



# Odenton Station Parking Impact Study

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## I. INTRODUCTION & STUDY PURPOSE

The Maryland Department of Transportation (MDOT) requested that a comprehensive parking impact study be performed at the Odenton MARC Station located at 1400 Odenton Road in Anne Arundel County, Maryland. The station consists of three surface parking facilities with a total of 2,070 parking spaces.

Odenton Station is a commuter rail station on the MARC Penn line. Currently the only local transit connections at the Odenton Station are the Central Maryland Regional Transit (CMRT) K and M routes and a private shuttle operated by the National Security Agency for employees only. MARC ridership has experienced a 6% growth per year for the past decade with 19,000 daily riders between Penn Station in Baltimore, MD and Union Station in Washington, D. C. According to the MARC ridership report, in 2012 on a typical weekday, there are approximately 2,560 boardings, up from 2,450 boardings in 2011.

The purpose of this study is to determine the future station parking needs to accommodate both the additional commuter parking demand from MARC ridership growth/expanded service and parking for the proposed Odenton joint development program. The Maryland Transit Administration (MTA) projects ridership at the Odenton Station could double by the year 2030, based on the MARC Investment Study forecasts. The allowable Odenton zoning could yield from 24 acres of state and county property a development program that includes up to 1,750 residential units, 75,000 square feet of retail space, 100,000 square feet of office space and a 120-room hotel. Parking impacts will be analyzed based on projected supply and demand, facility types and location, and interim parking needs.

In order to evaluate commuter parking at the Odenton Station, data was compiled to document existing parking conditions, station patron origins, access mode to transit and transit ridership. Alternative commutes to both the Odenton Station and downtown Washington D.C. were researched with respect to cost, parking availability and travel time to determine if other modes of travel or other park and ride locations could be feasible for Odenton MARC Station patrons.

Information for this report was obtained from MTA, Amtrak and Anne Arundel County. Other valuable recent documents include the August 2008 *Odenton MARC Station Area Planning* report by RK&K, the December 2009 *Odenton Town Center Master Plan* report by RK&K/ PB, the Odenton Small Area Plan by the County's Office of Planning and Zoning, and the 2010 *Transportation Study for the Odenton Town Center Master Plan* by Sabra Wang & Associates, Inc.

## II. EXISTING CONDITIONS

### A. Current Parking Supply and Utilization

There are three designated surface parking lots at the Odenton Station with a total of 2,070 spaces. There is currently no charge to park in the lots, which are typically open weekdays from 5 AM to approximately 10 PM – during operating hours of passenger rail service as noted by existing signage. An aerial map of the station is shown in **Figure 1**.

**Figure 1: Aerial Map**



Parking lot utilization data was surveyed on Wednesday September 7, 2011 at 10:00 AM, to represent typical weekday peak lot usage. Lots A and B are both greater than 99% utilized. Lot C was observed to be 92% utilized. **Table 1** summarizes the results of the parking utilization survey.

**Table 1: Summary of Odenton Station Parking Facilities**

Odenton Lot	Ownership	Parking Cost	# of Spaces	Utilization
<b>A (East Lot)</b>	MTA	Free	500	99%
<b>B (West Lot)</b>	MTA	Free	870	100%
<b>C (North Lot)</b>	MTA	Free	700	92%
<b>Total Number of Spaces</b>			<b>2,070</b>	

In addition to vehicle parking, bicycle parking facilities are also provided at the station. There are total of 41 bicycle spaces and 5 bike lockers. Despite the rainy conditions on the day of the observation, the bike racks were 30% utilized. **Figure 2** shows bicycle parking at the station.

**Figure 2: Bike Rack Usage at Odenton Station**



## **B. Existing Transit Services**

The following transit services are provided at Odenton Station:

MARC – Penn Line: The Penn Line provides weekday service from Penn Station in Baltimore to Union Station in Washington, D.C. The service operates on weekdays all day with twenty-five northbound and twenty-five southbound weekday stops at Odenton Station.

Central Maryland Regional Transit (CMRT) – Connect-A-Ride Route K: The K Route runs every 60 minutes from 6:30 AM to 11:02 PM Monday through Friday, 8:15 AM to 10:40 PM Saturday and 9:13 AM to 9:59 PM Sundays and holidays. The K Route serves Arundel Mills, Fort Meade and Odenton.

Central Maryland Regional Transit (CMRT) – Route M: The M Route, which began running in March 2011, is a very recent addition to the CMRT program. It runs 5:00 AM to 9:00 AM and 3:00 PM to 8:00 PM Monday through Friday and serves Piney Orchard and Odenton. Its services are timed to serve southbound MARC trains in the morning and northbound trains in the afternoon.

National Security Agency (NSA) Transportation Shuttle: NSA Transportation Services runs two fare-free in-house shuttles for Ft. Meade employees and residents. One route serves Odenton MARC Station, and the other route serves the Savage MARC Station. The Odenton shuttle currently runs Monday through Friday from 5:55 AM to 9:10 AM and 3:25 PM to 7:25 PM.

**C. Existing Boardings**

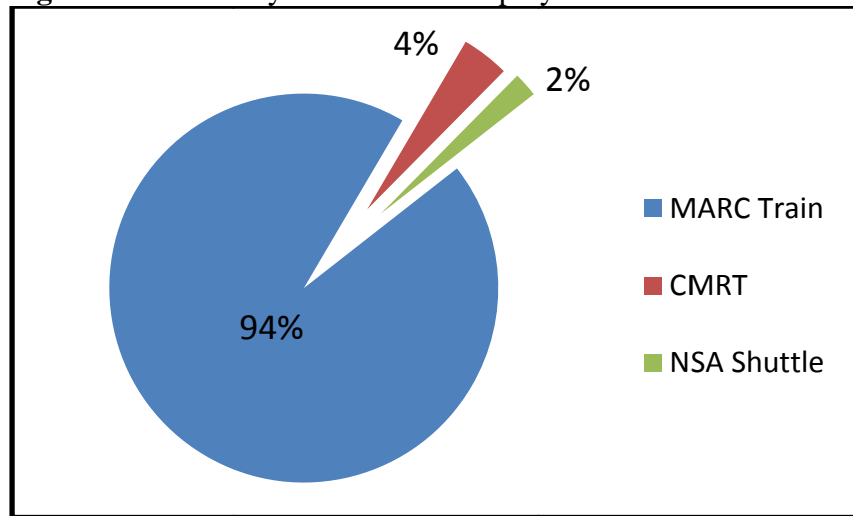
Current ridership data was obtained from each respective transit service provider (e.g. MTA, CMRT Connect-A-Ride, NSA) for each transit route serving Odenton Station. Daily and hourly boardings for 2012 were provided by MTA and indicate that 11.5% of station boardings occur after 10 AM, which is assumed to be after the peak parking accumulation of the day occurs. A summary of existing boardings is provided in **Table 2**, and existing ridership data is included in **Appendix A**. Boarding figures presented below represent unlinked trips counted as the number of passengers entering a transit vehicle regardless of whether they are making a transfer or not.

**Table 2:** Summary of Existing (2012) Boardings

TRANSIT SERVICE	ROUTE	BOARDINGS
NSA Transportation Shuttle	Odenton	50
CMRT	K	75
	M	25
MARC	Penn Line	2,560
<b>TOTAL DAILY STATION BOARDINGS (2012)</b>		<b>2,710</b>

Based on the 2012 daily boardings, **Figure 3** displays the transit mode distribution at Odenton Station. The majority of station users ride MARC train, 4% of station users ride the Connect-A-Ride K and M Routes, and another 2% of station patrons use the NSA Shuttle.

**Figure 3:** 2012 Daily Station Ridership by Transit Mode

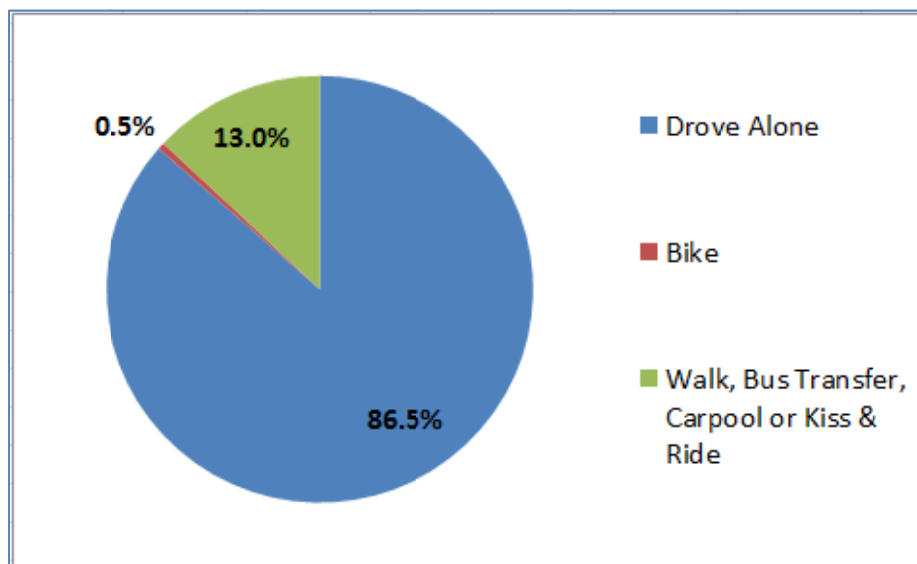


The existing access mode to MARC distribution was calculated based on ridership information and lot utilization, as follows:

- The 2,070 parking spaces at Odenton were observed to be 97% utilized. Assuming 1.025 passengers per vehicle<sup>1</sup>, 1,959 ( $2,070 \times 97\% \div 1.025 = 1,959$ ) station patrons drove to MARC.
- 1,959 patrons using vehicle access divided by 2,266 patrons accessing the MARC train in the AM peak period equals an approximate 86.5% drive to transit access mode share. (11.5% of boardings at this station do not occur during the AM peak period).
- 12 parked bicycles translates to a 0.5% bike to MARC mode share.
- The remaining 295 MARC riders boarding in the AM peak period are therefore assumed to arrive by walking, bus, carpool, or kiss & ride. However, no data is available at this time to further refine this assumption.

**Figure 4** displays this access mode to transit split based on the assumptions presented.

**Figure 4:** Existing Access Mode to MARC

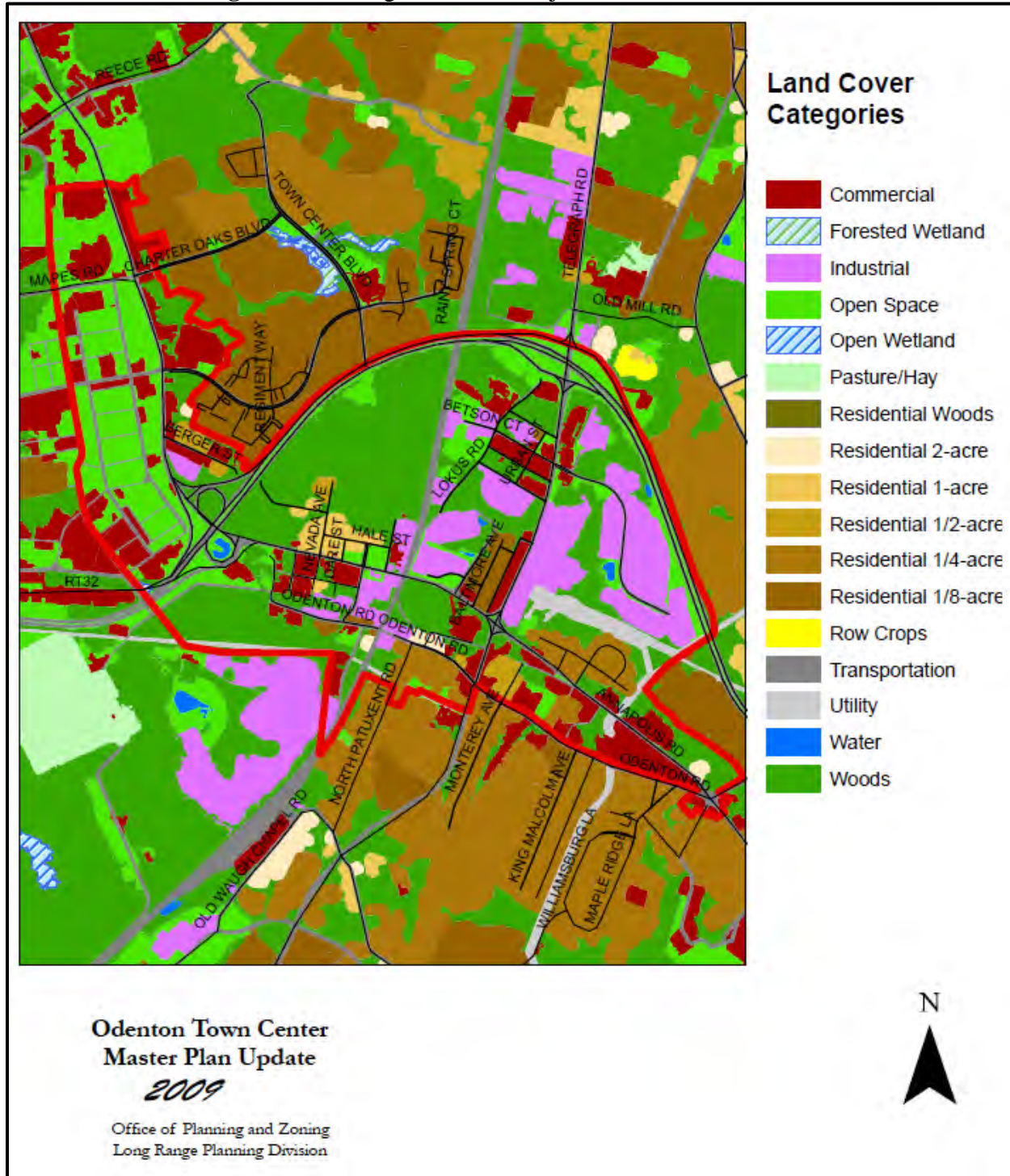


#### D. Existing Land Use

The existing land use surrounding the station includes light industrial, undeveloped land and residential. Land use west and north of the station is primarily light industrial. Further northwest and southwest of the station the land is undeveloped and is proposed to be developed by private entities. Land use southeast of the station is residential. **Figure 5** shows a map developed for the Odenton Town Center Master Plan that illustrates the existing land use in the area. **Figure 6** shows the location of publicly owned parcels that are being considered for joint public-private transit-oriented development.

<sup>1</sup> Vehicle occupancy rate determined by the National Capital Region Transportation Planning Board *Carpool Incentive Program Demonstration Project Study* (2009)

Figure 5. Existing Land Uses Adjacent to Odenton Station





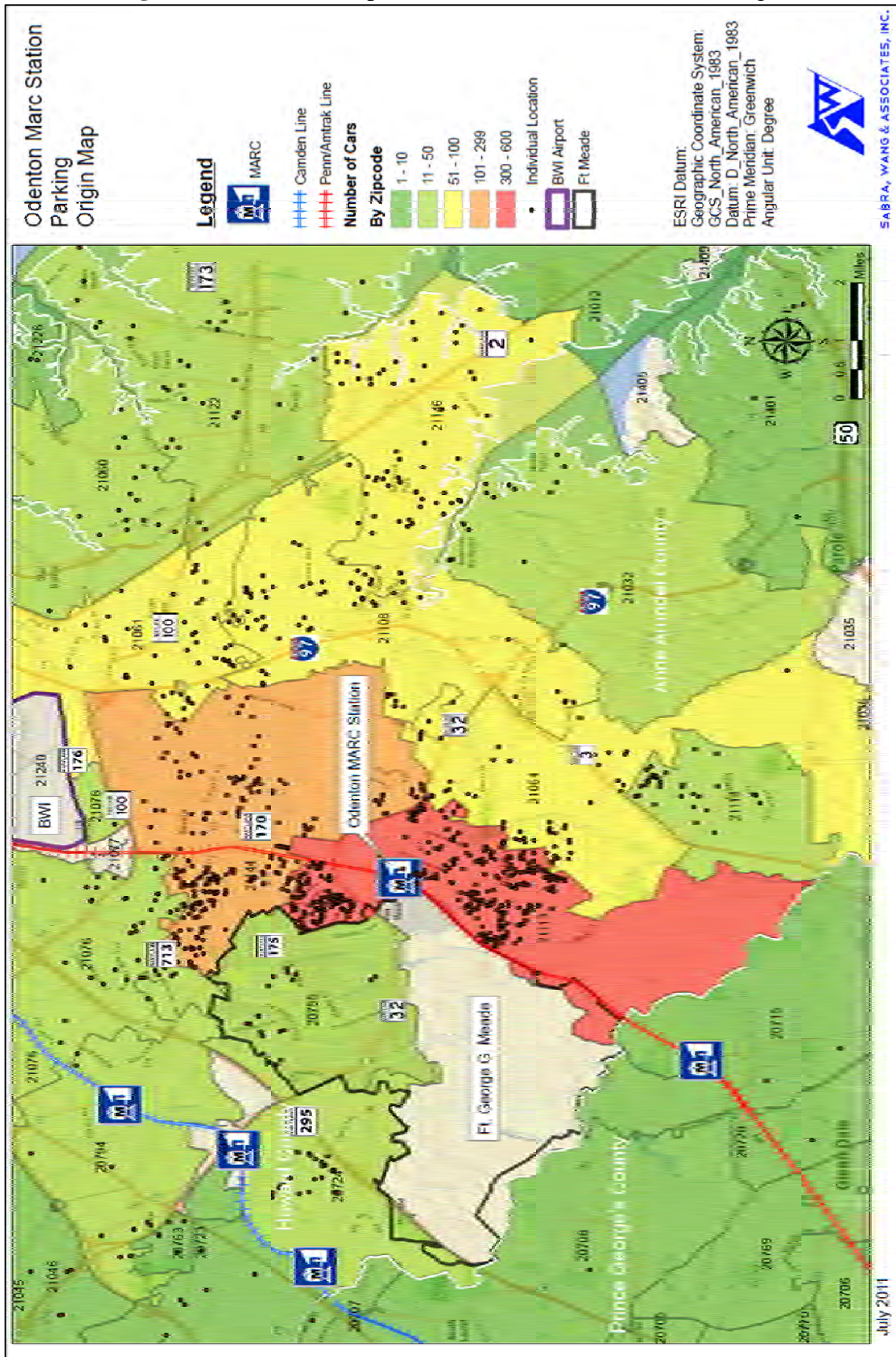
**Figure 6: Joint Development Parcels**

### III. PARKING SHED ANALYSIS

License plate data of parking station patrons was obtained and correlated to registered zip codes of origin to identify the Odenton Station parking shed. The data utilized was from a 2008 license plate survey provided by MTA, which was conducted on a typical weekday with schools in session. License plates were recorded for every vehicle parked in each station lot between 9:30 AM and 4:00 PM, the period of maximum lot occupancy. License plate information was sent to the Maryland Motor Vehicle Administration (MVA), where the corresponding registered zip codes were obtained. The zip codes were then plotted as a gradation map, displayed in **Figure 7**. License plate data was also displayed as a scatter plot (also **Figure 7**) to show vehicle origins by registered address.

The scatter plot/gradation map reveals that parking customer's origins are concentrated along the Penn Line corridor. A portion of commuters also originate from east of I-97 and from west of the Savage MARC Station along the Camden Line. The patrons from the west rely on the Penn Line for midday service as the Camden line does not provide midday service. Commuters closest to the station tend to come from the Odenton and Severn areas.

Figure 7: Gradation Map and Scatter Plot of Commuters' Origins



## IV. ALTERNATIVE COMMUTE ANALYSIS

Based on the origins of customers parking at the Odenton Station, potential alternate modes and routes were investigated. Customers currently parking at Odenton Station could instead go to an existing Park and Ride lot near their origin or along their route and either take a bus to Odenton Station or a commuter bus straight into downtown Washington, D.C. To determine possible alternative commutes, Park and Ride lots and commuter bus routes within the identified parking shed were researched. The selected alternative commutes were then compared, based on travel times and costs, with the existing commutes for customers parking at Odenton. This evaluation was used to determine the feasibility of alternative commutes for Odenton Station patrons.

### A. Alternative Park and Ride Lots

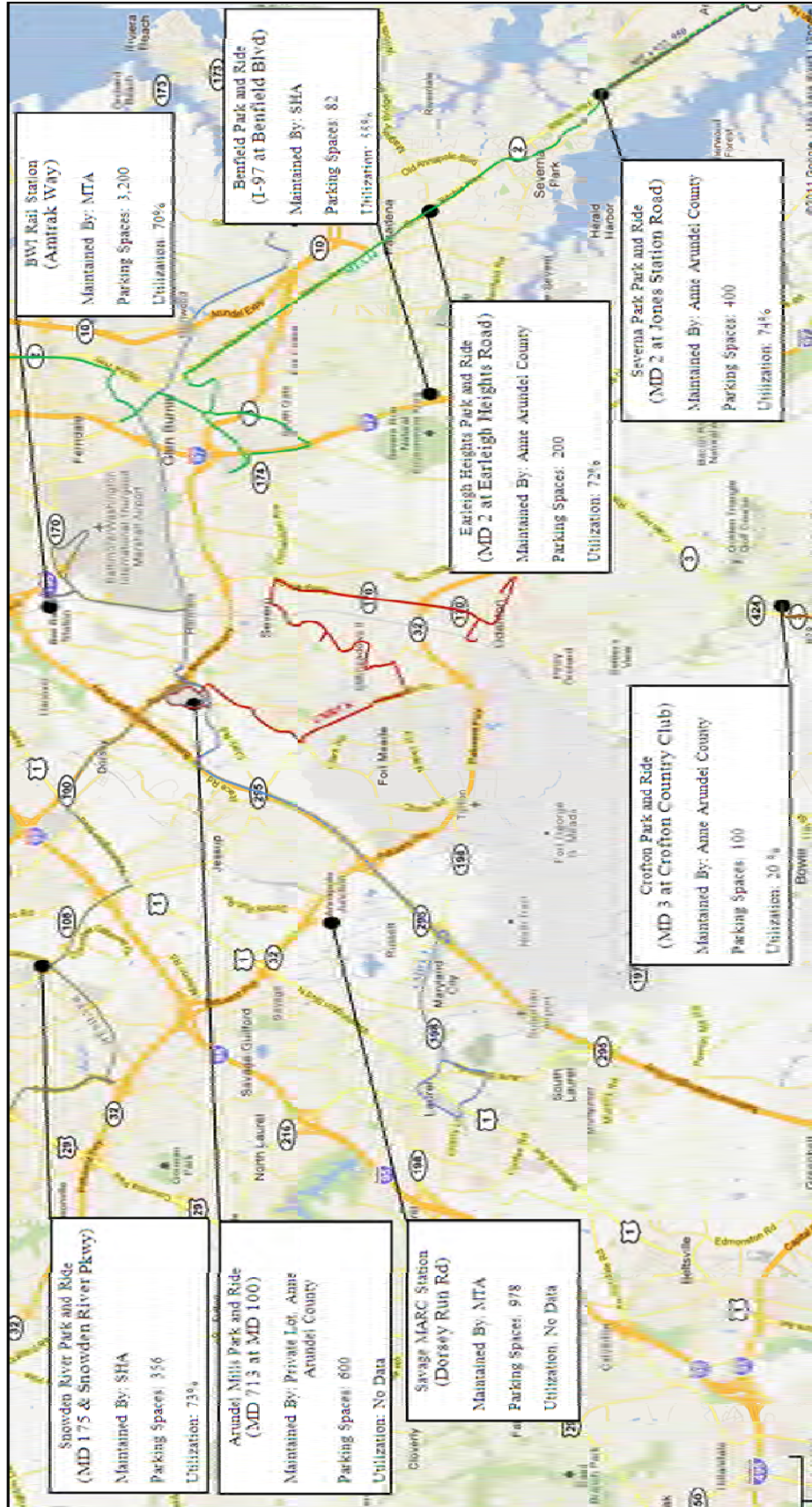
Each Park and Ride lot in the Odenton parking shed was researched to determine the number of available spaces and percent utilization on a typical weekday. **Table 3** presents the Park and Ride information, and **Figure 8** displays the Park and Ride locations and the bus routes that serve the Park and Ride lots.

**Table 3:** Summary of Existing Park and Ride Lots

Park and Ride Lots	Agency	Spaces	Connecting Buses	Utilization
Snowden River Park and Ride (MD 175 & Snowden River Pkwy.)	SHA	256	MTA: 310, 320, 995 Howard Transit: Gold, Silver	73%
Severna Park Park and Ride (MD 2 at Jones Station Road)	Anne Arundel County	400	MTA: 14, 950 Howard Transit: Silver	74%
Earleigh Heights Park and Ride (MD 2 at Earleigh Heights Rd)	Anne Arundel County	200	MTA: 14	72%
Crofton Park and Ride (Crofton Country Club)	Anne Arundel County	100	Metrobus: B29	20%
I-97 at Benfield Blvd	SHA	82	None	55%
Arundel Mills	Private Lot, Anne Arundel County Lease	600	MTA: 17 CMRT: J, K Howard Transit: Silver	No Data
BWI Rail Station	MTA	3,187	BWI Shuttle, MTA: 17	70%
Savage MARC Station	MTA	978	MTA: 202 Howard Transit: Silver	No Data

As shown in **Figure 7**, park and ride lots that might be used by drivers in the traffic shed are towards the perimeter of the defined shed. The Crofton Park and Ride lot is more central to the traffic shed, but there is no bus service from the lot to the Odenton MARC station. However, there is bus service to the Bowie Station, also on the Penn Line.

**Figure 8: Park and Ride Locations and Bus Routes**



## B. Pricing Analysis

A pricing analysis was performed to compare current Odenton parking customer commutes with alternative commutes from seven of the eight Park and Ride facilities. The Benfield Park and Ride was not evaluated as it has no connecting bus routes for an alternative commute. The analysis assumes a given Park and Ride facility as the trip starting point and the closest stop to Union Station as the destination.

- The Odenton parking customer travel time is calculated by summing the drive time from a given Park and Ride lot to Odenton Station (estimated based on Google Maps directions) plus the commuter rail travel time from Odenton Station to Union Station. The Odenton parking customer cost is the commuter rail fare plus the cost of vehicle use based on federally set standards of \$0.55 per mile.
- The alternative commute is calculated by summing the bus travel time plus an assumed ten minute bus-to-rail transfer time plus rail travel time to Union Station. Alternative commutes from Snowden and Earleigh Heights require bus-to-bus transfers, which are accounted for in the posted schedules and result in a lengthy alternative commute. It should also be noted that not all rail travel times are from Odenton Station; Severna Park and Crofton Park and Rides have buses that connect to BWI Rail Station and New Carrollton Station, respectively.
- Lastly, the drive directly to Union Station commute alternative was evaluated using Google Maps trip planner, which accounts for typical levels of congestion in estimating drive times. The cost for this trip is based a typical daily parking rate for a downtown garage plus the cost of vehicle use based on federally set standards of \$0.55 per mile.

**Table 4** shows the results of the analysis.

Results of the analysis indicate that for all park and ride locations, the commute to Union Station is cheaper by drive-to-rail than by bus (alternative commute), except for the MTA 950 bus commute from the Severna Park Park and Ride. From the Snowden and Earleigh Heights Park and Rides, travel times are significantly longer by bus than by auto due to the necessary bus transfers. From the Severna Park and Arundel Mills Park and Rides, travel times are slightly longer by bus than by auto but bus travel times are not unreasonable. In most cases, driving directly to Union Station is approximately five to ten minutes faster than driving to Odenton Station and taking commuter rail. However, the cost of fuel and downtown parking make this trip more expensive than a drive to rail trip. When starting from the BWI rail station, it is faster to take rail than drive directly to Union Station.

**Table 4: Alternate Commute Analysis**

Park & Ride Lot	Drive directly to Union Station <sup>1</sup>	Cost of Driving to Union Station	Driving Travel Time to Odenton	Cost of Driving to Odenton	Rail Station Parking Fare	Park & Ride Fare	Bus Travel Time	Buses Taken	Bus Fare	Rail Travel Time	Rail Fare	Total Drive & Rail Travel Time	Total Drive & Rail Fare	Total Bus/Bus & Rail Travel Time	Total Bus/Bus & Rail Fare
Snowden Park and Ride (MD 175 at Snowden River Pkwy)	47 min	\$16.89	20 min	\$5.34	Free	Free	101 min	HT Silver and CMRT K	\$3.50	32 min	\$5.00	52 min	\$10.34	147 min <sup>5</sup>	\$8.50
Earleigh Heights Park and Ride (MD 2 at Earleigh Hights.)	65 min	\$20.85	23 min	\$5.72	Free	Free	154 min	MTA 14, CMRT J and CMRT K	\$3.60	32 min	\$5.00	55 min	\$10.72	196 min <sup>5</sup>	\$8.60
Severna Park Park and Ride (MD 2 at Jones Sta. Rd)	50 min	\$19.20	28 min	\$6.99	Free (Free) <sup>2</sup>	Free	45 min <sup>2</sup>	HT Silver <sup>2</sup>	\$2.00	32 min (39 min) <sup>2</sup>	\$5.00 (\$6.00) <sup>2</sup>	60 min	\$11.99	94 min <sup>5</sup>	\$8.00
Crofton Park and Ride	42 min	\$12.32	28 min	\$6.99	Free	Free	101 min	MTA 950	\$4.25	32 min	\$5.00	60 min	\$11.99	101 min	\$4.25
Arundel Mills	46 min	\$14.85	15 min	\$4.13	Free	Free	36 min	CMRT K	\$1.50	32 min	\$5.00	47 min	\$9.13	78 min <sup>5</sup>	\$6.50
BWI Rail Station	51 min	\$17.44	N/A	N/A	Free <sup>4</sup>	N/A	N/A	N/A	N/A	39 min	\$6.00	39 min + Drive Time	\$6.00	N/A	N/A
Savage MARC Station	40 min	\$12.87	N/A	N/A	Free	N/A	N/A	N/A	N/A	47 min	\$5.00	47 min + Drive Time	\$5.00	N/A	N/A

1. Typical cost of parking per day assumed to be \$15 - \$20
2. The alternative bus route brings commuters to BWI Rail Station.
3. The alternative bus route brings commuters to New Carrollton Station.
4. It is assumed that daily commuters will pay the \$20 deposit for the free parking pass program at the BWI Station, rather than the alternative, paying \$9 per day.
5. Ten minutes were added to account for the transfer time between bus and rail.

## V. FUTURE CONDITIONS

### A. Previous Parking Studies

In 2008 RKK completed a study (*Odenton MARC Station Area Planning*) for the Maryland Department of Transportation detailing the benefits of and the need for Transit Oriented Development (TOD) projects in Odenton. The RKK development team's proposal called for two parking garages for the MARC commuters, Block D and Block H, with a total of 3,500 parking spaces. In 2011, a joint development proposal for Lot C proposed an 800-space commuter garage. Both concepts called for between 500 and 1,500 spaces of off-street garage parking for commercial and residential uses. **Figure 9** shows previously proposed parking garages and potential connecting roads to each garage.

**Figure 9:** Previously Proposed Garages



## **B. Local Area Network Improvements and TDM**

As part of developing commuter parking management strategies, the June 2010 *Transportation Study for the Odenton Town Center Master Plan* and the June 2010 *BMC Access to Rail Project* was reviewed to identify compatible elements which improve area facilities to reduce the drive to transit access mode share. The following summary highlights key elements of each report.

### Proposed Pedestrian Improvements:

- Accommodate pedestrians at all new traffic signals through phasing (e.g., leading pedestrian intervals), timing (e.g., MUTCD compliant walk and flashing don't walk), countdown and audible pedestrian signals, crosswalks and ADA ramps.
- Provide wider sidewalks and traffic calming devices such as chokers where practicable.
- Install new sidewalk on sections of N. Patuxent Road, Odenton Road, Skyline Avenue and Telegraph Road.
- Install missing pedestrian crossing signs at Odenton Station, and install directional signing for the station on Telegraph Road and Town Center Boulevard.
- Install curb ramps at the intersection of Telegraph Road and Annapolis Road and at the intersection of Town Center Boulevard and the Odenton Station entrance.
- Install crosswalks in the Odenton Station Parking Lot and across Telegraph Road. Also install missing crosswalks at the intersections of Piney Orchard Parkway at Odenton Road and Town Center Boulevard at Annapolis Road.

### Proposed Bicycle Improvements:

- Install bicycle lanes (e.g., share-the-road signing and marking, wide curb lanes), a bicycle depot at the MARC Station and bicycle wayfinding signing on the grid streets to connect the trail network to destinations within the Town Center.
- Sections of the following roadways have been identified for shared bike lanes: MD 170, MD 174, MD 175, Morgan Road and Odenton Road.
- Sections of the following roadways have been identified for bike shoulder installation: Burns Crossing Road, Gambrills Road, MD 170, MD 174, MD 175, MD 32, Sappington Station Road and Waugh Chapel Road.
- Build a shared-use trail along MD 175.

### Proposed Transit Access:

- Provide new or upgraded amenities (e.g., shelters, benches, real time transit information) for bus transit users at existing and proposed bus stops.
- Enhance existing and provide new feeder bus routes such as K, M, X and Y routes.



### Proposed Roadway and Intersection Improvements:

- Provide a new crossing of the AMTRAK/Penn Line tracks to improving overall traffic flow and levels of service in the study area. The southern bridge crossing P2 alignment is recommended.
- To regulate traffic flow within the Town Center grid streets and provide efficient and optimal mobility, restrict flow to one-way: westbound on Hale between Town Center and Nevada; eastbound on Duckens Street between Nevada and Morgan; and, southbound on Baldwin Road between Hale Street and Duckens Street. In addition, restrict peak hour curbside parking at key intersections and prohibit all left-turns at MD 175/Town Center and MD 175/Baldwin, except at Nevada Avenue.
- Install new traffic signals at the following intersections: MD 175 at Nevada Avenue (the signal should incorporate preemption for the existing firehouse), Hale Street at Nevada Avenue, Hale Street at Town Center Blvd, Duckens Street at Nevada Avenue, Duckens Street at Morgan Road, Duckens Street at Baldwin Road, P2 at Morgan Road extended, P2 at Piney Orchard Road and MD 170 at Lamonte Ave.
- To strengthen the existing grid and enhance north-south access within Odenton Town Center, the following geometric improvements are suggested:
  - upgrade Nevada Avenue to a four-lane divided roadway,
  - extend Hale Street west to the planned alignment of Odenton Avenue,
  - extend Baldwin Road north to Berger Street,
  - extend Berger Street to Town Center Boulevard (Lokus Road),
  - extend Dare Street to Berger Street,
  - upgrade MD 170 to a four-lane divided roadway north from MD 175 to Crossroads Drive,
  - provide for a potential new point of access to Fort Meade at the intersection of the P2 alignment with Morgan Road,
  - construct an access roadway from Winmeyer Avenue to the planned commuter parking structure, and
  - provide a 150-ft long right-turn lane for the north-, south- and east-bound right-turn movements at Piney Orchard Parkway at Odenton Road, with overlap phases for the north- and south-bound right-turn movements.

### **C. Future Transit Usage Projections**

Future MARC ridership projections were obtained through the Maryland Transit Administration (MTA); it is estimated that MARC ridership will double by the year 2030 – based on the MARC Investment Study forecasts. It should, however, be qualified that transit ridership forecasts are challenging due to the inherent difficulty in predicting economic changes, availability of resources, etc. Future NSA and Connect-A-Ride ridership was calculated using predicted passenger boardings per hour obtained from the November 2009 *Fort Meade/Base Realignment and Closure (BRAC) Transit and Ridesharing Planning Study*. This study also provided

predicted passenger boardings per hour for the recently implemented M Route and future X, Y and Unnamed (Severna Park) routes proposed as part of the initial BRAC network. For each route, future boardings at Odenton were calculated by multiplying the number of predicted passenger boardings per hour by an estimated fifteen service hours, then dividing by the number of locations served on the route.

Based on the BRAC study, the existing NSA Shuttle is to be converted to a high-frequency shuttle between Odenton, Fort Meade and the Extended Use Lease (EUL) parcels. The existing Connect-A-Ride K route is to be restructured into two routes, one of which will serve Odenton. This remaining route will only run between Odenton and Arundel Mills Mall, which explains the predicted decrease in future K Route boardings.

Proposed routes include: the X Route, to serve North Crofton, Odenton, EUL and Fort Meade; the Y Route, to serve Russett Green, Odenton, EUL and Fort Meade; and the unnamed route, to serve Arnold/Severna Park and Odenton. A summary of future 2030 boardings and alightings is provided in **Table 5**. Detailed transit usage projections are included in **Appendix E**.

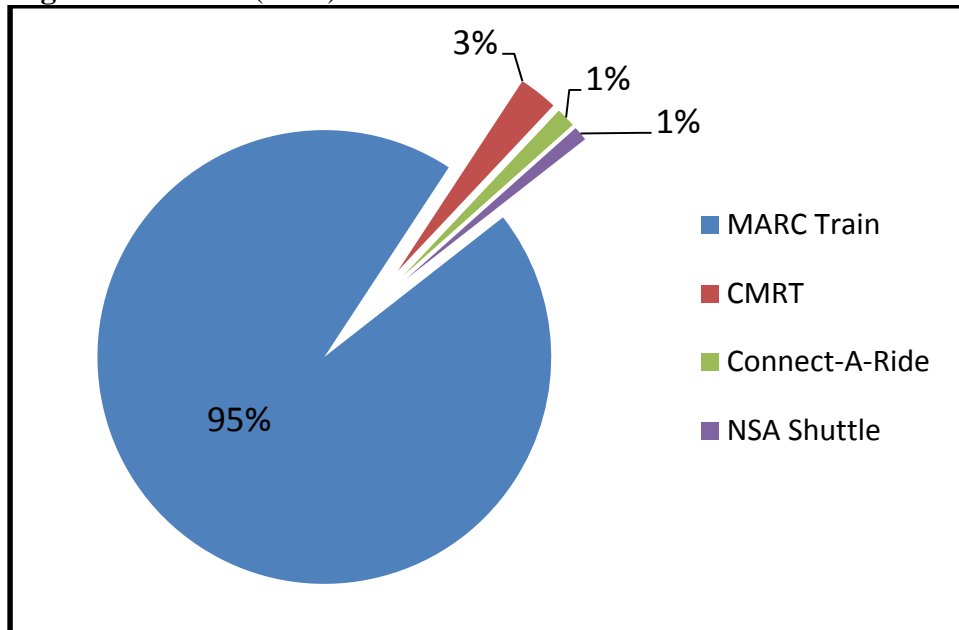
**Table 5: Summary of Future (2030) Boardings**

TRANSIT SERVICE	ROUTE	BOARDINGS
NSA Transportation Shuttle	Odenton	50
Central Maryland Regional Transit (CMRT)	Restructured K	68
	M	26
	X	34
	Y	30
	Unnamed (Severna Park)	45
MARC	Penn Line	4,900 <sup>1</sup>
<b>TOTAL DAILY STATION BOARDINGS (2030)</b>		<b>5,154</b>

1. Boarding projections based on MARC Investment Study forecasts

Based on this 2030 projected daily ridership data, **Figure 10** displays the future transit mode distribution at Odenton Station. The majority of station users (95%) will continue to take the MARC train. The Connect-A-Ride and NSA services maintain the same percentage of station ridership as they currently do, and the new CMRT routes are expected to account for 1% of station ridership.

**Figure 10:** Future (2030) Transit Mode Distribution



Assuming a similar proportion of drive to commuter rail access mode as existing conditions, the future station parking demand is calculated as follows:

Multiply the projected 4,900 future daily commuter rail boardings by the 88.5% of boardings occurring during the AM peak to get a projected 4,336 future AM peak commuter rail boardings. 4,336 times the previously calculated 86.5% drive to MARC access mode share yields an ***estimated demand of 3,750 peak parked vehicles for MARC patrons***. This demand would exceed the existing parking supply by 1,680 spaces.

## VI. DEVELOPMENT PARKING

The previous section addressed future parking needs for commuters only, but the proposed joint development will also require a parking supply. The following sections break down proposed land uses, projected development parking demand, potential shared parking opportunities with commuter spaces and potential reductions of development parking supply due to the transit-oriented development nature to determine the total number of spaces needed to accommodate both future commuters and development patrons. Balancing parking demand and supply will have an important influence on the long-term success of Odenton Town Center as a walkable, transit-oriented development. If parking supply greatly surpasses demand, it may discourage people from using other modes of travel and limit the potential for a more balanced mode share. However if there is insufficient parking, it may deter potential residents, employers and customers from living and working in the development.

### A. Development Program

As part of the Odenton joint development program, up to 100,000 square feet of office space, 250,000 square feet of retail, 1,750 residential dwelling units, and 120 hotel rooms could be constructed on state and county owned parcels.

### B. Parking Projections

Based on future land use and assuming full build-out, unadjusted future development parking demand was determined by the Anne Arundel County Zoning Requirements as well as the Institute of Transportation Engineers (ITE) 85<sup>th</sup>-Percentile Demand. The future parking demand is broken down by land use in **Table 6**.

**Table 6: Parking Demand by Land Use**

Land Use	Development Intensity	Units	AACO Zoning Requirement	ITE Parking 50th (85th) Percentile Demand	AACO Required Spaces	ITE Required Spaces	Peak Period
Commuter					3,750		weekday - daytime
<b>Development</b>							
Office	100	1,000 SF	5 Spaces / 1 K SF	2.84 (3.44) Spaces / 1 K SF	500	344	weekday - daytime
Retail	250	1,000 SF	5.56 Spaces / 1 K SF	2.65 (3.35) Spaces / 1 K SF	1,389	838	weekday - evening
Residential <sup>1</sup>	1750	DUs	1.98 Spaces / DU <sup>1</sup>	1.20 (1.46) Spaces / DU	3,465	2,555	weekday - evening
Hotel	120	Rooms	1 Space / Room	0.91 (1.14) Spaces / Room	120	137	weekday - evening
<b>Subtotal Raw Parking</b>					<b>9,224</b>	<b>7,623</b>	

1. Assumed 30% of dwellings are one-bedroom apartments, 30% are two-bedroom apartments, 15% are three-bedroom apartments and 15% are townhomes to compute a weighted average requirement.

As shown in the table, the two codes yield slightly different estimates. Based on the Anne Arundel County Zoning Requirements, 9,224 parking spaces are necessary to accommodate both commuters and new development users. This is approximately 1,500 spaces more than the ITE 85<sup>th</sup>-Percentile Demand estimate which predicts only 7,623 parking spaces would be needed. For the purpose of a conservative analysis, the higher of the two estimates will be assumed for each land use.

Another means of maximizing the efficiency and use of parking facilities is to encourage the joint use, or sharing, of parking facilities due to the variation in peak parking loading times for different land uses. **Table 7** breaks down parking occupancy rates for each type of development during four different parking periods. Based on these rates, the overall number of required spaces can be reduced to accommodate the only the highest combined peak parking load.

**Table 7:** Shared Parking Adjustments

Parking Use	Number of Required Spaces <sup>1</sup>	Parking Period	Parking Occupancy Rate	Adjusted Number of Spaces
Commuter	3,750	Weekday (6AM to 6PM)	100%	3,750
Office	500	Weekday (6AM to 6PM)	100%	500
Retail	1,389	Weekday (6AM to 6PM)	60%	833
Residential	3,465	Weekday (6AM to 6PM)	50%	1,733
Hotel	137	Weekday (6AM to 6PM)	50%	69
Commuter	3,750	Weekday Evening (6PM to 12AM)	10%	375
Office	500	Weekday Evening (6PM to 12AM)	10%	50
Retail	1,389	Weekday Evening (6PM to 12AM)	90%	1,250
Residential	3,465	Weekday Evening (6PM to 12AM)	100%	3,465
Hotel	137	Weekday Evening (6PM to 12AM)	100%	137
Commuter	3,750	Weekend Day (6AM to 6PM)	10%	375
Office	500	Weekend Day (6AM to 6PM)	10%	50
Retail	1,389	Weekend Day (6AM to 6PM)	100%	1,389
Residential	3,465	Weekend Day (6AM to 6PM)	100%	3,465
Hotel	137	Weekend Day (6AM to 6PM)	75%	103
Commuter	3,750	Weekend Evening (6PM to 12 AM)	10%	375
Office	500	Weekend Evening (6PM to 12 AM)	5%	25
Retail	1,389	Weekend Evening (6PM to 12 AM)	70%	972
Residential	3,465	Weekend Evening (6PM to 12 AM)	100%	3,465
Hotel	137	Weekend Evening (6PM to 12 AM)	100%	137
<b>Total New Weekday Spaces</b>				<b>6,884</b>
<b>Total New Weekday Evening Spaces</b>				<b>5,277</b>
<b>Total New Weekend Day Spaces</b>				<b>5,382</b>
<b>Total New Weekend Evening Spaces</b>				<b>4,974</b>

1. The greater of the AACO Zoning Requirement and the ITE 85th-Percentile Demand.

Based on the shared parking adjustments, the highest demand of 6,884 parking spaces occurs during the weekday period between 6:00 AM and 6:00 PM. Therefore, this will be the controlling peak demand. The weekday evening, weekend day and weekend evening periods demand 5,277 spaces, 5,382 spaces and 4,974 spaces, respectively.

Another factor must be accounted for before the final parking projection is determined: the effects of transit oriented development. Since the development is meant to encourage alternative modes of travel, parking requirements may be reduced for certain land uses. TOD parking ratios from the Caltrans Special Report *Parking and TOD: Challenges and Opportunities* were used to

estimate an average TOD parking ratio<sup>2</sup>. The percent reduction was then calculated by comparing the AACO Zoning Requirements to the average TOD parking ratios. Since it is difficult to predict how effective a TOD will be, these calculated percentages were then reduced proportionally by 25% for a more conservative analysis. TOD parking reduction calculations are shown in **Table 8**.

**Table 8:** Transit Oriented Development Reductions

Development	AACO Zoning Requirement	TOD Parking Ratio Range	Average TOD Parking Ratio	Calculated Reduction	Applied Reduction
Office	5 Spaces / 1 K SF	2-3 Spaces / 1 K SF	2.5 Spaces / 1 K SF	50%	38%
Retail	5.56 Spaces / 1 K SF	0.5-3.33 Spaces / 1 K SF	1.92 Spaces / 1 K SF	65%	49%
Residential <sup>1</sup>	1.98 Spaces / DU <sup>1</sup>	0.5-2.25 Spaces / DU	1.38 Spaces / DU	30%	23%
Hotel	1 Space / Room	0.5-1.5 Spaces / Room	1 Space / Room	0%	0%

1. Assumed 30% of dwellings are one-bedroom apartments, 30% are two-bedroom apartments, 15% are three-bedroom apartments and 15% are townhomes to compute a weighted average requirement.

Using these reductions and the weekday shared parking requirements, 5,737 total parking spaces are required for commuters and development uses. **Table 9** summarizes these final projections.

**Table 9:** Summary of Parking Projections

Parking Use	Weekday Shared Parking Requirement	TOD Reduction	Final Projection
Commuter	3,750	N/A	3,750
Office	500	38%	310
Retail	833	49%	424
Residential	1,733	23%	1,334
Hotel	69	0%	69
<b>Total Future Parking Projection</b>			<b>5,887</b>

Of the 3,750 commuter spaces, it is recommended that 5% (180 spaces) be designated carpool spaces and 6 spaces be designated car share (e.g. Zipcar or Car2Go) spaces. Since six bus routes will access Odenton Station in the future scenario, six bus bays will likely be needed. The number of Kiss & Ride spaces (including taxi spaces) needed would be determined when there is more data available on mode of access for drop-off trips.

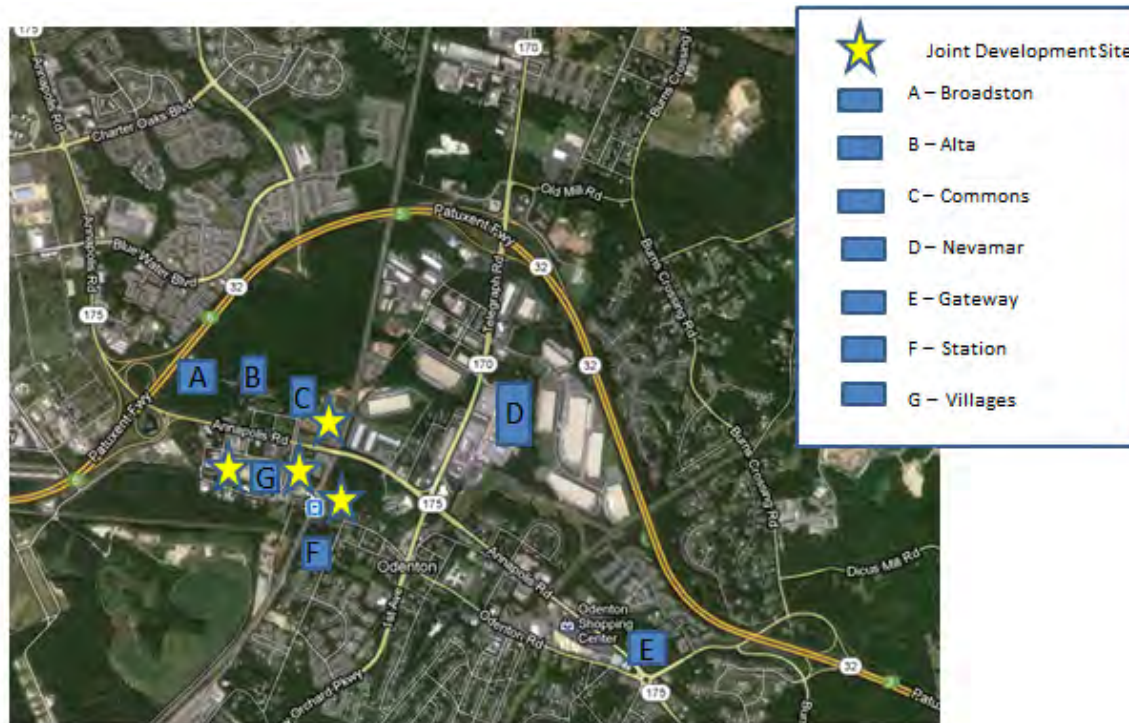
## VII. PARKING CONFIGURATIONS

This section discusses parking configurations, specifically the location, size, footprint and access connections of potential new parking facilities. It should be noted that this assessment is self-contained within the publicly owned development parcels. However, as development occurs, both within the joint parcels and within the greater Odenton area, there may be an opportunity to consider arrangements for additional shared and/or exclusive parking between third party developments and the joint developments. There are over 200 additional developable acres in the

<sup>2</sup> *Statewide Transit-Oriented, Development (TOD) Study: Factors for Success in California. Special Report - Parking and TOD: Challenges and Opportunities, February 2002*

Odenton Town Center area, with up to 2,000 dwelling units and several million square feet of office/retail space, such as Odenton Town Square, the Village at Odenton Station and Town Center Commons proposed. A location map of the third party development sites is shown in **Figure 11** below.

**Figure 11.** Odenton Town Center Third Party Development Sites



Previous development plans have proposed a fully de-centralized and distributed parking configuration with surface and/or structured parking facilities at a sub-parcel level. While a fully centralized parking configuration of a few ‘supergarages’ could optimize development footprints, the impact of peak hour traffic flow in and out of a few large centralized garages would overwhelm traffic capacity at key intersections along MD 175 and the garage access roadways, as well as reduce the desired Town Center urban design by reducing levels of foot traffic. Therefore a moderately consolidated parking configuration is presented herein, which still allows for a convenient “park once” approach for residents, workers and patrons of the joint development sites and MARC commuters.

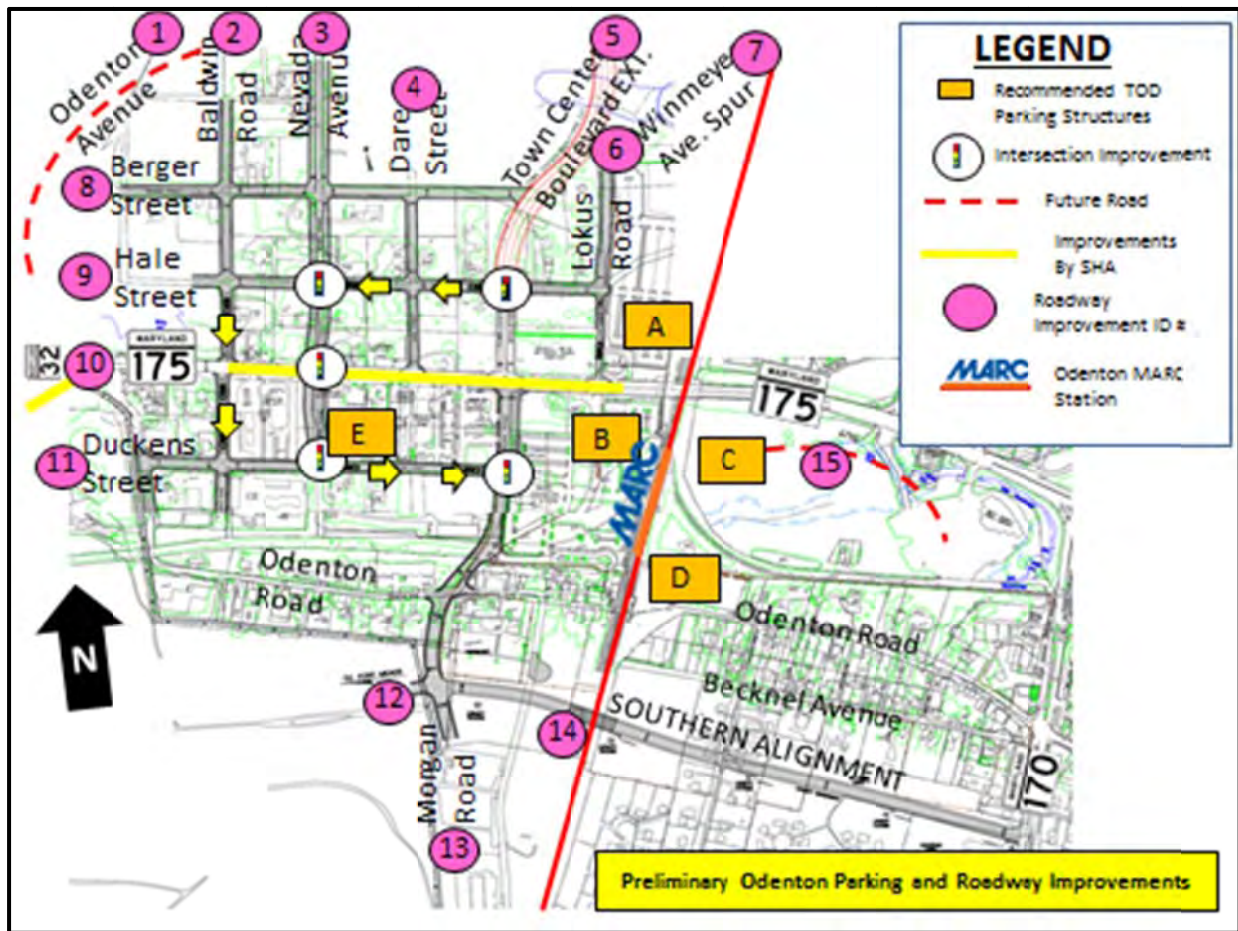
The consolidated parking configuration includes five proposed garages which provide a total of 5,930 spaces. The proposed garage locations, along with previously recommended roadway and bridge improvements are shown in **Figure 12**. A summary of each garage footprint, number of levels, and number of spaces is presented in **Table 10**.

**Table 10.** Proposed Garage Characteristics.

Garage	Footprint	Levels	Spaces
A	344' X 258'	5	1480
B	344' X 258'	5	1480
C	275' X 275'	4	800
D	344' X 225'	5	1280
E	344' X 258'	3	890



Figure 12: Recommended Odenton Joint Development Parking Garage Locations



### VIII. COST ESTIMATES AND PHASING

**Table 11** details the preliminary cost estimates for each of the improvements identified in Figure 12. These estimates are based on cost per mile averages developed by the Maryland State Highway Administration and national construction averages collected by RSMeans. The total cost for the five recommended parking facilities is estimated to be just under \$119M. The total cost for all roadway improvements is estimated to be around \$100M.

Although the proposed garage footprints are small, there will be some phasing needed to maintain 2,000 spaces available for commuters while the surface lots are closed for construction of the new parking garages and new buildings. To minimize the impact of construction activities on commuter parking, it is recommended to construct garages C (access via Winmeyer Ave) and E (located on the County's DPW maintenance lot) first prior to temporarily or permanently closing any surface spaces in Lots A, B or C. Further environmental analysis will be required to properly site garage C, and further coordination with the County including consideration of relocation and remediation costs will be required to properly site garage E.

**Table 11.** Recommended Improvements and Preliminary Cost Estimates

<b>Odenton Town Center Preliminary Cost Estimates</b>				
<b>Map Key</b>	<b>Description</b>	<b>Miles</b>	<b>Spaces</b>	<b>Total Cost</b>
<b>Garages<sup>1</sup></b>				
A	5 levels x 296 spaces per floor = 1,480 spaces; 344 x 258 = 88,752 sf		1480	\$ 29,600,000
B	5 levels x 296 spaces per floor = 1,480 spaces; 344 x 258 = 88,752 sf		1480	\$ 29,600,000
C	4 levels x 200 spaces per floor = 800 spaces; 275 x 275 = 75,625 sf		800	\$ 16,000,000
D	5 levels x 256 spaces per floor = 1,280 spaces; 344 x 225 = 77,400 sf		1280	\$ 25,600,000
E	3 levels x 296 spaces per floor = 890 spaces; 344 x 258 = 88,752 sf		890	\$ 17,800,000
<b>TOTAL GARAGES</b>				<b>\$ 118,600,000</b>
<b>Roadway Projects<sup>2,3</sup></b>				
1	Odenton Avenue	0.75		\$ 11,550,000
2	Baldwin Road	0.33		\$ 5,082,000
3	Nevada Avenue	0.34		\$ 5,236,000
4	Dare Street	0.16		\$ 2,464,000
5	Town Center Boulevard Extension	0.33		\$ 15,246,000
6	Lokus Road	0.11		\$ 1,694,000
7	Winmeyer Avenue Spur	0.1		\$ 1,540,000
8	Berger Street	0.25		\$ 3,850,000
9	Hale Street	0.3		\$ 4,620,000
10	MD 175	0.3		\$ 10,080,000
11	Duckens Street	0.3		\$ 4,620,000
12	AMTRAK/MARC crossing (excluding bridge)	0.52		\$ 24,024,000
13	Morgan Road	0.25		\$ 3,850,000
14	AMTRAK/MARC crossing (bridge)	0.09		\$ 8,568,000
15	Library Path	0.17		\$ 2,618,000
<b>TOTAL ROADWAY PROJECTS</b>				<b>\$ 105,042,000</b>

<sup>1</sup>. Garage construction estimates based on RSMeans national average of \$46.49/sf or \$20K/space.

<sup>2</sup>. Roadway project cost estimates based on SHA average of \$5.5M per lane mile for new construction, \$6M per lane mile for reconstruction, and \$180 per square foot for bridges plus a recommended 40% contingency.

<sup>3</sup>. Costs do not include acquisition of additional ROW.

Implementing a fee for parking should be considered in order to recover some or all of the construction costs for the structured parking facilities. Assuming that retail and residential parking would remain free to attract development, the cost would have to be assumed by

commuters. The cost for monthly parking at area rail stations varies from \$45 to \$80. Assuming the full 3,600 spaces forecasted for commuters are occupied on a regular basis, the investment in garages would be recovered in an estimated 34 to 62 years. These calculations are detailed in **Table 12**.

**Table 12.** Revenue Projections and Cost Recovery Time for Parking Facilities

Monthly Charge	Annual Revenue	Cost Recovery Time
\$ 80.00 (Same as New Carrollton)	\$ 3,456,000.00	34 Years
\$ 55.00 (Same as Greenbelt)	\$ 2,376,000.00	49 Years
\$ 45.00 (Same as College Park)	\$ 1,944,000.00	62 Years

## IX. FINDINGS AND RECOMMENDATIONS

- There are currently three designated surface parking lots at the Odenton Station providing total of 2,070 spaces. There is no charge to park in the lots, which are open during operating hours of passenger rail service.
- Lots A and B are both 100% utilized. Lot C was observed to be 92% utilized.
- There are total of 41 bicycle spaces and 5 bike lockers. Despite the rainy conditions on the day of the observation, the bike racks were 30% utilized.
- Odenton Station is currently served by the MARC Penn Line, CMRT routes K and M and the NSA Shuttle. Ridership data obtained from each transit service provider indicates that there were 2,710 total daily station boardings in 2012. Detailed hourly boarding data shows that the 88.5% of the rail boardings (2,266) occur by 10:00 AM on a typical weekday.
- The calculated existing access mode to MARC shows that 86.5% access MARC by driving alone, 0.5% access MARC by bike and the remaining 13% access MARC either by carpool, walking, bus transfer or kiss-and-ride.
- A license plate survey indicates that patrons' origins are concentrated along the Penn Line corridor. A portion of commuters originate from east of I-97 and from west of the Savage MARC Station along the Camden Line. Commuters closest to the station tend to come from the Odenton and Severn areas.
- Results of the alternative commute analysis indicate that for the majority of the defined parking shed, there are no strong advantages in either travel time or travel cost savings for Odenton station patrons to park and ride at an upstream or downstream satellite parking lot or utilize connecting or commuter bus services.

- Future year 2030 station transit services are expected to include the MARC Penn Line, CMRT routes K, M, X, Y and Severna Park and the NSA Shuttle. Approximately 4,900 total daily station boardings are predicted for the year 2030.
- Assuming a similar proportion of drive to commuter rail access mode as existing conditions, the year 2030 peak MARC parking demand is estimated to be 3,750 spaces.
- As part of the Odenton joint development program, up to 100,000 square feet of office space, 250,000 square feet of retail, 1,750 residential dwelling units, and 120 hotel rooms could be developed on state and county owned parcels.
- After calculating parking demand by land use, adjusting for potential shared parking and applying conservative transit-oriented development parking supply ratio reductions, the projected total future parking demand is 5,887 spaces.
- The proposed consolidated parking configuration includes five garages which would provide a total of 5,930 spaces, allowing enough spaces for forecasted parking assuming maximum density joint development buildout and peak ridership attainment.

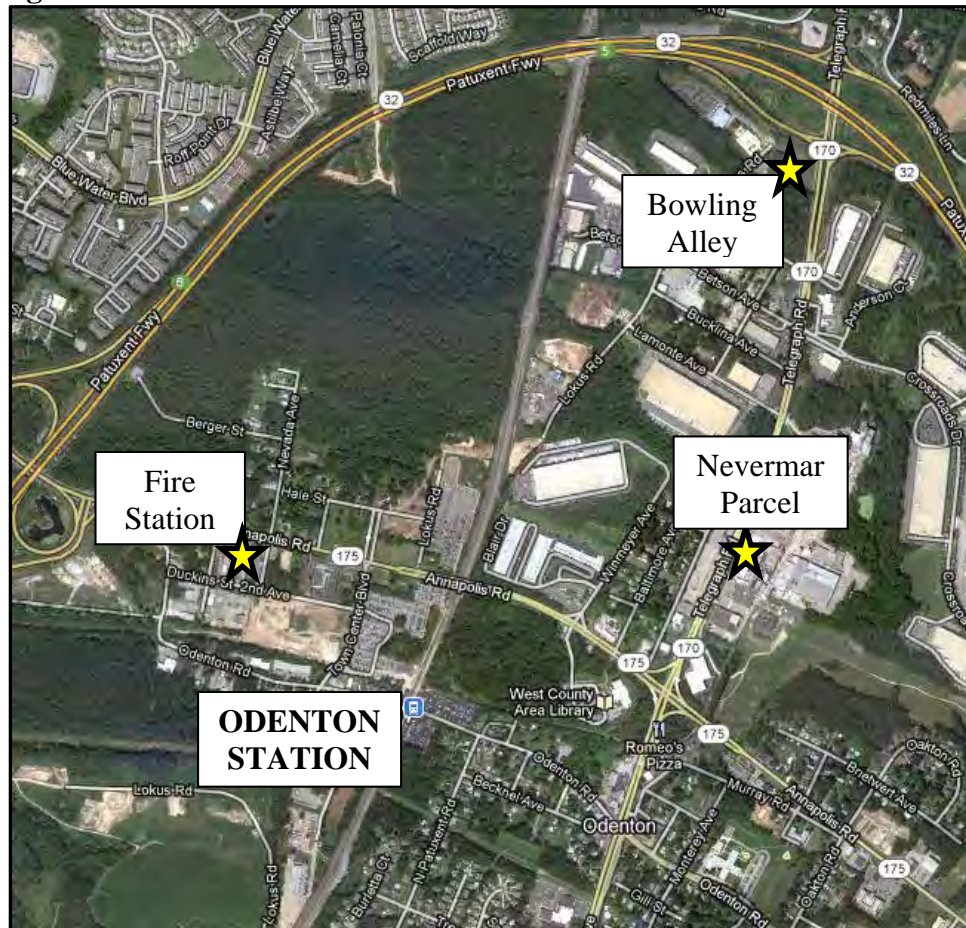
Based on these findings, the following recommendations are presented for consideration in developing a parking management plan for the Odenton MARC Station:

- 1) Improve Non-Auto Station Access: Upgrade the existing feeder bus routes along local streets with enhanced amenities such as those recommended in the TDM plan.
- 2) Develop an on-street parking plan for adjacent roadways: Evaluate the potential for short-term daytime (retail) and overnight (residential) on-street parking along the improved Town Center roadways such as Hale Street, Duckens Street, Berger Street, Nevada Avenue, Dare Street, Morgan Road and Town Center Blvd. Some of this parking should be revenue (metered) spaces.
- 3) Improve Wayfinding: Develop a wayfinding plan and provide wayfinding signing for pedestrians and bicycles with travel times and distances to and from destinations within a 1 to 3 mile radius of the station. Implement a bicycle sharing program with locations at key destinations in the vicinity of the transit station.
- 4) Create a Parking Management Association: To fully manage the publicly available on and off-street parking supply. Specific functions may include:
  - a. Develop shared parking agreements with third party development sites
  - b. Provide commuter and retail/ residential valets and on-demand shuttle service
  - c. Monitor parking utilization and performance
  - d. Establish Overflow Parking Lots: Identify potential satellite parking lots which could be used to provide additional parking and decrease demand at Odenton Station. Satellite lots would need to be served by frequent shuttle bus

connections to the station platform. Possible off-site parking locations are shown in **Figure 13**.

- e. Implement housing incentives that encourage MARC commuters to live in Odenton through enhanced marketing and partially subsidized transit passes. These efforts may allow for a reduction in the future drive to transit mode of access share and reduce the overall need for new commuter parking spaces.

**Figure 13: Potential Satellite Lot Locations**



- 5) Provide Real-Time Parking Information: Develop and implement a parking guidance system for the all structured parking facilities in the Odenton TOD that will serve commuter parking. The implementation of such a parking guidance system will require the deployment of a gated system that can count vehicles entering and exiting the facility (also known as a Parking Access and Revenue Control System). The system immediately alerts drivers when no spaces are available, decreasing the time spent looking for a space and directing drivers to alternative parking. The signing should be strategically located along MD 32 and/or MD 175 to give motorists advanced warning and adequate time to choose an alternate parking facility.

- 6) Use Pricing To Manage Parking Demand: Consider implementing daily parking rates to manage demand. Parking rates should be structured in graduated steps, so that the highest priced spaces are closer to the platform. Additionally, short-term spaces should be provided for visitors and retail patrons, and permit parking should be provided for residents.
  
- 7) Provide Better Traveler Information: Develop an education and outreach program including websites, flyers, advertisements and signing prior to, and during TOD construction with a branded message about ‘planning ahead for your commute’ and ‘watch out for changes’ in parking availability at the station.

A summary of recommendations is presented in **Table 13**.

**Table 13: Summary of Recommendations**

Recommendations	Advantages	Disadvantages	Cost	Timeline	Stakeholders
1) Upgrade existing feeder bus routes (amenities, coverage)	-Modest decrease in parking demand at Odenton (approx. 100 based on current ridership)	-May not attract enough riders due to transfer requirement	-Capital and operating costs (\$100-\$300 per hour) would need to be subsidized	Mid-Term	-AA County
2) Implement pedestrian and bicycle facility access improvements - including wayfinding signing and bicycle sharing program	-Significant increase in walk and bike access mode to transit (approx. 5%)	-Largely dependent upon build-out of adjacent residential density	-Approx. \$0.5 Million per mile sidewalk/side path	Mid-Term	-SHA, AA Co
3) Identify satellite parking lots	-Modest decrease in parking demand at Odenton closely correlated to number of additional parking spaces provided	-Largely dependent upon provision of frequent shuttle bus connections to Station platform	-A approx. \$5,000 per parking space	Long-Term	-SHA, AA Co
4) Implement real-time parking guidance system	-Decreases time spent looking for a parking space -Alerts drivers prior to freeway exit if no spaces are available		-Up to \$100,000 per sign	Mid-Term	-MDOT, MTA
5) Implement graduated daily parking rates to reduce demand	-A proven parking demand management tool -May increase parking revenue	-Will likely need political support	-Minimal	Mid-Term	-MTA, AA Co
6) Implement parking/commuting education and outreach program	-Will educate commuters about travel choices and travel information	-Much of this information is already available, but not easily accessible	-Minimal	Short-Term	-BMC, ARTMA, BWI Partnership, AA Co
7) Develop parking plan for adjacent roadways	-Supports efficient utilization of other parking resources	-May be challenging to agree upon shared parking opportunities, on-street regulations	-TBD	Mid-Term	-AA Co





## Odenton Station Parking Impact Study

January, 2013



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