

Howard Research and Development Corporation

## Downtown Columbia

# Downtown Transit Center and Circulator Shuttle Feasibility Study:

Part 1 - Downtown Transit Center & Downtown Circulator Shuttle (Part of CEPPA #5)



**December 2011**

**Note:**

This is an initial draft report presented to Howard County by the Howard Hughes Corporation. The County staff is in the process of reviewing this document and has not yet accepted it. Any questions or concerns regarding this draft report should be directed to the Howard Hughes Corporation.



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# Introduction

The following studies were conducted on behalf of the Howard Research and Development Corporation as part of commitments to complete Community Enhancements, Programs, and Public Amenities (CEPPAs) as required by Howard County Council Bill No. 58-2009.

Nelson\Nygaard Consulting Associates of San Francisco, California was commissioned to conduct the transit-related studies required by CEPPA 5.

Prior to approval of the first final development plan, one or more studies must be commissioned to satisfy CEPPA number 5, which states:

“GGP [General Growth Properties] will commission at GGP’s expense and in consultation with Howard County one or more feasibility studies for the following: (i) a new Broken Land Parkway/Route 29 north/south collector road connection to Little Patuxent Parkway and (ii) **a new Downtown transit center and Downtown Circulator Shuttle**. ...With regard to the transit center, the study will evaluate both long and short term transit expectations and needs both locally and regionally so that an appropriate location and facility program can be determined. Consideration shall be given to how the facility will operate initially as a free standing building, and in the future as a mixed use component of the Downtown Plan. Recommendations will be provided with regard to goals, management and operations. With regard to the Shuttle, the study will evaluate and determine appropriate levels of service and phasing in of service at various levels of development. As part of this, the study should examine the relationship between the shuttle and both long and short-term, local and regional transit expectations and needs. The shuttle feasibility study will also analyze equipment recommendations, routes and stops, proposed vehicle types, and operational and capital costs. The feasibility study shall include an evaluation and recommendations regarding ownership, capital and operational funding opportunities, responsibilities and accountability to provide guidance to the Downtown Columbia Partnership and the County.

Nelson\Nygaard met with GGP representatives and Howard County staff on July 21, 2010 to initiate discussions about the appropriate scope for the studies. Final scopes were submitted to the County in November 2010, and studies of transit center and circulator shuttle were commenced utilizing field observations and public data available from the County and other local, regional, and Federal agencies.

This report summarizes the results of the studies for a transit center and circulator shuttle. A number of technical appendices describe the analysis conducted to support the enclosed findings and recommendations.

# Chapter 1. Downtown Columbia Transit Center

## Background

A transit center is considered to be the point of arrival and departure for local transit routes, where riders can obtain transit information and board their bus. Transit centers are typically placed in or near the core of a community where the greatest density of transit riders are located. Transit centers come in all shapes and sizes depending on the markets they serve, the level of ridership, local topography, and surrounding land uses. They range from very simple facilities with no permanent structures that provide simple refuge and services for waiting riders, to extravagant structures serving large populations with dozens of boarding locations for various types of transit vehicles.

The primary transit provider serving Columbia, Howard Transit (HT), operates out of a simple transit hub in a portion of the Columbia Mall parking lot. The available space is limited, forcing buses to double-park while waiting to depart on their runs. Limited passenger information signing makes this experience confusing for new riders, and poor amenities make waiting for a bus unpleasant compared to the experience riders have at other transit departure points in nearby counties.

With the redevelopment of Downtown Columbia into Downtown Columbia, Howard County has identified an opportunity to study what form of improvements can be made to Howard Transit's hub in Columbia.

## Key Recommendations

- Howard Transit is in need of an improved short-term transfer hub at the Columbia Mall because the current parking lot location does not have facilities that meet any current standards for transfer center bus or passenger amenities. Continued operation at the current facility affects the quality of service throughout the HT system due to confusing transfer facilities and delayed bus departures. A new outdoor transit center can be installed at relatively low cost (approximately \$150-250,000), not including land.
- An improved or new transit center for Downtown Columbia should include bus berths to serve up to 12 buses at one time, which is the maximum number of buses departing Downtown Columbia on an hourly "pulse" during weekdays. This number of berths is determined to be sufficient for the full build-out of Downtown Columbia and for all planned service expansions.
- There is no requirement for dedicated transit center parking to be provided in the short- or long-term. The majority of existing and planned transit service uses Columbia as a hub and secondarily as an employment destination. Relatively few riders originate in Columbia to commute inter-city, and their park and ride demand is – and will continue to be – accommodated in customer parking for the mall. Over time, ridership will grow with residential and employment density, but such trips will not require new parking as residents will walk to the bus from their homes and employees travel inbound by transit.
- The transit center should remain in or near the current location of Howard Transit's bus hub until it requires relocation due to redevelopment, or until development of a building at the

long-term transit center site begins. There are no operational, total developed area, or ridership triggers that would necessitate relocation to the long-term site.

- This short-term transit center would include two outdoor bus medians each approximately 280-feet long serving six double-loaded bus berths each, with three berths located curbside where HT routes stop now. The remaining nine berths would be located parallel to and north of the on-street berths in three off-street lanes within the mall parking lot at a location that is planned to become a future development parcel. The footprint of this short-term transit center equals that of a planned parking garage on the development parcel, potentially allowing the parcel's adjacent building to be constructed without the garage while the transit center remains operational.
- The short-term transit center should include a minimum of four protected shelters with benches and map and schedule holders, eight uncovered benches, four trash receptacles, four APBP<sup>1</sup>-compliant bicycle racks accommodating at least eight bikes each, a signpost for each berth, pedestrian scale lighting, and full ADA access to all amenities.
- The long-term transit center would be integrated into the southern edge of a future development parcel located south of the Columbia Mall's southern entrance. This location was selected due to its similarly central location close to the mall, as well as the longer block lengths (~550 feet) which enables a single transfer median serving six buses per side to be designed.
- The recommended long-term transit center should include the same passenger amenities as the short-term center. It's location within a building footprint has a number of quality advantages that make transit attractive and well-integrated in Downtown Columbia, including:
  - A clear street-side presence that improves the visibility of transit in Downtown Columbia to attract riders
  - The least negative impact on streetscapes, on-street parking, and street-level uses
  - The opportunity to co-locate retail services on and near the bus median for improved passenger and passerby convenience, while preserving occupied floor space on the remainder of the development parcel
  - A covered transfer median and eastbound bus berths that will greatly improve passenger comfort, weather protection, and enjoyment while enabling easier maintenance
  - Adjacency to a mall parking garage for any park and ride demand

## Methodology

In order to determine the demand for a transit center and establish its appropriate size and location, a broader evaluation of how transit serves Columbia is necessary. This evaluation takes four basic steps:

- An evaluation of all existing transit routes that service the Columbia Mall and environs today to establish the number of buses that must be accommodated today;
- An evaluation of planned future transit routes that will serve Downtown Columbia to determine what if any additional capacity must be provided by a transit center;

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<sup>1</sup> Association of Pedestrian and Bicycle Professionals

- A study of the factors that drive the demand for transit in the surrounding region to determine if there needs to be changes in existing or future transit service to better-serve the community, which may impact the size of a transit center; and
- A study of the appropriate location to site a transit center that will have the capacity to accommodate all of the existing, planned, and improved transit services.

Detailed studies for each of these steps have been completed and are included in the appendices of this report. Existing and planned regional transit services are evaluated in Appendix A. The regional demand for transit is evaluated in Appendix B. The preferred design and location that also accommodates a Downtown Columbia circulator shuttle (the circulator is studied in Appendix C) has been studied in Appendix D.

## Existing Service Findings

Today, HT's users are primarily those who do not have access to a car<sup>2</sup>. This includes those who do not have the financial or physical means to own or drive a car, as well as those who are not licensed or insured. There are few "choice riders" who chose to ride the bus when a car also is available to them. While Downtown Columbia may have demand management measures and incentives to employees and residents to leave their car at home, non-choice riders will dominate ridership for some time. As a result, the service has been designed to get coverage as close to people's destinations as possible.

### *Howard Transit Operations*

Howard Transit operates eight fixed bus routes and one Americans with Disabilities Act (ADA) complementary paratransit route in Howard County. Seven of the eight routes<sup>3</sup> operate as a "pulse" system<sup>4</sup>, with the primary Columbia transit hub at the Columbia Mall as the start and end point. The Mall in itself is not a destination for many bus riders, but a transfer point to connecting routes. The rate of transfers per route is fairly high, ranging from 40 percent to a high of 70 percent on the Silver Route.

In general, service hours begin at 6 AM on weekdays, 8 AM on Saturdays, and 10 AM on Sundays. All routes run at 60 minute headways or longer, with the exception of the Green route, which operates every 30 minutes during weekday peak hours. The Silver Route connects with Maryland Area Regional Commuter (MARC) rail service at the Dorsey Station, the Baltimore-Washington International Airport (BWI) and MARC/Amtrak Station, and the two Maryland Transit Administration (MTA) light rail stations at BWI and its business park. The Gold Route serves the Snowden River Park & Ride. The Yellow Route connects Columbia with Ellicott City. The Red, Brown, Orange, and Green routes serve Columbia and surrounding businesses and neighborhoods.

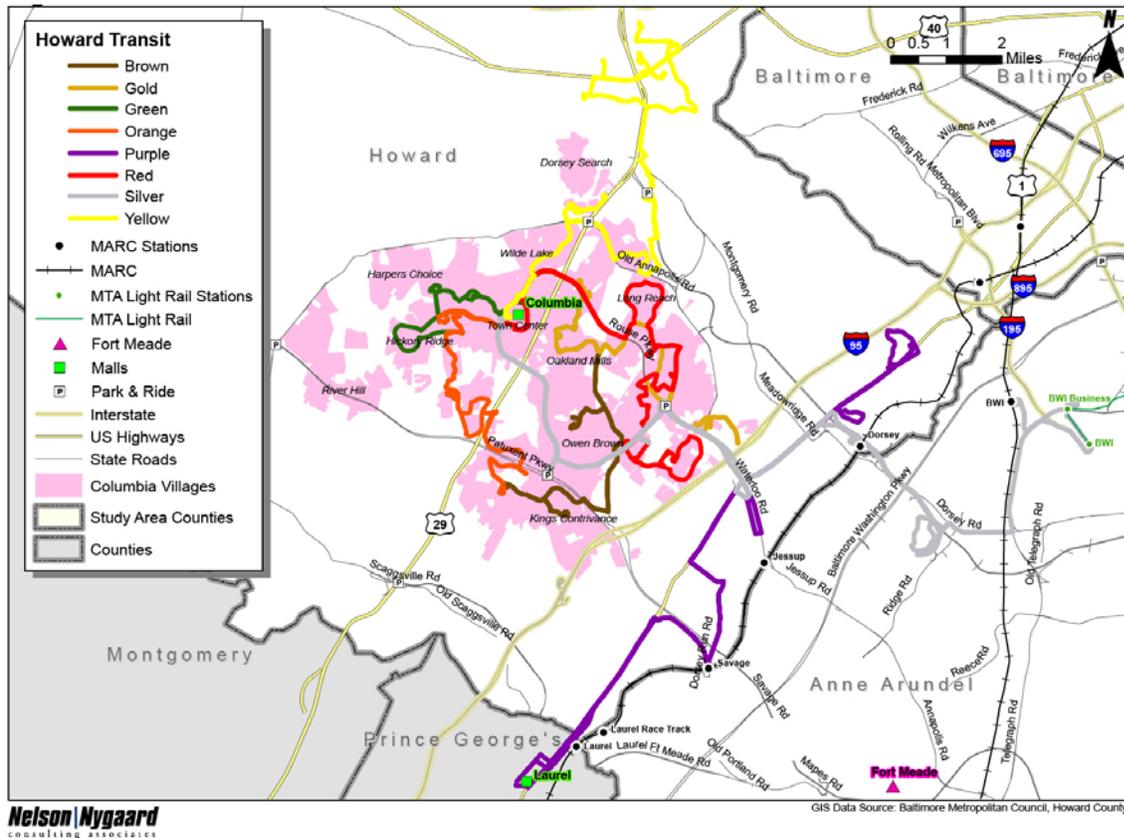
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<sup>2</sup> Matthew Helfant, Planner, Central Maryland Regional Transit. Phone interview 8/16/2010.

<sup>3</sup> The Purple route does not serve Columbia.

<sup>4</sup> A "pulse" system, also referred to as a "line-up," involves the coordinated departure of multiple routes from a single transfer point at the same time. Typically used for smaller systems with headways over 20 minutes, the coordinated departure ensures that passengers will not miss a transfer to the next bus. Essentially all outbound buses are held until the pulse time so that all inbound buses have time to arrive and discharge their transferring passengers before the next bus departs. The time allowed for transferring is typically also the time allowed for layover of the bus, when drivers can take a break from driving and complete required reports and inspections before heading out on the next run. This process repeats throughout the day until end of service.

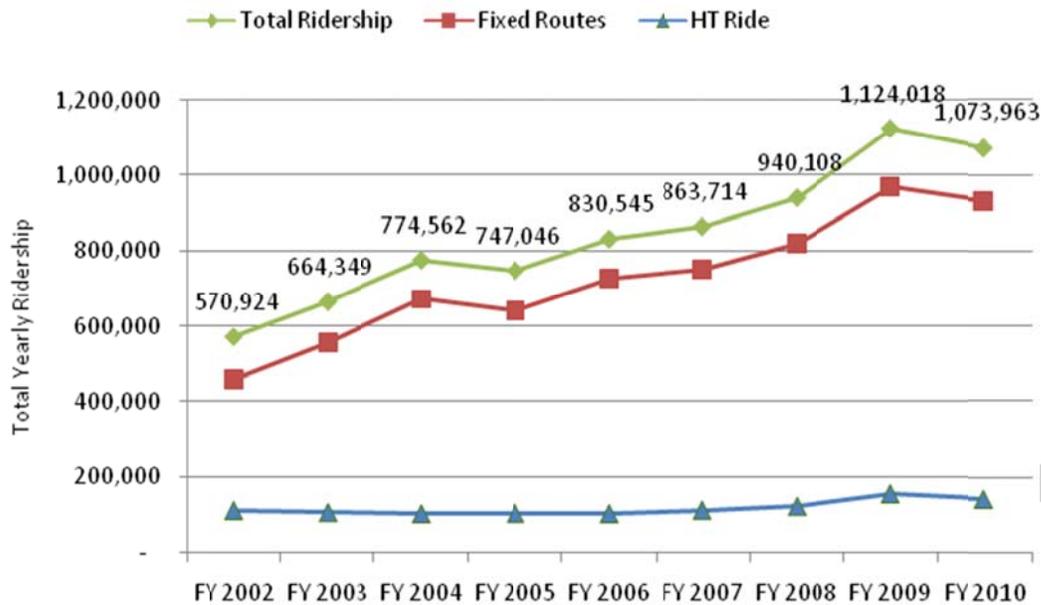
**Figure 1 Existing Howard Transit Routes**



### *Howard Transit Ridership*

Howard Transit fixed route ridership has steadily increased over the years, peaking at 1.1 million annual rides in FY 2009, with at least half of these riders traveling to or through the Columbia Mall hub. Due to budget cuts, three routes were discontinued as of July 9, 2010. These routes included: the Blue Route, which served River Hill and Harpers Choice villages; the Yellow Express, connecting Columbia to Ellicott City; and the Red Express from Columbia to Gateway. Also during the 2010 service cuts, fares were increased from \$1.50 to \$2 for a one-way trip. Since 2009, ridership has declined 4-percent, or 50,000 rides.

**Figure 2 Howard Transit Ridership Trends**



Source: Central Maryland Regional Transit

### *Howard Transit Overall Performance*

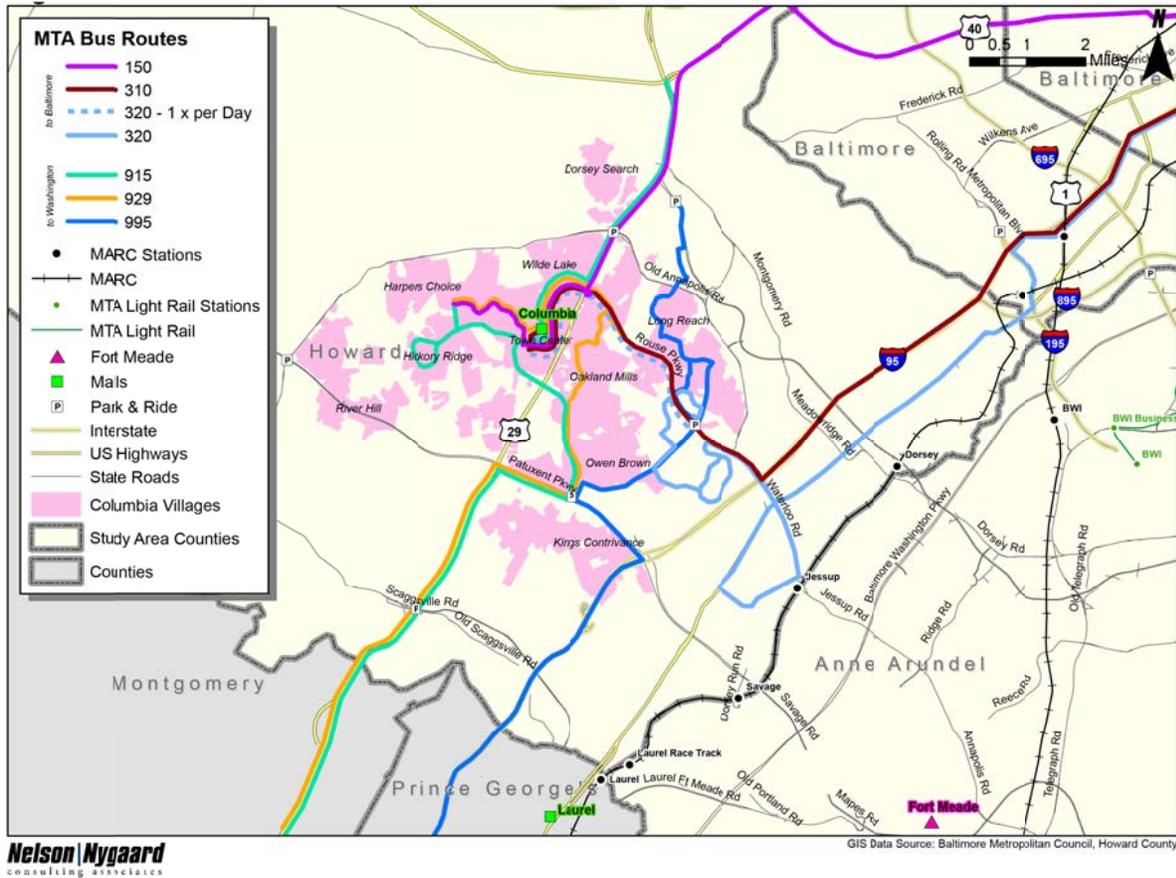
Regardless of long-term growing ridership, all HT routes fall under the Maryland Transit Administration’s (MTA) “Needs Review” category for operating costs per hour and per mile, which means that the cost to run the system is high compared to other small urban systems. However, three routes (Brown, Green, and Red) carry enough passengers per hour and per mile to be deemed “Successful” according to the MTA standards. How HT routes fall within the MTA standards shows that the system overall is carrying a decent level of passenger activity, but operating costs are high. Cost per hour averages over \$75, which exceeds MTA’s limit of \$50 for “Needs Review.” Cost per mile averages over \$4.30, which exceeds MTA’s limit of \$3.50 for “Needs Review.”

### *Maryland Transit Administration Overview*

The MTA also operates service in Columbia separate from HT. One express route and five commuter routes connect Columbia with Baltimore and Washington. In MTA’s Fiscal Year 2009, the five commuter routes carried more than 803,000 rider trips. However, only about 15% of these trips, or 120,000, originated or ended in Columbia. The highest ridership MTA route for Columbia, the express Route 150, ranks at the low end of MTA service in terms of ridership. It serves about 100 riders per weekday.

Even though the Baltimore express Route 150 carries more Columbia riders than any other MTA route serving Columbia, both Columbia and route ridership on the three Baltimore-bound routes is lower than the Washington-bound routes as well as the MTA system average, due to the fact that Baltimore represents a much smaller market share than Washington. Farebox recovery ratios for Columbia’s three routes to Washington perform above average in relation to the rest of the MTA system.

**Figure 3 Existing MTA Routes**



## Connect-A-Ride

Central Maryland Regional Transit (CMRT), the operator of HT service among others, runs a fixed route bus service called Connect-A-Ride (CAR), which includes Connect-A-Ride Laurel and Connect-A-Ride Anne Arundel. While Howard Transit routes focus around Columbia Mall, Connect-A-Ride service centers on the Laurel Mall. One route (E Route) travels between the Laurel Mall and Columbia Mall on one-hour headways (2-hours on weekends). It has the highest average weekday ridership of the Laurel routes at 130.

## Planned Service Findings

While all Columbia transit providers share a long-term vision of superior transit access for the region, including light rail, bus rapid transit, and expanded fixed route bus service, few concrete long-term plans exist that can be expected to change transit service in Downtown Columbia for the foreseeable future, with one exception. The opportunity of increased employment at Fort Meade in the near future (discussed in more detail below) has not gone unnoticed by transit providers. CMRT is already exploring opportunities to connect Columbia with Fort Meade through two routes: a new Columbia Gateway-Dorsey MARC-Fort Meade route; and a Clarksville-Fort Meade / Downtown Columbia-Fort Meade route, which is a restructuring of CMRT's existing Blue Route into two branches. Howard Transit sees the opportunity of a Downtown Columbia to Fort Meade connection as warranting frequent bus rapid transit (BRT) in its long-range plans.

### *Howard Transit Plans*

Due to systemwide financial constraints, no new Howard Transit services are planned, aside from a new loop route around the Odenton MARC station. However, Howard Transit does maintain a long-range list of service enhancements and new connections it would like to make, including:

- A circulator with 15-minute frequencies serving the Columbia Mall and surrounding villages;
- An express between Downtown Columbia and the Howard County government offices in Ellicott City;
- A Columbia Mall to Fort Meade bus rapid transit line (BRT) with 15-minute headways; and
- An express route on the successful Silver Line.

### *LRT Expansion*

Meanwhile, the Baltimore Region Rail System Plan includes extending the existing light rail serving Baltimore-Washington International Airport (BWI) west to Downtown Columbia. The estimated travel time on an extended LRT from Columbia to BWI is 42 minutes. However, given that this plan is largely a vision for transit over the next 40 years, it is not expected that this rail expansion will occur before the build-out of Downtown Columbia is complete, so it is not considered in the transit center analysis.

### *Washington Metropolitan Area Transit Authority (WMATA) Improvements*

While Howard County is not in WMATA's current metropolitan contract, three of MTA's commuter bus routes currently bring Columbia passengers to the Silver Spring Metro station, where a new intermodal hub is planned. This hub would facilitate transfers between MARC, Metrorail Red Line, Metrobus, other MTA commuter buses, Greyhound, and the proposed Purple Line light rail in Montgomery County.

## Transit Market Findings

There are many significant destinations in and around Columbia, many of which are likely attractors of transit ridership. Near the Columbia Mall and at other select areas along major surrounding roads, there are areas of commercial and civic development with employees that rely on transit. Johns Hopkins Applied Physics Laboratory is the single largest employer in Columbia. Shopping centers and malls are other major centers of activity, particularly the Columbia Mall.

### *Higher Employment Destinations*

Some areas in Harpers Choice (near Howard County General Hospital) and Hickory Ridge have employment densities between 16 and 24 jobs per acre that are considered high enough to support transit about every 15 minutes<sup>5</sup>. Downtown Columbia will be able to support even greater service frequency. Owen Brown, Long Reach and parts of Wilde Lake also have higher

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<sup>5</sup> According to the methodology of the Transit Capacity and Quality of Service Manual, 2<sup>nd</sup> ed., Transportation Research Board, Washington, DC, 2003.

employment densities between 8 and 16 employees per acre and can support service every half-hour.

### *Higher Residential Destinations*

However, most of Columbia is residential, and transit riders require connections to local and regional jobs served by Howard Transit, the MTA, and WMATA. In Howard County, the major population concentration of sufficient density to support higher-frequency transit is in Columbia. Several Columbia villages that have higher densities, particularly Harpers Choice at over 18 households per acre, can support transit service every 10 minutes<sup>6</sup>, as will all of Downtown Columbia, which will exceed 20 households per acre. At between 6 and 12 households per acre, Hickory Ridge, Long Reach, Owen Brown and Wilde Lake can support service every half-hour. Some areas of Oakland Mills can also support 30 minute headways. Beyond these communities, most other areas are more rural in nature.

### *Fort Meade Demand*

As Downtown Columbia sees new residential development, good connections to nearby and remote jobs will be important. Fort Meade is currently the key employer and destination for many in eastern Howard County. It is poised to become an even larger trip attractor with its planned expansion. The Base Realignment and Closure (BRAC) plan for Fort Meade will bring thousands more employees and family members to the Anne Arundel and Howard County area. To satisfy this demand, several new transit routes have been proposed as discussed above, and several providers and jurisdictions, including Howard County, have entered into a Memorandum of Understanding to promote transit ridership, provide new service, and implement transportation demand management programs that incentivize transit use. . One issue making the planning of transit services difficult is that employees do not yet know where, or if, they will relocate. However, it is evident that Downtown Columbia residences will play a part in serving Fort Meade families.

## Location and Layout of a Transit Center

Given the existing service described above, the layout and potential locations for a transit center in Downtown Columbia to replace the current transfer hub at the mall can be determined. There are both short-term and long-term considerations for the size of the transit center and include not only the current service levels, but how buses operates, and how potentially expanded service would be integrated. The location of the transit center is also important both for bus operations and circulation, as well as to provide the best and most convenient and accessible pedestrian connections into the densest parts of Downtown Columbia. Lastly, the layout of the center must consider the number of passengers to be accommodated, the types of services they need, and their ease of transfer, in addition to the safe, efficient management of buses.

The Howard Transit system's pulse schedule means that the number of berths required must be able to accommodate a vehicle from all routes at the same time. Seven of Howard Transit's routes serve the mall at the top and/or half of the hour. Four of the MTA express services – Routes 150, 310, 915, and 929 – have runs that stop at the mall a few minutes on either side of the top and half of the hour. In order to also accommodate layover and recovery time, those buses should have berths as well, and since they are all peak-oriented, they each need their own berth. One CMRT route, Route E, serves the mall as well, resulting in a total demand for 12

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<sup>6</sup> Ibid.

berths. The proposed Downtown Columbia circulator shuttle should have a signed curb space, but it does not need an additional berth because it can layover and recover off of the pulse demand points.

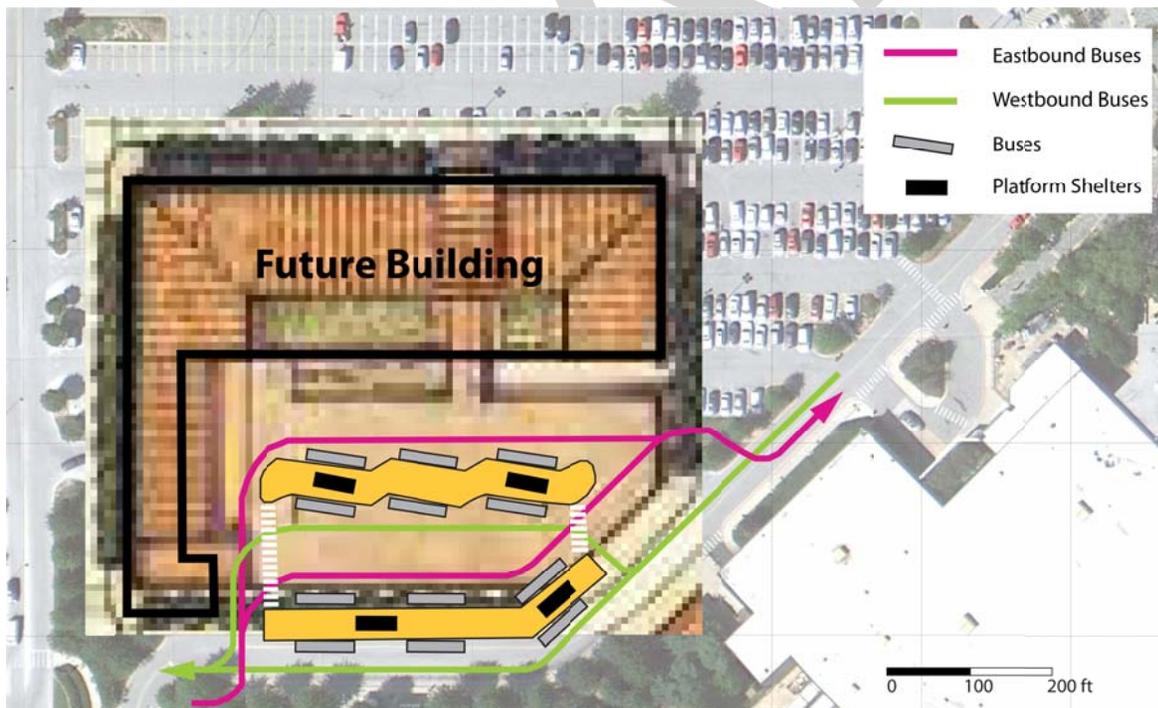
To best accommodate both bus movements and passenger transfers, the 12 berths should not be arranged linearly but rather should be located close together to avoid the issue of arriving on one bus and walking the length of 11 berths (over 800 feet) to a connecting bus. Limiting the center's footprint also simplifies placement within Columbia.

## Short-Term Transit Center

A short-term transit center would work to consolidate existing service in a way that orients and organizes service within Downtown Columbia. In order for this center to meet existing needs, it should accommodate 12 bus berths. The analysis recommends that this center remains in approximately the location where the Howard Transit bus hub is today. Until development patterns change substantially in Columbia, this site is both the least disruptive and best-placed location to serve transit routes, riders accessing the mall, and surrounding destinations.

A future parcel immediately north and adjacent to the hub could accommodate a modified short-term hub, as envisioned in Figure 4. This preserves the remainder of the site for existing parking or a future building. Three buses would use on-street stops while nine routes will use berths located off-street. Buses will circulate through eastbound and westbound, as shown in the diagram.

**Figure 4 Short-Term Transit Center**



The transit center would have two medians, one curbside and the other off-street. Each would be at least 20-feet wide and approximately 200-feet long. Two bus shelters with internal benches and maps and schedule holders should be provided per median with another four benches per median on either side of the shelters. Other amenities should include four trash receptacles, four APBP-compliant bicycle racks accommodating at least eight bikes each, a

signpost for each berth, pedestrian scale lighting, and full ADA access to both ends of each median with well-marked crosswalks between the ends of each opposing median. No dedicated parking is needed as the majority of existing and planned transit service uses Columbia as a hub and secondarily as an employment destination. All inter-city park and ride demand will continue to easily be accommodated in nearby mall parking.

The estimated capital cost for this facility could range from \$150-250,000, not including land.

## **Long-Term Transit Center**

As Downtown Columbia develops, additional demand for transit will be generated as densities increase. However, as shown previously and described in Appendix B, both planned transit improvements as well as projections for 2035 employment and population densities do not suggest that additional bus berthing capacity will be needed at a transit center. Anticipated transit improvements will likely involve larger vehicles and higher frequencies, but there is little need for additional routes in the Howard Transit system that serves Columbia, with the exception of Fort Meade connections. Future Fort Meade service – as well as any improvements to MTA and WMATA commuter routes – are not expected to operate on the pulse as other Howard Transit routes do because greater frequencies will be needed. As service frequencies increase, the need to temporally overlap bus layovers in a “pulse” paradoxically decreases. Simply put, if service migrates from the current 30–60 minute headways, the timepoints have less need to align in order to maintain an acceptable wait/transfer time. Therefore, these express and commuter services will more easily be able to use empty berths off-pulse (during the non-peak moments between the top and bottom of the hour), requiring only a more sophisticated changeable information system announcing to passengers which berth a bus will depart from. The potential to use other nearby curbside stops where there will be no conflicts with bus layovers would remain.

However, greater overall ridership and increased transferring between services will demand improved off-bus passenger amenities, including improved and sheltered waiting areas, long-term bicycle lockers, convenience retail, and information kiosks. While projected ridership is not expected to exceed the capacity of the short-term transit center, most projected riders will not be transit-dependent. These “choice” riders will not be drawn to the short-term center’s open-air design with simple amenities. In the long-term, a higher-quality transit center with improved amenities will be needed. The definition of when that happens is driven mostly by the tolerance of choice riders to use the short-term center, as opposed to any metric of build-out or ridership. Therefore, the point to shift to a long-term center will be driven by either: a) the need to build on the short-term center’s parcel, or b) the development of the parcel intended to house the long-term center.

### *Long-Term Location*

Several locations for a long-term transit center were evaluated according to four simple criteria that the transit center should possess:

- 1) Easy access to the road network;
- 2) Minimal impact on the future vehicular network;
- 3) Minimal additional bus travel miles; and
- 4) A close proximity to the mall.

The transit center should be integrated into a future mixed-use building to maximize visibility and passenger safety, as well as providing proximate amenities typical of quality transit centers.

It is recommended that the long-term transit center be moved south of the southern mall entrance. This location was selected due to its similarly central location close to the mall, as well as the future parcel's longer block length (~550 feet) which enables a single transfer median serving six buses per side to be designed. Six on-street berths would be located along the front of the development site for westbound stops; then buses would U-turn to the inside of the development site and travel eastbound through the transit center to exit. Eastbound buses would enter the transit center then U-turn to exit past the on-street berths. This concept is illustrated in Figure 5.

**Figure 5 Long-Term Transit Center**



The recommended long-term transit center should include the same passenger amenities as the short-term center. There will continue to be no need for dedicated transit center parking; while ridership will grow with residential and employment density, residents will walk to the bus from their homes and employees will be traveling inbound by transit. The recommended location within a building footprint has a number of quality advantages, including:

- A clear street-side presence that improves the visibility of transit in Downtown Columbia to attract more riders
- The least negative impact on streetscapes, on-street parking, and active street-level uses
- The opportunity to co-locate amenity services on and near the bus median for improved passenger and passerby convenience, while preserving active floor space on the remainder of the development parcel
- A covered transfer median and eastbound bus berths that will greatly improve passenger comfort, weather protection, and enjoyment while enabling easier maintenance
- Adjacency to a mall parking garage for any park and ride demand

# Chapter 2. Downtown Columbia Circulator Shuttle

## Background

The objective of the Downtown Columbia circulator is to serve key trip generators, which in this area include both the existing Mall and the future residential and office developments within Downtown Columbia. A phased approach to circulator routing will allow a short-term route to begin operations on existing roads serving existing developments, while a long-term pattern will serve future roads and developments.

## Key Recommendations

- Since existing Columbia residents are already served by Howard Transit routes, a Downtown Columbia circulator should begin operations when there are enough new residents in Downtown Columbia seeking such service, as determined through the results of monitoring surveys.
- A transportation demand management plan should be established for Downtown Columbia with a periodic monitoring program that can establish a clear metric(s) for when a circulator shuttle is appropriate, ideally through direct surveys of Downtown Columbia employees and residents that demonstrate the need.
- The short-term circulator should utilize existing mall and surrounding roads with approximately six stops near existing buildings and the mall. The circulator should operate on a fixed schedule, departing the transit center every 20-minutes.
- In the long-term, the circulator should extend its route to the Crescent area around the current Maryweather Pavillion when new development in that area is occupied and reporting a need through the monitoring program's surveys. Frequencies should increase to 15-minutes, with fixed departures from the short-term or long-term transit center.

## Methodology

In order to evaluate how a circulator shuttle for Downtown Columbia could be structured, four basic components were studied:

- Circulator routing
- Operating schedule
- Capital and operating costs

Each of these components is summarized below with full details contained in Appendix C. In addition, options for circulator ownership as well as potential funding streams are discussed below.

## Short-Term Circulator

No circulator serves the Columbia Mall area today. As noted earlier, most transit riders are passing through as transfers in the Howard Transit system. While there is sufficient jobs density in the mall area to support transit, existing and potential transit riders would seek to travel to and

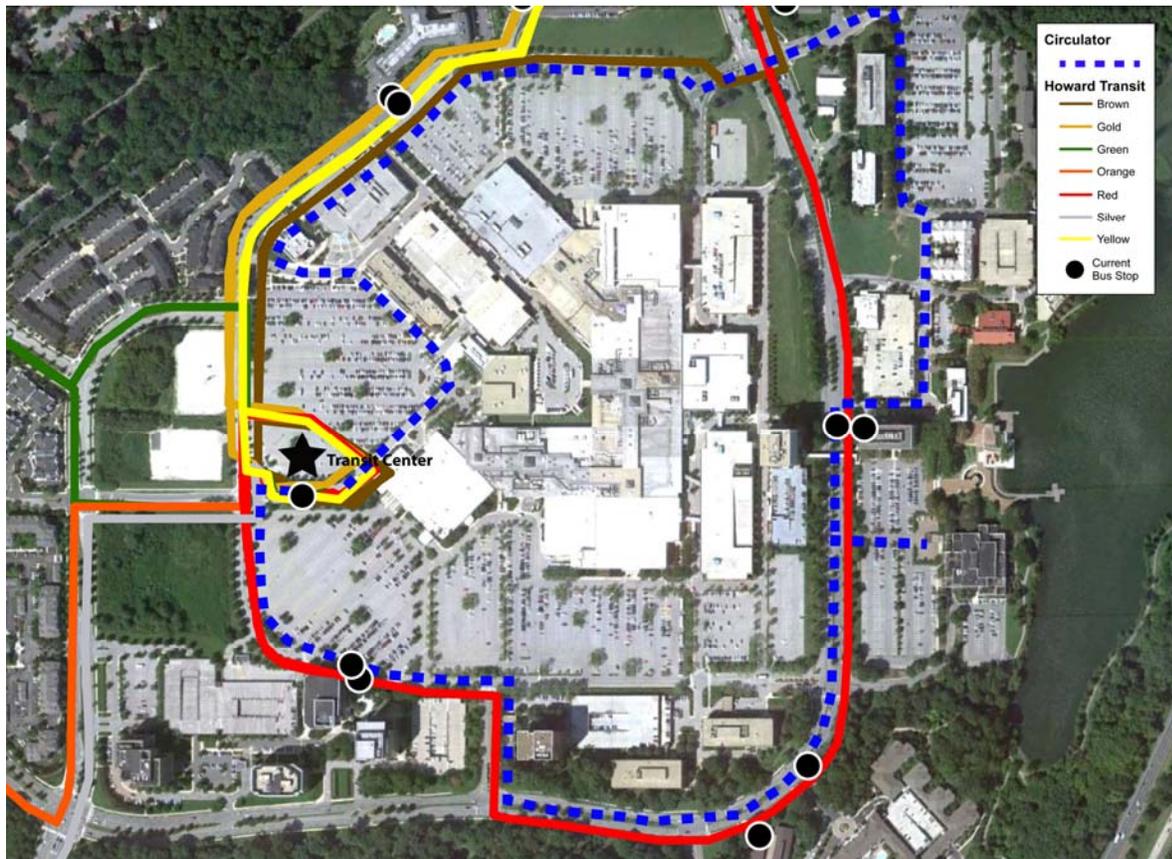
from off-site residences – job site to job site travel does not typically occur by transit. While there may be some value in connecting Downtown Columbia employment locations to the mall for retail-oriented trips, the infrequency of this demand and the short walking distances that already exist make justifying a circulator very difficult in the near future, especially since all Town Center destinations are within a 5-minute walk of the mall or transit hub.

However, as Downtown Columbia develops new housing opportunities on-site, demand to ride a circulator to on-site jobs and ultimately making it part of daily retail trips will begin to grow. While there is no accepted metric for when to implement a circulator shuttle that does not serve a high-ridership transfer point, such as a mass transit station, it seems appropriate that a circulator be considered after new on-site residential developments become occupied and resident survey responses suggest there would be demand for such a service. Therefore, implementation of a Downtown Columbia circulator shuttle should be contingent upon sufficient demand as determined by surveys of residents and employees of Downtown Columbia, possibly conducted through a transportation demand management (TDM) program. Figure 46 shows the long-term circulator, assuming completion of development in the Crescent area. In the long-term, the circulator route still serves the main front entrances of the mall on the western side of the site. East of Little Patuxent Parkway, the long-term circulator will loop around the new building just south of the pedestrian bridge (in the short-term that parcel will be served by an in-out turnaround). The long-term circulator will also travel on the new road proposed to connect Windstream Drive west of the mall south to Symphony Woods Road. The total route measures 2.8 miles. It is assumed that the bus will also travel at the same operating speed as CMRT – 15.8 miles per hour. Thus one round trip takes 10.6 minutes. With the compact development pattern of the community, the proposed long-term circulator route would be easily able to provide service to the entire study area such that everyone will be within a five-minute walk, or a quarter-mile, of the route. Although detailed development data has not been completed, the General Plan amendment outlines the mix of land uses planned for Downtown Columbia. Based upon that data, the market capture for the circulator route by 2035 is 7,990 housing units and 7,237 employees.

In both phases, the route will serve the mall's west entrance, and the long-term circulator would also serve the southeast entrance. Limiting service to one or two mall stops maximizes end point connectivity while minimizing each passenger's bus travel time. Additional stops should be made by drivers when hailed by riders curbside or on-board. Where repeated stops are typically made, Downtown Columbia tenants or the TMA should install appropriate stop amenities, such as those described under "capital cost" below.

Figure 466 presents what a short-term circulator route would likely be, assuming current land uses. This route uses the current transit hub area, heads clockwise around the mall loop, and serves destinations east of Little Patuxent Parkway. The bus accesses the hotel and library along the southeast portion of the mall before turning onto the mall road and back to the transit center. This route was chosen mostly to connect to outlying destinations that have a slightly longer walk to the transit hub and mall, while maintaining a high frequency of 20-minutes.

Figure 6 Short-Term Circulator



### *Circulator Operations*

In order to provide a high level of service that matches the level of density in Downtown Columbia once service is justified, initial headways of 20 minutes are recommended in the short-term<sup>7</sup>. Greater frequencies are not recommended in the initial phases so as to incentivize walking to and from the transit hub/center, helping to activate the streets and spaces of Downtown Columbia. Capital costs for the proposed circulator are estimated to be about \$150,000, as the route is not complicated enough to warrant purchasing scheduling software, passenger count machines, or other technologies. Two new vehicles will be the primary capital cost for the system. Cutaway, lift-equipped vehicles are recommended to accommodate early-year demand.

The operating costs are estimated to vary between \$340,000 and \$420,000 per year depending upon who runs the service. A private agency typically will have a lower operating cost than if a service was run by the local transit agency. This is partly because a transit agency focused wholly on providing service will have higher overhead than a private organization that contracts out for service.

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<sup>7</sup> Per the methodology of the Transit Capacity and Quality of Service Manual, 2<sup>nd</sup> ed., Transportation Research Board, Washington, DC, 2003. See Appendix C.3 for a detailed discussion.

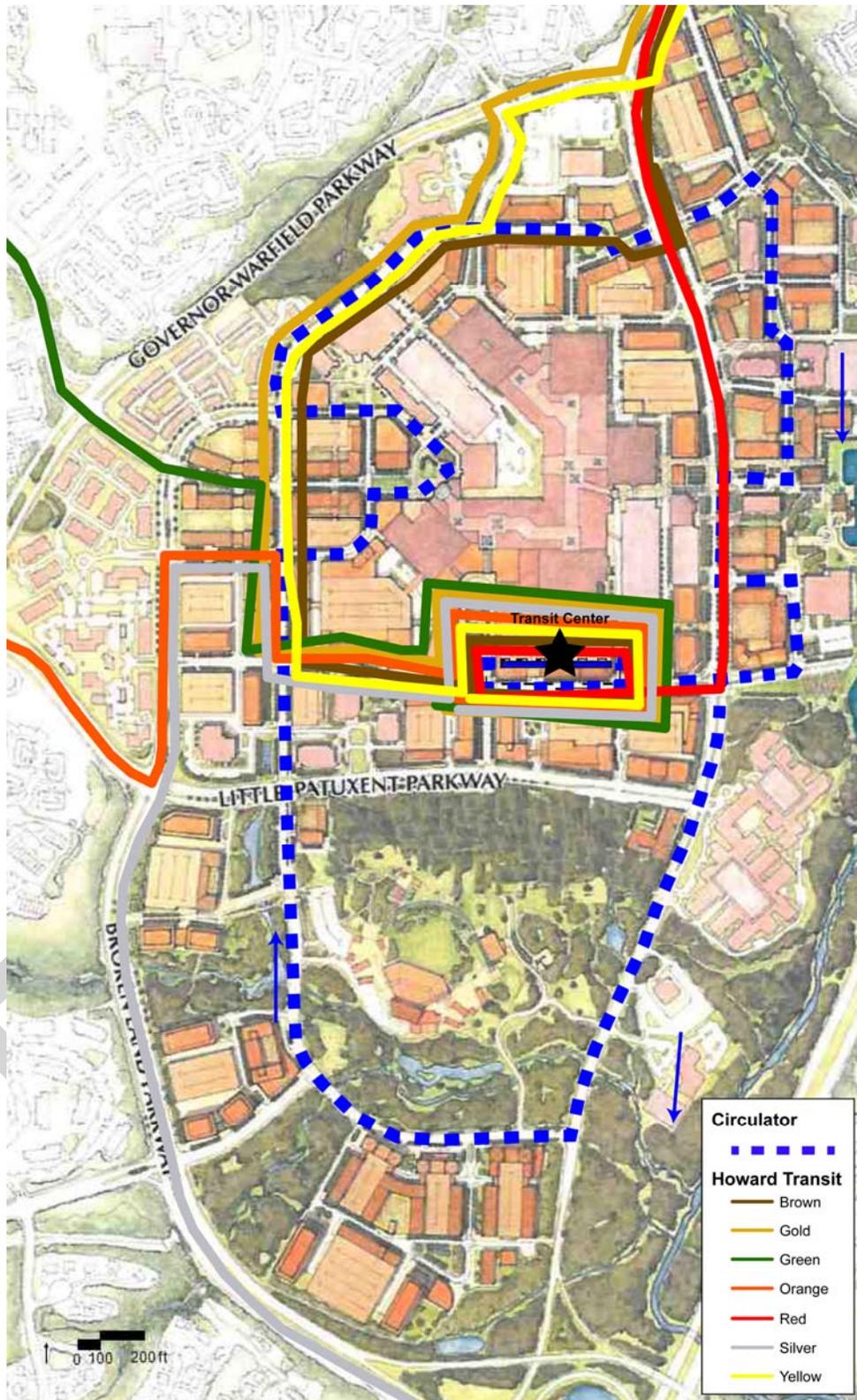
## Long-Term Circulator

Once new development becomes occupied in the southerly Crescent area, the farthest points within Downtown Columbia will be distant enough to benefit from additional service that replaces walking to other neighborhoods, services, employment, the mall, or the transit center. At this phase, circulator service should be increased to 15-minute headways. Figure 467 shows the long-term circulator, assuming completion of development in the Crescent area. In the long-term, the circulator route still serves the main front entrances of the mall on the western side of the site. East of Little Patuxent Parkway, the long-term circulator will loop around the new building just south of the pedestrian bridge (in the short-term that parcel will be served by an in-out turnaround). The long-term circulator will also travel on the new road proposed to connect Wind stream Drive west of the mall south to Symphony Woods Road. The route is intended to bring the circulator close to all parts of Downtown Columbia without circuitous moves that would impede the ability to provide 15-minute headways.

With the compact development pattern of the community, the proposed long-term circulator route would be easily able to provide service to the entire study area such that everyone will be within a five-minute walk, or a quarter-mile, of the route. In both phases, the route will serve two of the Mall's entrances, one on the south side and one on the west side, which maximizes end point connectivity while minimizing each passenger's bus travel time. There are only minor additional capital costs expected for new bus stop signs. Operating costs are expected to remain the same as the short-term circulator as only the layover and recovery time will lessen without becoming insufficient.

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Figure 7 Long-Term Circulator Route



## Circulator Ownership

A single administrative/management entity will help to ensure effective on-going circulator operations. Circulator management could also be carried out by Howard County, a business organization, or a private operator. The primary tasks that will be needed are as follows:

- **Managing the Operating Contract:** This includes operator contract oversight responsibilities and evaluation of contractor performance.
- **Marketing the Service:** All services require an effective public information and marketing campaign. This includes developing brochures, creating a distribution network, and preparing other marketing materials and informational pieces.
- **Applying for Funds:** There are a number of opportunities for securing public and private funding sources to help finance the service. Applying for funds, coordinating with other local agencies and businesses, following through with funding requests, and securing funding agreements is a major responsibility of the lead entity.
- **Refine Schedule and Make Routing Adjustments:** It is recognized that the proposed Downtown Columbia circulator may require periodic schedule adjustments as new development projects are built and existing uses are updated.

Based on typical circulator operations in the United States, three options for administering the circulator are:

- Howard County: The major advantage of the County assuming this role through CMRT is because CMRT already administers successful transit and shuttle systems throughout the state, it is very familiar with transit operations, and it has staff expertise in this area. Another advantage is that the County has a vested interest in providing high quality transit in the area to attract and maintain businesses within its jurisdiction. The County and CMRT would seek grant funding for the administration of the shuttle.
- Individual Employer: A Downtown Columbia employer that has experience operating a shuttle elsewhere could administer a circulator shuttle. The major disadvantages with this approach are that no single party would likely be interested in taking on this role as most employers are not in the business of providing shuttle service. Problems may arise from other employers being reluctant to have a competitor operating a circulator servicing their property.
- Transportation Management Association: A Transportation Management Association (TMA) may be a very effective manager for the circulator shuttle. The major advantage of a TMA assuming this role is that it would have a Board of Directors consisting of private sector interests such as employers, developers, building owners, residential communities, and public agencies. Under this option, the County would oversee the TMA and serve as the Executive Director. The TMA Board of Directors would have a vested interest in the circulator because they would be contributing to the cost of the service. A TMA would be eligible for a variety of public funding sources, but their power is their ability to leverage private money through direct oversight by private-sector interests. TMAs are unique in that they allow private developers and employers to seek public funds, while providing an avenue for public agencies to seek private funds.

### Summary

While all of the above ownership and management structures should be discussed with the County and Downtown Columbia Partnership stakeholders, a TMA should nonetheless be formed for Downtown Columbia with the intent of eventually contributing to the operation of a circulator.

## Funding Opportunities

Securing start-up funding as well as on-going financing for the Downtown Columbia circulator shuttle will be essential. This section describes potential revenue sources to pay for the circulator service, including Federal, state, and private opportunities. In many cases, shuttles are funded by a combination of public and private funds.

### *Advertising Revenues*

The circulator system itself can act as a revenue generator by capturing dollars through vehicle and bus stop advertisements. However, the circulator operator should be careful to not obscure the circulator's branding so they are still easily recognizable to patrons. Prices can vary widely, with price categories for different sized signs placed on the rear, sides, or inside of transit vehicles, and on bus shelters and benches. As an example of advertising revenues developed by Clear Channel Outdoor for a small shuttle system in San Marcos, California, the table below shows sample monthly advertising fees. Assuming advertisements were placed on one side of each bus, within their interiors, and at bus stops, revenues could reach approximately \$14,000 annually, assuming no gaps in advertisers.<sup>8</sup>

**Figure 8 Clear Channel Outdoor Bus Advertising Rates, San Marcos, CA<sup>9</sup>**

Location	Price (monthly)
Bus Tail	\$300
Bus Side	\$400
Bus Interior	\$35

### *Employer Contributions*

Downtown Columbia employers are a likely source of funding, particularly since the proposed circulator route and stop locations will serve their businesses. The exact contribution amount could be based on a number of factors, such as square footage, number of employees, proximity to circulator stops, or type of business, and it could be added on top of a flat participation rate assessed to all tenants, if desired. For those employers interested in a "front door" stop, a funding contribution could be higher than employers without this attractive element. These financial contributions could be used for capital procurements, such as passenger benches or shelters, or for operating purposes.

### *Transportation Management Agency Member Contributions*

Columbia and the County would be benefitted by establishing a Transportation Management Agency (TMA) to operate and fund the circulator system, as well as other TDM programs for Downtown Columbia. A TMA is typically a private, nonprofit organization. Usually TMAs are run by a Board of Directors with a small administrative staff – typically 1 to 3 people. They are public-private partnerships formed to address transportation, traffic and air quality issues, and they generally strive to improve the local business environment. TMAs are proactive organizations whose members may include employers, developers, building owners, residential communities and public agencies.

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<sup>8</sup> Bus shelter/bench rate estimated at \$250 per stop.

<sup>9</sup> Source: Clear Channel Outdoor, interview March 14, 2011.

TMAs are quite common throughout the East Coast. TMAs are eligible for a variety of public funding sources, but their strength lies in their ability to leverage private money through direct oversight by private-sector interests. TMAs are unique in that they allow private developers and employers to seek public funds, while providing an avenue for public agencies to seek private funds. This includes the contribution of employer funds to help subsidize the program. Typically, large employers may contribute \$5,000-\$20,000 per year to help offset operations and administrative costs.

### *Passenger Fares*

Passenger fares would provide an ongoing revenue stream to help support the cost of operating the circulator. While passenger fares would provide valuable operating revenues, the fares would be expected to recover only a small share of the operating costs. Bus services in the County typically collect between 15% and 30% of their costs from passenger fares. Shuttle services, however, are generally free-of-charge. Surveys indicate that the “free fare” is a major incentive for passengers who use these services. If a fare structure were established, it would be extremely important to set the structure “appropriately.” Setting a fare too high would discourage riders and create a disincentive for using transit.

While the current Howard Transit one-way fare is \$2.00, even a \$1.00 fare for travel within the vicinity of the mall may seem excessively high and could discourage people from using the service. A nominal fare of \$0.25 could be considered as an alternative fare structure, but it is reasonable to assume that passenger fares would recover less than ten percent of operating costs under a \$0.25 fare structure. There could be initial capital costs required if a fare was imposed (farebox, fare counting equipment, tickets, etc.) and ongoing administrative costs that would reduce this revenue source even further. Questions would also arise about discounted fares. Should students pay the same as adults? What about senior citizens?

For all of the above reasons, the circulator is recommended to be fare free.

### *State and Federal Funding Programs*

State and Federal programs may offer potential funding sources. Most of these funds are from the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA). Federal funding sources are likely to be the most competitive and tend to have the most requirements including requirements for matching funds that often are difficult to meet. An overview of potential sources is summarized below in Figure 9.

**Figure 9 State and Federal Funding Programs**

Agency	Program	Description
Federal Transit Administration	FTA Section 5309 Capital Program (Congressional Earmarks)	
US Department of Transportation Federal Highway Administration (FHWA)	Surface Transportation Programs	This funding program covers a wide range of transportation improvements such as roadway construction or rehabilitation, certain transit capital projects, parking facilities, and non-motorized transportation improvements. STP funds also may be used to bring sidewalks and intersections into compliance with the Americans with Disabilities Act (ADA).
US Department of Transportation Federal Highway Administration (FHWA)	Congestion Mitigation and Air Quality (CMAQ) Improvement Program	The CMAQ program was designed to enable "non-attainment" areas under the Clean Air Act to fund certain types of transportation programs to improve air quality. Eligible projects include both construction and non-construction activities that have some direct relation to air-quality improvement.
Maryland Transit Administration (MTA)	Jobs Access and Reverse Commute (JARC)	The Job Access and Reverse Commute Program (JARC) goals are to improve access to transportation services to employment and employment related activities for low-income individuals and welfare recipients and to transport residents of urbanized areas and non-urbanized areas to suburban employment opportunities.
US Department of Transportation Federal Highway Administration (FHWA)	Public Transportation Modernization Improvement and Service Enhancement Account (PTMISEA)	Funds from this source are available for rehabilitation, safety or modernization improvements, capital service enhancements or expansions, new capital projects, bus rapid transit improvements, or for rolling stock procurement, rehabilitation or replacement.

Sources: FHWA

# Appendix A. Regional Transit System Evaluation

## A.1 Existing Transit Services

Downtown Columbia is served by bus transit provided from several different transit operators, including Howard Transit (HT), Central Maryland Regional Transit (CMRT), and the Maryland Transit Administration (MTA). HT and CMRT provide local bus service, while the MTA operates express and commuter buses traveling to Baltimore and Washington, D.C. The MTA also operates the MARC commuter train on a line between Washington, DC and Baltimore in Anne Arundel County and along the eastern edge of Howard County. HT connects Columbia with the Dorsey MARC station, approximately 10 miles east of Columbia Mall, as well as the Savage and BWI stations. Shuttle service is provided in Anne Arundel County by the BWI Business Partnership.

A Transit Development Plan (TDP) was completed in 2009 by KFH Group containing detailed information on the fixed-route transit routes serving Howard County (Appendix A). The TDP analyzes how existing routes serve destinations such as major employers, high-density housing, human service agencies, shopping centers, schools, and medical centers. The conclusion of the TDP is that the current services access nearly all of these destinations.<sup>10</sup> The TDP also lays out planning strategies for the system as well as route recommendations.

### Howard Transit

Howard Transit provides fixed-route service throughout the eastern portion of Howard County through contracted service to CMRT, who in turn contracts service to First Transit. HT's ridership totaled 931,583 on eight routes in Fiscal Year 2010. The service's users are primarily those who do not have access to a car; there are few "choice riders."<sup>11</sup> The vast majority of people living in Howard County do not work there and must commute to other areas; conversely, the majority of people working in Howard County come from another area. Thus HT's role lies in transporting employees to jobs at the Columbia Mall, the Howard County General Hospital, various office parks throughout the county, Fort Meade, and to Anne Arundel and Prince George's Counties. The routes operate as a pulse system, with the primary Columbia transit hub in the Columbia Mall as the start and end point. The Mall in itself is not a destination for many bus riders, but a transfer point to connecting routes. Bus operators in theory wait for transfers at the Mall, but in practice this policy is not always followed.<sup>12</sup> The transfer point is just outside the Mall in the parking lot, and consists of three shelters. Due to lack of space, buses must double park, and passengers have to walk between buses looking for their transfer since there are no spaces dedicated to each route.<sup>13</sup> Figure 10 shows HT's routes.

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<sup>10</sup> KFH Group, Inc. for the MTA Office of Planning. [Howard County Short-Range Transit Development Plan](#). February 24, 2009 (see Appendix E).

<sup>11</sup> Matthew Helfant, Planner, Central Maryland Regional Transit. Phone interview 8/16/2010.

<sup>12</sup> Matthew Helfant

<sup>13</sup> Transit Development Plan, 2-10



**Figure 11 Average Daily Ridership, June 2010**

Route	Destinations	Service Span (days per week/ hours per weekday)	Weekday Headways (Minutes)	Average Daily Weekday Ridership	Weekend Headways (Minutes)	Average Daily Weekend Ridership
Silver	Columbia Mall, MD Food Center/BWI	7 / 16	60	582	60 Sat, 120 Sun	303
Green	Columbia Mall / Wild Lake/Hospital/ HCC	7 / 16	30	548	60	277
Brown	Columbia Mall/ Kings Contrivance	7 / 17	60	495	60 Sat, 120 Sun	180
Red	Columbia Mall/ Long Reach/ Dobbin/ Snowden Square/ Gateway	7 / 17	60	494	60 Sat, 120 Sun	179
Yellow	Columbia Mall/ Ellicott City	6 / 14	120	244	60	182
Orange	Columbia Mall/ HCC/ Kings Contrivance	7 / 16	60	231	60 Sat, 120 Sun	176
Gold	Columbia Mall/ Lark Brown/ MD Food Center	6 / 14	60	148	120	60
Purple	Laurel Mall/ Elkridge	6 / 14	60	187	120	102

Source: CMRT, Web schedules

In general, service hours begin at 6 AM on weekdays, 8 AM on Saturdays, and 10 AM on Sundays. All routes run at 60 minute headways or longer, with the exception of the Green route, which operates every 30 minutes during weekday peak hours. All routes run Monday through Saturday; five of the routes also provide Sunday service. During the 2010 service cuts, fares were increased from \$1.50 to \$2 for a one-way trip. Discount tickets for seniors, students, and persons with disabilities rose from 50 cents to \$1. Monthly passes remain at the same cost of \$47. Howard Transit utilizes NextBus technology which tells riders how long it will be until the next bus arrives by way of satellite technology that tracks vehicles. CMRT is working to equip all HT buses with an Automatic Vehicle Location system, which utilizes GPS technology to track actual bus location, which would feed into the county's NextBus Web site.

All routes connect at Columbia Mall except for the Purple Route, which travels from the Connect-a-Ride service hub at Laurel Mall north to Elkridge. The Purple Route also serves the Dorsey and Savage MARC stations. The Silver Route connects with rail service at the Dorsey MARC Station, BWI MARC/Amtrak, and MTA BWI and BWI Business District light rail stations. The Gold Route serves the Snowden River Park & Ride.

HT's operating budget primarily comes from the County, with a small portion provided by the MTA through programs such as Federal 5307 funds, 5311 funds, and Rural and Community Based Services. The MTA has created service standards for small urban bus systems that can

be used to evaluate HT operational efficiency and productivity, as shown in Figure 12. HT operating expenses in the fourth quarter of Fiscal Year 2010 were just over \$1.5 million, and fares collected totaled \$116,046, for a farebox recovery ratio of 7.7 percent, which falls under the “Needs Review” range of service standards. A system like HT should net 20 to 25 percent farebox recovery to reach an “Acceptable” rating. Operating costs were just over \$75 per hour and approximately \$4.30 per mile. Figure 12 shows operating characteristics by route compared against MTA service standards for small urban bus systems. Given the wide variation in ridership levels, some routes, like the Green Route, have a fairly high farebox recovery ratio at 13.4 percent. The Silver Route experiences very high ridership, on par with the Green Route, but since so many of its riders are transfers who do not pay a fare, the farebox recovery is low. The table shows that all HT routes fall under the “Needs Review” category for operating costs per hour and per mile, meaning the cost to run the system is high compared to other small urban systems. In terms of passenger productivity, however, three routes (Brown, Green, and Red) carry enough passengers per hour and per mile to be deemed “Successful” according to the MTA standards. The Silver Route carries an “Acceptable” level of passengers per hour and per mile. How HT routes fall within the MTA standards shows that the system overall is carrying a decent level of passenger activity, but operating costs are high.

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**Figure 12 Operating Statistics, 4<sup>th</sup> Quarter FY2010**

Route	Operating Cost per Hour			Operating Cost per Mile			Operating Cost per Pass. Trip			Farebox Recovery Ratio			Passenger Trips per Mile			Passenger Trips per Hour		
	< \$45	\$45-\$50	>\$50	<\$2.50	\$2.50-\$3.50	>\$3.50	<\$4	\$4-\$6	>\$6	>25%	20%-25%	<20%	>.75	.65-.75	<.65	>12	8-12	<8
	S	A	NR	S	A	NR	S	A	NR	S	A	NR	S	A	NR	S	A	NR
Brown			\$75.82			\$4.33		\$4.98				8.0%	0.87			15.23		
Gold			\$75.81			\$4.33			\$13.80			3.6%			0.31			5.49
Green			\$75.80			\$4.40	\$2.91					13.4%	1.51			26.05		
Orange			\$75.81			\$4.33		\$6.93				3.6%			0.62			10.93
Red			\$76.40			\$4.13	\$3.85					7.8%	1.07			19.84		
Silver			\$75.79			\$4.33		\$6.42				4.1%		0.67				11.81
Yellow			\$75.81			\$4.33		\$7.25				6.1%			0.6			10.46
Purple			\$75.82			\$4.34		\$9.55				5.9%			0.45			7.94

*S=Successful A=Acceptable*

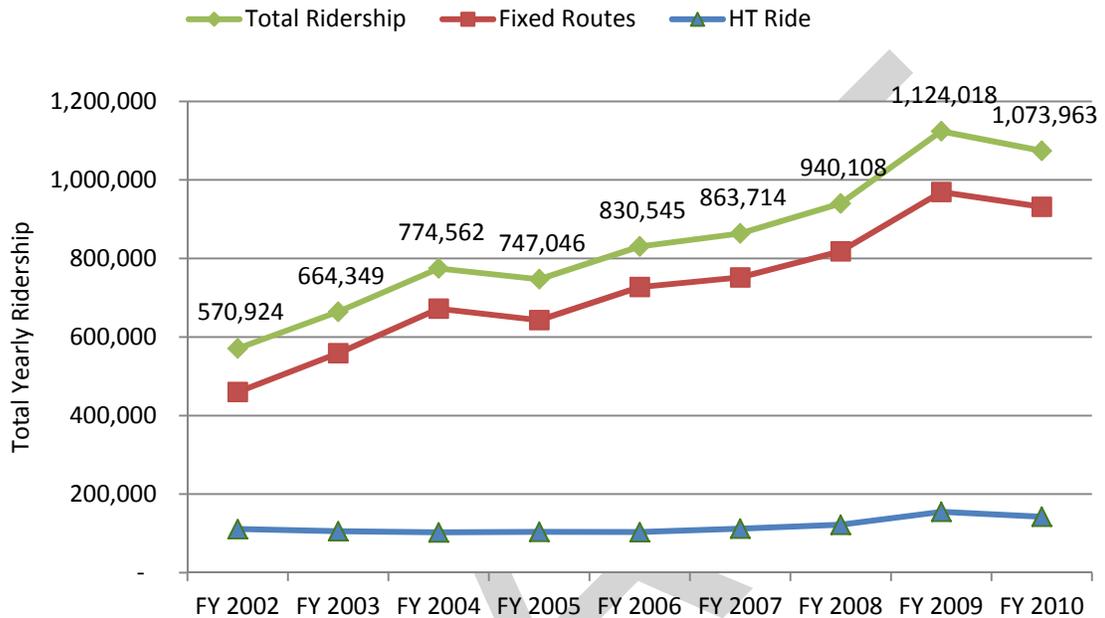
*NR=Needs Review*

Best Performing Route      Worst Performing Route

Source: Operations data: CMRT; Based upon MTA service standards for small-urban fixed-route bus systems.

Fixed route ridership has steadily increased over the years, peaking at 1.1 million annual rides in FY 2009, as shown in Figure 13. The “HT Ride” line in the chart represents ridership on the ADA complementary paratransit service for persons with disabilities. Ridership on this service has remained stable during the past several years.

**Figure 13 Howard Transit Ridership Trends**

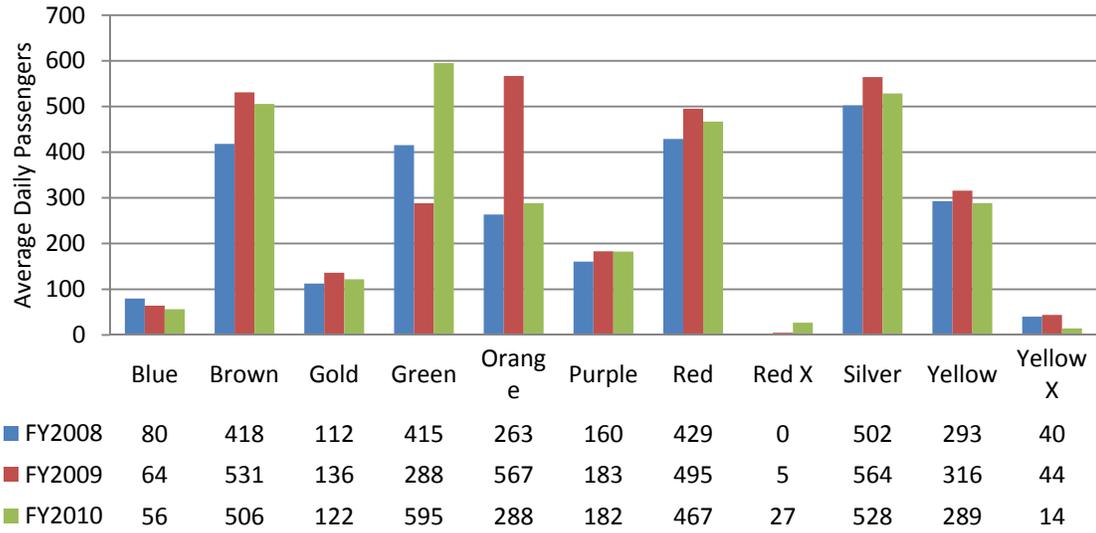


Source: CMRT

Figure 14 shows ridership trends over the past three fiscal years. In general, levels have remained steady except on the Green Route, which spiked in 2010 to nearly 600 trips per day, and the Orange Route, which experienced a spike in Fiscal Year 2009.<sup>14</sup> Figure 15 shows average Saturday ridership. The Gold and Purple Routes have very low ridership, although trends are up for both routes. Figure 16 shows average Sunday trips. Usage of the five Sunday routes is fairly even, except for the Green Route which peaked in 2010, the Orange Route which spiked in 2009, and the Silver Route where ridership has steadily decreased from 2008-2010.

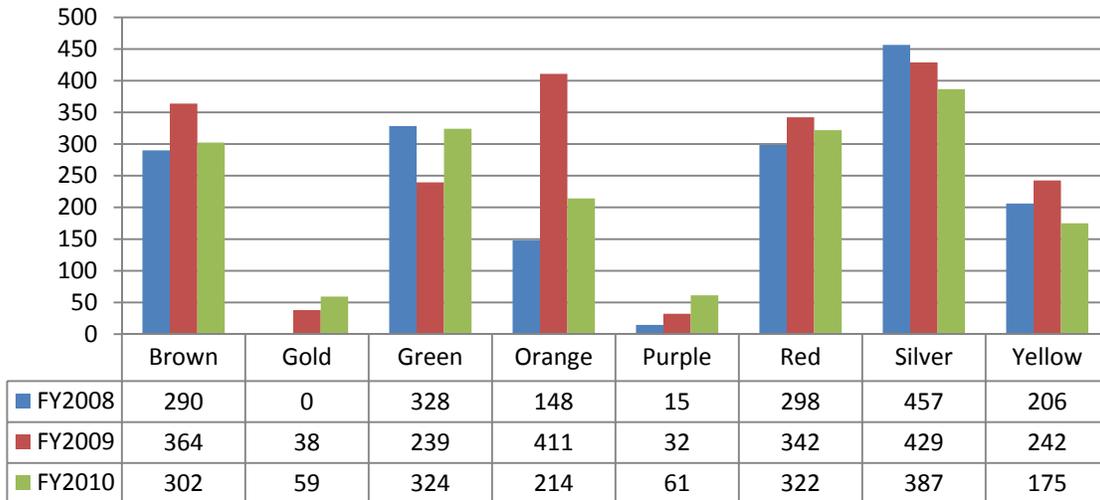
<sup>14</sup> According to CMRT, there is no clear reason for these spikes in ridership.

**Figure 14 Average Weekday Ridership by Route**



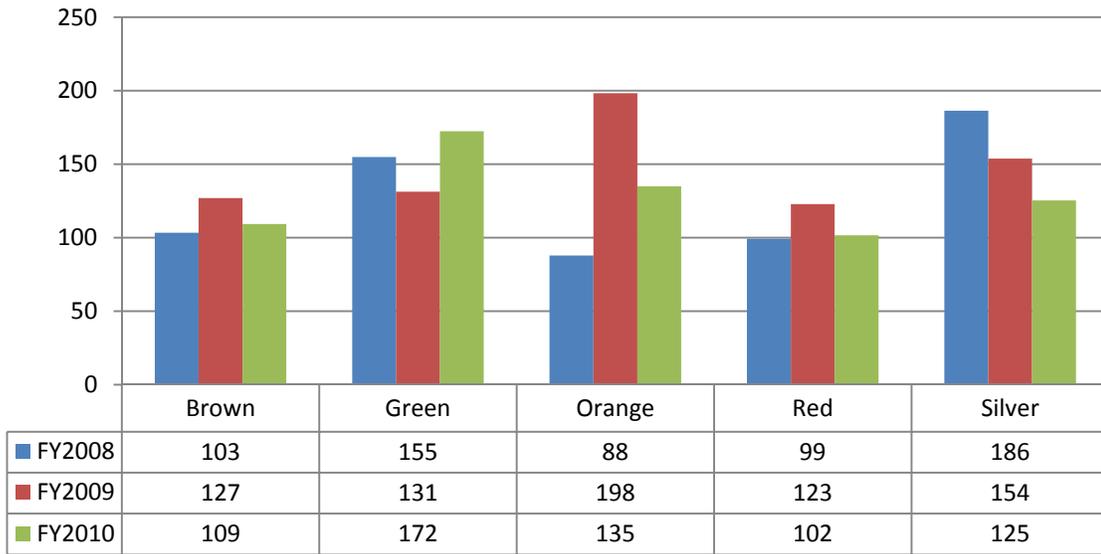
Source: CMRT

**Figure 15 Average Daily Saturday Ridership**



Source: CMRT

**Figure 16 Average Daily Sunday Ridership**

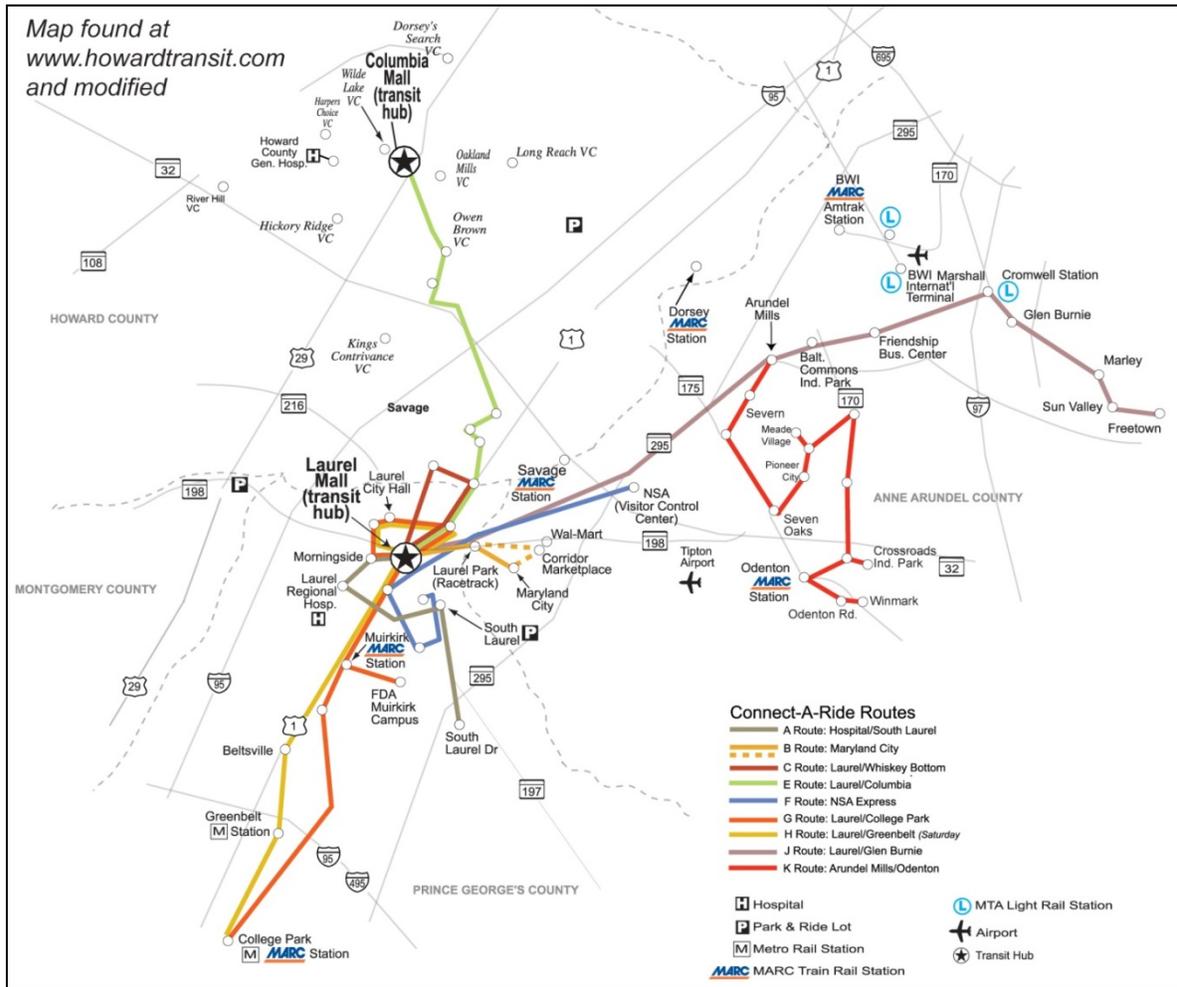


Source: CMRT

### Connect-A-Ride

CMRT runs a fixed route bus service called Connect-A-Ride (CAR), which includes Connect-A-Ride Laurel and Connect-A-Ride Anne Arundel. While Howard Transit routes focus around Columbia Mall, Connect-A-Ride service centers on the Laurel Mall. One route (E Route) travels between the Laurel Mall and Columbia Mall. Figure 17 presents the CAR system routes and Figure 18 presents characteristics of the route serving Columbia. E Route, the only one serving Columbia, has the highest average weekday ridership of the Laurel routes.

**Figure 17 Connect-A-Ride Routes**



**Figure 18 Route E Characteristics**

Route	Destinations	Service Span (days per week/ hours per weekday)	Weekday Headways (Minutes)	Average Weekday Daily Ridership	Weekend Headways (Minutes)	Average Weekend Daily Ridership
E	Route 197 P&R, Laurel Mall, Savage, Owen Brown, Columbia Mall	6 / 12	60	357	120	131

Regular fares for E Route are \$2 (reduced fares for students, seniors, and persons with disabilities are offered at half-price), which includes free transfers for two hours. A one-day pass is \$5. Ten-ride tickets are available for \$18, and a monthly pass is \$67.

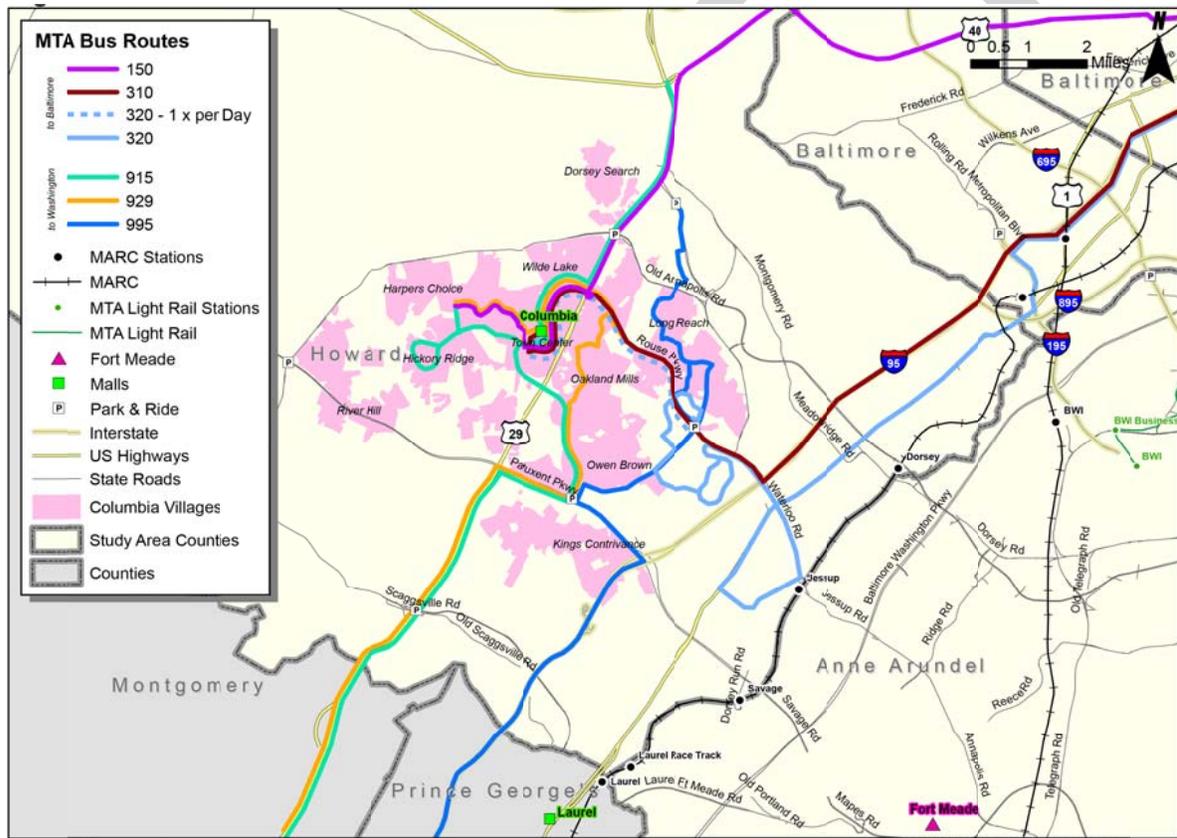
CMRT also runs HT Rides, the federally-mandated ADA paratransit service. ADA paratransit vehicles provide curb-to-curb service to eligible recipients. Service is available 9 AM-3 PM Monday through Friday, and passengers must live within ¾ mile of the fixed

route. HT Ride's service is a shared ride for passengers making trips to medical appointments, senior centers, or employment. Passenger origins and destinations must be within Howard County, although HT Ride will make limited medical trips to Baltimore.

## MTA Express and Commuter Buses

Express and commuter buses serve both Washington and Baltimore. MTA operates four express routes in Howard County which all serve Downtown Baltimore and Johns Hopkins Hospital, and 18 commuter routes: five to Baltimore (42 daily trips) and 13 to DC (371 daily trips). Of these routes, one express route and five commuter routes serve Columbia, as shown in Figure 19 and described in Figure 20. In Fiscal Year 2009, these five routes carried more than 803,000 rider trips. Ridership data by stop was collected by the MTA over six days in September 2009. The ridership data shown in Figure 20 is the average over those six days.<sup>15</sup>

**Figure 19 MTA Bus Routes**



**Nelson Nygaard**  
consulting associates

<sup>15</sup> Ridership data provided by Glenn Hoge, MTA

**Figure 20 MTA Route Characteristics**

Route	Description	Number of stops in Howard County	Trips per AM / PM serving Howard County	Average Daily AM Pick-Ups	Average Daily AM Pick-Ups at Columbia Mall
<b>Express</b>					
150	Columbia Mall to Downtown Baltimore	3	5 / 5	108 <sup>16</sup>	108
<b>Commuter</b>					
310	Columbia to Downtown Baltimore/Johns Hopkins Hospital	4	4 / 4	140	15
320	Columbia and Jessup to Downtown Baltimore/Johns Hopkins Hospital	26	4 / 4	69 *	3
915	Columbia to Silver Spring/Washington	14	11 / 12	477	73
929	Columbia to Silver Spring/Washington	20	12 / 13	519	76
995	Clarksville/Ellicott City/Columbia to Washington	11	7 / 7	572	Does not serve Mall

\* This is a reverse commute route so ridership represents AM drop-offs in Howard County.

Source: MTA

All routes pick up and drop off at Columbia Mall except Route 995, which stops at Executive Park Drive and Columbia 100 Parkway, to the northeast of the Mall. All routes serve Howard County and then travel directly to Baltimore and Washington, except for Routes 915 and 929, which make limited stops in Montgomery County. Route 320 is a reverse-commute route, starting in downtown Baltimore and bringing employees west. Only one 320 trip per morning and per evening travels between Snowden Park & Ride to Columbia Mall via Little Patuxent Parkway. On Route 915, the Columbia Mall stop had the third-highest number of boardings on average (after stops in Washington DC), and on the 929, the Mall ranked second. The express route, 150, is the only route that operates in both directions during each peak period. Service to downtown Baltimore takes approximately 60

<sup>16</sup> Stop by stop data was not collected on express routes. This is an estimate based on average daily ridership of 216, assuming that half the pick-ups occur in the morning.

minutes, while travel time to Washington is nearly 90 minutes. Ridership on the Baltimore-bound routes is lower than the system average, due to the fact that Baltimore represents a much smaller market share than Washington. The Washington-bound routes serving Howard County rank middle of the pack in terms of ridership.<sup>17</sup>

All the routes also stop at one or more Park & Ride lots in Howard County, all of which are free of charge, as shown in Figure 21.

**Figure 21 Howard County Park & Rides**

P&R Name	Address	Number of Spaces	Routes Served
Broken Land East/West	MD 32 & Broken Land Parkway	643	915, 929, 995
Clarksville	MD 32 & MD 108	170	995
Long Gate	MD 100 & Long Gate Parkway	300	995, 150
Scaggsville	US 29 & MD 108	99	915, 929
Snowden River	MD 175 & Snowden River Parkway	210	310, 320, 995

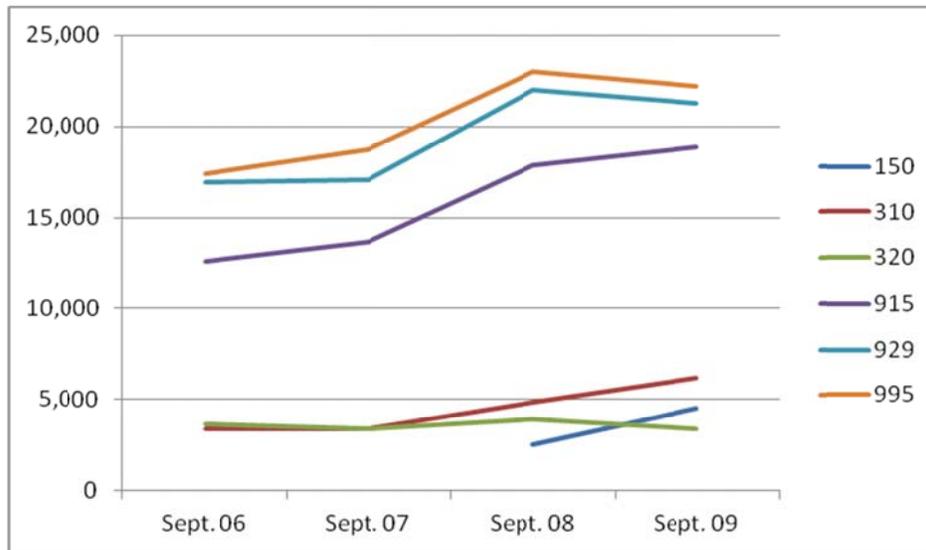
Source: <http://www.howardcommutersolutions.com/park/default.asp>

Full fare on express buses is \$2, with a senior and disabled fare of \$0.95. Daily and monthly passes are also available: day passes are \$3.50 plus \$0.40 a ride, and monthly passes are \$80 (\$16.50 plus \$0.40 a ride for seniors and disabled). Fares on commuter buses vary by zones 1-6. Service to and from Columbia entails travel in zones 2 or 3, depending on whether riders embark at Silver Spring (zone 2) or downtown Washington (zone 3). Zone 2 full-fare trips cost \$3.50, with monthly passes available for \$119. One-way trips in zone 3 cost \$4.25, with monthly passes costing \$144.50. MTA fare medium are accepted to transfer to Howard Transit and Connect-A-Ride, but the MTA does not accept transfers from Howard Transit and Connect-A-Ride.

Ridership on the five commuter routes followed similar trends from September 2006 to 2009, as shown in Figure 22. Ridership on the express route rose from 2008 to 2009 on three of the routes.

<sup>17</sup> Glenn Hoge, MTA, phone interview 8/19/2010

**Figure 22 MTA Ridership Trends**



Source: MTA. Route 150 ridership for Sept. 08 was estimated from average daily ridership multiplied by 21 weekdays.

The Washington routes perform above average in relation to the MTA system, as shown in Figure 23. Route 310 had very high farebox recovery due to service changes beginning in January 2009, when former Route 311 was combined into Route 310. Thus, ridership in December 2008 was 4,321 on Route 310 and 3,056 on Route 311, but after the elimination of Route 311, those riders switched to 310. In February 2009, ridership on Route 310 totaled 6,410. The Columbia Mall express to Baltimore, Route 150, ranks at the low end of MTA service in terms of ridership. In early 2009, costs were \$1,155 per day or \$6.57 per passenger boarding.<sup>18</sup>

**Figure 23 MTA Operating Characteristics, September 2009**

Route	Passengers per Trip	Cost	Revenue	Farebox Recovery
150	22*	\$24,273	\$3,696	15.2%
310	29	\$27,821	\$19,262	69.2%
320	20	\$27,861	\$9,114	32.7%
915	39	\$161,754	\$72,157	44.6%
929	40	\$173,027	\$81,653	47.2%
995	41	\$188,730	\$85,550	45.3%
System Average	38.9	\$165,226	\$70,749	42.8%

Source: MTA

\* MTA provided average daily ridership. This number was divided by the total number of daily trips to calculate passengers per trip. Cost per day totaled \$1,155.86, which was multiplied by 21 weekdays

<sup>18</sup> Michael Deets, MTA Service Development, e-mail message 8/23/2010.

## MARC

The regional rail service, MARC, has three lines: Brunswick, Camden, and Penn, which all serve Washington's Union Station and ten counties in Maryland. Five stops on the Camden Line run along the border between Howard and Anne Arundel Counties – Dorsey, Jessup, Savage, Laurel Racetrack, and Laurel. The Camden Line makes six trips southbound to Washington and three trips northbound to Baltimore in the morning peak, and three trips to Washington and six trips to Baltimore in the evening peak. It takes 19 minutes to get from Dorsey to Baltimore's Camden Station, and 59 minutes from Dorsey to Washington's Union Station. Jessup is served by just two trains per day. Trains stop at Laurel Racetrack in the evening only.

A one-way ticket from Dorsey to Baltimore costs \$4, with an unlimited monthly for \$100. A single ride from Dorsey to Washington costs \$6. The monthly costs \$150. Monthly pass holders can add \$102 to the cost of their monthly ticket for unlimited rides on the WMATA Metrorail and Metrobus system.

The Camden Line has the lowest ridership of the lines, with 4,800 daily passengers. The Penn Line carries 21,000 daily riders. In terms of ridership by station, Dorsey and Laurel each serve 600 trips per day, and Savage serves 500. These three stations have the highest ridership of the Camden Line stations. There are virtually no riders at Jessup. Ridership on the Camden Line has grown little over the years and there are no plans to change service. While there is demand for weekday midday and weekend service, there are no plans to provide such service due to financial constraints. Free parking is provided at the five stations serving Howard County. The Laurel lot is at 100 percent occupancy, while the other two stations are at around 70 percent. Ninety percent of riders are heading to Washington.<sup>19</sup>

## MTA Light Rail

The MTA operates a 33-station light rail system running on a north-south alignment from Hunt Valley to BWI and Cromwell/Glen Burnie. Howard Transit's Silver route connects to the BWI and BWI Business District stops on the light rail. The light rail serves these stops ever 20 to 30 minutes from 5 AM to 1 AM on weekdays and Saturday. Sunday service at BWI runs from 10:30 AM to 8 PM. Connect-A-Ride Anne Arundel's J route connects to the Cromwell/Glen Burnie light rail station.

## WMATA

WMATA provides rail and bus service in the Washington metropolitan region. Bus service does not extend beyond Prince George's and Montgomery Counties except for one route, the B30, that connects Greenbelt Metro station to BWI. The B30 runs non-stop through Anne Arundel County on the Baltimore Washington Parkway. Laurel is served by four local routes: the 87/88 runs from Laurel to the Greenbelt and New Carrollton Metro stations, and the 89/89M connects Laurel and Greenbelt Metro station.

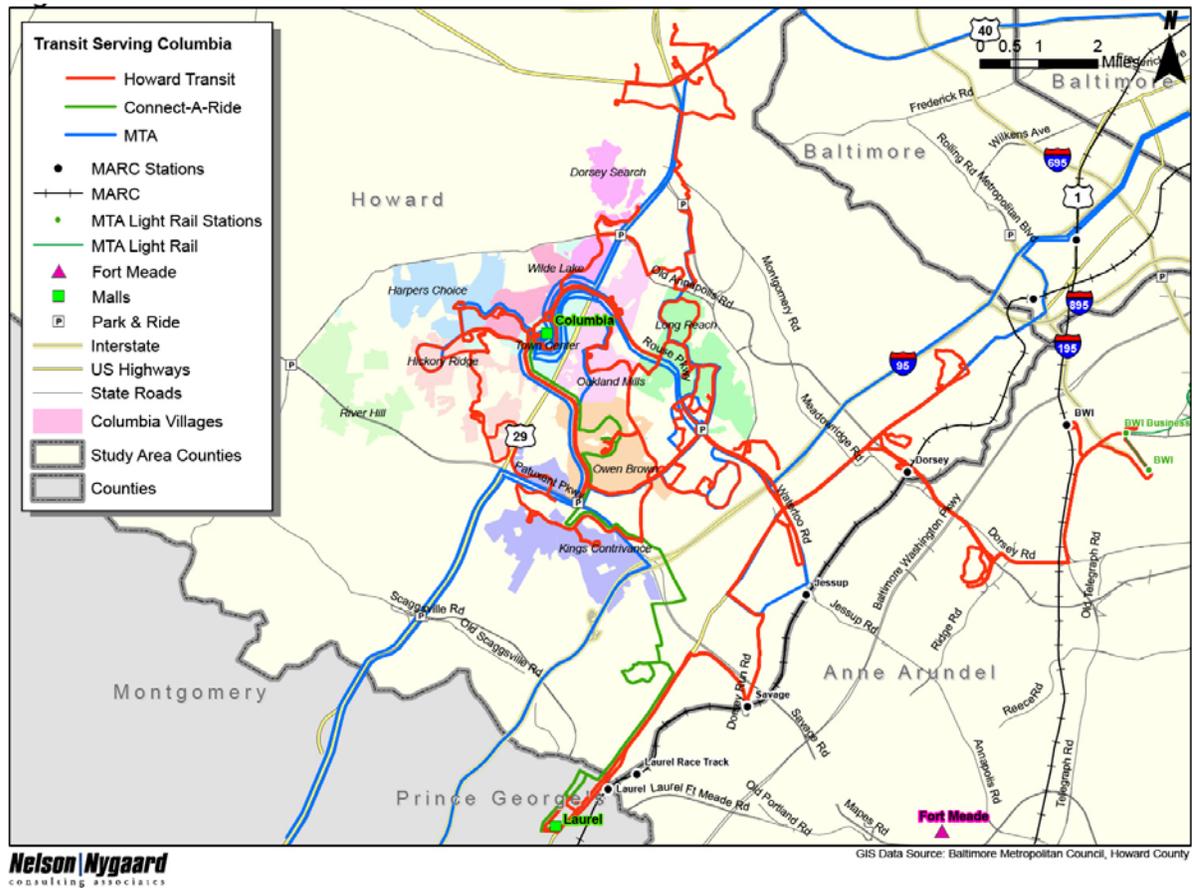
## All Services

Figure 24 shows all the transit services that serve Columbia today.

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<sup>19</sup> John Hovattor, MTA, Phone interview 8/23/2010

**Figure 24 Existing Transit Services**



## Commuter Programs & Shuttles

The Howard County Department of Planning and Zoning runs Commuter Solutions, a Web site containing information on transportation options. The site contains links to find carpools and vanpools, a ridesharing application, park and ride locations, and transit services.

The BWI Business Partnership runs a reverse-commute service called Work on Wheels, connecting Baltimore residents to work sites in Howard County. The goal of the program is to provide entry-level labor to businesses. A company requiring workers sends WoW a detailed job description and the partnership screens candidates. The program is funded through a grant from the Baltimore City Department of Social Services and the Howard County Department of Planning and Zoning.

Another service run by the Partnership is the LINK shuttle, which connects the BWI area transit stations to Fort Meade. The route has been in service for several years, and serves as both a business shuttle transporting people between different government agencies as well as a commuter route that serves MARC, Amtrak, the light rail, and MTA bus. Service runs 12 hours per day, Monday through Friday, on 35-minute headways. Ridership is approximately 4,500 to 5,000 passengers per month. Service is free and open to the

general public until the bus reaches Fort Meade, when only Fort Meade employees are allowed to ride. The Partnership contracts LINK service.<sup>20</sup>

The Partnership contracts with VPSI for vanpool service. VPSI is a turnkey operation who provides full vanpool service, including vehicle maintenance, drivers, and roadside assistance. Commuters pay into a pool and VPSI provides service.

## Key Findings

Howard Transit service:

- Howard Transit's users are primarily those who do not have access to a car; there are few "choice riders."
- In general, service hours begin at 6 AM on weekdays, 8 AM on Saturdays, and 10 AM on Sundays. All routes run at 60 minute headways or longer, with the exception of the Green route, which operates every 30 minutes during weekday peak hours.
- The routes operate as a pulse system, with the primary Columbia transit hub in the Columbia Mall as the start and end point. The Mall in itself is not a destination for many bus riders, but a transfer point to connecting routes. The rate of transfers per route is fairly high, ranging from 40 percent to a high of 70 percent on the Silver Route.
- Due to lack of space, buses must double park, and passengers have to walk between buses looking for their transfer since there are no spaces dedicated to each route.
- Howard Transit fixed route ridership has steadily increased over the years, peaking at 1.1 million annual rides in FY 2009, with at least half of these riders traveling to or through the Columbia Mall hub. During the 2010 service cuts, fares were increased from \$1.50 to \$2 for a one-way trip.
- All HT routes fall under the "Needs Review" category for operating costs per hour and per mile, meaning the cost to run the system is high compared to other small urban systems. However, three routes (Brown, Green, and Red) carry enough passengers per hour and per mile to be deemed "Successful" according to the MTA standards. How HT routes fall within the MTA standards shows that the system overall is carrying a decent level of passenger activity, but operating costs are high.

MTA service:

- One express route and five commuter routes connect Columbia with Baltimore and Washington.
- In Fiscal Year 2009, these five routes carried more than 803,000 rider trips. However, only about 15% of these trips, or 120,000, originated or ended in Columbia.
- The highest ridership route for Columbia, express route 150, ranks at the low end of MTA service in terms of ridership. It serves about 100 riders per weekday.
- Ridership on the Baltimore-bound routes is lower than the system average, due to the fact that Baltimore represents a much smaller market share than Washington.
- Farebox recovery ratios for the Washington routes perform above average in relation to the rest of the MTA system.

Commuter Programs:

- The Howard County Department of Planning and Zoning runs Commuter Solutions, a Web site containing information on transportation options.

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<sup>20</sup> Ben Cohen, BWI Business Partnership, phone interview 9/2/2010

- The BWI Business Partnership runs a reverse-commute service called Work on Wheels, connecting Baltimore residents to work sites in Howard County.

## Summary

Downtown Columbia is served by many transit routes, highlighted by services for commute demand during peak hours. Communities with existing transit services offer an operating framework on which to expand services. The range of Columbia's existing transit services provides a valuable base from which to plan additional services to accommodate future travel demand.

## A.2 Future Transit Services

The following section outlines plans for future transit services in and around Howard County.

### CMRT

Due to the financial constraints, the agency is not planning any new services aside from a new loop route around the Odenton MARC station.<sup>21</sup> CMRT, however, does have a long-range list of service enhancements and new connections it would like to make, which are outlined as follows:

- Circulator Route – This route would operate every 15 minutes during the week and every half hour during the weekend with the purpose of getting people to the Columbia Mall hub and moving people between villages.
- Yellow Express – This route, connecting Columbia to Howard County government offices in Ellicott City, was discontinued in July 2010. The county moved the offices a few years ago and ridership dropped, but the offices are going back to Ellicott City soon.
- Maple Lawn to Savage area – Maple Lawn is a newly built mixed use community in southwest Howard County espousing some new urbanism neighborhood design principles.
- Columbia Mall to Fort Meade – Run a BRT with 15-minute headways. If a dedicated lane is not possible, CMRT has discussed with the NSA running the vehicle in an HOV and transit lane. Stops would be located at Broken Land Parkway park and ride and the Savage MARC station.<sup>22</sup>
- Silver Express – The Silver local route is one of the top two routes on Howard Transit. An express service would just stop at the main attractors like Columbia Mall, the Maryland Food Bank, Arundel Mills, and BWI.
- Laurel to Fort Meade – Express service from Laurel's Main Street to Fort Meade during peak hours.
- Annapolis to Fort Meade – Express service during peak hours.

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<sup>21</sup> Matthew Helfant

<sup>22</sup> Matthew Helfant

- Extend route F from the NSA gate to circulate within Fort Meade, significantly reducing walking distances for riders.
- Expand the vanpool and rideshare program.
- Start two subscription bus services from the Pentagon and Springfield Metro stations. This would likely consist of two trips each day.
- Run the following routes at 30-minute headways: E, F, G, H, K (refer to Figure 17).

## MTA – MARC

MARC has no plans to change service on the Camden Line.<sup>23</sup>

The MARC Growth and Investment Plan, published in 2007, discussed increased service on the Penn Line, which provides the easiest commute option for Fort Meade employees from Odenton station. The plan calls for 15-minute headways during peak hours and 30 minutes off-peak. The plan also calls for an additional PM peak train, a late-night train, weekend service, and the purchase of additional capacity from Amtrak.<sup>24</sup>

## MTA – Rail

The Baltimore Region Rail System Plan Final Report laid out a rail system expanding south, east, and west. The proposed system would be a 109-mile rail system with 66 new miles added to the existing 43 miles of Metro Subway and Light Rail lines (see Figure). The finished system could have as many as 122 stations, including 68 new stations in addition to the 54 stations that exist now. The complete rail plan is a \$12 billion investment that will be implemented over a 40-year timeframe.<sup>25</sup>

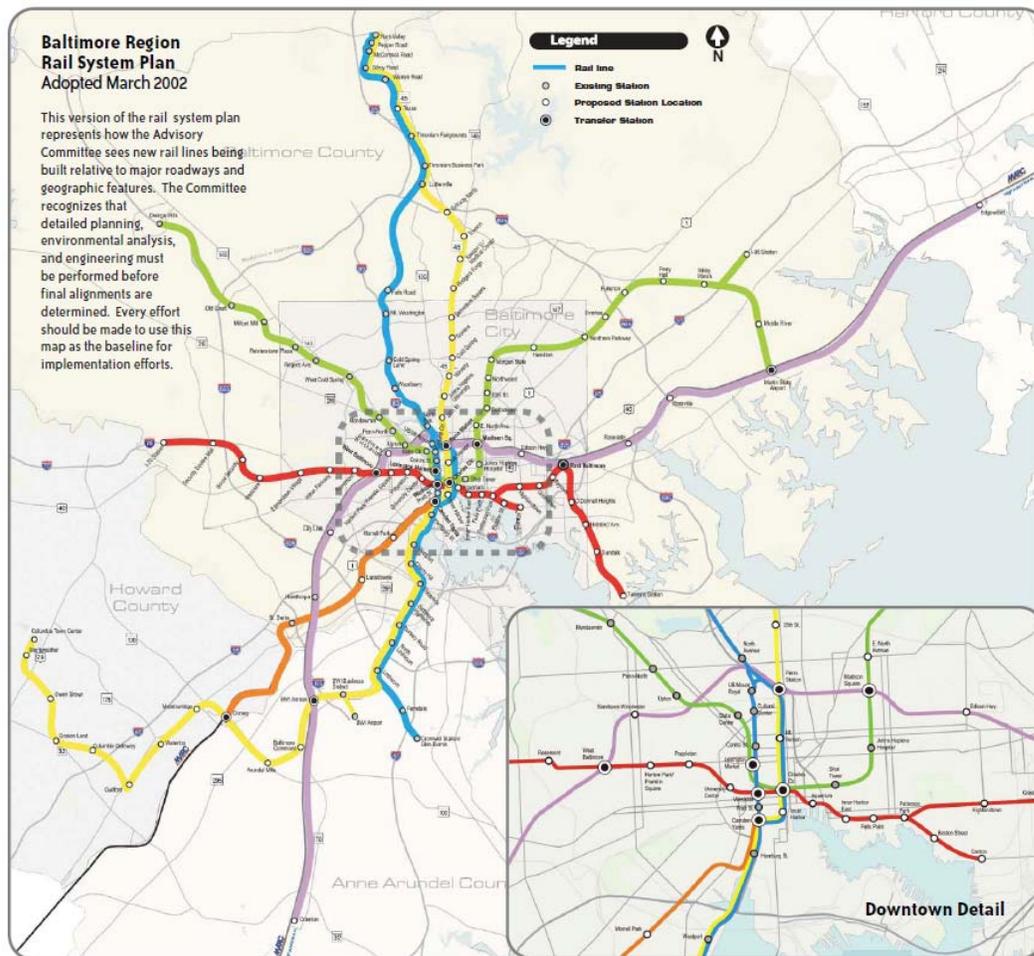
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<sup>23</sup> John Hovattor

<sup>24</sup> KFH Group, Inc. Fort Meade/Base Realignment and Closure Transit and Ridesharing Planning Study. November 2009. Page 94.

<sup>25</sup> Report of the Advisory Committee of the MTA. Baltimore Region Rail System Plan Final Report. August 2002. <http://www.baltimorerailplan.com/>

**Figure 25 Baltimore Region Rail System Plan, March 2002**



The rail plan includes extending the existing light rail serving BWI west to Downtown Columbia. This new Yellow Line would mean increasing the light rail length from 14 to 42 miles, with a total of 46 stations. The extension to the west would serve three main markets:

- The Arundel Mills Mall and new developments in the MD 100 area;
- Spur revitalization in the area between Elkridge and Savage, and
- Provide a direct connection between Downtown Columbia and BWI<sup>26</sup>

The estimated travel time on an extended LRT from Columbia to BWI is 42 minutes.

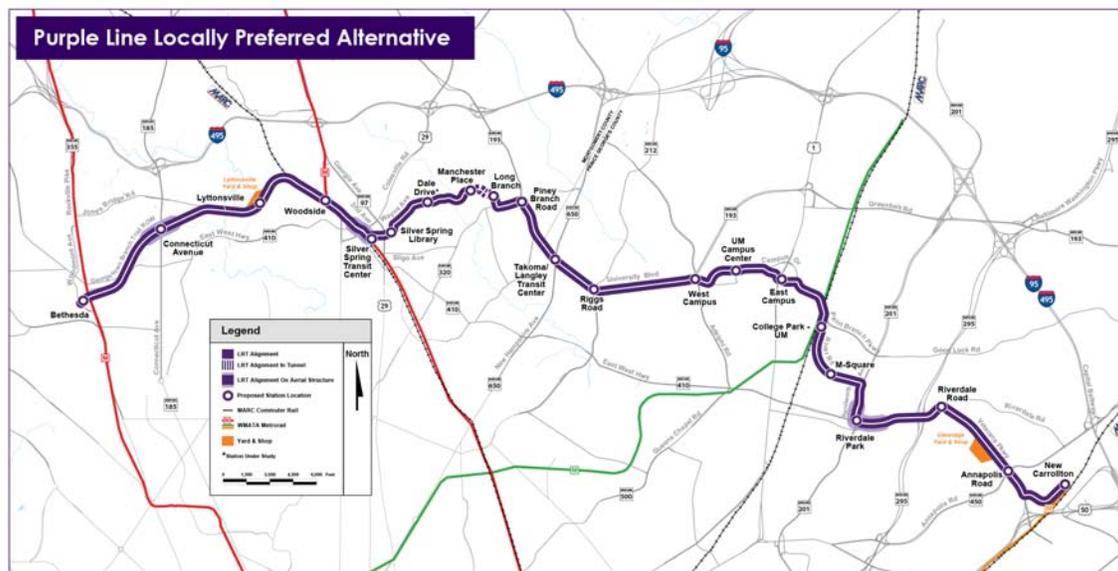
### WMATA

Howard County is not in WMATA's current metropolitan contract, meaning service does not extend beyond the Montgomery and Prince George's County borders. Should Howard County be interested in service, changes would have to be made to WMATA's contract, and the County would have to contribute funding.

<sup>26</sup> MTA Advisory Committee. Baltimore Region Rail System Plan. 2000.

The MTA bus routes currently bring passengers to the Silver Spring Metro station, where a new intermodal hub is planned. This hub would facilitate transfers between MARC, Metrorail, Metrobus, MTA commuter buses, Greyhound, and the proposed Purple Line light rail. The Purple Line is a 16-mile light rail connecting Bethesda, MD in Montgomery County to New Carrollton in Prince George's County. The Purple Line has received New Starts funds and is now in the preliminary engineering and design phase. Route 29, which connects Howard County to Silver Spring via MTA routes 915 and 929, has been designated a priority transit corridor.<sup>27</sup> Creating priority transit corridors is an initiative undertaken by WMATA to improve travel times, customer information, and street operations on 24 corridors that carry high level of bus ridership. These 24 corridors are candidates for physical and operational treatments.<sup>28</sup>

**Figure 26 Purple Line**



Source: <http://www.purplelinemd.com/>

## Central Maryland Transit Facility

A proposed Central Maryland Transit Facility would be a publicly-owned operations facility created jointly by the MTA, Howard County, and Anne Arundel County. A Memorandum of Understanding was signed by all three parties in 2003, which laid out the need for the facility to store and maintain the buses of Howard Transit, Connect-A-Ride, and any vehicles that would be purchased to run future services in the area. The agreement stipulated that the MTA was to provide project management and engineering assistance.<sup>29</sup> In 2008, an MOU was signed between Howard and Anne Arundel Counties stating that funds to build the facility might come from FTA Section 5309-Bus and Bus Facility, but the project did not receive the grant. As of 2011, the facility is still being pursued. The proposed facility would be on Corridor Road in Savage. Currently the vehicles are being

<sup>27</sup> Tom Harrington, WMATA, phone interview 8/23/2010

<sup>28</sup> "Metrobus Priority Corridor Network." Presentation May 22, 2008.

<sup>29</sup> <http://www.co.ho.md.us/DPZ/DPZDocs/MOUMTAHoCoAACo.pdf>

stored and maintained further north in Elkridge so the new facility would mean a significant reduction in deadhead costs.<sup>30</sup>

## Fort Meade Expansion

The Fort Meade army installation is Anne Arundel County's largest employer. As of 2007, over 108,500 people lived, worked, or patronized the site.<sup>31</sup> The Base Realignment and Closure (BRAC) plan will bring thousands more employees and family members to the Anne Arundel and Howard County area.

Significant planning efforts have been undertaken to handle the growth of Fort Meade. KFH Group, the same organization who completed the TDP, completed a transit and rideshare study for the base in 2009. The study looked at existing transit services in Anne Arundel and Howard Counties, as well as current connections from northern Virginia, as the Defense Information Systems Agency has the most employees moving to Fort Meade and those employees may choose to commute rather than move in the short-term.

Transit service today includes a circulator route sponsored by the National Security Agency (NSA). Service is run on a 28-seat shuttle from the Odenton MARC station throughout Fort Meade. The service is free, operates Monday through Friday during peak periods, and makes seven daily round trips.<sup>32</sup>

Potential future service alternatives developed by KFH serving Fort Meade from Anne Arundel and Howard Counties would be open to the public but would end at Fort Meade, so that anyone remaining on the bus would pass through security. The study presented maps and costs (based on current contract costs with First Transit) for six new routes in Anne Arundel County plus a restructuring of K Route, for a total annual operating cost of nearly \$4.2 million.<sup>33</sup>

Proposed routes from Howard County would cost \$965,917 annually to operate and are summarized as follows:

- Columbia Gateway-Dorsey MARC-Fort Meade (Figure 27) – This route would serve the dense residential development of the Gateway and would operate 7 hours per day during peak hours on weekdays. The route would provide connections to the Gold, Purple, and Silver Howard Transit routes, the Connect-A-Ride K and MARC. Eight boardings are expected per hour.
- Blue Route: Clarksville-Fort Meade, Downtown Columbia-Fort Meade (Figure 28) – This is a restructuring of the Blue Route into two branches. The dark blue route would serve the residential area of Clarksville, the Clarksville Park & Ride, Savage MARC, and Fort Meade. The light blue route would serve Downtown Columbia, Broken Land Park & Rides, Savage MARC, and the Fort. Service would run 8 hours per day during peak hours as express service. Eight boardings are expected per hour.<sup>34</sup>

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<sup>30</sup> Matthew Helfant, CMRT, e-mail message 8/30/2010

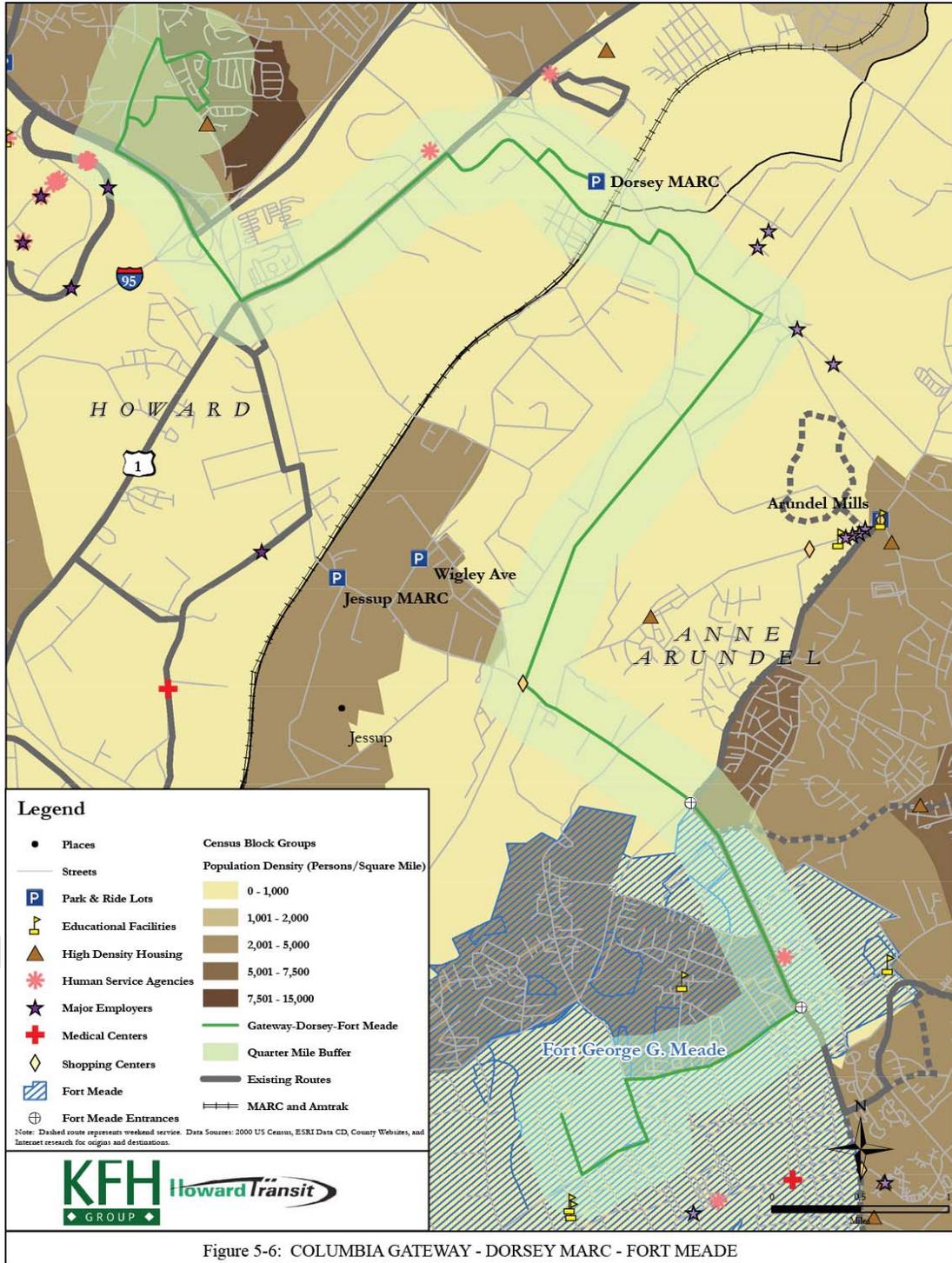
<sup>31</sup> Fort Meade/Base Realignment and Closure Transit and Ridesharing Planning Study. Page 10.

<sup>32</sup> Ibid page 80

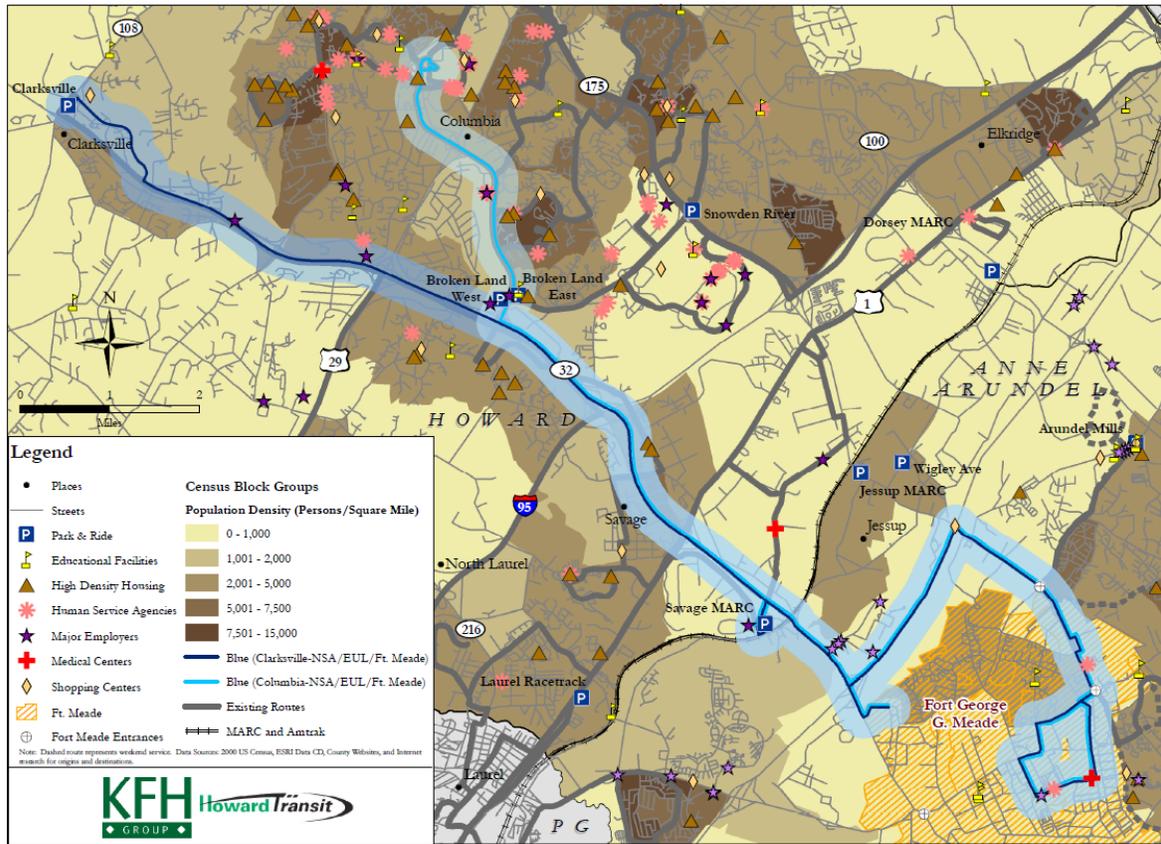
<sup>33</sup> Ibid, page 81

<sup>34</sup> Fort Meade/Base Realignment and Closure Transit and Ridesharing Planning Study, Page 82-92

Figure 27 Columbia Gateway Route



**Figure 28 Restructured Clarksville/Downtown Columbia Blue Route**



MTA Commuter Bus is looking at three options for service to Fort Meade, including routes from Gaithersburg, the Harry S. Truman Park & Ride, and Greenbelt Metro.

The state and counties have created BRAC plans and transportation action items. In 2007 the Howard County BRAC Task Force presented the following items:

- Improve MARC frequency and reliability;
- Evaluate options to extend WMATA's Green Line;
- Restructure and expand local and regional bus routes including express service from Park & Rides;
- Provide fare incentives for bus service to Fort Meade and parking disincentives; and
- Explore a joint use transit operations facility on the base similar to the Central Maryland Transit Facility.

A group of 10 agencies (including the counties, MTA, WMATA, BWI Business Partnership, and Fort Meade employers) began planning how to transport people without adding congestion to already congested roadways. The goal of all parties is to do everything possible to avoid increasing single-occupancy vehicle trips. An MOU was signed by the 10 agencies in 2010 pledging to implement Transportation Demand Management strategies such as carpool, vanpool, ridesharing, express bus, and telework to accommodate Fort

Meade growth. The agencies agreed to collaborate in obtaining funds to support TDM, and outlined a list of action items for each agency. Transit-relevant resolutions include:

MDOT

- a. Provide funds to BWI Business Partnership for ridesharing.
- b. Seek funds to create a Fort Meade Regional Rideshare Coordination Center and advisory board.
- c. Work with the MTA to create transit services.
- d. Potentially provide operating/capital funds for local transit service serving Fort Meade's travel shed.

BWI Business Partnership

- e. Provide or support TDM programs including vanpools, carpools, ridesharing, express buses, shuttles, and telework.

CMRT

- f. Develop transit service at Fort Meade and its surrounding commuter shed.

Fort Meade and tenants

- g. Support operation of the Rideshare Coordination Center.

Howard & Anne Arundel Counties

- h. Promote public transportation.
- i. Work with MDOT and other agencies to identify funding for transit.
- j. Identify and request BRAC transit and mobility initiatives as part of the State priority process.

All Agencies

- k. Serve on the Rideshare Coordination Center advisory board.

One issue making the planning of transit services difficult is that employees do not yet know where, or if, they will relocate. As noted earlier, many Virginia residents may initially choose to commute rather than sell their homes due to the current real estate market. One of the Fort Meade tenants has surveyed their staff to find out exactly where people have chosen to live. The BRAC process of relocation is currently on-going. Transportation services will likely grow incrementally, as employees move to the area. For instance, a vanpool might grow eventually into a full bus service.

Unique challenges to ridesharing at Fort Meade include the Fort's wide commute area and the many jurisdictions involved. For instance, many employees might start their trip in the Metropolitan Washington Council of Governments (MWCOG) planning area, but Fort Meade employees are not eligible for MWCOG's Guaranteed Ride Home program. The high-security nature of Fort Meade's tenants mean that not even basic information about rideshare candidates can be shared.

The BWI Business Partnership is planning several services. Subscription bus service may be used where there are dense clusters of employees. Federal workers receive \$230 per month in transportation incentive money, which would pay all the costs of a vanpool or carpool. However, the incentive may be cut in half down to \$115 (the amount it totaled before the federal stimulus program doubled it) in January 2011. The Partnership, in

concert with For Meade, is also planning an all day, two-way shuttle similar to LINK between the Greenbelt Metro station and Fort Meade. Unlike LINK, however, this service would not be open to the public, so only those with security badges would be allowed to ride. The Partnership is investigating options to send transit vehicles through a gate designated for this service, meaning the security check will go much faster as the riders have already been initially scanned, plus the bus will not have to wait in the personal vehicle line. Given the number of employees and the high level of security around the campus, it could take an hour for an employee driving alone just to get through the gate.<sup>35</sup>

## Key Findings

- Due to the financial constraints, CMRT is not planning any new Howard Transit services aside from a new loop route around the Odenton MARC station. CMRT, however, does have a long-range list of service enhancements and new connections it would like to make, including a circulator with 15-minute frequencies serving the Columbia Mall and surrounding villages; an express between Columbia and the Howard County government offices in Ellicott City; a Columbia Mall to Fort Meade bus rapid transit line (BRT) with 15-minute headways; and an express route on the successful Silver Line.
- The Baltimore Region Rail System Plan includes extending the existing light rail serving BWI west to Downtown Columbia. The estimated travel time on an extended LRT from Columbia to BWI is 42 minutes.
- While Howard County is not in WMATA's current metropolitan contract, MTA's bus routes currently bring Columbia passengers to the Silver Spring Metro station, where a new intermodal hub is planned. This hub would facilitate transfers between MARC, Metrorail, Metrobus, MTA commuter buses, Greyhound, and the proposed Purple Line light rail.
- The Base Realignment and Closure (BRAC) plan for Fort Meade will bring thousands more employees and family members to the Anne Arundel and Howard County area. Proposed routes from Howard County include a new Columbia Gateway-Dorsey MARC-Fort Meade route and a Clarksville-Fort Meade, Downtown Columbia-Fort Meade route, which is a restructuring of the existing Blue Route into two branches. One issue making the planning of transit services difficult is that employees do not yet know where, or if, they will relocate.

## Summary

Downtown Columbia is served by numerous transit agencies. Transit options include local bus service, express bus, nearby commuter rail, and shuttles. To accommodate demand that has increased over time, Howard Transit plans to increase service frequency as operating funds become available. Regionally, expansions in the residential population and the relocation at Fort Meade have spurred collaborative efforts to manage future transportation demand via means other than single-occupant vehicles. Ridership patterns and trends will be taken into account during the planning of a future Columbia shuttle.

By exploring the demographics in Columbia and in the region, it is possible to gain a better understanding of what the demand will be for transit service, and how a transit circulator can fit into the operational mix. The next chapter illustrates the current demand for transit and the anticipated trends that will influence the need for transit in the area.

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<sup>35</sup> Ben Cohen, BWI Business Partnership; Bert Rice, Fort Meade. Phone Interviews 9/2/2010.

# Appendix B. Regional Transit Market Analysis

This appendix evaluates existing and projected transit ridership in and around Columbia to help determine the market for a transit center as well as a Downtown Columbia circulator shuttle.

## B.1 Activity Centers

Columbia's location in central Maryland provides for a great opportunity to link two major metropolitan areas, Washington DC and Baltimore Maryland, which combined represents the fourth largest metropolitan area in the Country. US Route 29, Interstate 295, and the Northeast Corridor rail line offer north-south connections that give residents and employees easy access to major destinations in these metropolitan areas. There are also many significant destinations in and around Columbia, many of which are likely attractors of transit ridership. Land use determines the success of transit in several ways, particularly the type of use and the subsequent number of potential riders that will want to access that use. Major trip destinations that are especially attractive to transit include educational institutions, medical facilities, major employers, shopping centers, and medium to high density housing. Understanding places that attract people requires an evaluation of the kinds of uses and services that occur at these places.

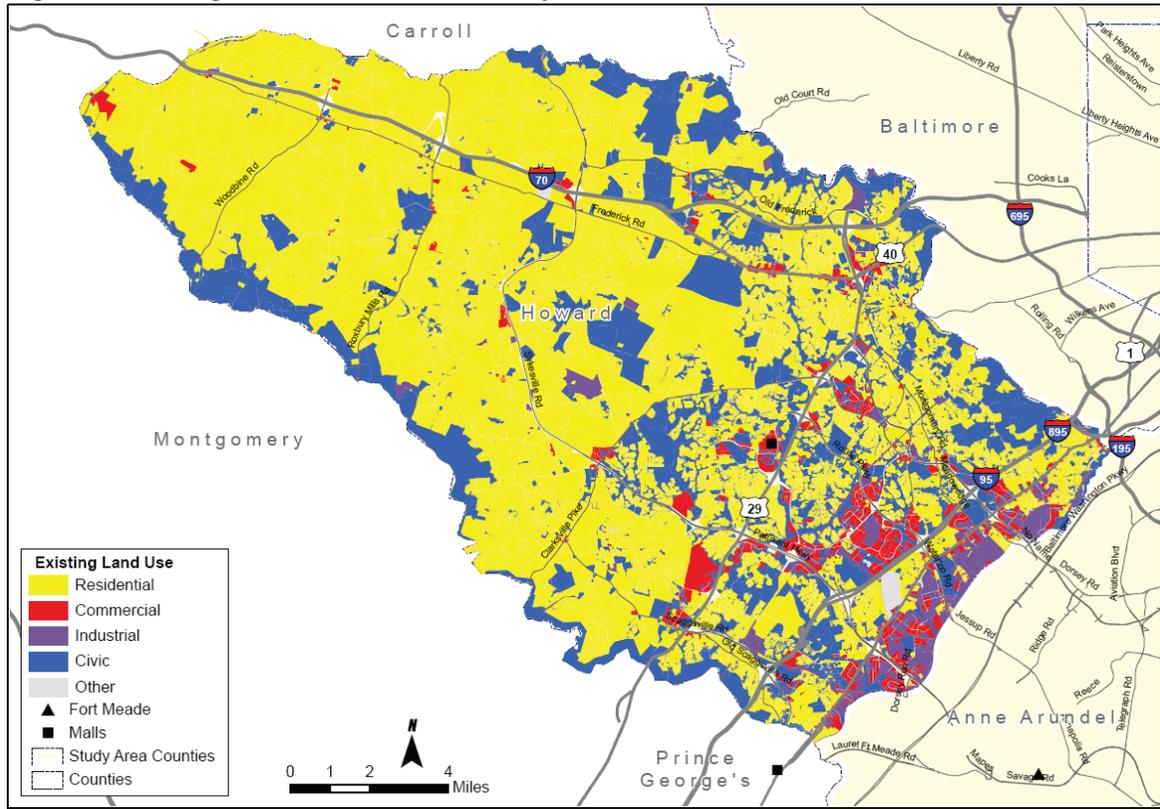
In Downtown Columbia and other select areas along major roads, there are areas of commercial and civic development, but most of Columbia is residential. Along the border of Howard County and Anne Arundel County, there is a significant amount of industrial uses. A map of land uses by parcel is shown in Figure. Projected land uses by 2035 are shown in Figure 30. Comparison of these two figures shows that there is not a significant change in land uses projected from today to 2035.

Howard County's General Plan<sup>36</sup> which was updated and amended to include the Downtown Columbia Plan, focuses on how the land use patterns of the county are largely set, and how in the next 20 years, the focus will be on renovation and redevelopment of older properties and urban centers. The Plan specifically focuses redevelopment in the eastern portion of the county, and uses the US Route 1 Corridor Revitalization program, Ellicott City, and Downtown Columbia as examples. Howard County's Adequate Public Facilities (APF) Act, passed in 1992, is a primary technique to control and manage where the growth is to occur in the county. The APF requires development projects to pass certain tests as a condition of subdivision or site development plan approval. This is done to promote controlled growth by synchronizing new development with the availability of public facilities. A recent revision to the Act regarding roads was recently approved and added to the Act as part of the Downtown Plan enabling legislation.

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<sup>36</sup> Howard County General Plan, 2000.

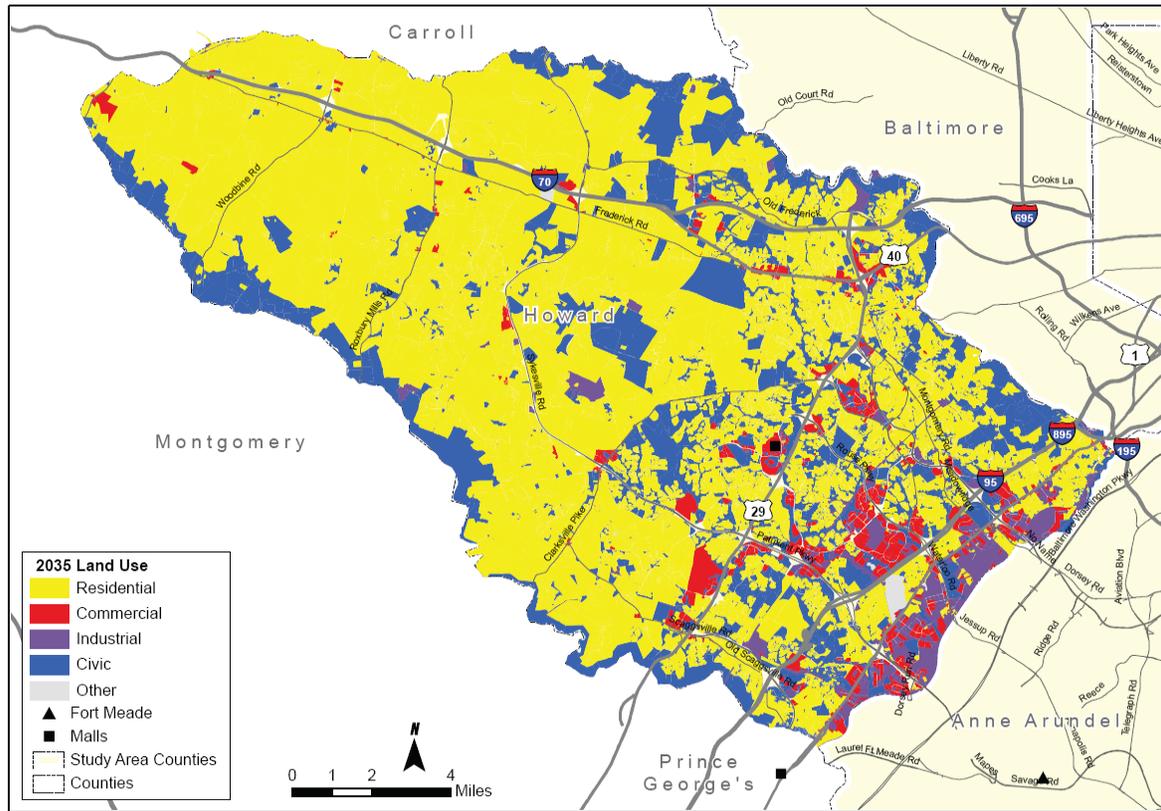
**Figure 29 Existing Land Use in Howard County**



**Nelson\Nygaard**  
consulting associates

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**Figure 30 Land Use Projections in Howard County - 2035**



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## B.2 Key Destinations

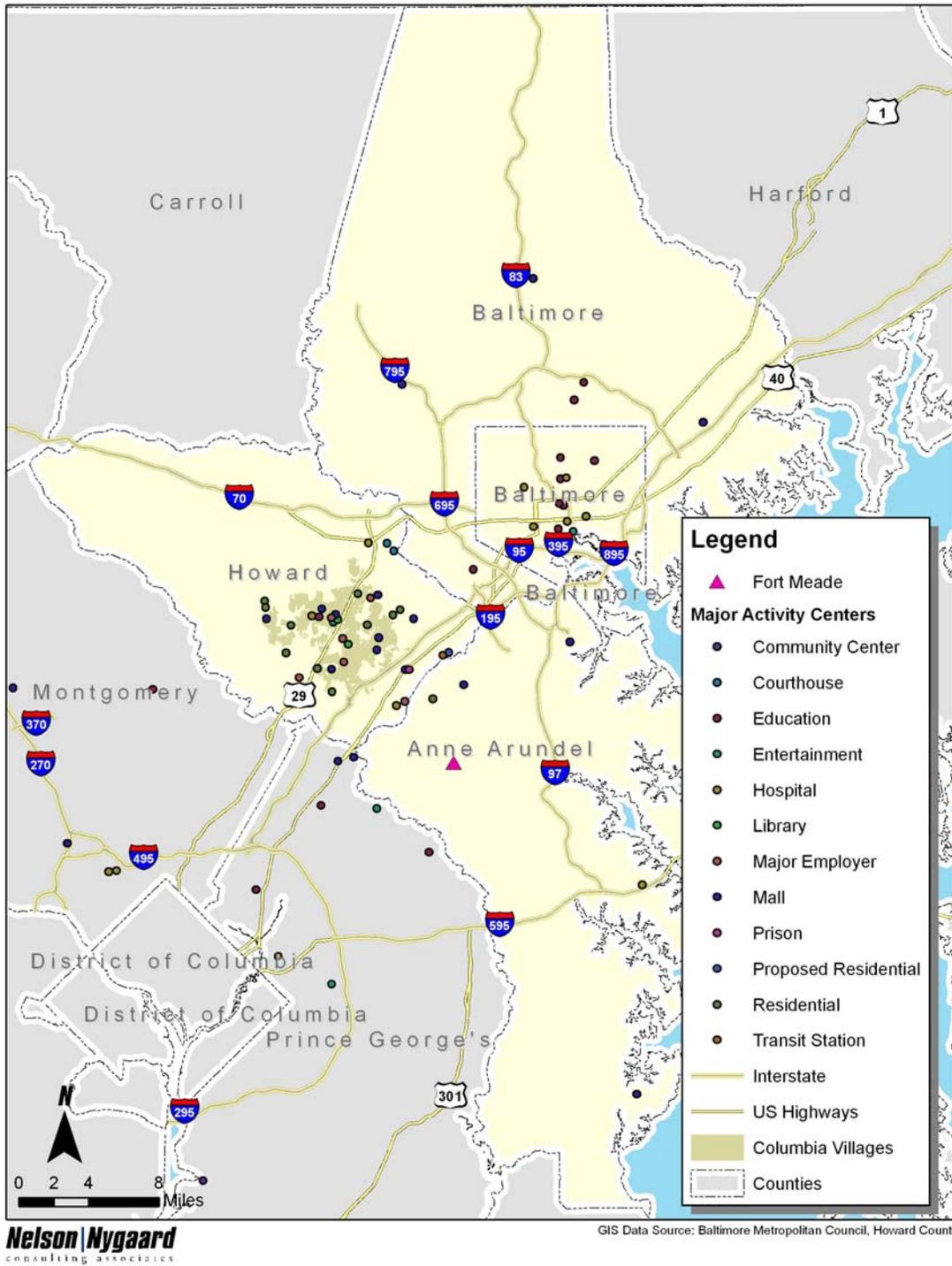
Many major destinations and attractors are located in Washington, DC and Baltimore, but there are also several along Interstate 95, US-29, and in Columbia. Major employer centers are located in Downtown Columbia, Oakland Ridge Business Center, Hilcroft Executive Park, Patuxent Woods Business Center, and Columbia Gateway Business Park. Johns Hopkins Applied Physics Laboratory is the single largest employer in Columbia. Shopping centers and malls are other major centers of activity, particularly The Columbia Mall, Arundel Mills Mall, and Columbia Crossing Mall. There are also several large residential developments: Walnut Creek, Gateway Overlook, Shipley's Grant, ElkrIDGE Crossing, Male Lawn, and others. There are many educational institutions in the area, particularly Howard Community College and Johns Hopkins University.

Fort Meade is currently a key employer and destination, and is poised to become an even larger trip attractor with its planned expansion. According to the Howard County Short-Range Transportation Development Plan<sup>37</sup>, Fort Meade's base realignment will see an increase of over 5,000 military, civilian, and contractor employees, plus nearly another 5,000 family members. An additional 3,000-7,000 support personnel are expected. The

<sup>37</sup> KFH Group, Inc. for the MTA Office of Planning. Howard County Short-Range Transit Development Plan. February 24, 2009. Page 1-6.

Fort Meade BRAC Transit and Ridesharing Planning Study<sup>38</sup> estimates that by 2013 or 2015, there will be about 22,000 new jobs at Fort Meade.

**Figure 31 Major Centers of Activity**



<sup>38</sup> KFH Group, Inc. Fort Meade/Base Realignment and Closure Transit and Ridesharing Planning Study. November 2009. Page 2-4.

## B.3 Population & Employment

Of all of the factors that impact the demand for transit, the most important is that sufficient numbers of people must live and work in close proximity. In densely developed areas, there will be large numbers of residents and employees in close proximity that will be able to easily access transit services. In less densely developed areas, fewer people will be able to easily use transit service and thus demand will be lower. Park and ride lots and feeder bus service can extend the “reach” of transit service, but almost without exception, the more people who live and work within close proximity to transit, the higher the demand will be.

Population and employment densities can also be used to provide an indication of the type and frequency of service that would be most appropriate. Industry-accepted densities required to support transit services are displayed in Figure. According to the *Transit Capacity and Quality of Service Manual*<sup>39</sup>, areas with 3 to 6 households per acre and/or 4 to 8 jobs per acre can typically support bus service with 60 minute frequencies. As these densities increase, greater frequency of service can be supported. Areas with less than three households and four jobs per acre generally do not support fixed-route transit ridership.

**Figure 32 Population and Employment Transit Service Density Thresholds**

<b>Bus Transit Service Frequencies</b>	<b>Population Households/Acre</b>	<b>Employment Jobs/Acre</b>
60 minutes	3-6	4-8
30 minutes	6-12	8-16
15 minutes	12-18	16-24
10 minutes	18-36	24-48
<=5 minutes	>36	>48

### Methodology

Existing and projected population and employment densities for Howard County were available using the Baltimore Metropolitan Council’s Round 7C demographics data, which is the Baltimore Metropolitan Council’s cooperative forecasting group’s latest set of demographics projections for the region. Round 7C was adopted by the Baltimore Regional Transportation Board in October 2010<sup>40</sup>, and the data is used for regional transportation models.

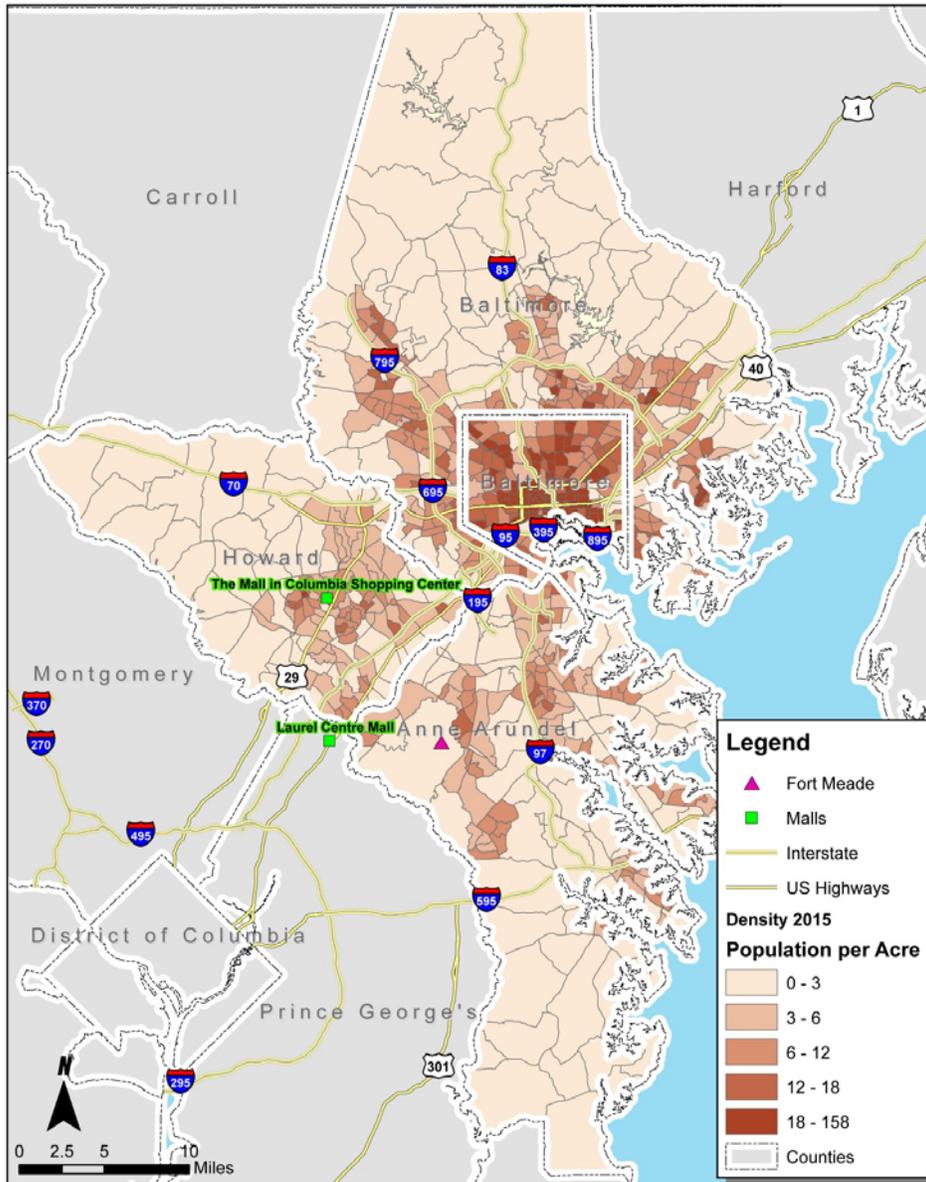
<sup>39</sup> Transit Capacity and Quality of Service Manual, 2<sup>nd</sup> ed., Transportation Research Board, Washington, DC, 2003.

<sup>40</sup> Round 7C Cooperative Forecasts. October 2010. <http://www.baltometro.org/publications/socio-economic-trends>

## Population Densities

As seen in Figure, household densities in the region – as is the case in most regions in America – are highest in the core of cities. In Howard County, the major population concentration is in Columbia. Figure 34 shows the population density of several Columbia villages that support transit service, particularly Harpers Choice, which can support transit service every 10 minutes, and most of Downtown Columbia, Hickory Ridge, Long Reach, Owen Brown and Wilde Lake can support service every half-hour. Some areas of Oakland Mills can also support 30 minute headways. Beyond these communities, most other areas are more rural in nature.

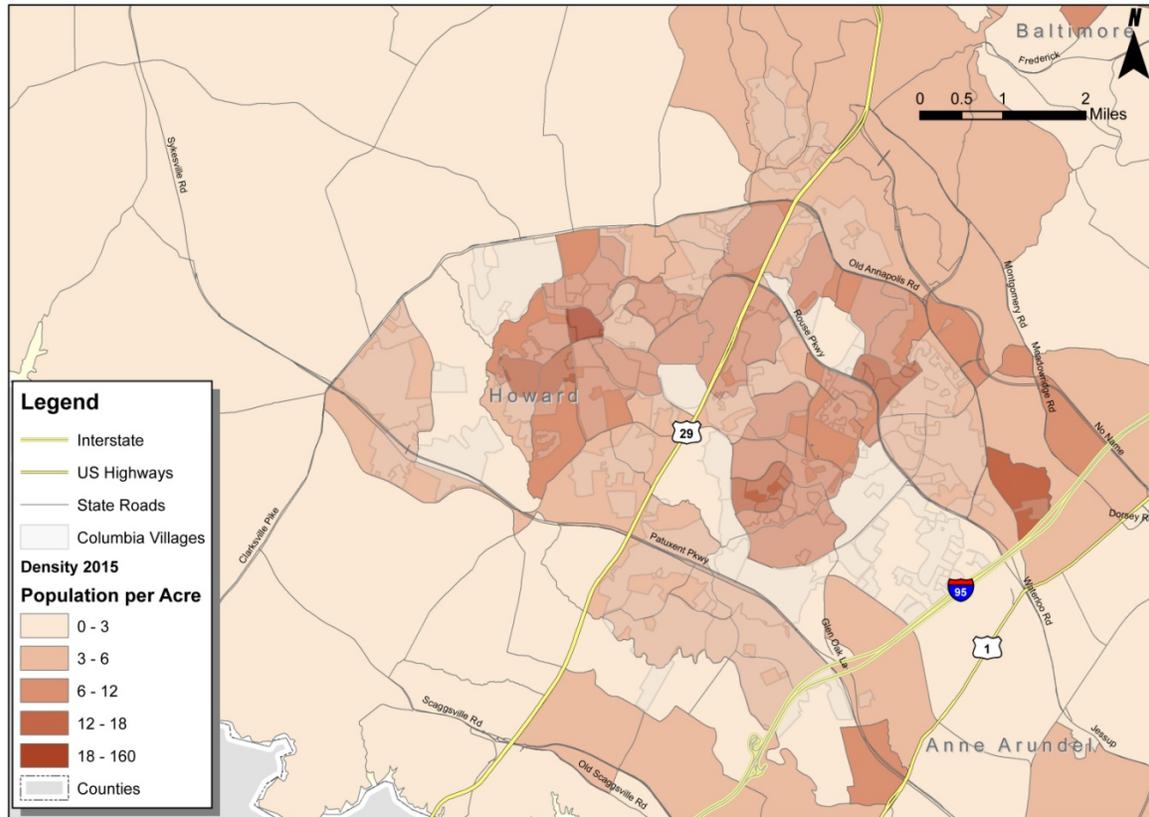
**Figure 33 Population Density by TAZ 2015 - Region**



**Nelson|Nygaard**  
consulting associates

GIS Data Source: Baltimore Metropolitan Council, Howard County

**Figure 34 Population Density by TAZ 2015 - Columbia**



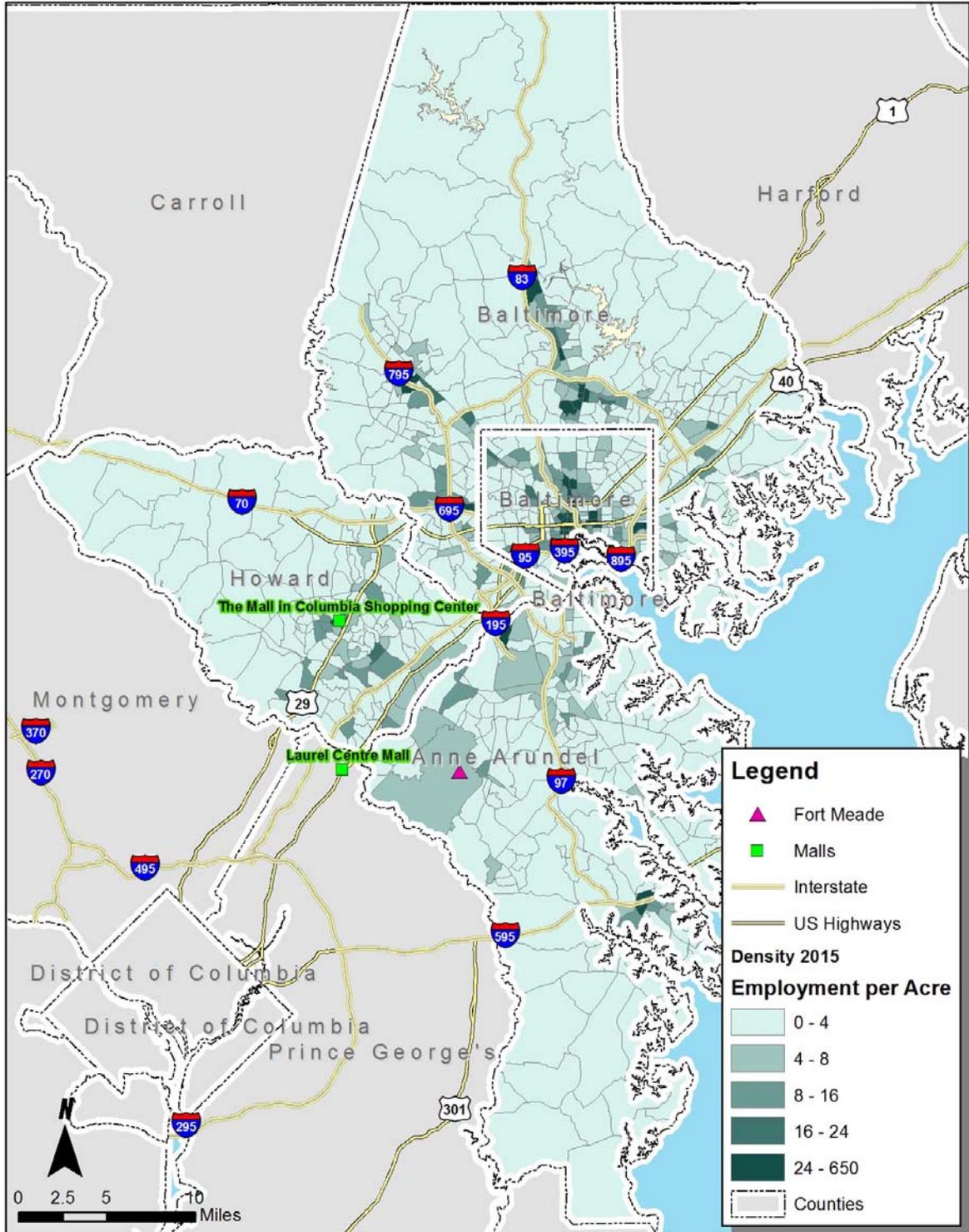
**Nelson Nygaard**  
consulting associates

GIS Data Source: Baltimore Metropolitan Council, Howard County

## Employment Densities

Even more so than population, most regional employment is concentrated in the corridor between Washington, DC and Baltimore. Employment densities along Route 29 are therefore significant. Figure 35 shows employment density in terms of jobs per acre. Downtown Columbia, Owen Brown, Long Reach and parts of Wilde Lake also have higher employment densities and can support service every half-hour. Some areas in Harpers Choice (near Howard County General Hospital) and Hickory Ridge have employment densities high enough to support transit about every 15 minutes.

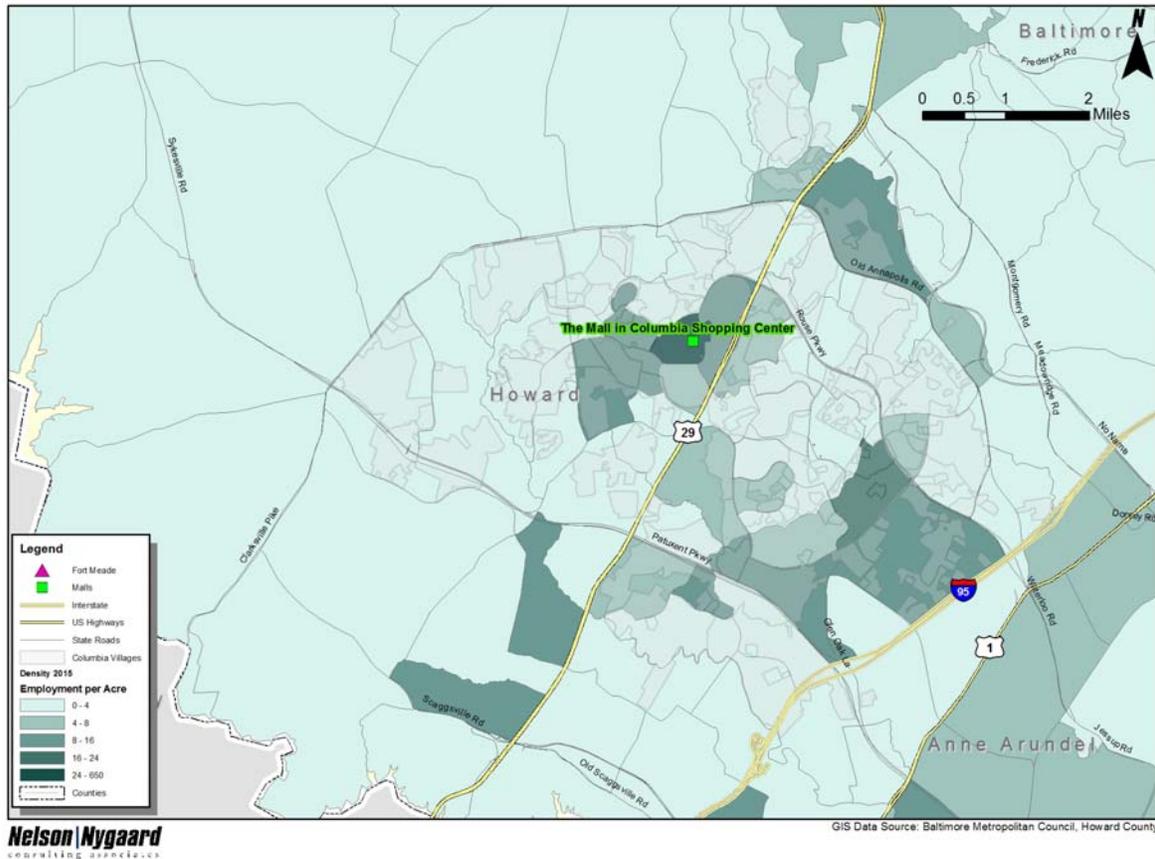
**Figure 35 Employment Density by TAZ 2015 - Region**



**Nelson Nygaard**  
consulting associates

GIS Data Source: Baltimore Metropolitan Council, Howard County

**Figure 36 Employment Density by TAZ 2015 - Columbia**



## Population and Employment Trends

While population and employment densities are strong indicators of current transit demand, recent trends provide an indication of how and where the demand for transit is changing. As described below, general trends in the region show that the population is growing at steady rates, but higher growth is seen outside of the city cores and even more in the outer areas. Despite the trends, the cores still remain the largest transit markets.

According to 2008 US Census estimates, while the entire state of Maryland grew 11% between 1990 and 2000 to over five million residents, the population of Howard County grew more than 30% and Columbia grew by 16%. More recently, overall growth has slowed, but Howard County still shows significant population increases (Figure 37).

**Figure 37 Columbia, Surrounding County, & State Population Changes, 1990-2008**

Area	1990 Population	2000 Population	2008 Population (estimated)	1990-2000 Change	2000-2008 Change
Columbia	75,883	88,254	89,763	16%	2%
Howard County	187,328	247,842	274,995	32%	11%
Anne Arundel County	427,239	489,656	512,790	15%	5%
Baltimore County	692,134	754,292	785,618	9%	4%
Maryland	4,780,753	5,296,486	5,633,597	11%	6%

Sources: 1990 and 2000 US Census and 2008 US Census Update

Based on the Round 7C data from the Baltimore Metropolitan Council, the combined population in Baltimore, Howard, and Anne Arundel counties is expected to increase by just over 700,000 residents by 2035, which is a 13% increase in population. Employment is also expected to increase even more than population: by 2035, there will be nearly 600,000 jobs, or a 15% increase.

By 2035 the population in Columbia is expected to increase by more than 3,000 residents (+3%), and jobs are expected to more significantly increase (+20%). This includes the entirety of Columbia, which encompasses ten villages, including Downtown Columbia.

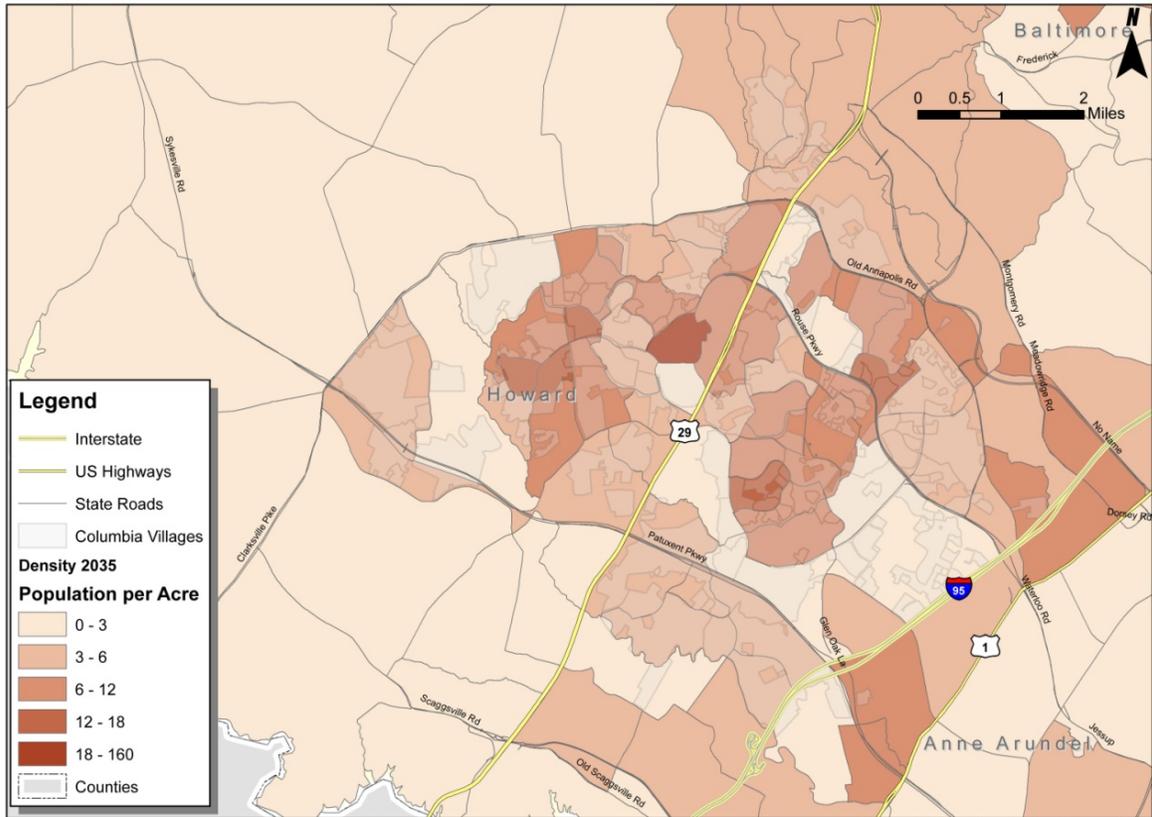
The population in Downtown Columbia is expected to be one of the highest growing population centers in the county. By 2035, the area is projected to have 8,970 residents and 18,270 employees. Nearly 90% of the growth expected in Columbia is expected in Downtown Columbia. It is also expected to remain as one of the densest areas in the region in terms of population and employment (Figure 38).

The plans to develop Downtown Columbia would add an additional 5,500 residential units, or 14,000 additional residents (assumes Columbia's current 2.53 persons per household) and an additional 5,400 jobs<sup>41</sup>.

The intersection of population density and employment density is displayed in the form of a population-employment density matrix (Figure 39). The highest concentrations of population and employment density are in dark turquoise, and these are in and around Baltimore and Columbia. There is also a concentration just northeast of Fort Meade. The population employment density matrix does not change much in 2035.

<sup>41</sup> Employment estimated using the US Energy Information Administration's estimates for employment by square foot. [http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed\\_tables\\_2003/2003set1/2003pdf/b1.pdf](http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set1/2003pdf/b1.pdf).

**Figure 38 Population Density by TAZ 2035 - Columbia**

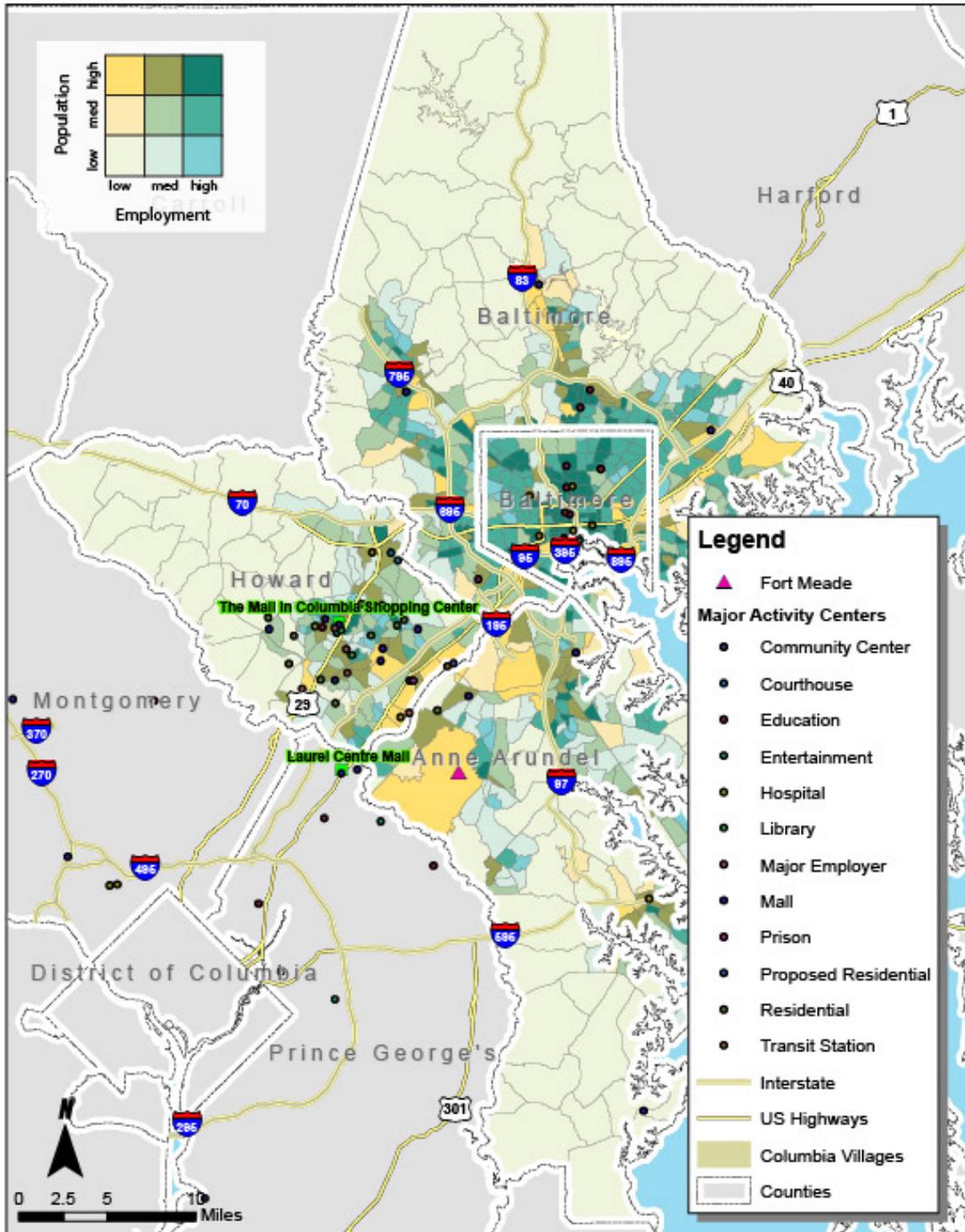


**Nelson Nygaard**  
consulting associates

GIS Data Source: Baltimore Metropolitan Council, Howard County

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Figure 39 Population and Employment Density Matrix 2015



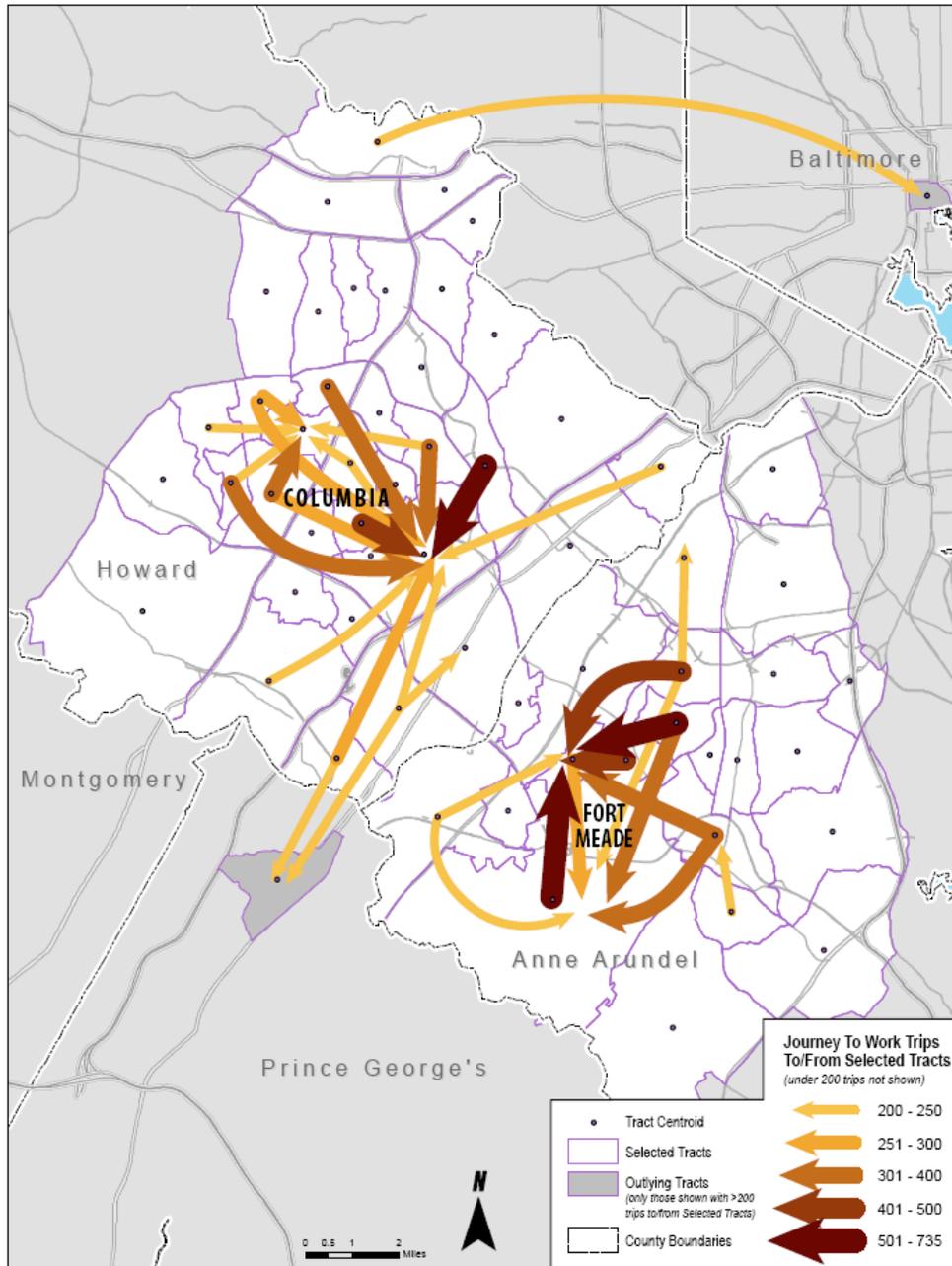
**Nelson Nygaard**  
consulting associates

GIS Data Source: Baltimore Metropolitan Council, Howard County

## B.4 Existing Travel and Commute Patterns

In addition to examining employment and activity centers, existing travel and commute patterns are also relevant. US Census Journey to work data suggest that a significant number of residents of Columbia work in Columbia, office parks just west of Interstate 95, and Fort Meade (Figure 40). A closer look at Columbia reveals that a majority of the trip destinations for workers are in the office parks near Interstate 95 (Figure 41).

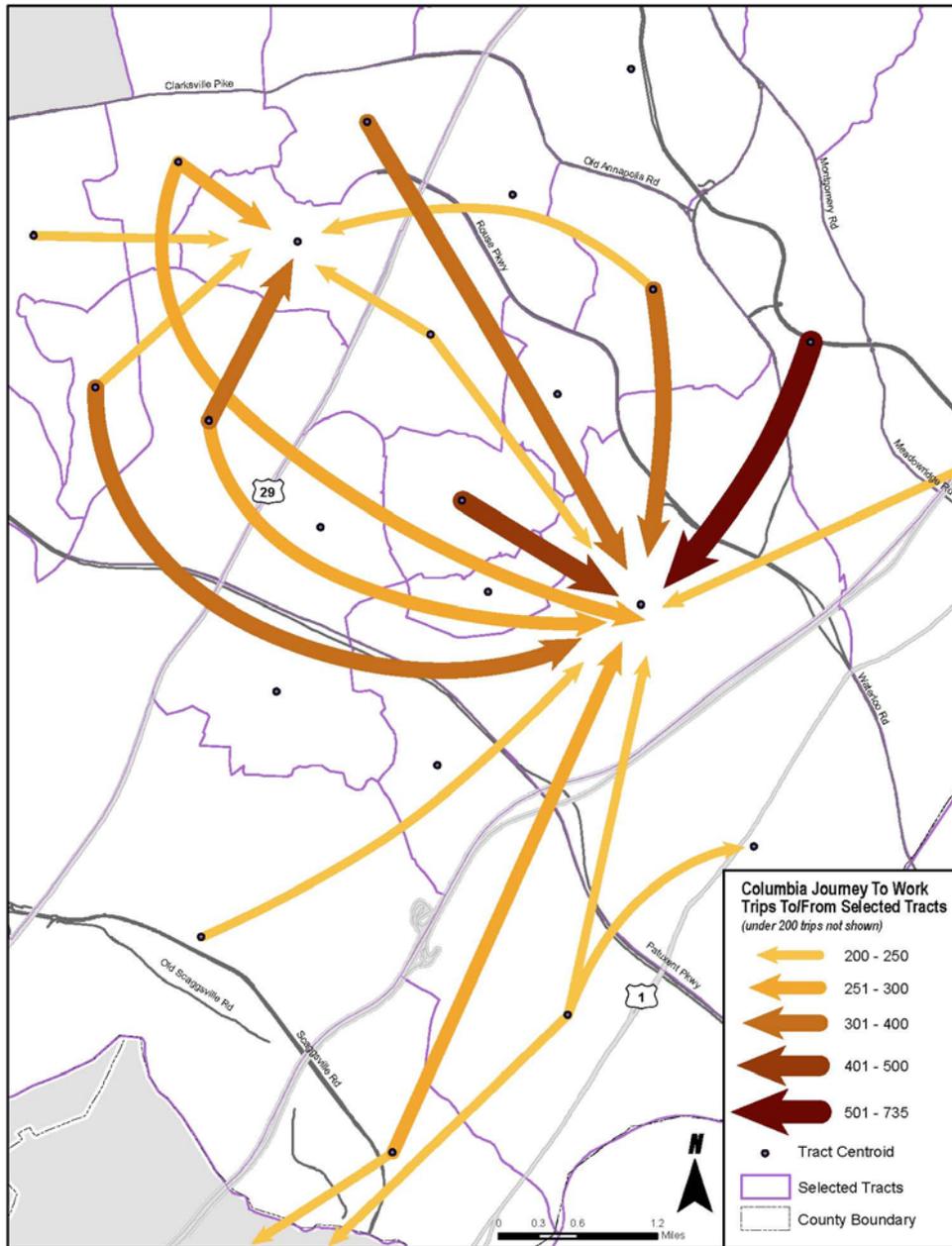
**Figure 40 Journey to Work From Selected Census Tracts**



**Nelson|Nygaard**  
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GIS Data Source: Baltimore Metropolitan Council, Howard County, ESRI, CTPP 2000 JTW

**Figure 41 Journey to Work around Columbia by Census Tract**



**Nelson Nygaard**  
consulting associates

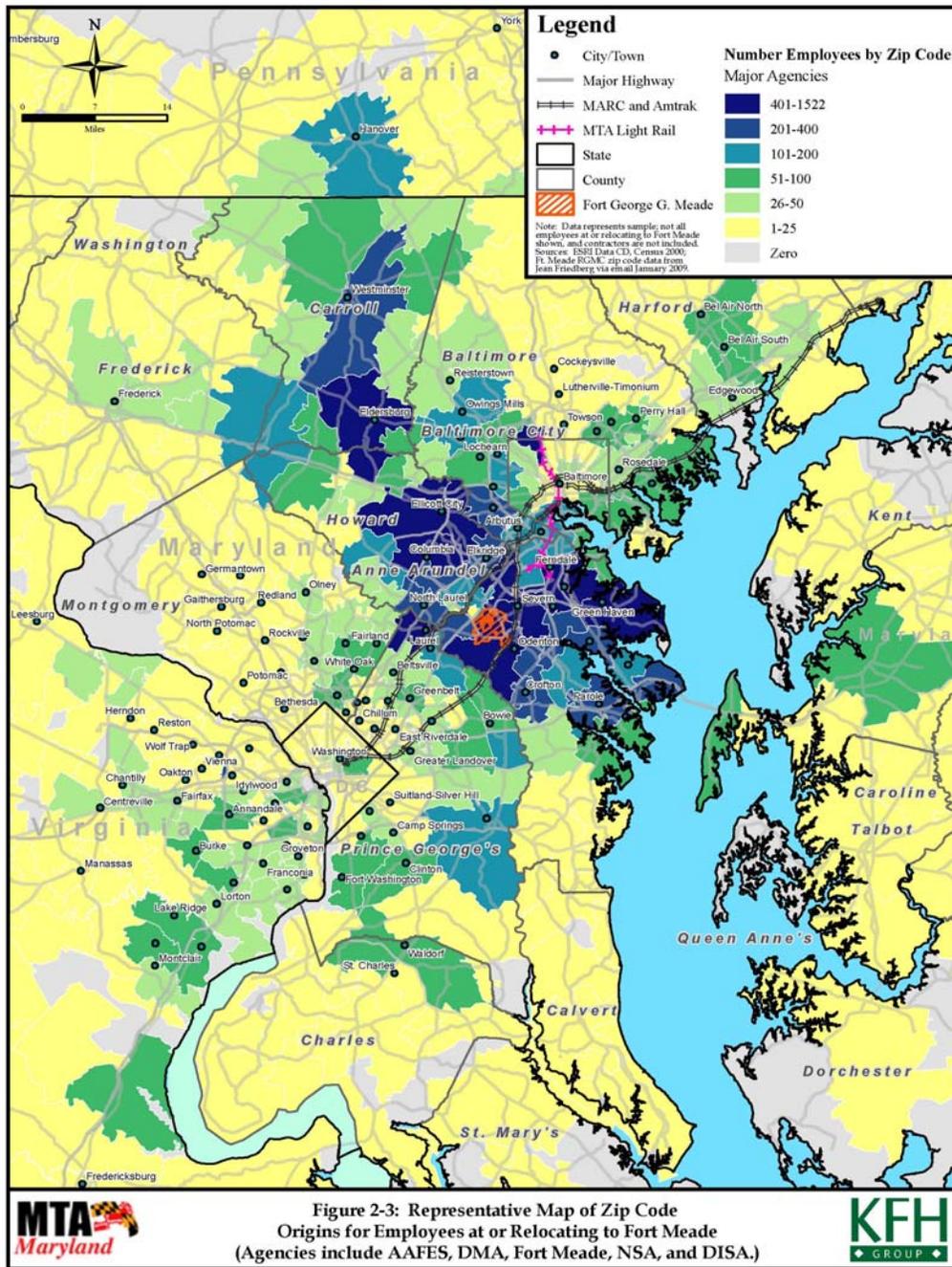
GIS Data Source: Baltimore Metropolitan Council, Howard County, ESRI, CTPP 2000 JTW

## B.5 Impact of Transit-Dependent Populations

The Howard County Short-Range Transportation Development Plan completed in 2009 by KFH Group identifies population groups that exhibit the greatest need for public transportation services. Populations that have a higher propensity to use transit have certain demographic characteristics, such as higher age, presence of a disability, lower income, or lack of automobile availability. The analysis completed by KFH Group in Figure 42 shows the density of transit-dependent populations overlaid with transit services. The figure shows that areas of moderate to high transit propensity are located along Route 29



**Figure 43** Origins for Employees at or Relocating to Fort Meade

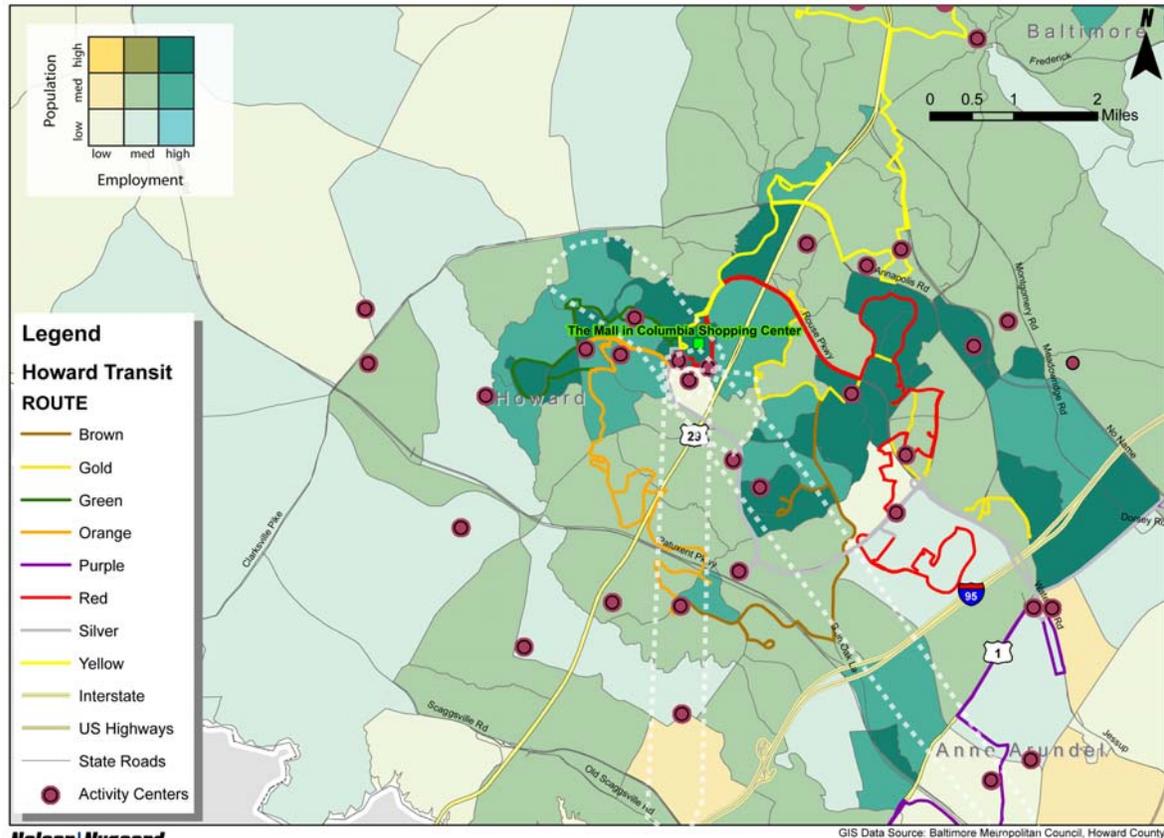


## B.6 Priority Transit Locations

Transit usage occurs in areas that contain a nexus of high population density, high employment density, concentrations of transit-dependent populations, and activity centers. An index of all these factors overlaid with existing services clearly shows which areas could support transit but are currently not served. A map of this transit propensity index is shown in Figure. The areas that can support transit service, as well as the recommended frequencies for transit, are summarized below:

- Oakland Mills (15 minute service)
- Laurel Mall (30-60 minute service)
- Harpers Choice and Wilde Lake (15-30 minute service)
- Fort Meade (10-15 minute service, based on BRAC projections)

**Figure 44 Locations for Increased Transit Service**



## Key Findings

- There are also many significant destinations in and around Columbia, many of which are likely attractors of transit ridership.
- In Downtown Columbia and other select areas along major roads, there are areas of commercial and civic development, but most of Columbia is residential.
- Howard County's General Plan specifically focuses redevelopment in the eastern portion of the county, and uses Downtown Columbia as an example.
- Johns Hopkins Applied Physics Laboratory is the single largest employer in Columbia. Shopping centers and malls are other major centers of activity, particularly the Columbia Mall.
- Fort Meade is currently a key employer and destination, and it is poised to become an even larger trip attractor with its planned expansion.

- In Howard County, the major population concentration of sufficient density to support higher-frequency transit is in Columbia. Several Columbia villages that have higher densities, particularly Harpers Choice, can support transit service every 10 minutes, as will all of Downtown Columbia.
- Hickory Ridge, Long Reach, Owen Brown and Wilde Lake can support service every half-hour. Some areas of Oakland Mills can also support 30 minute headways. Beyond these communities, most other areas are more rural in nature.
- Some areas in Harpers Choice (near Howard County General Hospital) and Hickory Ridge have employment densities high enough to support transit about every 15 minutes. Downtown Columbia will be able to support even greater service frequency.
- Owen Brown, Long Reach and parts of Wilde Lake also have higher employment densities and can support service every half-hour.

## **Summary**

By detailing the demand for transit, based on both an understanding of the transit dependent population in the area and the employment connections that transit can serve, it is possible to develop a service that can meet a variety of needs. Appendix 3 details the service and operational characteristics of a circulator for Downtown Columbia based on the characteristics defined in this appendix.

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# Appendix C. Transit Circulator Design

This appendix describes the proposed Downtown Columbia circulator route, schedule, capital and operating costs, and vehicle options.

## C.1 Circulator Routing

The objective of the Downtown Columbia circulator is to serve key trip generators, which in this area include both the existing Mall and future residential and office developments within Downtown Columbia. A phased approach to circulator routing will allow a short-term route to begin immediate operations on existing roads serving existing developments, while a long-term pattern will serve future roads and developments. Figure 46 shows the long-term circulator, assuming completion of development in the Crescent area. In the long-term, the circulator route still serves the main front entrances of the mall on the western side of the site. East of Little Patuxent Parkway, the long-term circulator will loop around the new building just south of the pedestrian bridge (in the short-term that parcel will be served by an in-out turnaround). The long-term circulator will also travel on the new road proposed to connect Windstream Drive west of the mall south to Symphony Woods Road. The total route measures 2.8 miles. It is assumed that the bus will also travel at the same operating speed as CMRT – 15.8 miles per hour. Thus one round trip takes 10.6 minutes. With the compact development pattern of the community, the proposed long-term circulator route would be easily able to provide service to the entire study area such that everyone will be within a five-minute walk, or a quarter-mile, of the route. Although detailed development data has not been completed, the General Plan amendment outlines the mix of land uses planned for Downtown Columbia. Based upon that data, the market capture for the circulator route by 2035 is 7,990 housing units and 7,237 employees.

In both phases, the route will serve the mall's west entrance, and the long-term circulator would also serve the southeast entrance. Limiting service to one or two mall stops maximizes end point connectivity while minimizing each passenger's bus travel time. Additional stops should be made by drivers when hailed by riders curbside or on-board. Where repeated stops are typically made, Downtown Columbia tenants or the TMA should install appropriate stop amenities, such as those described under "capital cost" below.

Figure 46 presents the recommended short-term circulator route (assuming current land uses). This route uses the current transit hub area, heads clockwise around the mall loop, and serves destinations east of Little Patuxent Parkway. The bus accesses the hotel and library along the southeast portion of the mall before turning onto the mall road and back to the transit center. The graphic shows the Howard Transit routes, which also serve the mall, as well as current Howard Transit bus stops. It is assumed that the bus will travel at the same average operating speed as CMRT – 15.8 miles per hour. Thus one round trip of the short-term circulator, which measures 2.3 miles, will take 8.7 minutes.

**Figure 45 Short-Term Circulator**

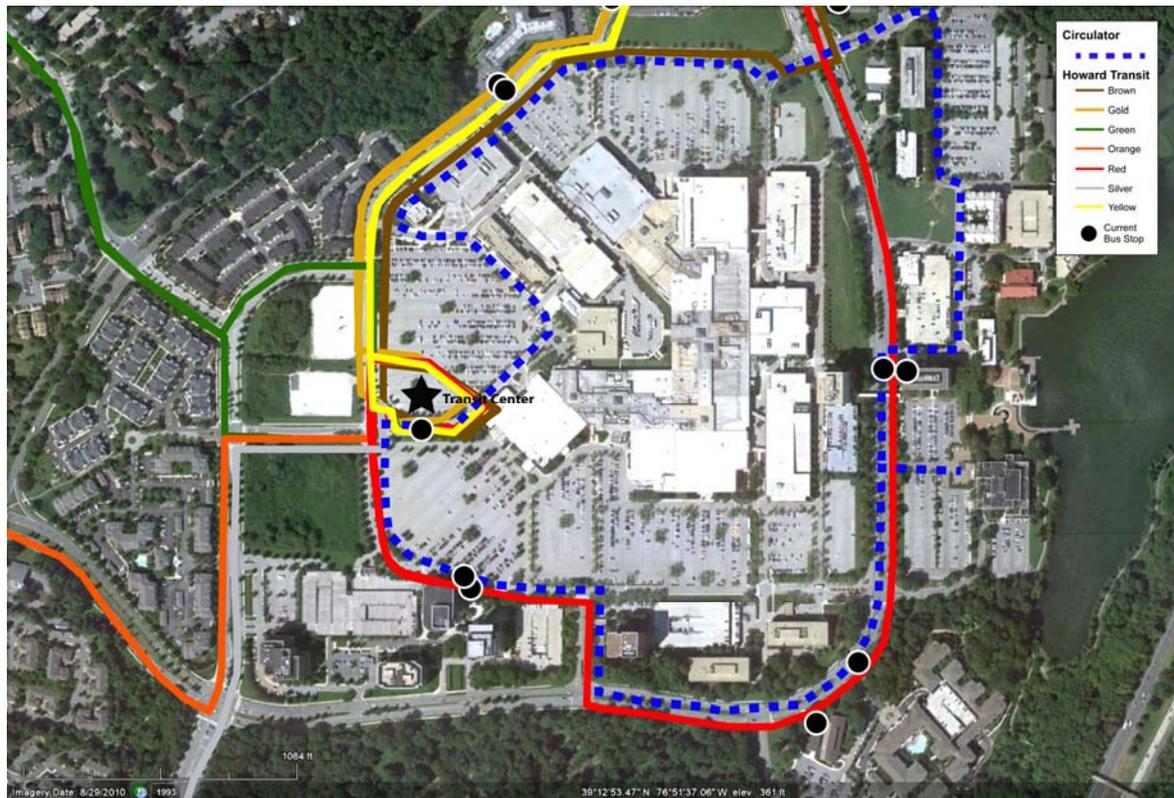


Figure 46 shows the long-term circulator, assuming completion of development in the Crescent area. In the long-term, the circulator route still serves the main front entrances of the mall on the western side of the site. East of Little Patuxent Parkway, the long-term circulator will loop around the new building just south of the pedestrian bridge (in the short-term that parcel will be served by an in-out turnaround). The long-term circulator will also travel on the new road proposed to connect Windstream Drive west of the mall south to Symphony Woods Road. The total route measures 2.8 miles. It is assumed that the bus will also travel at the same operating speed as CMRT – 15.8 miles per hour. Thus one round trip takes 10.6 minutes. With the compact development pattern of the community, the proposed long-term circulator route would be easily able to provide service to the entire study area such that everyone will be within a five-minute walk, or a quarter-mile, of the route. Although detailed development data has not been completed, the General Plan amendment outlines the mix of land uses planned for Downtown Columbia. Based upon that data, the market capture for the circulator route by 2035 is 7,990 housing units and 7,237 employees.<sup>43</sup>

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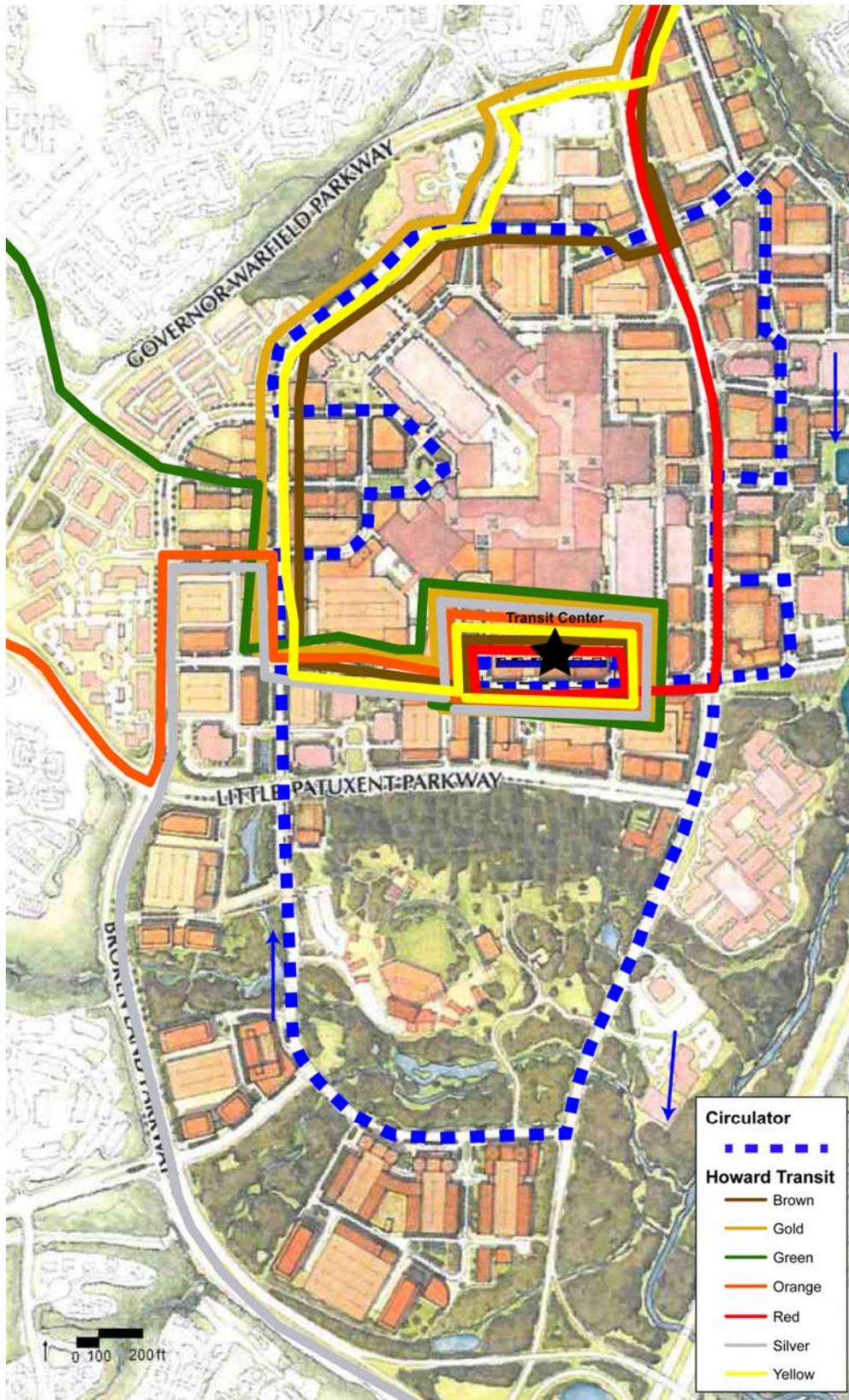
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<sup>43</sup> Employment was calculated using US Energy Information Administration data on mean workers per square feet for different land uses.  
[http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed\\_tables\\_2003/2003set1/2003pdf/b1.pdf](http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set1/2003pdf/b1.pdf)

Where repeated stops are typically made, Downtown Columbia tenants or the TMA should install appropriate stop amenities, such as those described under “capital cost” below.

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Figure 46 Long-Term Circulator Route



## C.2 Schedule and Operations

### Travel Demand

Demand for transit services is based on many factors, including the level and quality of transit services, the types of trips that are made, and the availability of other modes for making those trips. Recently, the cost of fuel has become an important determinant of the demand for transit services.

The overall quality of the transit service is an important determinant of the percentage of total trips that will use transit, and this percentage can be identified using the concept of transit levels of service (LOS), where letter grades identify the overall quality of transit service provided on a scale of A through F, with “A” being exceptional service and “F” being poor service.

Transit LOS measures consider several parameters of quality. For fixed route service, transit quality considers factors such as coverage, hours of service, frequency, and convenience of transit service. *The Transit Capacity and Quality of Service Manual, 2nd Edition*<sup>44</sup> defines transit Level of Service (LOS) for different types of transit services, and Figure 47 summarizes key indicators for fixed route transit services.

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<sup>44</sup>*Transit Capacity and Quality of Service Manual*, 2<sup>nd</sup> Edition, 2003, Transportation Research Board, Washington, D.C., Page 3-33.

**Figure 47 Transit Level of Service**

Level of Service	A	B	C	D	E	F
Characteristic	<b>Most suitable for large cities and downtowns</b>					
			<b>Suitable for small cities and suburban areas</b>			
Coverage of Transit Supportive Area	90% to 100%	80% to 90%	70% to 80%	60% to 70%	50% to 60%	40% to 50%
Frequency of Bus	<10 minutes	10-14 min.	15-20 min.	21-30 min.	31-60 min.	>60 minutes
Operating hours in a day	19-24 hours Night service provided	17-18 hours Late evening service	14-16 hours Early evening service	12-13 hours Daytime service only	4-11 hours Only peak hour or mid-day	0-3 hours Very limited or no service
Convenience	Faster by transit than by auto	Transit trip is the same as by auto	Transit slower, but tolerable for choice riders	Round-trip an hour longer than by auto	Tedious for all riders, may be best possible in small cities	Undesirable for most riders

Levels of service “A” through “C” are most often seen in large cities and downtown areas. LOS “C” through “F” are more appropriate to suburban communities and smaller towns. A variety of measures make up an LOS designation and they can be applied to different areas – so one part of a town may have an “A” level of service and another part a “D” level of service.

The first characteristic, “Coverage of Transit Supportive Area,” considers areas with sufficient density of residents and employees to support fixed route transit services. The coverage of these areas with transit service is one measure of quality. In an area with mid-level density and both employees and residents, such as the proposed build out of Downtown Columbia, Transit LOS C is appropriate. Therefore, a headway of 15-20 minutes is recommended. The result would be to provide a choice of modes between walking and transit that allow residents and employees to equally weight their time.

### Schedule

In order to provide a high level of service, initial headways of 20 minutes are recommended in the short-term. Once development is completed in the Crescent area, the farthest points within Downtown Columbia will be distant enough to benefit from additional service: at this phase, circulator service should be increased to 15 minute headways. Due to the short nature of the loop, this headway results in an efficient use of vehicles. The

route in both the short-term and long-term will require a total of two vehicles – one in operation and one as a spare. Given the short travel time on board, another option of running two vehicles in opposite directions would drastically increase operating costs without providing much benefit. For such a small system, this is a high spare ratio, so a spare vehicle could potentially be shared between the circulator system and Howard Transit, suggesting that similar vehicle types may be appropriate. However, a smaller vehicle is assumed for cost estimating purposes below to be conservative (a larger vehicle's cost would be off-set by the efficiency of sharing a spare with CMRT).

Figure 48 shows the system schedule in the short term and Figure 49 shows the long-term schedule. The timing is on a clock face schedule to make it easier for people to remember. The start of the route will be at the short or long-term transit center.

**Figure 48 Short-Term Circulator System Schedule**

Description	Weekday	Saturday	Sunday	Route Start
Service Hours	6 AM-10 PM	8 AM-10 PM	8 AM-10 PM	
Headways (minutes)	20	20	20	0:00
Trips per Day	48	42	42	0:20
Revenue Hours per Day	8	7	7	0:40

**Figure 49 Long-Term Circulator System Schedule**

Description	Weekday	Saturday	Sunday	Route Start
Service Hours	6 AM-10 PM	8 AM-10 PM	8 AM-10 PM	0:00
Headways (minutes)	15	15	15	0:15
Trips per Day	64	56	56	0:30
Revenue Hours per Day	16	14	14	0:45

## Capital Cost

Capital costs for the proposed circulator will be minimal, as the route is not complicated enough to warrant purchasing scheduling software, passenger count machines, or other technologies. Vehicles will be the primary capital cost for the system. Cutaway, lift-equipped vehicles are recommended to accommodate early-year demand and be physically appropriate for the village setting. An estimate of different sizes of cutaways and capacity is shown in Figure 50.

**Figure 50 Cutaway Characteristics**

Description	Length	Seats	Average Cost	Minimum Life (Years)	Minimum Life (Miles)
Medium-Duty Cutaway	<35 ft	20-40	\$75,000-\$175,000	7	200,000
Light-Duty, Mid-Sized Cutaway	25-30 ft	16-25	\$50,000-\$65,000	5	150,000
Light-Duty, Small-Sized Cutaway	16-28 ft	1-22	\$30,000-\$40,000	4	100,000

Source: "An Evaluation of the Market for Small to Medium Sized Cutaway Buses." Federal Transit Administration. 21 December 2007.

APTA's survey of 288 transit agencies in 2007 yielded an average cutaway vehicle cost of \$67,299, which will be used in this analysis.<sup>45</sup>

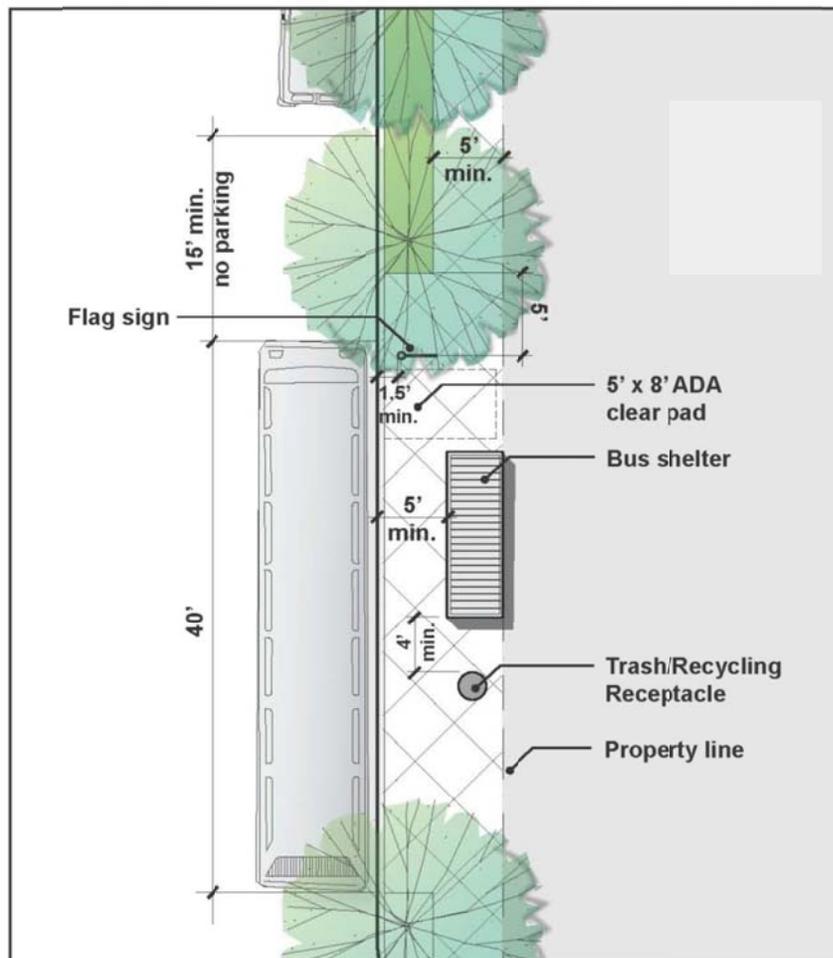
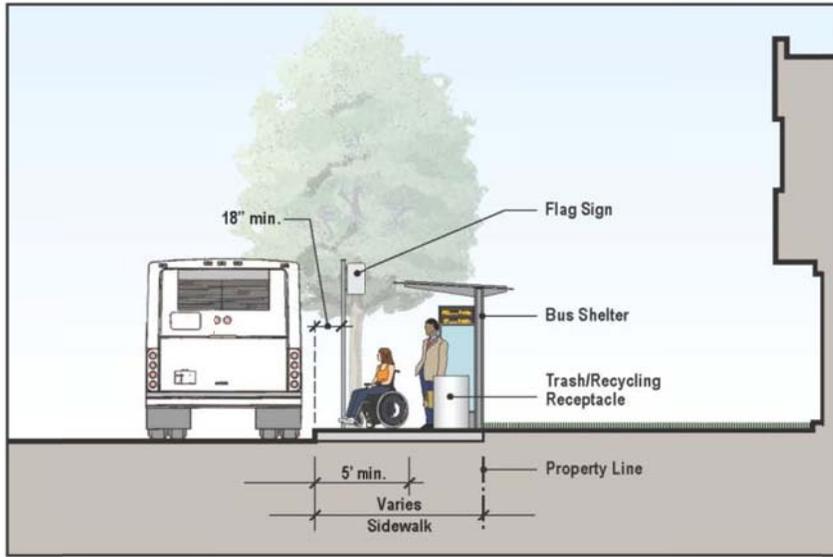
Although the route will likely be hail and ride, signage along the route will help define it. Bus stop signs should be purchased for the fixed stops at the mall, with wayfinding installed inside the mall leading passengers to the stops. Shelters and benches should be provided at the two fixed stops on each side of the mall. Shelters may cost anywhere from \$2,500 to \$10,000, depending on the quantity purchased, roof style, and materials. For this analysis, an average cost of \$4,500 is used. The pole and sign cost an additional \$400. Recommended stop configurations are shown in Figure 52, which are similar to those used by Howard Transit today.

**Figure 51 Capital Costs**

Item	Cost	Units	Total
Vehicle	\$67,299	2	\$134,598
Sign, Bench, Shelter	\$4,900	2	\$9,800
Total Capital Costs			\$144,398

<sup>45</sup> APTA 2007 Transit Vehicle Database

**Figure 52 Recommended Bus Stop Design**



## Operating Cost

The operating costs will vary based upon who runs the service. A private agency typically will have a significantly lower operating cost than if a service was run by the local transit agency. This is partly because a transit agency focused wholly on providing service will have higher overhead than a private organization that contracts out for service.

Based upon the proposed operating schedule, the short-term circulator will accrue 2,816 revenue hours of service per year over 5,612 vehicle hours. This is because the route in the short-term is 10 minutes, but is running on 20-minute headways. Thus the hours when the operator picks up passengers is half the time the operator will be out in the field. In the long-term, when the route lengthens and headways shorten, the circulator will accrue approximately 5,612 annual revenue hours of service and 5,612 vehicle hours. The difference between revenue hours and vehicle hours is that no fuel is being expended during vehicle hours; this might be an operator break time. The operator, however, is still being paid thus the short-term cost is not simply half the long-term cost. Administrative costs would also be similar in the short and long-term.

Operating costs vary based upon the type of agency running the service. As an example of the difference in operating costs between a public and private organization, operating costs per hour were used from CMRT's operation of Howard Transit and from BWI Business Partnership's LINK shuttle. The operating cost per hour is an excellent measure as it encompasses administrative expenses, driver salary, fuel, and maintenance.

In order to estimate operating costs in the short and long-term, full-build costs were calculated for the long-term route, and it is assumed that in the short-term, costs will be 75-percent of long-term costs.

**Figure 53 Short-Term operating costs**

Annual Revenue Hours	Operating Cost/Hour	Annual Cost
2,816 + operator salary/admin	\$75 - Public Agency (CMRT)	\$420,900 * 75%=\$315,675
	\$60 - Private Operator (BWI Business Partnership)	\$336,720* 75%=\$252,540

**Figure 54 Long-Term Operating Costs**

Annual Revenue Hours	Operating Cost/Hour	Annual Cost
5,612	\$75 - Public Agency (CMRT)	\$420,900
	\$60 - Private Operator (BWI Business Partnership)	\$336,720

Given the different options on vehicles and provider, costs can vary widely. A summary of the lowest and highest estimate for a year of service is shown below.

**Figure 55 Difference in Costs - Short Term**

Cost Scenario	Capital	Operating	Total	Difference
Low	\$30,000	\$252,540	\$282,540	\$208,135
High	\$175,000	\$315,675	\$490,675	

**Figure 56 Difference in Costs – Long-Term**

Cost Scenario	Capital	Operating	Total	Difference
Low	\$30,000	\$336,780	\$366,780	\$229,120
High	\$175,000	\$420,900	\$595,900	

### Alternative Power Vehicles

Many communities, understanding the environmental harm caused by vehicle emissions, have expressed interest in transit vehicles using alternate fuel options. The costs of different alternative fuel vehicles are shown in Figure 57, with a diesel vehicle shown as the base for comparison.

**Figure 57 Vehicle Costs – Alternative Fuels**

Fuel Type	Average Cost
Diesel Fuel	\$67,299
Diesel & Electric Battery	\$63,797
Biodiesel	\$64,671
Propane	\$69,058
Compressed Natural Gas	\$79,200
Electric (DesignLine model) <sup>46</sup>	\$559,000

Source: “An Evaluation of the Market for Small to Medium Sized Cutaway Buses”

<sup>46</sup> The CMRT document “The Electrification of Public Transit in Columbia, MD” calls for use of DesignLine vehicles. This article quotes a price for the vehicles: <http://www.ecofriend.org/entry/eco-buses-designline-hybrid-electric-bus-is-as-quiet-as-a-tomb/>

The costs of fuel will also vary. 8 presents the prices for each fuel type as of July 2010. This data, collected by the Alternative Fuels and Advance Vehicles Data Center, a department of the U.S. Department of Energy, has been normalized to price per gasoline equivalent or price per diesel equivalent. This price factors in the fact that the price paid per unit of energy differs from the price paid per gallon. For the electric vehicle option, power costs include batteries and a charging station. The annual operating cost would be \$1.6 million based upon calculations by CMRT.

**Figure 58 Fuel Prices, July 2011**

Fuel Type	Average Fuel Prices on Energy-Equivalent Basis
Gasoline	3.68
Diesel	\$3.54
Compressed Natural Gas	\$2.07
Ethanol (E85)	\$4.60
Propane	\$4.26
Biodiesel (B20)	\$3.67
Biodiesel (B99-B100)	\$4.13

Source: [http://www.afdc.energy.gov/afdc/price\\_report.html](http://www.afdc.energy.gov/afdc/price_report.html) Price Reports

Different fuels also require different infrastructure. Biodiesel can be placed in diesel tanks, but other fuels require new holding tanks. Propane can be stored in an above-ground tank costing around \$8,500, while both ethanol and CNG must be in underground tanks, which cost around \$150,000.<sup>47</sup> CMRT has also explored utilizing electric vehicles. The simplest and most cost-effective means of storing and maintaining vehicles would be through a partnership with CMRT. This way the operator of a Downtown Columbia circulator would not have to invest in a new facility.

## Recommendations

- Short-Term: 2.3-mile circulator, operating every 20 minutes; weekdays from 6AM to 10PM, weekends 8AM to 10PM. Locate transit center within future garage footprint at the current transit hub.
- Long-Term: 2.8-mile circulator, operating every 15 minutes; weekdays from 6AM to 10PM, weekends 8AM to 10PM. Locate transit center south of mall circulating through a future development site.

<sup>47</sup> Nelson\Nygaard. "Nogales Transit Feasibility Study." 2006.

# Appendix D. Transit Center Site Evaluation

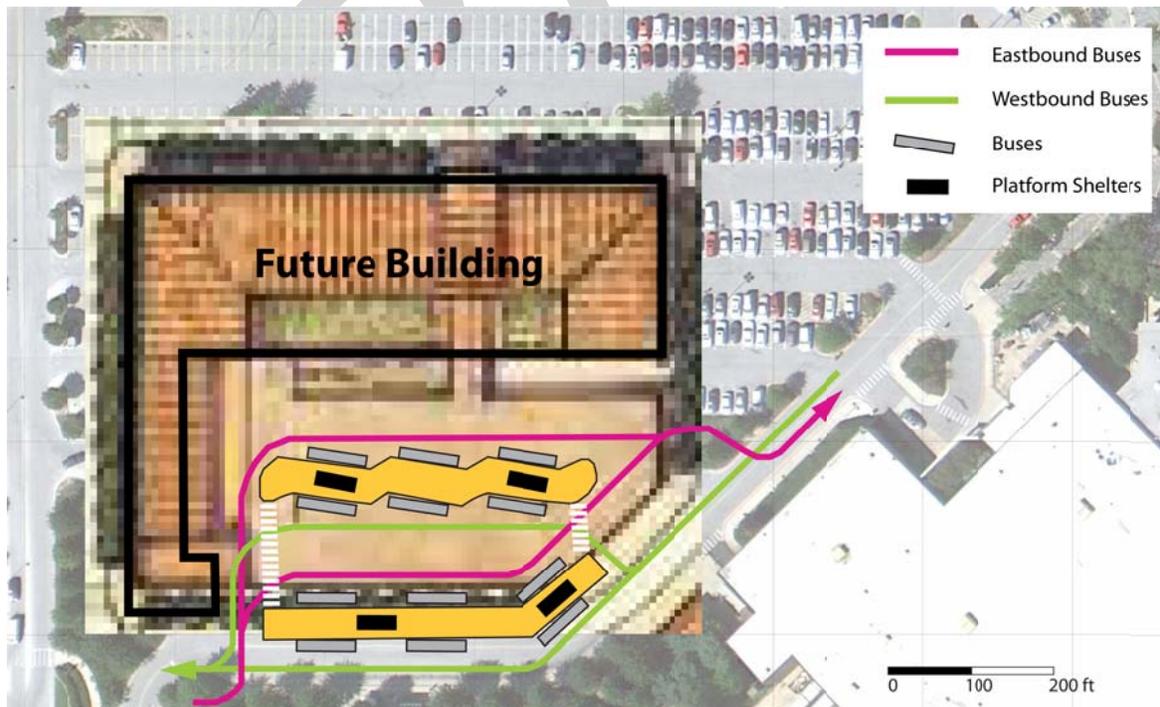
A location for a transit transfer center which can be both integrated into the built environment as well as support local and regional transit operations is evaluated below.

## D.1 Short-Term Transit Center Location

The circulator proposed to provide service in the short-term would operate every 20 minutes, translating into three stops at the mall every hour. Since the phases of Downtown Columbia's development are not currently determined, shifting from the existing location is not recommended. Absent an improved transit hub, the additional demand of three buses per hour should be accommodated at the existing Howard Transit bus stop at the Mall.

In preparation for future development, a short-term transit center that can fit 12 bus stops (accommodating all Howard Transit and MTA buses, plus the circulator) can be created within the space that will be occupied by a future parking garage adjacent to the existing transit hub. In this way, the remainder of this parcel can be developed with a building while allowing transit operations to continue until structured parking is necessary. This short-term transit center is shown in Figure 59. Six buses would use 70-90 ft on-street stops (90 ft is needed only for articulated buses used by the MTA) while six routes will use a sawtooth berth facility located off-street. Buses will circulate through eastbound and westbound, as shown in the diagram.

**Figure 59 Short-Term Transit Center**



## D.2 Long-Term Transit Center Location

As Downtown Columbia develops, additional demand for the circulator, as well as transfers with the County-wide transit system will be generated. At that point, a complete transit center will be needed, so that both internal and regional transit riders can be accommodated within a complete transit transfer facility.

The Howard Transit system's pulse schedule means that the number of berths required must be able to accommodate a vehicle from all routes at the same time. Seven of Howard Transit's routes serve the mall at the top and/or half of the hour. One CMRT route, Route E, serves the mall as well. Four of the express services – routes 150, 310, 915, and 929 – have runs that stop at the mall a few minutes on either side of the top and half of the hour. In order to also accommodate layover and recovery time, those buses should have berths in the long-term as well. Since these routes are all peak-oriented, they each need their own berth. Adding in a dedicated berth for the circulator results in a total demand for 12 berths. [One express route, the 320, only stops at the mall once in the morning (8:47 am) and once in the afternoon (5:10 pm). This route could share a berth with the 150, as they are never at the mall at the same time, and there is a sizeable time buffer between their arrivals at the mall (26 minutes or more).]

To best accommodate both bus movements and passenger transfers, the 12 berths should be close together; this avoids the issue of arriving on one bus and walking the length of 11 berths (660-770 feet) to a connecting bus. Limiting the center's footprint also simplifies placement within Downtown Columbia (larger sites are more difficult to accommodate).

On-street bus berths require approximately 70 feet in length per berth. Saw tooth berths angled in towards the sidewalk require only 60 feet including space for buses to pull out without backing up. For a transfer area to accommodate 12 berths, opposing berths are recommended, arrayed with six on each side of a passenger waiting median, or concourse. Six on-street berths would require 420 feet in length; six saw tooth berths would require 360 feet in length.

Buses are driven along the left side of the median and pull into berths to the right ("left-handed operation"). This allows passengers to disembark directly onto the median and walk along the median for all transfers with no potential vehicle conflict. Crosswalks are then only needed between the median and the mall, and along other desire line routes. Three locations were considered for placing a transit center within Downtown Columbia. Site 1 would fit onto a new road planned under Downtown Columbia's build out design; however, it would require minor deviations from the circulator route alignment as has been described previously. Site 2 would require a slight deviation of the route accessing the southeast Mall entrance. Site 3 would fit onto a new road planned under Downtown Columbia's proposed build out design. Any transit center site would need to be integrated into the development plan's build-out phasing so as to be included into a future mixed-use building.

## D.3 Evaluation of Long-Term Transit Center Locations

Criteria for evaluating potential placements of the transit center include:

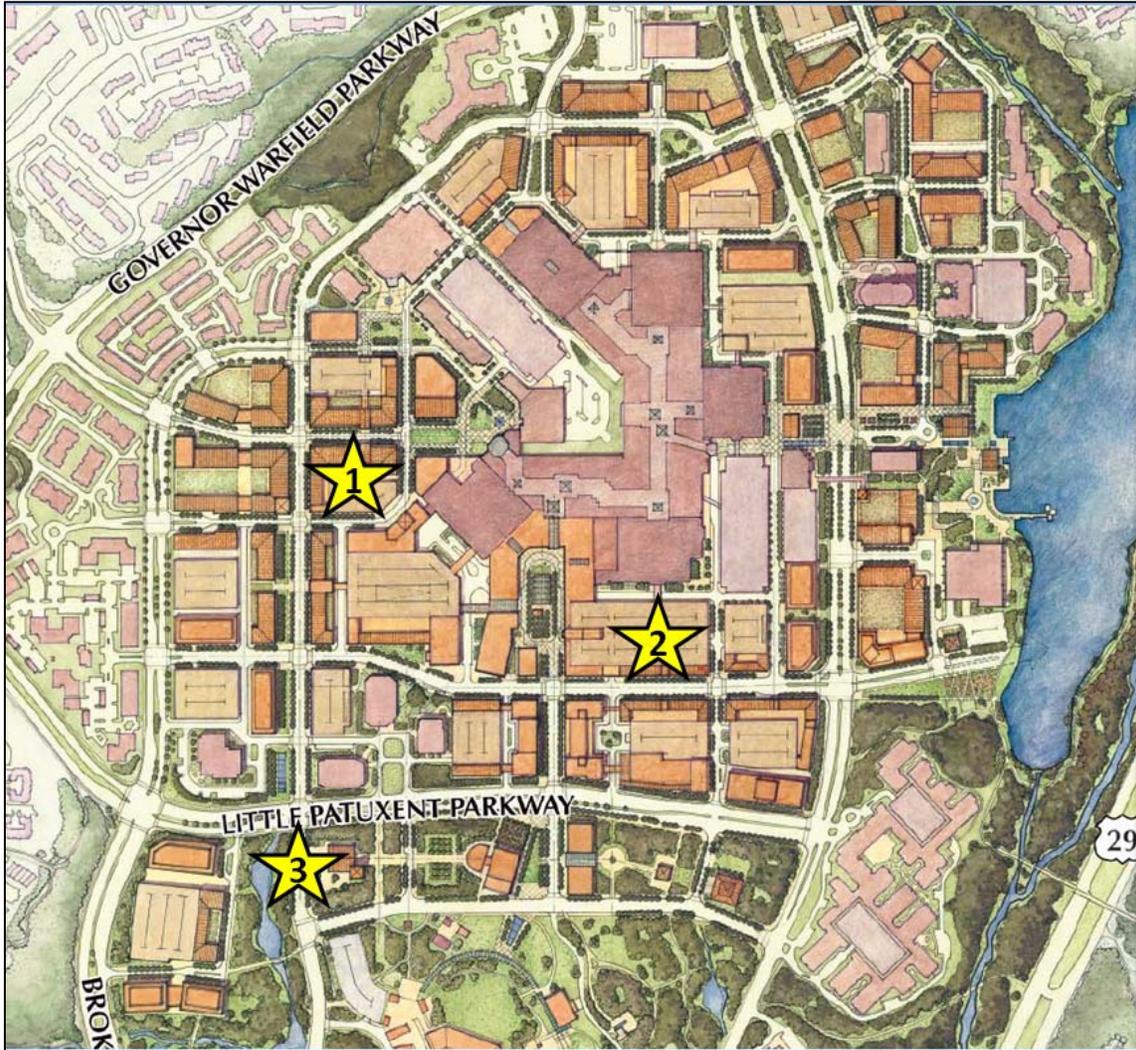
- **Easy access to the road network.** Buses should have direct access to the roadway network and should not be impeded by a circuitous access path to the transit center.
- **Minimizes impacts on the vehicular network.** Placement of the transit center should not cause buses to unduly impede other vehicular traffic using the roadway network, nor should the transit center block or divert traffic.
- **Minimize additional bus travel miles.** The transit center should be located centrally and conveniently, minimizing additional travel distance for buses to reach the transit center.
- **Close to Mall.** The transit center will serve as the bus stop for passengers accessing the Mall, thus the center should be within a short walk of the Mall facility.

Based on these criteria, Figure 60 indicates how the potential transit center locations perform. Each site is given a rating – Yes, No, or Partial – based on its level of compliance with each criterion. To rank proximity to the Mall, straight line distances were calculated from the transit centers to the Mall building. Distances under 420 feet (a 2-minute walk assuming a walk speed of 3.5 feet per second) are acceptable. For Site 5, the actual distance a passenger would have to walk around the building along the Mall ring road to access the Mall proper was calculated.

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**Figure 60 Transit Center Site Analysis**

Site	Easy Access to Road Network	Minimizes Impacts on Vehicular Network	Minimizes Additional Bus Travel Miles	Distance to Mall less than 420 ft
Site 1	No	Yes	No	275 ft – Yes
Site 2	Partial	Yes	No	300 ft – Yes
Site 3	Yes	Yes	Yes	1,820 feet - No



Site 1 fails on two criteria because of its location off the network, and would also require a revision in the circulator routing. This site, however, is also closest to the Mall entrance. Site 2 would require additional bus miles, but is also quite close to Windstream Drive access and is close to the Mall. Site 3 is located in a more direct vehicular location as it lies along proposed roads, but it is significantly farther from the mall than other options; Site 3 is approximately a third of a mile from the mall. For these reasons, Site 2 scores highest of the three sites. Since service convenience is a key aspect of successful transit, the shorter walk distance from the transit center to the Mall under option 2 makes it the

recommended option for a long-term transit center. However, given current operations and anticipated early stages of redevelopment, Site 1 is considered the best location for a short-term transit center due to its short walking distance to the Mall entrance.

## D.5 Recommended Transit Center Location

In the long-term, the transit center will be moved just south of the mall. The center will still consist of 12 bus berths, with six on either side of a concourse stretching along one edge of a 540-foot development site. The circulator will travel westbound on the mall road after crossing Little Patuxent Parkway. Six on-street berths will be located along the front of the development site; then buses will U-turn to the inside of the development site and travel eastbound back out to Little Patuxent Parkway. This concept is illustrated in Figure 61. As shown, Howard Transit routes are recommended to be modified to serve the long-term transit center. This rerouting will create a transit spine on the western mall road with frequent service and multiple opportunities for Downtown Columbia patrons to board buses.

**Figure 61 Long-Term Transit Center**



# Appendix E. Transit Development Plan

Howard County recently commissioned a Short Range Transit Development Plan for Downtown Columbia. This plan, completed by KFH Group in March 2009, outlines a series of strategies for the county to pursue to improve transit services for Downtown Columbia. This Downtown Columbia TDP describes the planning process undertaken, analyzes existing services, and provides recommendations on service strategies and options. The following highlights the service and organizational alternatives from the TDP. The complete TDP can be found at <http://www.co.ho.md.us/DPZ/DPZDocs/HowardCountyTDP.pdf>.

## Service Standards

- **Frequency** – Increase frequency on the Green Route, which has the highest ridership, to 30-minute headways. The TDP also outlines the costs, benefits, and potential ridership increases that could be achieved by running 30-minute headways on the rest of the routes.
- **Southeast County** – A route is needed linking Columbia to major employers: Johns Hopkins Applied Physics Laboratory, Montpelier Research Park, Maple Lawn, Emerson, North Laurel Community Center, and Laurel.
- **Town Center** – Two shuttle options were identified. Concept 1 entailed a midday lunch shuttle linking employees east of Little Patuxent Parkway to the town center. The more robust second concept called for a high-frequency, all-day shuttle from higher density developments around the Mall that are part of GGP's Town Center plan to Downtown Columbia.
- **Northeast County** – Restructure the Yellow route to reduce circuitous routing. Create a new route linking Ellicott City to Route 1 that does not involve going through Columbia and Laurel. Link these two new Yellow routes (Yellow East and Yellow West) at a transfer point in Ellicott City, at a place MTA runs bus service, to create a mini transit hub.
- **Vehicle Replacement** – The county is still recovering from having deferred vehicle replacement in the past; at times the county has purchased vehicles using 100 percent local funds due to urgent vehicle replacement needs (as opposed to 80% Federal funding which is often applied). The TDP recommends a phased vehicle replacement plan. All new vehicles should be hybrids with AVL, digital fareboxes, and stop announcements.
- **BRAC** – Analysis in the TDP taken from the BMC travel demand model predicts that very little residential concentration from BRAC will settle in Columbia. Three TAZ's show medium-high commute travel to Fort Meade. The BMC model used in the TDP, however, does not take into account the full build-out of the Town Center plan.<sup>48</sup>

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<sup>48</sup> Fort Meade is currently surveying employees being shifted to Fort Meade to identify exactly where they will live.

- **Passenger Facilities** – Develop a transit center in Downtown Columbia with improved passenger amenities, as proposed by GGP.
- **Service & Performance Guidelines** – Stakeholders noted that there was a lack of formal county transit policy, covering issues such as new service (where to provide it, at what span and headway), evaluating service (when to drop a route, when to revise), and quality of service (acceptable on-time standards). The MTA published Transit Design Guidelines in 2002 providing acceptable standards for service and guidelines on densities that support transit. These were distributed as guidelines to transit systems statewide, but were not formally adopted by the state. Another series of performance measures were developed by the MTA that focus of financial recovery and operational efficiency, and are now included on the annual MTA grant application. Based upon the MTA's guidelines as well as guidelines from WMATA, Prince George's County, and Montgomery County, the TDP lists a series of performance measures and service standards for Howard County.

## Transit Plan

The TDP makes several recommendations for service changes as well as planning initiatives, laid out on a near, medium, and long-term time frame. Recommendations relevant to HT routes are summarized below. A full listing of recommendations made by KFH Group, including the planning work behind them, can be found in the full TDP here: <http://www.co.ho.md.us/DPZ/DPZDocs/HowardCountyTDP.pdf>.

### *Near-Term*

- Operational Improvements: Yellow Route revision to service Circuit Court; Cost – Neutral
- Operating Expansion: Red Express Trips During Peak; \$115,000
- Planning: Transit Center Scoping Study: \$100,000
- Operating Expansion: \$1,361,000 total
  - l. Red Route: Full Half-hour headway peak: \$169,000
  - m. Brown Route: 30-minute peak: \$169,000
  - n. Silver Route: 30-minute peak/peak express trips: \$250,000
  - o. Conceptual Downtown Columbia Mid-Day Shuttle: \$96,000 (Figure 5-1)
  - p. Initiate Taxi Program for seniors and persons with disabilities: \$200,000 (if feasible based on study)
  - q. HTRide Expansion: \$477,000 (Operate three additional paratransit vehicles)
- Capital
  - r. Bus Stop Improvements: \$325,000
  - s. Transit Travel Training Contract
- Planning: \$200,000 total
  - t. Downtown Columbia Transit Station (CTCTS) Environmental Studies: \$150,000
  - u. Bus Stop Assessment: \$50,000

*Long-Term*

- Operating Expansion: \$2,545,000 total; Maps of new routes are included in the KFH Group TDP
  - v. Yellow: Restructure: \$299,000
  - w. Ellicott City/Elkridge Connector: \$524,000
  - x. Columbia/Maple Lawn/South County: \$524,000
  - y. Conceptual Town Center Shuttle: \$721,000
  - z. HTRide Expansion: \$477,000 (Operate three additional paratransit vehicles)
- Capital
  - aa. Bus Stop Improvements: \$325,000 per year, ongoing program
  - bb. Downtown Columbia Transit Station Site Acquisition
  - cc. Downtown Columbia Transit Station Construction: \$3,000,000

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