

Appendix 7: Transportation Analysis

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1. Purpose

The public hearing draft of the *Gaithersburg West Master Plan* proposes a conversion of the Life Sciences Center (LSC) area from auto-oriented suburbia to a transit-oriented, mixed-use, community. This Appendix provides the technical basis and details for the transportation system recommendations in the *Gaithersburg West Master Plan*.

The Plan proposes several innovative changes designed to promote the orderly implementation of a transit-oriented and sustainable center for the LSC, including:

- realigning the Corridor Cities Transitway (CCT) with line-haul service between the proposed LSC CCT stations
- accepting congestion levels that reflect the Planning staff and Planning Board approach to adequacy
- establishing a local street network that will create a finer grid than exists today and will improve vehicular and pedestrian connections between districts
- an implementation plan that relies on proportional participation by all developments and a staging plan to coordinate area wide transportation system implementation in lieu of assigning piecemeal transportation exaction requirements to individual development applications.

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 Growth Policy. The current Growth Policy applies an area wide mobility measure called Policy Area Mobility Review and a localized measure of congestion called Local Area Transportation Review. These measures, used to define adequacy for development review cases, are adapted for master plan analysis by applying the Department's TRAVEL/3 regional travel demand model and Local Area Model as described in detail in Chapter 3 of this Appendix.

The land use and transportation systems are balanced to promote end-state development that provides the density needed to redevelop the LSC area from an auto-oriented community to a transit-oriented community. The transportation system needed to accommodate these levels of development must achieve a 30 percent non-auto driver mode share (NADMS) for LSC employees, an objective that can be met through a combination of strategies, including:

- improved access to transit, including realigning the CCT through the LSC and improved transit circulator services in combination with the concentration of future development within walking distance of transit
- implementing a finer local street network with block lengths of 350 feet or less that promotes walking and bicycling
- managing the long-term parking supply by coordinating zoning requirements and public parking provisions
- commencing proactive travel demand management services through the establishment of the Greater Shady Grove Transportation Management District (TMD).

Establishing this balance between land use and transportation required an iterative review of alternative land use and transportation concepts, as described in this Appendix, which documents:

- the need to balance long-term land use and transportation systems to provide sufficient mobility in the developing LSC area and surrounding communities, using appropriate evaluation tools and measures of effectiveness
- the staging, implementation, and monitoring mechanisms that manage land use and transportation implementation details over two to three decades as the Plan is implemented.

The Appendix covers two areas.

- Chapter 2 describes the recommendations at a greater level of detail than described in the Plan.
- Chapter 3 demonstrates that the Plan's end-state conditions will result in an appropriate balance between land use and transportation.

2. Transportation Plan Recommendations

The *Gaithersburg West Master Plan* recommends a multimodal transportation system that recognizes the prior planning for the CCT system to create a transit-oriented community of walkable blocks with transportation options for residents, employees, and visitors.

Figure 1 shows the range of transportation system strategies examined in the Plan, including:

- travel demand management
- transit services
- local street network
- transportation system policies.

Figure 1 indicates the likelihood that the Plan would incorporate the different strategies based on analyses and coordination performed to date. The shaded cells indicate those strategies with high potential. In general, those strategies with high potential were incorporated into the Plan.

Figure 1: Transportation Management Strategies

	Strategy	Opportunities	Constraints	Potential
Demand Management cost	Reduce Single Occupant Vehicle mode share	Flexible, low capital cost	Operational costs, monitoring	High
	Increase parking charges	Reduce traffic, provide revenue	Establishing parking lot district, garage locations	Moderate
Transit Services	Construct CCT through LSC area	Serve planned development near LSC stations, reduce traffic congestion	Capital costs, operational costs	High
	Express bus service using value-priced lanes from I-270 and ICC	Capture long-distance riders	Operating cost	Moderate
	Shuttle services	Low capital cost	Operating cost	Moderate
Local Street Network	Add local mid-block streets	Provide alternate routes, reduce walking distances	Capital costs, defining final alignment and implementation responsibilities	High
	Left turn prohibitions	Reduce congestion	Circuitous trips (cars and buses), public acceptance	Moderate
	Add turn lanes	Reduce congestion	Increase pedestrian crossing distances, capital cost	High (for selected locations)
	Grade separated interchanges	Reduce congestion	Capital cost, attractiveness, inhibits pedestrian crossings, public acceptance	Moderate (for selected locations)

Policies	Strategy	Opportunities	Constraints	Potential
	CCT bridging over roadways	Reduce congestion	Capital cost, attractiveness, public acceptance	Moderate (for selected locations)
	Accept higher congestion levels	Consistent with urbanizing area, no capital cost	Operating costs, public acceptance	Moderate
	Increase residential uses	Create mixed use centers, provide housing near jobs, lower trip generation rates	Economic and market feasibility	Moderate
	Staging Plan	Provide services at time of development	None	High

A. Travel Demand Management

Travel Demand Management (TDM) describes a wide range of programs and services designed to reduce the use of single-occupant vehicle trips. 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 and include:

- infrastructure such as high quality pedestrian environments, bus or high occupancy vehicle facilities or preferential treatments, telework centers, commuter information stores, car-sharing (i.e., Zipcar) and bike-sharing stations, and well-located transit stations or stops with real-time transit information
- services such as transit services, vanpools, ride-matching, Guaranteed Ride Home services, alternative commute option information (i.e., Greater Shady Grove Management District and the Metropolitan Washington Council of Government Commuter Connections)
- policies that affect the use of 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.

Montgomery County Travel Demand Management Applications

Current TDM strategies include a variety of programs and services integrated between the private and public sectors. The Office of Legislative Oversight has summarized the County's existing TDM activities in their December 2008 report 2009-6, titled Transportation Demand Management Implementation, Funding, and Governance.

Private sector contributions include requirements of Planning Board conditions determined at the time of development review and approval (subdivision), often through a Traffic Mitigation Agreement (TMAG) to either provide a specified set of services or to achieve a specific performance objective. TMAGs are described in the Planning Board's Local Area Transportation Review/Policy Area Mobility Review (LATR/PAMR) Guidelines.

Public sector contributions include the activities of the area Transportation Management District (TMD). The proposed Greater Shady Grove TMD will provide services to employers and employees in the commercial areas of the LSC to promote adoption of commuter benefits programs by employers and to inform employees of alternative commuting options. The Greater Shady Grove TMD will also work to improve transit service in the area, to increase ridership, and to provide transit-friendly amenities.

In 2002, the County Council adopted Bill 32-02, an important link between the public and private sector TDM programs. This TDM law requires employers with more than 25 employees located in one of the County's four Transportation Management Districts to implement a Traffic Management Plan (TMP), participate in an annual commuter survey, and submit an annual report of TMP activities.

Target TDM Markets

TDM strategies can be customized to target markets that consider land use (i.e., residential, commercial, or special event) and time of day (i.e., peak period, midday, or all day). Figure 2, from the Institute of Transportation Engineers Transportation Impact Analyses for Site Development an ITE Proposed Recommended Practice, summarizes the different types of TDM techniques commonly applied nationally to reduce vehicle traffic generation by their target market and trip reduction focus.

Figure 2: Travel Demand Management Techniques and Target Markets

Table 7-11. Sample TDM Techniques With Potential to Reduce Site Traffic Generation

Technique ^a	Types of Trips Affected					
	Office	Retail	Industrial	Residential	Lodging	Event
Physical Actions						
Parking availability reduced below normal demand level or substantial increase in parking costs	T, P	-	T, P	T, P	T, P	T, P
Quality pedestrian environment on-site (mixed-use developments only)	T, P, M	T, P, M	T, M	T, P, M	T, P, M	T, P, M
Building amenities (bicycle lockers, showers, ATM, parking garage dimensions to accommodate vanpools, wiring for ease of telework)	T, P, M	-	T, P, M	T, P, M	-	-
Non-Physical Actions						
Transit service to areas of trip origins	T, P	T, PM	T, P	T, P	T, P	T, P
Carpool, vanpool programs (ridematching, preferential parking, subsidies, promotion)	T, P	T, PM	T, P	T, P	-	T, P
Modified work schedules (4/40, staggered, flex)	P	-	P	P	-	-
Telecommute options	T, P	-	-	T, P	-	-
Internal shuttle transportation to/within development site	T, M	T, M	-	T, M	T, P	-
Transit subsidy	T, P	-	T, P	T, P	-	-
On-site transportation coordinator or information center	T, P	T, P	T, P	T, P	T, P	T, P

T = daily trips, P = peak hour trips, PM = p.m. peak hour trips, M = midday trips.

^aOther techniques may be applicable either separately or in combination with others. To be effective, each measure must be designed to generate and sustain use of alternatives to the single-occupant automobile.

Many TDM techniques are effective in reducing auto travel at all times of day, others are targeted to peak period conditions. The Plan recommends a continued focus on weekday peak period modal shifts to optimize transportation system performance when congestion is greatest. As Montgomery County begins to consider climate change and energy requirements identified in the 2009 Climate Protection Plan the emphasis of travel demand management can be expected to shift somewhat from managing traffic congestion to reducing greenhouse gas emissions. The two objectives (peak period mobility versus daily or annual carbon footprint) are often, but not always, in sync. Shifting travel modes from auto to walking or biking will serve both objectives and TDM policies should make this shift the highest priority.

On the other hand, shifting an auto trip from the peak period to the off-peak period will serve the historic TDM objective of managing peak period performance, but has a smaller effect on greenhouse gas emissions (the difference between travel speeds and emissions during peak and off-peak periods).

The Plan's TDM strategies focus on commuters who work in the LSC area, for three reasons.

- Recurring vehicular travel demand is most constrained by traffic leaving the LSC area during the evening peak period.
- For the types of housing envisioned in the LSC (predominantly multifamily mid-rise units), the location and market provide high levels of transit use without the application of external TDM actions.
- TDM strategies applied at the workplace are often more effective than those applied at the residential level, due to both economies of scale and the fact that the employer/employee relationship can often be more productively applied than the residential owner/tenant relationship.

The staging plan for the LSC recommends that the mode share and transportation system performance be monitored periodically to track planned progress in targeted modal shifts and a reduction in per-unit vehicle trip generation rates. The implementation plan relies on a strong linkage between public and private TDM efforts so that the responsibility for success of the LSC trip reduction efforts are distributed across all plan area owners and tenants.

LSC Employees

The Plan recommends a 30 percent non-auto driver mode share (NADMS) goal for the LSC. The current NADMS for this area is 16 percent. The NADMS measures the percentage of travelers who drive to and from work in the LSC as opposed to taking other modes.

The Local Area Modeling performed for the LSC analysis assumed that the 30 percent NADMS would be achieved over time for all commercial employees within the LSC located north of Darnestown Road. For monitoring purposes, the NADMS has been defined as:

- employees who normally arrive at their LSC workplace during the busiest two hours of the morning peak period from 7:00 a.m. to 9:00 a.m.
- auto drivers, including those in single-occupant vehicles (SOV) and those in carpools and vanpools.
- non-auto commuters, including transit riders, carpool/vanpool passengers, walkers, bicyclists, as well as those who have an LSC workplace but telecommute on the day of surveys.

The last master plan for the LSC area, the 1990 Shady Grove Study Area Master Plan estimated, on average, approximately 12 percent of the home-to-work trips originating outside the study area bound for Shady Grove would arrive at work via transit. As noted previously, the NADMS goal for this Plan in the LSC is 30 percent.

When comparing these two mode shares it should be noted that the land area in the 1990 Shady Grove Plan is roughly twice as large as the LSC and reflects a relatively dispersed land use pattern located both east and west of I-270. Also, the 30 percent NADMS goal for the LSC includes transit use, as well as other sub-mode shares such as ridesharing, walking, or biking. The Plan considers a 30 percent NADMS goal in the LSC area achievable for several reasons, including:

- the realignment of the CCT through the LSC

- the concentration of planned development within walking distance of the three proposed CCT stations in the LSC
- complementary feeder-bus service to the proposed CCT stations
- implementation of an active TDM program in the LSC (including employer-sponsored subsidized transit fares, parking management strategies, and staggered work hours).

LSC Residents

The 1990 Shady Grove Study Area Master Plan identified a 75 percent auto-driver goal for the journey-to-work for study area residents. The 2005 Census Update Survey noted that this goal has very nearly been achieved in the R&D Village Policy Area, with a 73 percent auto-driver mode share reported for area residents.

B. Corridor Cities Transitway (CCT) and Local Transit System

To serve the LSC area, this Plan recommends realigning the CCT with line-haul service between the proposed LSC CCT stations. To reduce delays for transit and vehicles, this realignment may require CCT grade separations at Key West Avenue (MD 28) and Great Seneca Highway (MD 119). Project planning for the CCT takes into account the potential need to reconfigure existing bus service to avoid duplication and ensure the most efficient allocation of vehicles and personnel. There are currently six Ride On routes from the Shady Grove Metro Station, three of which provide service to the LSC area, including Shady Grove Adventist Hospital and the Traville Transit Center. When the CCT is in place, these routes may need to be readjusted to ensure the most efficient service. This Plan also recommends developing express bus service using value-priced lanes from I-270 and the Intercounty Connector (ICC), as well as shuttle bus routes to serve the LSC area.

As LSC densities increase with zoning requirements and design guidelines that require buildings to be street-oriented rather than parking-lot oriented, the number of potential transit riders and the attractiveness of transit will also increase.

Corridor Cities Transitway

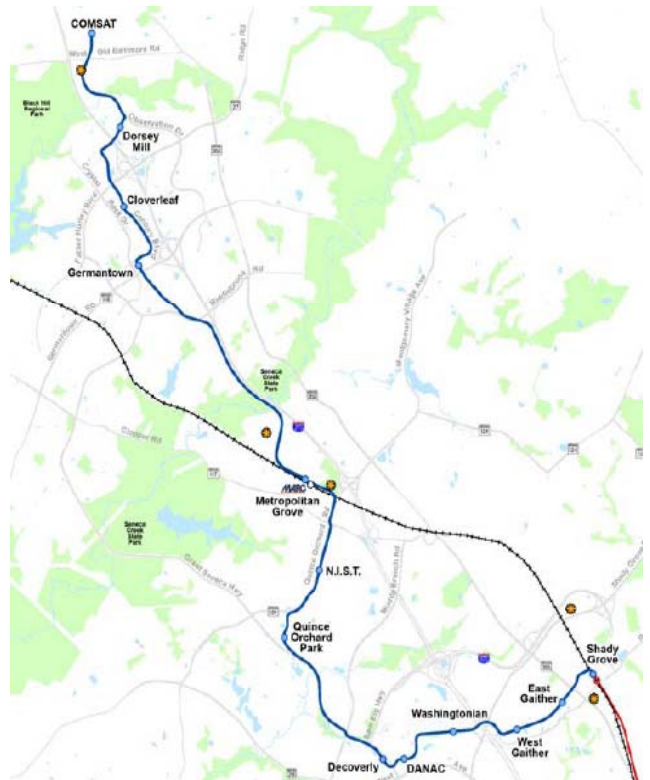
Background

The Corridor Cities Transitway (CCT) has been included in County master plans in one form or another for over 20 years. The CCT is envisioned as either a bus rapid transit (BRT) or light rail transit (LRT) system providing frequent (five to ten minute) service between the Shady Grove Metro Station and Clarksburg (i.e., the COMSAT site).¹

Purpose

The CCT's primary purpose is to provide improved mobility options within the corridor as well as improved access to the Metrorail system. The CCT is viewed as central to establishing active, pedestrian oriented, mixed-use centers along the entire corridor—not just in the Gaithersburg West area. As such, the visions for the centers and the CCT are co-dependent.

Figure 3: Current CCT alignment



¹While adopted master plans envision the CCT extending into Frederick County, the current Environment Assessment underway by the Maryland Transit Administration (MTA) includes only the segment between Shady Grove and the COMSAT site in Clarksburg. Any eventual first phase of actual construction of the CCT would likely involve a segment that began at the Shady Grove Metrorail Station and ended at some location south of the COMSAT site (e.g., Metropolitan Grove or Germantown).

Station Locations and Functions

The activity centers served by the CCT stations include Shady Grove, King Farm, Crown Farm, Quince Orchard Park, Metropolitan Grove, Germantown and the southern edge of Clarksburg. One overriding objective in recent past (Shady Grove and Twinbrook) and current (Germantown and Gaithersburg West) planning efforts is to establish a vision for pedestrian oriented mixed-use communities with transit supportive densities within one-half mile of most station areas. Combining a mix of activities with high quality transit service will reduce the growth rate of single occupant auto trips—sometimes significantly. There are 14 planned station locations along the alignment between Shady Grove and COMSAT. The current plan is for seven of the 14 stations to have parking for transit riders, including the Washingtonian (Crown Farm) and Decoverly stations.

Current CCT Study

The Maryland Transit Administration has completed an updated Alternatives Analysis/Environmental Assessment (AA/EA) of the CCT. The assessment updates information from the CCT's 2002 Environmental Impact Statement and guide the selection of a preferred mode (bus rapid transit or light rail).

Alternative Alignment Recommended by the Gaithersburg West Master Plan

At its southern end, the CCT current master planned alignment (the blue line on Figure 4) goes over I-270 heading west after leaving King Farm and serves the Crown Farm development in the City of Gaithersburg before entering the Gaithersburg West study area along the south side of Decoverly Drive. The Plan proposes two stations, the DANAC station on Decoverly Drive just before the alignment goes over Great Seneca Highway and the Decoverly Station located on the west side of Great Seneca Highway.

The red line represents potential modifications to the CCT alignment. The modified alignment within Crown Farm is a result of the local review of the development carried out by the City of Gaithersburg and has been closely coordinated with the Maryland Transit Administration.

The Plan recommends the CCT alignment be extended south along Broschart Road to better serve the Shady Grove Life Sciences Center, the current Public Service Training Academy site, and the Johns Hopkins University (JHU) Belward Research Campus with stations at each of these locations. Commuter parking would likely be available at no more than two of the stations and more likely, just one of the three stations.

King Farm



7

Metropolitan Grove



8

Figure 4: Draft Plan CCT Alignment and Stations

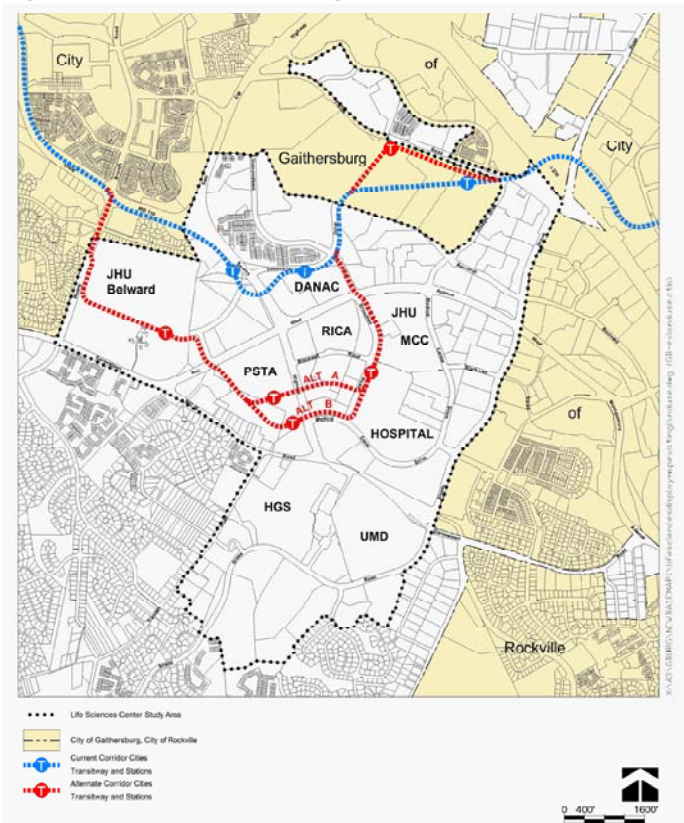


Figure 1: Draft Plan CCT alignment and stations

The analysis of this proposed change to the alignment of the CCT is being carried out by the MTA using updated land use forecasts provided by the Planning Department.² The analysis is expected to be completed after the release of the Alternatives Analysis/Environmental Assessment in May 2009. It will inform the selection of a Locally Preferred Alternative scheduled to occur in Fall 2009.³

Staff believes the proposed alignment shift will better support the Plan's vision, complement the other planning efforts along the I-270 Corridor, and better fulfill the potential of the CCT. Accordingly, CCT planning should continue and should assume that shifting the alignment south better meets the Plan's vision, even if it requires additional environmental impact analysis.

It should also be noted that some communities near the proposed alignment have requested consideration of other modifications to the alignment on the Belward campus. While these additional modifications are not currently being studied by the MTA, staff feels that the dialogue should continue so as not to preclude further consideration at a later date.

CCT Staging Considerations

It is possible the CCT will involve a staged or phased implementation—regardless of mode or alignment. Key factors to consider in the staging plan include:

- frequent service (ten minutes or less)
- average scheduled speed faster than conventional local bus service—a minimum of 15 mph.
- new, low floor, hybrid electric or other clean technology, and branded vehicles
- distinctive, well-lit station areas that are far enough apart to maintain an attractive average scheduled speed.

Existing Ride On Service

Nine Ride On routes serve the Gaithersburg West Plan area with service that varies so the daily ridership shown in the table to the right includes passengers boarding outside the planning area.

Ride On Strategic Plan

The September 2008 Montgomery County Strategic Transit Plan indicates that Travilah is an underserved area of the County. Additional service in that area would likely result in additional service in the Gaithersburg West area.

Potential Bus Service Changes in Response to Introduction of the CCT

Project planning for the CCT takes into account the need to reconfigure the existing bus service in order to avoid duplication and ensure the most efficient allocation of vehicles and personnel. Preliminary concept level planning of how a route network might evolve if the CCT were in place has been conducted by the MTA in consultation with the County's Ride On staff and with WMATA's Metrobus staff.

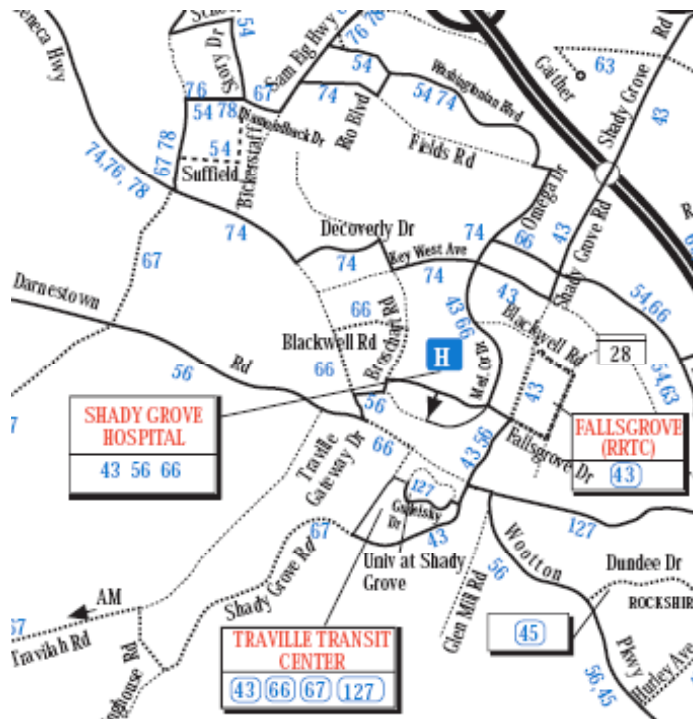
As of this writing, the operating plan for the bus service envisioned under the CCT's BRT alternative calls for improved service frequencies on the above routes and does change any route terminals. Under the LRT alternative, the Rockville routes and Route 43 would have improved service frequencies with no change in the routes' beginning or end points. The remaining routes (those more oriented to the LSC area) would be shorter, operate more frequently, and be designed as feeder routes for the CCT.

²The forecast provided by MTA includes updated estimates for Germantown, Twinbrook, and White Flint as well.

³Note that the analysis of the alternative alignment effectively expands the scope of the LPA decision to include alignment (master plan or new alignment through LSC area) as well as mode (bus rapidtransit or light rail). If the new alignment is chosen as part of the LPA, it is possible the Federal Transit Administration will require the MTA to conduct another supplemental environmental assessment, which could delay the project entering the FTA's New Start pipeline.

Figure 5: Ride On Routes and Average Ridership

Route No.	From	To	Peak Period Frequency	Average Weekday Ridership
43	Shady Grove Metrorail	Shady Grove Hospital	15	900
54	Rockville	Lake Forest	20	2,200
55	Rockville	Germantown Transit Center	15	6,900
56	Rockville	Lake Forest	20	2,500
66	Shady Grove Metrorail	Traville Transit Center	30	110
67	Shady Grove Metrorail	Traville Transit Center	30	130
74	Shady Grove Metrorail	Germantown Transit Center	30	750
76	Shady Grove Metrorail	Poolesville	30	600
78	Shady Grove Metrorail	Kingsview Park & Ride	30	230



Preliminary Ridership, Cost, and Cost-Effectiveness Estimates for the CCT

The MTA project team has released the following preliminary ridership (year 2030) estimates for the current CCT alignment using Round 6.4 demographic projections. The average weekday ridership is estimated to range from 21,000 to 30,000.

Figure 6: Round 6.4 Ridership for Existing CCT Alignment

CCT Alternatives Preliminary Travel Demand Forecasts & Cost Estimates				
Transit Alternative	Travel Time Shady Grove to COMSAT (minutes)	Ridership (Daily Boardings)	Capital Cost (millions-2007\$)	Annual Operations and Maintenance Costs (millions-2007\$)
Hwy 1 and Trans. TSM	60	6,000 - 7,000	\$86.9	\$14.8
Hwy 1 and Light Rail	36	24,000 - 30,000	\$777.5	\$28.1
Hwy 1 and Bus Rapid	38	21,000 - 27,000	\$449.9	\$26.8
Hwy 2 and Light Rail	36	24,000 - 30,000	\$777.5	\$28.1
Hwy 2 and Bus Rapid	38	21,000 - 27,000	\$449.9	\$26.8

Both Hwy 1 and Hwy 2 have four general purpose and two express toll lanes on I-270 in each direction in Montgomery County north of I-370 to the future interchange with New cut Road (between MD 121 and West Old Baltimore Road). Both have two general purpose lanes on I-270 in each direction from the future New cut Road interchange to I-70. Hwy 1 has two express toll lanes in this segment while Hwy 2 has one express toll lane.

MTA has also estimated the cost effectiveness of the alternatives under consideration (see Figure 7).

Figure 7: Cost Effectiveness of the Existing CCT Alignment

		A	B	C	D
	Total Capital Costs (2007 dollars)	Annualized Capital Costs (2007 dollars)	Annual Operating Costs (2007 dollars)	Annual User Benefit (Hours)	Annualized Cost per Hour of User Benefit
TSM	86,860,000	7,440,700	14,793,000	1,890,000	--
Build Alternatives					
Alternative 6A (LRT)	777,530,000	62,202,400	28,129,000	3,960,000	\$32.90
Alternative 6B (BRT)	449,920,000	36,443,500	26,859,000	4,110,000	\$18.50
Alternative 7A (LRT)	777,530,000	62,202,400	28,129,000	3,990,000	\$32.43
Alternative 7B (BRT)	449,920,000	36,443,500	26,859,000	4,140,000	\$18.25

The Annualized Cost per Hour of User Benefit (column D) takes into account the annualized costs of the respective alternatives and the extent to which travel time benefits occur when compared to the TSM or ⁴Transportation System Management alternative.⁴ This variable is used by the Federal Transit Administration (FTA) to evaluate projects across the country competing for federal funds. Under the current FTA guidelines, the cost per hour for the Light Rail Transit (LRT) alternatives exceeds the amount that the FTA would consider competitive for funding. The BRT alternatives are well below the FY 2009 threshold cost of \$23.99 per hour, indicating greater funding potential for BRT. The cost estimates are not expected to change prior to the availability of the AA/EA document in May 2009 but are expected to change when the alignment through the Life Sciences Center area is examined by the MTA project team.

⁴ The TSM alternative is an alternative that includes improved bus service operating over existing roadways. There is no transitway that would be constructed under this alternative.

Transit Supportive Density Considerations

The Planning Department has reviewed the considerable amount of existing and evolving research on station area densities, pedestrian accessibility and connectivity, transit mode share, and other issues related to transit oriented development. The following examples represent the issues and options.

The FTA-sponsored report by Reconnecting America, *Station Area Planning: How to Make Great Transit-Oriented Place*, identifies different types of activity centers in the context of function, density, and level of transit service as shown in the following tables.

Figure 8: Characteristics of Transit-Oriented Development

DISTRICTS			CORRIDOR	<p>QUESTIONS ARE POSED in this table to help all the station area planning partners identify the areas they are planning within the place typology. The place types in the typology are generalized so as to highlight similarities and differences as well as the parameters that tend to define their land use mix, housing densities, and transit service. Because of this a particular place may not fit exactly into one of these types. All of the characteristics that are identified, defined and quantified are intended to be descriptive and not prescriptive, in the recognition that all places are unique.</p> <p>Note: The term "station area" typically refers to the half-mile radius around the station, about 500 acres in size. The term "primary transit mode" refers to the transit types that typically support the place type.</p>
Urban Neighborhood	Transit Neighborhood	Special Use/ Employment District	Mixed-Use Corridor	
Predominantly residential district with good access to regional and subregional centers	Predominantly residential district organized around transit station	Local focus of economic and community activity without distinct center	Local focus of economic and community activity without distinct center	
Heavy rail, LRT/streetcar, BRT, commuter rail, local bus	LRT/streetcar, BRT, commuter rail, local bus	LRT/streetcar, BRT, potentially heavy rail	LRT/streetcar, BRT, local bus	
5-15 minutes	15-30 minutes	15-30 minutes	5-15 minutes	
Moderate- to high-density residential uses with supporting commercial and employment uses	Low- to moderate-density residential uses with supporting commercial and employment uses	Concentrations of commercial, employment and civic/cultural uses, potentially with some residential	Moderate-density mix of residential, commercial, employment and civic/cultural uses	
Primarily local-serving retail opportunity; need for some community-serving retail	Primarily local-serving retail opportunity	Potential for community- and regional-serving retail but need to balance demands for access	Primarily local-serving retail opportunity; need for some community-serving retail	
Expanding local-serving retail opportunities and increasing high-density housing	Integrating moderate-density housing and supporting local-serving retail	Creating sustainable off-peak uses and accommodating peak travel demand	Expanding local-serving retail opportunities and high-density housing opportunities	
Fruitvale in Oakland, Greenwich Village in New York City, the Pearl District in Portland, University City in Philadelphia	Ohlone-Chynoweth outside San Jose; Plano, Texas; Barrio Logan in San Diego; Capitol Hill in Washington D.C.	South of Market in San Francisco, Camden Station in Baltimore, South Waterfront in Portland	International Boulevard in Oakland, Washington Street in Boston, University Avenue in St. Paul, Minnesota	

Source: *Station Area Planning*, Reconnecting America and the Center for Transit-Oriented Development, February 2008, page 8.

Some representative or general TOD residential categories include the following:







Figure 9: Characteristics of Residential Transit Oriented Development

	CENTERS			
	Regional Center	Urban Center	Suburban Center	Transit Town Center
<i>Housing Mix (New Development)</i>	High-rise and mid-rise apartments and condos	Mid-rise, low-rise, some high-rise and townhomes	Mid-rise, low-rise, some high-rise and townhomes	Mid-rise, low-rise, townhomes, small-lot single family
<i>Station Area Total Units Target</i>	8,000-30,000	5,000-15,000	2,500-10,000	3,000-7,500
<i>Net Project Density (New Housing)</i>	75-300 du/acre	50-150 du/acre	35-100 du/acre	20-75 du/acre
<i>Station Area Total Jobs Target</i>	40,000-150,000	5,000-30,000	7,500-50,000	2,000-7,500
<i>Minimum FAR (New Employment Development)</i>	5.0 FAR	2.5 FAR	4.0 FAR	2.0 FAR
	<p>ONCE THE PLANNING partners have identified an appropriate place type to guide planning in a particular station area, these guidelines can be used to think through the characteristics of the places they want to create. The following criteria should be discussed:</p>			<p>• Housing mix: the range of housing types will vary depending on local conditions and the community vision. These types refer to new, not existing, housing.</p> <p>• Station area total units target: The range will vary according to local conditions.</p>

Source: *Station Area Planning*, Reconnecting America and the Center for Transit-Oriented Development, February 2008, page 12.

An example of a similar typology for mixed use sites is presented below.

Figure 10: Characteristics of Mixed-Use Transit-Oriented Development

		Net Density	Characteristics	Construction Type	Parking Configuration	
MIXED USE TYPES	Mid-Rise Residential Over Commercial	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	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	
EMPLOYMENT TYPES	Low-Rise Office/Commercial	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	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	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	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.

Non-Auto Mode Share

The available research indicates that the percent of work trips by residents in a Transit Oriented Development made by transit, walking, or bicycle varies but in general, is much higher than for the region overall. This is especially the case in maturing regions with heavy rail systems as noted in the tables below from the *Transit Cooperative Research Program (TCRP) Report 128: Effects of TOD on Housing, Parking, and Travel*.

Figure 11: Transit Trends for Journey to Work Trips for Selected TODs

Region	Transit Share 1970 (%)	Transit Share 1980 (%)	Transit Share 1990 (%)	Transit Share 2000 (%)	% Change 1970- 2000 (%)
Older and Redeveloping Regions					
Chicago TOD Average (n=8)	24.0	21.7	18.7	16.7	-30.0
Chicago MSA Average	22.1	16.6	13.7	11.5	-48.0
NY/NJ TOD Average (n=26)	15.7	13.1	13.6	16.4	4.0
NY/NJ MSA Average	35.5	26.7	25.4	24.9	-30.0
TOD Average	19.8	17.4	16.1	16.5	-17.0
MSA Average	28.8	21.6	19.5	18.2	-37.0
Maturing - Heavy Rail Regions					
Atlanta TOD Average (n=4)	20.9	22.5	24.9	19.3	-8.0
Atlanta MSA Average	9.2	7.7	4.6	3.7	-60.0
Miami TOD Average (n=2)	0.5	2.7	5.4	6.5	1094.0
Miami MSA Average	7.1	5.0	4.4	3.9	-45.0
San Francisco TOD Average (n=18)	17.8	22.3	20.1	21.0	18.0
San Francisco MSA Average	11.6	11.4	9.6	9.5	-18.0
Washington DC TOD Average (n=16)	19.0	27.4	32.5	30.0	58.0
Washington DC MSA Average	15.4	13.1	11.3	9.4	-39.0
TOD Average	14.6	18.8	20.7	19.2	32.0
MSA Average	10.8	9.3	7.5	6.6	-39.0
New Start - Light Rail Regions					
Portland TOD Average (n=5)	9.2	13.4	11.8	14.6	58.0
Portland MSA Average	5.5	7.6	5.0	5.7	3.0
San Diego TOD Average (n=6)	8.3	11.2	6.5	6.7	-19.0
San Diego MSA Average	3.7	3.4	3.5	3.4	-7.0
Los Angeles TOD Average (n=6)	6.2	11.5	10.2	8.4	37.0
Los Angeles MSA Average	4.2	5.2	4.7	4.7	11.0
Dallas TOD Average (n=6)	14.5	9.1	9.2	3.2	-78.0
Dallas MSA Average	5.2	3.5	2.3	1.8	-66.0
Denver TOD Average (n=2)	9.4	8.6	8.4	7.5	-20.0
Denver MSA Average	4.3	6.0	4.2	4.3	0.0
Salt Lake City TOD Average (n=4)	2.4	5.8	3.2	5.0	108.0
Salt Lake City MSA Average	2.2	5.0	3.1	3.0	36.0
TOD Average	8.3	9.9	8.2	7.6	-9.0
MSA Average	4.2	5.1	3.8	3.8	-9.0
Total TOD Average (n=103)	15.1	17.0	16.9	16.7	11.0
Total MSA Average (n=12)	19.0	14.1	12.0	7.1	-63.0

Source: Renne, 2005

Source: Transit Cooperative Research Program Report 128, Transportation Research Board, 2008, page 9.

Figure 12: Walk/Bike Trends for Journey to Work Trips for Selected TODs

Region	Walk Share 1970 (%)	Walk/Bike Share 1980 (%)	Walk/Bike Share 1990 (%)	Walk/Bike Share 2000 (%)	% Change 1970-2000 (%)
Older and Redeveloping Regions					
Chicago TOD Average (n=8)	13.6	14.1	9.8	8.9	-34.0
Chicago MSA Average	9.6	7.9	5.7	3.4	-64.0
NY/NJ TOD Average (n=26)	16.9	14.3	8.6	8.2	-51.0
NY/NJ MSA Average	10.0	10.2	7.3	5.8	-42.0
TOD Average	15.2	14.2	9.2	8.6	-44.0
MSA Average	9.8	9.0	6.5	4.6	-53.0
Maturing - Heavy Rail Regions					
Atlanta TOD Average (n=4)	13.1	16.1	7.9	7.4	-43.0
Atlanta MSA Average	4.4	3.2	3.1	1.4	-68.0
Miami TOD Average (n=2)	3.3	3.6	3.0	2.8	-15.0
Miami MSA Average	7.3	5.5	4.1	2.2	-70.0
San Francisco TOD Average (n=18)	19.8	19.1	14.9	16.1	-19.0
San Francisco MSA Average	8.6	9.1	6.4	4.4	-49.0
Washington DC TOD Average (n=16)	17.3	18.3	14.9	14.2	-18.0
Washington DC MSA Average	8.4	7.0	5.4	3.2	-62.0
TOD Average	13.4	14.3	10.2	10.1	-24.0
MSA Average	7.2	6.2	4.8	2.8	-61.0
New Start - Light Rail Regions					
Portland TOD Average (n=5)	23.2	23.4	19.5	20.4	-12.0
Portland MSA Average	7.8	7.4	5.4	3.7	-52.0
San Diego TOD Average (n=6)	13.2	22.6	9.4	7.7	-42.0
San Diego MSA Average	9.5	9.1	6.1	4.0	-58.0
Los Angeles TOD Average (n=6)	15.2	13.5	10.7	9.5	-37.0
Los Angeles MSA Average	7.7	7.6	5.1	3.2	-58.0
Dallas TOD Average (n=6)	31.9	9.4	26.1	11.2	-65.0
Dallas MSA Average	5.8	3.4	3.2	1.6	-72.0
Denver TOD Average (n=2)	13.4	6.3	7.9	5.5	-59.0
Denver MSA Average	7.8	6.4	4.9	3.1	-60.0
Salt Lake City TOD Average (n=4)	12.9	8.0	6.9	7.1	-45.0
Salt Lake City MSA Average	6.5	5.7	4.5	2.3	-65.0
TOD Average	18.3	13.9	13.4	10.2	-44.0
MSA Average	7.5	6.6	4.8	3.0	-60.0
Total TOD Average (n=103)	17.4	15.8	12.3	11.2	-36.0
Total MSA Average (n=12)	7.8	6.9	5.1	3.2	-59.0

Source: Renne, 2005

Source: Transit Cooperative Research Program Report 128, Transportation Research Board, 2008, page 10.

TOD Density Thresholds and the CCT

In general, minimum job densities that are transit-supportive for fixed-guideway line-haul services, i.e., that establish a ridership base for peak period service that is frequent and reasonably competitive with an auto trip ranges from 25 to 50 jobs/acre. The corresponding minimum number for residential development ranges from 10 to 35 dwelling units/acre. The ranges and mix can vary by station but these are the minimum densities to support transit. The density threshold is typically applied within one-half mile of the station with the higher densities within ¼ mile of the station.

Staff has examined the station area densities along the CCT alignment using the COG Round 6.4 land use forecasts, for all stations except the LSC area. The Round 6.4 forecasts were developed in 2003 as the Planning Department began analyzing the I-270 Corridor master plans. In the LSC area, jobs and housing were estimated for year 2030 and were provided to the MTA for their evaluation of the proposed alignment in August 2008. A summary of the estimate of jobs and housing in the August 2008 forecasts used by MTA is presented below:

Figure 13: Staff's August 2008 Forecast for 2030 Development

PROGRAM /TAZ/VARIABLE	SGLSC CLUSTER	PSTA CLUSTER	BELWARD CLUSTER	TOTAL/AVERAGE
Research/Office/Lab SF	2,105,750	89,750	1,250,500	3,446,000
Residential SF & DU's	1,980,000	1,607,000	352,000	3,939,000
Retail SF	37,600	156,000	23,600	217,200
Industrial	760,950	56,700	1,678,950	2,496,600
Other (Cultural/Rec) SF	2,218,500	11,500	750,000	2,980,000
Subtotal	7,102,800	1,920,950	4,055,050	13,078,800
Land Area	9,458,223	2,223,447	6,941,704	18,623,374
FAR	0.75	0.86	0.58	0.70
HH/Acre	9.12	31.48	2.21	9.21
Jobs /Acre	67.45	17.59	64.58	60.43
Jobs Per DU	7.40	0.56	29.24	6.56
Total Jobs	14,645	898	10,292	25,835
Total Residents	3,445	3,551	778	7,775
Total DU's	1,980	1,607	352	3,939
Non Residential SF				9,139,800
Residential SF				3,939,000
Total				13,078,800

Figure 14 shows how these densities compare with other station area densities—both along the CCT and along Metrorail. The estimates reflect densities with an approximate radius of half mile station areas since that is the approximate size of the sub-zones used in the analysis.

Figure 14: Round 6.4 Forecast for 2030 Development Comparisons

<u>CCT Stations - Sub Zones Are Round 6.4</u>	2030 HH/Acre	2030 Jobs/Acre
	<u>Within First Half Mile</u>	<u>Within First Half Mile</u>
Clarksburg Town Center	3	6
Shawnee Lane	2	13
COMSAT	4	15
Dorsey Mill	3	14
Manekin	4	21
Cloverleaf	3	14
Germantown Transit Center	6	13
Middlebrook Road	2	10
Metropolitan Grove	5	10
First Field	4	19
NIST	3	9
Quince Orchard	4	5
Decoverly	6	7
DANAC	4	15
Crown Farm	4	33
West Gaither	2	35
East Gaither	11	2
Shady Grove	10	22
<u>Metrorail Stations - Round 7.0</u>		
Shady Grove	13	15
Rockville	7	33
Twinbrook	8	31
White Flint	16	63
Grosvenor	14	11
Medical Center	1	41
Bethesda Metro	34	110
Friendship Heights	27	73

<u>Other Activity Centers - Round 7.0</u>					
Milestone Center	2	2			
Lakeforest Mall	7	6			
Rock Spring Park	2	21			
Washingtonian Center	6	11			
<u>Life Science 2030 Using CCT Round 7.2 Forecast</u>					
SGLSC Cluster	9	67			
PSTA Cluster	31	18			
Belward Cluster	2	65			
Life Science 2030 Average	9	60			
<u>Density Threshold Minimums From Literature</u>					
Heavy Rail	12	50			
Light Rail	9	25-50			
BRT	5-15	25-50			
Express Bus	3-15	10			
Local Bus	3-8	5-10			
<u>TOD Guidelines - Station Area Planning</u>					
	<u>Urban Center</u>	<u>Suburban Center</u>	<u>SGLSC CLUSTER</u>	<u>PSTA CLUSTER</u>	<u>BELWARD CLUSTER</u>
Peak Transit Frequency	5-15	5-15	6	6	6
Station Area Total Housing Units Target	5,000 - 15,000	2,000 - 10,000	1,980	1,607	352
New Housing Density	50-150 du/acre	35-100 du/acre	9	31	2
Station Area Total Jobs Target	5,000-30,000	7,500 - 50,000	14,645	898	10,292
Minimum FAR - New Employment Development	2.5	4.0	N/A	N/A	N/A

The examination of the station area densities indicates that the initial 2030 land use forwarded to the MTA exceeds the generally accepted minimum densities for TOD station areas and is approximately double the station area job density planned for Crown Farm and the west side of King Farm. In general, the station area densities along the CCT at some other stations (excluding the more recently planned station areas in Germantown, Shady Grove, Crown Farm, King Farm) are below the ⁶minimum densities.

In summary, the staff analysis of station area densities in Round 6.4 led to the conclusion that additional density should be concentrated at selected CCT stations where redevelopment potential is highest to more closely reflect TOD level densities and therefore, also to improve CCT competitiveness for federal funding.

C. Street Network

The Plan's street network includes major highways, arterials, and master-planned business streets. These streets are required elements of the Plan and associated development, and should be built according to County design standards to accommodate both regional (for major highways and arterials) and local (for business streets) travel needs.

Section 49-31 of the County Code defines the functional classification system for roadways.

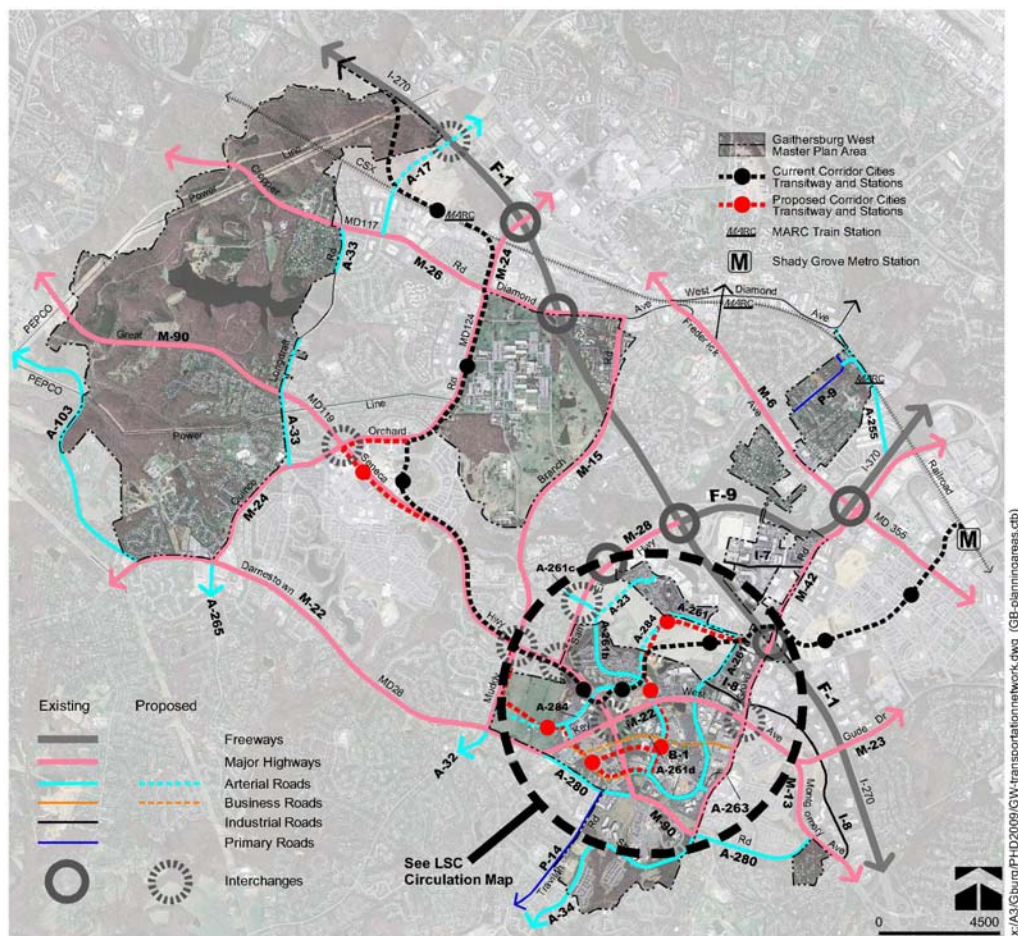
- A Major Highway is meant nearly exclusively for through movement of vehicles at a moderate speed. Access must be primarily from grade-separated interchanges and at-grade intersections with public roads, although driveway access is acceptable in urban and denser suburban settings.
- An Arterial is meant primarily for through movement of vehicles at a moderate speed, although some access to abutting property is expected.
- A Business District Street is meant for circulation in commercial and mixed-use zones.
- A Primary Residential Street is meant primarily for circulation in residential zones, although some through traffic is expected.
-

The Gaithersburg West Master Plan takes into consideration the County's Road Code (Chapter 49) developed in 2006 and design standards (Executive Regulation 31-08) developed in 2007 and 2008. Executive Regulation 31-08 stresses the need to develop context-sensitive solutions with street designs that reflect and emphasize the planned adjacent land uses. The design guidance reflects that while the County formally has rural, suburban, and urban areas, a continuum exists both across and within those three designations.

Figures 15 and 17 present the proposed overall street network for the Plan area and a closer view of the LSC district. The proposed road network has the following elements:

- A network of traffic-carrying, master-planned, business district streets (shown as fuchsia lines for major highways and blue lines for arterials in both figures) designed to reflect the County's new Road Code emphasis on multimodal access and stormwater management.
-
- A secondary network of business district streets will provide internal site accessibility to the LSC with a focus on enhancing pedestrian connectivity by reducing block size.

Figure 15: Gaithersburg West Street Network

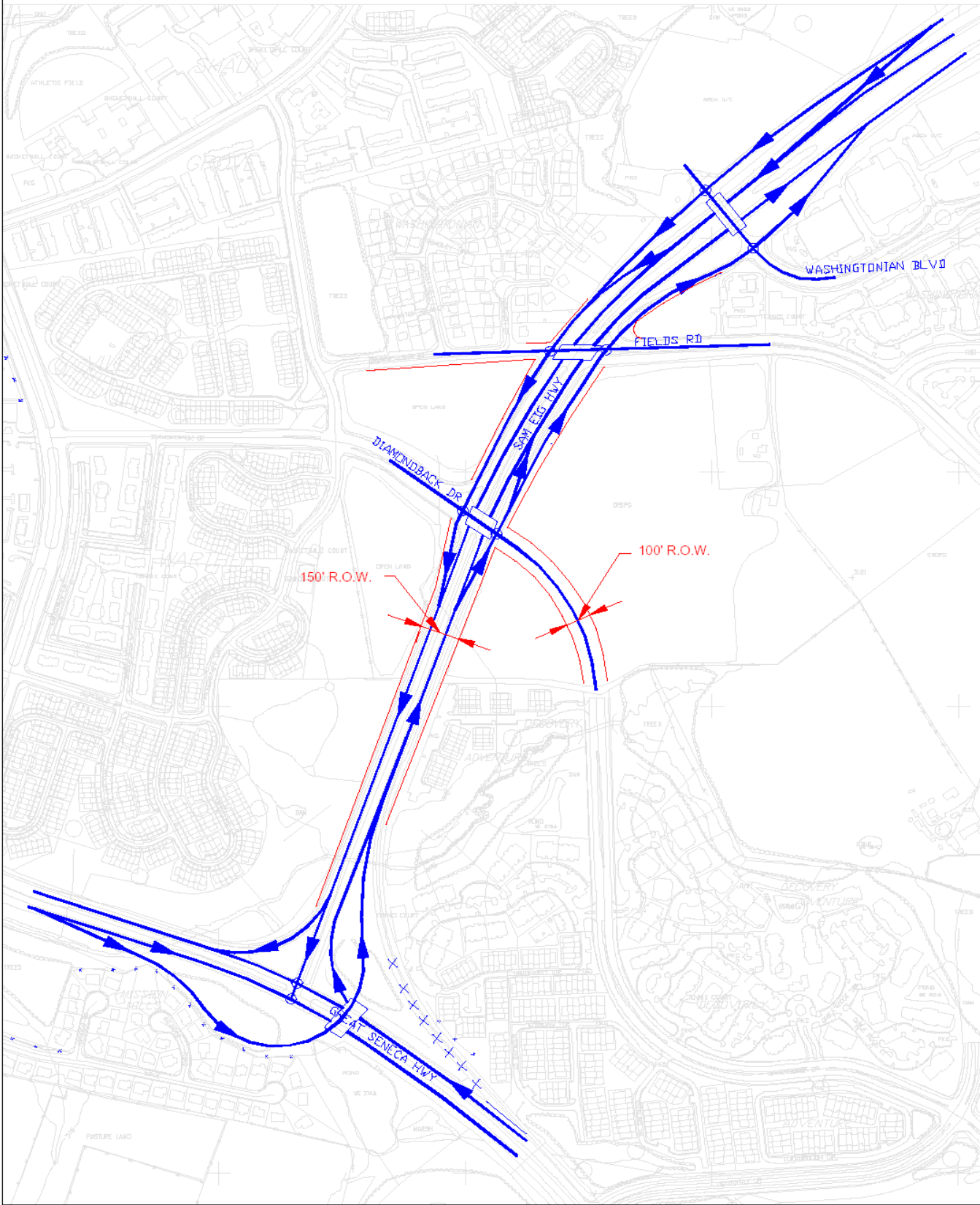


Specific streets are described in the Plan and this Appendix.

Sam Eig Highway

To support proposed development levels while maintaining a suburban level of mobility for automobile users, this Plan sees the need to reconstruct Sam Eig Highway as a grade-separated boulevard treatment within a 250-foot wide right-of-way with three through lanes in each direction; shoulders suitable for peak-period, peak-direction use by BRT; and two-lane, one-way, frontage roads providing connections to Fields Road and Diamondback Drive with a flyover ramp connection from eastbound Great Seneca Highway to northbound Sam Eig Highway. The concept plan (Figure 16) illustrates how this would function, and the minimum right-of-way expansion needed to accommodate improvements.

Figure 16: Illustrative Concept of Sam Eig as a Controlled Major Highway



Key West Avenue (MD 28)

This Plan shows the need to accommodate build-out levels of development on an expanded roadway network. The predominant east-west vehicle movement in the Plan area is accommodated on Key West Avenue, a major highway, following construction efforts to expand that roadway and reroute through traffic to it, as evidenced by its designation as MD Route 28.

If the area develops at build-out levels, the Plan's staging would ultimately require reconstructing Key West Avenue within a 200-foot wide right-of-way between Great Seneca Highway and Shady Grove Road to provide a consistent design treatment that includes a wide landscaped median, four through travel lanes in each direction, and a separate curb lane that can provide multiple functions. (During peak periods, the curb lane should serve as a through lane for transit vehicles only and a right turn lane for other vehicles.)

The Plan's staging recommendations require a decision on the ultimate configuration for Key West Avenue prior to Stage 3 of development (build-out). The recommended 200-foot wide right-of-way would facilitate the development of urban-diamond interchanges at Great Seneca Highway and Shady Grove Road with Key West Avenue elevated above the cross streets. The roadway would need to be reconstructed as an urban boulevard between the two interchanges, and the distance between existing building faces would accommodate the wider right-of-way.

Longdraft Road (A-33)

Longdraft Road forms the boundary between the City of Gaithersburg and the Plan area. The east side of Longdraft Road is in the City of Gaithersburg and the west side is part of this master plan. The 1985 master plan classified Longdraft Road from Pheasant Run Drive (in the City of Gaithersburg) to the railroad as an arterial (A-33). That plan also identified sections of Longdraft Road and Watkins Mill Road as an arterial route (A-17) that would extend from Quince Orchard Road to Great Seneca Creek with a recommended right-of-way of 80 feet and four travel lanes. This proposed route assumed that Watkins Mill Road would be extended from its current terminus at Route 355, across I-270. At Clopper Road, Pheasant Run Drive would connect Watkins Mill Road with Longdraft Road.

At the request of the City of Gaithersburg, the County Department of Transportation (DOT) studied this route and recommended using Clopper Road, rather than Pheasant Run Drive, as a link between Watkins Mill Road extended and Longdraft Road. This Plan recommends that Longdraft Road and Watkins Mill Road be classified separately as A-33 and A-17, respectively. This Plan recommends that the arterial designation for the northernmost portion of Longdraft Road, from Clopper Road to the railroad, be removed.

In 2004, DOT initiated a facility planning study for Longdraft Road from Quince Orchard Road to Clopper Road. The study examined whether this two-lane, 1 1/2 mile section of Longdraft Road should be widened to accommodate existing and future traffic projections. In addition to potential road way improvements, the study examined bicycle and pedestrian enhancements.

In July 2008 the County Council's Transportation and Environment Committee determined the Longdraft Road facility planning study should not proceed to Phase II, referring the elements recommended by the Planning Board and resident coalition to other programs within DOT's capital and operating budgets to move forward. By doing so these elements likely will be implemented sooner than if they remained within a project planning study.

- Renumber Longdraft Road as A-33 (from A-17) from Quince Orchard Road to Clopper Road (excluding the section from Longdraft Court to Golden Post Lane, which is completely within the City of Gaithersburg).
- Remove the arterial designation of Longdraft Road north of Clopper Road to the railroad.

Watkins Mill Road (A-17)

As discussed above, Watkins Mill Road and Longdraft Road were recommended in the 1985 master plan as an arterial route (A-17) from Quince Orchard Road on the south to Great Seneca Creek on the north.

This Plan recommends that the two roads continue to be designated as arterials, but considered as separate routes with individual numbers. A portion of Watkins Mill Road (from Route 355 to just north of Windbrooke Drive) is in the City of Gaithersburg and is designated as an arterial. The City of Gaithersburg has planned an extension of Watkins Mill Road south of Route 355 to Clopper Road, with a new interchange at I-270. The extension of Watkins Mill Road and the new I-270 interchange are funded for planning and engineering in the State's 2004 Comprehensive Transportation Program. This Plan supports the City's efforts to complete this connection.

Watkins Mill Road from Windbrooke Drive to Great Seneca Creek is in Montgomery Village and is not within the Plan's boundaries. There are four public schools along this section of Watkins Mill Road and the community has raised concerns about traffic safety. The 2004 CIP included a traffic calming project to analyze options to reduce travel speed and improve safety on this road. This project is required by the County Council before construction of a new interchange at I-270 and Watkins Mill Road extended.

- Classify Watkins Mill Road (A-17) from Great Seneca Creek to 400 feet north of Windbrooke Drive as an arterial with an 80-foot right-of-way and four lanes.
- List the right-of-way requirements for Watkins Mill Road from Clopper Road to 400 feet north of Windbrooke Drive as "not applicable," since this section is in the City of Gaithersburg.
- Support further study to address traffic safety and the potential for traffic calming measures along Watkins Mill Road in Montgomery Village.
- Support the extension of Watkins Mill Road from Route 355 to Clopper Road in the City of Gaithersburg.

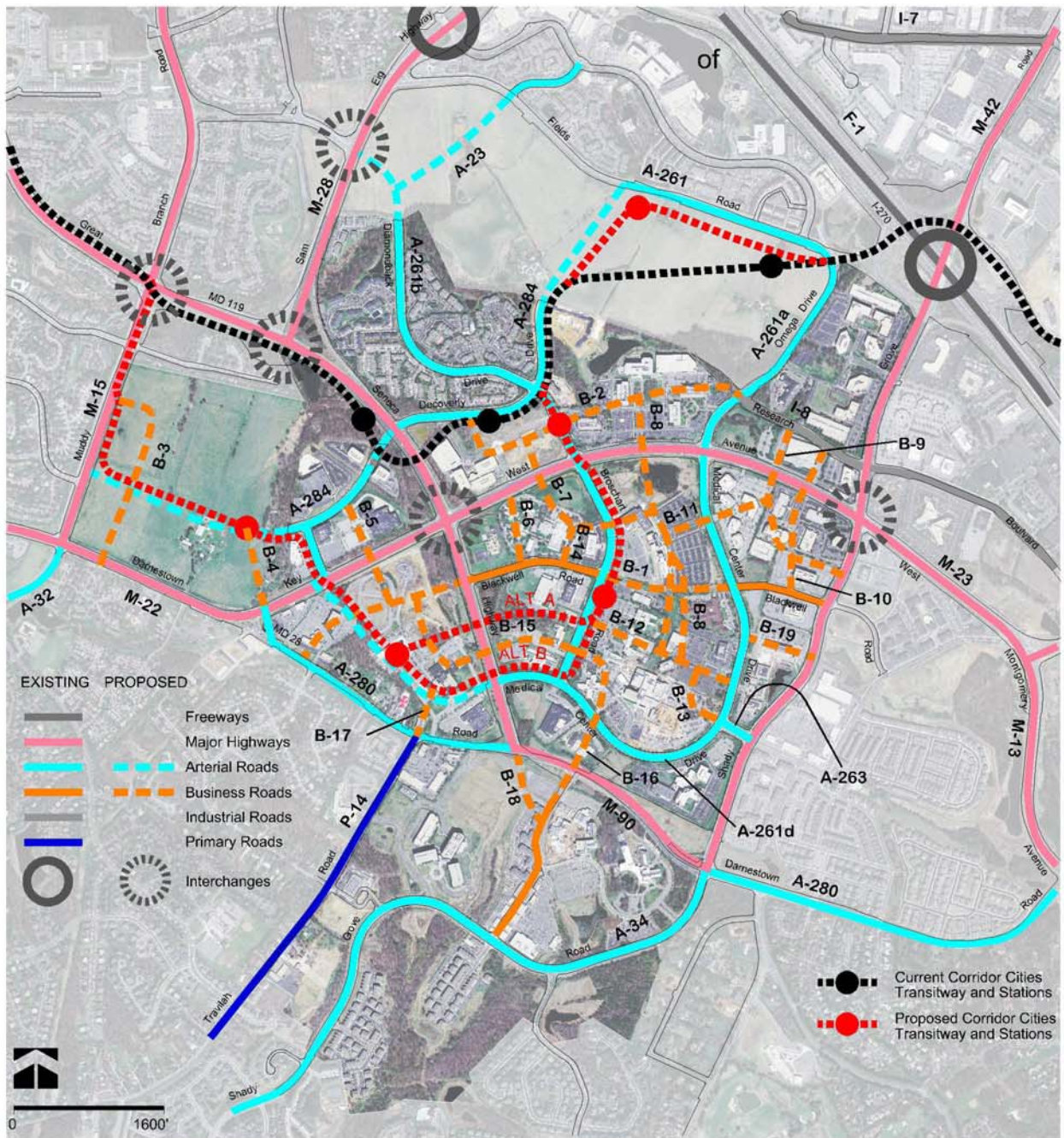
The Plan recommendations also include:

- removing the proposed grade-separated interchange between Darnestown Road and Shady Grove Road, since the intersection is forecast to operate near capacity with an at-grade solution. Land use and travel demand distribution will focus east-west travel along Key West Avenue (MD 28), requiring a higher infrastructure investment at plan build-out, including a grade-separated interchange at Key West Avenue junction with Shady Grove Road
- retaining Darnestown Road as a four-lane arterial, recognizing adjacent community interest in a down-classification of the roadway but also the need for four lanes of capacity and an arterial function
- retaining Game Preserve Road as an unclassified master plan roadway, recognizing adjacent community and Rustic Road Advisory Committee interest in a rustic road classification. Analysis performed during plan development indicates that the roadway currently has safety concerns that do not support rustic road classification. The interest in reclassification is prompted in part by concerns regarding through traffic that will be reduced by the completion of the parallel arterial Watkins Mill Road between MD 355 and MD 117
- reducing the number of through travel lanes on Oakmont Avenue from four lanes to two lanes, but retaining a reconstructed Deer Park Bridge over the CSX tracks, recognizing the need to retain a grade-separated arterial roadway function for the adjacent commercial area and neighboring communities.

Master Planned Business Streets

The business street system is intended to be a slow-speed environment, with both the public and private realms designed to emphasize a 30 mile per hour target speed.

Figure 17: LSC Street Network



Secondary Grid of Local Streets

Figure 17 describes a secondary street system that will be developed to nest within the Major Highway and Arterial street system. These streets are designed to facilitate site access (particularly for the larger development sites) and enhance pedestrian and bicycle mobility by improving the network's permeability.

In addition to pedestrian connectivity, the tighter street grid can extend operational flexibility options such as left turn restrictions at major congested intersections and access management along major roads. These business streets are predominantly two lanes, with parking on one (60-foot wide right-of-way) or both sides (70- or 100-foot wide right-of-way). They should include curb extensions at crosswalks to further reduce pedestrian exposure to vehicle traffic.

The locations of roads where development is in place provide an opportunity to thread between existing buildings and environmental constraints while still providing a grid network for pedestrians and vehicles. Details on final alignments will be subject to further engineering evaluation at the time of new development or redevelopment.

Notable new roads include:

- B-1, Blackwell Road should be extended on to the PSTA site to Medical Center Drive Extended (A-261d), or if possible, to Darnestown Road to provide a business district road parallel to Key West Avenue specific to the LSC.
- B-2, a new road connection of the Decoverly development access road to Research Boulevard.
- B-3 and B-4, new roads connecting the LSC Belward District to the highway network. Connection to the existing signalized intersection with Darnestown Road helps preserve mobility for pedestrians as well as vehicles.
- B-8, a new road connecting the LSC Central District to Key West Avenue. The section south of Blackwell is shown as split into two one-way pairs with a green, walkable space between to take advantage of the space between existing hospital buildings.
- B-16, a new road connection from Medical Center Drive to Travilah Gateway Drive. This connection, also constructed as a local business district street, would provide a direct pedestrian connection across Darnestown Road between the LSC Central District CCT stop, the Universities at Shady Grove (USG) site and the Traville development. It may also be necessary to realign the current USG entrance of Travilah Gateway Drive to better match a new road opposite Darnestown Road.
- B-18, would be a new road extending Great Seneca Highway south of Darnestown Road to connect to Travilah Gateway Drive. The connection, constructed as a local business district street, would also provide a direct pedestrian connection across Darnestown Road into LSC South along the most direct path for persons walking from a future CCT stop on the PSTA site. This connection would provide an additional access point at an already signalized location.

D. Bicycle and Pedestrian System

The Plan's bicycle and pedestrian system will be implemented through a combination of land use and zoning policies, local street network implementation, and pedestrian access and safety improvements.

Bikeway Network

The Plan proposes a bikeway system with three key elements.

- An off-road, shared-use path system connecting Gaithersburg West to other areas of the County via bikeways adopted in the *Countywide Bikeways Functional Master Plan* (2005).
- Shared-use paths along major highways and arterial roadways, separating cyclists from higher speed vehicles.
- An emphasis on slower, signed-shared bikeways on new roadways within the LSC. These roads would use a 30 mile per hour target speed to facilitate shared space, rather than separated modal facilities and the Road Code emphasis on bike accommodation on all streets.

Off-road shared use paths and on-road bicycle accommodations serve different users; a majority of the avid cycling community is interested in quality on-road bike accommodation. However, the Plan's higher speed highways and arterials encourage separating cyclists from vehicles. The Plan's large number of off-road paths complement the adopted paths in the *Countywide Bikeways Functional Master Plan*.

In September 2007, the Planning Board supported the Road Code requirement that generally marked bike lanes should be provided as a matter of course on roads with daily traffic volumes of more than 20,000 vehicles per day or a posted speed of 45 miles per hour or greater.

County Wide Bikeways

The *Countywide Bikeways Functional Master Plan* was updated and adopted in 2005. County wide bikeway classifications follow.

- Shared use paths (formerly Class I)

An off-road asphalt or concrete path (optimally 8'-12' wide) that is separated from motorized traffic by either a minimum five-foot landscape panel or by a physical barrier such as a wall or fence. The path may be adjacent and parallel to a road or may be completely separate from a road in its own right-of-way. The path is designed and intended to be shared by multiple users—bicyclists, walkers, joggers, skaters, etc. Shared use paths are generally more appropriate in areas where there are fewer conflicts with driveways and intersecting streets and where separation from motor vehicles is highly desirable.

- Bike lanes (formerly Class II)

A portion of a roadway that has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists. The bike lane is four to six feet wide and is available in both directions adjacent to the curb, with the cyclist traveling in the same direction as the motor vehicles. Bike lanes are more appropriate along major travel corridors with higher speeds and volumes and where a defined space for bicyclists is desired.

- Signed shared roadway (formerly Class III)

A roadway that has been designated as a preferred route for bicycle use, but there is no separation or striping that delineates the bike travel area from travel area for motor vehicles. Shared roadways feature a wide curb lane (closed section roads), paved shoulders (open section roads), or low traffic volumes and speeds (neighborhood streets). Shared roadways are appropriate where vehicle speeds and volumes are lower, where inadequate right-of-way makes bike lanes or a shared use path infeasible or in rural areas where there may be room to bike on the shoulder of the road.

In certain situations, a roadway may be recommended for dual bikeways—two types of bike facilities. Some roadways can accommodate both on-road and off-road bicycle facilities, in which case the route may be recommended for both a shared use path and a bike lane or a shared use path and shared roadway. This is called a dual bikeway. The State Highway Administration is now providing wider (up to 16-feet) outside travel lanes on all reconstructed roads to accommodate bikes. When these areas are less than three feet, and do not qualify as bike lanes, they are considered to be bicycle areas.

County wide bikeways provide direct or indirect connections to municipalities, as well as existing and proposed transit stations, activity centers, employment centers, and residential neighborhoods. They also provide connections between major activity centers and regional recreational park destinations and connect communities located outside the County's growth areas to the County wide bikeway network. The 2005 Countywide Bikeways Functional Master Plan attempts to strike a balance between recommended improvements for both off-road (shared use paths) and on-road bikeways (bike lanes, shared roadways). It identifies a network of bikeways that will support those who wish to travel by bicycle and accommodate varying skill levels and abilities.

The County wide bikeway network is integrated with other facilities, including local bikeways, sidewalks, and park trails. In most residential neighborhoods, it is not possible or feasible to provide both a sidewalk and a bike path. Therefore, the neighborhood sidewalk often accommodates both pedestrians and bicyclists. By law, bicyclists are permitted on sidewalks in Montgomery County.

Pedestrian and Cyclist Access and Safety

Pedestrian and bicyclist access and safety will be pursued through several initiatives, including:

- design standards to implement the County's Road Code
- design guidelines for private sector development in the Plan area
- zoning requirements for bicycle parking and other amenities
- engineering, education, and enforcement programs under the County Executive's Pedestrian Safety Initiative.

In 2007, the County Council adopted several amendments to Chapter 49 of the County Code concerning streets and roads to improve pedestrian and bicycle accommodation, stormwater management, and context-sensitive design. In December 2008, the Council approved Executive Regulation 31-08 AM, Context Sensitive Road Design Standards, which specify certain design standards and processes for implementing the revised road construction code, most notably the typical cross-section standards for many types of roads and streets, the required stormwater management criteria for capturing runoff within the right-of-way, and considerations for establishing target speeds and street tree placement. Continued effort is needed to complete the range of street design standards and intersection design standards that will be needed to promote pedestrian and bicyclist access and safety in new or reconstructed roadway design.

The Planning Board will adopt urban design guidelines for the LSC that will provide guidance for the pedestrian realm to improve access, comfort, and safety, including:

- building orientation to maximize pedestrian accessibility
- street tree planting
- design treatments for sidewalks and driveways
- street lighting
- signing and marking.

The Plan proposes the LSC Zone for much of the LSC area. This zone is designed to facilitate pedestrian access and safety through several means:

- pedestrian-oriented activity at street level with uses such as storefront retail and restaurants
- safety-oriented environmental design including clearly marked sidewalks and crosswalks
- street trees providing canopy and landscaping on all streets, including street furniture such as benches, trash receptacles, and planters

- continuous, direct, and convenient connections to transit stations for pedestrians and bicyclists.

As both public and private sector projects are implemented, all agencies need to elevate pedestrian and bicycle access and safety considerations in their review of design and operational elements, including:

- maximum 30-foot curb radii
- signal timing, including pedestrian countdown signals that provide the ability to complete roadway crossing at a speed of 2.5 feet per second or slower, and at least five seconds of startup time (and greater time where pedestrian volumes result in platooning)
- maximum crosswalk lengths of 60 feet between pedestrian refuges
- accessible bus stop locations at or near marked crosswalks
- signing and marking per the *Manual on Uniform Traffic Control Devices*, including marked crosswalks on all approaches to signalized intersections and elimination of lane markings across intersections
- street lighting designed to improve the visibility of pedestrians at levels specified by the Illuminating Engineering Society of North America
- designing mixed-use streets, pedestrian walkways, and alleys using Crime Prevention Through Environmental Design criteria.

3. Transportation and Land Use Balance

The *Gaithersburg West Master Plan* transportation analyses reflect the procedural guidance established by the County Council's Growth Policy, applied through the LATR and PAMR processes described below, followed by a description of regional transportation and land use assumptions and a brief summary of the alternative local land use scenarios analyzed.

This Plan establishes a new LSC Policy Area for the LSC Central, LSC West and LSC Belward transit station areas, with policy attributes the same as for the Germantown Town Center Policy Area. The current LATR standard for local intersection congestion in the LSC is 1475 CLV. The Plan would increase this standard to 1600 CLV.

Figure 20 shows the Plan's proposed level and mix of development in the LSC Policy Area.

Figure 19: LSC Policy Area Land Use

Area	Acres	Existing		Future	
		Jobs	HH	Jobs	HH
LSC Central, West, Belward	567	9,200	0	44,600	4,525

A. Measures of Effectiveness

Alternative development scenarios with varying amounts of commercial and residential development were analyzed for three levels of transportation impacts.

- An area wide mobility analysis indicates the degree to which the alternative local land use and transportation scenarios provide an appropriate balance between land use and transportation per current County policies.
- An intersection congestion analysis indicates the degree to which alternative land use or transportation changes affect congestion hot-spots within the LSC area.
- A cordon line analysis demonstrates the effects of vehicles generated by local land use scenarios as compared to through travel.

The first two measures are elements of the County's Growth Policy, called Policy Area Mobility Review (PAMR) and Local Area Transportation Review (LATR). Both PAMR and LATR are summarized below and detailed background information is available on the Department's website, www.montgomeryplanning.org.

B. Policy Area Mobility Review (PAMR)

PAMR measures transportation system adequacy considering Relative Transit Mobility and Relative Arterial Mobility for each of the County's 21 policy areas. PAMR is used in the implementation of the Adequate Public Facilities Ordinance (APFO) to forecast conditions considering the County's pipeline of approved development and near-term transportation system improvements for which funding is committed during the next four years.

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 end-state conditions for the plan. PAMR is the current measure of area wide transportation adequacy, introduced into the County Growth Policy in 2007. It is similar to the Policy Area Transportation Review measure that was an element of the Growth Policy from 1982 to 2003.

PAMR continues a long-standing County policy that higher levels of roadway congestion are appropriate in areas with higher quality transit service. This policy provides multimodal equity across the County and facilitates the development of pedestrian-oriented, rather than auto-oriented, improvements in Metro Station Policy Areas. 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, defined as the relative speed by which journey to work trips can be made by transit as opposed to by auto, is based on the Transit/Auto Travel Time level of service concept in the 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 transit trip takes more than an hour longer than single-occupant auto trip.

Relative arterial mobility is a measure of congestion on the County's arterial roadway network, defined as the relative speed by which auto trips move during peak congestion periods as compared to the free-flow speed. It is based on the urban street delay level of service in the 2000 Highway Capacity Manual, published by the Transportation Research Board. This concept 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, from A to F. 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.

In addition to its APFO utility, PAMR is also used in the development of master plans to determine whether or not a plan's end-state land use and transportation recommendations are in balance. Master plan study areas typically address roadway capacity needs by intersection improvements rather than roadway widening. Therefore, the AGP process has evaluated master plan study areas in conjunction with the master plan and policy area surrounding these areas.

The LSC Policy Area is located within and comprises a major portion of the R&D Village Policy Area. Figure 21 shows the forecast PAMR conditions for all policy areas in the County for 2030 assuming the Gaithersburg West Master Plan "high" scenario with a 32.5 percent NADMS. Figure 22 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 high scenario's assumptions, the R&D Village Policy Area is forecast to operate at:

- Relative Transit Mobility of 63 percent (LOS D – between 60 and 75 percent)
- Relative Arterial Mobility of 40 percent (LOS D – between 40 and 55 percent).

The current Growth 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 derived from the analysis of the scenario described above just meets this threshold.

The PAMR analysis performed thus far has evaluated a range of scenarios. The demographics and development intensity of the high scenario reflect the upper bound of the scenarios tested and result in the highest travel demand. The Plan recommends a less intense development level than the high scenario. Therefore, staff is confident that the Plan-recommended scenario will balance land use and transportation.

Figure 20: Policy Area Mobility Review Chart-2030

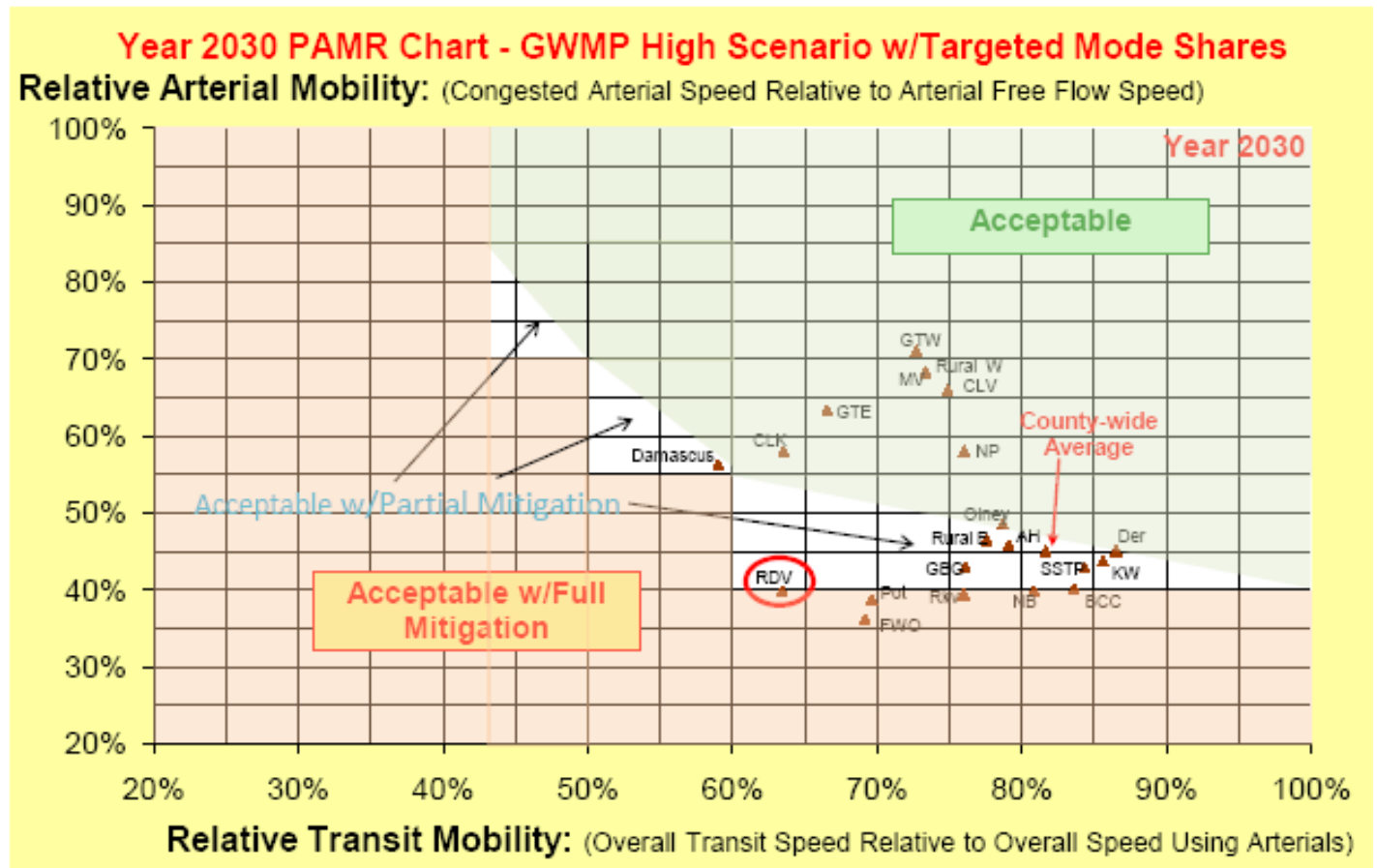


Figure 21: Policy Area Mobility Review Table-2030

Derivation of Year 2030 PAMR Results by Policy Area - Gaithersburg West Master Plan "High" LU Scenario w/TDM Mode Shares)

Policy Area	Relative Arterial Mobility					Relative Arterial Mobility	Relative Transit Mobility		
	VTMT	VHT (free-flow)	VHT (congested)	Free-Flow Speeds	Congested Speeds		Average Arterial Travel Time	Average Transit Travel Time	Relative Transit Mobility
Aspen Hill	189,868	5,783	12,626	32.8	15.0	46%	40.9	51.8	79%
Bethesda/Chevy Chase	396,854	15,574	38,863	25.5	10.2	40%	31.1	37.2	84%
Clarksburg	108,964	3,628	6,267	30.0	17.4	58%	38.1	59.9	64%
Cloverly	95,462	2,356	3,570	40.5	26.7	66%	44.0	58.8	75%
Damascus	90,837	2,255	4,009	40.3	22.7	56%	48.4	82.1	59%
Derwood/Shady Grove	140,087	4,982	11,055	28.1	12.7	45%	37.5	43.3	87%
Fairland/White Oak	384,192	10,126	28,073	37.9	13.7	36%	40.0	57.8	69%
Gaithersburg City	243,110	8,667	20,190	28.1	12.0	43%	34.5	45.4	76%
Germantown East	105,604	3,565	5,632	29.6	18.8	63%	36.5	54.8	67%
Germantown West	154,896	5,060	7,123	30.6	21.7	71%	36.5	50.2	73%
Kensington/Wheaton	465,588	14,581	33,389	31.9	13.9	44%	37.0	43.3	85%
Montgomery Village/Airpark	142,629	4,726	6,942	30.2	20.5	68%	41.3	56.3	73%
North Bethesda	237,712	9,980	25,052	23.8	9.5	40%	30.3	37.5	81%
North Potomac	66,824	2,391	4,119	27.9	16.2	58%	39.2	51.6	76%
Olney	168,213	4,749	9,777	35.4	17.2	49%	47.1	59.9	79%
Potomac	203,448	6,118	15,804	33.3	12.9	39%	38.1	54.7	70%
R & D Village	80,760	3,583	8,994	22.5	9.0	40%	26.6	42.0	63%
Rockville City	277,965	12,036	30,617	23.1	9.1	39%	31.5	41.5	76%
Silver Spring/Takoma Park	273,044	10,429	24,351	26.2	11.2	43%	33.4	39.6	84%
Rural East	608,504	15,513	33,414	39.2	18.2	46%	47.1	60.8	77%
Rural West	241,519	6,573	9,621	36.7	25.1	68%	46.5	63.4	73%
Montgomery County Total	4,676,080	152,675	339,488	30.6	13.8	45%	37.5	46.0	82%

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 areas highlighted in blue in Figures 21 and 22 are those most likely to be affected by redevelopment in the Plan area. The assessment of the policy area conditions reflect the upper bound of the demographic scenarios tested for the LSC in combination with Round 7.1 demographic forecasts for all other areas in the Washington metropolitan region. Therefore, while the exhibits are appropriately labeled with a horizon year of 2030, staff does not expect that the full master plan yield for any of the Policy Areas will be achieved by the year 2030. Figure 23 provides a summary of year 2005 PAMR conditions by policy area for comparison purposes.

Figure 22: Policy Area Transportation Review Table - 2005

Derivation of Year 2005 PAMR Results by Policy Area

Policy Area	Relative Arterial Mobility					Relative Transit Mobility			
	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	166,975	4,992	11,141	33.4	15.0	45%	36.4	54.5	67%
Bethesda/Chevy Chase	370,936	14,148	31,264	26.2	11.9	45%	25.8	36.9	70%
Clarksburg	48,985	1,341	2,038	36.5	24.0	66%	38.6	69.9	55%
Cloverly	80,280	1,954	3,398	41.1	23.6	58%	39.8	59.6	67%
Damascus	57,419	1,350	1,749	42.5	32.8	77%	43.5	95.7	45%
Derwood/Shady Grove	128,774	4,337	8,851	29.7	14.5	49%	34.4	50.8	68%
Fairland/White Oak	332,420	9,478	18,794	35.1	17.7	50%	35.4	60.9	58%
Gaithersburg City	187,111	6,483	12,132	28.9	15.4	53%	31.5	56.4	56%
Germantown East	83,578	2,421	4,388	34.5	19.0	55%	35.4	65.6	54%
Germantown West	111,574	3,299	4,525	33.8	24.7	73%	35.7	61.5	58%
Kensington/Wheaton	410,368	12,896	26,052	31.8	15.8	50%	31.7	45.3	70%
Montgomery Village/Airpark	92,853	3,086	5,928	30.1	15.7	52%	38.3	64.9	59%
North Bethesda	194,168	7,893	17,069	24.6	11.4	46%	27.0	39.1	69%
North Potomac	53,299	1,811	2,989	29.4	17.8	61%	36.7	60.6	61%
Olney	136,864	3,972	7,727	34.5	17.7	51%	43.9	72.2	61%
Potomac	180,868	5,290	11,631	34.2	15.6	45%	33.7	54.5	62%
R & D Village	47,322	1,980	2,853	23.9	16.6	69%	30.7	52.2	59%
Rockville City	255,979	10,016	20,932	25.6	12.2	48%	29.1	47.3	62%
Silver Spring/Takoma Park	230,410	8,782	17,926	26.2	12.9	49%	27.7	40.2	69%
Rural East	449,002	11,427	20,928	39.3	21.5	55%	42.9	70.2	61%
Rural West	171,011	4,596	6,411	37.2	26.7	72%	42.7	75.6	56%
Montgomery County Total	3,790,196	121,552	238,726	31.2	15.9	51%	34.2	50.7	67%

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

C. Local Area Transportation Review (LATR)

The *Gaithersburg West Master Plan* supports redevelopment toward a transit-oriented community with an emphasis on pedestrian accessibility, connectivity, and safety.

The intersection analysis applies the Critical Lane Volume (CLV) methodology from the Department's LATR guidelines. The CLV values are converted to a volume-to-capacity, or v/c ratio, by dividing the current or forecasted CLV values by the applicable congestion standard.

As shown in Figure 24, the County's Growth Policy establishes acceptable levels of congestion for different policy areas based whether alternative modes of transportation are available. In rural policy areas, where few auto alternatives exist, the congestion standard is 1350 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 1800.

The Public Hearing Draft Plan recommends creating a Town Center policy area to encompass the entire LSC district, so that intersections within the district and served by the CCT would have a congestion standard of 1600 CLV. Currently, intersections in the LSC area have a congestion standard of 1450 CLV. Intersections along Shady Grove Road in the Plan area have a congestion standard of 1500 CLV where the Rockville Policy Area overlaps.

Figure 23: Intersection Congestion Standards by Policy Area

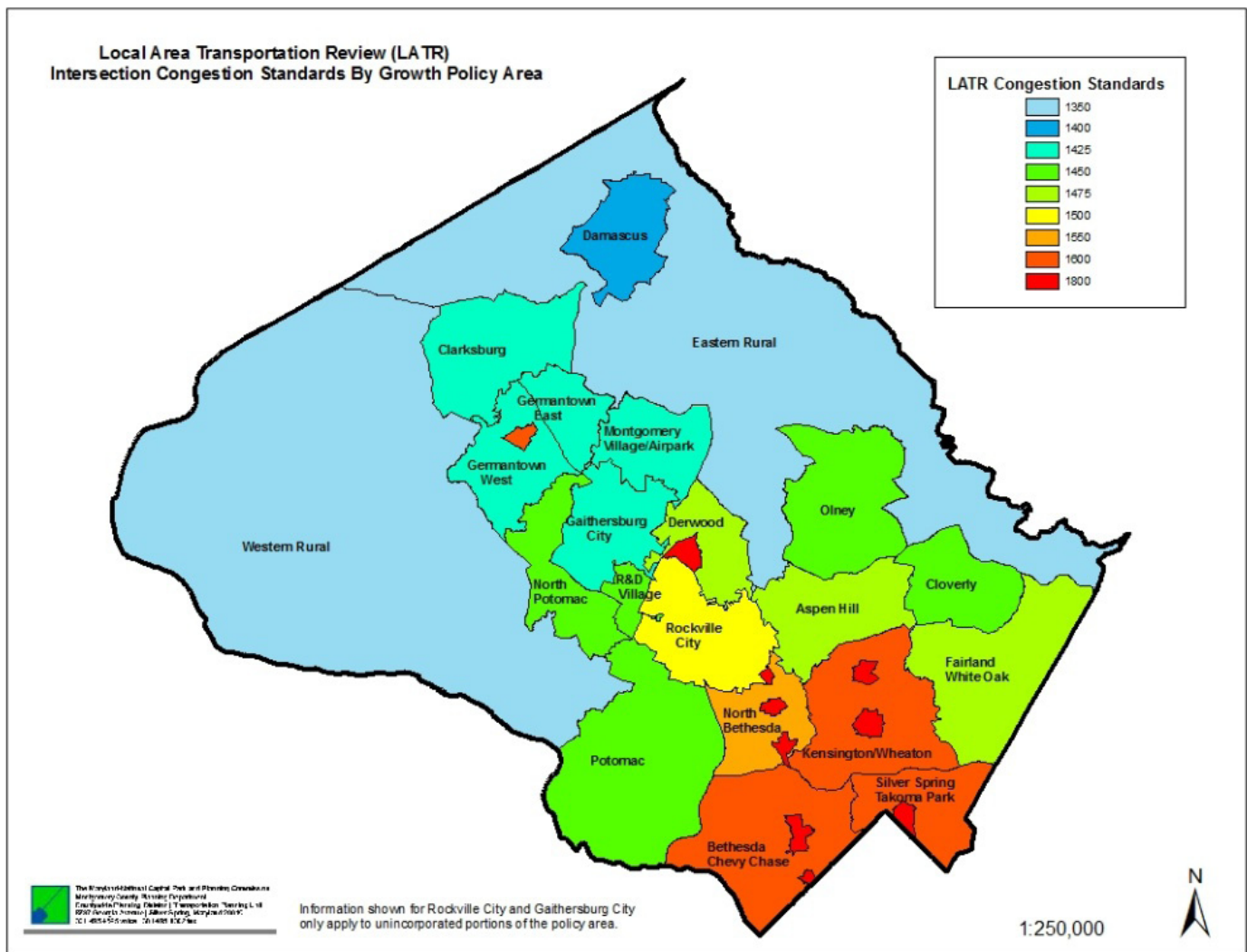


Figure 24 summarizes the congested intersections for existing conditions and the high land use scenario. However, the draft Plan recommends one million square feet less commercial use than tested in the high land use scenario. As indicated in Figure 24:

- Currently, all but three of the tested signalized intersections pass the congestion test. Shady Grove Road at Key West Avenue (MD 28), Great Seneca Highway at Muddy Branch Road, and Darnestown Road (MD 28) at Muddy Branch Road exceed either the 1450 or 1600 CLV congestion standards at full buildout of the high scenario.
- Nine intersections tested under the high land use scenario would exceed the 1600 CLV standard. At four of these locations, forecast CLVs over 2000 (a v/c ratio of 1.25) warrant planning for grade-separated interchanges. The draft Plan also retains the recommendation for an eastbound left flyover ramp from Great Seneca Highway to Sam Eig Highway to keep the intersection within the congestion standard.
- Five of the at-grade intersections tested under the high land use scenario are forecast to exceed the 1600 CLV congestion standard at Plan buildout during either the morning or evening peak hour: Shady Grove Road at Corporate Boulevard, Key West Avenue and Broschart Road, Darnestown Road and Muddy Branch, Key West Avenue and Omega Drive/Medical Center Drive, and Key West Avenue and Darnestown Road. At these locations, the forecast CLVs range from 1668 to 1721, indicative of delays associated with Metro Station Policy Area development. Grade-separated interchanges are not warranted at this level of forecast congestion, but at-grade improvements will be required as development occurs.

- Analysis of the draft Plan's recommended land use on intersection congestion remains in progress. To date, the draft Plan's recommended land use generates about 10 percent fewer vehicle trips than the high land use scenario represented in Figure 25. Considering the effect of through traffic, staff expects the CLVs for the Plan recommendations to generally be about five percent lower than those shown in Figure 25.

Figure 24: Intersection Analysis

Gaithersburg West Master Plan

Intersection Analyses

Critical Lane Volume and Volume/Capacity Ratios

"High" Land Use Scenario

Intersection	Existing Conditions			High Land Use Scenario Tested		
	AM	PM	Max V/C	AM	PM	Max V/C
84 Shady Grove @ Corporate	1096	1467	0.92	1388	1668	1.04
85 Shady Grove @ Research	1074	1089	0.68	1418	1515	0.95
86 Shady Grove @ Key West	1391	1640	1.03	Replaced by Interchange		
87 Shady Grove @ Medical Center Way	744	868	0.54	1023	1086	0.68
88 Shady Grove @ Darnestown	1098	794	0.69	1382	1592	1.00
134 Darnestown @ Travilah	907	974	0.61	1076	1460	0.91
368 Great Seneca @ Darnestown	1028	1009	0.64	1548	1447	0.97
369 Great Seneca (MD 119) @ Key West (MD 28)	1227	1114	0.77	1568	1449	0.98
370 Great Seneca @ Muddy Branch	1654	2179	1.36	Replaced by Interchange		
415 Key West (MD28) @ Brochart/Diamondback	1563	1195	0.98	1306	1694	1.06
446 Darnestown @ Muddy Branch	1697	1250	1.06	1721	1431	1.08
466 Key West (MD28) @ Omega/Med Center	1313	1359	0.85	1591	1679	1.05
479 Key West (MD28) @ Darnestown	1085	1058	0.68	1521	1718	1.07
518 West Montgomery (MD 28) @ Hurley	830	998	0.62	830	998	0.62
519 West Montgomery (MD 28) @ Research	941	1307	0.82	1326	1514	0.95
567 Fields @ Washingtonian	455	747	0.47	482	1168	0.73
568 Fields @ Rio	440	1029	0.64	810	1476	0.92
569 Sam Eig @ Fields	1456	1297	0.91	Replaced by Interchange		
570 Sam Eig @ Diamondback	933	1217	0.76	Replaced by Interchange		
572 Great Seneca (MD 119) @ Sam Eig	1240	1348	0.84	1228	1189	0.77 *
700 West Montgomery (MD 28) @ Key West (MD 28)	942	1304	0.82	1196	1596	1.00
798 Darnestown @ Gudelsky				1120	931	0.70
901 Great Seneca (MD 119) @ Decoverly				1168	1518	0.95
902 Key West (MD 28) @ JHU				1274	1489	0.93
903 Great Seneca (MD 119) @ Med Center				1201	1451	0.91
904 Shady Grove @ Blackwell				1262	1537	0.96
905 PSTA road @ Key West Avenue				1510	1489	0.94
906 Diamondback @ Decoverly				1145	1361	0.85
907 Muddy Branch @ JHU New				997	1501	0.94
908 Great Seneca (MD 119) @ Blackwell				1296	1548	0.97
909 Research Blvd @ W Gude				1582	1550	0.99

* Reflects planned flyover ramp for east bound left turns

D. Cordon Line Analysis

A cordon line analysis is a general tool to quickly compare total traffic volumes entering or leaving the *Gaithersburg West Master Plan* area. In developing the master plan, a subregional cordon line was established, as indicated in Figure 18, to consider flows into and out of the area surrounding but including the LSC. This cordon line reflects the boundary between analysis that applied the TRAVEL/3 system level model and analysis that applied the Local Area Model.

The cordon line is used two ways. First, to assess forecast traffic volumes based on trip generation and second, to establish a constant level of through traffic for quick-response sensitivity tests to land use alternatives with a conceptual cordon line volume. These conceptual cordon line volumes are reflected in the bar chart comparisons of land use volumes and may differ slightly from the volumes shown on traffic assignments.

Vehicular Traffic Volumes

Figure 26 compares existing and forecast traffic volumes at the studied cordon line. In general, the cordon line serves as the boundary between the LSC area, where land uses are proposed to change as a result of this plan, and the area outside of the cordon, which is subject to other plans or is otherwise not forecast to change development densities. As a result, traffic volumes at these locations are substantially higher than in the interior of the master plan area.

At the cordon line, the total traffic volume will increase by about 43 percent, from 392,000 vehicles per day to 561,000 vehicles per day. The heaviest volumes will occur on the major highways where they meet I-270, Sam Eig Highway and Shady Grove, with between 79,900 and 88,000 vehicles per day.

Traffic volumes and volume growth will be slightly lower within the LSC area due to the expanded roadway network. In general, traffic volumes along Key West Avenue today in the Plan area are 52,000 vehicles per day and are forecast to grow to between 56,000 and 65,000 vehicles per day.

Figure 25: Sector Plan Cordon Line Traffic Volumes

**Gaithersburg West Plan
Study Area Cordon Line**

2007 Conditions - Observed Peak Hour Totals

Location	ADT	AM Peak Hour			PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
10 DIAMONDBACK DR	15100	1000	330	1330	440	800	1240
12 TRAVILAH RD	10700	460	350	810	440	570	1010
13 MUDDY BRANCH/ Darnestown	18200	1230	270	1490	660	940	1600
15 DARNESTOWN RD (MD 28)	35900	2590	580	3170	940	1980	2930
16 GLEN MILL RD	17000	370	1120	1500	840	560	1400
17 MUDDY BRANCH/ Great Seneca	20600	850	670	1520	950	1030	1980
18 WEST MONTGOMERY AVE (MD 28)	52000	2110	2090	4200	2460	2190	4650
20 Shady Grove Road/270 + slip ramp	58700	3470	1520	4990	2010	2990	5000
21 Sam Eig Highway	66600	2160	2890	5040	2840	3440	6280
23 W Gude Drive	32500	1440	1220	2660	1190	1670	2860
24 Shady Grove Road/Traville	11900	610	450	1060	540	430	970
25 GREAT SENECA HWY (MD 119)	53100	3160	1070	4220	1650	3160	4810
TOTAL	392300	19440	12550	31990	14960	19750	34720

Modeled Draft Plan (High Scenario) Conditions

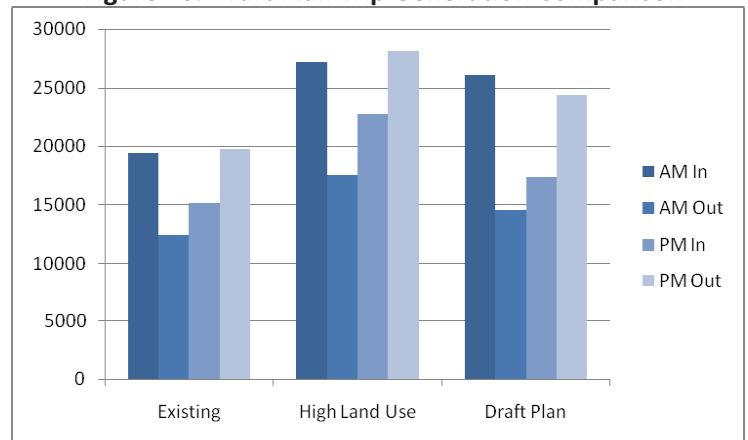
Location	ADT	AM Peak Hour			PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
10 DIAMONDBACK DR	18400	1210	380	1590	560	980	1540
12 TRAVILAH RD	16300	770	510	1280	640	860	1500
13 MUDDY BRANCH/ Darnestown	26300	1580	550	2130	1040	1310	2350
15 DARNESTOWN RD (MD 28)	46900	2910	970	3880	1580	2510	4090
16 GLEN MILL RD	25000	690	1320	2000	1300	940	2240
17 MUDDY BRANCH/ Great Seneca	35200	1570	1080	2650	1690	1650	3340
18 WEST MONTGOMERY AVE (MD 28)	76800	3240	2870	6110	3140	3820	6950
20 Shady Grove Road/270 + slip ramp	79900	4230	2630	6870	2660	4050	6710
21 Sam Eig Highway	88000	3570	2890	6460	4190	4310	8500
23 W Gude Drive	49300	2280	1680	3960	1980	2450	4430
24 Shady Grove Road/Traville	31000	1210	1160	2370	1460	1450	2910
25 GREAT SENECA HWY (MD 119)	68000	3620	1780	5400	2380	3790	6170
TOTAL	561100	26860	17830	44690	22610	28110	50720

Draft Plan Trip Comparison

The Plan's recommendations for transportation infrastructure and staging are based on a high land use scenario, even though the Plan's selected recommendations are at a slightly lower density. Figure 27 compares the scenario and the Plan's recommended trip generation characteristics.

- existing land uses within the cordon generate about 31,700 vehicle trips in the morning peak hour and 34,900 trips in the evening peak hour.
- The high scenario generates 44,700 vehicle trips in the morning peak hour and 50,800 trips in the evening peak hour.
- Comparatively, the Plan recommendations generate 40,600 vehicle trips in the morning peak hour and 41,700 in the evening peak hour, a difference of about 10 percent between the two land use scenarios.

Figure 26: Draft Plan Trip Generation Comparison



The Plan also recommends a slightly lower non-auto driver mode split (NADMS) of 30 percent, compared to the high scenario NADMS of 32.5 percent, resulting in slightly higher per-square foot trip rates per square foot of use modeled.

E. Travel Demand Forecasting Process and Assumptions

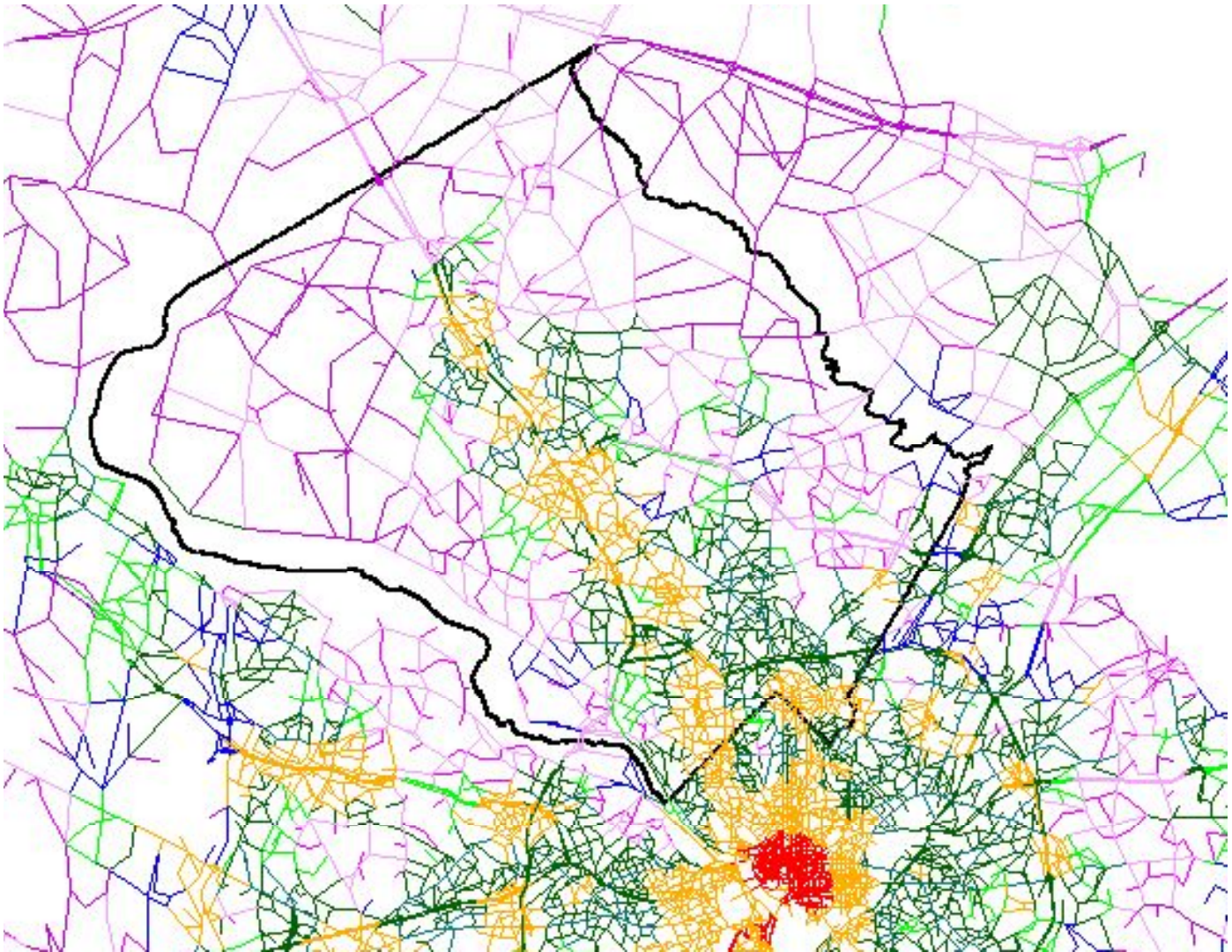
The travel demand forecasting process includes three levels of analysis: TRAVEL/3, TRAVEL/3 post processing, and CLV intersection analysis.

The Department's regional travel demand forecasting model, TRAVEL/3, is used to develop forecast travel demand results for weekday travel and PM peak periods. TRAVEL/3 is a four-step model, consisting of:

- trip generation: person trips generated by land use type and density within each TAZ
- trip distribution: person trips generated in each TAZ that travel to each of the other TAZs within the metropolitan area
- mode split: travel mode of the person trips, including single-occupant auto, multiple-occupant auto, transit, or a non-motorized mode such as walking or bicycling
- traffic assignment: roadways 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 applied by the Metropolitan Washington Council of Governments (MWCOC) for air quality conformity analysis. Figure 28 shows the relationship of Montgomery County to the regional travel demand network, featuring the coding of street network characteristics to reflect the general level of adjacent development density.

Figure 27: Travel/3 Model Network Typology



The TRAVEL/3 provides system-level results that are used directly to obtain the Policy Area Mobility Review 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 refinement of the AM and PM 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 *Policy Area Mobility Review/Local Area Transportation Review Guidelines*.

Travel/3 Forecasting Assumptions

The *Gaithersburg West Master Plan* forecasts assumed the following parameters:

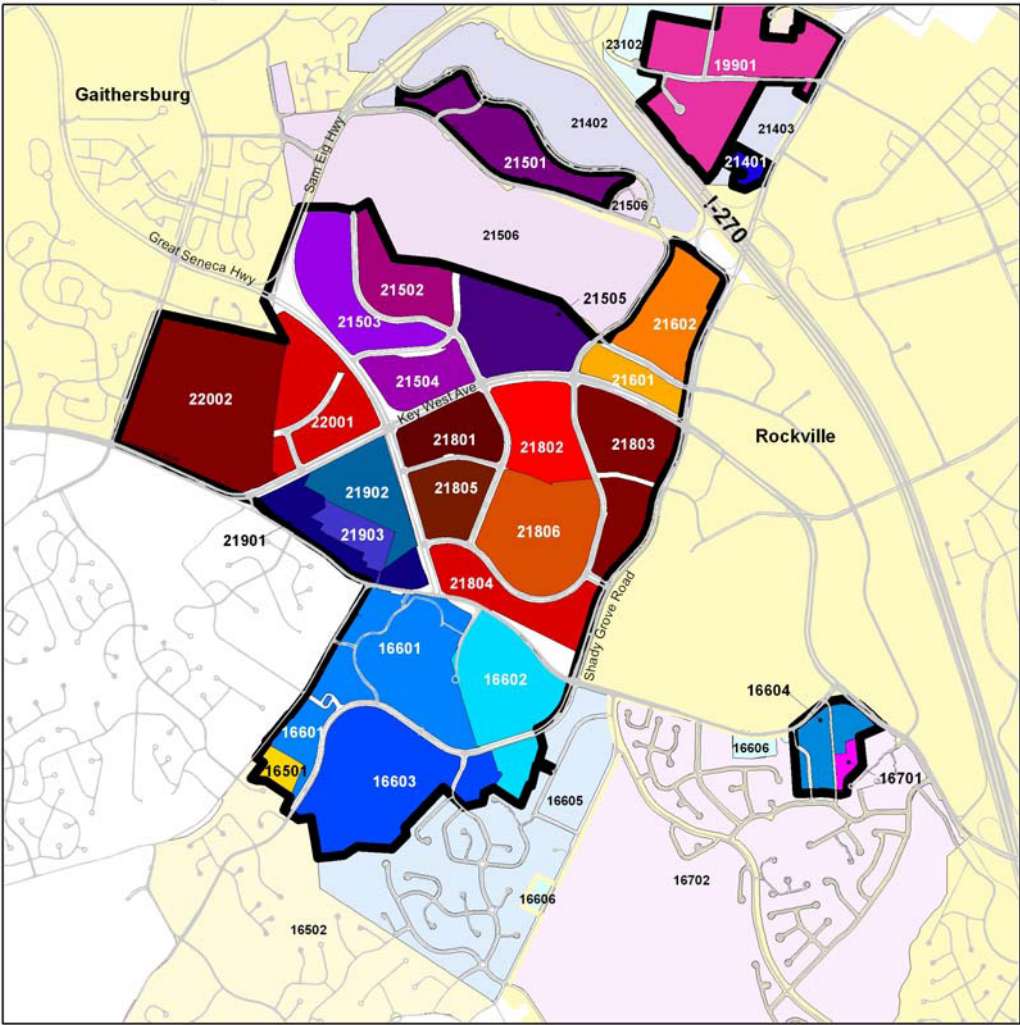
- A 2030 horizon year, the most distant horizon year for which forecast land use and transportation system development is available.
- Regional growth per the MWCOG Cooperative Forecasting Process. The most current round of Cooperative Forecasts was used.
- For the Washington region, the Round 7.1 forecasts 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 2030.
- For Montgomery County, the Round 7.1 forecasts include an increase from 500,000 employees and 347,000 households in 2005 to 670,000 employees and 441,300 households in 2030.
- For the LSC area, the Round 7.1 forecasts include an increase from 6.9M square feet of development and 3,300 households in 2005 to 12.9M square feet of development and 8,000 households in 2030.
- 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 buildout of the LSC area include:
 - elimination of the WMATA turnback at Grosvenor
 - the Corridor Cities Transitway (realigned through the LSC) from Shady Grove to Clarksburg
 - the Purple Line between Bethesda and Silver Spring
 - 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.

F. 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 R&D Village Policy Area as six TAZs. The LSC LAM disaggregates these six TAZs into twenty three (23) subzones as indicated in Figure 28.

Figure 28: LSC Area Local Area Model Subzone



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. Figure 29 shows the trip generation rates used in the LAM.

Figure 29: Local Area Model Peak Hour Trip Generation

Land Use	Units	AM	PM
Office (at 30% NADMS)	1000 Square Feet	1.30	1.20
Retail (at 30% NADMS)	1000 Square Feet	1.00	3.00
Industrial (at 30% NADMS)	1000 Square Feet	1.00	1.00
Other Commercial (at 30% NADMS)	1000 Square Feet	1.00	1.00
Multifamily residential (garden apartment)	Dwelling unit	0.48	0.83
Multifamily residential (highrise)	Dwelling unit	0.44	0.48

These trip generation rates reflect a combination of varied land uses and their Local Area Transportation Review rates for typical development in Metro Station Policy Areas such as White Flint 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 2 percent of observed count data for both morning and evening peak hours.

The trip generation rates shown in Figure 29 are generally lower than those found in the Institute of Transportation Engineers (ITE) Trip Generation Report, particularly for commercial land uses. These trip generation rates reflect the fact that ITE rates for most commercial locations do not have Gaithersburg West's transit availability and use potential of the CCT. The difference for residential uses is not quite as high because ITE trip generation rates for multifamily housing 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 LSC zone also incorporate a discount for pass-by and diverted-link trips.

Land Use Alternatives Tested

Figure 30 shows the LSC Policy Area land use alternatives considered for the LAM in the development of the Gaithersburg West Master Plan.

Figure 30: LSC Policy Area Land Use Scenarios Considered in Plan Development (TAZs 218, 219, and 220)

Scenario	commercial square feet	dwelling units
Existing	3.5m	0
1990 Plan – Low Scenario	7.2m	500
Medium Scenario	12.4m	4,800
High Scenario	16.1m	9,700
Recommended Scenario	15.2m	4,525

