-50 jobs per acre are needed to support frequent high quality transit service, that is LRT or BRT.

As would be expected, the densities vary considerably, demonstrating that TOD comes in different sizes and settings. Both stations in the plan area fall within the "neighborhood" circle in the above scatter plot. The forecast for 2040 reflects a gross density of 7-8 households per acre and 3-4 jobs per acre. The same data set for existing conditions indicates gross densities of 6-7 households per acre and about 2 jobs per acre.[7]

A summary of the land use scenarios tested for the Plan is presented in Table 3:

Table 3 Summary of Land Use Scenarios

Variable	Existing	Holding Capacity or Current Plan Yield[8]	Proposed	
				Long Term
commercial sf[9]	532,815	954,859		966,948
jobs[10]	1,298	2,563		1,995
dwelling units (du)	2,176	3,876		4,521
job/du	0.60	0.66		0.44

Existing Conditions – Street Network

The Plan area and its transportation system are shaped by the natural divide created by the Long Branch Stream Valley Park that splits the Plan area into an eastern half and a western half. The Plan area street network, the proposed Purple Line stations, and the traffic analysis sub-zones used in the analysis are presented in Figure 7.

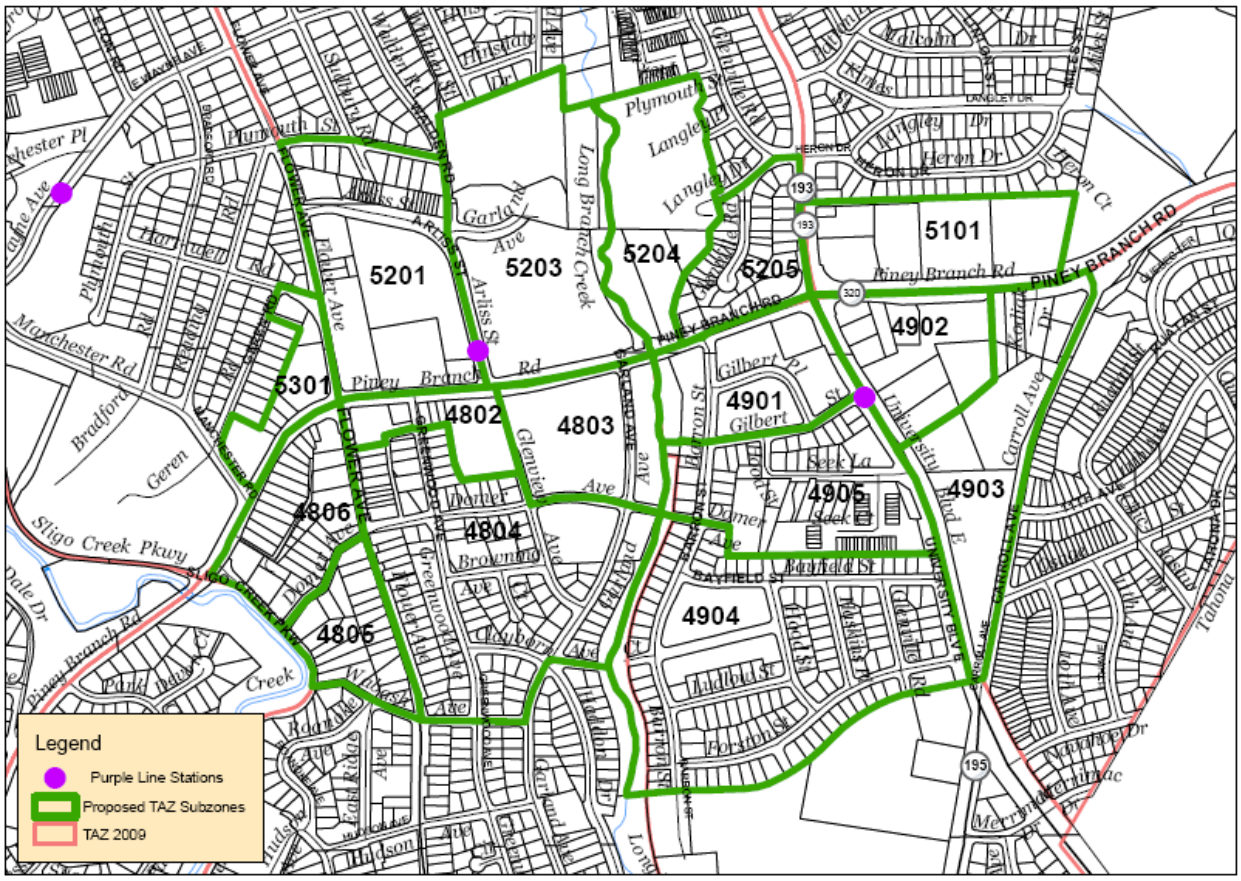
Space constraints within the graph area prohibit the labeling of all of the "neighborhood" stations on the scatter plot.

[8] Current Plan Yield is an estimate of the ultimate amount of development under the zoning in the current adopted applicable master plan. There is no time horizon (10, 20, 30 years) associated with this estimate.

[9] Commercial square feet only; does not include square footage of dwelling units.

[10] This estimate is based on 250 square feet per employee for office space, 400 square feet for retail, and 500 square feet for other.

Figure 7 Sector Plan Street Network and Traffic Analysis Subzones



Roadways

Major roadways that serve the Plan area include University Boulevard (MD 193), Piney Branch Road (MD 320), Flower Avenue (MD 787), Arliss Street, and Carroll Avenue. A summary of existing master-planned Plan area streets and highways is provided in Table 4.

Existing Intersection Capacity

The capacity or performance of major intersections included in this analysis is defined by the ratio of the Critical Lane Volume (CLV) congestion standard for the applicable Policy Area.[11] The Plan area intersections are located within the Silver Spring/Takoma Park Policy Area, which has a congestion standard of 1,600 CLV.

A summary of existing CLVs for intersections considered in this analysis is provided in Table 5 and graphically represented in Figure 8. As shown, all intersections located within the Plan area boundary are operating below the congestion standard of 1,600 CLV, except for the University Boulevard/Piney Branch Road intersection, which operates slightly above the standard during the evening peak hour. This intersection has the highest CLV within the Plan area with a volume to capacity ratio of 0.86 during the morning peak hour and 1.00 during the evening peak hour. The traffic analysis completed as part of the Purple Line AA/DEIS indicated that the intersection will operate with a Level of Service F in year 2030, with or without the Purple Line.

[11] Additional explanation of the methodology used to assess intersection capacity as part of the Planning Department's master plan process is provided as part of the Transportation/Land Use Balance section of this appendix.

Table 4
Long Branch Sector Plan
Existing Master Planned Streets and Highways Classifications

Roadway Facility	Master Plan of Highways Number	Limits	Minimum r.o.w.[12] (feet)	Number of Lanes	Speed[13]	Design Standard[14]
Piney Branch Road (MD 320)	M-11	University Blvd to Carroll Ave	120	4	40	2008.01
University Boulevard (MD 193)	M-19	Carroll Ave to Langley Dr	120	6 Divided	40	2008.01
Flower Avenue (MD 787)	A-83	Wabash Ave to Piney Branch Rd	55	2	25	2004.19
Carroll Avenue (MD 195)	A-89	Merrimac Dr to University Blvd	90	2	30	2004.21
Piney Branch Road (MD 320)	A-311	Sligo Creek Pkwy to University Blvd	80*	4	30	2004.01
Flower Avenue (MD 787)	B-1	Piney Branch Rd to Arliss St	70	2	25	2005.01
Arliss Street	B-2	Piney Branch Rd to Flower Ave	70	2	30	2005.02
Carroll Avenue	P-2	University Blvd to Piney Branch Rd	70	2	30	2003.12
Flower Avenue (MD 787)	P-3	Arliss St to Plymouth St	70*	2	30	2003.10
Garland Avenue	P-4	Wabash Ave to Piney Branch Rd	60	2	25	2003.11
Manchester Road	P-5	Piney Branch Rd to Geren Rd	70	2	25	2003.11

Reflects minimum right of way as contained in the applicable (existing) adopted plan. The recommended number of lanes refers to the number of planned through travel lanes for each segment not including lanes for turning, parking, acceleration, deceleration, or other purposes auxiliary to through travel. Rights-of-way to be measured symmetrically based upon roadway centerline unless noted with an asterisk*.

[13] Existing posted speed limit

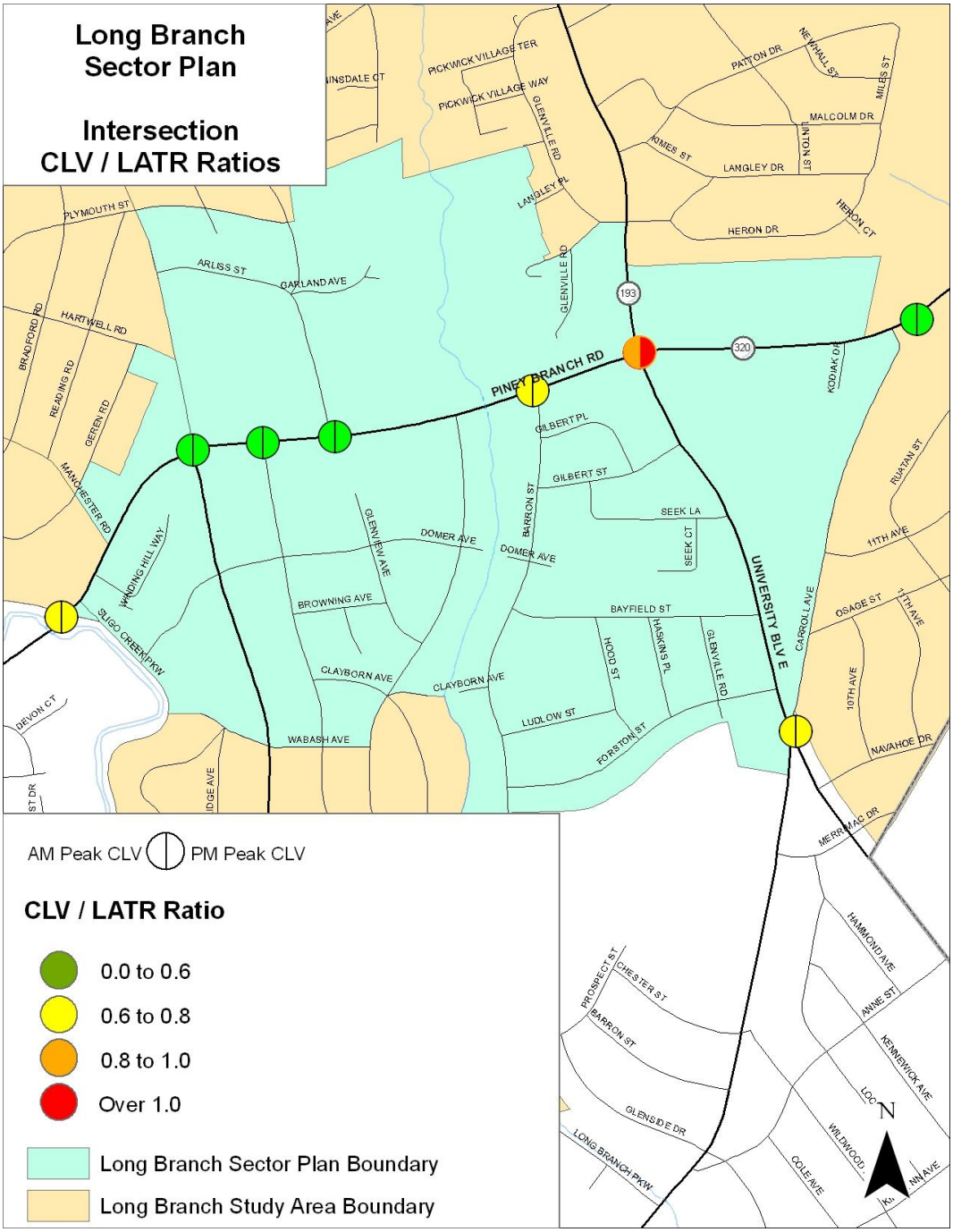
[14] Intended to reflect existing section and standard in road code thought to be most representative of existing section.

Table 5
Long Branch Sector Plan
Summary of Intersection Capacity Analysis

Intersection number	Name	AM Peak Hour		PM Peak Hour	
		CLV	V/C Ratio	CLV	V/C Ratio
335	University Blvd and Carroll Ave	1256	0.79	1247	0.78
338	Piney Branch Rd and Sligo Creek Pkwy	1295	0.81	1263	0.79
339	Piney Branch Rd and Flower Ave	855	0.53	812	0.51
340	Piney Branch Rd and Greenwood Ave/ Shopping Center Dr	458	0.29	662	0.41
341	Piney Branch Rd and Arliss St/Shopping Center Dr	866	0.54	818	0.51
342	Piney Branch Rd and Barron St	1048	0.66	1051	0.66
343	University Blvd and Piney Branch Rd	1381	0.86	1607	1.00
344	Piney Branch Rd and Carroll Ave/Driveway	739	0.46	840	0.53
658	University Blvd and Wayne Ave/ Buckingham Dr	852	0.53	729	0.46

Note: Congestion Standard for Silver Spring/Takoma Park Policy Area: 1,600 CLV.

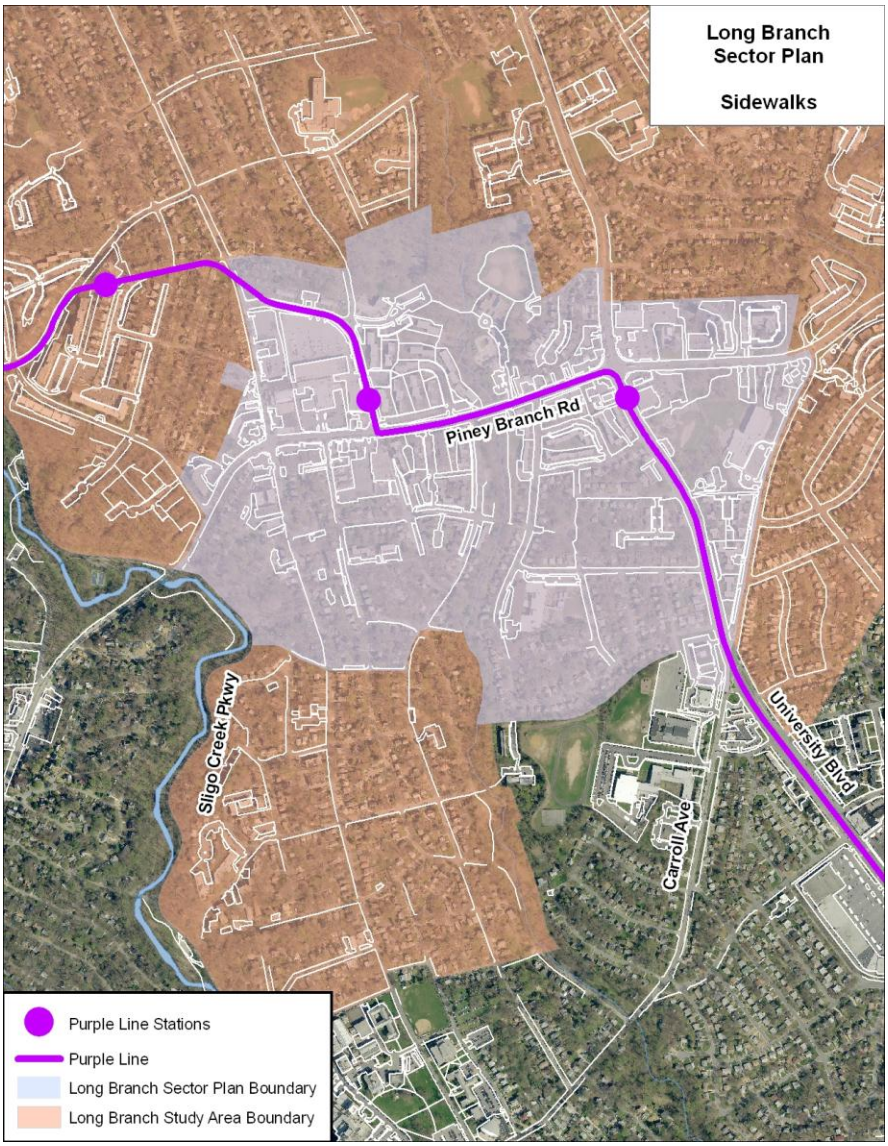
Figure 8 CLV/LATR Ratios



Existing Conditions - Pedestrian Network

The Plan area is characterized by high pedestrian and bicycle activity. Therefore, improved pedestrian safety and accessibility is a key in developing Plan recommendations. A current sidewalk inventory completed for the Plan area is presented in Figure 9.

Figure 9 Sidewalk Inventory Map



In fall 2008, Montgomery County Department of Transportation (MCDOT) completed a pedestrian road safety audit for the section of Piney Branch Road between Flower Avenue and the Prince George's County Line, an area identified as a high incident area (HIA) for pedestrian-related crashes. The MCDOT continues to examine suggestions from the audit and is pursuing

certain improvements based on funding, constructability, and coordination with Maryland State Highway Administration (SHA). Because Piney Branch Road is a State-maintained roadway, any improvements along this roadway require coordination with SHA. The schedule/status of the recommended improvements is provided below:

- Sidewalk improvements along the north side of Piney Branch Road between Flower Avenue and Greenwood Avenue – completed Spring 2010.
- Lighting Improvements along Piney Branch Road between University Boulevard and Carroll Avenue – agreement reached with PEPCO February 2010.
- Lighting Improvements along Piney Branch Road between Carroll Avenue and the Prince Georges County Line – agreement reached with PEPCO April 2010.
- Upgrade to LED countdown pedestrian signals (CPS) at the intersection of Piney Branch Road and Carroll Avenue – design request submitted to SHA May 2010.
- Pedestrian refuge islands and flashing beacons adjacent to New Hampshire Estates Park, across from Pineway Towers and between the entrances for the Nob Hill and Forest Park Apartments – review and approval by SHA pending.

Other pedestrian and capacity-related projects that have been completed or are being pursued within the Long Branch Sector Plan area include:

- Carroll Avenue Pedestrian Safety and Traffic Calming – between Piney Branch Road and University Boulevard, including bump-outs, crosswalks, and medians. Final phase completed June 2010.
- Flower Avenue Pedestrian Refuge Islands – installed on Flower Avenue at Arliss Street (approximately six years ago).
- Flower Avenue between Arliss Street and Piney Branch Road – installed pedestrian refuge island December 2004.
- Arliss Street at Garland Avenue – This is a revitalization project to be implemented by Department of Housing and Community Affairs (DHCA) for streetscape and ADA upgrades to the north and east sides of Arliss Street between Flower Avenue and Piney Branch Road, which will include ADA ramps, crosswalks, curbside improvements, and upgrades at the intersection at Arliss Street/Garland Avenue with new signing, crosswalks, curb ramps, landscaping and a slight geometric change to the island. The above improvements will add street trees, new sidewalk pavement, bring driveways up to ADA standards, and will provide a nicer and safer walking environment.
- Piney Branch Road Rehabilitation and Repaving Project – from the D.C. Line to University Boulevard.
- Traffic Signal Improvement – Piney Branch Road and Flower Avenue, including reconstruction of entire traffic signal, including ADA ramp improvements, APS, and CPS.
- Flower Avenue – the City of Takoma Park is considering annexation of a part of the Flower Avenue right-of-way between Carroll Avenue and Piney Branch Road. The City is also considering street improvements to Flower Avenue that would include new sidewalks as

well as landscaping that can slow and filter stormwater. The annexation proposal is to change the boundary line of the City of Takoma Park so that the full width of the right-of-way (the land between the property lines on both sides of the street) is wholly within the City of Takoma Park. Currently, the boundary line is at the edge of the Flower Avenue pavement on the east, or Silver Spring, side of the street. Private properties that are now in Silver Spring will remain in Silver Spring (or unincorporated Montgomery County).

Existing Conditions - Bicycle System

The Plan area has several bicycle facilities within its boundaries that are included in the *Countywide Bikeways Functional Master Plan* (CBFMP). These include bicycle lanes on Carroll Avenue, dual bikeway facilities along University Boulevard, and signed shared roadways on Sligo Creek Parkway and Piney Branch Road. In addition, there are a number of planned local signed shared roadway bikeways within the study area.

The recommended countywide bikeways for the Plan area are described in Table 6 and presented in Figure 10. The Countywide bikeway recommendations are currently not implemented, except for a short section of bike lanes that exist along Carroll Avenue between Long Branch Trail and Merrimac Drive

The Plan area includes three hard surface hiker-biker trails, including the Sligo Creek Trail, the Long Branch Trail, and the Northwest Branch Trail.

Table 6
Long Branch Sector Plan
2005 Countywide Bikeways Plan Recommendations

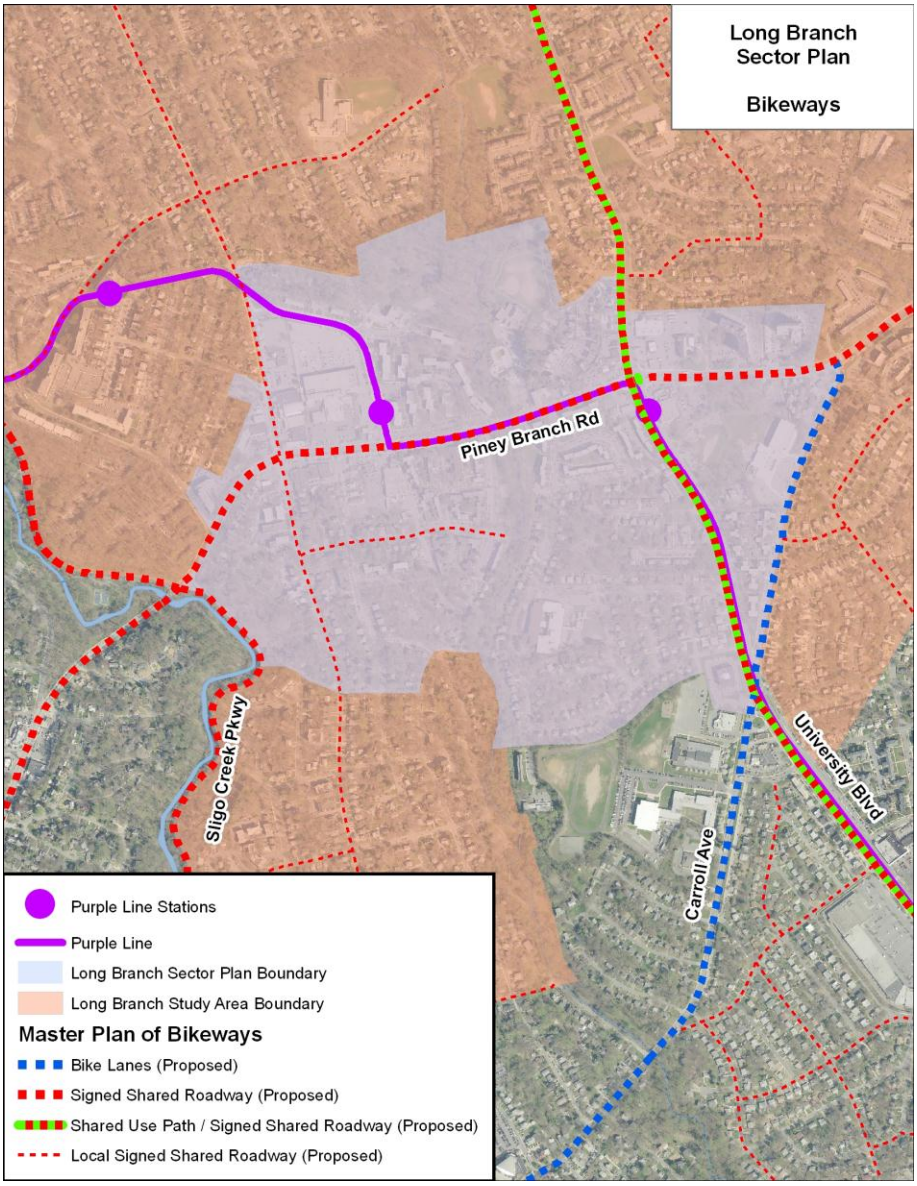
Bikeway Facility	Bikeway Route Number	Bikeway Type	Limits	Plan Reference
University Boulevard (MD 193)	DB-5	Dual Bikeway; Shared use path and signed shared roadway	Carroll Ave to Langley Dr	CBFMP, ESSMP
Carroll Avenue (MD 195)	BL-10	Bike Lanes	Merrimac Dr to Piney Branch Rd	CBFMP
Sligo Creek Parkway	SR-14	Signed shared roadway	Wabash Ave to Piney Branch Rd	CBFMP, ESSMP, TPMP
Piney Branch Road (MD 320)	SR-49	Signed shared roadway	Sligo Creek Pkwy to Carroll Ave	CBFMP
Flower Avenue (MD 787)	PB-8 (Local)	Signed shared roadway	Wabash Ave to Plymouth St	ESSMP, TPMP, ESSMP/TPMP Supplement
Domer Avenue	PB-63 (Local)	Signed shared roadway	Flower Ave to Long Branch Trail	ESSMP, ESSMP/TPMP Supplement

CBFMP – Countywide Bikeways Functional Master Plan

ESSMP – East Silver Spring Master Plan

TPMP – Takoma Park Master Plan

Figure 10: Recommended Countywide Bikeways Map



Summary – Existing Conditions

Key characteristics of the existing transportation network include the following.

- A street network that includes four state roadways, with intersections generally operating within the congestion standard set by the County's Subdivision Staging Policy. However, one intersection, Piney Branch Road and University Boulevard, currently operates worse than the congestion standard for the Policy Area and is expected to become more congested by 2030.

- There is good bus transit service within the Plan area, especially along Flower Avenue, Piney Branch Road, and University Boulevard. A large segment of those living and/or working within the Plan area are within a quarter-mile of a bus route.
- In addition to the two Purple Line stations planned for the Plan area, MTA plans two more stations just outside the Plan area. Densities associated with the areas around the two stations will provide for more commercial and residential units than exist today but will be comparable to other neighborhood serving stations in the County.
- Additional analysis is needed to quantify sidewalk connectivity in this area of high pedestrian activity and transit dependency. In general, gaps in the core area need to be addressed as part of the planning process. Particular attention should be paid to connectivity as it relates to the planned Purple Line stations.
- The Plan area has a number of existing hard surface trails and planned Countywide bikeways. The planning focus should attempt to identify additional facilities that would improve access to the Purple Line and to the existing trail system.

Programmed Transportation Improvements

There are no programmed SHA/DOT capital improvements projects currently within the Plan area. The planned Takoma/Langley Transit Center is one-half mile southeast of the Plan area boundary at the northwest corner of the New Hampshire Avenue (MD 650)/University Boulevard (MD 193) intersection.

Recommendations – Roadways

Major roadways that serve the Plan area are University Boulevard, Piney Branch Road, Flower Avenue, and Carroll Avenue. Table 8 lists the recommended master planned streets and highways within the Plan area. As shown in Table 8, many of the master planned roadways within the plan area are maintained and operated by SHA. The recommended new local streets will complete gaps in the roadway network and enhance movement of pedestrians, bicyclists, and vehicles throughout the community.

Table 8
Long Branch Sector Plan
Recommended Streets and Highways

Roadway Facility	Master Plan of Highways Number	Limits	Minimum r.o.w.[15] (feet)	Number of Lanes[16]	Target Speed	Design Stand
Major Highway						
Piney Branch Road (MD 320)	M-11	University Blvd to Carroll Ave	120	4 Lane Divided	35	2008.02 Modified
University Boulevard (MD 193)	M-19	Carroll Ave to Piney Branch Rd	120[18]	6 Lane Divided w/Transitway	35	2008.02 Modified
University Boulevard (MD 193)	M-19	Piney Branch Rd to Langley Dr	120	6 Lane Divided	35	2008.01 Modified
Arterial Rd.						
Flower Avenue (MD 787)	A-83	Wabash Ave to Domer Ave	60	2	25	2004.20 Modified
Carroll Avenue (MD 195)	A-89	Merrimac Dr to University Blvd	90	2	30	2004.22 Modified
Piney Branch Road (MD 320)	A-311	Sligo Creek Pkwy to Flower Ave	80	4	30	2004.02 Modified
Piney Branch Road (MD 320)	A-311	Flower Ave to Arliss St	103	4 Lane Divided	30	2004.06 Modified
Piney Branch Road (MD 320)	A-311	Arliss Street to University Blvd	112	4 Lane Divided w/Transitway	30	2004.06 Modified
Business St.						
Flower Avenue (MD 787)	B-1	Domer Ave to Arliss St	70	2	25	2005.01 Modified
Arliss Street	B-2	Piney Branch Rd to Flower Ave	100	2 Lane w/Transitway	25	2005.03 Modified
Glenview Avenue	B-3	Domer Ave to Piney Branch Rd	70	2	25	2005.02 Modified
Greenwood Avenue	B-4	Domer Ave to Piney Branch Rd	70	2	25	2005.02 Modified
Gilbert Street Extension	B-5	University Boulevard to Piney Branch Road	70	2	25	2005.02 Modifi
Minor Arterial Rd.						
Glenville Road	MA-1	Piney Branch Road to University Blvd.	70	2	25	2004.20 Modifi
Primary Residential St.						
Carroll Avenue	P-2	University Blvd to Piney Branch Rd	70	2	25	2003.12 Modified
Flower Avenue	P-3	Arliss St to Plymouth St	70	2	25	2003.10 Modified
Garland Avenue	P-4	Wabash Ave to Piney Branch Rd	60	2	25	2003.11 Modified
Manchester Road	P-5	Piney Branch Rd to Geren Rd	70	2	25	2003.11 Modified
Domer Avenue	P-9	Sligo Creek Pkwy to Barron St	60	2	25	2003.11 Modified

[15] Reflects minimum right of way, and may not include lanes for turning, parking, acceleration, deceleration, or other purposes auxiliary to through travel. Rights-of-way are considered to be measured symmetrically based upon roadway right-of-way centerline.
[16] The recommended number of lanes refers to the number of planned through travel lanes for each segment.
[17] Reflects the most representative roadway cross-section.
[18] This proposed minimum right-of-way does not include any additional right-of-way that may be required to accommodate the Purple Line. Additional right-of-way requirements for the Purple Line will be determined either at the time of final design for the Purple Line or at the time of subdivision using latest project-level plans available for the Purple Line.

Recommendations to accommodate the Purple Line and enhance the adjacent pedestrian and biking environment and network functionality include:

-
- Modify the University Boulevard master planned street cross section between Carroll Avenue and Piney Branch Road to accommodate the proposed Purple Line (within a dedicated median), bike lanes, cycle tracks, and a shared-use path.
- Create the Piney Branch Road right-of-way between Flower Avenue and Arliss Street to be at least 103 feet wide, accommodating a median; between Arliss Street and University Boulevard it should be a minimum of 112 feet to accommodate the Purple Line in a dedicated median lane.
- Create the Arliss Street right-of-way width between Piney Branch Road and Flower Avenue to be at least 100 feet to accommodate the Purple Line in a dedicated median lane.

Recommendations to reinforce a gateway to the area, enhance the pedestrian and biking environment, and encourage and complement street level neighborhood serving retail include the following.

- Implement a new roadway cross section for Piney Branch Road between University Boulevard and Carroll Avenue to include a median, street trees, bike lanes, a wide sidewalk, and a shared use path.
- Implement a consistent cross section along Carroll Avenue between University Boulevard and Piney Branch Road to include traffic calming features while accommodating through traffic.
- Reclassify Greenwood Avenue between Domer Avenue and Piney Branch Road as a Business Street with a minimum right-of-way width of 70 feet and a new cross section.
- Revise the Flower Avenue right-of-way width between Wabash Avenue and Domer Avenue to a minimum of 60 feet to implement a new cross section.
- Reclassify Flower Avenue between Domer Avenue and Arliss Street as a Business Street with a minimum right-of-way width of 70 feet, to implement a new cross section.

A recommendation to mitigate intersection level of service at University Boulevard and Pine Branch Road, mitigate Purple Line impacts on park access and parking, and enhance pedestrian access to the Purple Line Pine Branch Road station includes the following.

- Extend Gilbert Street (between University Boulevard / Langley Drive and Piney Branch Road) with a minimum right of way of 70 feet and a business street cross section.

Recommendations to improve network connectivity and better separate local and through traffic include the following.

- Reclassify Glenview Avenue between Domer Avenue and Piney Branch Road as a Business Street with a minimum right-of-way width of 70 feet.
- Extend Glenville Road to Piney Branch Road and reclassify it as a Minor Arterial (between University Boulevard/Langley Drive and Piney Branch Road) with a minimum right-of-way of 70 feet.
- Improve pedestrian and vehicular bridge crossing of the Long Branch Stream Valley Park at Domer Avenue.
- Reclassify Greenwood Avenue between Domer Avenue and Piney Branch Road as a Business Street with a minimum right-of-way of 70 feet and a cross section that improves neighborhood connectivity between the north and south sides of Piney Branch Road.

Recommendations – Intersections

Major intersections within the Plan area currently operate below the Silver Spring/Takoma Park Policy Area congestion standard of 1,600 CLV, except for the University Boulevard/Piney Branch Road intersection, which currently is operating at the congestion standard during the evening peak hour. A traffic analysis completed as part of the Purple Line AA/DEIS indicated that this intersection will operate with a Level of Service "F" in year 2030, with or without the Purple Line.

An examination of the University Boulevard/Piney Branch Road intersection was conducted using the Local Area Model (LAM). The analysis is required because the intersection just meets the congestion standard and is forecast to exceed the standard in the future. A closer examination of the variables contributing to the problem—or potentially mitigating the problem—will help determine how much more development the Plan area could accommodate. More information on how the LAM is used to assess intersection performance within the Plan area boundary is presented later in this appendix.

A summary of the analysis of the University Boulevard/Piney Branch Road intersection is presented in Table 9.

Table 9 Local Area Model Analysis of University Blvd and Piney Branch Road Intersection

Intersection	Existing		Holding Capacity or Current Plan Yield[19]		Proposed Long Term	
	AM	PM	AM	PM	AM	PM
Carroll Ave and University Blvd	1256	1247	1436	1496	1313	1446
Sligo Creek Pkwy and Piney Branch Rd	1295	1263	1550	1475	1575	1475
Piney Branch Rd and Flower Ave	855	812	1039	1162	962	1186
Piney Branch Rd and Greenwood Ave/ Shopping Center Dr	458	662	515	707	437	542
Piney Branch Rd and Arliss St/ Shopping Center Dr	866	818	1073	1223	1479	1436
Piney Branch Rd and Barron St	1048	1051	1154	1209	1002	1004
University Blvd and Piney Branch Rd	1381	1607	1746	2106	1398	1710
Piney Branch Rd and Carroll Ave/ apartment driveway	739	840	942	1116	852	1077
University Blvd and Wayne Ave/ Buckingham Dr	852	729	816	723	816	723

All future scenarios include:

- new vehicular bridge on Domer Ave across Long Branch
- extension of Glenview Road from Domer Ave to Piney Branch Road
- improvements to the intersection of University Blvd and Piney Branch Road:
  - a new access road at the southeast corner of University Blvd and Piney Branch Road
  - prohibition of left turns from Piney Branch Roadd to University Blvd
  - on Piney Branch Road in the eastbound direction, add a right turn lane and convert the existing thru/right lane to a thru lane.

The intersection and mitigation analysis indicates the following within the context of the land use scenarios that were tested:

- The current congestion standard of 1,600 CLV will be exceeded (possibly significantly) if nothing is done.

[19] Current Plan Yield is an estimate of the ultimate amount of development under the zoning in the current adopted applicable master plan. There is no time horizon (10, 20, 30 years) associated with this estimate.

- Constructing Gilbert Street Extended of the southeast and/or northwest quadrants of the intersection, along with associated left turn restrictions from Piney Branch Road, would likely bring the intersection to a level of congestion that is within or near the standard.
- Any land use scenario more intense than those tested would likely result in the standard being exceeded, requiring consideration of alternative strategies (e.g., a grade separated interchange) that would involve additional cost and would not necessarily be consistent with the Plan vision.

Based on those considerations and findings, the following strategies are recommended with respect to the major intersections in the Plan area.[20]

- Reconfigure University Boulevard/Piney Branch Road intersection to:

  - accommodate the Purple Line station within the University Boulevard median just south of Piney Branch Road
  - eliminate existing east-west split-phase signal operation on Piney Branch Road
  - prohibit eastbound and westbound left turns from Piney Branch Road
  - extend Gilbert Street from its current terminus at University Boulevard east to intersect with Piney Branch Road east of University Boulevard and thereby provide a two-way access road within the southeast quadrant of the intersection (to accommodate eastbound Piney Branch Road to northbound University Boulevard left turns)
  - extend Glenville Road to Piney Branch Road and reclassify it as a Minor Arterial (between University Boulevard/Langley Drive and Piney Branch Road)
  - improve pedestrian/bicyclist safety and accessibility to the Purple Line median station by eliminating certain turn movements through the intersection and potentially providing additional green time for pedestrian crossings.

- Reconfigure Piney Branch Road/Arliss Street intersection to accommodate the Glenview Avenue extension.
- Reconfigure University Boulevard/Gilbert Street intersection to accommodate the Gilbert Street extension.

<u>Recommendation - Public Transportation</u>

The Purple Line and its two stations within the Plan area are essential to attaining the Plan vision. Additional guidance related to public transportation include the following.

- Consider locating bus shelters along Piney Branch Road outside the public right-of-way on private properties via easements.

[20] Operational elements such as signal phasing and turn prohibitions will require further study in coordination with implementing agencies.

- Consider bilingual wayfinding signage for pedestrians so safe and direct paths to and from stations are easily identifiable.

- Continue local bus service to serve the new Purple Line stations. Local bus service will still be required in what will continue to be an area of high transit dependency.

- Implement the Plan area Purple Line stations as recommended in the *Purple Line Functional Master Plan*—within the median of University Boulevard just south of Piney Branch Road and within the median of Arliss Street just north of Piney Branch Road.

- Implement safe pedestrian/bicyclist access to Purple Line stations along University Boulevard and Arliss Street using techniques such as more visible crossings, controlled traffic movements, and additional green time for pedestrian crossings where operationally feasible.

The Plan supports implementing the Purple Line LPA as shown in the September 2010 *Purple Line Functional Master Plan.*

Recommendations - Pedestrian and Bicycle

As evidenced by the daily activity on its streets, Long Branch has a significant number of pedestrians and bicyclists. Improving mobility and providing safety measures for both of these modes is an important Plan goal.

Gaps are present in the existing sidewalk network. The Plan recommends rehabilitating existing connections and adding new connections to supplement pedestrian connectivity within the Plan area.

The Plan recommendations (see Table 10 and Figure 11) are intended to close one of the last missing gaps in an off-road bicycle network from Long Branch/Takoma Langley Crossroads to Bethesda/NIH/BRAC via Silver Spring. The proposed bike facilities connect Sligo Creek Trail and Long Branch Trail stream valley trails and extend the bikeways close to Northwest Trail. The recommendations also provide bikeway connections to the proposed Long Branch and Piney Branch Stations.

The Plan proposes east-west bicycle connectivity for all user groups through:

- bike lanes along Piney Branch Road from Sligo Creek Parkway to Carroll Avenue
- shared use paths along:
  - Wabash Avenue from Sligo Creek Parkway to Garland Avenue
  - Clayborn Avenue from Garland Avenue to Long Branch Trail
  - Domer Avenue from Barron Street/Seek Lane Local Park to Flower Avenue
  - Gilbert Street from University Boulevard to Long Branch Trail

- Gilbert Street extended from Piney Branch Road to University Boulevard

The Plan also proposes north-south bicycle connectivity for all user groups through:

- cycle tracks along University Boulevard from Piney Branch Road to Carroll Avenue (extending to New Hampshire Avenue and to Prince Georges' County line with recommendations in the *Takoma-Langley Crossroads Sector Plan*)
- shared use path on Garland Avenue from Clayborn Avenue to Wabash Avenue
- shared use path on Barron Street from Domer Avenue to Gilbert Street
- bike lanes on Flower Avenue between Domer Avenue and Arliss Street
- bike lanes on Arliss Street from Flower Avenue to Piney Branch Road
- bike lanes on Carroll Avenue from Merrimac Drive to Piney Branch Road
- signed shared roadway along Sligo Creek Parkway
- existing hard surface park trail along Long Branch Trail.

The Purple Line project, as planned, will construct bike lanes and a minimum six-foot sidewalk on University Boulevard south of Piney Branch Road to Carroll Avenue. This segment ultimately is recommended to include a directional cycle track.

Finally, the Plan supports the designation of the Plan area by the Maryland State Highway Administration, as a Bicycle-Pedestrian Priority Area. This designation will help improve the design of streets and pedestrian routes to provide better access throughout the community using:

- new public street connections between neighborhoods and the Town Center
- new or improved crosswalks that are safer and provide better links to neighborhoods
- pedestrian and bicycle paths (such as the walking and recreation loops).

Table 10
Long Branch Sector Plan
Recommended Bikeways

Bikeway Facility	Bikeway Route Number	Bikeway Type	Limits	Status
University Boulevard (MD 193)	DB-5	Shared use path and signed shared roadway	Piney Branch Rd to Langley Dr	Proposed
University Boulevard (MD 193)	DB-5	Ultimate: Bike lanes and directional cycle track; Interim: Bike lanes and sidewalk - then shared use path	Carroll Ave to Piney Branch Rd	Proposed
Piney Branch Road (MD 320)	DB-32	Shared use path and bike lanes	University Blvd. to Carroll Ave	Proposed
Carroll Avenue (MD 195)	BL-10	Bike lanes	Merrimac Dr to Piney Branch Rd	Proposed
Piney Branch Road (MD 320)	BL-39	Bike lanes	Sligo Creek Pkwy to University Blvd	Proposed
Flower Avenue (MD 787)	BL-38	Bike lanes	Domer Ave to Arliss St	Proposed
Wabash Avenue	SP-78	Shared use path	Sligo Creek Parkway to Garland Ave	Proposed
Garland Avenue	SP-78	Shared use path	Wabash Ave to Clayborn Ave	Proposed
Clayborn Avenue	SP-78	Shared use path	Garland Ave to Long Branch Trail	Proposed
Gilbert Street	SP-79	Shared use path	Long Branch Trail to University Blvd	Proposed
Gilbert Street Extension	SP-79	Shared use path	University Blvd to Piney Branch Rd	Proposed
Barron Street	SP-79	Shared use path	Domer Ave/ Seek Lane Local Park to Gilbert St	Proposed
Domer Avenue	SP-79	Shared-use path	Flower Ave to Barron St/ Seek Lane Local Park	Proposed
Flower Avenue	PB-8	Signed shared roadway	Wabash Ave to Domer Ave	Proposed
Flower Avenue	PB-8	Signed shared roadway	Arliss St to Plymouth St	Proposed

Table 10
(continued)

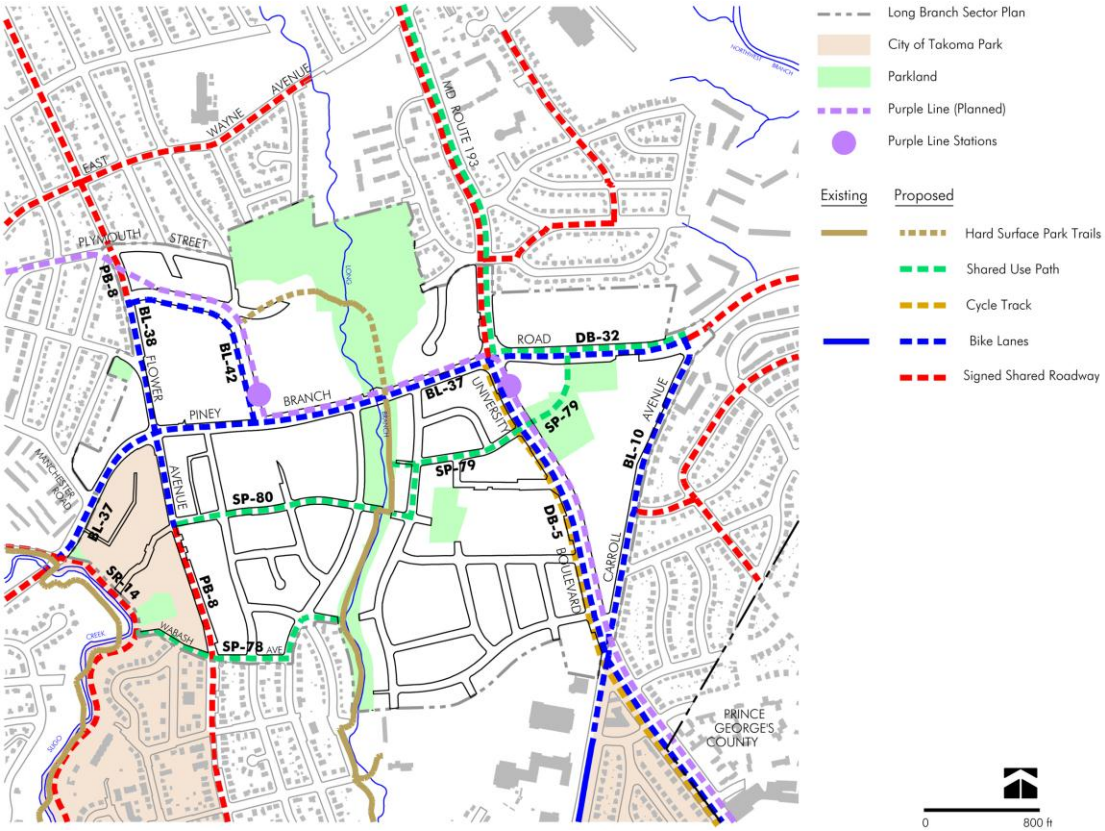
Bikeway Facility	Bikeway Route Number	Bikeway Type	Limits	Status
Sligo Creek Parkway	SR-14	Signed shared roadway	Wabash Ave to Piney Branch Rd	Existing
Arliss Street	BL-42	Bike Lanes	Flower Ave to Piney Branch Rd	Proposed

Additional recommendations for the pedestrian and bike network within the Plan area include the following.[21]

- Develop a sidewalk improvement program for the Plan area to prioritize the rehabilitation of existing sidewalks and complete missing sidewalks and trail connections.
- Implement proposed recreational loops to connect existing/future public and private facilities in the community.
- Install a traffic signal at the intersection of Piney Branch Road and Garland Avenue.
- Install a traffic signal at the intersection of Arliss Street and Garland Avenue.
- Install a traffic signal at the intersection of University Avenue and Gilbert Street/Gilbert Street extended.
- Improve the pedestrian bridge over Long Branch Stream at Clayborn Avenue.
- Improve the bridge over the Long Branch stream at Domer Avenue. It is recommended the bridge improvements provide for two way vehicular traffic and a shared use path as noted above. Formalize existing natural surface trail(s) between Long Branch Local Park and Long Branch-Wayne Local Park parallel to the Long Branch stream.

[21] The eventual implementation of operational improvements like traffic signals, crosswalks, sidewalks, pedestrian signals, bus stops, etc. are subject to the evaluation and concurrence of the applicable implementing agencies.

Figure 11 Recommended Bikeways



Transportation/Land Use Balance

The Plan's transportation analyses reflect the procedural guidance established by the County Council's Subdivision Staging Policy.[22]

Measures of Effectiveness

The analysis of plan development and its potential impact on the transportation network considers three levels of transportation analysis:

- an area-wide mobility analysis that indicates the degree to which any particular local land use and transportation scenario provides an appropriate balance between land use and transportation per current County policies.
- an intersection congestion analysis that indicates the degree to which the Plan land use and transportation network affects congestion hot-spots within the Kensington area
- a cordon line analysis demonstrating the relative amount of through traffic vs. local traffic.

The first two measures are elements of the County's Subdivision Staging Policy, called Policy Area Mobility Review (PAMR) and Local Area Transportation Review (LATR), summarized below. Detailed background information on these two analyses as applied under current policy is available on the Department's website, www.montgomeryplanning.org

Policy Area Mobility Review

Since the early 1980s, every master plan has considered the balance between land use and transportation using an assessment of area-wide conditions forecast for the Plan's end-state conditions. PAMR is the current measure of area-wide transportation adequacy, introduced into the County Growth Policy in 2007. It is similar in nature to the Policy Area Transportation Review measure that was an element of the Growth Policy from 1982 to 2003.

PAMR is used to implement the Adequate Public Facilities Ordinance (APFO) to forecast conditions by considering the County's pipeline of approved development and near-term transportation system improvements for which funding is committed during the next four years.

PAMR continues the County's long-standing policy that higher levels of roadway congestion are appropriate in areas with higher quality transit service. This provides multi-modal equity across the County and promotes the development of pedestrian-oriented, rather than auto-oriented, improvements in Metro Station Policy Areas.

[22] As previously noted (see footnote 2), PAMR was used as the area wide mobility test used in the Long Branch Sector Plan. The narrative that is included in this section of the Appendix therefore includes a description of that methodology and the corresponding results.

Through PAMR, the County Council has established transit and arterial level of service (LOS) standards for each policy area by considering area-wide adequacy on two scales relative transit mobility and relative arterial mobility.

Relative transit mobility is based on the Transit/Auto Travel Time level of service concept in the Transportation Research Board's 2003 *Transit Capacity and Quality of Service Manual* published by the Transportation Research Board. It is defined as the relative speed by which journey to work trips can be made by transit, as opposed to by auto. This concept assigns letter grades to various levels of transit service, so that LOS A conditions exist for transit when a trip can be made more quickly by transit (including walk-access/drive-access and wait times) than by single-occupant auto. This LOS A condition exists in the Washington region for certain rail transit trips with short walk times at both ends of the trip and some bus trips in HOV corridors. LOS F conditions exist when a trip takes more than an hour longer to make by transit than by single-occupant auto.

Relative arterial mobility measures congestion on the County's arterial roadway network based on the urban street delay level of service in the Transportation Research Board's 2000 *Highway Capacity Manual*. It measures congestion by comparing modeled congested speeds to free-flow speeds on arterial roadways. It then assigns letter grades to the various levels of roadway congestion, with letter A assigned to the best levels of service and letter F assigned to the worst levels of service. For a trip along an urban street that has a free-flow speed (generally akin to posted speed) of 40 miles per hour, LOS A conditions exist when the actual travel speed is at least 34 miles per hour, including delays experienced at traffic signals. At the other end of the spectrum, LOS F conditions exist when the actual travel speed is below 10 miles per hour.

The Plan area is located within the Silver Spring/Takoma Park Policy Area. Figure 12 shows the forecast Policy Area Mobility Review conditions for all Policy Areas in the County for 2040 assuming the Plan's high scenario. Table 11 summarizes the supporting travel data, including vehicle miles of travel (VMT) and vehicle hours of travel (VHT) for both free-flow and congested conditions. Given the assumptions of the high scenario, the Silver Spring/Takoma Park Policy Area is forecast to operate at:

- Relative Transit Mobility of 96 percent (LOS B – between 75 and 100 percent)
- Relative Arterial Mobility of 43 percent (LOS D – between 40 and 55 percent).

The current Subdivision Staging Policy requires that all Policy Areas have a relative arterial mobility of at least 40 percent, or LOS D conditions, regardless of the level of transit service provided. The PAMR results meet this threshold and from a policy perspective, the Plan can be considered to be in balance.

Figure 12 Forecast (2040) PAMR for Long Branch Sector Plan

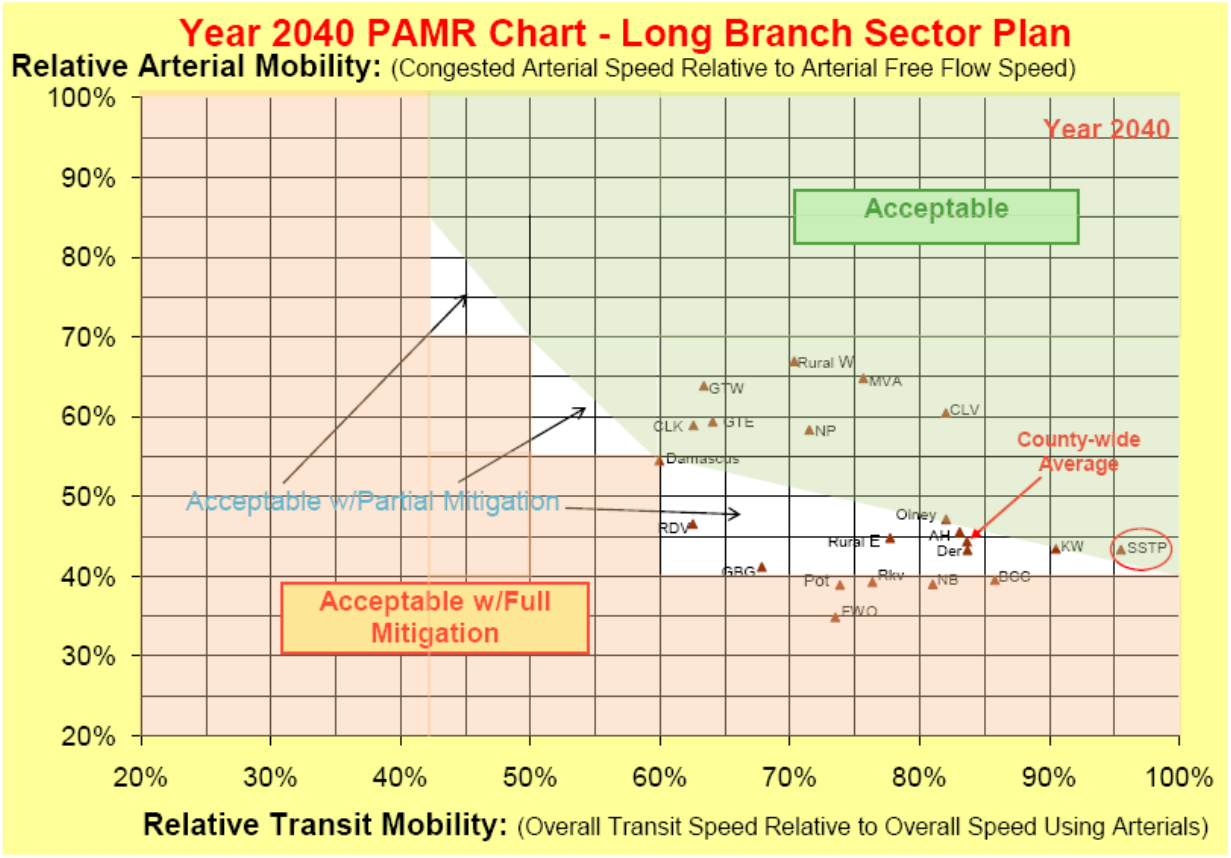


Table 11 Policy Area Mobility Review-2040

Derivation of Year 2040 PAMR Results by Policy Area - Long Branch Sector Plan

						Relative Arterial Mobility			Relative Transit Mobility
Policy Area	VMT	VHT (free-flow)	VHT (congested)	Free-Flow Speeds	Congested Speeds	Relative Arterial Mobility	Average Arterial Travel Time	Average Transit Travel Time	Relative Transit Mobility
Aspen Hill	192,056	5,862	12,866	32.8	14.9	46%	43.2	52.0	83%
Bethesda/Chevy Chase	401,996	15,799	39,962	25.4	10.1	40%	33.3	38.8	86%
Clarksburg	115,781	3,804	6,456	30.4	17.9	59%	39.8	63.6	63%
Cloverly	101,526	2,512	4,155	40.4	24.4	60%	46.2	56.3	82%
Damascus	93,962	2,338	4,290	40.2	21.9	54%	51.1	85.3	60%
Derwood	149,087	5,143	11,882	29.0	12.5	43%	38.9	46.5	84%
Fairland/White Oak	402,348	10,811	30,994	37.2	13.0	35%	42.4	57.7	73%
Gaithersburg City	248,615	9,210	22,366	27.0	11.1	41%	35.1	51.7	68%
Germantown East	112,574	3,829	6,449	29.4	17.5	59%	37.8	58.2	65%
Germantown West	177,848	5,726	8,964	31.1	19.8	64%	37.0	58.4	63%
Kensington/Wheaton	469,414	14,801	34,063	31.7	13.8	43%	39.6	43.8	90%
Montgomery Village/Airpark	153,705	5,121	7,902	30.0	19.5	65%	42.4	56.1	76%
North Bethesda	242,873	10,243	26,258	23.7	9.2	39%	32.1	39.6	81%
North Potomac	72,109	2,523	4,325	28.6	16.7	58%	41.6	58.3	71%
Olney	177,625	4,867	10,322	36.5	17.2	47%	49.7	60.6	82%
Potomac	201,666	6,061	15,571	33.3	13.0	39%	40.2	54.5	74%
R & D Village	78,574	3,462	7,435	22.7	10.6	47%	31.3	50.1	62%
Rockville City	288,966	11,783	29,997	24.5	9.6	39%	33.9	44.3	77%
Silver Spring/Takoma Park	272,727	10,535	24,302	25.9	11.2	43%	36.5	38.2	96%
Rural East	629,987	16,125	35,990	39.1	17.5	45%	49.0	63.1	78%
Rural West	252,588	6,860	10,243	36.8	24.7	67%	49.2	70.0	70%
Montgomery County Total	**4,836,027**	**157,415**	**354,792**	**30.7**	**13.6**	**44%**	**39.5**	**47.2**	**84%**

Relative Arterial Mobility measures total PM Peak Period vehicular travel on arterial roadways within each policy area
Relative Transit Mobility measures AM Peak Period travel times for journey-to-work trips originating within each policy area
VMT = Vehicle Miles of Travel
VHT = Vehicle Hours of Travel

The assessment of Policy Area conditions in Figure 11 and Table 11 reflect the upper bound of the demographic scenarios tested for Long Branch in combination with the year 2040 Round 8 demographic forecasts for all other areas in the Washington metropolitan region. Therefore, while the exhibits are appropriately labeled with a horizon year of 2040, staff does not expect that the full plan yield for any of the Policy Areas will be achieved by the year 2040.

The Plan also recognizes Long Branch's proximity to the Silver Spring CBD and the Takoma/ Langley Crossroads area. The development density and transportation improvements associated with both these areas that are anticipated to be in place by the year 2040 are assumed in the area-wide transportation analysis of the Plan.

Local Area Transportation Review (LATR)

The Long Branch Sector Plan supports reinvestment in a transit-oriented setting of a neighborhood scale with an emphasis on pedestrian safety, accessibility, and connectivity.

As previously noted, the intersection analysis conducted as part of the Plan applies the Critical Lane Volume (CLV) methodology from the Department's Local Area Transportation Review (LATR) guidelines. The CLV values are converted to a volume-to-capacity measurement, or V/C ratio, by dividing the current or forecasted CLV values by the applicable congestion standard.

As shown in Figure 13, the County's Subdivision Staging Policy establishes acceptable levels of congestion for different policy areas based on the degree to which alternative modes of transportation are available. In rural policy areas, where few alternatives to auto transport exist, the congestion standard is 1,350 CLV (which equates to the middle range of LOS D). In Metro Station Policy Areas, where multiple alternatives to auto transport are provided, the congestion standard is 1,800. Currently, intersections in the Long Branch area as part of the Silver Spring/Takoma Park Policy Area have a congestion standard of 1,600 CLV.

Figure 13 Intersection Congestion Standards by Policy Area

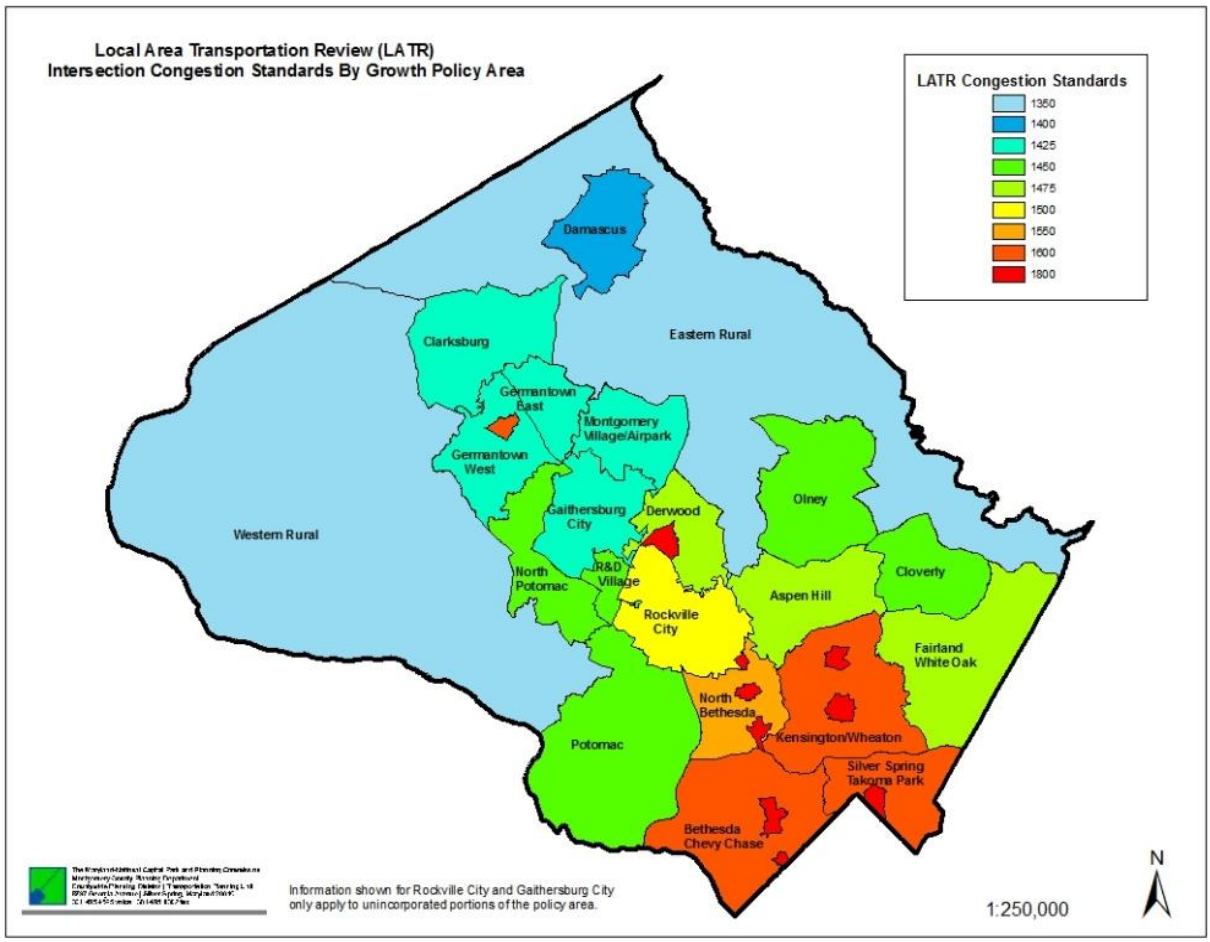


Table 12 summarizes the major intersections under both existing conditions and the medium land use scenario tested for the draft Plan. Findings include the following.

- The intersection of University Boulevard and Piney Branch Road has a CLV during the PM peak hour that is slightly above the Policy Area standard of 1,600.
- The introduction of the previously described extension of Gilbert Street, the associated prohibition of left turns from Piney Branch Road onto University Boulevard, and the addition of a turn lane from University Boulevard to westbound Piney Branch Road would likely allow the intersection to operate at or near the Policy Area standard.
- The intersection of Sligo Creek Parkway and Piney Branch Road would likely operate right at the Policy Area standard with no change in the configuration of that intersection.

Table 12 Intersection Analysis

	Name	Existing		Scenario 2A		Scenario 7C1		Scenario 7C2		Scenario 7C3	
	Land Use Scenario	Existing		Holding Capacity		High w/Retail Min		High w/Retail Min		High w/Retail Min	
	Intersection Improvements at University / Piney Branch										
	University / Piney Branch Double SBL							X			
	University / Piney Branch Double NBL									X	
ID	Intersection	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
335	Carroll & University Blvd	1256	1247	1436	1496	1313	1446	1313	1446	1313	1446
338	Sligo Creek Pkwy & Piney Branch Rd	1295	1263	1550	1475	1575	1475	1575	1475	1575	1475
339	Piney Branch Rd & Flower Ave	855	812	1039	1162	962	1186	962	1186	962	1186
340	Piney Branch Rd & Greenwood Ave / Shopping Center Dr	458	662	515	707	437	542	437	542	437	542
341	Piney Branch Rd & Arliss St / Shopping Center Dr	866	818	1073	1223	1479	1436	1479	1436	1479	1436
342	Piney Branch Rd & Barron St	1048	1051	1154	1209	1002	1004	1002	1004	1002	1004
343	University Blvd & Piney Branch Rd	1381	1607	1746	2106	1398	1710	1269	1627	1398	1710
344	Piney Branch Rd & Carroll Ave / Apts Driveway	739	840	942	1116	852	1077	852	1077	852	1077
658	University Blvd & Wayne Ave / Buckingham Dr	852	729	816	723	816	723	816	723	816	723

All alternatives include Domer Bridge, Glenview Rd Extension, Access Rd, Prohibit Left Turns from Piney Branch Rd to University Blvd, Split out EB Thru/Right on Piney Branch Rd to University Blvd

Cordon Line Analysis

The cordon line analysis measures total traffic volumes entering or leaving an area.

Vehicular Traffic Volumes

Table 13 compares existing and forecast traffic volumes at the studied cordon line. In general, the cordon line serves as the boundary between the Plan area, where land uses are proposed to change as a result of this Plan, and elsewhere in the County, which is subject to other plans and/or is otherwise not forecast to change development densities from this Plan.

At the cordon line, the total traffic volume is forecast to increase by about 28 percent, from 167,600 vehicles per day to 215,000 vehicles per day. The heaviest volumes are forecast occur on University Boulevard north of the Plan area, with nearly 47,000 vehicles per day.

Table 13 Sector Plan Cordon Line Traffic Volumes

2010 Conditions - Observed Peak Hour Totals

			AM Peak Hour			PM Peak Hour		
	Location	ADT	Inbound	Outbound	Total	Inbound	Outbound	Total
101	Walden	600	30	22	52	18	36	54
102	University N	38,600	1,396	1,827	3,223	1,700	1,643	3,343
103	Piney Branch E	25,100	1,548	609	2,157	1,018	1,092	2,110
104	University S	39,400	1,563	1,360	2,923	1,876	1,901	3,777
105	Carroll	10,500	279	605	884	546	356	902
107	Garland	900	54	54	108	22	18	40
108	Flower S	6,400	307	200	507	285	304	589
109	Sligo Creek Pkwy S	4,600	240	150	390	179	213	392
110	Piney Branch W	18,100	418	985	1,403	1,090	583	1,673
111	Sligo Creek Pkwy N	7,600	277	424	701	321	263	584
112	Manchester	1,700	36	68	104	96	94	190
113	Flower N	14,100	386	645	1,031	751	608	1,359
	TOTAL	167,600	6,534	6,949	13,483	7,902	7,111	15,013

2040 Conditions - Scenario 2 - Peak Hour Totals

			AM Peak Hour			PM Peak Hour		
	Location	ADT	Inbound	Outbound	Total	Inbound	Outbound	Total
101	Walden	800	30	40	70	30	40	70
102	University N	46,800	1,700	2,200	3,900	2,000	2,050	4,050
103	Piney Branch E	34,100	1,750	1,000	2,750	1,550	1,500	3,050
104	University S	45,900	1,800	1,650	3,450	2,150	2,200	4,350
105	Carroll	15,000	500	750	1,250	650	650	1,300
107	Garland	2,200	60	110	170	120	90	210
108	Flower S	11,200	450	400	850	500	550	1,050
109	Sligo Creek Pkwy S	5,000	250	150	400	150	300	450
110	Piney Branch W	24,100	750	1,200	1,950	1,250	900	2,150
111	Sligo Creek Pkwy N	10,900	400	550	950	450	450	900
112	Manchester	2,200	90	90	180	100	100	200
113	Flower N	16,800	450	750	1,200	850	800	1,650
	TOTAL	215,000	8,230	8,890	17,120	9,800	9,630	19,430

The traffic volumes are highest during the evening peak hour when the total traffic entering or leaving Long Branch is about 19,400, of which about 90 percent is going to or from Long Branch and about 10 percent is through traffic. Under the development scenario tested, the locally generated traffic would increase by about 26 percent and the through traffic would increase by about 50 percent.

Overview of Travel Demand Forecasting Process and Assumptions

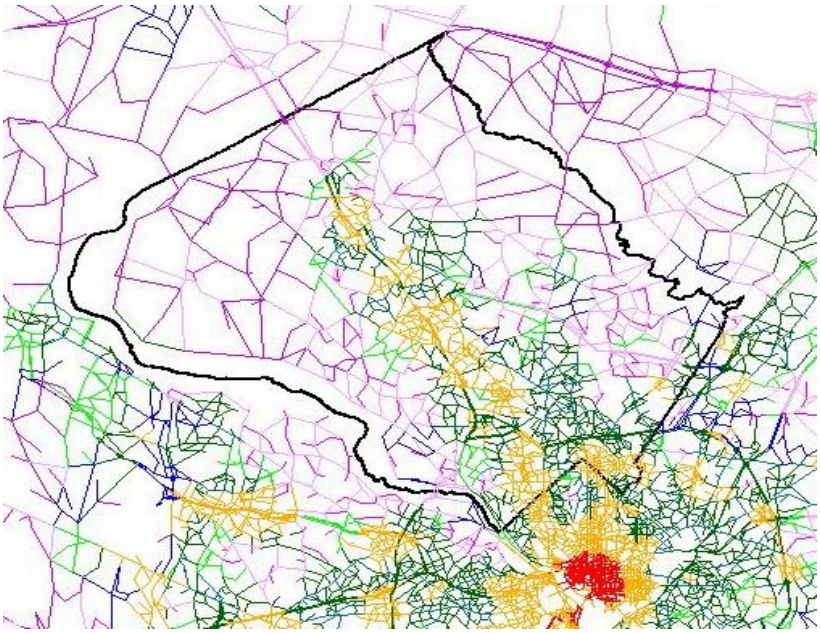
The travel demand forecasting process uses three levels of analysis. The Department's regional travel demand forecasting model, TRAVEL/3, is used to develop forecast travel demand results for weekday travel and evening peak periods.

TRAVEL/3 is a four-step model, consisting of:

- trip generation: the number of person trips that are generated by given types and densities of land uses within each TAZ
- trip distribution: how many person trips generated by each TAZ will travel to each of the other TAZs within the metropolitan area
- mode split: which mode of travel the person trips will use, including single-occupant auto, multiple-occupant auto, transit, or a non-motorized mode such as walking or bicycling
- traffic assignment: the roadways that will be used for vehicular travel between TAZs.

The TRAVEL/3 model incorporates land use and transportation assumptions for the metropolitan Washington region, using the same algorithms as applied by the Metropolitan Washington Council of Governments (MWCOG) for air quality conformity analysis. Figure 14 shows the relationship of Montgomery County in the regional travel demand network, featuring the coding of street network characteristics to reflect the general level of adjacent development density.

Figure 14 Travel Forecasting Network



TRAVEL/3 provides system-level results that are used directly to obtain PAMR forecasts for the County's Policy Area Transportation Review. The system-level results are also used as inputs to the finer grain analytic tools described below.

The second level of analysis consists of post processing techniques applied to the TRAVEL/3 forecasts, as described in NCHRP Report 255. These techniques include refining the morning and evening peak hour forecasts to reflect a finer grain of land use and network assumptions than included in the regional model, such as the location of local streets and localized travel demand management assumptions. The NCHRP 255 analyses are used to produce the cordon line analyses.

The third level of analysis includes intersection congestion, using the Critical Lane Volume (CLV) methodology described in the Department's *Local Area Transportation Review/Policy Area Mobility Review (LATR/PAMR) Guidelines*.

Travel/3 Forecasting Assumptions

The Long Branch Plan forecasts assumed the following parameters:

- A 2040 horizon year. This is currently the most distant horizon year for which forecast land use and transportation system development is available.

- Regional growth per the MWCOG Cooperative Forecasting Process, using the most current round of Cooperative Forecasts.

    - For the Washington region, the Round 8 forecasts include an increase from 3.0 million jobs and 1.9 million households in 2005 to 4.2 million jobs and 2.5 million households in 2040.

    - For Montgomery County, the Round 8 forecasts include an increase from 500,000 employees and 347,000 households in 2005 to 670,000 employees and 441,300 households in 2040. An additional 22,000 employees and 8,000 households above the Round 8 forecast was assumed for development located within the White Flint Sector Plan area—reflecting that Plan's current land use recommendations.

- Transportation improvements in the region's Constrained Long Range Plan (CLRP), a fiscally constrained transportation network. Notable projects assumed to be in place for the build-out of the Long Branch Sector Plan include:

    - eliminating the WMATA turnback at Grosvenor
    - the Purple Line between Bethesda and New Carrollton
    - the Montrose Parkway, including an interchange at Rockville Pike

- the Intercounty Connector
- express toll lanes on I-270 from I-370 to the city of Frederick.

Local Area Modeling Process and Assumptions

The Department's Local Area Modeling (LAM) process uses NCHRP Report 255 techniques to convert the TRAVEL/3 system level forecasts to intersection-level forecasts. The LAM process is then used as a pivot-point technique to reflect changes to the localized land use or transportation network, providing both cordon line and network analysis results.

The TRAVEL/3 model represents the Long Branch Plan and surrounding area as five transportation analysis zones (TAZs). The Long Branch LAM disaggregates the area within the plan overlapping these five TAZs into 16 subzones based on block groupings separated by major roads within the Plan area boundary.

The LAM process uses trip generation rates that are customized to reflect both existing conditions and future changes, considering both the land use types and changes in travel behavior.

Table 14 Local Area Model Peak Hour Trip Generation

Land Use	Units	AM	PM
office	1,000 square feet	1.60	1.60
retail	1,000 square feet	0.70	1.70
industrial	1,000 square feet	1.10	1.10
other	1,000 square feet	1.10	1.10
single-family residential	dwelling unit	0.95	1.11
multifamily residential (garden apartment)	dwelling unit	0.44	0.48

These trip generation rates reflect a combination of Local Area Transportation Review rates for development similar to that envisioned for Long Branch and were calibrated to match the observed traffic counts, considering the amount of through traffic in the roadway network so that the LAM volumes at the network cordon line are within two percent of observed count data for both morning and evening peak hours.

The trip generation rates shown in Table 14 are generally lower than those found in the Institute of Transportation Engineers (ITE) trip generation report, particularly for commercial land uses. The rates reflect the fact that ITE rates for most commercial locations do not have the transit availability and usage found in Long Branch. The difference for residential uses is not quite as high because ITE multifamily trip generation rates do reflect the fact that most multifamily housing units have, almost by definition, sufficient density to support transit

service. Finally, the retail trip generation rates in the Long Branch zones also incorporate a discount for pass-by and diverted-link trips.

Glossary of Transportation Terms

Bicycle Route - A bikeway that features appropriate directional and informational signage.

Bikeway - A transportation or recreational facility designed to accommodate bicycling, including shared use paths, bike lanes, and shared roadways.

Bike Lanes - Sometimes referred to as a Class II Bikeway. A portion of a roadway designated by striping and pavement markings for the preferential or exclusive use of bicyclists. Consists of a four to six-foot lane in each direction with traffic flow.

County Wide Bikeways - Bikeways of County wide significance that connect to major destinations: municipalities, central business districts, town centers, employment centers, transit centers, and regional parks and trails. They are the skeleton of the County's bikeway network.

Shared Use Path - An eight to 10-foot asphalt or concrete path separated from motorized traffic either by barrier or a minimum five-foot landscaped panel. These facilities may be located within a roadway right-of-way or within an independent right-of-way. They can also be designed for use by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users.

Shared Roadway - A roadway open to both bicycle and motor vehicle travel that may be an existing roadway, road with curb lanes, or road with paved shoulders, including wide outside curb lane (14 to16 feet), bikeable shoulder (four to six feet), or low volume, low speed streets.

Signed Shared Roadway - A shared roadway designated as a preferred bicycle route using warning, directional, and informational signage.

Major Highway - A road providing less speed and mobility than freeways but more access via at-grade intersections. Driveway access is acceptable in urban and dense suburban settings.

Arterial Road - A road connecting major highways and providing more access points than a major highway while moving traffic at lower speeds.

Minor Arterial - A road functioning as an arterial but with adjacent land uses that make traffic calming appropriate.

Business District Road - A road within a business district that is neither a major highway or arterial and that is primarily used to provide access to commercial establishments.

Primary Residential Road - A road used primarily to provide access to residential property.

Modal Split - The percent of persons arriving at a destination by one of the available transportation modes. For example, the percent of persons who arrive at a destination by private automobile is called the “auto mode split” and includes both drivers and passengers.

Light Rail Transit (LRT) - An electric railway system characterized by its capability to operate single cars or short trains along exclusive rights-of-way at ground level, on aerial structures, in subways, or in streets.