The Transit Question:

Baltimore Regional Transit Needs Assessment

Assessing the Baltimore region's transit needs:

- Existing transit services
- Profile of transit users
- Comparison to peer regions
- Helping people get where they need to go
- Quality of service
- Recommendations

Baltimore Metropolitan Council

October 2015

Baltimore Metropolitan Council

Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
410-732-0500
www.baltometro.org

"Transit exists to provide individuals with a reliable means of transportation. Good transit systems are not just for the 'transit dependent' portion of our population. It is an effective means of moving people to work, recreation, and centers of learning."

– Anonymous Contributor,
Regional Transit Needs Assessment Survey

Letter from BMC's Executive Director

This Baltimore Regional Transit Needs Assessment is a report developed for, and at the request of, the Baltimore Metropolitan Council's Board of Directors. The charge from BMC's Board of Directors was two-fold. First, we were to develop a comprehensive assessment of our multimodal transit network. Second, BMC was asked to present a set of recommendations for a truly regional transit system that reflects local priorities and supports economic growth.

The assessment has been developed internally by BMC's professional planning staff over a period of 90 days. It is designed to serve as a resource for our members, as they work to address local and regional transit challenges.

The Baltimore region's transit network is among the largest and most complex in the country. The bulk of our system is provided by the Maryland Transit Administration (MTA), which operates a large series of individual modes, consisting of a range of rail and bus services. Complementing MTA service is a network of locally operated transit system (LOTS) services and private services designed to support individual anchor institutions and distinct business districts. With the exception of its core bus system, MTA's modes operate relatively well when compared to national peers. As ancillary pieces of a larger system, our LOTS agencies maximize their limited resources to fill gaps and meet the needs of transit-dependent residents and employees.

The most significant challenge our transit network faces is that it fails to act as an integrated system. The reality is that a lack of coordination and connectivity has created a system that is not equal to the sum of its parts. This observation will not surprise either the thousands of daily transit riders in the region or our policy makers in state and local government. The issues plaguing our current system developed over decades, and a remedy will require significant long-term investment and a renewed cooperation between state and local government.

During the research and writing of this report, BMC staff developed a series of general observations that we believe are helpful in framing the report's recommendations:

- Demographic analysis tells us that many of our vulnerable populations rely on transit as part of their daily lives. Any changes to our system should be made only after consideration of the effects on these populations.
- The highest demand for transit is found in the east/west corridor through Baltimore City and Baltimore County. This corridor intersects each of our rail lines and has the potential to truly integrate the system.
- Growth of our region's suburban job centers has strained our transit network and made it difficult to meet the first and last mile needs of our commuters.
- The realities of policy, politics, and constituent priorities make it difficult to implement changes to the system.
- Based on survey responses and anecdotal evidence, public perception of our transit system is low. As improvements are made to the system, equal effort must go into outreach and education to fully realize these its potential.
- The comprehensive recommendations found at the end of this assessment offer a vision of a truly integrated system that addresses five critical system-wide needs:
  - **Public Information**: Real-time arrival information, clearer signage and mapping, improved tools for trip planning.
  - **System Access**: Universal fare collection across modes; multimodal hubs that create efficient connections to employment and cultural centers; focus on first and last mile needs.
  - **System Performance**: Routinely updated plans for each MTA mode; enhanced and open data collection and analysis; signal and lane priority for transit vehicles.
  - **Safety and Security**: Detailed incident reporting; reduction in overcrowded buses; increased local and state cooperation on station design and safety.
  - **Economic Integration**: New transit lines into Baltimore and to regional job centers; improved connections between modes; investment in new and existing transit-oriented development (TOD).

The breadth and detail of this report would not have been possible without the input and contribution of many partners. We would be remiss if we did not thank the following for their contributions to this report.

- The Maryland Department of Transportation
- The Maryland Transit Administration
- Transportation and planning staffs in each of BMC's member jurisdictions
- Advocates and partner organizations
- The public for valuable input in the form of comments, feedback, and ideas.

We hope this report serves as a foundational document for challenging conversations and policy decisions that will define the future of our region's transit system.

Respectfully submitted,

Michael B. Kelly
Executive Director

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Introduction

Mission

On July 28, 2015, Baltimore County Executive Kevin Kamenetz, chair of the Baltimore Metropolitan Council, directed BMC staff to review the region's current transit system and to provide the Council with a set of recommendations for a regional transit system. This system should help people get where they need to go, support projected economic growth in the region, and reflect the priorities of member jurisdictions.

This report analyzes the needs of system users, while acknowledging the priorities of our member jurisdictions, in the hope that transit assets can help to to create more opportunity for all of the region's residents and businesses.

Regional Approach

The Baltimore region, with a population over 2.7 million people, is one of the 20 largest metropolitan regions in the United States. The region consists of Baltimore City and Anne Arundel, Baltimore, Carroll, Harford, and Howard counties.

Critical to the regions' success is its ability to support residents and the business climate by (1) maintaining and improving infrastructure and (2) organizing civic and corporate leadership to develop solutions to the problems that affect the region's competitiveness, vitality, and quality of life.

Together, the Baltimore Metropolitan Council (the Council of Governments for the region) and the Baltimore Regional Transportation Board (the Metropolitan Planning Organization for the region) are working to strengthen regional ties and collaborative efforts that benefit the entire region.

Document Structure

This document is based on secondary research and is a summary and synthesis of existing research. **BMC staff collected d**ata, some of which had already been analyzed and interpreted, from various sources. While the timeline did not allow for primary research, BMC staff members took care in evaluating the data and the information used herein. Data and information used in this report have cited sources. While staff prepared this report relatively quickly, relying on past research, recommendations derived from these sources are intended to provide the best outcomes for the most transit riders.

The report contains the following chapters:

INFORMATION ON THE EXISTING TRANSIT SYSTEM AND USERS

- What services does the current system provide? Who uses transit? How might the regional user profile evolve in the coming years because of changing demograhics? How does Baltimore're regional system compare to other peer regions around the country?

ANALYSIS OF REGIONAL TRANSIT ISSUES AND CHALLENGES

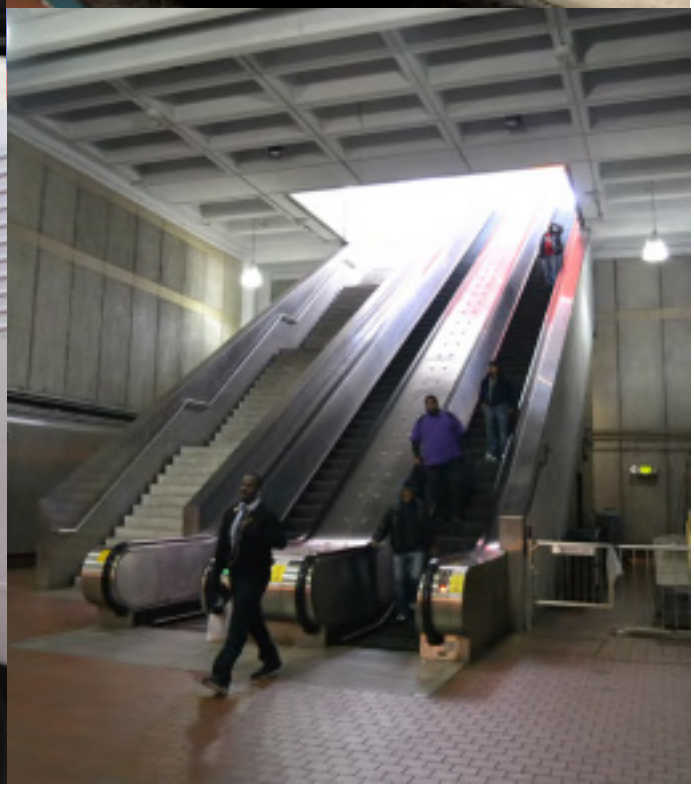
- What helps or hinders people from using transit? How can regional performance indicators help us see areas for improvement?

RECOMMENDATIONS

- What can we do, both in the near and long terms, to improve the transit system for everyone—transit-dependent riders as well as choice riders?

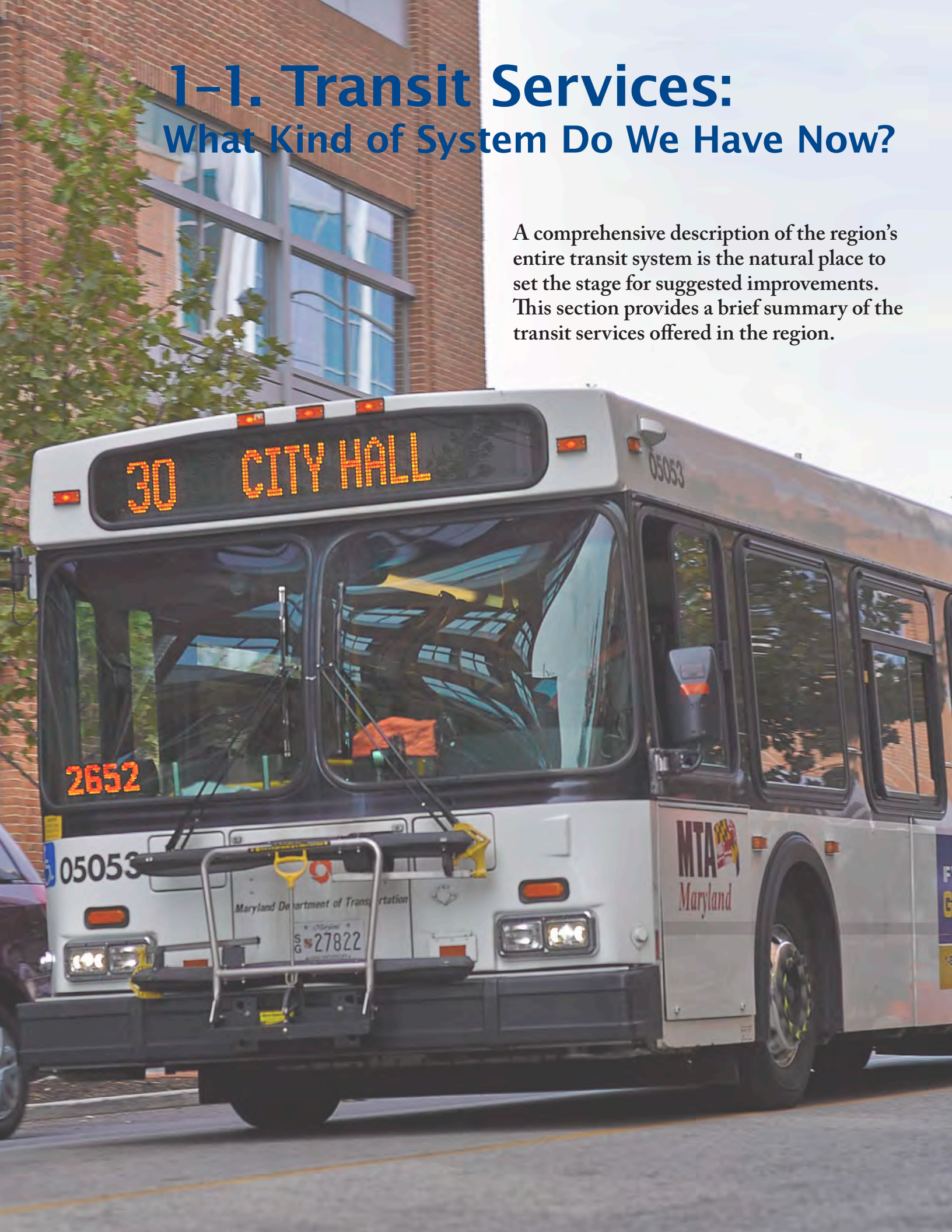
GREEN ROUTE
0910

MARC
7872



1-1. Transit Services:
What Kind of System Do We Have Now?

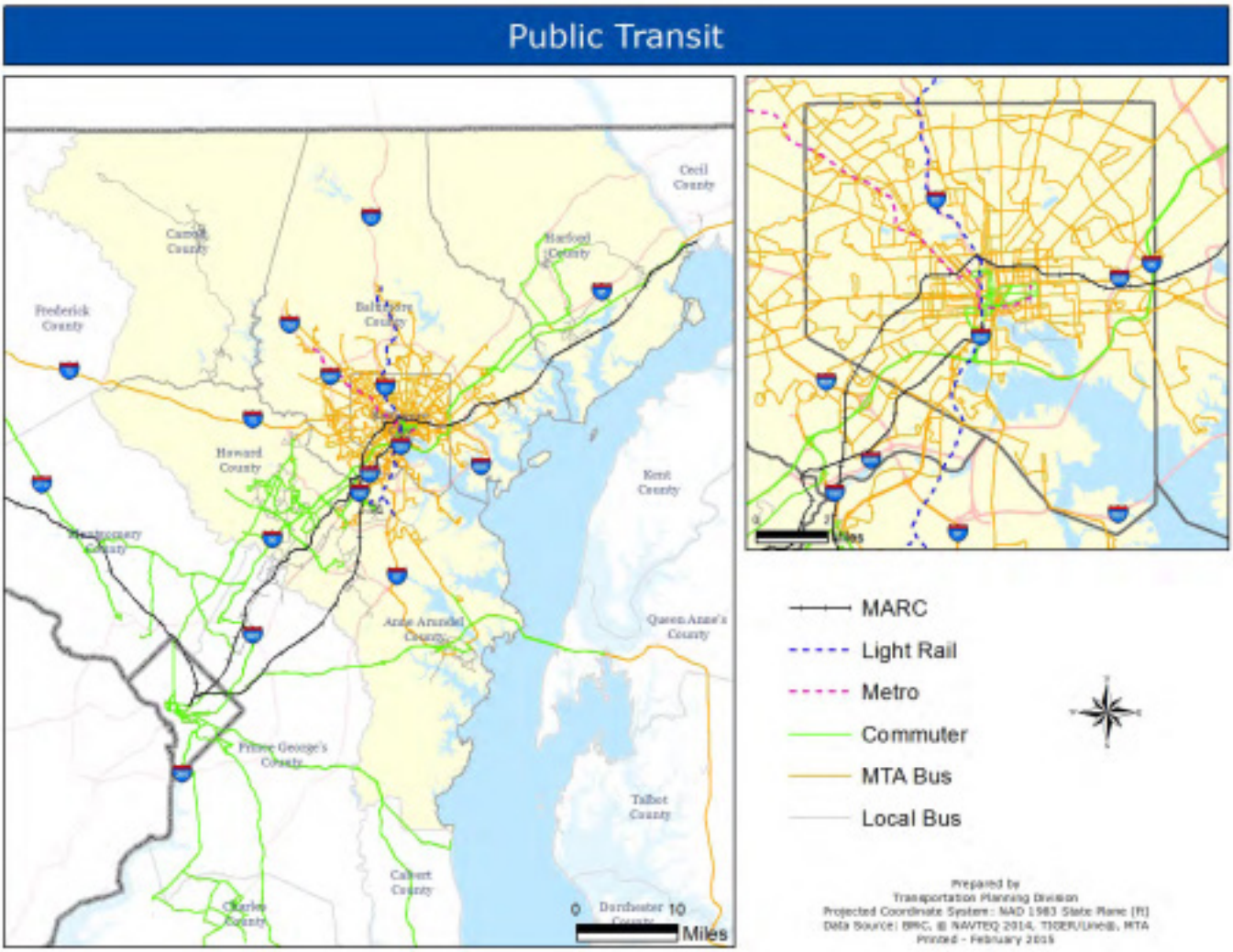
A comprehensive description of the region's entire transit system is the natural place to set the stage for suggested improvements. This section provides a brief summary of the transit services offered in the region.



1-1. Transit Services

Existing Transit and Shuttle Services

The Baltimore region's transit system is a complex, multimodal network consisting of core bus, commuter bus, light rail, subway, commuter rail, mobility / demand response service, locally operated transit systems, and privately operated shuttles.



Baltimore Metropolitan Council

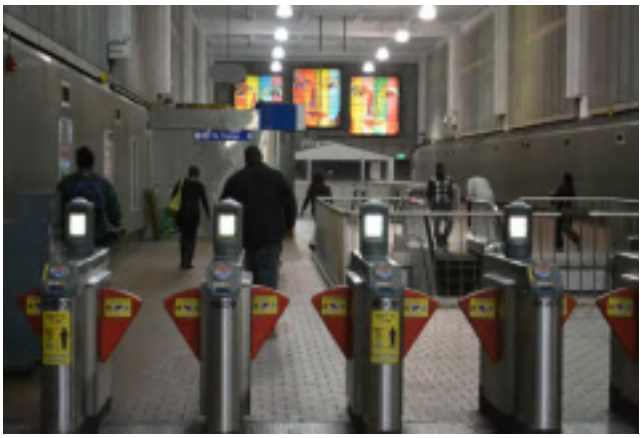
What Kind of System Do We Have Now?

Light Rail

Commuter Bus

MARC

Core Bus



Metro Subway

MARYLAND TRANSIT ADMINISTRATION

The Maryland Transit Administration (MTA) operates and administers a critical piece of the transportation network in the Baltimore region. Every weekday, approximately 370,000 trips are taken on MTA buses, light rail, and trains. Most of these trips are within the core service areas of the City of Baltimore and Baltimore County.

Core bus serves over 72 million trips a year and consists of three kinds of bus service: local buses, neighborhood circulators, and QuickBus, a system of limited-stop buses along major corridors.

Commuter bus provides express transit service connecting suburban residential areas—Columbia, Bel Air, Havre de Grace, and Laurel—to downtown Baltimore. Five commuter bus routes operate in the Baltimore region, making 55 daily trips.

The light rail line provides service seven days a week. This line runs for 29.5 miles, beginning in Baltimore County and extending south through Baltimore City to terminate in Anne Arundel County.

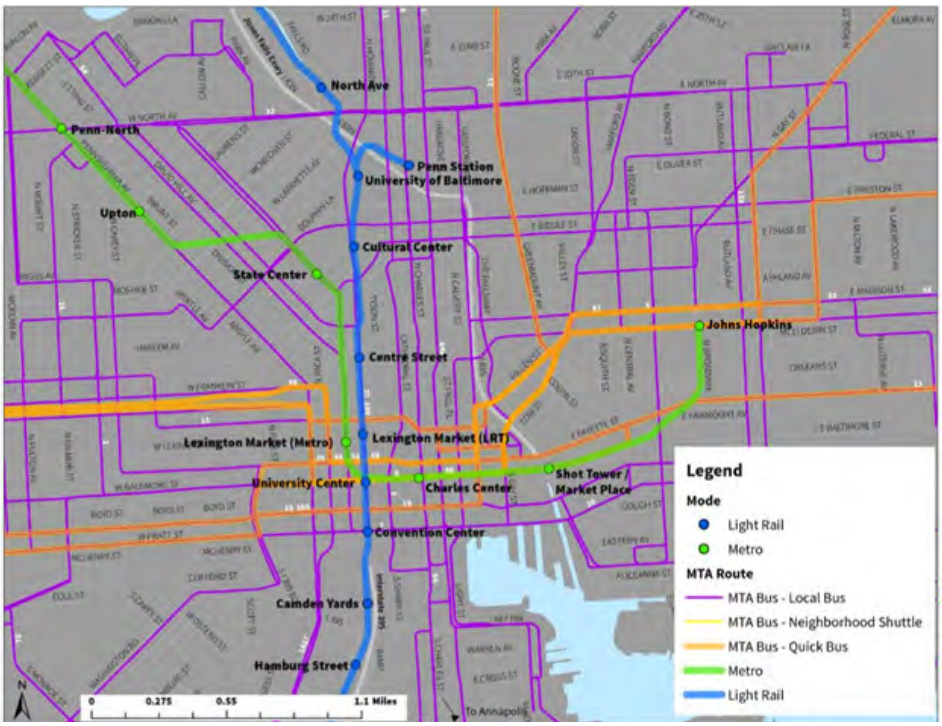
The 15.5-mile, 14-station Metro subway system operates every 8-10 minutes during the morning and evening peak periods; every 11 minutes during weekday evenings, and every 15 minutes on Saturdays, Sundays, and holidays.

Maryland Rail Commuter (MARC) train service provides service in Harford County, Maryland; Baltimore City; Washington D.C.; Brunswick, Maryland; Frederick, Maryland; and Martinsburg, West Virginia.

19 GOUCHER

DEFINITIONS

[System Name – Fiscal Year] (e.g., Core Bus – Fiscal Year 2014)	
Metric	**General Definition**
Total Annual Transit Ridership	Transit ridership by mode of directly operated services
Average Weekday Ridership	Average daily ridership for an average week.
# of Vehicles	The number of vehicles in the transit fleet that are available to operate in revenue service to carry passengers, including spares and vehicles temporarily out of service for routine maintenance and minor repairs. Revenue vehicles do not incoude service vehicles such as tow trucks, repair vehicles, or automobiles used to transport employees.
# of Revenue Miles Traveled*	The miles traveled when the vehicle is in revenue service (i.e., the time when a vehicle is available to the general public and there is an expectation of carrying passengers).
# of Revenue Hours Operated*	The hours covered when the vehicle is in revenue service (i.e., the time when a vehicle is available to the general public and there is an expectation of carrying passengers).
Operating Cost per Revenue Mile*	A "per mile" cost-efficiency measure assessing how much vehicle usage occurs in revenue service (as opposed to traveling to or from a garage or traveling for some other non-revenue service).
* According to TCRP Report 88: "These types of measures are very common and are utilized by virtually all transit systems when evaluating system-wide performance. However, these measures should be viewed with caution, because they do not measure a transit system's ability to meet the needs of its passengers. These measures only evaluate how efficiently a system can put service on the street, irrespective of where the service is going or how much it it utilized." – Transit Cooperative Research Program (TCRP) Report 88, Transportation Research Board. *A Guidebook for Developing a Transit Performance-Measurement System*. 2003.	



MTA Core Bus

The Maryland Transit Administration (MTA) is the largest public transportation provider in the state of Maryland and makes up the core of the region's transportation system. Buses debuted in Baltimore in 1909.

The MTA operates 57 local bus lines with service within the City of Baltimore and Baltimore County and regional bus service throughout the region. These lines include 47 local buses, four limited stop routes (known as QuickBus), and four express bus routes (which operate from various suburbs to downtown Baltimore).

MTA has bus transfer facilities within Baltimore City and Baltimore County as well as numerous bus shelters throughout the region. MTA has electronic GFI Genfare fareboxes. MTA has formal reciprocal fare agreements with the Regional Transportation Agency of Central Maryland (RTA).

Riders can plan trips using Google Transit. In addition, Central Maryland Regional Transit (CMRT) maintains the TRIP (Transportation Resource Information Point) website, which also uses Google Transit data. MTA does not have a mobile accessible website.

CORE BUS LINES

- Route 1 – Sinai Hospital / Mondawmin to Fort McHenry
- Route 3 – Cromwell Bridge Road / Sheppard Pratt Hospital to Inner Harbor
- Route 4 – Turner Station - C.C.B.C. Essex
- Route 5 – Mondawmin Metro subway station to Cedonia
- Route 7 – Mondawmin Metro subway station to Canton
- Route 8 – Lutherville light rail stop to University of Maryland Transit Center
- Route 9 – International Circle to Lutherville light rail stop
- Route 10 – U.S. Route 40 & Rolling Road / Paradise to Dundalk / Bull Neck Road
- Route 11 – Towson Town Center - Canton Crossing
- Route 12 – Stella Maris to Kirk and Bartlet
- Route 13 – Walbrook Junction - Canton/Fells Point
- Route 14 – Patapsco light rail stop to Jumpers Hole / Annapolis
- Route 15 – Security Square Mall / Westview to Overlea / Perry Hall
- Route 16 – Mondawmin Metro subway station to Brooklyn Homes
- Route 17 – Patapsco light rail stop / University of Maryland Transit Center - BWI Thurgood Marshall Airport / Arundel Mills / Parkway Center
- Route 18 – Glen and Key avenues to Velvet Valley / Copper Ridge / Scotts Hill / Owings Mills Center
- Route 19 – Carney / Goucher and Taylor to State Center

Core Bus – Fiscal Year 2014	
Total Annual Ridership	75,780,350
Average Weekday Ridership	245,121
# of Vehicles	730
# of Revenue Miles Traveled	20,047,418
# of Revenue Hours Operated	1,738,160
Operating Cost per Revenue Mile	$13.09

- Route 20 – Security Square Mall to City Hall
- Route 21 – Mondawmin Metro station to Fells Point
- Route 22 – Mondawmin Metro station to Johns Hopkins Bayview Medical Center
- Route 23 – U.S. 40 and Rolling Rd. to Fox Ridge
- Route 24 – Whispering Woods to Moravia Park Drive
- Route 27 – Reisterstown Plaza Metro station to Port Covington
- Route 29 – Cherry Hill light rail stop
- Route 30 – Edmondson Village to Bayview Medical Center
- Route 33 – Rogers Avenue Metro Station to Moravia
- Route 35 – White Marsh Mall / UMBC / Blind Industries
- Route 36 – Northern Parkway and York Rd to Riverview / Monroe Street
- Route 38 – North Bend Loop / Cold Spring Lane and Grandview
- Route 40 – Security Boulevard at C.M.S. / Middle River
- Route 44 – Security Square Mall / Rosedale Industrial Park
- Route 46 – Paradise Loop / Downtown / Cedonia
- Route 47 – Walbrook Junction to Overlea Loop
- Route 48 – Towson Town Center to University of Maryland Transit Center
- Route 50 – Erdman and Belair to Erdman and Belair
- Route 51 – Rogers Avenue Metro subway station / Monroe St. / Cherry Hill / Patapsco
- Route 52 – Milford Mill Loop to Mondawmin Metro subway station
- Route 53 – Old Court Metro Station to Mondawmin Metro Station
- Route 54 – Randallstown /Milford Mill to Penn-North Metro Station
- Route 55 – Fox Ridge / Towson Town Center
- Route 56 – Glyndon to Owings Mills Town Center
- Route 57 – Security Square Mall / Social Security Adminstration to Rogers Avenue Metro Station
- Route 58 – White Marsh / Reisterstown Plaza Station
- Route 59 – Owings Mills Town Center / Redland Ct. to Reisterstown Plaza Metro Station
- Route 60 – Stevenson University to Reisterstown Plaza
- Route 61 – Mt. Washington Loop / Inner Harbor
- Route 64 – Rivera Beach / Curtis Bay / Energy Parkway to North Avenue
- Route 77 – Old Court Metro Subway Stop / UMBC / Patapsco light rail stop
- Route 91 – Sinai Hospital / City Hall
- Route 97 – Mondawmin Shuttle
- Route 98 – Hampden Shuttle
- Route 99 – Old Court Metro Station to BWI Thurgood Marshall Airport
- Route 120 – Downtown Baltimore to White Marsh
- Route 150 – Downtown Baltimore to Columbia
- Route 160 – Johns Hopkins Hospital / Fox Ridge / Whispering Woods

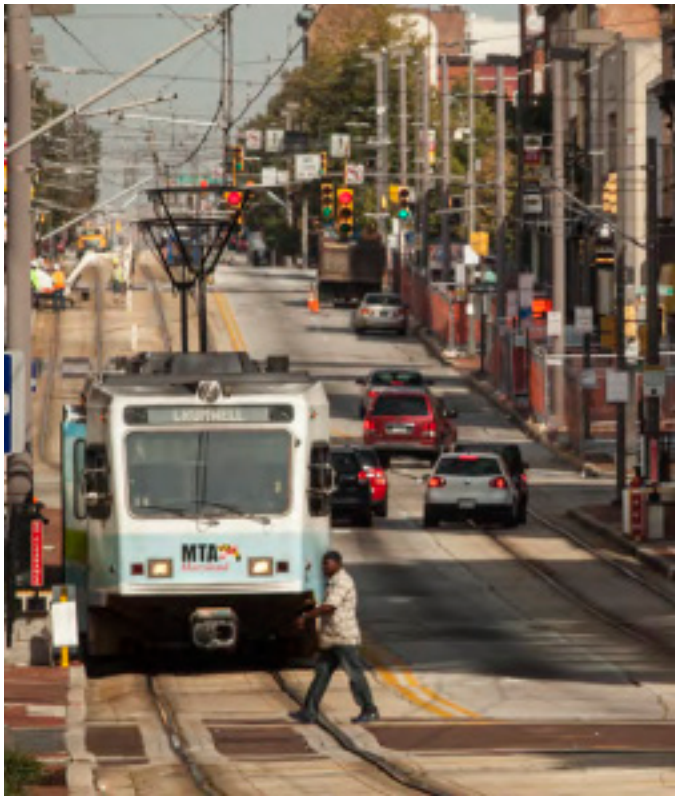
MTA Commuter Bus

Commuter bus provides express transit service to connect suburban residential areas—Columbia, Bel Air, Havre de Grace, and Laurel—to downtown Baltimore. Several commuter bus routes operate in the region, making 55 daily trips. MTA took over suburban bus and commuter rail services in 1973.

COMMUTER BUS LINES

- Route 201 – Gaithersburg park-and-ride to BWI Thurgood Marshall Airport
- Route 202 – Gaithersburg to Department of Defense (DOD) / Fort Meade
- Route 203 – Columbia to Bethesda
- Route 220 – Annapolis/Truman to Washington DC
- Route 230 – Severna Park / Annapolis / Truman to Washington DC
- Route 240 – Kent Island to Washington DC
- Route 250 – Kent Island / Davidsonville to Washington DC
- Route 260 – Severna Park / Davidsonville to Washington DC
- Route 305 – Columbia to Silver Spring / Washington DC
- Route 310 – Columbia to Baltimore / Johns Hopkins
- Route 315 - Columbia to Silver Spring / Washington DC
- Route 320 – Baltimore to Jessup/Columbia
- Route 325 - Columbia to Silver Spring / Washington DC
- Route 335 – Clarksville/Columbia to Washington DC
- Route 345 – Ellicott City / Columbia to Washington DC
- Route 410 – Churchville / Bel Air to Baltimore / State Center
- Route 411 – Hickory / Bel Air to Baltimore / Johns Hopkins
- Route 420 – Havre de Grace to Baltimore / Johns Hopkins

Commuter Bus – Fiscal Year 2014	
Total Annual Ridership	4,017,089
Average Weekday Ridership	15,132
# of Vehicles	220 (66 State owned)
# of Revenue Miles Traveled	5,409,950
# of Revenue Hours Operated	186,550
Operating Cost per Revenue Mile	$10.81



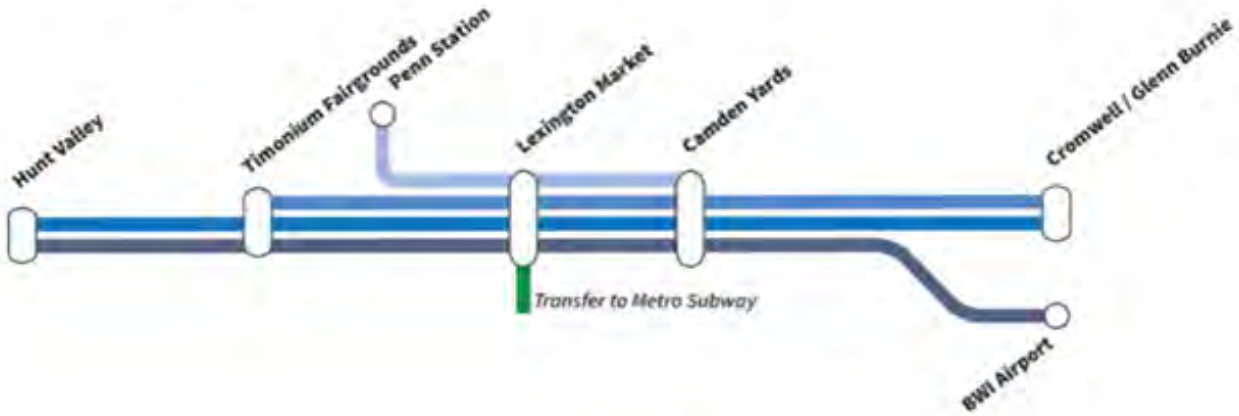
Light Rail – Fiscal Year 2014	
Total Annual Ridership	8,105,743
Average Weekday Ridership	25,183
# of Vehicles	53
# of Revenue Miles Traveled	3,102,718
# of Revenue Hours Operated	157,896
Operating Cost per Revenue Mile	$14.45

Light Rail

The Central Light Rail Line runs 29.5 miles and travels from Hunt Valley in Baltimore County, through the heart of Baltimore City, past Oriole Park at Camden Yards, to the Cromwell Station / Glen Burnie area in Anne Arundel County. The line that opened for service in 1992 extends to the Linthicum station and then splits to travel to the BWI Thurgood Marshall Airport Station and to the Cromwell / Glen Burnie Station.Customers traveling to BWI Thurgood Marshall Airport or Penn Station can transfer at any point between the Mount Royal and Linthicum stops.

Light rail trains operate every 10 minutes peak / 15 minutes off-peak between Timonium and Linthicum and every 20-30 minutes Hunt Valley to Timonium, Linthicum to BWI Marshall Airport, and Linthicum to Cromwell Station / Glen Burnie. The light rail shuttle train operates every 20-30 minutes between Penn Station and Camden Yards. Free parking is available at many of the stops.

In addition, many MTA bus lines serve the light rail stations, offering connections to popular Baltimore area destinations. Service is from 5:00-12:00 a.m. on weekdays, from 6:00-12:00 a.m. on Saturdays, and from 11:00 a.m. to 7:00 p.m. on Sundays.



Metro Subway

The Baltimore Metro rapid rail transit line operates along a 15.5-mile route between downtown Baltimore and Owings Mills in the northwest suburbs. Metro subway opened for service in 1983.

Fourteen stations serve the communities along the system seven days a week. Metro trains are available every eight minutes during morning and afternoon rush hours and every 10-20 minutes at other times.

Free parking is available at all Metro stations between Owings Mills and Mondawmin. In addition, many MTA bus lines serve the Metro subway stations, offering connections to popular Baltimore area destinations.

Metro Rail – Fiscal Year 2014	
Total Annual Ridership	14,632,430
Average Weekday Ridership	47,322
# of Vehicles	100
# of Revenue Miles Traveled	5,044,282
# of Revenue Hours Operated	207,550
Operating Cost per Revenue Mile	$12.08

Commuter Rail – Fiscal Year 2014	
Total Annual Ridership	9,167,935
Average Weekday Ridership	35,990
# of Vehicles	177
# of Revenue Miles Traveled	5,863,505
# of Revenue Hours Operated	152,638
Operating Cost per Revenue Mile	$23.01

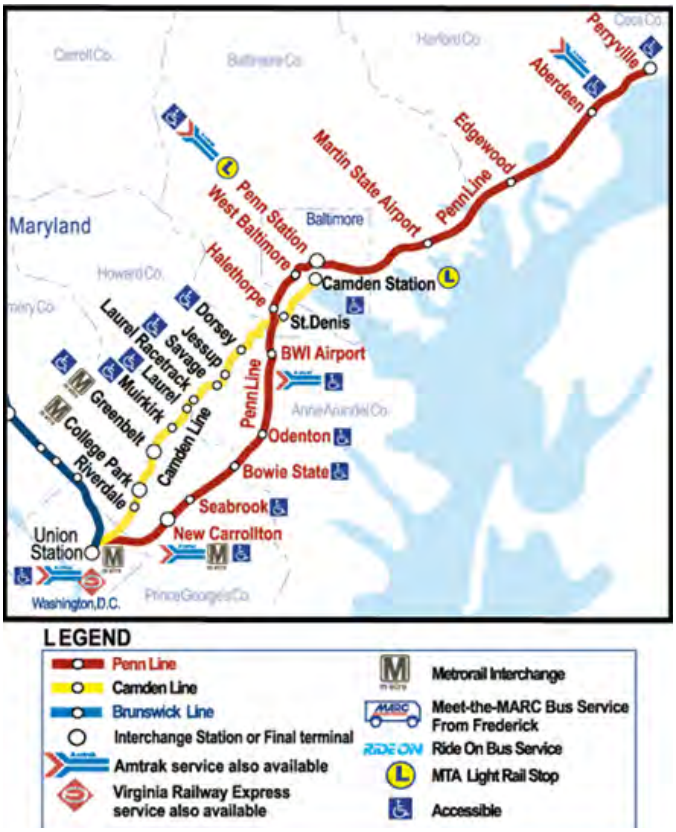
MARC

The Maryland Area Regional Commuter (MARC) train service is an integral component of Maryland's transportation system. The 187-mile commuter rail system, providing service on three lines, operates Monday-Friday between Washington, DC and Baltimore, MD; Washington, DC and Perryville, MD; and Washington, DC and Martinsburg, WV. In 2013, MTA added weekend service from Baltimore's Penn Station to Union Station in Washington, DC.

The Penn Line operates primarily between Baltimore's Penn Station, through BWI Thurgood Marshall Airport train station, and Union Station in Washington, DC. Stops include Baltimore City, Odenton, and Bowie State University. In addition, there are four stops north of Penn Station (Martin State Airport, Edgewood, Aberdeen, and Perryville).

The Camden Line operates out of Camden Yards in downtown Baltimore City and travels to Union Station in Washington DC. Stops include Dorsey, Laurel, and College Park.

The Brunswick Line operates between Brunswick, MD and Union Station in Washington, DC. This line also includes extensions to Frederick, MD and Martinsburg, WV. Stops on the Brunswick Line include areas surrounding Washington, DC such as Gaithersburg, Rockville, and Silver Spring, MD.



MTA Mobility / Paratransit Program

Mobility/paratransit service is for residents who are unable to use local bus, Metro subway, or light rail service. MTA provides mobility/paratransit service via contracts with Veolia Transportation, MV Transportation, and First Transit Inc. MTA took over mobility paratransit services in 1978.

Mobility – Fiscal Year 2014	
Total Annual Ridership	1,781,084
Average Weekday Ridership	5,893
# of Vehicles	483
# of Revenue Miles Traveled	14,755,042
# of Revenue Hours Operated	1,110,157
Operating Cost per Revenue Mile	$5.03

Charm City Circulator – Fiscal Year 2014	
Total Annual Ridership	4,000,000
Total Annual Operating Cost	$7,000,000
# of Vehicles	30

Charm City Circulator

Baltimore City DOT operates four Charm City Circulator routes with 30 buses, 19 of which operate in the peak period. The Purple Route operates north-south from Federal Hill to Penn Station; this route was extended north to University Parkway in fall 2014. The Banner Route operates east-west from the visitor center at Fort McHenry to the Inner Harbor. The Green Route operates from City Hall to Fells Point to Johns Hopkins Hospital. The Orange Route operates from Hollins Market to Harbor East. Service is provided seven days a week with 10-minute headways.

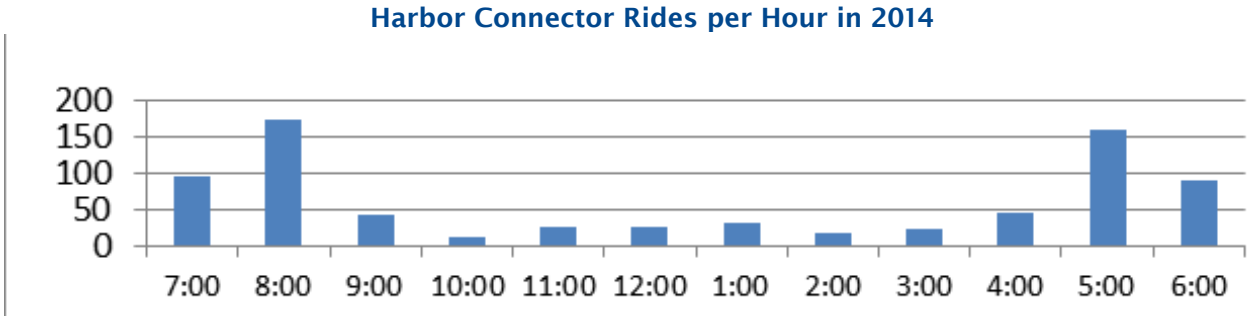
The Charm City Circulator is a fare-free system. Because funding for most of the service comes from an adjustment to the City parking fund, the Circulator must serve the central business district. Veolia is responsible for maintaining vehicles.

Circulator routes utilize many of MTA's stops. Of 110 stops, approximately 60 percent are joint MTA/Circulator bus stops. Routes connect to ZipCar locations, bike share, Penn Station, Metro stations in the central business district, water taxi landings, MTA light rail, MTA bus service, MTA commuter buses on Light Street, and fringe parking lots. Transfer locations between Circulator services include the Inner Harbor and Harbor East.

Harbor Connector

Baltimore City DOT operates the Harbor Connector, which is a ferry service on the Inner Harbor. The Harbor Connector is a free service for commuters. Baltimore City offers three Harbor Connector routes: Maritime Park - Tide Point, Canton Waterfront Park - Tide Point, and Harbor View - Harbor East. Service is offered Monday through Friday, from 7:00 a.m. to 7:00 p.m.

Harbor Connector ridership has grown quickly with new routes. As shown below, ridership is related to work trips and peak hours.



Water Taxi

The privately operated water taxi service serves as a peak season visitor attraction with very limited service during winter months. One in six waterfront visitors utilizes the water taxi. The water taxi service offers limited utility for Inner Harbor residents. An estimated 375 "frequent floater" passes were sold during 2014.

Annapolis Transit

The Annapolis DOT, or Annapolis Transit, has 17 transit vehicles for fixed-route circulator service during peak hours:

- Red Route – Monday-Saturday: Westfield Mall to Eastport via Admiral Drive and Hilltop Lane Anne Arundel Medical Center - Admiral Oaks, Annapolis Marketplace, Hilltop Lane, Eastport Plaza
- Yellow Route – Monday-Saturday: Westfield Mall to Riva Road - Westfield Mall, Housely Road, Riva Road, Truman Parkway, Heritage Court, Admiral Chocrane Dr
- Gold Route – 7 days a week: Edgewater to Arnold/AACC via Bestgate and Westfield Mall South River Colony - MD 2, Admiral Cochrane Drive, Harbor Center, Westfield Mall, Anne Arundel Medical Center, Bestgate Road, Rowe Blvd, Church Circle,Ritchie Highway, Arnold, Anne Arundel Community College
- Purple Route South – Monday-Saturday evenings, Sundays (Westfield Mall to Eastport via Annapolis Towne Center and Church Circle): Westfield Mall, Housley Road, Forest Drive, Annapolis Marketplace, Hilltop Lane, Bay Forest Center, Eastport
- Purple Route North – Monday-Saturday evenings, Sundays (Westfield Mall to Eastport via Annapolis Towne Center and Church Circle): Westfield Mall, Housley Road, Annapolis Towne Center, West Street Library, Church Circle, Main Street, Eastport
- Brown Route – Monday-Friday, Saturday (two separate schedules): Westfield Mall to Eastport via Forest Drive - Forest Drive, Old Solomons Island Road, Copeland Road, Annapolis Marketplace, Newtowne, Robinwood, Bay Forest Center, Eastport
- Orange Route – Monday-Friday (Downtown Annapolis to Forest Drive via Spa Road): Church Circle, Calvert Street, West Street, Spa Road, Copeland Road, Annapolis Marketplace, Newtowne, Robinwood, Hilltop
- Green Route – Monday-Saturday (Westfield Mall to Eastport via West Street): West Street Library, Church Circle, Main Street, Eastport Plaza

The Circulator currently carries 1,000 riders per day with service every 10 minutes. Annapolis Transit connects with MTA commuter bus service at the Harry Truman park-and-ride lot. Annapolis Transit does not connect to MARC rail.

In 2010, the City moved from a pulse to an arterial system with four meeting points. The Westfield Annapolis Plaza Mall is the primary transfer location. The other transfer locations are at Safeway, Eastport Plaza and the Harry Truman park-and-ride lot. The Annapolis DOT does not offer service to Fort Meade, the National Security Administration (NSA), the BWI Thurgood Marshall Airport, or Arundel Mills.

Carroll Transit System

The Carroll Transit System (CTS), operated by Butler Mobility, has four fixed routes:

- South Carroll Shuttle
- Westminster Shuttle
- Eldersburg-Westminster Shuttle
- Taneytown-Westminster Shuttle.

Six vehicles provide fixed-route service. Each day, CTS serves 100 to 150 riders on the fixed-route service. The three routes that serve Westminster connect. The South Carroll Shuttle also connects to the Eldersburg-Westminster Shuttle. The Westminster Mall is the central transfer point for new transfers.

CTS started METRO Connector on June 1, 2015. This is a daily shuttle from Westminster to the Owings Mills Metro station. Pickups are at the Fenby park-and-ride (on MD 97 just south of MD 32) at 5:15 a.m. and 6:45 a.m.. Returns from the Metro are at 4:00 p.m. and 6:00 p.m. The cost is $20 per round trip and $75 for five round trips, and service is by reservation only.

Other limited service is available outside the county. CTS uses FTA Section 5310 grant funding to provide demand response service for veterans accessing veterans' facilities in Baltimore, Frederick, and Martinsburg, WV. Local match is provided through collaboration with numerous agencies, including ARC, Change, Target, Granite House, the Department of Social Services, Digestive Disease, Catastrophic Health Planners, Access Carroll, Partnership for a Healthy Carroll County, and others.

CTS currently provides dialysis transportation after hours using FTA funding. The demand response service has proven to be very popular. Three years ago, CTS had 300 to 350 trip requests per day; now requests exceed 700 per day. CTS can provide 600 demand response trips door to door per day.

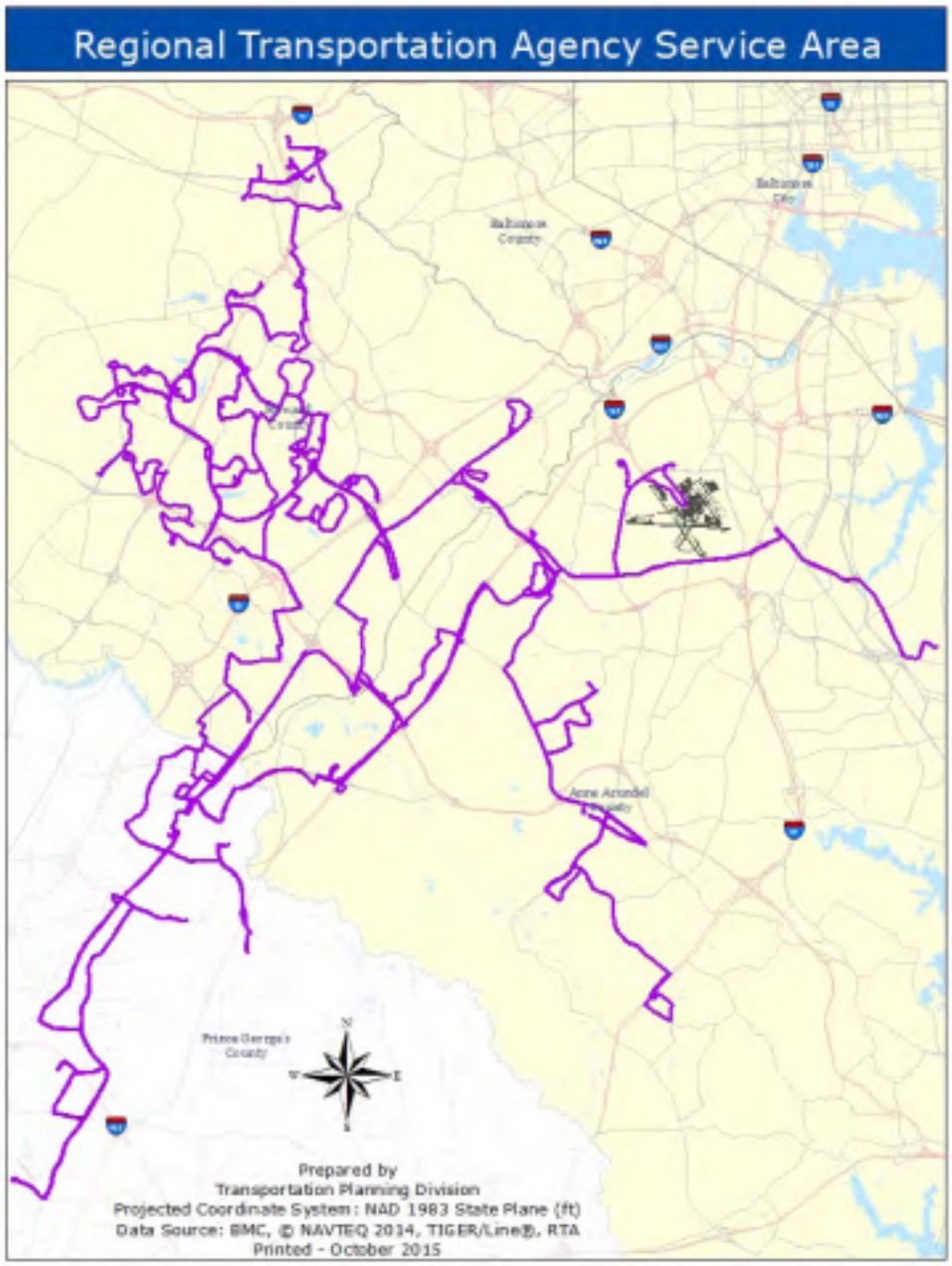
Harford Transit

Harford Transit serves Aberdeen, Havre de Grace, Riverside, Edgewood, and Joppatowne and connects to MTA's Flyer and MARC train service to Baltimore and Washington DC. Harford Transit operates 10 routes:

- Havre de Grace to Bel Air - Green 1 & 1A: Serving Aberdeen MARC/Amtrak station,Beard's Hill Shopping Center,Harford Mall,State Office Building,Harford Community College,Harford Memorial Hospital
- Joppatowne to Bel Air - Blue 2 & 2A: Serving Harford Mall,Joppatowne Shopping Plaza,Edgewater Village Center,MD 24 park-and-ride,Social Security office,Walmart/Target
- Bel Air Circulator - Orange 3: Serving Harford Mall,Office On Aging,Harford Senior Housing,Target,Bel Air Plaza,Country Village,Upper Chesapeake Medical Center,McFaul Activity Center
- Aberdeen Circulator - Yellow 4: Serving Aberdeen MARC/Amtrak station,Walmart,Aberdeen Senior Activity Center,Aberdeen High School,George D. Lisby Elementary School,Aberdeen Shopping Plaza,Aberdeen Boys & Girls Club
- Edgewood Circulator - Red 5: Serving Edgewater Village Center,MD 24 park-and-ride,Windsor Valley,Harford Commons,Woodbridge Shopping Center
- Edgewood to Aberdeen - Purple 6: Serving Aberdeen MARC/Amtrak station,Walmart,Windsor Valley,Riverside Shopping Center,Riverside Business Park,Cokesbury
- Edgewood to Aberdeen - Purple 6A: Serving Aberdeen MARC/Amtrak station,Walmart,Windsor Valley,Home Depot,Riverside Business Park
- Aberdeen to Perryville - Teal 7: Serving Aberdeen MARC/Amtrak station,Hollywood Casino,Perryville MARC station,Perryville Outlets,Perryville Library,Perryville Veterans Administration facility,Swan Harbor

Harford Mall is the system's largest transfer point. The Aberdeen train station is the second largest transfer point. There is no reciprocal fare agreement. Transferring riders must pay the full fare.

Harford Transit's extended demand response service is available to eligible disabled individuals, senior citizens, and low-income wage earners. The service is available from 4:00-9:00 p.m, Monday through Friday. Persons with disabilities are given priority. Senior citizens, age 60 and over, may use the service if they are registered with Harford Transit. Low-income wage earners of any age may use the service if they are referred by the County Department of Social Services or Susquehanna Workforce. Service areas include parts of Aberdeen, Bel Air, Edgewood, and Havre de Grace and the area in between. This service is funded by an FTA grant awarded on behalf of the Harford County Transportation Steering Committee.



Regional Transportation Agency of Central Maryland

The Regional Transportation Agency of Central Maryland (RTA) is a transit organization developed to establish a more effective and efficient public transportation system across Central Maryland. The RTA is made up of multiple jurisdictions, including Anne Arundel County, Howard County, the City of Laurel, and northern Prince George's County.

The RTA combined the management and administrative functions of multiple transit operations, with a goal of reducing operating costs and providing a better customer service experience by improving connections across Central Maryland. The Commission enables all of the participating jurisdictions to oversee transit management operations. The intent is to use cost savings to increase frequencies, expand service from Columbia to Ft. Meade and from Annapolis to Ft. Meade, NSA and the airport.

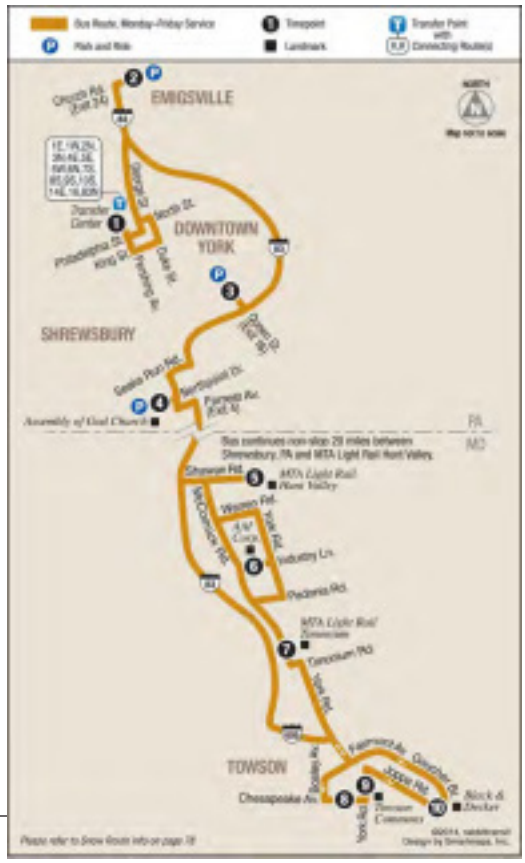
Regionally, RTA connects with MTA and WMATA, but the thrust is to connect with Baltimore service. WMATA only comes up to the Howard County line. RTA has RouteMatch scheduling software for paratransit. Howard County has AVL, including NextBus.

Rabbit Transit (York, PA)

Rabbit Transit provides commuter service between York, PA and locations in Baltimore County. The rabbitExpress Route 83S runs Monday through Friday, starting at 4:33 a.m. and ending at 7:40 p.m. Peak period frequency is every 30 minutees, and off-peak frequency is every 70 minutes.

Destinations include downtown York, park-and-ride sites, Towson Commons, Black & Decker, and BWI Thurgood Marshall Airport via MARC stations. Rabbit Transit buses will stop at any MTA bus stop to drop off passengers. Rabbit Transit buses connect with MTA light rail (Hunt Valley, Timonium) and the Towson University Shuttle.

The one-way fare for adults, students, and disabled riders (fare specific to Route 83S as of March 20, 2014) is $5.00. Seniors pay no fare if they have a PA Senior Free Fare Card. The 11-ride Express Hop-n-Go Pass is $50.00, and the 1-month Express Hop-n-Go Pass $136.00.



Other Transit Services

COLLEGETOWN SHUTTLE

The free Collegetown Shuttle transports students, staff, and faculty at six participating colleges to other campuses and key destinations throughout the region. There is no fare to ride. Students merely have to show their college or university ID card to board the bus.

The six institutions served are Goucher College, Towson University, Loyola University Maryland, Notre Dame of Maryland University, Johns Hopkins University (Homewood Campus), and Morgan State University. In addition to the six schools, the shuttle stops at Towson Town Center, Penn Station, and Towson Place Shopping Center.

The Collegetown Shuttle has two routes: the Blue Route and the Red Route. The Blue Route starts at Goucher College and ends at Penn Station, while the Red Route goes from Towson University, moves eastward to Morgan State, then goes to Penn Station.

The Blue Route operates all days of the week, with Monday-Thursday service running from 8:15 a.m. to 10:50 p.m. The Red Route also operates all days of the week, with Monday-Wednesday service running from 7:20 a.m. to 9:40 p.m. Both routes offer later service on Fridays and Saturdays.

TOWSON UNIVERSITY SHUTTLE

Towson University runs shuttle routes both on campus and off campus to serve the general campus community. The University encourages community members visiting the campus to park their vehicles in a designated lot and use the Gold Route shuttles to access other locations on campus.

In addition to the paratransit service, the front seats of each campus shuttle bus are reserved for individuals with disabilities. Shuttle services do not operate when there are no scheduled classes.

Routes include:

- Gold Route, Gold Route Weekend – serving campus locations; weekdays: 7:00-2:00 a.m., weekends: 4:00 p.m. to 2:00 a.m.
- Black Express – serving campus locations Monday-Thursday; service runs from 7:35-11:35 a.m.
- Timonium/Cockeysville – serving the Timonium MTA park-and-ride lot and the Yorktowne Plaza MTA stop in Cockeysville, Monday-Friday from 6:45 a.m. to 10:15 p.m.
- Kenilworth, Goucher, Rodgers Forge – serving apartment complexes and other locations in these areas; service runs from 7:15 a.m. to 10:15 p.m.
- Loch Raven – serving apartment complexes and other locations in these areas; service runs from 7:00 a.m. to 10:15 p.m.
- Tiger in Town – serving MTA bus stops throughout the Towson area, daily from 4:45 p.m. to 2:32 a.m.

Expanded shuttle schedules are available for the Timonium/Cockeysville Route, Kenilworth Route, Goucher Route, and Rodger's Forge Route.

JOHNS HOPKINS UNIVERSITY TRANSPORTATION SERVICES

Homewood Transportation Services provides several services to faculty, staff, and students. These include Blue Jay Shuttle, Night Ride, Homewood - Peabody - JHMI Shuttle, Keswick - Homewood - Eastern - JHMI Shuttle, and the Carey Business School Shuttle.

The Blue Jay Shuttle service operates on a fixed-route evening schedule in an area near adjacent to the Homewood campus. Service runs from 5:50-11:30 p.m., seven days a week, excluding University holidays and other dates as determined by the University. During intersession and summer session, limited service is offered. The fleet of vans departs from Brody Learning Commons—seen as the shuttle's transportation hub—starting at 5:50 p.m. Shuttles are equipped with TransLoc, a GPS-based real-time transit information system available online or through a mobile device.

Night Ride is an on-demand, curb-to-curb service to and from locations within the service area. While the regular Blue Jay Shuttle routes are running, Night Rides are dispatched only to those who need service to locations not served by fixed routes. Other fixed-route services are the Homewood - Peabody - JHMI Shuttle and the Keswick - Homewood - Eastern - JHMI Shuttle.

The Carey Business School Shuttle's operates Monday through Friday, except on University holidays. The shuttle runs without stops between the Carey Business School in Harbor East to Mason Hall on the Homewood Campus.

UMBC TRANSIT

UMBC Transit provides responsive shuttle and charter bus services to meet the transportation needs of the UMBC community. Shuttle routes with over 300 stops cover residential communities near campus, as well as shopping areas surrounding UMBC.

All UMBC students, faculty, and staff are able to utilize UMBC Transit shuttle routes and services. A UMBC campus identity card is required for boarding. An important new tool is Transit Tracker, which provides the rider with web-enabled, GPS location of all buses. This service provides real-time information for riders.

Routes include:

- Arbutus/Irvington Route – serving the Arbutus and Irvington communities; weekday service from 7:00 a.m. to 11:00 p.m., weekend service from 8:30 a.m. to 11:00 p.m.
- Arundel / BWI MARC Route – serving the nearby Arundel Mills Mall and BWI MARC/Amtrak train station (weeekends only)
- BWI/MARC Route – providing access to the BWI MARC/Amtrak train station; weekday service from 7:00 a.m. to 8:00 p.m.
- Catonsville Route – serving the Catonsville Community (Frederick Road business district) and Catonsville Community College bus stop on Rolling Road; weekday service from 7:00 a.m. to 11:10 p.m., weekend service from 9:15 a.m. to 9:10 p.m.
- Downtown Route – serving downtown Baltimore; weekday service from 7:00 a.m. to 11:10 p.m., Saturday service from 10:00 a.m. to 11:10 p.m.
- Halethorpe/Satellite Route – serving the Halethorpe train station, South Campus satellite lot, and the main campus; weekday service from 7:30 a.m. to 10:50 p.m., Sunday service from 2:00 p.m. to 10:15 p.m.
- U.S. 40 / Rolling Road Route – connecting to the U.S. 40 business district; weekend service from 11:00 a.m. to 5:30 p.m.

BWI BUSINESS PARTNERSHIP LINK SHUTTLE

The LINK Shuttle connects Federal agencies at Fort Meade to satellite offices in the Nursery Road business district and to the MARC and Light Rail transit stations. It operates 250 weekdays per year, is free of charge and is open to the public. The shuttle stops at the BWI Amtrak/MARC station and the BWI Business District light rail stop. The shuttle operates Monday through Friday from 5:45 a.m. to 5:30 p.m.

FORT MEADE TRANSPORTATION DIVISION

Fort Meade contracts with Skookum Contractors to operate three shuttles. The Defense Information School Shuttle and Fort Meade Internal Shuttle Bus both operate seven days a week and only provide transportation on base. The Fort Meade / MARC Shuttle Bus provides service to Union Station and Penn Station.

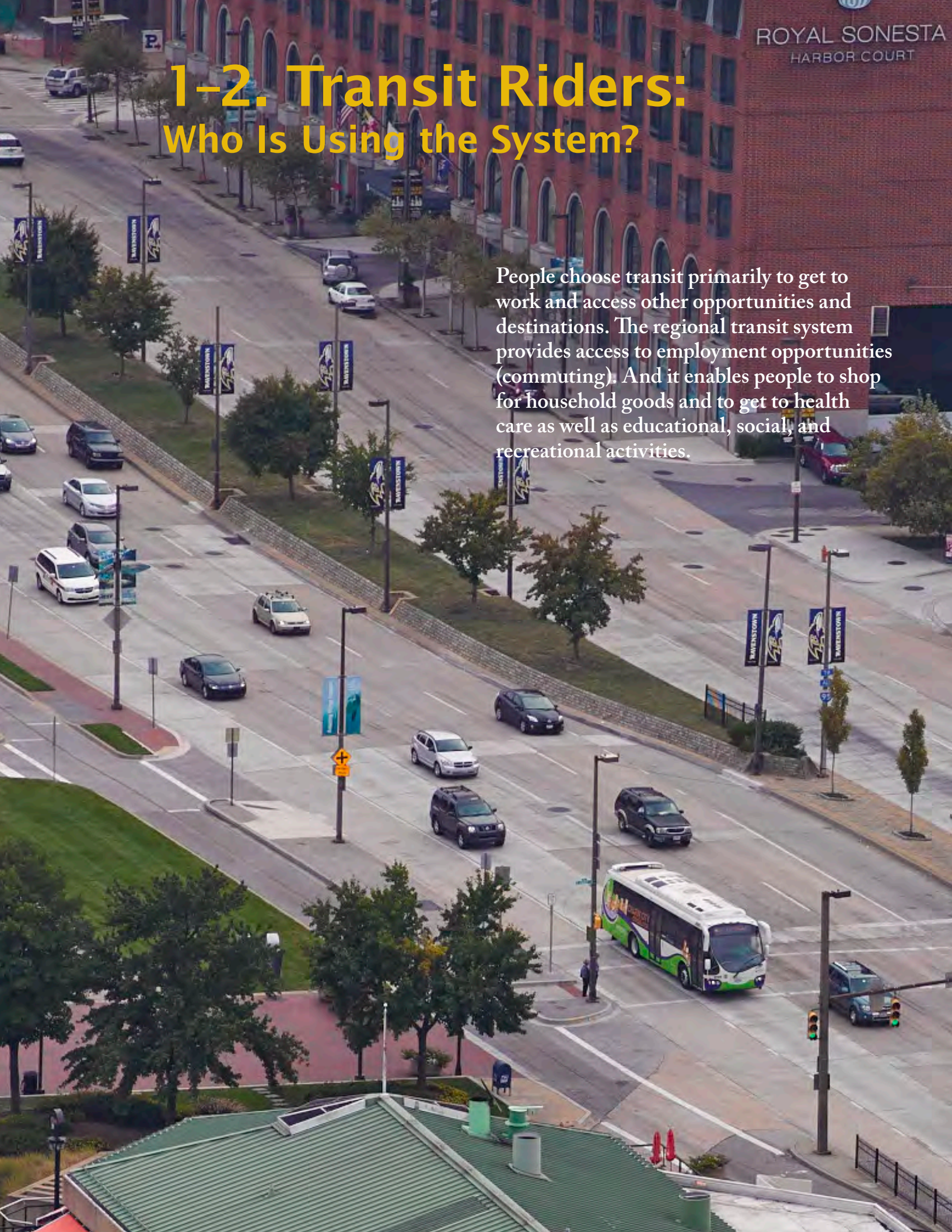
BAYRUNNER SHUTTLE EAST

BayRunner Shuttle provides daily, scheduled transport services for airline passengers traveling from Cambridge, Salisbury, Easton, Kent Island, Ocean Pines, and Ocean City to Baltimore-Washington International Airport or the Baltimore Greyhound Bus Terminal.

References:

- Department of Transportation Maryland http://mta.maryland.gov/
- http://baltimorerwatertaxi.com/
- *On-Call Transit Analysis, Locally Operated Transit Systems Agency Profiles*, (2014) STV
- http://baltimorecollegetown.org/shuttle/
- Towsion University: http://www.towson.edu/adminfinance/auxservices/parking/shuttle/
- Johns Hopkins University: http://ts.jhu.edu/Shuttles/
- UMBC: http://www.umbc.edu/transit
- BWI Business Partnership: http://www.bwipartner.org/
- Transportation Resources Information Point: http://www.mdtrip.org/
- Bayrunner Shuttle, http://www.bayrunnershuttle.com/

1–2. Transit Riders:
Who Is Using the System?



People choose transit primarily to get to work and access other opportunities and destinations. The regional transit system provides access to employment opportunities (commuting). And it enables people to shop for household goods and to get to health care as well as educational, social, and recreational activities.

1–2. Transit Riders

This section provides a description and profile of users of the Baltimore region transit system.

First, some context. The MTA reports that people in the region take 370,000 transit trips on an average weekday. That sounds like a lot of people. That is, until we consider the number of auto trips taken on an average weekday: BMC's travel demand model estimates nearly 4 million single-occupant vehicle (SOV) trips taken each weekday. Looking at this in terms of commuters in the region, 76.7 percent of all commuters use SOVs while 6.4 percent of commuters choose to use transit.

Who Uses Transit in the Baltimore Region?

People use transit in the region either to get to work (60 percent of transit users) or to get to other opportunities and destinations (40 percent of transit users). Generally there are two types of transit users:

- **Transit-dependent**: Those who rely on transit because they have no other options.
- **Choice Riders**: Those who choose to ride transit but have other options within their means. For example, some people use transit to save money on their commutes or to express a personal lifestyle choice.

TRANSIT-DEPENDENT RIDERS

Transportation options are limited for many people. In the region, 11.6 percent of households have no motor vehicle available (with 62.1 percent of these "carless" households located in Baltimore City). Some elderly and disabled people are unable to drive because of physical or cognitive limitations. Also, some students must depend on specialized services from MTA and LOTS agencies to get to school. Baltimore City middle and high school students account for up to 22 percent of peak-period transit use in the City on an average weekday.

COMMUTERS

Commuting is a major reason why some choice riders use transit. Following are some statistics about commuters in the region:

- As noted above, 6.4 percent of all commuters in the region use transit. This translates to 85,000 of the region's residents.
- 80 percent of transit commuters are from Baltimore City or Baltimore County (60.5 percent and 22.4 percent, respectively).
- 25.7 percent of transit commuters work in Baltimore City and 61.4 percent commute to the surrounding jurisdictions.
- 43.1 percent of workers who commute by transit are from households with incomes below $50,000, with 17 percent of local transit commuters having a household income below $25,000. The regional median family income was $64,300 in 2013.
- Transit commuters are predominantly female (56.3 percent).
- Younger workers tend to use transit more to get to work in Baltimore City. Of "millennials" in the workforce (workers between the ages of 25 to 34), 29 percent reported a primary work location within Baltimore City.
- The region's proximity to the Washington region is one reason why 11.3 percent of Baltimore workers commute beyond the Baltimore metropolitan region for work.
- 63.8 percent of transit users work for private, for-profit employers.
- 21.4 percent of transit users work for either local, state, or federal government.
  - 49.4 percent of MARC users work for local, state, or federal government, with federal employment representing 43.3 percent of this total. Half of the MARC commuters in the 2008 MTA on-board transit survey reported receiving either a partial or full employer-paid fare subsidy.
- 11.7 percent of bus commuters receive a partial or full employer paid fare subsidy.

Who Is Using the System?

WHEN DO PEOPLE TRAVEL BY TRANSIT IN THE BALTIMORE REGION?

- Commuter travel is concentrated in the morning (6:30 a.m. to 9:30 a.m.) and afternoon (3:30 p.m. to 6:30 p.m.) peak periods.
- Almost half of non-commuting travel (46.6 percent) occurs during the midday period between the hours of (9:30 a.m. and 3:30 p.m.).
- Almost a third (31.7 percent) of all transit travel occurs during the midday. The midday time period is twice as long (6 hours compared to 3 hour peak periods) as the peak period, but with fewer routes and less frequent transit service.
- 25.7 percent of transit users departed for work between 5:00 and 6:29 a.m., compared to 18.6 percent for all workers.
- 47.6 percent of all transit users leave for work between 6:30 and 9:29 a.m. The same peak period (6:30 to 9:29 a.m.) is the departure time of 60.2 percent of workers regardless of mode.
- The reported departure time for work is generally earlier for transit users compared to workers for all other modes.

TRAVEL TIME IN THE BALTIMORE REGION

- The mean travel time to work within the Baltimore region is 47.9 minutes for local transit and 58.5 minutes for commuter rail (MARC). The mean travel time to work for Baltimore region residents to the Washington region is 71.5 minutes for local transit and 83.2 minutes for MARC.
- The mean transit travel time to work within the Baltimore region is 88 percent greater than the mean single-occupant vehicle (SOV) travel time (25.5 minutes)[1] and 41 percent longer than the SOV travel time for Baltimore region residents to the Washington region (50.7 minutes).

OTHER FACTORS INFLUENCING TRANSIT

- **Access**. Urban form influences the ability of users to ride transit. Most bus users (71.7 percent) and Metro and light rail users (52.2 percent) walk to access transit, whereas most MARC users (50.9 percent) drive.
- **Service / Service Availability**. The ability of transit users to access destinations is influenced by the service directness or the number of transfers required to access a destination.
  - Roughly 40 percent of all transit trips surveyed in 2008 required at least one transfer.
  - When commuting, 60.1 percent of riders reported zero transfers compared to 57.3 percent for non-commuting trips.
  - Bus and Metro / light rail transfer rates are significantly different. This likely is due to the type of service available, as bus routes are "funneled" to fixed-rail transit with many fixed-rail origins and destinations requiring a transfer from or to local bus.
  - 56 percent of Metro and light rail users transferred at least once, with 20.3 percent transferring two or more times.

Ridership Trends / Potential Riders

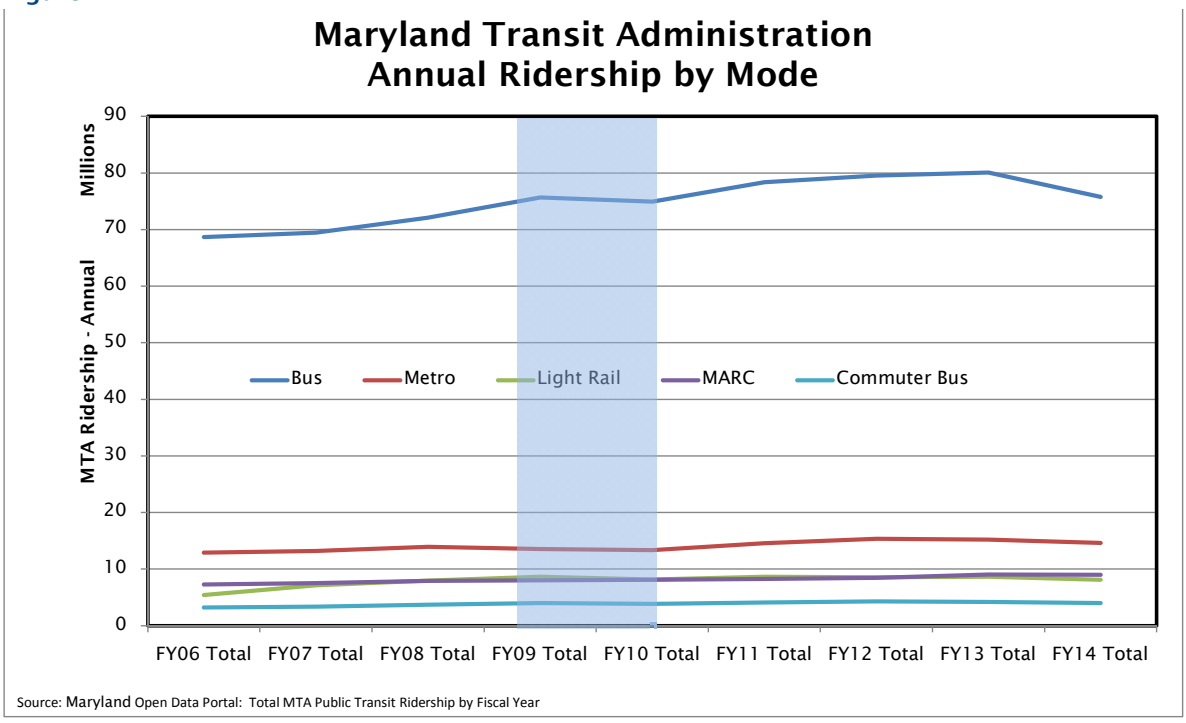
As reported in FY 2014, ridership on MTA's fixed-route transit—including local bus, Metro, light rail, MARC, and commuter bus—was 111.5 million, with most riders (68 percent) using local buses.

From 2007-2010, the nation's economy experienced a deep recession, which included higher unemployment rates. Recovery from this downturn has been slow. It is reasonable to conclude that, during this period of high unemployment, many people also cut back on non-work travel. This same period saw a significant increase in fuel prices in the region, with the price of gasoline exceeding $4 a gallon in 2008. Together, these factors led to increased transit ridership, as shown by the increase in MTA's average weekday transit ridership total.

Declines in ridership have been reported twice over the last nine fiscal years (see Figure 1). In FY 2010, reported ridership declined as result of the easing of effects of the "Great Recession." A 4.83 percent decline in FY 2014 was attributed to "foul local weather, from tropical storms to winter snowfalls."[2]

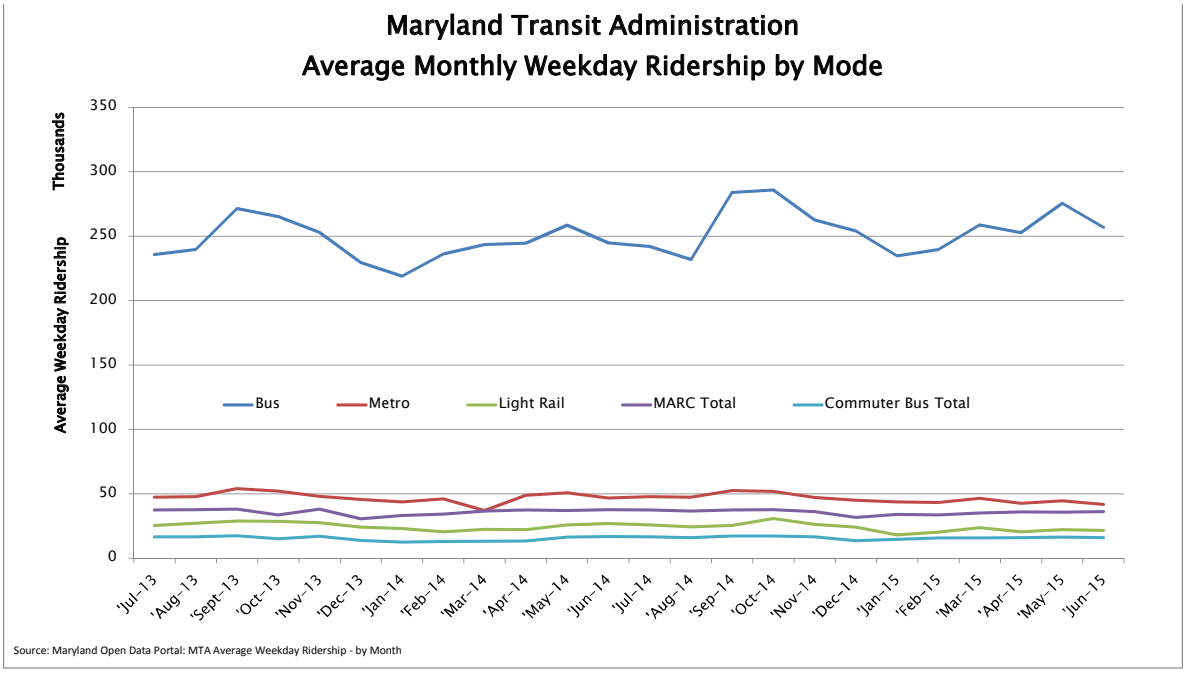
1 Nationally, the mean travel time to work is 25.5 minutes.
2 *Baltimore Sun*, "MTA ridership drops as fare increase looms," March 17, 2015.

Figure 1



The FY 2014 decline in ridership was reported on core transit modes, ranging from a 0.9 percent decline on MARC to a 6.26 percent decline on light rail. FY 2015's reported monthly ridership showed a 2.49 percent increase over FY 2014 (see Figure 2). FY 2015 ridership growth was positive for bus (4.66 percent) and commuter bus (5.49 percent), but reported declines continued for Metro (-2.33 percent), light rail (-6.31 percent), and MARC (-1.04 percent).

Figure 2



The MTA 2008 comprehensive on-board transit survey collected rider demographic and survey trip data. This data has been analyzed and summarized, building a solid understanding of transit users. The 2008 survey indicated that core transit serves purposes other than commuting, with 40 percent of riders reporting using transit for shopping, school, and "other" transit trips (see Figure 3). For transit-dependent residents, transit services can provide the needed mobility in sustaining a quality of life in gaining access to daily necessities. A careful balance is necessary to address the broad purposes for which people need transit in the region.

Figure 3

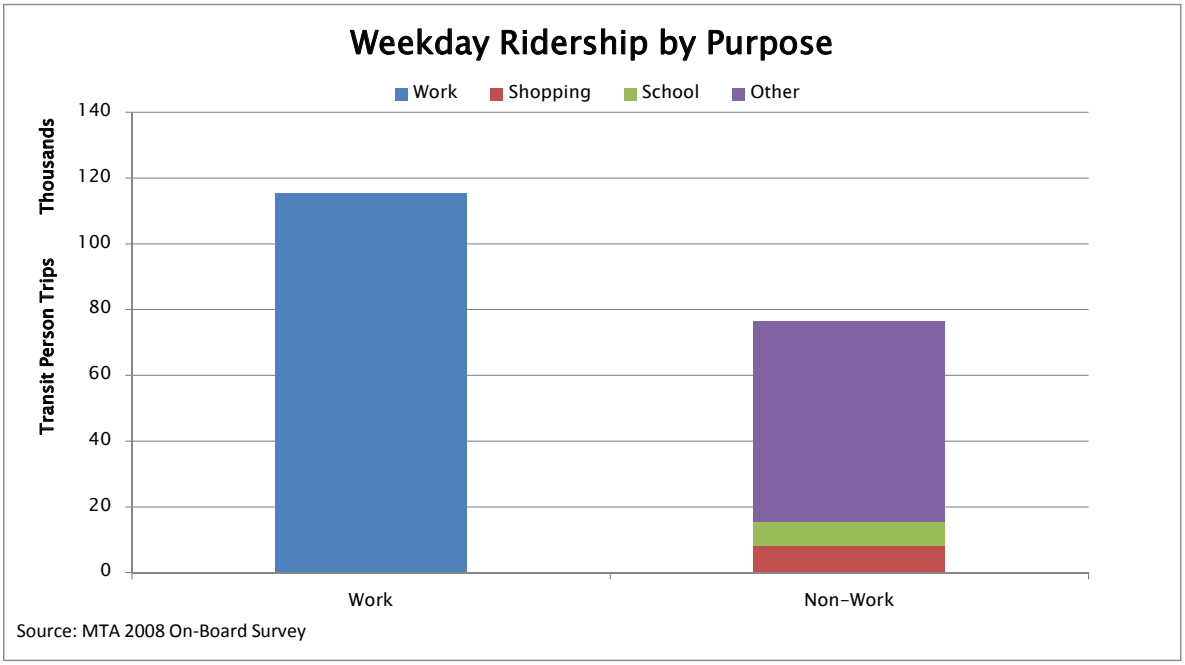
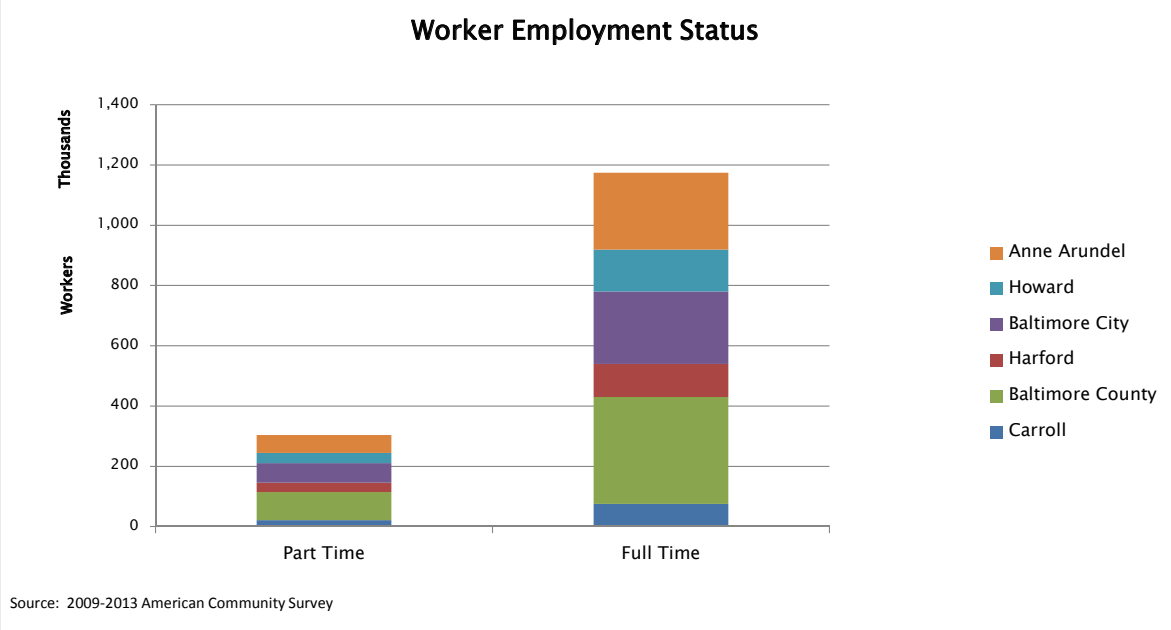


Figure 4



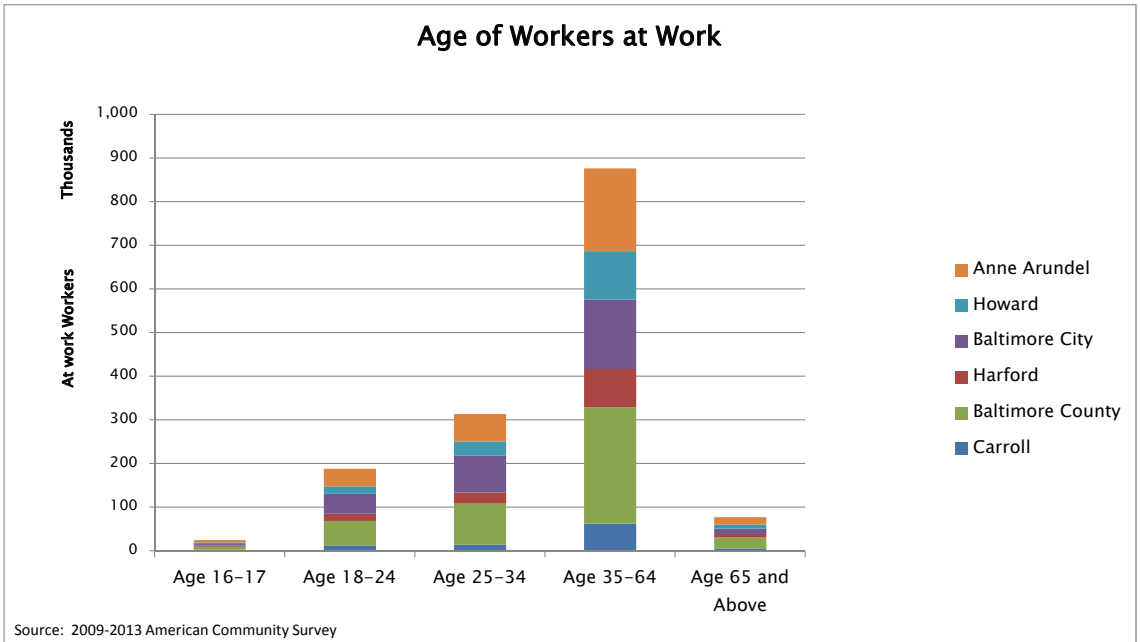
COMMUTING TRENDS

Data from the U.S. Census Bureau American Community Survey (ACS), a collection of household and personal demographic data and primary work location travel characteristics, provides an understanding of regional commuting patterns. The ACS estimated that the Baltimore region was home to 1.48 million workers (primary employment) in the year 2013, with 21 percent working 30 or fewer hours per week.

Baltimore County has the greatest reported number of people working outside the home (448,000), followed by Baltimore City (315,000). At the regional level, slightly more men are employed than women. However, in Baltimore County and City, female workers outnumber male workers. Greater than half (55 percent) of the region's population works outside the home. The share of residents working is projected to decrease as the baby boom generation retires, thus increasing the number of non-working regional residents who will have a greater need to access health care services and social activities.

Figure 5 shows a summary of regional workers who worked outside the home. Researchers have found emerging differences in location and travel choice preferences for the millennial generation. Workers between the ages of 25 and 34 were tabulated separately to evaluate some of these differences. Across the region, 21 percent of the workers are between the ages of 25 and 34. Over half (57 percent) of the workers between the ages of 25 to 34 reside in Baltimore County (29.9 percent) and Baltimore City (27.1 percent). Over a quarter (27.8 percent) of Baltimore City workers are between the ages of 25 to 34, which is the highest share within the Baltimore region.

Figure 5

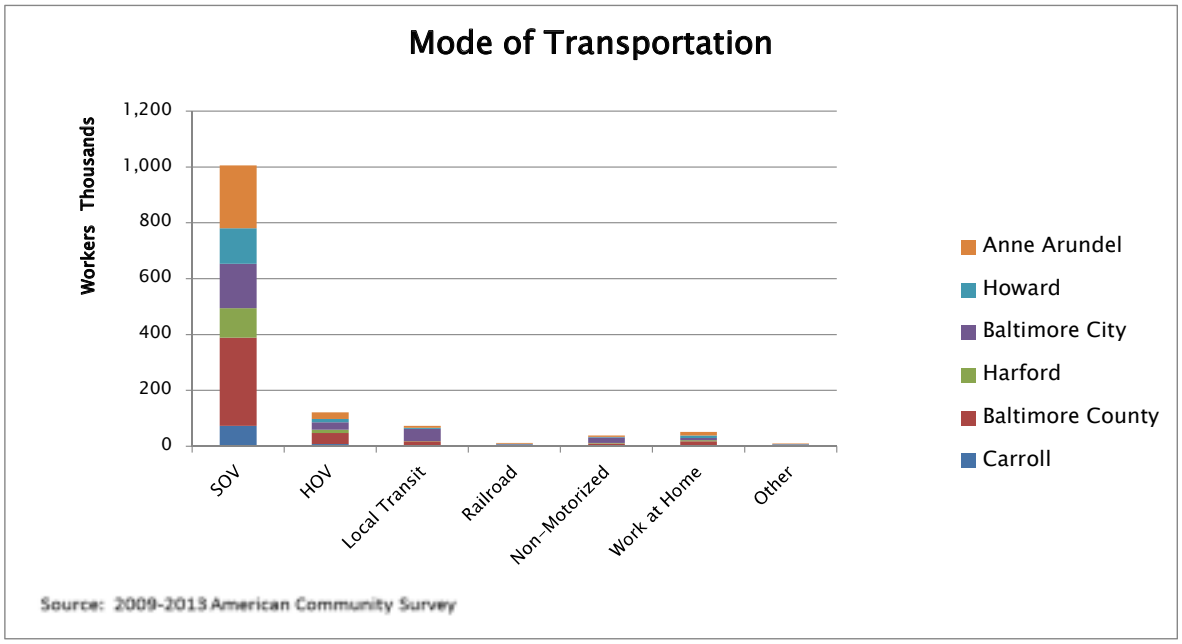


Shift of Employment to the Suburbs

Suburbanization of employment over the last several decades has shifted the primary destination for commuters away from Baltimore City to the surrounding jurisdictions. In 2013, the ACS estimated that 61.4 percent of Baltimore region workers commuted to the surrounding jurisdiction, while about a quarter (25.7 percent) reported primary work locations within Baltimore City. For workers between the ages of 25 to 34, a slightly higher share (29 percent) reported a primary work location within Baltimore City. 11.3 percent of Baltimore workers commuted beyond the Baltimore metropolitan region for work, primarily due to the region's proximity to the Washington region.

ACS respondents provided the mode of transportation used in 2013 (see Figure 6), with SOV being the majority choice at 76.7 percent. The reported regional use of local transit was 5.5 percent, and railroad (MARC) usage was reported at 0.9 percent. More than 80 percent of the region's local transit for commuting was reported for workers residing in Baltimore City (60.5 percent) and Baltimore County (22.4 percent). Shares for the remaining jurisdictions are: Anne Arundel (9.27 percent), Howard (5.4 percent), Harford (1.37 percent), and Carroll (1.08 percent). According to ACS data, the average worker travel time varies considerably by mode. SOV users report a mean travel time of 25.5 minutes for trips within the Baltimore region, compared to local transit users who report a mean travel time of 48 minutes.

Figure 6

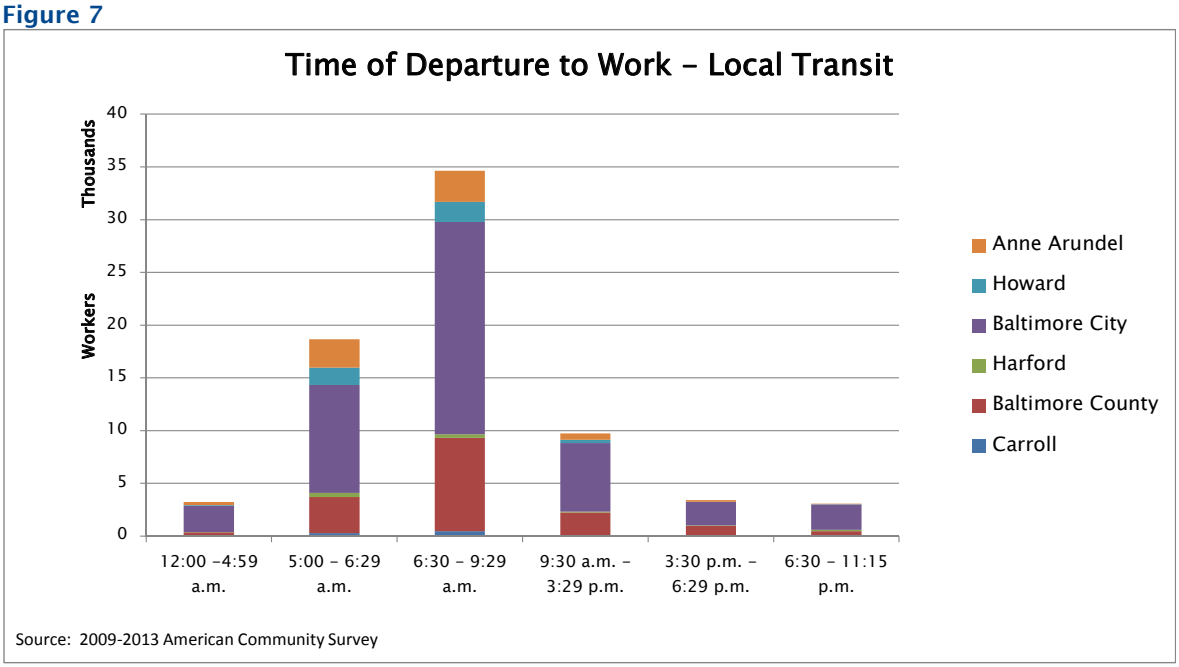


Commuter Characteristics: Additional Details

The ACS provides data on transit user characteristics for the commuting trip and household/person demographics. This enables a greater understanding of travel choices. The ACS estimates that 85,000 Baltimore region residents commute to their primary place of work using either local transit or railroad (MARC). This represents 6.4 percent of all commuters within the Baltimore region. Most (65,700) regional transit users reported primary work locations within the Baltimore region, with the remaining reporting primary work places in the Washington region (17,700) and other locations (1,100).

Railroad (MARC) usage by Baltimore region resident workers is not concentrated in any one jurisdiction. Residents in Baltimore City (25.6 percent), Baltimore County (24.53 percent), and Anne Arundel County (26.88 percent) each report around a quarter of the railroad (MARC) usage, with Howard County (17.07 percent), Harford County (5.4 percent), and Carroll County (0.52 percent) residents making up the remaining shares. Most (80.5 percent) of the Baltimore region workers who reported using railroad (MARC) showed the Washington region as their primary work location. Other primary work locations with large share of railroad (MARC) users are Baltimore City (10 percent) and Baltimore County (3.7 percent).

Figure 7



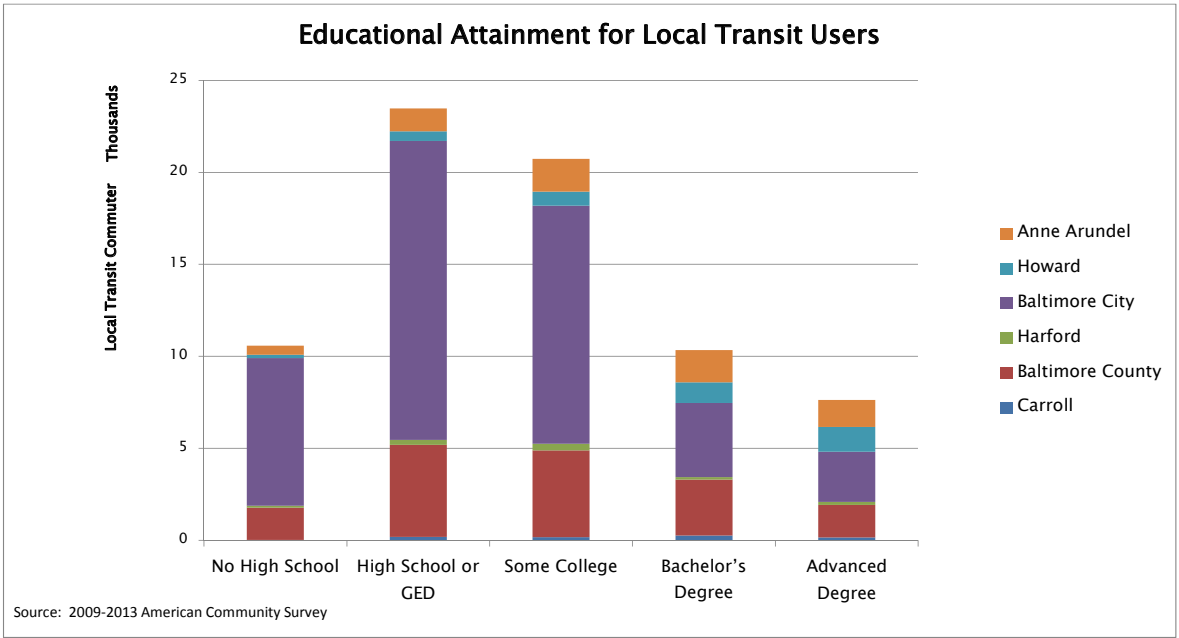
The reported departure time for work is generally earlier for transit users (see Figure 7) compared to workers for all other modes. Slightly more than a quarter (25.7 percent) of local transit users report a departure time for work between 5:00 and 6:29 a.m., compared to 18.6 percent for all workers. The peak hours between 6:30 and 9:29 a.m. departure time for work is reported for 34,600 workers or 47.6 percent of all local transit users. The same peak period (6:30 to 9:29 a.m.) is the departure time of 60.2 percent of workers regardless of mode. The longer mean local transit time (47.9 minutes) may help explain the transit user's earlier departure time. The midday reported time of departure to work (9:30 a.m. to 3:29 p.m.) using local transit is the choice for 13.4 percent of local transit users, occurring after or prior to more frequent directional peak transit service. The overnight (6:30 p.m. to 11:15 p.m.) and early morning (12:00 to 4:59 a.m.) time of departure to work periods were reported for 6,300 workers or 8.7 percent of local transit users. Second and third shift workers who participated in the Opportunity Collaborative workshops reported transit travel challenges during the overnight period.

The ACS data reported that, in 2013, 43.1 percent of workers commuting using local transit were from households with incomes below $50,000, with 17 percent of local transit commuters having a household income below $25,000. The Baltimore region urban area 2013 median household income was $64,300, above the household income of a typical local transit commuter.

In the region, reported worker educational attainment is high, with 38 percent having attained a college degree. Educational attainment is the highest in Howard County, with 60 percent of workers attaining a college degree. Of those workers, 25 percent have attained a professional degree beyond a bachelor's degree. Baltimore City has the highest share of workers (12 percent) with less than a high school education.

Generally, transit commuters' educational attainment is lower compared with regional workers overall (see Figure 8). Nearly 15 percent of local transit users had not completed high school; 32.2 percent have a high school education. Local transit commuters who had a bachelor's or advanced degree represented a quarter (24.7 percent) of users. More women (56.3 percent) are local transit commuters (with a total number 9,200 higher than the total for men).

Figure 8



Using the ACS form, workers provided information on their primary work employer. 63.8 percent of local transit workers work for private for-profit employers. The primary employer of about one in five (21.4 percent) of local transit workers is either local, state or federal government. The share of reported railroad (MARC) users' local, state or federal government share is 49.4 percent, with federal employment representing 43.3 percent. The high share of federal workers using railroad (MARC) is due largely to the employer-provided fare subsidy as a result of federal government participation in pre-tax transit commuter benefits. Half of the MARC commuters in the 2008 MTA on-board transit survey reported receiving either a fare subsidy either partially or fully paid by the employer. This is compared with 11.7 percent of 2008 local bus commuters reporting receiving either a partial or full employer-paid fare subsidy. The Internal Revenue Service (IRS) announced the 2015 pre-tax commuter benefits limits of $130 for transit and $250 for parking benefits.

Employer information provided by ACS participants is used in identifying the worker's primary industry, which describes the kind of business conducted by a person's employing organization. Detailed industry data was grouped into 18 broad categories, with five categories containing 63.7 percent of local transit users:

- Medical (16.2 percent),
- Entertainment (13.4 percent),
- Professional Services (11.8 percent),
- Administration (11.7 percent), and
- Retail (10.5 percent).

The next four industries containing 22.6 percent of local transit users:

- Education (7.1 percent),
- Financial Services (5.9 percent),
- Service Sector (5.5 percent) and
- Transportation (4.1 percent).

In 2013, 11.6 percent of Baltimore region households reported no motor vehicle available with 62.1 percent of these households located in Baltimore City. Local transit commuters from zero vehicle households was 42.2 percent in 2013 with over half (55.5 percent) of Baltimore City and 29 percent of Baltimore County local transit commuters reporting no household vehicle available. Over 800 local transit commuters from Anne Arundel County and 500 from Howard County reported residing in zero vehicle households.

TOP BUS BOARDINGS (2014)

MTA bus service currently has 57 bus routes. Of these routes, 47 are regular or "local" buses, four are limited-stop routes (i.e., QuickBus), and four are express bus routes (that operate from various suburbs to downtown Baltimore). A ranking of boarding information was performed and the top five as well as the top 10 MTA bus routes were identified (see figures 10 and 11). The top five routes included all local routes. The top five routes accounted for 60,100 average weekday boardings, about 25 percent of all total weekday bus boardings in the region for 2014. The top 10 routes accounted for 108,500 average weekday bus boardings, or about 45 percent of the total weekday bus boardings in 2014.

A more nuanced analysis is merited to define demand from east to west. However, the demand for east-west transit movement is high. The primary movement of four of the top five routes (15, 13, 23, and 10) and eight of the top 10 (15, 13, 23, 8, 10, 5, QB 40, 22, and 20) all serve an east-west movement, with all but Route 22 directly serving the downtown or mid-town areas. Larger movements also suggest there is ongoing demand for transit between (and through) greater Towson to downtown, White Marsh to downtown, Security to downtown, and Catonsville to downtown.

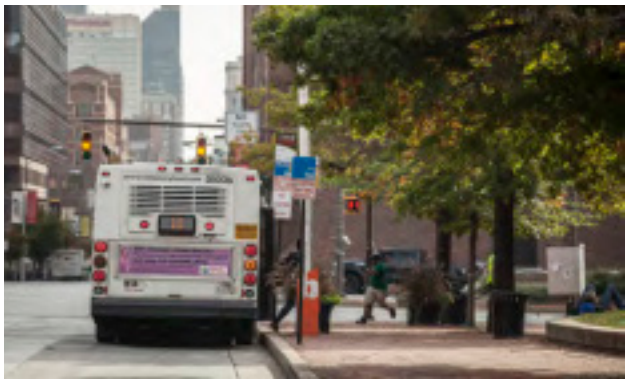
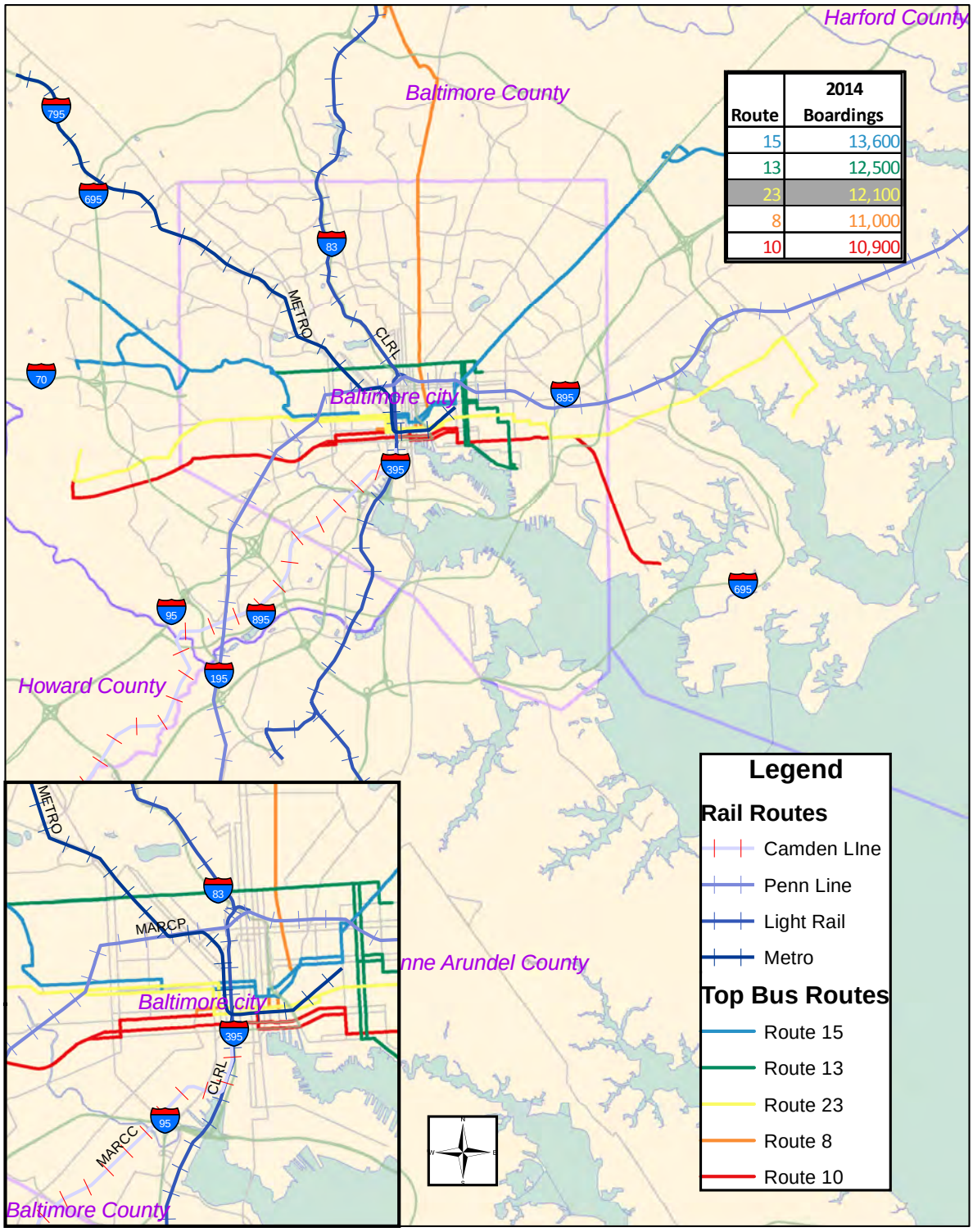


Figure 9

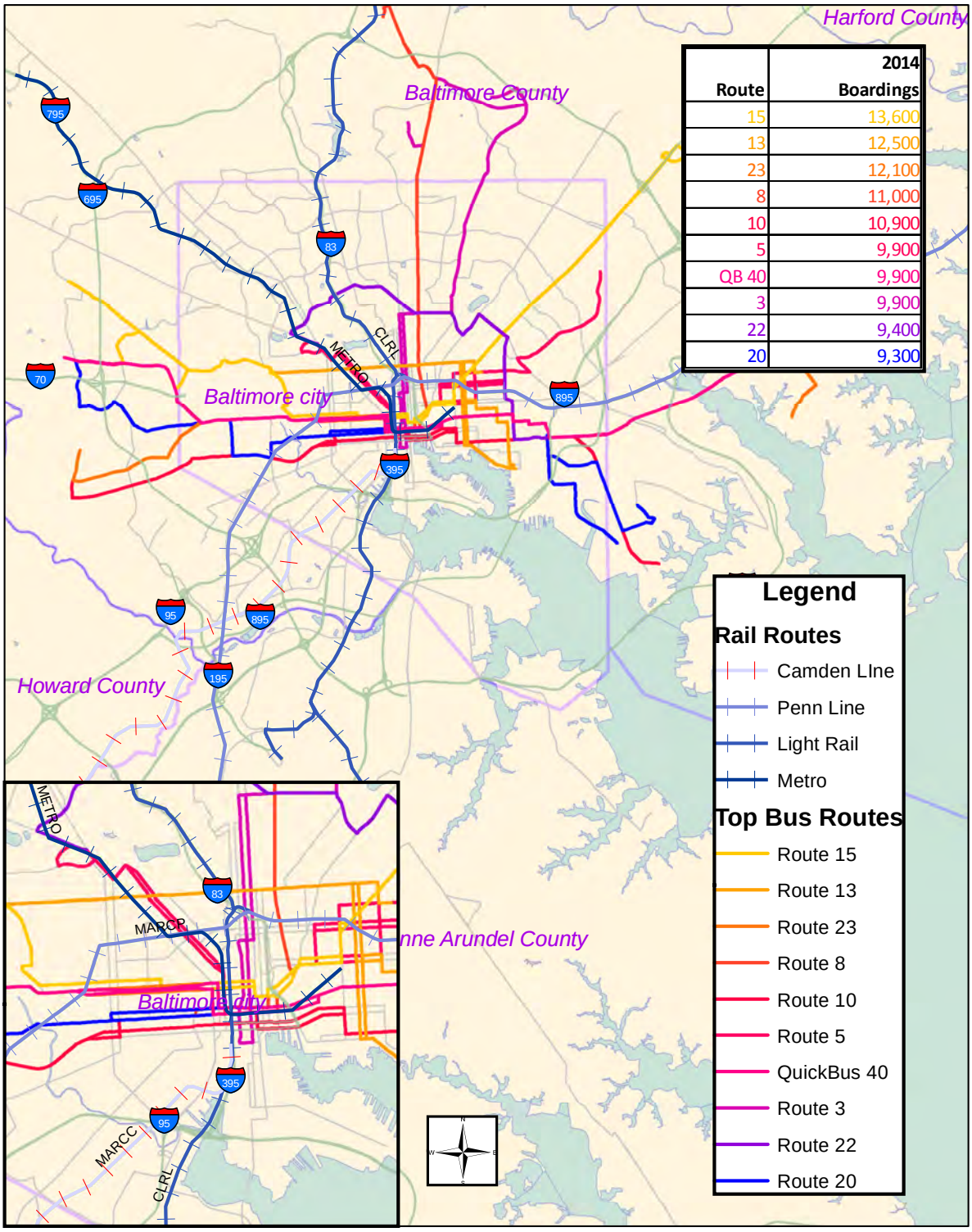
Top Five MTA Bus Routes by 2014 Boardings



Route	2014 Boardings
15	13,600
13	12,500
23	12,100
8	11,000
10	10,900

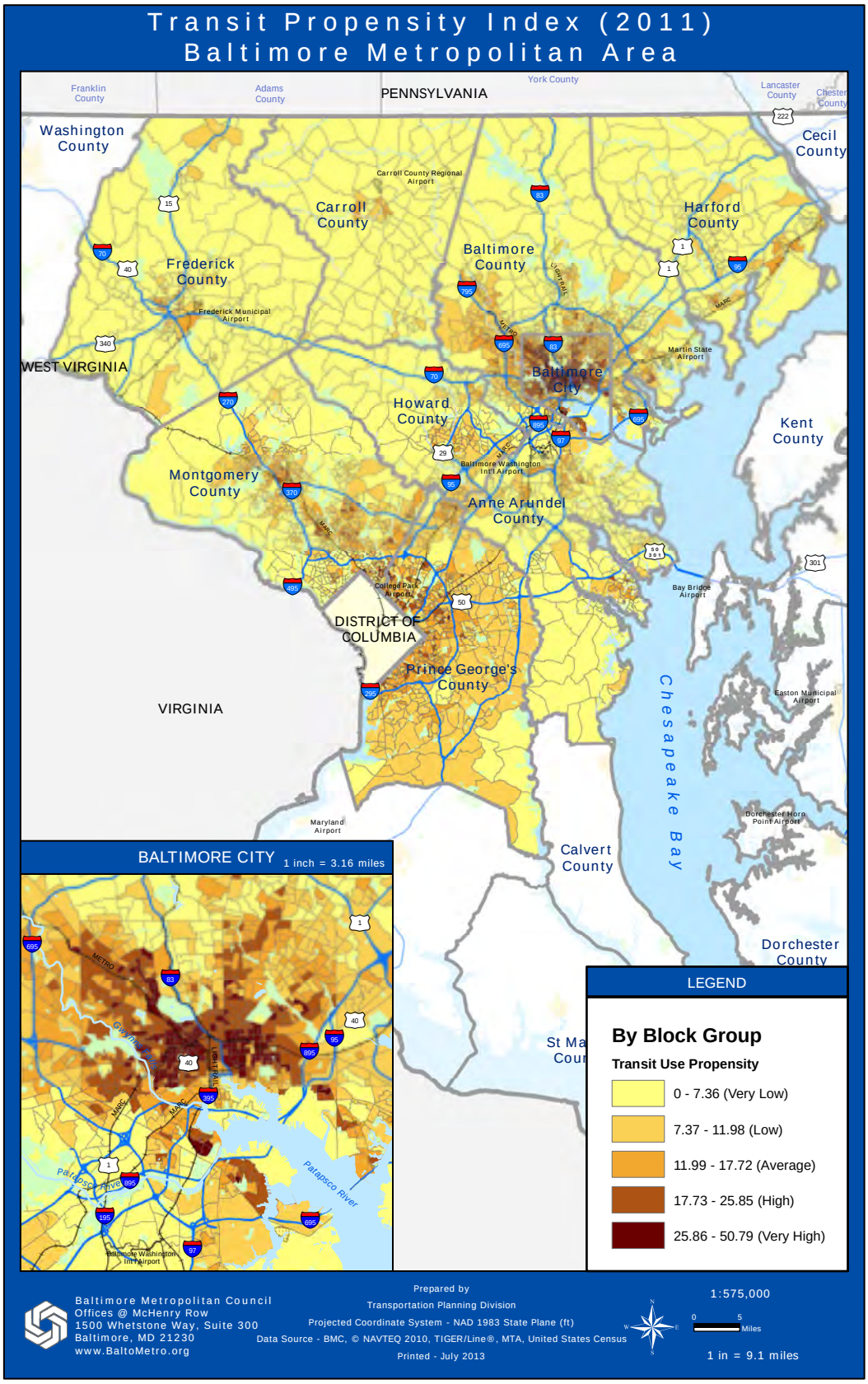
Figure 10

Top Ten MTA Bus Routes by 2014 Boardings



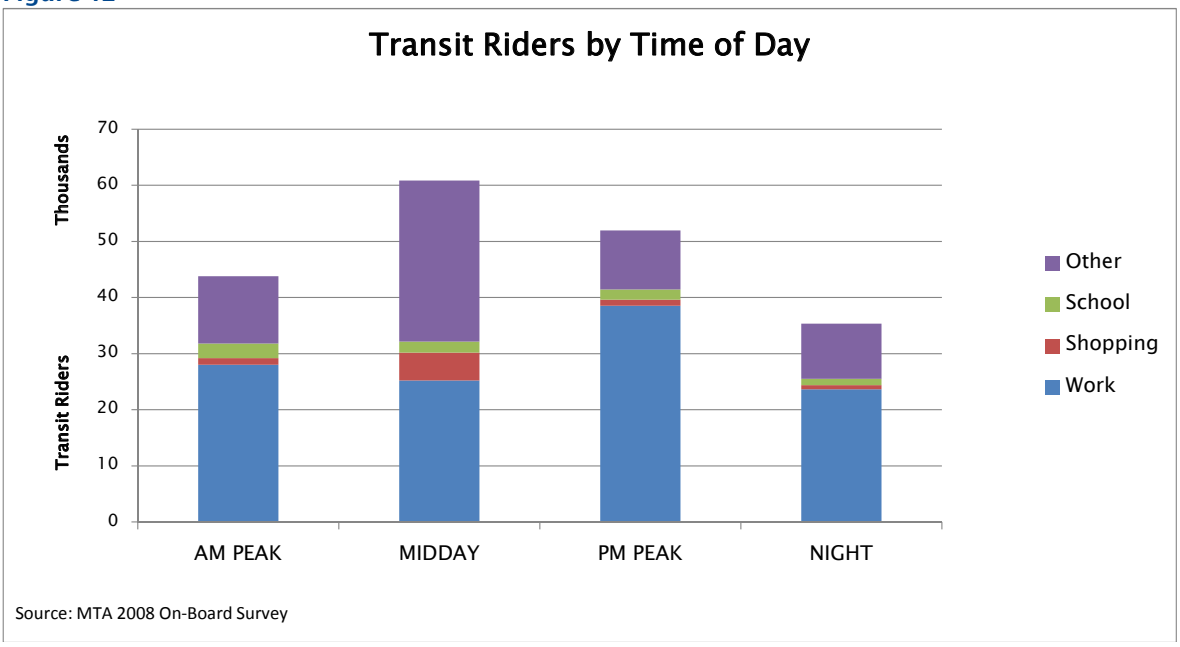
Route	2014 Boardings
15	13,600
13	12,500
23	12,100
8	11,000
10	10,900
5	9,900
QB 40	9,900
3	9,900
22	9,400
20	9,300

Figure 11



Baltimore Metropolitan Council

Figure 12



TRANSIT USERS – INDEX

Numerous national research studies using transit ridership survey data have identified household and person level demographics characteristics common with transit use. The Transit Cooperative Research Program (TCRP) – Report 28 identified several demographic indicators of transit demand: zero vehicle housing units, mobility limitations, recent immigrants, low-income households, females, population density.

A Transit Use Propensity (TUP) Index was developed based on demographic groups that are likely to use public transit, as identified in TCRP Report 28. Using the 2008 on-board transit survey reported trips, the eight strongest demographic indicators were weighted and combined to develop an index from very high to very low transit use propensity. The 2011 Baltimore region results are shown on the map in Figure 12.

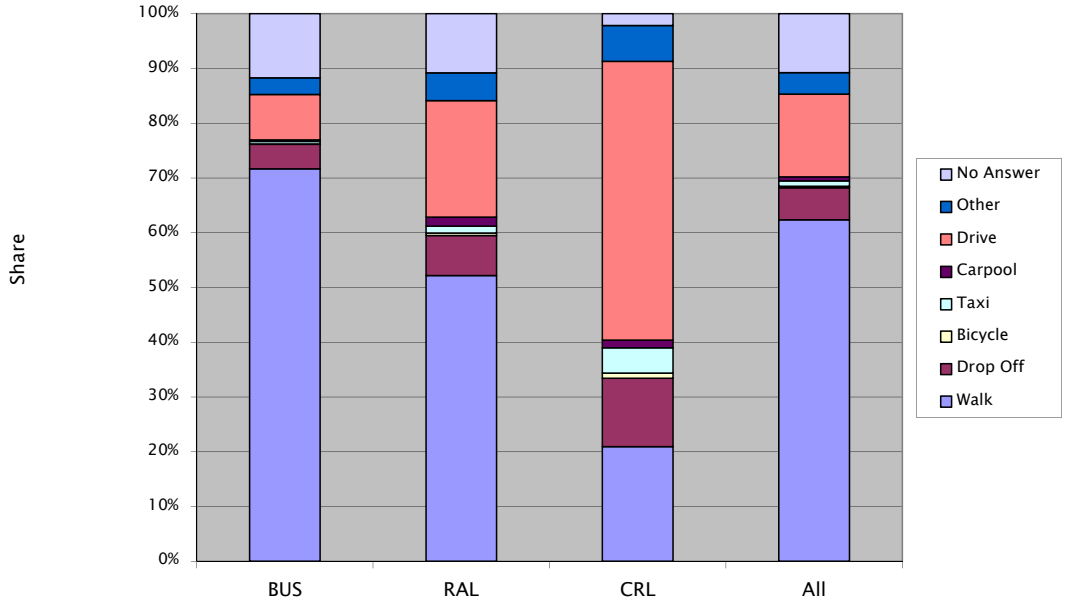
TRANSIT USERS – NON-COMMUTING

The annual ACS provides demographic data and workers' primary work location travel characteristics. To understand non-commuter transit use, planners and transit operators periodically administer on-board transit and/or household travel surveys. In the spring of 2007 and 2008—and as part of the Federal Transit Administration's Red Line New Starts analysis—an on-board transit survey was administered. This effort collected 13,158 "completed and usable" survey records, providing a comprehensive dataset of MTA system users. Transit users riding a locally operated transit system (LOTS) were not surveyed; only ACS data is available for these users. The advantage of an on-board transit survey compared to the annual ACS survey is the ability to more closely exam transit travel, particularly data on non-commuting travel.

About 40 percent of transit trips were for travel other than commuting, with 32 percent classified as "other." Examples of "other" types of transit travel are to: access health care, make social visits, get to school or training, or take part in recreational activities. Almost half of non-commuting travel (46.6 percent) occurs during the midday period between the hours of 9:30 a.m. and 3:30 p.m., whereas commuter travel is concentrated in the morning (6:30 a.m. to 9:30 a.m.) and afternoon (3:30 p.m. to 6:30 p.m.) peak periods. Almost a third (31.7 percent) of all transit travel occurs during the midday. The midday time period is twice as long (6 hours compared to 3 hour peak periods) compared to the peak period, with fewer routes and less frequent transit service.

In 2008, survey respondents traveling for commuting and non-commuting reported differences in household vehicle availability. Just over 40 percent of transit commuters reported residing in a zero-vehicle household, compared to just over 50 percent of people making non-commuter trips. Commuting trips attract more "choice riders." In contrast, traveling for non-commuter purposes meets the mobility needs of the transit-dependent population.

Figure 13 – Transit Mode of Access



TRANSIT USERS – ACCESS

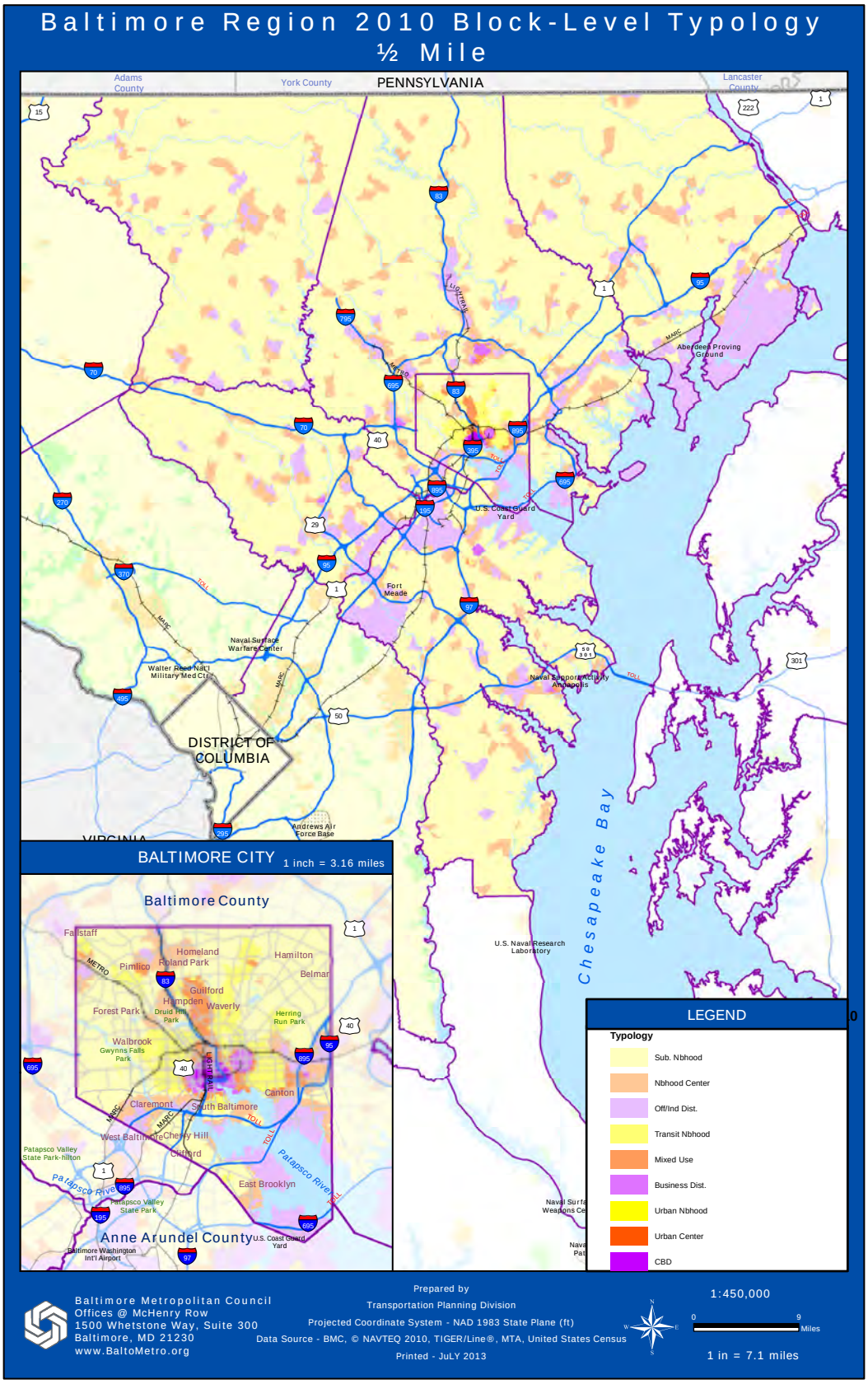
The ability of users to ride transit is influenced by urban form. The 2008 on-board survey reveals differences in how transit users accessed the bus, rail (Metro and light rail), and commuter rail (MARC) systems (Figure 14). The vast majority of bus users (71.7 percent) and a majority of Metro and light rail users (52.2 percent) walked to access the transit system, while most MARC users (50.9 percent) drove to access the transit system. This highlights the need to integrate the bus system within neighborhoods and to focus Transit-Oriented Development (TOD) around rail stations, thus reducing transit access time. Destinations with walkable activity centers should also be considered, since transit users to improve the ability of transit users to walk to reach final destinations.

The ability of transit users to access destinations is influenced by the service directness or the number of transfers required to access destination. Roughly 40 percent of all 2008 on-board survey trips required at least one transfer. When commuting, 60.1 percent of riders reported zero transfers compared to 57.3 percent for non-commuting transit trips. As expected, there were reported differences in transfer rates between bus and Metro / light rail. Local bus routes are "funneled" to fixed-rail transit, with many fixed-rail origins and destinations requiring a transfer from or to local bus. Most Metro and light rail users (56 percent) transferred at least once, with one in five (20.3 percent) transferring two or more times.

BMC staff conducted a regional typology analysis based on Center for Transit Oriented Development (CTOD) methodology. This analysis used locally endorsed small area population and employment data. The methodology classifies areas within nine different land use categories based on the total number of residents plus jobs (intensity) and the mix of households and employment (ratio of residents to jobs). The method provides a consistent regional classification identifying neighborhoods, centers, and employment districts along with the scale (intensity) of development. The 2010 block level Baltimore region typology results are shown in the table below.

Intensity: Residents + Workers		
Housing	**Mix (Ratio of Workers to Residents)**	**Employment**
Urban Neighborhood	Urban Center	Central Business District / Special District
Transit Neighborhood	Mixed-Use Center	Business District
Suburban Neighborhood	Neighborhood Center	Office/Industrial District

Figure 14


Baltimore Region 2010 Block-Level Typology
½ Mile
PENNSYLVANIA
Adams County
York County
Lancaster County
Aberdeen Proving Ground
U.S. Coast Guard Yard
Fort Meade
Naval Surface Warfare Center
Walter Reed Nat'l Military Med Ctr
Naval Support Activity Annapolis
DISTRICT OF COLUMBIA
Andrews Air Force Base
U.S. Naval Research Laboratory
Chesapeake Bay
BALTIMORE CITY
1 inch = 3.16 miles
Baltimore County
Anne Arundel County
Patapsco River
Patapsco Valley State Park
Baltimore Washington Int'l Airport
LEGEND
Typology
Sub. Nbhood
Nbhood Center
Off/Ind Dist.
Transit Nbhood
Mixed Use
Business Dist.
Urban Nbhood
Urban Center
CBD
Baltimore Metropolitan Council
Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
www.BaltoMetro.org
Prepared by
Transportation Planning Division
Projected Coordinate System - NAD 1983 State Plane (ft)
Data Source - BMC, © NAVTEQ 2010, TIGER/Line®, MTA, United States Census
Printed - JuLY 2013
1:450,000
0
9
Miles
1 in = 7.1 miles

Specialized Transportation Services

This section summarizes the demographics of the Baltimore region's elderly and disabled populations and identifies the transportation providers who serve them. The section also includes a description of an ongoing transportation needs assessment focusing on these two groups. There is also a brief discussion of the Maryland Transit Administration's (MTA) Mobility/Paratransit service.

ELDERLY POPULATION

The region is getting older as the size of the region's elderly population is expected to increase from just over 380,000 in 2014 to more than 600,000 in 2040. In 2014, the elderly represented 14 percent of the Baltimore region population. By 2040, it will rise to more than 20 percent of the total population. In the same period, the elderly will make up 25 percent of the driving age population in the region.

2014 Regional Elderly Population Distribution

Jurisdiction	Elderly Age Groups			Total Jurisdiction Elderly Population	Total Jurisdiction Population (All Ages)	Percent of Local Jurisdiction Population
	Young Elderly (Age 65-74)	Middle Elderly (Age 75-84)	Old Elderly (Age 85+)			
Anne Arundel	45,713	20,816	8,721	75,250	560,133	13%
Baltimore City	43,777	22,298	10,593	76,668	622,793	12%
Baltimore	69,726	38,647	22,410	130,783	826,925	16%
Carroll	15,108	7,190	3,436	25,734	167,830	15%
Harford	21,883	10,238	4,322	36,443	250,105	15%
Howard	23,430	10,089	4,175	37,694	309,284	12%
Region	**219,637**	**109,278**	**53,657**	**382,572**	**2,737,070**	**14%**

- Population Estimates for July 1, 2014. Prepared by the Maryland Department of Planning. Source: U.S. Census Bureau, June, 2015.

The region's elderly remain tenaciously independent. Over 90 percent of the elderly continue to age in place after they retire. Only 5 percent move to the Sunbelt, or to local retirement communities and continuing care facilities. The other 5 percent choose options such as moving in with family.

Suburbanization of the elderly is a not-surprising effect of the "in-place" phenomenon. By 2030, about 80 percent of the Baltimore region elderly population will live in dispersed, low-density suburban areas. In these settings, public transportation and paratransit services are limited and very expensive to provide.

National data suggests that most of the elderly are in good health, but that a substantial portion of the elderly will face increasing disabilities as they age. In the Baltimore region:

- Approximately 290,000 of the elderly have no significant travel disabilities. This large group in the Low Travel Need category is able to drive or travel whenever and wherever they please without reliance on others.
- Over 60,000 of the elderly are in the Moderate Travel Need category. They are able to either drive or walk three blocks, but not both.
- More than 30,000 of the elderly are in the High Travel Need category. They have multiple disabilities and can need door-to-door transportation service as well as a travel companion to meet their mobility needs.

DISABLED POPULATION

The data shown in the table comprise the following disabilities: hearing, vision, cognitive, ambulatory, self-care, and independent living difficulties. Cognitive difficulties predominate among the young; ambulatory, independent living, and hearing difficulties predominate among the elderly.

2014 Regional Disabled Population Distribution

Jurisdiction	Age 0-5	Age 5-17	Age 18-64	Age 65+	Total	Percent with a Disability
Anne Arundel	422	3,954	27,006	21,660	53,042	10%
Baltimore City	805	6,595	45,694	41,387	94,481	12%
Baltimore	187	1,039	6,946	7,713	15,885	10%
Carroll	27	2,263	14,830	10,121	27,241	11%
Harford	294	2,207	8,043	10,883	21,427	7%
Howard	104	6,905	52,529	30,172	89,710	15%
Region	**1,839**	**22,963**	**155,048**	**121,936**	**301,786**	**11%**

- Source: 2014 American Community Survey (ACS) 1-Year Estimates

TRANSPORTATION PROVIDERS

Elderly and disabled residents of the Baltimore region are served primarily by paratransit services provided by state and local governments, including ADA paratransit service, demand response service, and taxi voucher programs, as well as an extensive network of private non-profit transportation providers.

MTA and Locally Operated Transit Systems (LOTS)

The table lists paratransit services by jurisdiction. MTA Mobility operates ADA paratransit service within ¾ mile of MTA fixed-route service in Baltimore City, Anne Arundel County, and Baltimore County.

Baltimore Region Paratransit Service

Jurisdiction	Agency	Type of Service	Hours of Operation
Anne Arundel	MTA Mobility	ADA Paratransit	Same as MTA Fixed Route
	AA Aging and Disabilities	Van Transportation / Taxi Voucher	N/A
Baltimore City	MTA Mobility	ADA Paratransit	Same as MTA Fixed Route
	BC Aging and CARE Services	TaxiCard Program	24/7
Baltimore	MTA Mobility	ADA Paratransit	Same as MTA Fixed Route
	BC CountyRide	Demand Response Shopping Shuttle	M-F, 8:00 a.m. - 4:00 p.m. At least once a month
Carroll	Carroll Transit System	Demand Response	M-F, 8:00 a.m. - 5:00 p.m.
Harford	Harford Transit	ADA Paratransit SSTAP/Demand Response Extended Demand Response	M-F, 6:15 a.m. - 6:15 p.m. M-F, 6:00 a.m. - 5:00 p.m. M-F, 4:00 p.m. - 9:00 p.m.
Howard	RTA Mobility	ADA Paratransit	Same as RTA Fixed Route

Non-Profit Providers

The representative list of Baltimore region non-profit transportation providers includes many that offer shuttle or demand response service using buses or vans, including accessible vehicles, and also volunteer driver programs that match elderly riders with volunteer drivers. Transportation is frequently a gateway to other activities and services, such as social outings, financial counseling, and home repair, provided by these organizations:

- Action in Maturity
- Associated Catholic Charities
- Athelas Institute
- Comprehensive Housing Assistance, Inc. (CHAI)
- Easter Seals Servicing DC MD VA
- Family and Children's Services of Central Maryland
- Fying Colors of Success
- Hopkins ElderPlus
- Humanim
- LifeBridge Health
- Mosaic Community Services
- NeighborRide
- Partners In Care
- Penn-Mar Organization
- Progress United
- Providence Center
- Sojourner-Douglass College
- The ARC of Carroll County
- The ARC Northern Chesapeake
- The League for People with Disabilities
- Winter Growth

ASSESSMENT OF TRANSPORTATION NEEDS

As part of the 2015 update of the *Baltimore Region Coordinated Public Transit-Human Services Transportation Plan*, on June 17 and 18, 2015, the MTA and BMC hosted two regional workshops to engage a variety of organizations at the local level that are aware of transportation issues, especially in regard to people with disabilities, older adults, and people with lower incomes. The two Baltimore Area Coordinated Transportation Planning Workshops attracted 34 participants.

Federal Transit Administration (FTA) coordinated planning guidelines require an assessment of transportation needs for individuals with disabilities and the elderly. The transportation needs assessment for the Baltimore region focuses on these population groups, and also involves a broader approach that builds upon previous coordinated transportation planning efforts.

The section below lists the results from the overall transportation needs assessment based on input from stakeholders at the two regional workshops. The next several months will see the completion of a more detailed plan for these services, in particular the development of regional strategies, activities, and projects to meet identified needs. Considering the inexorable aging of the region's population, the timely implementation of these strategies, activities, and projects must be a priority.

Highlights of the needs assessment follow:

Expanded Transportation Services

While there are an array of transportation resources in the region, stakeholders discussed a variety of unmet needs and gaps in services. Specific issues and needs identified by participants and included the following:

Trip Purpose

- There are insufficient transportation options to access dialysis treatment centers. There are limited options for long distance trips to medical facilities, particularly for people who are not eligible for Medicaid-funded transportation.
- There is a need for expanded transportation options for non-medical trips, i.e. shopping, recreational, social, and other quality of life trips.

Time Related

- Transportation services at certain time frames – early morning, mid-day, evenings, weekends, and for second and third shift job hours – remain limited in much of the region, and there is a need to expand travel options at these times.
- There is a lack of transportation options that enable same day or last minute trips. The recent legalization of Transportation Network Companies (TNC) such as Uber and Lyft by the Maryland General Assembly may present opportunities to address this gap in service.

Place/Destination

- While some services exist, the current transportation options for urban area residents to access employment opportunities in the suburbs (reverse commute service) are limited.

Other

- There is a lack of transportation options for individuals who may need more customized transportation services and greater assistance to travel, especially for seniors and people with disabilities.
- The capacity of volunteer driver programs should keep pace with the region's growing senior population. There is a need to develop enhancements that will encourage and maintain volunteer involvement in these programs.
- There is a need for local governments and non-profit organizations to understand where they can use mobile applications and other technology, e.g. data collection via an automated reservation system, to improve transportation service.

Outreach, Marketing, and Education

- There is a need for a centralized location for customers, human service agency staff, families, caregivers, etc., to gain information on available aging and disability resources, including transportation options.
- There is a need to publicize already existing information sources.
- There is a need for travel training efforts that help to educate potential customers in the use of available public transportation services in the region.

More Affordable Transportation Services

- There is a need to assess the fare structure as fares may be cost-prohibitive for people whose trips are not subsidized by a particular program or agency (i.e. Medicaid).
- While private transportation services are available in the region many people cannot afford to use them.

Improved Coordination and Connectivity

- While some connections exist between some public transit providers in the region, stakeholders expressed the need for more convenient connections among the various Locally Operated Transit Systems (LOTS) in the region and the core MTA services that are provided in the metropolitan area.
- Stakeholders noted the need for first mile/last mile connections to help connect people to existing services. These issues are especially acute in suburban areas where jobs may not be within walking distance to public transit services.
- Currently there is limited coordination of trips between different human service agencies and organizations. There is a need for improved communication between these agencies and the ability to identify possible coordination opportunities.

Additional Funding

- There is a lack of overall funding to support the variety of transportation services that are needed in the region. There is a need to further quantify and document unmet needs and gaps in service as part of educating elected officials and potential funders.

MTA MOBILITY/PARATRANSIT SERVICE

In addition to the regional needs assessment, there is an immediate concern to be addressed—namely, the many anecdotal reports which suggest that riders of MTA Mobility experience excessive delays. Specifically, return trips with wait times of several hours have been frequently reported.

To its credit, MTA has established new on-time performance standards for Mobility service. Under the new standards, on-time performance has been defined as plus-or-minus 10 minutes of scheduled arrival time. Although the standards will help clarify expectations for all parties, it would also be beneficial to extend the Rate Your Ride program to paratransit service.

Rate-Your-Ride currently gives riders of MTA fixed-route service an easy way to send their comments, positive and negative, to MTA in real time via text, phone, or online survey. The Rate-Your-Ride program should be adapted to paratransit service and made available in a low-tech format suitable for Mobility riders and their families. As is the case with fixed-route service, the results should be published monthly.

"MTA's Rate-Your-Ride program should be adapted to paratransit service and made available in a low-tech format suitable for Mobility riders and their families."

Baltimore City Student Transportation Service

Baltimore City Public Schools (BCPS) currently contracts with the Maryland Transit Administration (MTA) for student transportation service (school bus services). The service is provided within guidelines established by FTA. According to FTA guidelines: "Public transportation vehicles can be used to transport students and school personnel to and from school if they ride regularly scheduled mass transportation service that is open to the general public."

A brief analysis of this activity is undertaken here in response to conversation about the tradeoffs of providing student transportation service.

The analysis includes MTA and five peer transit agencies from around the country that also have formal agreements to provide student transportation for one or more school districts. The peer agencies selected either have fixed route bus service that APTA has identified as similar to MTA's or they serve an area that is a demographic peer of the Baltimore area. Ridership, fares, and payments from the school districts are compared.

DESCRIPTION OF MTA STUDENT TRANSPORTATION

Eligibility

Baltimore City Public Schools (BCPS) secondary students who reside more than 1.5 miles from their schools are eligible to receive an S-Pass that allows them to ride any MTA Local Bus, Metro Subway or Light Rail to and from school. Charter schools can also purchase the passes from BCPS for their students. Elementary school students are eligible for yellow school bus service.

The current contract allows students unlimited travel between 5 a.m. and 8 p.m.

A new contract that MTA is negotiating with BCPS will allow students two trips per day between 5 a.m. and 6 p.m. with unlimited transfers for 90 minutes.

Ridership

Approximately 27,000 BCPS and charter school students ride MTA each day. Total BCPS K-12 enrollment is 84,976.

Up to 22 percent of the total ridership on the MTA system on any given school-day during peak hours of service is from students (245k total daily bus trips and potential of 54k daily bus trips from students).

Fares

Students pay no fare. Instead, MTA bills the schools directly when students use the passes. The fare is $1.20 for a one-way trip, and $2.40 for two or more one-way trips per day. MTA's regular fare is $1.70.

Payment from BCPS

MTA billed BCPS $5,194,333 during the 2014-2015 school year for S-Pass usage including administrative charges. The schools also buy prepaid tickets from MTA that they use primarily for their summer programs and for after-school activities. This amounted to $440,000.00. The total billed for the 2014-2015 school year was $5,634,333.

PEER SYSTEM ANALYSIS – STUDENT TRANSPORTATION

Ridership

In this section, student ridership of transit is analyzed from the perspective of the school district and the transit agency. Yellow school bus ridership is included in the school district analysis.

Student Ridership on School Buses and Public Transit, Including Eligibility and Fares – Maryland Transit Administration (MTA) and Selected Public Transit Agencies

State	School District	Transit Agency	Student Enrollment (K-12)	Daily Ridership			
				School District		Transit Agency	
				School Bus	Public Transit	Total	Student
FL	Miami-Dade County Public Schools	Miami-Dade Transit (MDT)	350,846	(17%) 59,093	(2%) 5,800	176,700	(3%) 5,800
GA	Atlanta Public Schools Fulton Co Public Schools Dekalb Co Public Schools	MARTA	230,756	(79%) 181,912	(19%) 43,890	204,250	(21%) 43,890
HI	Hawaii Department of Education	TheBus	121,196	(12%) 15,000	(14%) 17,351	108,800	(16%) 17,351
MD	Baltimore City Public Schools	MTA	84,976	(5%) 4,000	(32%) 27,000	161,550	(17%) 27,000
DC	District of Columbia Public Schools	WMATA	66,335	(5%) 3,239	(24%) 16,062	647,300	(2%) 16,062
MN	Minneapolis Public Schools	Metro Transit	35,356	(79%) 28,000	(14%) 4,900	134,900	(4%) 4,900

School District – Students Riding Public Transit

The number of students transported daily by MTA (27,000) is higher than all but MARTA (43,890), which serves the school districts of Atlanta, Fulton County, and Dekalb County. TheBus in Honolulu (17,351) and WMATA in the District of Columbia (16,062) transport somewhat fewer students. Miami-Dade Transit (5,800) and Metro Transit in Minneapolis (4,900) transport a comparatively small number of students.

How much a school district relies on public transit is shown by the proportion of all enrolled students that ride public transit. The proportion of BCPS students transported daily by MTA (32 percent) is the highest, but four of the peer transit agencies also transport a large proportion of their school district's students: WMATA (24 percent), MARTA (19 percent), TheBus (14 percent), and Metro Transit (14 percent).

In contrast, Miami-Dade Transit transports a very small proportion (2 percent) of the County's 350,846 students.

School District – Students Riding School Buses

The availability of yellow school bus service differs considerably among the school districts studied.

A large majority of Minneapolis's Metro Transit (79 percent) and Atlanta's MARTA (79 percent) area students are eligible to ride school buses.

On the other hand, only a modest number of Miami-Dade County (17 percent) and Honolulu County (12 percent) students are eligible to ride school buses.

As noted previously, elementary school students are eligible to ride school buses in Baltimore City (5 percent); only special needs students are eligible in Washington, DC (5 percent).

Transit Agency

As an ad hoc measure of the effect of student transportation service on overall transit operations, the ratio of daily student riders to daily total riders, was calculated for each transit agency. Based on the results, the agencies fall into two distinct groups.

At WMATA, Miami-Dade Transit, and Metro Transit, the proportion of student riders is small (< 4 percent).

At TheBus, MTA, and MARTA, the proportion of student riders is significantly higher, ranging from 16 percent to 21 percent.

Fares

All of the transit agencies are paid to transport students. Either the students pay or the school district pays under a formal agreement.

Students Pay

Miami-Dade Transit and TheBus have nominal or published student fares of $1.10 and $1.25, respectively. The fares are discounted approximately 50 percent compared to adult fares.

School District Pays

Like MTA, WMATA and Metro Transit offer nominally free service but are reimbursed by their school districts. As noted previously, the actual MTA fare is $1.20, which represents a discount of 30 percent on the adult fare. The actual Metro Transit fare is $1.60, which represents a discount of 40 percent. WMATA participates in The District of Columbia's School Discount Program. The School Discount Program provides free 30-day passes to eligible students, making any comparisons difficult.

Other

Under MARTA'S program, 10-Trip Student Breeze Passes may be purchased by participating primary and secondary schools and given or sold to registered students. Student eligibility to receive passes is determined by the participating school.

Payment from School System

No data on reimbursements have been collected from the peer agencies but, based on the discussion of fares, the rate of reimbursement paid to MTA is about average.

SUMMARY OF STUDENT TRANSPORTATION SERVICES

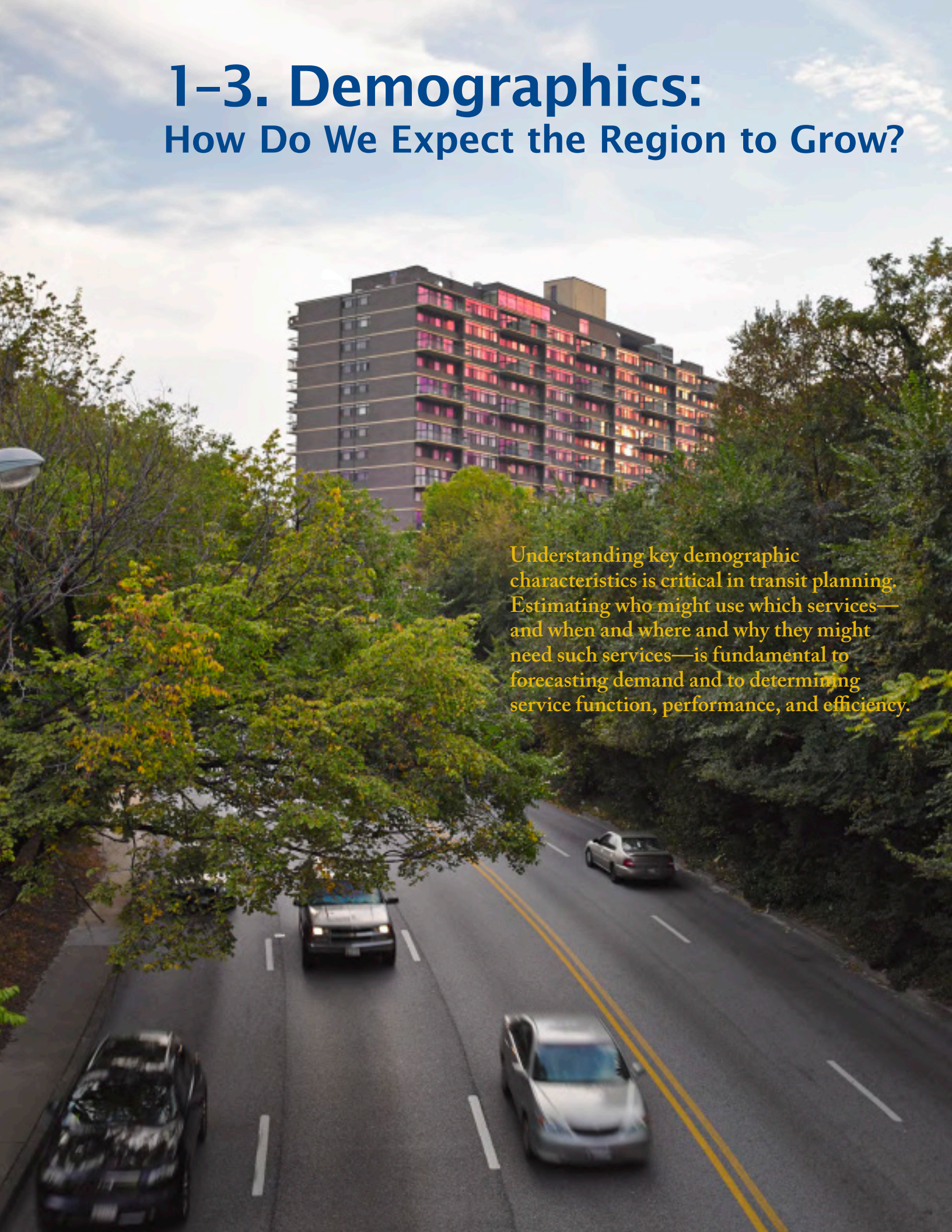
MTA transports many students to and from Baltimore City school programs each day, providing a vital service to schools and families. Judging by the number and proportion of enrolled students transported, they appear to be on the higher end of peer agencies that transport school children. On the other hand, the proportion of BCPS students that are provided transportation by the school district, including those eligible for either public transit or yellow school bus service, is about average.

Like most of the school districts analyzed that contract for public transit or yellow school bus service, BCPS assumes the cost associated with the service.

Although the discounts offered by MTA on student fares paid by the BCPS appear to be the lowest of the peer agencies, MTA's student fare is lower than the fares of all but one of the peer agencies.

Demand for these services is primarily during the peak travel periods, during the am peak and just before and into the p.m. peak. Therefore, an analysis should be performed to determine the opportunity cost of assigning MTA buses to student service that could operate on more productive routes. In particular, the ratio of student ridership to general ridership should be calculated by route. More detailed information will be necessary to run those calculations.

1–3. Demographics:
How Do We Expect the Region to Grow?



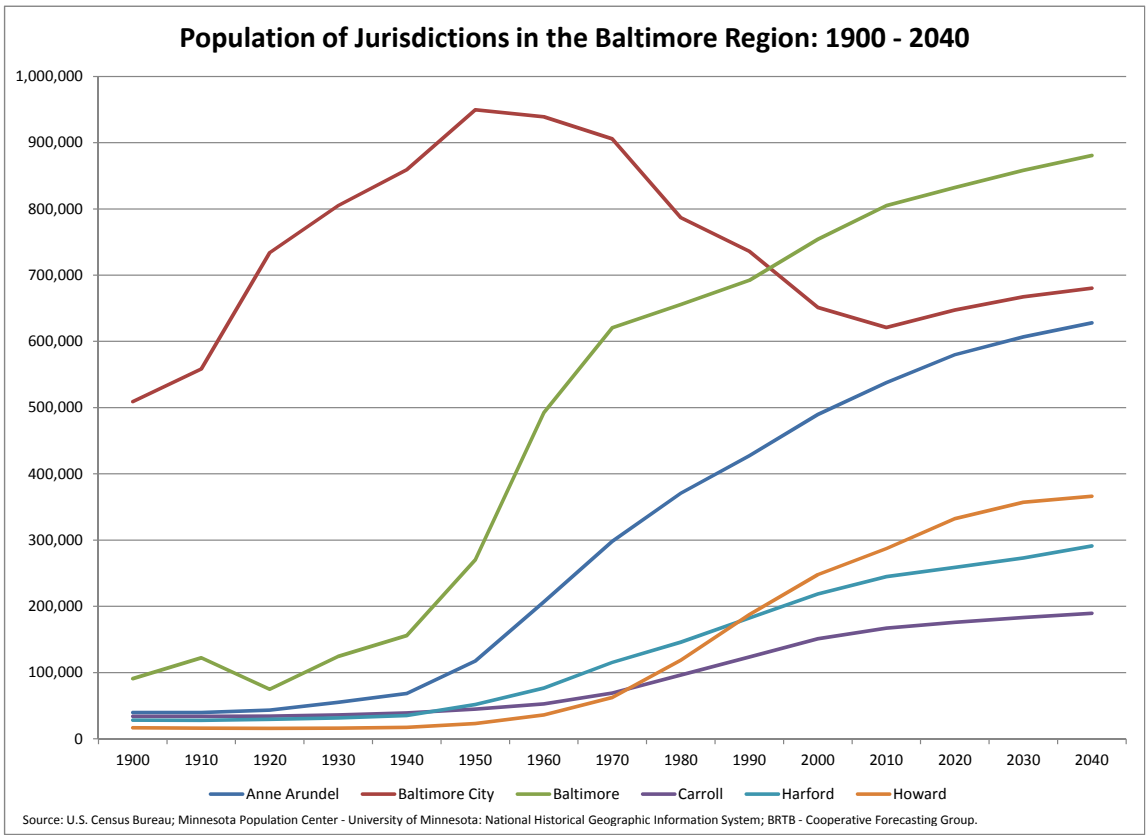
Understanding key demographic characteristics is critical in transit planning. Estimating who might use which services—and when and where and why they might need such services—is fundamental to forecasting demand and to determining service function, performance, and efficiency.

1-3. Demographics

Correlating key demographic data points and understanding variation among the various data sources requires a balance between art and science. Key data include:

- Population and population density
- Employment and employment density
- Household income
- Vehicle ownership
- Age (seniors and young)
- Transit propensity (a derived measure of the likelihood of using transit services).

Like many older major metropolitan areas, the Baltimore region experienced a period of population decentralization during the second half of the 20th century. At the regions core, the population of Baltimore City peaked at 950,000 in 1950. At that time, the City accounted for 65.2 percent of the region's total population. The City's population declined over the course of the next sixty years, as the surrounding jurisdictions experienced unprecedented growth – largely due to the prevalence of an expanding road network, allowing people to live further from the city in which they worked. During that time the City's population decreased 34.6 percent and the collective population of the surrounding jurisdictions increased by 302.3 percent. By 2010, the central city accounted for 23.3 percent of the region's 2,663,000 residents.



How Do We Expect the Region to Grow?

An analysis of demographic and economic trends over time is central to understanding the spatial location and magnitude of demand for transit service. BMC staff compared historical, current, and forecasted population and employment levels across the region, utilizing population and employment estimates and forecasts created by the Cooperative Forecasting Group (CFG).

The CFG utilizes the Traffic Analysis Zone (TAZ) as the smallest unit of geography in its forecasts. The current and forecast data BMC staff used in this analysis comes from the Round 8A data set, endorsed by the BRTB on June 24, 2014. The Round 8A data set has a horizon year of 2040, 25 years from now. In order to provide a consistent analysis of historical and projected population and employment growth, BMC staff compared historical densities and growth patterns over the course of the past 25-years along with anticipated growth over the course of the next 25 years (1990 to 2015 and 2015 to 2040). The historical data used in the analysis comes from Round V (1994) for the year 1990.

Population

HISTORICAL

An analysis of the demographic data from the past 25 years shows that the population of the region's central city has declined as the population of the region's surrounding jurisdictions has increased. The population of Baltimore City decreased by over 99,000 persons over the time period, falling 13.5 percent to 636,700 in 2015. Over the same time period, the surrounding jurisdictions collectively experienced growth of 502,100 people, increasing by 31.1 percent to 2,114,300 in 2015. The table below provides the population and population growth figures for each jurisdiction in the region for the 1990 to 2015 time period.

Population Change: 1990-2015

	1990		2015		Change	% Change
Jurisdiction	Population	Share	Population	Share	1990-2015	1990-2015
Anne Arundel	427,239	18.2%	559,619	20.3%	132,380	31.0%
Baltimore City	736,014	31.3%	636,722	23.1%	-99,292	-13.5%
Baltimore	692,134	29.5%	823,121	29.9%	130,987	18.9%
Carroll	123,372	5.3%	170,549	6.2%	47,177	38.2%
Harford	182,132	7.8%	251,991	9.2%	69,859	38.4%
Howard	187,328	8.0%	309,043	11.2%	121,715	65.0%
Region	2,348,219	100.0%	2,751,045	100.0%	402,826	17.2%

- Source: U.S. Census Bureau; Baltimore Regional Council of Governments - Cooperative Forecasting Group: Round V; Baltimore Regional Transportation Board - Cooperative Forecasting Group: Round 8A.

Anne Arundel County and Baltimore County experienced the greatest population growth in absolute terms, increasing by 132,400 and 131,000 respectively. Howard County experienced the highest population growth in relative terms, increasing by 65.0 percent over the 25 year period, reaching 309,000 in 2015. Overall the region's population increased by 402,800 (17.2 percent) over the time period, to 2,751,000 in 2015. A map of the 1990-2015 population change at the Traffic Analysis Zone (TAZ) level is included in an appendix.

Density of both population and employment are key components in the evaluation of transit systems as there must be an adequate number of potential transit users to support the system. Population density for each of the jurisdictions and TAZs in the region was calculated to highlight where in the region the population is concentrated. Below is a table detailing the population density for each jurisdiction and for the region as a whole for years 1990 and 2015. While the figures are aggregate and do not account for the distribution of population within each jurisdiction, they do provide context as to the general distribution of density among the region's jurisdictions.

Population Density – (Persons per Square Mile)

Jurisdiction	1990	2015
Anne Arundel	1,028	1,346
Baltimore City	9,060	7,838
Baltimore	1,151	1,369
Carroll	275	379
Harford	414	573
Howard	744	1,227
Region	1,049	1,228

- Source: U.S. Census Bureau; Baltimore Regional Council of Governments - Cooperative Forecasting Group: Round V; Baltimore Regional Transportation Board - Cooperative Forecasting Group: Round 8A.

Population density was computed for each TAZ in the region, as shown in the map in Figure 1. Population densities of TAZs across the region range from below 10 persons per square mile at BWI and in some of the heavy industrial areas, to over 52,000 persons per square mile in a TAZ adjacent to downtown Baltimore. The TAZs with the highest densities, over 12,000 persons per square mile, were almost exclusively located in Baltimore City. Also note that certain counties such as Anne Arundeln have almost 40 percent of land consumed in federal properties, critical areas, open space, and rural conservation.

Figure 1

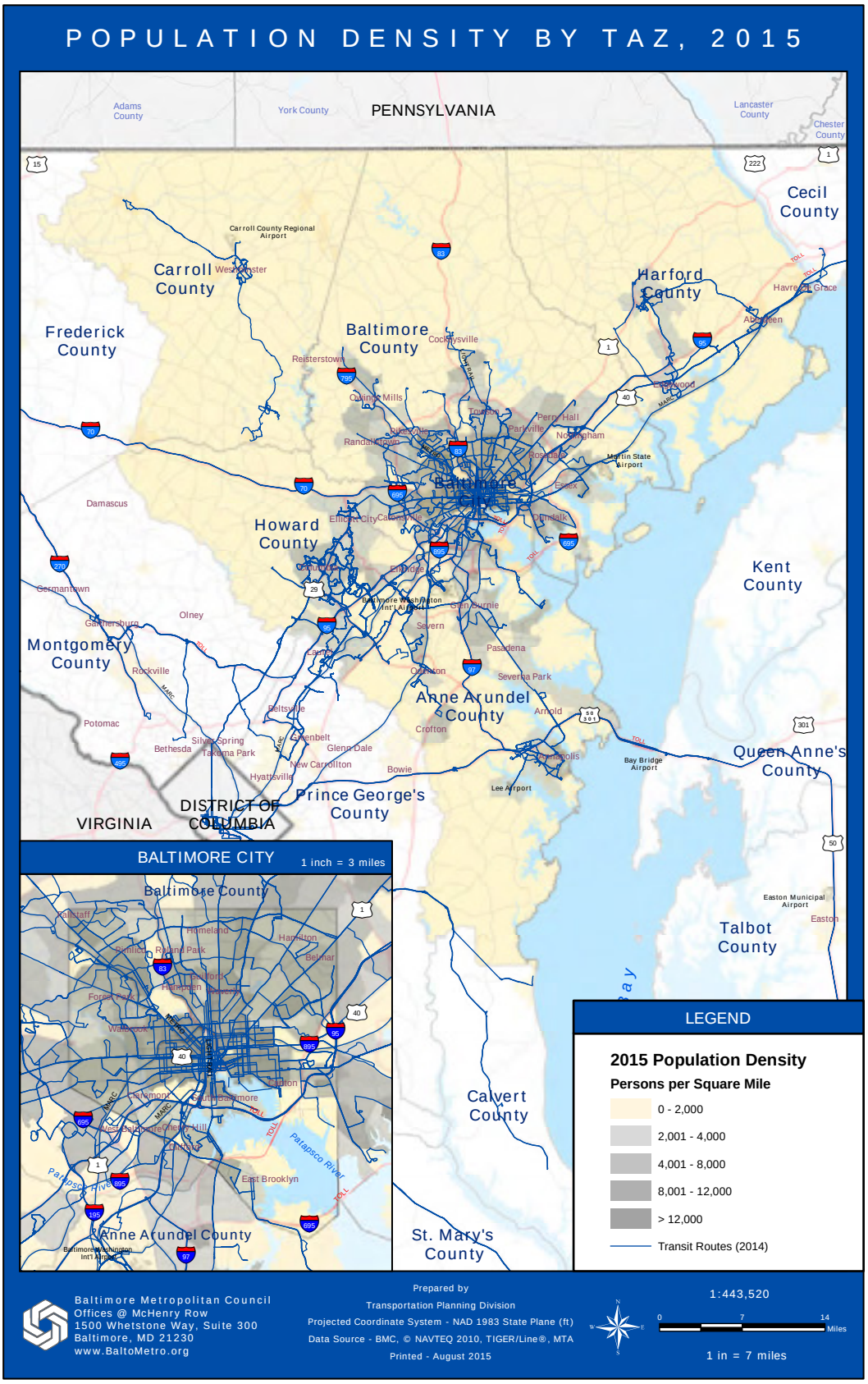
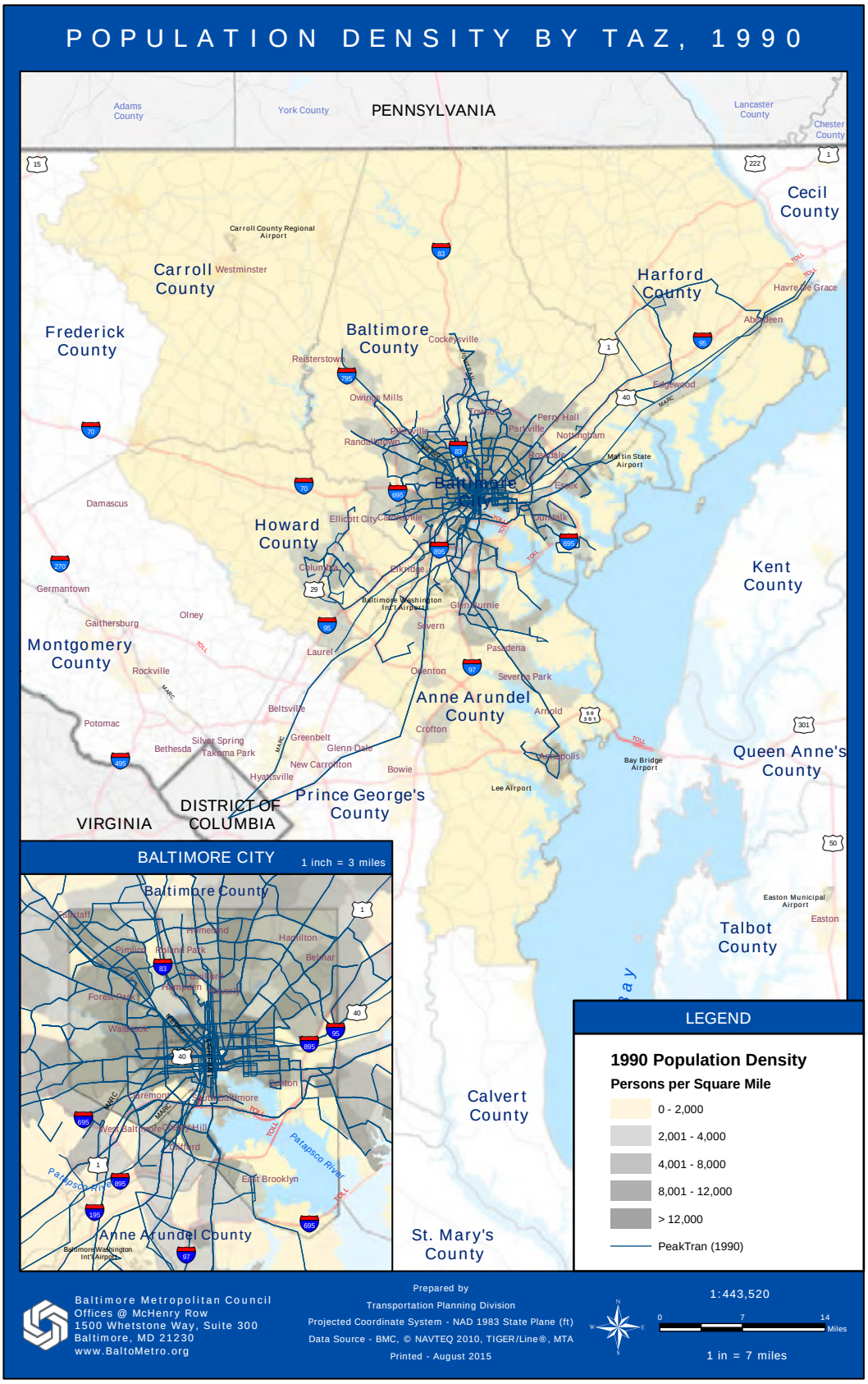

POPULATION DENSITY BY TAZ, 2015
PENNSYLVANIA
Adams County
York County
Lancaster County
Chester County
Cecil County
Carroll County
Frederick County
Baltimore County
Harford County
Howard County
Kent County
Montgomery County
Anne Arundel County
Queen Anne's County
Prince George's County
Talbot County
Calvert County
St. Mary's County
VIRGINIA
DISTRICT OF COLUMBIA
Carroll County Regional Airport
Martin State Airport
Baltimore Washington Int'l Airport
Lee Airport
Bay Bridge Airport
Easton Municipal Airport
Westminster
Reisterstown
Cockeysville
Towson
Perry Hall
Parkville
Nottingham
Randallstown
Rosedale
Essex
Dundalk
Damascus
Ellicott City
Columbia
Elkridge
Glen Burnie
Severn
Pasadena
Odenton
Severna Park
Arnold
Crofton
Annapolis
Germantown
Olney
Gaithersburg
Rockville
Potomac
Bethesda
Silver Spring
Takoma Park
Greenbelt
Glenn Dale
New Carrollton
Bowie
Hyattsville
Beltsville
Laurel
Havre de Grace
Aberdeen
Edgewood
Easton
BALTIMORE CITY
1 inch = 3 miles
Baltimore County
Homeland
Hamilton
Belmar
Rosedale
Forest Park
Woodlawn
Pimlico
Ryland Park
Lochearn
Pikesville
Reisterstown
Owings Mills
Randallstown
Towson
Parkville
Nottingham
Essex
Dundalk
Glen Burnie
Severn
Pasadena
Odenton
Severna Park
Arnold
Crofton
Annapolis
Bowie
Lee Airport
Bay Bridge Airport
Easton
Talbot County
Queen Anne's County
Calvert County
St. Mary's County
Patapsco River
Chesapeake Bay
Anne Arundel County
Baltimore Washington Int'l Airport
LEGEND
2015 Population Density
Persons per Square Mile
0 - 2,000
2,001 - 4,000
4,001 - 8,000
8,001 - 12,000
> 12,000
Transit Routes (2014)
Baltimore Metropolitan Council
Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
www.BaltoMetro.org
Prepared by
Transportation Planning Division
Projected Coordinate System - NAD 1983 State Plane (ft)
Data Source - BMC, © NAVTEQ 2010, TIGER/Line®, MTA
Printed - August 2015
1:443,520
0 7 14 Miles
1 in = 7 miles

Figure 2



Baltimore Metropolitan Council

Of the 94 TAZs in 1990 with over 12,000 persons per square mile, 91 of them (96.8 percent) were located in Baltimore City. The majority of these TAZs were within proximity of the downtown area, and running north along the Park Heights and York Road corridors. Population density remains high in several of the communities that border the city, including sections of Dundalk, Parkville, Towson, Liberty/Lochearn, and Catonsville. Farther from the central city, as the population density generally dissipates, there are additional pockets of concentration in areas such as White Marsh, Owings Mills, Randallstown, Columbia, Glen Burnie, and Annapolis.

The overlay of transit routes on the maps in Figures 1 and 2 indicate that Baltimore City as well as the majority of the high-population density TAZs in the surrounding jurisdictions have some transit coverage. The frequency, quality, and extent of transit service are addressed in other sections of this report.

FORECAST

The CFG population forecasts indicate that the region will continue to grow over the next 25 years but at a slower pace than the growth of the 1990-2015 period. Regional population forecasts show gains of 285,000 persons to a total of 3,036,100 in 2040, an increase of 10.4 percent compared to 17.2 percent in the 1990-2015 period. Growth rates of local jurisdictions will shift as well.

Baltimore City is expected to reverse its decades-long trend of population loss, with growth anticipated to continue at 6.8 percent in the 2015-2040 period, increasing the City's population by 44,000. Surrounding jurisdictions are forecasted to grow by 241,500 people, increasing by 11.4 percent to 2,355,800 in 2040. The table below provides the population and population growth figures for each jurisdiction for the 2015-2040 period.

Population Forecast: 2015-2040

	2015		2040		Change	% Change
Jurisdiction	Population	Share	Population	Share	2015-2040	2015-2040
Anne Arundel	559,619	20.3%	628,048	20.7%	68,429	12.2%
Baltimore City	636,722	23.1%	680,262	22.4%	43,540	6.8%
Baltimore	823,121	29.9%	880,726	29.0%	57,605	7.0%
Carroll	170,549	6.2%	189,574	6.2%	19,025	11.2%
Harford	251,991	9.2%	291,089	9.6%	39,098	15.5%
Howard	309,043	11.2%	366,352	12.1%	57,309	18.5%
Region	2,751,045	100.0%	3,036,051	100.0%	285,006	10.4%

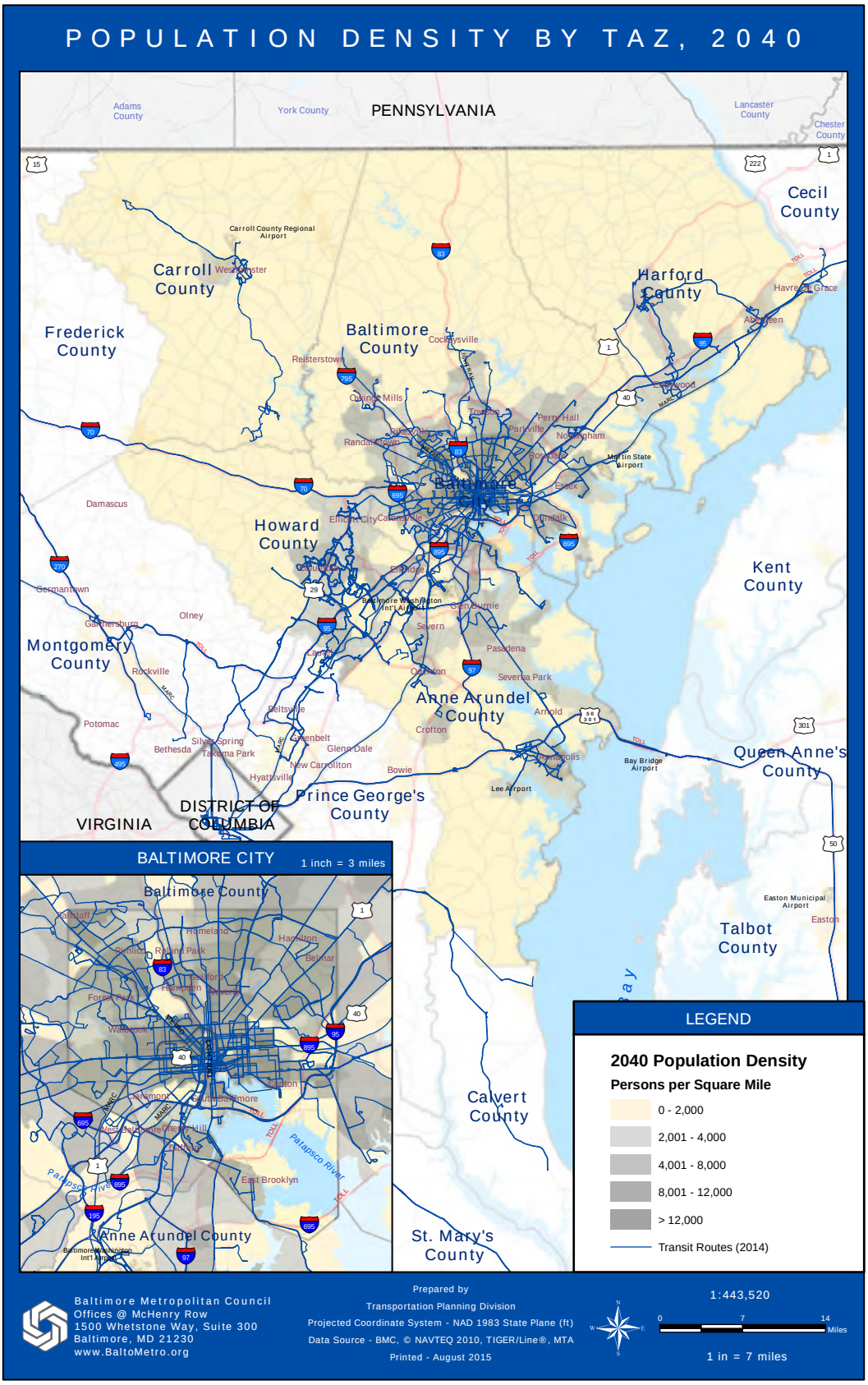
- Source: U.S. Census Bureau; Baltimore Regional Transportation Board - Cooperative Forecasting Group: Round 8A.

The surrounding jurisdictions forecast a more moderate pace of growth into the future. Anne Arundel County forecasts the greatest population growth in absolute terms: 68,400. Howard County anticipates the highest population growth in relative terms, increasing by 18.5 percent over the 25-year period, reaching 366,400 people in 2040.

A map of the 2015-2040 forecasted population change at the TAZ level is included in an appendix.

As Figure 3 on the next page shows, the general pattern of population density across the region is expected to remain largely the same as it was in 2015. A noticeable difference between this and the density maps from earlier years is the increase in the number of higher density TAZs outside of the central city. The number of TAZs outside the city with a density over 4,000 persons per square mile increased from 88 in 1990 to 116 in 2015, and are expected to increase to 128 in 2040. The transit overlay on the map noted above indicates that the majority of year 2040 high-population density tracts in the city and surrounding jurisdictions are currently served by transit. This is not an indication of the adequacy of the service, just its presence. Other sections of this report address factors such as the frequency, quality, and extent of transit service.

Figure 3



Baltimore Metropolitan Council

Employment

HISTORICAL

Employment in the region increased by 18.5 percent over the last 25 years, reaching a total of 1,581,500 in 2015. As with population, employment declined in Baltimore City while all of the surrounding jurisdictions experienced growth. Employment in the City fell by 21.6 percent from 495,900 in 1990 to 388,700 in 2015. Over the same time period, the surrounding jurisdictions grew by 353,900 jobs (cumulatively), increasing by 42.2 percent to a total of 1,192,800 in 2015.

Employment Change: 1990-2015

	1990		2015		Change	% Change
Jurisdiction	Employment	Share	Employment	Share	1990-2015	1990-2015
Anne Arundel	237,708	17.8%	342,011	21.6%	104,303	43.9%
Baltimore City	495,921	37.2%	388,651	24.6%	-107,270	-21.6%
Baltimore	382,803	28.7%	465,801	29.5%	82,998	21.7%
Carroll	46,639	3.5%	73,063	4.6%	26,424	56.7%
Harford	70,195	5.3%	115,562	7.3%	45,367	64.6%
Howard	101,614	7.6%	196,381	12.4%	94,767	93.3%
Region	1,334,880	100.0%	1,581,469	100.0%	246,589	18.5%

- Source: U.S. Census Bureau; Baltimore Regional Council of Governments - Cooperative Forecasting Group: Round V; Baltimore Regional Transportation Board - Cooperative Forecasting Group: Round 8A, Baltimore Metropolitan Council.

The relative share of employment by jurisdiction has changed, but the largest concentration of employment has remained constant. Anne Arundel and Howard counties experienced the largest employment growth in absolute terms, increasing by 104,300 and 94,800, respectively. Howard County exhibited the highest relative employment growth, increasing by 93.3 percent, reaching 196,400 in 2015. A map of 1990-2015 employment change at the TZA level is included in an appendix.

Just as population density is a factor in the analysis of transit systems, employment density is a consideration as well, as employees contribute to the number of potential transit users. The table below provides the employment density for each jurisdiction and for the Baltimore region for years 1990 and 2015.

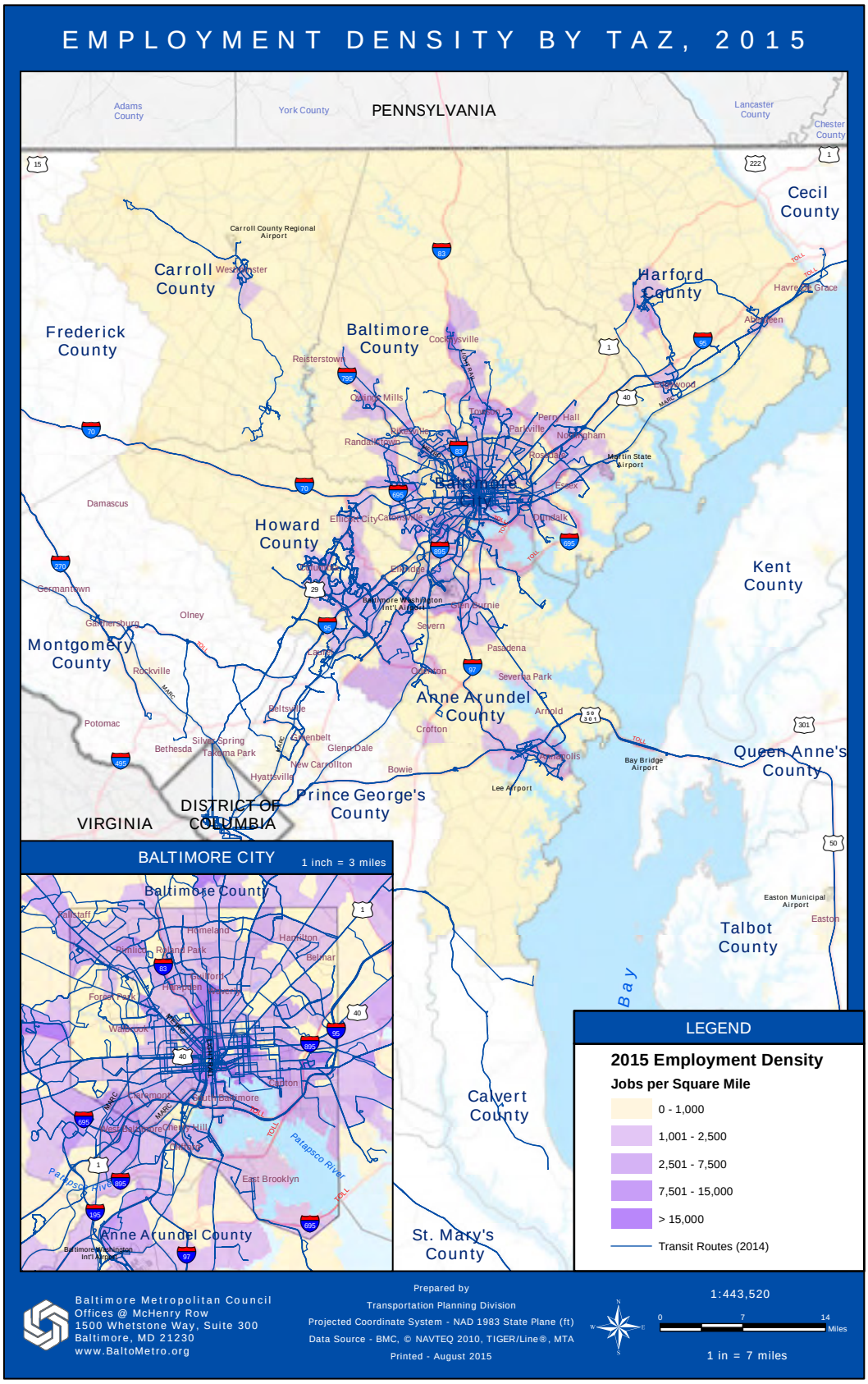
Employment Density – (Jobs per Square Mile)		
Jurisdiction	1990	2015
Anne Arundel	572	823
Baltimore City	6,105	4,784
Baltimore	636	774
Carroll	104	163
Harford	160	263
Howard	403	779
Region	596	706

- Source: U.S. Census Bureau; Baltimore Regional Council of Governments - Cooperative Forecasting Group: Round V; Baltimore Regional Transportation Board - Cooperative Forecasting Group: Round 8A.

The employment change and density tables illustrate that, even after substantial employment loss, Baltimore City has the second highest employment level in the region and retains the most dense employment concentration in the region. The City has nearly six times the employment density of the second highest jurisdiction (Anne Arundel County).

Employment density was computed for each TAZ in the region and can be seen in the map in Figure 4. Outside of downtown Baltimore City, which is the location of the highest employment density in the region, other high employment density TAZs include Towson, Cockeysville, Owings Mills, Security, Columbia, (adjacent to) BWI, Glen Burnie, and Annapolis. The overlay of transit routes on the maps in Figures 4 and 5 indicate that Baltimore City as well as the majority of the high-population density tracts in the surrounding jurisdictions were served by transit in 1990 and are served by transit in 2015.

Figure 4


EMPLOYMENT DENSITY BY TAZ, 2015
PENNSYLVANIA
Adams County
York County
Lancaster County
Chester County
Cecil County
Carroll County
Frederick County
Baltimore County
Harford County
Howard County
Montgomery County
Anne Arundel County
Prince George's County
Kent County
Queen Anne's County
Talbot County
Calvert County
St. Mary's County
VIRGINIA
DISTRICT OF COLUMBIA
Carroll County Regional Airport
Baltimore Washington Intl Airport
Martin State Airport
Bay Bridge Airport
Lee Airport
Easton Municipal Airport
BALTIMORE CITY
1 inch = 3 miles
Baltimore County
Anne Arundel County
Patapsco River
LEGEND
2015 Employment Density
Jobs per Square Mile
0 - 1,000
1,001 - 2,500
2,501 - 7,500
7,501 - 15,000
> 15,000
Transit Routes (2014)
Baltimore Metropolitan Council
Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
www.BaltoMetro.org
Prepared by
Transportation Planning Division
Projected Coordinate System - NAD 1983 State Plane (ft)
Data Source - BMC, © NAVTEQ 2010, TIGER/Line®, MTA
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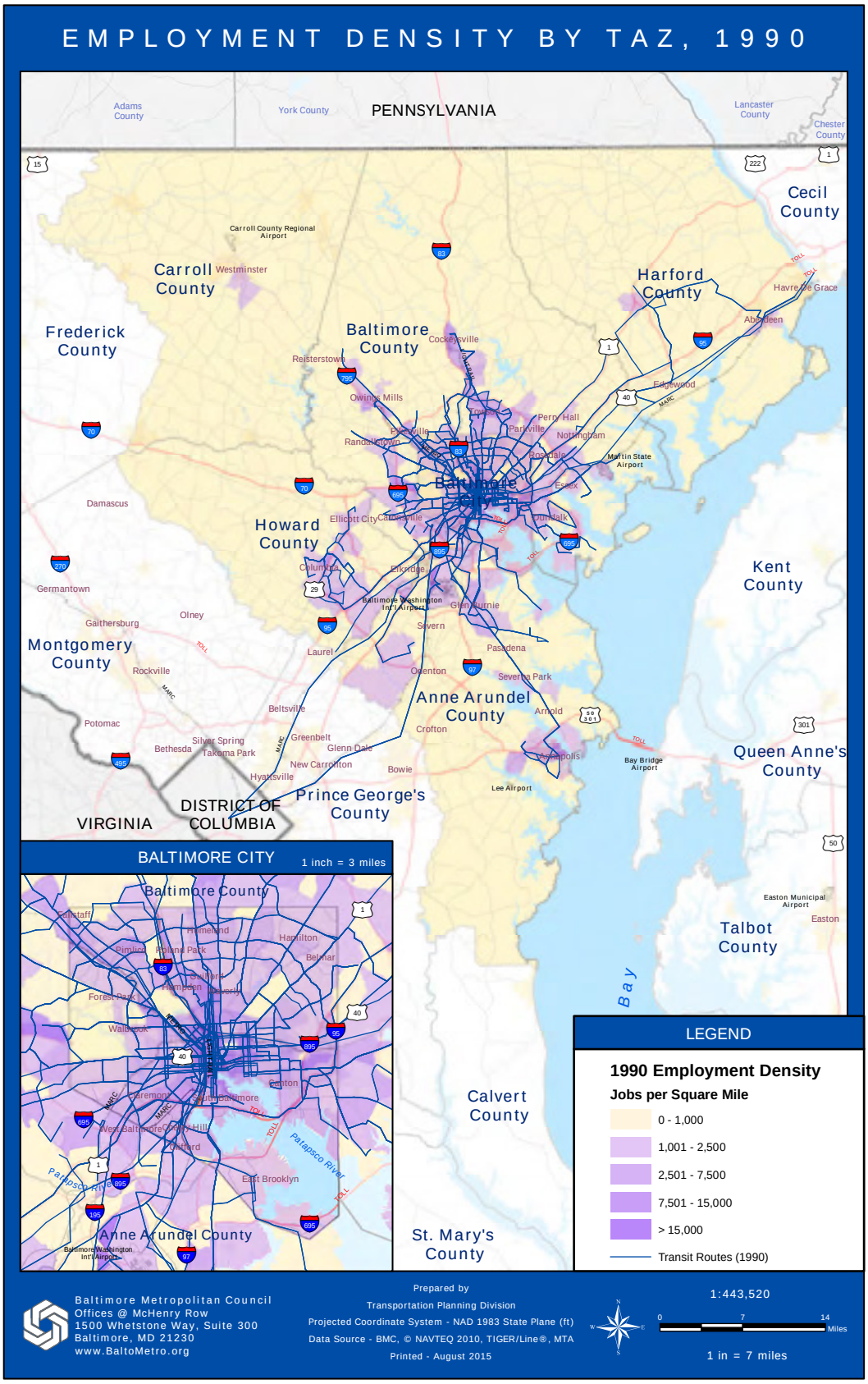
1 in = 7 miles

Figure 5



Baltimore Metropolitan Council

FORECAST

The forecasts developed by the CFG suggest employment in the region will continue to grow over the course of the next 25 years, and a faster rate than the growth of the 1990 – 2015 period. Regional employment is forecast to increase by 320,200 jobs to a total of 1,901,700 in 2040, marking an increase of 20.2 percent compared to 18.5 percent growth in the previous time period. The forecast regional employment growth rate nearly doubles that of the population growth rate (10.4 percent) over the 25 year period, indicating a need to import workers.

The growth rates of the local jurisdictions have shifted as well. Baltimore City expects to reverse its employment loss from the previous period, as it forecasts employment growth of 16.9 over the 2015 – 2040 time period. The surrounding jurisdictions collectively forecast employment growth of 254,700 jobs, increasing by 21.4 percent to 1,447,500 in 2040. The table below provides the employment and employment growth figures for each jurisdiction in the region for the 2015 to 2040 period.

Employment Forecast: 2015-2040

	2015		2040		Change	% Change
Jurisdiction	Employment	Share	Employment	Share	2015-2040	2015-2040
Anne Arundel	342,011	21.6%	424,061	22.3%	82,050	24.0%
Baltimore City	388,651	24.6%	454,167	23.9%	65,516	16.9%
Baltimore	465,801	29.5%	510,565	26.8%	44,764	9.6%
Carroll	73,063	4.6%	85,351	4.5%	12,288	16.8%
Harford	115,562	7.3%	167,261	8.8%	51,699	44.7%
Howard	196,381	12.4%	260,309	13.7%	63,928	32.6%
Region	1,581,469	100.0%	1,901,714	100.0%	320,245	20.2%

- Source: U.S. Census Bureau; Baltimore Regional Transportation Board - Cooperative Forecasting Group: Round 8A, Baltimore Metropolitan Council.

As was the case with the population forecasts, the surrounding jurisdictions forecast a more moderate pace of growth into the future. Anne Arundel County forecasts the greatest employment growth in absolute terms, increasing by 82,100. Harford County anticipates the highest population growth in relative terms, increasing by 44.7 percent over the 25 year period, reaching 167,300 in 2040.

A map of 2015-2040 forecasted employment change at the TAZ level is included in an appendix.

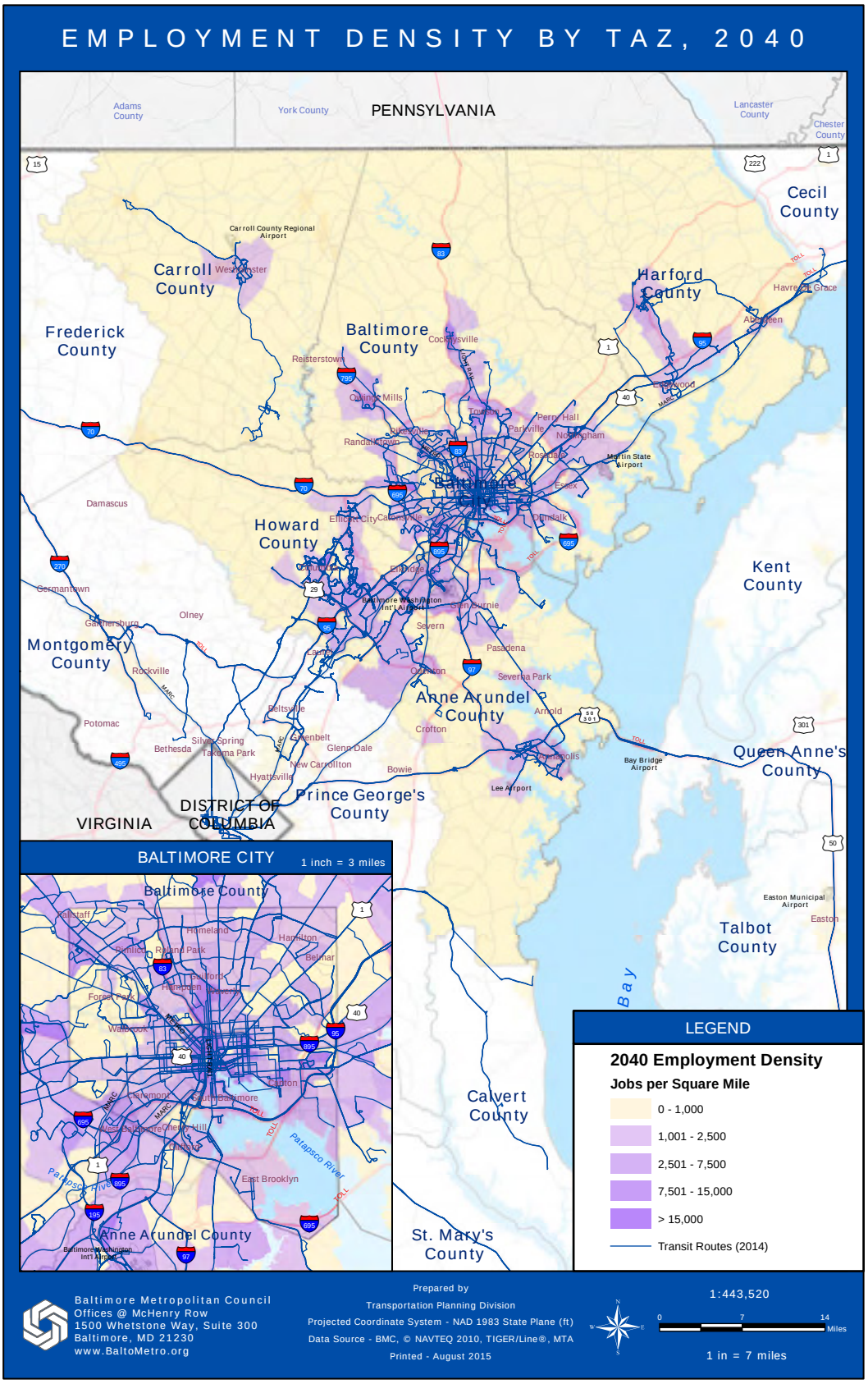
As the map in Figure 6 shows, the general pattern of employment density across the region is forecasted to remain largely the same as it was in 2015. As was the case with the change in population density, there is a noticeable increase in the number of TAZs with higher density employment outside of the central city. Again, the relative share of employment by jurisdiction has changed, but the largest concentrations of employment are expected to remain constant. The observed and forecast trend of increased employment (and thus employment density) outside of the central city warrants examination of the transit service to and between these growth areas.

Employment Density – (Jobs per Square Mile)

Jurisdiction	2015	2040
Anne Arundel	823	1,020
Baltimore City	4,784	5,591
Baltimore	774	849
Carroll	163	190
Harford	263	380
Howard	779	1,033
Region	706	849

- Source: U.S. Census Bureau; Baltimore Regional Council of Governments - Cooperative Forecasting Group: Round V; Baltimore Regional Transportation Board - Cooperative Forecasting Group: Round 8A.

Figure 6


EMPLOYMENT DENSITY BY TAZ, 2040
PENNSYLVANIA
Adams County
York County
Lancaster County
Chester County
Cecil County
Carroll County
Frederick County
Baltimore County
Harford County
Howard County
Kent County
Montgomery County
Anne Arundel County
Queen Anne's County
Prince George's County
Talbot County
Calvert County
St. Mary's County
VIRGINIA
DISTRICT OF COLUMBIA
Carroll County Regional Airport
Martin State Airport
Baltimore Washington Int'l Airport
Bay Bridge Airport
Lee Airport
Easton Municipal Airport
Chesapeake Bay
BALTIMORE CITY
1 inch = 3 miles
Baltimore County
Anne Arundel County
LEGEND
2040 Employment Density
Jobs per Square Mile
0 - 1,000
1,001 - 2,500
2,501 - 7,500
7,501 - 15,000
> 15,000
Transit Routes (2014)
Baltimore Metropolitan Council
Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
www.BaltoMetro.org
Prepared by
Transportation Planning Division
Projected Coordinate System - NAD 1983 State Plane (ft)
Data Source - BMC, © NAVTEQ 2010, TIGER/Line®, MTA
Printed - August 2015
1:443,520
0 7 14 Miles
1 in = 7 miles

Other Factors Influencing Transit Use

While the general indicators of historical and forecast population and employment growth are important considerations in an analysis of a region's transit system, it is critical to take a more targeted look at the demand for transit service by investigating the demographics of transit riders. A study conducted for the Maryland Transit Administration's Bus Network Improvement Project in July of 2013 by a consultant team headed by Foursquare Integrated Transportation Planning identifies and explores additional demographic characteristics that impact transit utilization. The following section explores a selection of the characteristics identified in that report.

LOW-INCOME HOUSEHOLDS

Low-income household data for the region was compiled by census tract using 2009-2013 American Community Survey (ACS) data on poverty status. The percent of households below the poverty line for the previous 12-month period was identified for all tracts in the region. This percentage ranges from less than 1% in 23 tracts in the surrounding jurisdictions (12 in Howard County) to over 50% in several tracts in East and West Baltimore near downtown and in the Cherry Hill neighborhood of South Baltimore in Baltimore City. The two census tracts containing the University of Maryland-Baltimore County in Catonsville and Towson University also display a high percentage of households below the poverty level. However, this is not an accurate portrayal of poverty, but rather reflective of the large student population. There is a greater share of households below the poverty level in in Baltimore City than in the surrounding jurisdictions. The table below shows the share of households below poverty by jurisdiction.

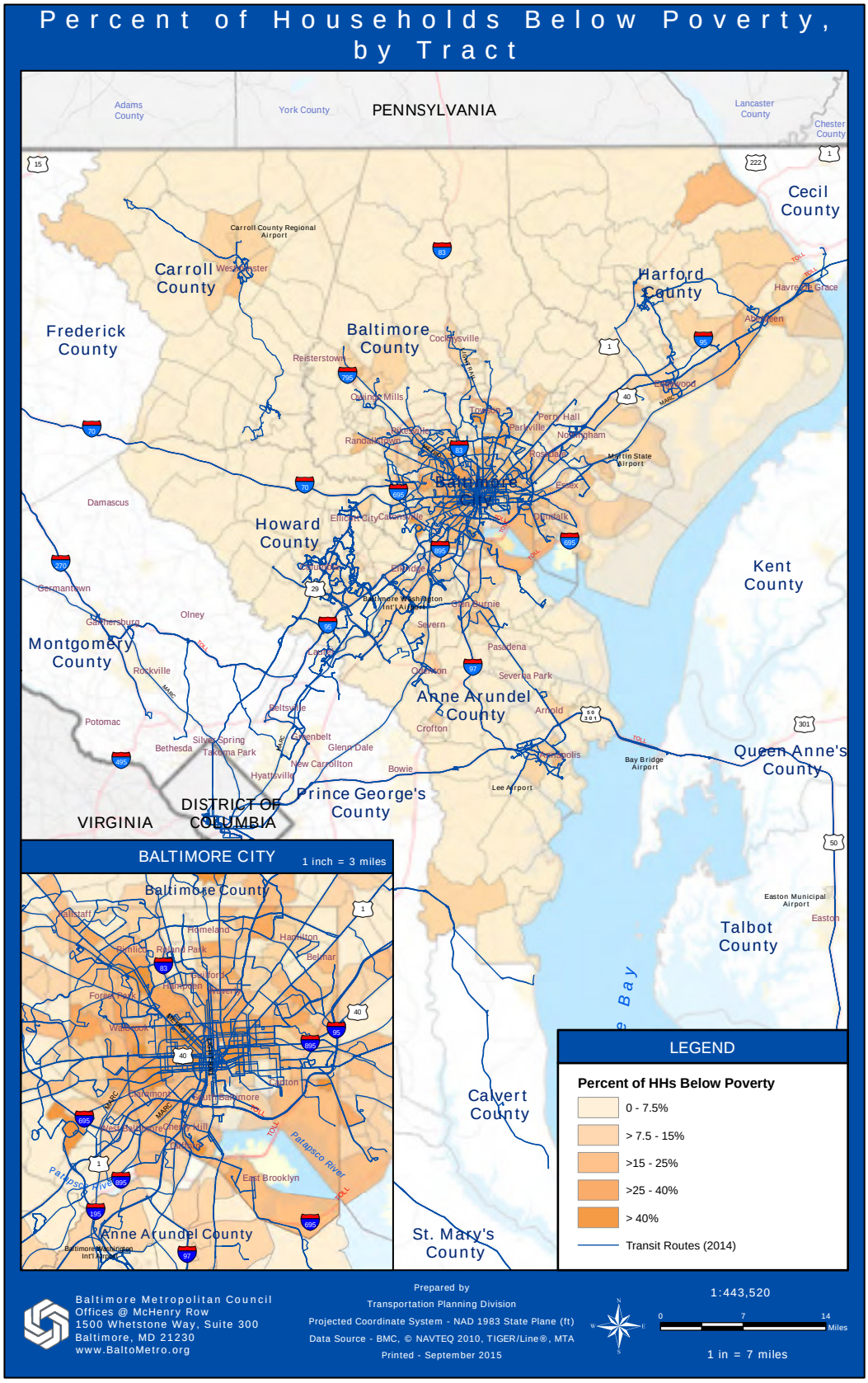
Share of Households by Poverty Level, by Jurisdiction

Jurisdiction	% Below Poverty Level
Anne Arundel	5.8%
Baltimore City	21.9%
Baltimore	8.4%
Carroll	5.5%
Harford	7.3%
Howard	4.2%
Region	10.4%

- Source: U.S. Census Bureau, 2009-2013 5-Year American Community Survey, Table B17001.

The majority of high poverty tracts within the City of Baltimore corresponded well with the existence of some level of Core Bus routes, as well as the Metro and Light Rail alignments. Figure 7 illustrates the distribution of low-income household census tracts within the Baltimore region, as well as the location of transit bus and rail lines.

Figure 7


Percent of Households Below Poverty, by Tract
PENNSYLVANIA
Adams County
York County
Lancaster County
Chester County
Cecil County
Carroll County
Frederick County
Baltimore County
Harford County
Howard County
Kent County
Montgomery County
Anne Arundel County
Queen Anne's County
Prince George's County
Talbot County
Calvert County
St. Mary's County
VIRGINIA
DISTRICT OF COLUMBIA
Carroll County Regional Airport
Martin State Airport
Baltimore Washington Int'l Airport
Bay Bridge Airport
Lee Airport
Easton Municipal Airport
BALTIMORE CITY
1 inch = 3 miles
LEGEND
Percent of HHs Below Poverty
0 - 7.5%
> 7.5 - 15%
>15 - 25%
>25 - 40%
> 40%
Transit Routes (2014)
Baltimore Metropolitan Council
Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
www.BaltoMetro.org
Prepared by
Transportation Planning Division
Projected Coordinate System - NAD 1983 State Plane (ft)
Data Source - BMC, © NAVTEQ 2010, TIGER/Line®, MTA
Printed - September 2015
1:443,520
0 7 14 Miles
1 in = 7 miles

HOUSEHOLDS WITH NO VEHICLE AVAILABLE

Information on households that do not have access to a vehicle was compiled by census tract using 2009-2013 ACS data. Overall, the boundaries of the City of Baltimore correspond closely with the extent of the area with high percentages of households with no vehicle available. The percentage of households with no vehicle available ranges from less than 1 percent in many tracts in the surrounding jurisdictions, to greater than 70 percent in several tracts to the east and west of downtown Baltimore. As seen in the table below, Baltimore City has a much larger share of households with no vehicle available than any of the surrounding jurisdictions.

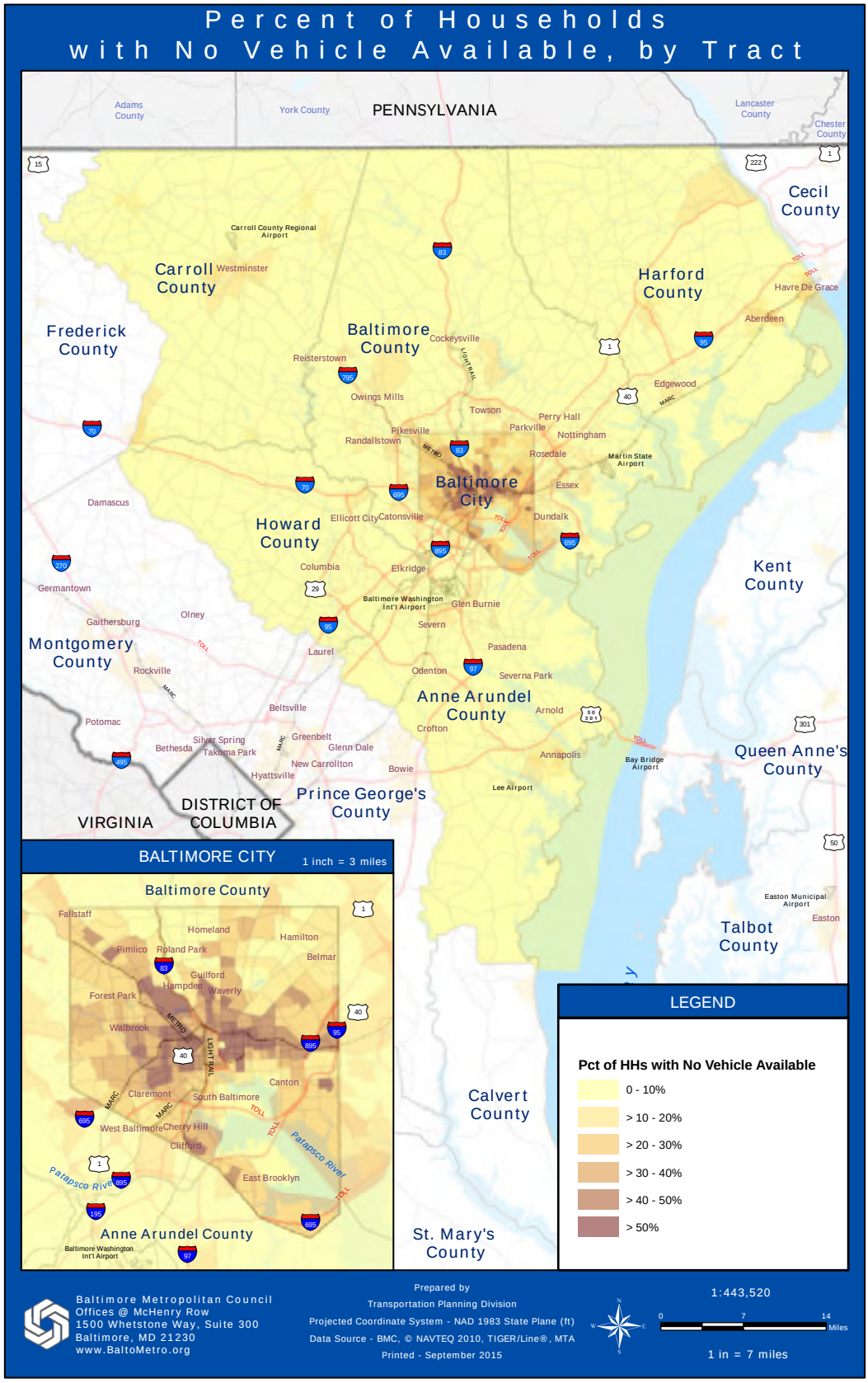
Share of Households with No Vehicle Available, by Jurisdiction

Jurisdiction	% with No Vehicle Available
Anne Arundel	4.2%
Baltimore City	30.3%
Baltimore	8.1%
Carroll	4.3%
Harford	4.6%
Howard	3.5%
Region	11.6%

- Source: U.S. Census Bureau, 2009-2013 5-Year American Community Survey, Table B08201.

Generally, tracts in proximity to downtown Baltimore have a much higher percentage of households with no vehicle available than those in the surrounding jurisdictions. The tracts with higher percentages corresponded well with core bus routes and the Metro subway alignment. Figure 8 illustrates the percentage of households with no vehicle available by census tract in the Baltimore region.

Figure 8


Percent of Households
with No Vehicle Available, by Tract
PENNSYLVANIA
Adams County
York County
Lancaster County
Chester County
Cecil County
Carroll County
Westminster
Carroll County Regional Airport
Harford County
Havre De Grace
Aberdeen
Frederick County
Baltimore County
Cockeysville
Reisterstown
Owings Mills
Towson
Perry Hall
Parkville
Nottingham
Pikesville
Randallstown
Rosedale
Edgewood
Martin State Airport
Baltimore City
Essex
Dundalk
Damascus
Howard County
Ellicott City
Catonsville
Columbia
Elkridge
Kent County
Germantown
Baltimore Washington Int'l Airport
Glen Burnie
Gaithersburg
Olney
Severn
Montgomery County
Laurel
Pasadena
Rockville
Odenton
Severna Park
Anne Arundel County
Arnold
Beltsville
Potomac
Crofton
Silver Spring
Greenbelt
Bethesda
Takoma Park
Glenn Dale
Annapolis
Bay Bridge Airport
Queen Anne's County
New Carrollton
Bowie
Hyattsville
Lee Airport
Prince George's County
DISTRICT OF COLUMBIA
VIRGINIA
Easton Municipal Airport
Easton
Talbot County
BALTIMORE CITY
1 inch = 3 miles
Baltimore County
Fallstaff
Homeland
Hamilton
Pimlico
Roland Park
Belmar
Guilford
Hampden
Waverly
Forest Park
Walbrook
Canton
Claremont
South Baltimore
West Baltimore
Cherry Hill
Clifford
East Brooklyn
Patapsco River
Anne Arundel County
Baltimore Washington Int'l Airport
Calvert County
St. Mary's County
LEGEND
Pct of HHs with No Vehicle Available
0 - 10%
> 10 - 20%
> 20 - 30%
> 30 - 40%
> 40 - 50%
> 50%
Baltimore Metropolitan Council
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Printed - September 2015
1:443,520
0
7
14
Miles
1 in = 7 miles

AGE

Regional population by age information was compiled by census tract using 2009-2013 ACS data. Populations age 65 and over and under the age of 18 have a higher need for public transportation due to their lower levels of vehicle ownership.

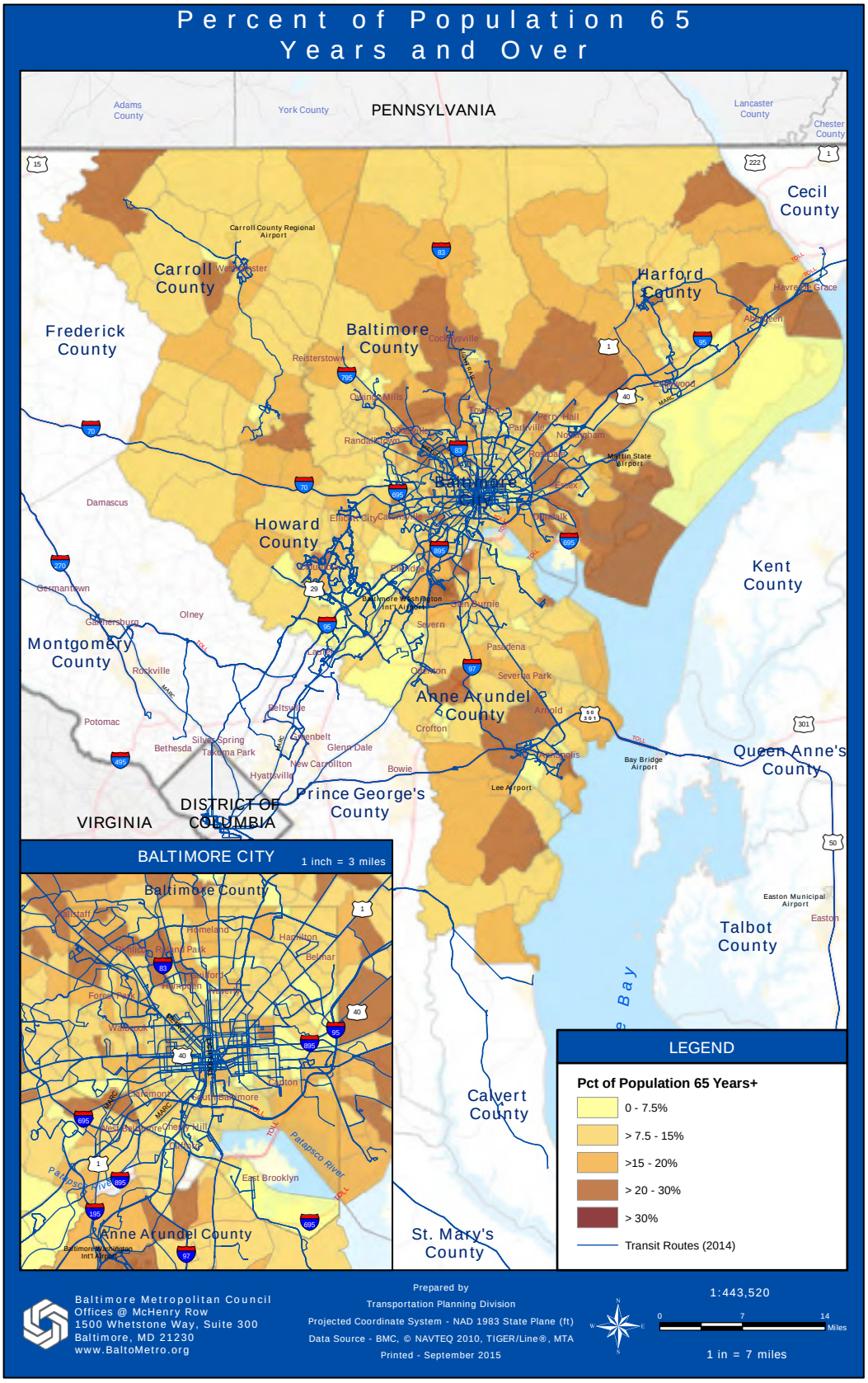
65+ Population

Concentrations of the age 65 and over population generally are outside of Baltimore City, in tracts in Baltimore and Anne Arundel counties with limited transit. Of the 24 tracts in the region in which the 65+ population accounts for more than 25 percent of total population, 16 (66.7 percent) are in Baltimore County, four (16.7 percent) are in Anne Arundel County, three (12.5 percent) are in Baltimore City, and one (4.2 percent) is in Carroll County.

The 65+ population is nearly 55 percent of a tract in Towson (near the intersection of Joppa Rd. and Charles St.) and nearly 51 percent of a tract in Catonsville (north of Wilkens Ave. inside I-695). Other areas with high percentages of 65+ population include Oregon Ridge, portions of Cockeysville/Timonium, and Pikesville in Baltimore County; near BWI Thurgood Marshall Airport and in portions of Crownsville in Anne Arundel County; and the Cross Keys area of Baltimore City. While some of these communities—Cross Keys, Pikesville, and BWI—are served by rail, the presence of housing within ¼ mile of stations is limited.

Figure 9 illustrates the percentage of the population age 65 and over by census tract for the Baltimore region.

Figure 9


Percent of Population 65 Years and Over
PENNSYLVANIA
Adams County
York County
Lancaster County
Chester County
Cecil County
Carroll County
Frederick County
Baltimore County
Harford County
Howard County
Kent County
Montgomery County
Anne Arundel County
Prince George's County
Queen Anne's County
Talbot County
Calvert County
St. Mary's County
VIRGINIA
DISTRICT OF COLUMBIA
Carroll County Regional Airport
Martin State Airport
Baltimore Washington Int'l Airport
Bay Bridge Airport
Lee Airport
Easton Municipal Airport
Damascus
Germantown
Gaithersburg
Olney
Rockville
Potomac
Bethesda
Silver Spring
Takoma Park
Greenbelt
Glenn Dale
New Carrollton
Hyattsville
Bowie
Reisterstown
Cockeysville
Owings Mills
Randallstown
Parkville
Nottingham
Perry Hall
Essex
Dundalk
Severna Park
Pasadena
Severn
Odenton
Crofton
Arnold
Annapolis
Havre de Grace
Aberdeen
Easton
BALTIMORE CITY
1 inch = 3 miles
Baltimore County
Anne Arundel County
Homeland
Hampden
Belmar
Forest Park
Woodlawn
Catonsville
Arbutus
East Brooklyn
Patapsco River
LEGEND
Pct of Population 65 Years+
0 - 7.5%
> 7.5 - 15%
>15 - 20%
> 20 - 30%
> 30%
Transit Routes (2014)
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0 7 14 Miles
1 in = 7 miles

Under 18 Population

Areas with high concentrations of population under the age of 18 were generally found within Baltimore City, while the surrounding jurisdictions each have pockets where the presence of this demographic is more pronounced. Across the region, persons under the age of 18 years represent 22.7 percent of the population. There are 54 Census tracts in the region in which this demographic accounts for 30 percent or more of the population. The greatest share of these youth concentrated tracts (22 of the 54) is located in Baltimore City, and areas such as Cherry Hill, West Baltimore, and East Baltimore each contain tracts with greater than 40 percent of persons being under the age of 18. Outside of the city, areas with a high concentration of youth include the area adjacent to Fort Meade, and Elkridge and Laurel in Howard County, Security and Middle River in Baltimore County, and Edgewood in Harford County.

Overall, the areas with high percentages of youths in Baltimore City were situated in areas with several existing transit bus and/or rail routes. While many of the areas outside of the city that contain high concentrations of youth are served by transit in some capacity (including Columbia, Security, and Fort Meade), there are others that have little or no access to transit (including Mount Airy, Eldersburg, and portions of Laurel and Ellicott City).

Figure 10 illustrates the percentage of the population under the age of 18 by census tract for all tracts in the Baltimore region.

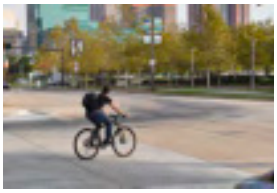
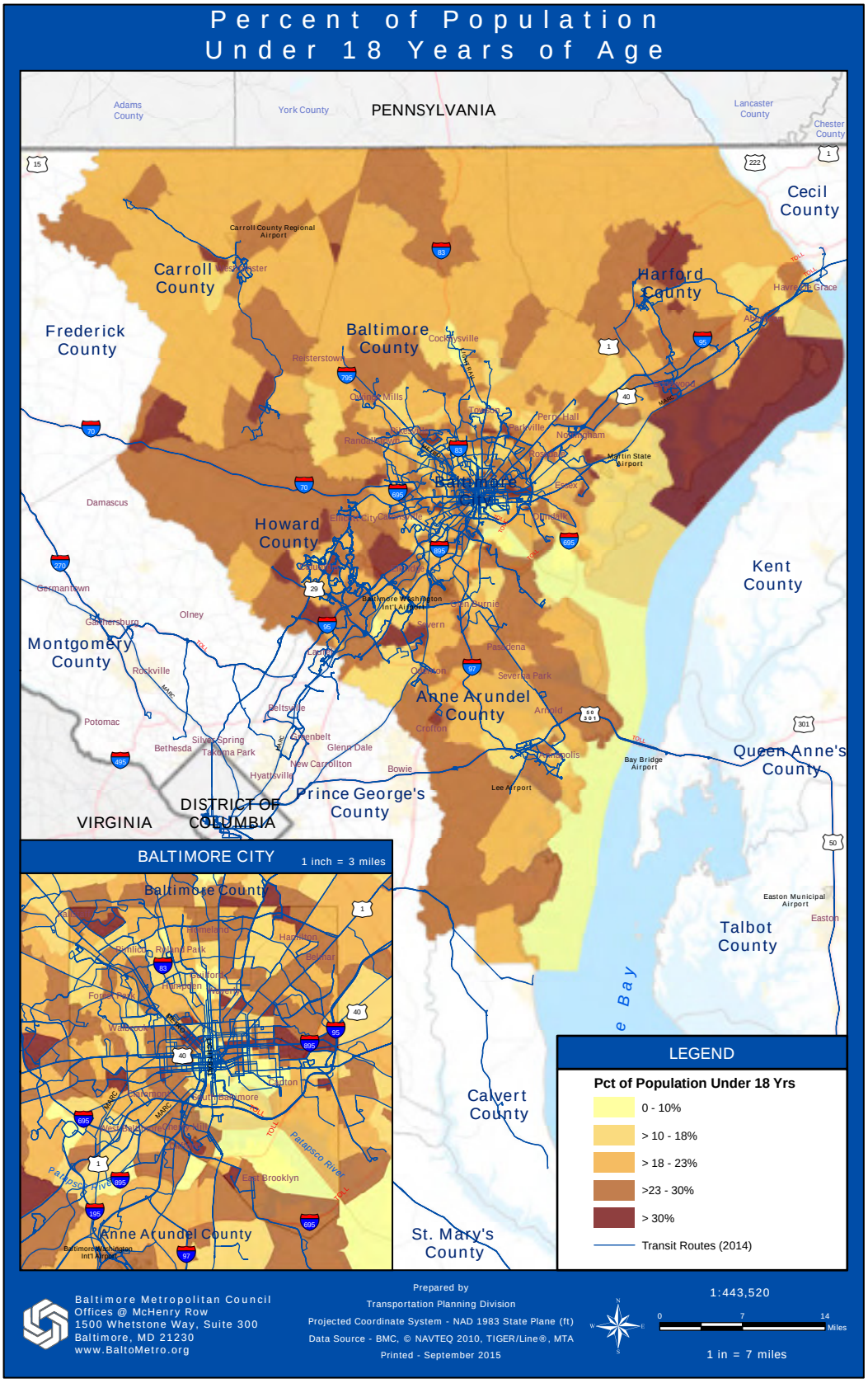


Figure 10


Percent of Population
Under 18 Years of Age
PENNSYLVANIA
Adams County
York County
Lancaster County
Chester County
Cecil County
Carroll County
Frederick County
Baltimore County
Harford County
Howard County
Kent County
Montgomery County
Anne Arundel County
Queen Anne's County
Talbot County
Prince George's County
Calvert County
St. Mary's County
VIRGINIA
DISTRICT OF COLUMBIA
Carroll County Regional Airport
Martin State Airport
Baltimore Washington Int'l Airport
Lee Airport
Bay Bridge Airport
Easton Municipal Airport
BALTIMORE CITY
1 inch = 3 miles
Baltimore County
Anne Arundel County
LEGEND
Pct of Population Under 18 Yrs
0 - 10%
> 10 - 18%
> 18 - 23%
>23 - 30%
> 30%
Transit Routes (2014)
Baltimore Metropolitan Council
Offices @ McHenry Row
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Baltimore, MD 21230
www.BaltoMetro.org
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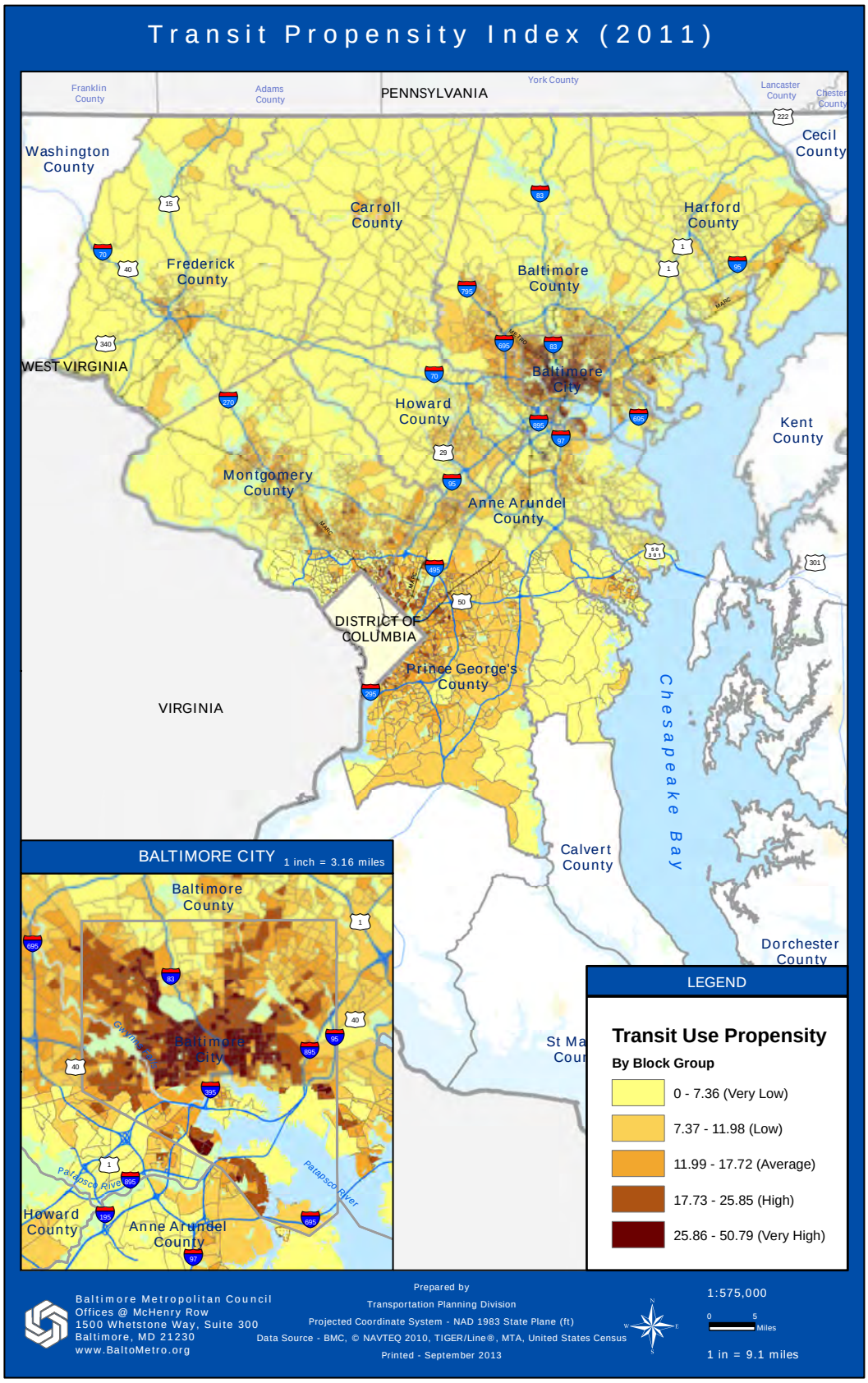
Printed - September 2015
1:443,520
0 7 14 Miles
1 in = 7 miles

TRANSIT USE PROPENSITY

As mentioned in the Transit Riders section of this report, it is useful to examine the Transit Use Propensity (TUP) Index, based on demographic groups that are likely to use public transit. Using the 2008 On-Board Transit Survey reported trips; the eight strongest demographic indicators were weighted and combined developing an index from very high to very low transit use propensity. The 2011 Baltimore region results are shown in Figure 11.

The map indicates that most of the areas with Very High Transit Use Propensity in the region are in Baltimore City. The areas with this rating are concentrated in the Downtown, West Baltimore, and East Baltimore areas, as well as along the Park Heights corridor. Areas of the city featuring concentrations of Low and Average Transit Use Propensity include portions of Morrell Park, Roland Park, Hamilton, and Canton. The propensity is markedly lower outside Baltimore City, with the exception of several communities on the Baltimore City/Baltimore County border including Security, Liberty/Lochearn, Randallstown, and Parkville, and a few isolated pockets with average propensity in Glen Burnie, Annapolis, and Edgewood.

Figure 11


Transit Propensity Index (2011)
Franklin County
Adams County
PENNSYLVANIA
York County
Lancaster County
Chester County
Cecil County
Washington County
Carroll County
Harford County
Frederick County
Baltimore County
WEST VIRGINIA
Baltimore City
Howard County
Kent County
Montgomery County
Anne Arundel County
DISTRICT OF COLUMBIA
Prince George's County
VIRGINIA
Chesapeake Bay
Calvert County
Dorchester County
BALTIMORE CITY
1 inch = 3.16 miles
Baltimore County
Baltimore City
Howard County
Anne Arundel County
Patapsco River
LEGEND
Transit Use Propensity
By Block Group
0 - 7.36 (Very Low)
7.37 - 11.98 (Low)
11.99 - 17.72 (Average)
17.73 - 25.85 (High)
25.86 - 50.79 (Very High)
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Projected Coordinate System - NAD 1983 State Plane (ft)
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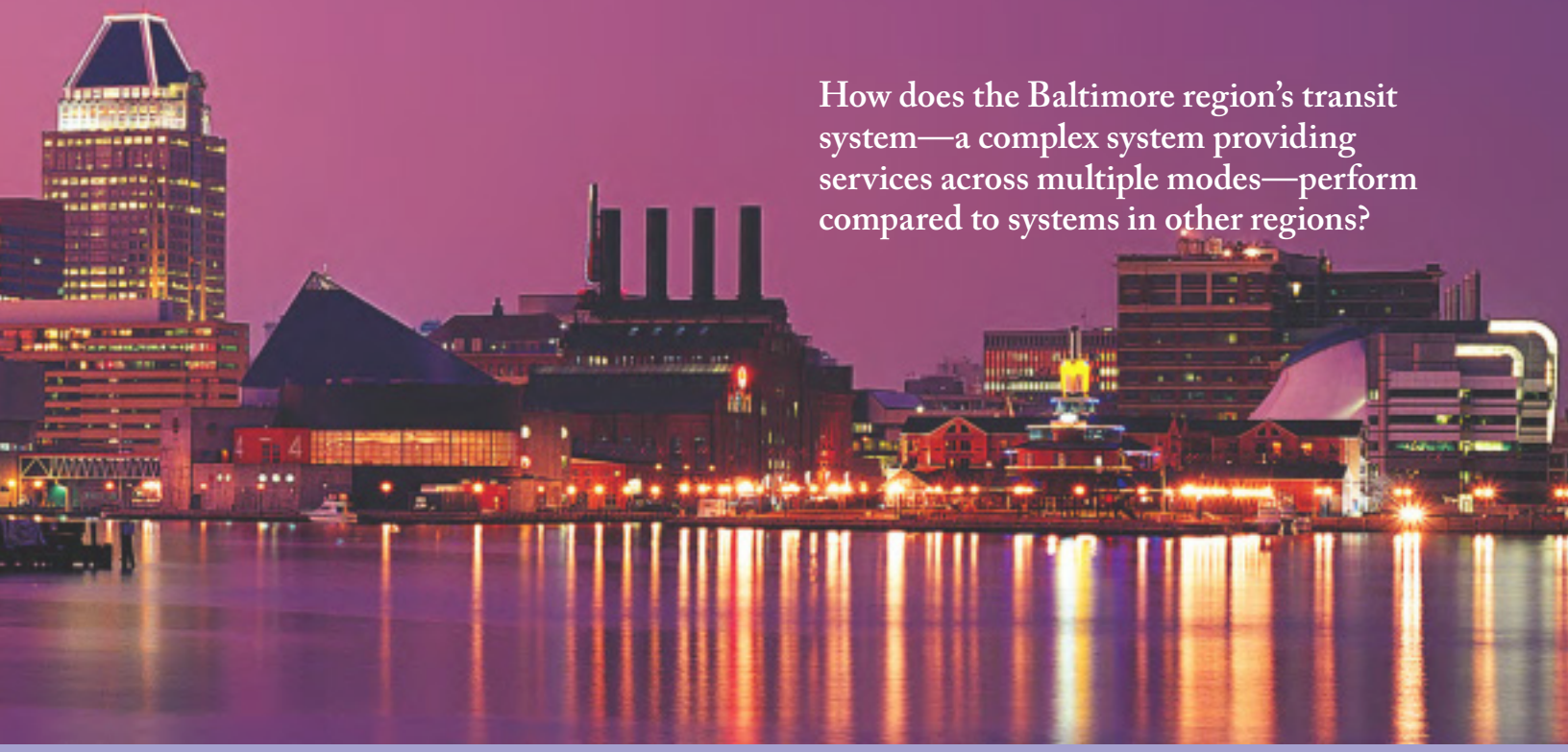
Printed - September 2013
1:575,000
0 5 Miles
1 in = 9.1 miles

1-4. Peer Transit Systems:
How Do We Compare to Other Regions?



How does the Baltimore region's transit system—a complex system providing services across multiple modes—perform compared to systems in other regions?

1-4. Peer Transit Systems

Peer Comparisons

The Baltimore region has a complex regional transit system providing services across multiple modes. To get a sense of where a system's performance lies relative to other similar agencies, peer comparisons are a useful way to examine transit service performance. The performance measures and peers chosen are important in making any comparison.

A true "apples-to-apples" comparison among agencies is difficult if not impossible to make since the basic operating settings of the various systems and individual board policies might result in substantial differences. However, a peer comparison can reveal useful information even if a given methodology might have some flaws and thus might not be an ideal candidate for comparison.

This section focuses on comparing a set of operating measures across peer regions to evaluate how many people the transit systems move for a set cost[1].

DEFINING OUR PEERS

How were peer agencies (by mode) identified?

- **2014 APTA Fact Book rankings**: The next highest and next lowest ranked transit agency by mode were selected as peers for the following service provision and ridership statistics:
  - Vehicles operated in maximum service: The largest number of vehicles operated at any one time throughout the day. This is typically during the morning or evening rush hour.
  - Unlinked passenger trips: The number of times passengers board public transportation vehicles
- **Demographically similar urbanized areas**: Identifying peers through APTA Fact Book rankings ensured that the transit agencies themselves are similar to MTA in ridership and/or number of vehicles operated. Another method is to select peer agencies operating in urbanized areas with demographic characteristics similar to those of the Baltimore region. These urbanized areas include Cleveland, Denver–Aurora, Minneapolis–St. Paul, Pittsburgh, and St. Louis. It should be noted that transit agencies serving these urbanized areas don't provide service across all of the modes. For example, Cleveland is the only urbanized area that operates a heavy rail system.

What is included?

- Rankings are based on the most recent APTA Fact Book, which uses the 2012 NTD. The 2013 NTD data has been released, but we primarily utilize statistics from 2012 since APTA peer agencies are identified through rankings based on 2012 NTD data.
- **General Characteristics**: Population, ridership, service provision, fleet age, and transit amenities
- **Service Efficiency and Effectiveness**: Service efficiency describes the relationship between service inputs (represented by operating expenses) and service outputs (represented by vehicle revenue miles and vehicle revenue hours). Service effectiveness describes the relationship between service inputs and service consumption (represented by passenger miles and unlinked passenger trips). Measures are based on 2012 and 2013 NTD data.

1 When comparing this region's transit system to transit systems in other regions, it is important to note that the language and measures used by the National Transit Database (NTD) are based on reports by transit professionals using their data. Consequently, the measures of performance used in this section may mean less or be of less value to the general public, which tends to view transit service performance from the "user" or "consumer" perspective and not from the operator's point of view.

How Do We Compare to Other Regions?

**Baltimore –
Commuter Rail**

**Cleveland –
Bus Rapid Transit**

Modal Types

COMMUTER BUS

Commuter bus is a fixed-route bus service that connects outlying areas with central cities with no stops for at least 5 miles after leaving the central city.

General Characteristics

- Peers include agencies serving
  - Atlanta (GRTA)
  - Houston (Metro)
  - Los Angeles – Long Beach – Anaheim (LADOT)
  - Seattle (ST).
- The transit agency service area population varies from 1.4 million in Atlanta to 8.6 million in Los Angeles – Long Beach – Anaheim. MTA serves a population of approximately 2.2 million.
- MTA was ranked third nationwide in 2012 in both vehicles operated during maximum service (192) and unlinked passenger trips (4,290,500). Among peer agencies, vehicles operated during maximum service ranged from 83 at Los Angeles DOT to 278 at Houston Metro. Ridership ranged from 1.8 million unlinked passenger trips at GRTA to 16 million at ST.
- MTA had an older fleet of commuter buses with an average fleet age of 7.5 years. In comparison, Metro in Houston was the only agency with an older average fleet at 8.2 years. LADOT, GRTA, and ST had 2012 average fleet ages of 0.3, 5.3, and 5.4 years, respectively.
- Amenities:
  - Commuter buses are fully accessible across all agencies
  - GRTA and ST provide bicycle racks, LADOT and Houston Metro allow bicycles on most buses, MTA only allows folding bicycles on commuter buses.

Agency	Urbanized Area (UZA) Name	UZA Population (Service Area Population)	Operating Expenses	Average Fleet Age in Years	2012 Vehicles Operated Maximum Service		2012 Unlinked Passenger Trips	
					Amount	Rank	Amount (Thousands)	Rank
Central Puget Sound Regional Transit Authority (ST)	Seattle, WA	3,059,393 (2,781,740)	$102,725,123	5.4	225	2	16,012.40	1
City of Los Angeles Department of Transportation (LADOT)	Los Angeles-Long Beach-Anaheim, CA	12,150,996 (8,626,600)	$12,883,281	0.3	83	5	1,843.40	4
Georgia Regional Transportation Authority (GRTA)	Atlanta, GA	4,515,419 (1,354,871)	$16,846,984	5.3	103	4	1,802.40	5
Maryland Transit Administration (MTA)	Baltimore, MD	2,203,663 (2,203,663)	$33,903,309	7.5	192	3	4,290.50	3
Metropolitan Transit Authority of Harris County, Texas (Metro)	Houston, TX	4,944,332 (3,527,625)	$44,122,688	8.2	278	1	7,367.30	2

Service Efficiency and Effectiveness

- MTA commuter bus service efficiency and effectiveness increased at least 50 percent from 2012 to 2013. This can be attributed to increases in commuter bus operating expenses from $34 million in 2012 to $53 million in 2013. Vehicles operated in maximum service and unlinked passenger trips remained relatively constant over the same period.
- For service efficiency, MTA ranked last among its peers in both operating expense per vehicle revenue mile ($9.90) and per vehicle revenue hour ($297.63) in 2013.
- For service effectiveness, MTA ranked first among its peers in operating expense per passenger mile ($0.30) but ranked last in operating expense per unlinked passenger trip ($12.69) in 2013.

Agency	Service Efficiency				Service Effectiveness			
	Operating Expense per Vehicle Revenue Mile		Operating Expense per Vehicle Revenue Hour		Operating Expense per Passenger Mile		Operating Expense per Unlinked Passenger Trip	
	2012	2013	2012	2013	2012	2013	2012	2013
APTA Peers								
Central Puget Sound Regional Transit Authority (ST)	$8.91	$9.18	$185.98	$194.11	$0.43	$0.43	$6.42	$6.39
City of Los Angeles Department of Transportation (LADOT)	$7.35	$6.01	$159.16	$130.51	$0.42	$0.31	$6.99	$5.09
Georgia Regional Transportation Authority (GRTA)	$6.31	$6.26	$162.09	$160.05	$0.36	$0.37	$9.35	$9.28
Maryland Transit Administration (MTA)	$6.51	$9.90	$185.43	$297.63	$0.19	$0.30	$7.90	$12.69
Metropolitan Transit Authority of Harris County, Texas (Metro)	$5.66	$5.92	$147.48	$154.98	$0.34	$0.32	$5.99	$5.97

Houston – Commuter Bus

Commuter Bus – What Are the Peer Systems Up To?

Central Puget Sound Regional Transit Authority – Adopted a Regional Transit Long-Range Plan in December 2014 with a goal of providing more transportation choices for its growing region. This includes an expansion of the commuter bus system. The Sound Transit Board is currently developing a ballot measure for November 2016 to fund service improvements.

Los Angeles Department of Transportation – Adopted a new Short-Range Transit Plan in March 2015. One of the goals in this plan includes "Enhancing Experience of Bus Passengers." LADOT implemented the first mobile ticketing project in California and wi-fi on commuter express buses. In addition, all 103 commuter express buses covering 14 routes are equipped with triple bike racks.

Georgia Regional Transit Authority – Work is guided by the FY 2014-2016 Strategic Plan. The Plan focuses on increasing ridership, optimizing service in managed lanes, and creating strategic partnerships. These strategies will help the authority continue to build a strong brand image, while also effectively allocating limited resources both to improve maintenance and operations facilities and to update transit information technology. In August, the GRTA Board adopted the Direct Xpress Service Plan as a framework for transforming the Xpress commuter coach service over the next decade and beyond. This follows two years of analysis designed to make the service more reliable, flexible, and intuitive and includes three immediate new routes with more to come.

Metropolitan Transit Authority of Harris County in Houston (METRO) – Recently implemented a well publicized major realignment of the bus system to improve trips to key activity centers throughout the region and to provide flexibility for growth.

COMMUTER RAIL

Commuter rail provides short-distance passenger train service between city centers and outlying suburbs. Intercity rail is generally excluded unless it is operated primarily for commuter purposes. It may also be called metropolitan rail, regional rail, or suburban rail.

General Characteristics

- Peers identified through the APTA include agencies serving:
  - Los Angeles – Long Beach – Anaheim (Metrolink)
  - San Francisco-Oakland (Caltrain)
  - Washington DC-VA-MD (VRE).
- Peers based on population include agencies serving Minneapolis–St. Paul (Metro Transit).
- The service area population for peer transit agencies varies from 680,000 at VRE to approximately 8.3 million at Metrolink.
- APTA Peers:
  - MTA had 8,532,200 unlinked passenger trips in 2012 (ninth nationwide).
  - Ridership varied widely from 4.7 million (VRE) to 13 million unlinked passenger trips (Metrolink).
  - Vehicles operated during maximum service varied from 87 (VRE) to 172 (Metrolink), with MTA operating 132 (eighth nationwide).
- Demographic Peers: Metro Transit operates a much smaller commuter rail service with around 700,000 unlinked passenger trips and 22 vehicles operated in maximum service.
- MTA had an average fleet age of 17 years in 2012, exceeded by only Caltrain (20.7) among peers. The MTA average fleet age cited here does not incorporate recent and planned procurement of new MARC coaches. These new locomotives and commuter rail coaches will very likely positively impact the average MTA fleet age and improve service efficiency and effectiveness by reducing operating expenses.
- Amenities:
  - MTA runs limited weekend service on the Penn Line. All peers run at least limited weekend service except for VRE.

– Accessibility varies. MTA stations lacking a platform level with the train are equipped with a wheelchair lift. Bridge plates are provided to facilitate entry and exit from trains. Limited stations have elevators. Most Caltrain stations are fully accessible. All Metro Transit, Metrolink, and VRE stations are fully accessible.

– All Caltrain, Metro Transit, and Metrolink trains either have dedicated bicycle cars or space for bicycles in each car. VRE allows up to 2 full-size bicycles on limited non-peak trains. MTA permits full-size bicycles on weekends only on select Penn Line trains.

Agency	Urbanized Area (UZA) Name	UZA Population (Service Area Population)	Operating Expenses	Average Fleet Age in Years	2012 Vehicles Operated Maximum Service		2012 Unlinked Passenger Trips	
					Amount	Rank	Amount (Thousands)	Rank
APTA Peers								
Maryland Transit Administration (MTA)	Baltimore, MD	2,203,663 (2,203,663)	$97,050,916	17	132	8	8,532.20	9
Peninsula Corridor Joint Powers Board dba: Caltrain (PCJPB)	San Francisco-Oakland, CA	3,281,212 (3,690,367)	$97,555,152	20.7	100	9	12,999.30	8
Southern California Regional Rail Authority dba: Metrolink (Metrolink)	Los Angeles-Long Beach-Anaheim, CA	12,150,996 (8,341,002)	$171,572,964	10.8	172	7	13,155.80	7
Virginia Railway Express (VRE)	Washington, DC-VA-MD	4,586,770 (680,400)	$61,552,829	12.8	87	10	4,702.20	10
Demographic Peers								
Metro Transit	Minneapolis-St. Paul, MN-WI	2,650,890 (1,805,940)	$16,419,740	3.2	22	19	700.30	19

Service Efficiency and Effectiveness

- For service efficiency, MTA ranked third among five peer agencies across both measures and years. Both measures increased by more than 25 percent from 2012 to 2013.
- For service effectiveness, operating expenses per passenger mile increased from $0.38 to $0.44 from 2012 to 2013, moving MTA from second to fourth among peer agencies. Operating expenses per unlinked passenger trip increased from $11.37 in 2012 to $13.47 in 2013, moving MTA from 2nd to 3rd among peer agencies. These increases are at least partially attributable to increases in MTA commuter rail operating expenses from $97 million in 2012 to $121.6 million in 2013. Over this period, vehicles operated in maximum service also increased substantially from 132 to 175.
- Minneapolis–St. Paul, the only demographic peer with a commuter rail agency, trailed MTA in all service efficiency and effectiveness measures.

Agency	Service Efficiency				Service Effectiveness			
	Operating Expense per Vehicle Revenue Mile		Operating Expense per Vehicle Revenue Hour		Operating Expense per Passenger Mile		Operating Expense per Unlinked Passenger Trip	
	2012	2013	2012	2013	2012	2013	2012	2013
APTA Peers								
Maryland Transit Administration (MTA)	$16.67	$21.38	$660.48	$826.89	$0.38	$0.44	$11.37	$13.47

Agency	Service Efficiency				Service Effectiveness			
	Operating Expense per Vehicle Revenue Mile		Operating Expense per Vehicle Revenue Hour		Operating Expense per Passenger Mile		Operating Expense per Unlinked Passenger Trip	
	2012	2013	2012	2013	2012	2013	2012	2013
Peninsula Corridor Joint Powers Board dba: Caltrain (PCJPB)	$15.20	$15.48	$530.55	$543.79	$0.35	$0.28	$7.50	$6.22
Southern California Regional Rail Authority dba: Metrolink (Metrolink)	$14.65	$14.38	$573.08	$560.14	$0.40	$0.41	$13.04	$14.08
Virginia Railway Express (VRE)	$30.29	$29.17	$948.54	$912.46	$0.41	$0.41	$13.09	$13.34
Demographic Peers								
Metro Transit	$31.84	$33.07	$1,158.52	$1,178.54	$0.92	$0.89	$23.45	$22.55

Commuter Rail – What Are the Peer Systems Up To?

CalTrain system in San Francisco-Oakland, CA – Undergoing the Caltrain Modernization program that includes:

- electrification of the existing Caltrain corridor between San Francisco and San Jose
- installation of an advanced signal system, called Communications Based Overlay Signal System Positive Train Control (CBOSS PTC), that includes federally mandated safety improvements
- replacement of Caltrain's diesel trains with high-performance electric trains called Electric Multiple Units.

CalTrain is also working with the California High speed Rail Commission.

Metrolink in Los Angeles – Recently adjusted its schedule, including additional peak hour trains on some lines. Metrolink also won an AdWheel Grand Prize Award for its use of Facebook at the 2015 American Public Transportation Association (APTA) Annual Meeting held in October 2015. AdWheel awards recognize public transportation agencies and APTA members for creative excellence in advertising, communications, marketing, and promotions.

VRE Operations Board – Adopted the VRE System Plan at its January 2014 meeting. The plan provides a framework for VRE system investments and actions VRE should pursue through 2040 to best meet regional travel needs. The system investments and service expansion recommended in the System Plan will enable VRE to carry over 40,000 new weekday trips by 2040, more than double the 19,000 daily trips carried today.

Metro Transit in Minneapolis-St. Paul – Northstar Commuter Rail unit has initiated the Northstar Corridor Development Authority with the goal of extending service to St. Cloud, MN.

HEAVY RAIL

Heavy rail is an electric railway operating on a separated right-of-way and includes the capacity for high traffic volumes. Alternative names for heavy rail include metro, subway, rapid transit, and rapid rail.

General Characteristics

- Peers identified through the APTA include agencies serving:
  - Los Angeles-Long Beach-Anaheim (LACMTA)
  - Miami (MDT)
  - San Juan (ATI)
  - New York-Newark (SIRTOA). SIRTOA, serving Staten Island, is part of the much larger New York MTA.
- Peers based on population include Cleveland's GCRTA.

- Service area populations range from around 500,000 at SIRTOA to 8.6 million at LACMTA. This large range in service area population among peers is at least partially due to the limited number of heavy rail agencies nationwide (15).
- APTA Peers: In 2012, MTA operated one of the smaller of the 15 heavy rail systems in the country in terms of both vehicles operated in maximum service at 54 (12th nationwide) and unlinked passenger trips at around 15.2 million (11th nationwide). Vehicles operated during maximum service ranged from 32 (ATI) to 76 (MDT). Unlinked passenger trips ranged widely from 6.5 million (SIRTOA) to 47.7 million (LACMTA).
- Demographic Peers: GCRTA operated the smallest heavy rail service nationwide in both vehicles operated in maximum service (20) and unlinked passenger trips (6.2 million).
- Average fleet age at MTA ranked third out of the six agencies compared at 27.4 years. ATI had the lowest average fleet age at 10.4 while SIRTOA had the highest at 41 years. MTA is currently undergoing specification development for the replacement of metro vehicles. This could carry implications for both future average fleet age and for service efficiency and effectiveness.
- Amenities:
  - All agencies offer weekend service
  - All MTA stations are accessible, including both escalators and elevators from street entrances to the train platform, tactile warning strips near the platform edge, and accessible parking. All LACMTA and nearly all GCRTA stations are accessible, while not all stations at MDT and SIRTOA are accessible.
  - Bicycles are allowed at all times without restriction on MTA, GCRTA, and LACMTA trains so long as space allows and with a permit on ATI or MDT trains. SIRTOA allows bicycles at all times except for weekday peak hours for peak direction trains.

Agency	Urbanized Area (UZA) Name	UZA Population (Service Area Population)	Operating Expenses	Average Fleet Age in Years	2012 Vehicles Operated Maximum Service		2012 Unlinked Passenger Trips	
					Amount	Rank	Amount (Thousands)	Rank
APTA Peers								
Alternativa de Transporte Integrado –ATI (PRHTA)	San Juan, PR	2,148,346 (701,366)	$55,557,261	10.4	32	14	10,909.40	12
Los Angeles County Metropolitan Transportation Authority dba: Metro (LACMTA)	Los Angeles-Long Beach-Anaheim, CA	12,150,996 (8,626,817)	$105,619,995	16	70	11	47,735.70	9
Maryland Transit Administration (MTA)	Baltimore, MD	2,203,663 (2,203,663)	$53,571,599	27.4	54	12	15,199.10	11
Miami-Dade Transit (MDT)	Miami, FL	5,502,379 (2,496,435)	$76,284,971	30	76	10	18,706.10	10
Staten Island Rapid Transit Operating Authority, dba: MTA Staten Island Railway (SIRTOA)	New York-Newark, NY-NJ-CT	18,351,295 (491,730)	$40,343,489	41	46	13	6,467.90	14
Demographic Peers								
The Greater Cleveland Regional Transit Authority (GCRTA)	Cleveland, OH	1,780,673 (1,412,140)	$29,362,013	29	20	15	6,240.50	15

Service Efficiency and Effectiveness

- For service efficiency, MTA ranked second out of six agencies to MDT in operating expense per vehicle revenue mile in 2013 ($10.12) and 3rd out of 6 agencies to MDT and GCRTA in operating expense per vehicle revenue hour in 2013 ($247.45). San Juan's ATI ranked lowest of those compared.
- For service effectiveness, MTA ranked 4th of 6 for operating expenses per passenger mile in 2013 ($0.67). MTA ranked 2nd in operating expense per unlinked passenger trip in 2013 ($3.40).

Agency	Service Efficiency				Service Effectiveness			
	Operating Expense per Vehicle Revenue Mile		Operating Expense per Vehicle Revenue Hour		Operating Expense per Passenger Mile		Operating Expense per Unlinked Passenger Trip	
	2012	2013	2012	2013	2012	2013	2012	2013
APTA Peers								
Alternativa de Transporte Integrado –ATI (PRHTA)	$29.06	$29.68	$538.20	$549.69	$1.06	$1.07	$5.09	$5.14
Los Angeles County Metropolitan Transportation Authority dba: Metro (LACMTA)	$17.16	$17.04	$392.93	$387.56	$0.46	$0.49	$2.21	$2.36
Maryland Transit Administration (MTA)	$11.58	$10.12	$281.96	$247.45	$0.69	$0.67	$3.52	$3.40
Miami-Dade Transit (MDT)	$11.19	$9.85	$264.79	$218.19	$0.55	$0.50	$4.08	$3.66
Staten Island Rapid Transit Operating Authority, dba: MTA Staten Island Railway (SIRTOA)	$16.86	$17.51	$361.56	$356.54	$1.07	$1.03	$6.24	$6.12
Demographic Peers								
The Greater Cleveland Regional Transit Authority (GCRTA)	$14.76	$11.63	$286.19	$238.49	$0.67	$0.64	$4.71	$4.37

Heavy Rail – What Are the Peer Systems Up To?

Los Angeles County Metro Rail – Has five rail projects under construction, with two opening next year (the Expo Line Phase 2 and the Gold Line Foothill Extension light rail projects) and the extension of the Metro Purple Line subway. LA Metro is also updating its Long-Range Transportation Plan and developing a potential ballot measure for future improvements.

Miami-Dade Transit – In 2012, opened the 2.4-mile elevated Metrorail extension from the Earlington Heights station to the Miami Intermodal Center (MIC) next to Miami International Airport (MIA). This project includes the new MIA Metrorail Station, a multi-level structure featuring landscaping, an entry plaza, and other passenger amenities. The MIC is a major centralized transportation hub currently being developed by the Florida Department of Transportation. Once completed, the MIC will provide access to all modes of transportation, including Metrobus, Metrorail, Tri-Rail, Amtrak, Greyhound, tour buses, taxi cabs, and rental cars. An automated people mover will connect the MIC to the airport.

Staten Island Railway – Recently expanded morning express rush hour trains and enhanced its evening express service.

Greater Cleveland Regional Transit Authority – Updated its strategic plan and is constructing upgrades to several stations, including the station near the airport.

LIGHT RAIL

Light rail operates passenger rail cars along rights-of-way frequently separated from other traffic, traditionally in short trains of one to three cars. Light rail may also be referred to as a streetcar, tramway, or trolley.

General Characteristics

Minneapolis – Light Rail

- Peers identified through the APTA include agencies serving:
  - Minneapolis–St. Paul (Metro Transit)
  - San Jose, CA (VTA)
  - Seattle (ST).
- Peers based on population include:
  - St. Louis (Metro)
  - Denver-Aurora (RTD)
  - Pittsburgh (Port Authority)
  - Cleveland (GCRTA).
- Service area populations for these agencies range from 1.4 million (GCRTA) and Port Authority to 2.8 million (ST).
- Though identified as a peer through APTA rankings, Metro Transit is also a demographic peer.
- MTA light rail service ranked 14th nationwide in vehicles operated during maximum service (38). Vehicles operated in maximum service ranged from 26 (S)T to 55 (VTA) among APTA peers while demographic peers ranged from 13 (GCRTA) to 102 (RTD).
- MTA ranked 16th out of 22 nationwide in unlinked passenger trips (8.8 million). Among APTA peers, unlinked passenger trips ranged from 8.7 million (ST) to 10.5 million (Metro Transit). Among demographic peers, unlinked passenger trips ranged from 2.9 million (GCRTA) to 20.6 million (RTD).
- MTA had the second highest average fleet age among the eight agencies compared at 18.3 years. Average fleet ages ranged from 4.3 years (ST) to 20.4 years (Port Authority). Nationwide, MTA had the 4th oldest fleet of light rail vehicles in 2012.
- Amenities: Light rail agencies compared provide weekend service and uniformly allow bicycles on light rail vehicles. All trains and nearly all stations are ADA accessible, though not all Cleveland GCRTA and Pittsburgh Port Authority stations are currently fully accessible.

Agency	Urbanized Area (UZA) Name	UZA Population (Service Area Population)	Operating Expenses	Average Fleet Age in Years	2012 Vehicles Operated Maximum Service		2012 Unlinked Passenger Trips	
					Amount	Rank	Amount (Thousands)	Rank
APTA Peers								
Central Puget Sound Regional Transit Authority (ST)	Seattle, WA	3,059,393 (2,781,740)	$51,370,132	4.3	26	16t	8,701.10	17
Maryland Transit Administration (MTA)	Baltimore, MD	2,203,663 (2,203,663)	$43,345,659	18.3	38	14	8,796.30	16
Metro Transit	Minneapolis-St. Paul, MN-WI	2,650,890 (1,805,940)	$27,886,232	7.7	27	15	10,498.20	14
Santa Clara Valley Transportation Authority (VTA)	San Jose, CA	1,664,496 (1,880,876)	$61,685,649	10.7	55	13	10,372.90	15

Agency	Urbanized Area (UZA) Name	UZA Population (Service Area Population)	Operating Expenses	Average Fleet Age in Years	2012 Vehicles Operated Maximum Service		2012 Unlinked Passenger Trips	
					Amount	Rank	Amount (Thousands)	Rank
Demographic Peers								
Bi-State Development Agency d.b.a. (St. Louis) Metro (METRO)	St. Louis, MO-IL	2,150,706 (1,540,000)	$62,122,401	13.3	58	10	17,000.00	10
Denver Regional Transportation District (RTD)	Denver-Aurora, CO	2,374,203 (2,619,000)	$68,454,319	6.7	102	5	20,639.10	7
Port Authority of Allegheny County (Port Authority)	Pittsburgh, PA	1,733,853 (1,415,244)	$52,043,343	20.4	56	11t	7,130.40	18
The Greater Cleveland Regional Transit Authority (GCRTA)	Cleveland, OH	1,780,673 (1,412,140)	$12,339,684	31	13	21	2,856.40	21

Service Efficiency and Effectiveness

- For service efficiency, MTA ranked third and fourth out of eight in 2013 operating expense per vehicle revenue mile ($11.60) and per vehicle revenue hour ($231.29), respectively. Only demographic peers ranked better than MTA – Denver and St. Louis for operating expense per vehicle revenue mile and Cleveland, Denver, and Minneapolis–St. Paul for operating expense per vehicle revenue hour.
- For service effectiveness, MTA ranked fourth and fifth out of eight in 2013 operating expense per passenger mile ($0.64) and per unlinked passenger trip ($4.37), respectively. Once again, only demographic peers performed better than MTA – Denver, Minneapolis–St. Paul, and St. Louis for operating expense per passenger mile with the addition of Cleveland for operating expense per unlinked passenger trip.

Agency	Service Efficiency				Service Effectiveness			
	Operating Expense per Vehicle Revenue Mile		Operating Expense per Vehicle Revenue Hour		Operating Expense per Passenger Mile		Operating Expense per Unlinked Passenger Trip	
	2012	2013	2012	2013	2012	2013	2012	2013
APTA Peers								
Central Puget Sound Regional Transit Authority (ST)	$20.12	$20.01	$377.34	$375.20	$0.76	$0.70	$5.90	$5.44
Maryland Transit Administration (MTA)	$14.00	$11.60	$273.63	$231.29	$0.75	$0.64	$4.93	$4.37
Metro Transit	$13.56	$14.03	$192.47	$197.85	$0.50	$0.60	$2.66	$3.19
Santa Clara Valley Transportation Authority (VTA)	$20.00	$21.50	$316.83	$347.59	$1.10	$1.19	$5.95	$6.42

Agency	Service Efficiency				Service Effectiveness			
	Operating Expense per Vehicle Revenue Mile		Operating Expense per Vehicle Revenue Hour		Operating Expense per Passenger Mile		Operating Expense per Unlinked Passenger Trip	
	2012	2013	2012	2013	2012	2013	2012	2013
Demographic Peers								
Bi-State Development Agency d.b.a. (St. Louis) Metro (METRO)	$9.82	$10.41	$233.65	$245.61	$0.41	$0.42	$3.65	$3.80
Denver Regional Transportation District (RTD)	$8.10	$8.56	$152.45	$153.33	$0.39	$0.43	$3.32	$3.67
Port Authority of Allegheny County (Port Authority)	$26.98	$25.52	$351.29	$324.07	$1.53	$1.56	$7.30	$6.42
The Greater Cleveland Regional Transit Authority (GCRTA)	$17.65	$14.92	$264.19	$222.51	$0.73	$0.68	$4.32	$4.04

Light Rail – What Are the Peer Systems Up To?

Central Puget Sound Regional Transit Authority – Adopted a Regional Transit Long-Range Plan in December 2014 with a goal of providing more transportation choices for this growing region, including an expansion of the commuter bus system.

Sound Transit Board – Currently developing a ballot measure for November 2016 to fund service improvements.

Metro Transit in Minneapolis-St. Paul – Expanding its light rail system, including the Southwest Light Rail Transit Project (METRO Green Line extension) and the Blue Line extension to the northwest and to Target Field.

San Jose Light Rail – Upgrading its system, including the Mountain View Light Rail Double Track Project and several associated BRT projects. The VTA is implementing these upgrades based on a 2010 Light Rail Improvement Plan.

Denver RTD – FasTracks Program is a multi-billion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail

BUS

Bus service is a fixed-route service operating on streets and roadways in vehicles powered by diesel, gasoline, battery, or alternative fuels. Types of bus service included in this mode are local service, express service, limited-stop service, and Bus Rapid Transit.

General Characteristics

- Peers identified through the APTA include agencies serving:
  - Urban Honolulu (DTS)
  - Minneapolis–St. Paul (Metro Transit)
  - Miami (MDT)
  - Chicago (PACE).

- MTA is required by the General Assembly to submit a comparison report of peer agencies. In addition to APTA peers, we include peers identified in this report as well as the demographic peers. These peers include agencies serving:
  - Atlanta (MARTA)
  - Cleveland (GCRTA)
  - Dallas (DART)
  - Denver (RTD)
  - Houston (Metro)
  - Pittsburgh (Port Authority)
  - San Jose (VTA)
  - Seattle (King County Metro)
  - St. Louis (Metro)
  - Salt Lake City (UTA)
  - Washington, DC (WMATA).

Salt Lake City – Local Bus

- Including more peer agencies is useful since bus service figures so prominently in the Baltimore region. Service area populations range from 953,000 at Honolulu DTS to 5.6 million at PACE, a bus agency serving counties surrounding Chicago. Most have service area populations of between approximately 1.5 and 2.5 million persons.
- MTA operated one of the largest bus services in the country in 2012, ranking 14th out of more than 600 bus service agencies in both vehicles operated in maximum service (599) and unlinked passenger trips (73.6 million). Among APTA peers, DTS operated the fewest buses in maximum service at 434 while Metro Transit operated the most at 747. Among all peers, MTA ranked seventh out of 16, with Cleveland's GCRTA operating the fewest buses (303) and Washington's WMATA the most (1,327).
- Ridership at APTA peers in 2012 ranged from a low of 32.2 million at PACE to a high of 77.9 million at MDT. Among all peers, MTA ranked sixth out of 16, with the fewest unlinked passenger trips at Salt Lake City's UTA (20.2 million) and the most at Washington, DC's WMATA (136.8 million).
- Of the 16 agencies compared, only three had lower average fleet ages than MTA (7.1 years). These agencies were agencies serving Minneapolis–St. Paul (5 years), Salt Lake City (5.4 years), and Washington, DC (6.6 years). MTA programs the annual purchase of buses to replace those that have been in service for 12 or more years. Forty-one 40-foot hybrid diesel-electric buses were scheduled to be delivered to MTA in FY 2015. Future MTA bus procurement will be clean diesel vehicles.
- Amenities:
  - Buses are uniformly accessible to persons with disabilities across all agencies.
  - Buses at all agencies are equipped with racks capable of holding 2-3 bicycles.

Agency	Urbanized Area (UZA) Name	UZA Population (Service Area Population)	Operating Expenses	Average Fleet Age in Years	2012 Vehicles Operated Maximum Service		2012 Unlinked Passenger Trips	
					Amount	Rank	Amount (Thousands)	Rank
APTA Peers								
City and County of Honolulu Department of Transportation Services (DTS)	Urban Honolulu, HI	802,459 (953,207)	$178,871,978	10.9	434	25	76,296.60	13
Maryland Transit Administration (MTA)	Baltimore, MD	2,203,663 (2,203,663)	$297,374,548	7.1	599	14	73,574.80	14

Agency	Urbanized Area (UZA) Name	UZA Population (Service Area Population)	Operating Expenses	Average Fleet Age in Years	2012 Vehicles Operated Maximum Service		2012 Unlinked Passenger Trips	
					Amount	Rank	Amount (Thousands)	Rank
Metro Transit	Minneapolis-St. Paul, MN-WI	2,650,890 (1,805,940)	$248,515,225	5	747	12	69,855.00	15
Miami-Dade Transit (MDT)	Miami, FL	5,502,379 (2,496,435)	$304,832,932	8.5	693	13	77,859.00	11
Pace - Suburban Bus Division (PACE)	Chicago, IL-IN	8,608,208 (5,630,238)	$160,555,855	7.7	584	15	32,191.00	33
MTA Report Peers								
Dallas Area Rapid Transit (DART)	Dallas, TX	5,121,892 (2,423,480)	$242,592,248	12.2	509	17	38,378.90	26
King County Department of Transportation (King County Metro)	Seattle, WA	3,059,393 (1,957,000)	$430,144,035	7.8	909	8	95,592.10	10
Metropolitan Atlanta Rapid Transit Authority (MARTA)	Atlanta, GA	4,515,419 (1,574,600)	$211,539,134	7.6	443	24	61,596.70	16
Metropolitan Transit Authority of Harris County, Texas (Metro)	Houston, TX	4,944,332 (3,527,625)	$289,899,026	8.2	769	11	58,100.00	19
Port Authority of Allegheny County (Port Authority)	Pittsburgh, PA	1,733,853 (1,415,244)	$282,746,282	7.8	572	16	55,704.70	20
Santa Clara Valley Transportation Authority (VTA)	San Jose, CA	1,664,496 (1,880,876)	$218,163,621	8.4	357	28	32,338.40	32
Utah Transit Authority (UTA)	Salt Lake City-West Valley City, UT	1,021,243 (2,165,290)	$106,822,500	5.4	503	18	20,151.40	45
Washington Metropolitan Area Transit Authority (WMATA)	Washington, DC-VA-MD	4,586,770 (3,719,567)	$565,803,610	6.6	1,327	5	136,795.30	6
Demographic Peers								
Bi-State Development Agency d.b.a. (St. Louis) Metro (METRO)	St. Louis, MO-IL	2,150,706 (1,540,000)	$139,581,933	7.9	313	32t	29,120.50	36
Denver Regional Transportation District (RTD)	Denver-Aurora, CO	2,374,203 (2,619,000)	$301,669,047	9.7	822	9	76,717.00	12
The Greater Cleveland Regional Transit Authority (GCRTA)	Cleveland, OH	1,780,673 (1,412,140)	$142,998,626	8.3	303	34	33,858.00	29

Service Efficiency and Effectiveness

- For service efficiency in 2012, MTA ranked 16th out of 16 in operating expense per vehicle revenue mile ($15.60) and 14th in operating expense per vehicle revenue hour ($169.84). These rankings improved to 11th ($11.51) and 10th ($133.51), respectively, in 2013.
- Service effectiveness also improved at MTA from 2012 to 2013. MTA ranked 13th out of 16 in operating expense per passenger mile in 2012 ($1.30) and 9th in 2013 ($0.98). For operating expense per unlinked passenger trip, MTA ranked 6th out of 16 in 2012 ($4.04) and 2nd in 2013 ($3.48).
- Improvement from 2012 to 2013 in MTA service efficiency and effectiveness measures is at least partially attributable to the decrease in bus operating expenses from $297 million in 2012 to $237 million in 2013.

Agency	Service Efficiency				Service Effectiveness			
	Operating Expense per Vehicle Revenue Mile		Operating Expense per Vehicle Revenue Hour		Operating Expense per Passenger Mile		Operating Expense per Unlinked Passenger Trip	
	2012	2013	2012	2013	2012	2013	2012	2013
APTA Peers								
City and County of Honolulu Department of Transportation Services (DTS)	$9.81	$10.63	$130.05	$139.54	$0.43	$0.51	$2.34	$2.64
Maryland Transit Administration (MTA)	$15.60	$11.51	$169.84	$133.51	$1.30	$0.98	$4.04	$3.48
Metro Transit	$10.94	$11.43	$126.82	$131.77	$0.84	$0.93	$3.56	$3.75
Miami-Dade Transit (MDT)	$10.57	$10.51	$126.34	$125.35	$0.69	$0.69	$3.92	$3.86
Pace - Suburban Bus Division (PACE)	$7.95	$8.04	$112.30	$114.36	$0.78	$0.81	$4.99	$5.07
MTA Report Peers								
Dallas Area Rapid Transit (DART)	$8.94	$9.13	$120.68	$118.44	$1.50	$1.61	$6.32	$6.56
King County Department of Transportation (King County Metro)	$12.91	$13.29	$155.38	$159.43	$0.94	$0.90	$4.50	$4.46
Metropolitan Atlanta Rapid Transit Authority (MARTA)	$9.28	$9.69	$112.72	$118.30	$0.93	$0.96	$3.43	$3.69
Metropolitan Transit Authority of Harris County, Texas (Metro)	$8.71	$9.18	$114.63	$120.69	$1.01	$0.98	$4.99	$5.02
Port Authority of Allegheny County (Port Authority)	$15.02	$14.32	$189.09	$186.14	$1.29	$1.30	$5.08	$5.09
Santa Clara Valley Transportation Authority (VTA)	$14.98	$15.27	$181.04	$183.90	$1.28	$1.35	$6.75	$6.90
Utah Transit Authority (UTA)	$7.68	$7.28	$128.23	$120.36	$1.98	$1.44	$5.30	$5.68

Agency	Service Efficiency				Service Effectiveness			
	Operating Expense per Vehicle Revenue Mile		Operating Expense per Vehicle Revenue Hour		Operating Expense per Passenger Mile		Operating Expense per Unlinked Passenger Trip	
	2012	2013	2012	2013	2012	2013	2012	2013
Washington Metropolitan Area Transit Authority (WMATA)	$14.03	$14.12	$145.03	$144.42	$1.36	$1.35	$4.14	$4.13
Demographic Peers								
Bi-State Development Agency d.b.a. (St. Louis) Metro (METRO)	$7.49	$7.87	$102.66	$107.36	$0.92	$0.95	$4.79	$4.94
Denver Regional Transportation District (RTD)	$9.00	$8.82	$113.49	$120.12	$0.75	$0.78	$3.93	$4.10
The Greater Cleveland Regional Transit Authority (GCRTA)	$11.70	$11.80	$138.06	$135.74	$0.99	$1.06	$4.22	$4.46

Local "Core" Bus – What Are the Peer Systems Up To?

Honolulu Department of Transportation Services – In 2011, TheBus in Honolulu opened the Middle Street Intermodal Center. This newly expanded facility incorporates TheBus, HandiVan, bicycles, cars, pedestrians, and the future light rail line. Route reductions and eliminations followed budget issues. Efforts are now under way to restore or expand the service.

Metro Transit in Minneapolis-St. Paul – Working to add up to 150 new bus shelters and upgrade an additional 75 existing shelters with lighting and heat, focused in areas of concentrated poverty. An urban Bus Rapid Transit line with improved service and enhanced stations is in construction by Metro and will serve Roseville, Falcon Heights, St. Paul, and south Minneapolis beginning in spring 2016.

Miami-Dade Transit – Completed the MDT10Ahead, the Transit Development Plan, a 10-year strategic vision to promote the operation of an efficient, reliable, and financially sustainable transit system. Miami-Dade Transit is also working with the Miami-Dade MPO on short- and near-term transportation plans to lay a foundation for future transit improvements along other transit corridors in the county.

Pace Transit, Chicago Area – Implementing bus-on-shoulder programs and an Arterial Rapid Transit (ART) service. This service features increased speed through several enhancements, including limited stops and use of transit signal priority (TSP).

Metropolitan Transit Authority of Harris County in Houston (METRO) – Recently implemented a well publicized major realignment of the bus system to improve trips to key activity centers throughout the region and to provide flexibility for growth.

Honolulu – Local Bus

Farebox Recovery

Farebox recovery is the ratio of revenues from passenger fares to operating expenses.Transit agencies use farebox recovery ratio's as one means to measure performance relative to the public investment in transit.

In Maryland, farebox recovery ratio has been used as a means to frame conversations regarding MTA performance. This includes legislation to set targets the MTA must meet across all modes for budgetary purposes. These conversations often focus on the level of direct dollars returned to the Transportation Trust Fund from the cost of transit services. They do not measure indirect or other returns associated with transit (e.g., reduction of costs associated with environmental impacts or reduced congestion, or less tangible increases in quality of life).

CAVEAT: FAREBOX RECOVERY AS A MEASURE

Transit agencies seek to address the needs and characteristics of the region they serve and those who use the system.

The unique economic, historic, and political context in which each transit agency operates influences budgetary decision making, including fare levels, resulting in widely varying farebox recovery ratios nationwide.

Generally speaking, transit agencies seek to address the needs and characteristics of the region they serve and those who use the system. The unique economic, historic, and political context in which each transit agency operates influences budgetary decision making, including fare levels, resulting in widely varying farebox recovery ratios nationwide.

The following material compares MTA farebox recovery to the largest transit agencies nationwide for bus, commuter bus, commuter rail, light rail, and heavy rail. Data are from the 2012 and 2013 National Transit Database. All agencies nationwide with full data availability are included for commuter rail, light rail, and heavy rail as there are a limited number of agencies for these modes. Bus and commuter bus comparisons include the 25 largest transit agencies in terms of 2013 unlinked passenger trips. For-profit commuter bus agencies are not included.

- MTA has a stated goal of reaching a farebox recovery ratio of 35 percent across all modes of transit, meaning that passenger fare revenues account for 35 percent of operating expenses throughout MTA. MTA met this goal for commuter bus (44 percent) and commuter rail (42 percent) in 2012 and commuter rail (35 percent) in 2013.
- Bus: MTA fell in the bottom quarter of bus farebox recovery at 20 percent and 24 percent in 2012 and 2013, respectively. The five highest ratios ranged from 34 to 50 percent in 2013.
- Commuter Bus: MTA's 2013 farebox recovery of 30 percent placed the agency in the bottom quarter among the 25 largest commuter bus agencies nationwide. In comparison, the five highest commuter bus farebox recovery ratios fell between 60 and 80 percent.
- Commuter Rail: Farebox recovery at MTA ranked in the bottom half of commuter rail agencies nationwide at 35 percent in 2013. The top five farebox recovery ratios ranged from 55 to 61 percent.
- Heavy Rail: MTA farebox recovery was 25 percent in 2013, placing MTA in the bottom half of all heavy rail agencies. The five highest farebox recovery ratios ranged from 56 to 77 percent.
- Light Rail: MTA farebox recovery was 19 percent in 2013. This placed MTA in the bottom half among light rail agencies nationwide (seventh out of 23). The five highest light recovery ratios ranged from 45 to 59 percent.

Figure 1

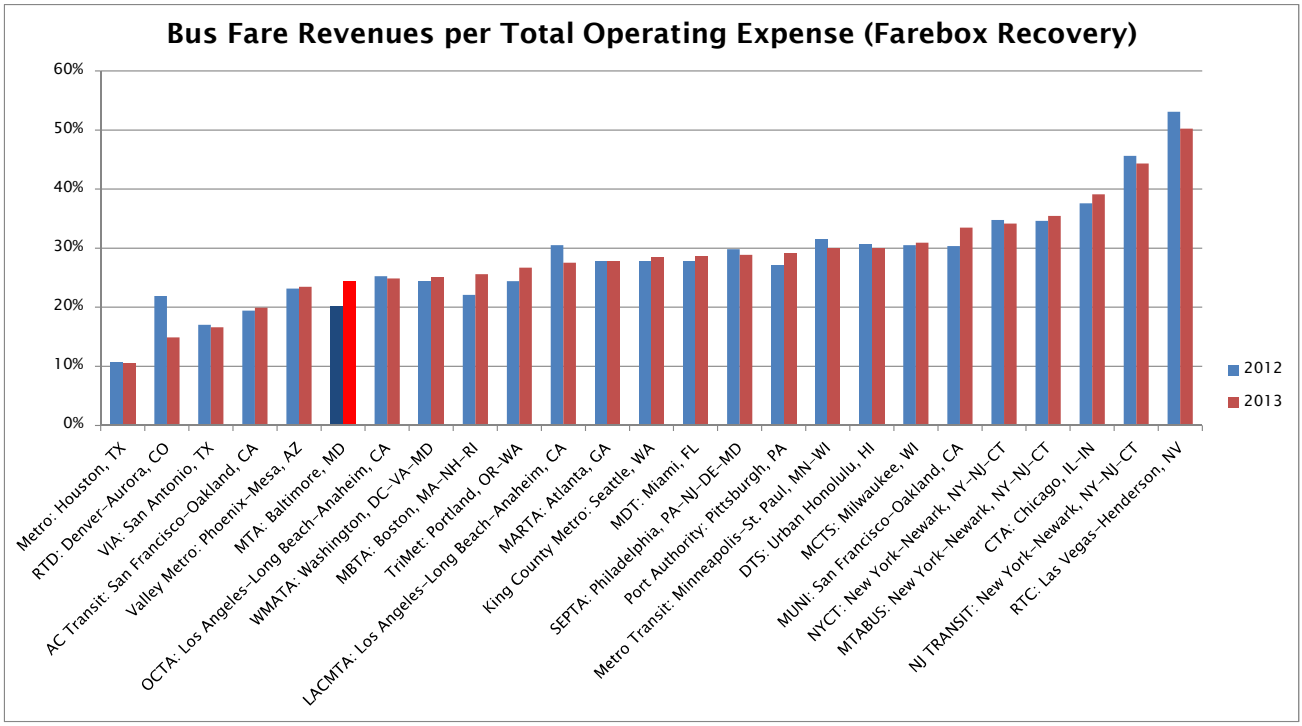
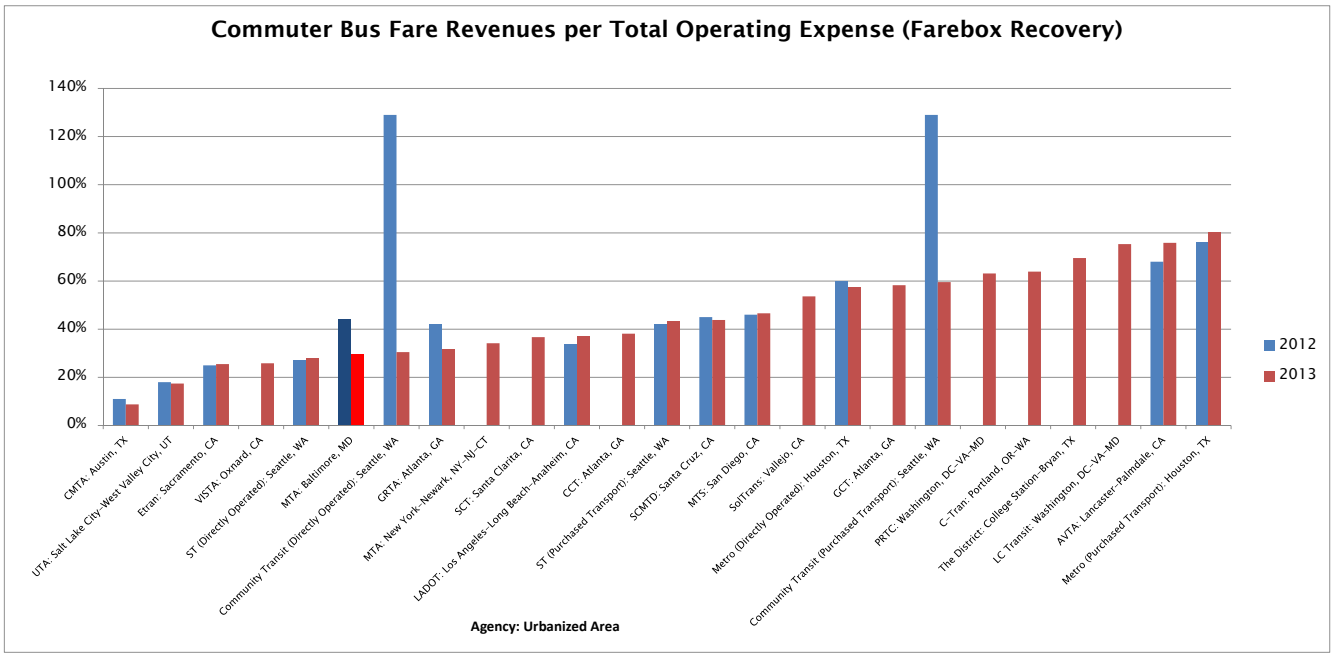


Figure 2



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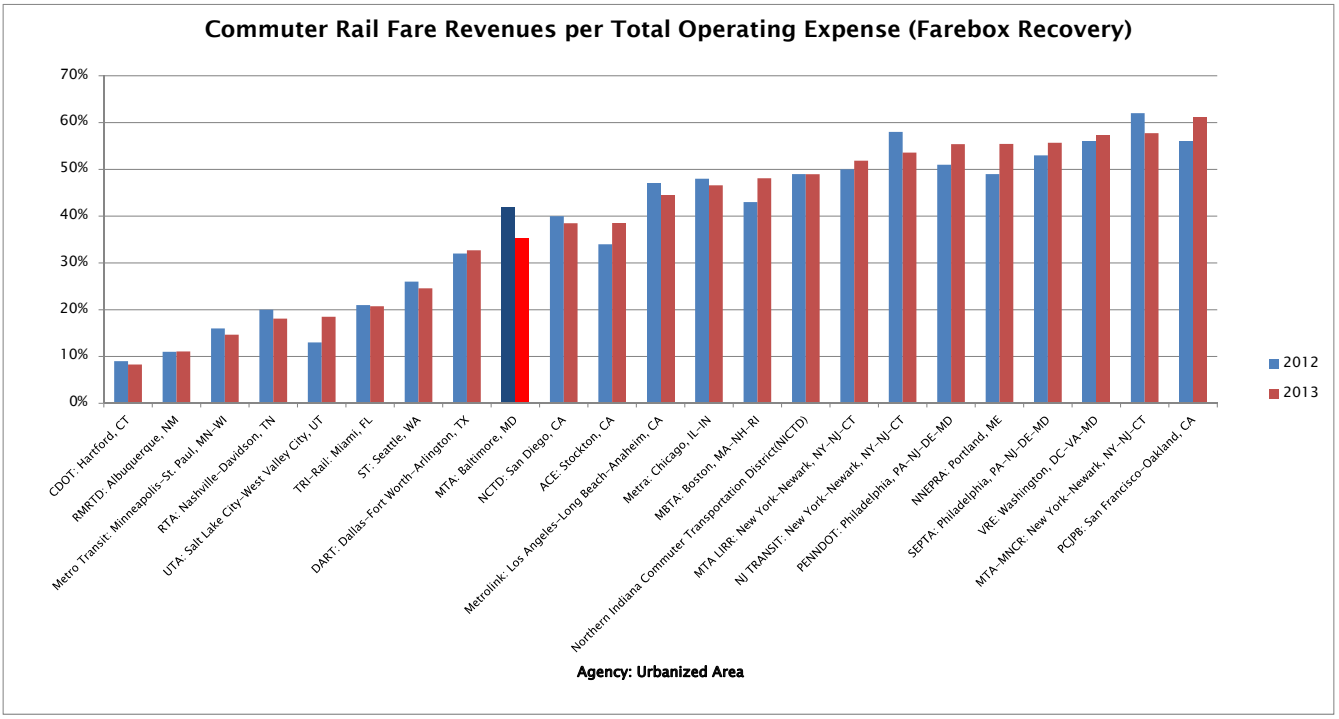

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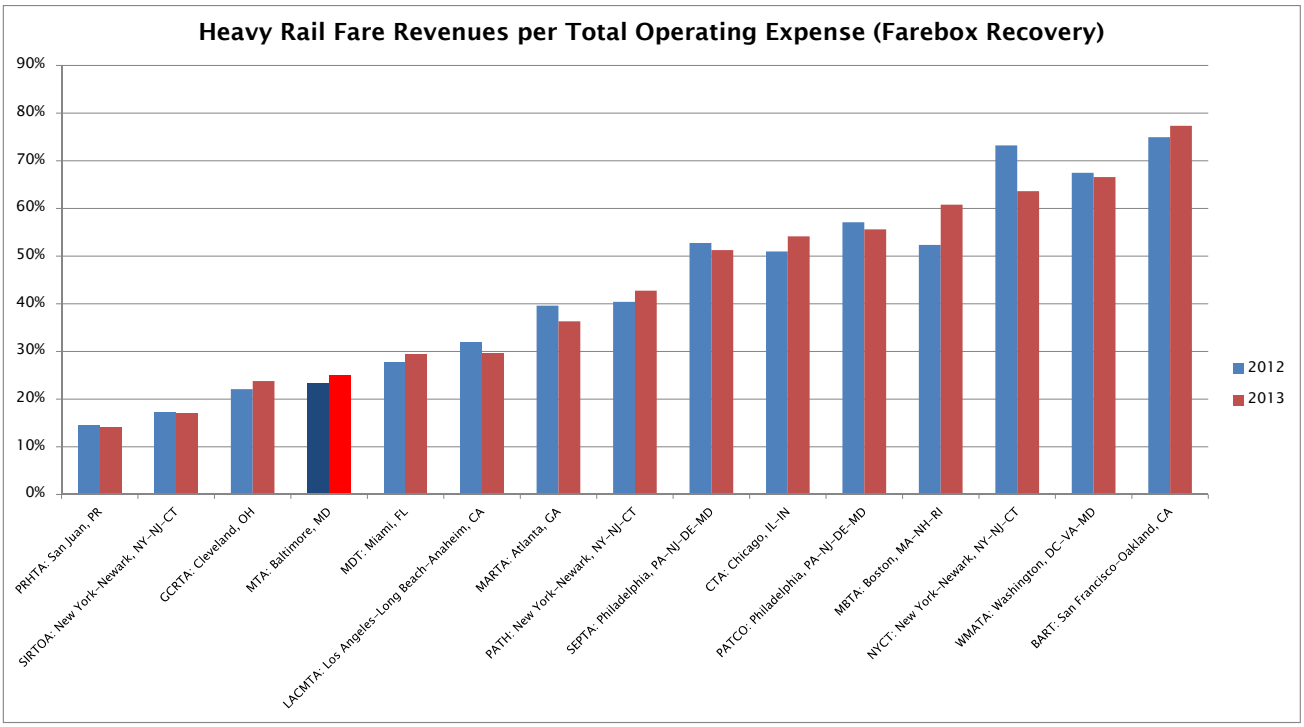

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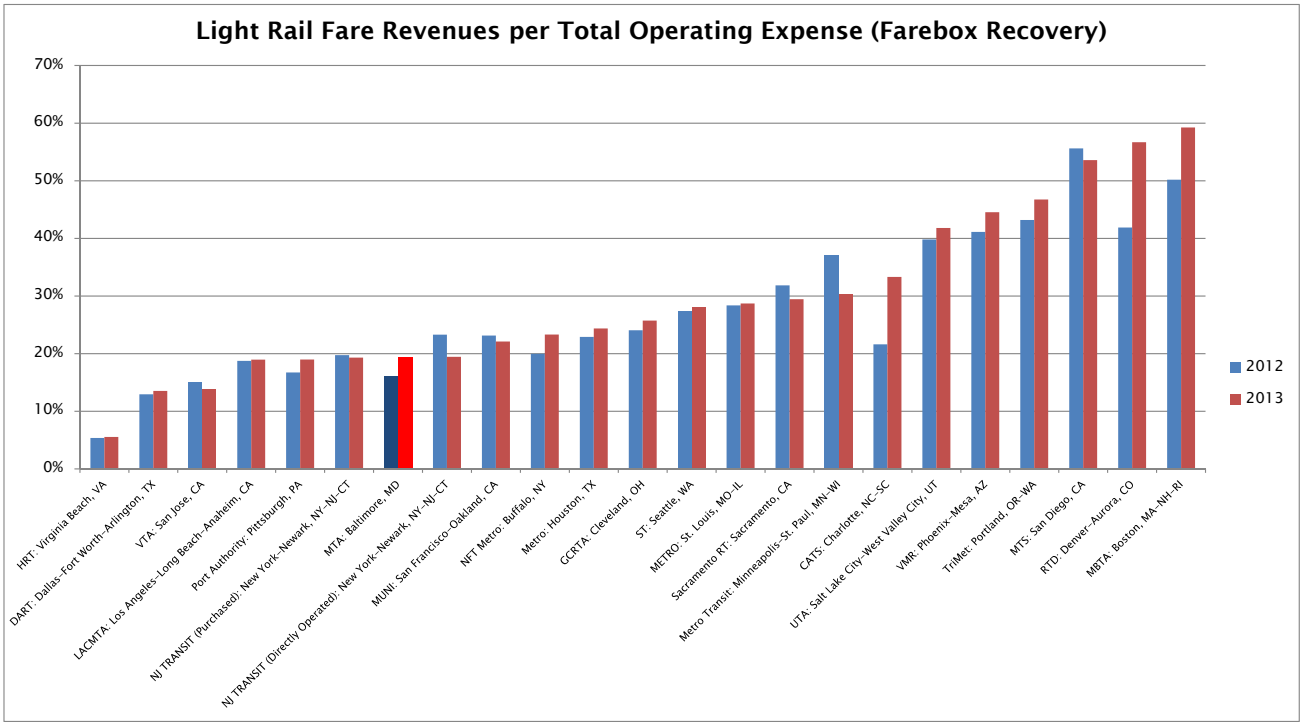

Comparing Vehicles Operated in Maximum Service and Passenger Miles Through Time

Transit ridership and service provision change through time. It is useful to analyze how these factors interrelate. In an effort to understand changes in ridership and service provision through time, we compared changes in annual passenger miles with those in vehicles operated in maximum service through time. As defined in the APTA, vehicles operated in maximum service represent the largest number of vehicles operated at any one time throughout the day. This is typically during the morning or evening rush hour periods. For purposes of the comparison to peers, vehicles operated in maximum service includes both directly operated and purchased transportation.

As similarly sized urbanized areas, agencies serving the Denver, Pittsburgh, and St. Louis urbanized areas were chosen for this comparison. The statistics focus only on fixed-route service, and thus demand response transit services are not included. It is important to note that these agencies provide service across a different subset of transit modes. The comparison is still useful, however, since we are looking at trends through time in total service provision vs. ridership.

In the Baltimore Region, MTA passenger miles have increased steadily from 499.6 million in 1996 to 829.6 in 2013. This represents an increase of approximately 66 percent. Over the same period, the number of vehicles operated by MTA in maximum service across all transit modes (aside from demand response) has fluctuated, with a slight increase through 2003, followed by a decrease through 2007, and finally a gradual increase through 2013. As a result, the overall increase in vehicles operated in maximum service from 1996 through 2013 did not keep pace with that of annual passenger miles. Vehicles operated in maximum service increased from 958 in 1996 to 1067 in 2013, an increase of approximately 11 percent. Therefore, the 66 percent increase in annual passenger miles far surpasses the 11 percent increase in vehicles operated in maximum service.

The implication is that over this period, vehicles either became more crowded, were operated more miles, or both. Incorporating data on annual vehicle revenue miles shows a steady increase from 31.2 million in 1996 to 40.1 million in 2013, a total increase of nearly 29 percent. Thus, annual vehicle revenue miles increased comparatively more than vehicles operated in maximum service but comparatively less than annual passenger miles. Barring significant increases in the carrying capacity of vehicles operated in maximum service, this implies that MTA vehicles were both operated for more miles and became more crowded over the period from 1996 through 2013.

Pittsburgh – Express Bus

St. Louis – Local Bus

Contrary to MTA, all metrics showed an overall decline for the Pittsburgh Port Authority from 1996 to 2013. Vehicles operated in maximum service, passenger miles, and annual vehicle revenue miles all initially increased from 1996 through 2001 or 2002. Aside from fluctuations in the mid 2000s, all statistics then exhibit a relatively steady decline through 2013. From 1996 through 2013, annual passenger miles decreased from 301.3 million to 240.5 million, a decrease of just over 20 percent. Vehicles operated in maximum service declined by a nearly identical percentage, from 786 in 1996 to 626 in 2013. Annual vehicle revenue miles also declined by around 20 percent over this period. In contrast to MTA, these statistics show that service provision at the Port Authority was reflective of service consumption.

Denver – Light Rail

Service consumption showed a marked and continuous increase at the Denver Regional Transportation District. Apart from decreases in 1998, 2002, and 2009, annual passenger miles increased steadily from approximately 295.2 million in 1996 to 602.9 million in 2013, an increase of more than 100 percent. Aside from significant decreases in 1998, both annual vehicle revenue miles and vehicles operated in maximum service increased steadily through 2008 and 2009, respectively. Both metrics then decline before increasing in 2013. Vehicles operated in maximum service exhibited an overall increase of nearly 38 percent, rising from 695 in 1996 to 958 in 2013. Annual vehicle revenue miles increased from 30.6 million in 1996 to 45.7 million in 2013, an increase of around 50 percent. Similar to MTA, the increases in service provision at RTD do not match those for service consumption, resulting in vehicles that were operated more miles and implying that these vehicles also became more crowded during this period.

Service provision and consumption statistics reveal conflicting trends at St. Louis' Metro. Annual passenger miles fluctuates during this period, but exhibits an overall upward trend. It increased from 220.8 million in 1996 to just over 306 million in 2013, an increase of approximately 38.5 percent. In contrast, vehicles operated in maximum service declined steadily from 584 in 1996 to 371 in 2005. Aside from a large decrease in 2009 and subsequent increase in the years following, vehicles operated in maximum service remains at this level through 2013. This reflects an overall decrease of nearly 37 percent. While vehicles operated in maximum service largely decreased, annual vehicle revenue miles actually increased over this period. Vehicle revenue miles fluctuates with periodic decreases, but gradually increases from 21.4 million in 1996 to around 24.7 million in 2013, an increase of around 15.5 percent. These statistics reveal a trend of increasing service consumption paired with a decrease in the number of vehicles operated in maximum service and a slight increase in annual vehicle revenue miles. This implies that a decreasing number of vehicles was operated more consistently and with increasing numbers of passengers on board between 1996 and 2013.

References

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- Maryland Transit Administration (2015). *Analysis of the FY 2016 Maryland Executive Budget, 2015*. Baltimore, MD.
- U.S. Department of Transportation Federal Transit Administration (2013). National Transit Database Transit Profiles: Top 50 Agencies. Washington, DC.

2-1. Wayfinding.

How Does the Public Get Information?

Wayfinding is an important part of transit use. Before users, particularly new users, can ride a transit system, they need to find out how to ride. This involves questions such as: Where does this line go? How frequent is service? What are the service hours?

2-1. Wayfinding

Providing Information on the System

Transit riders often need help to answer questions about service and coverage quickly and accurately. Products that can help riders find their way in the system include mapping, call centers and websites, and real-time vehicle information. This last item—access to real-time information—is particularly important with the widespread use of smart phones.

MAPPING

At the request of the members of the Baltimore Regional Transportation Board, BMC enlisted the services of STV, Inc. to review existing mapping of the regional transit providers, review other peer regional mapping products, and make recommendations to improve Baltimore Regional transit mapping. While STV's work is not yet complete, some key potential recommendations have been identified, including:

- Consider the geographic scale of the region. The most effective maps use color, pictograms/symbols/icons, and good graphic design to more effectively convey information in the limited space available on a map.
- It is less important to show all streets and features. Many effective maps are more symbolic than geographically accurate, and some do not contain the complete underlying street grid. A transit rider seeking specific route or schedule information would still likely be referred to route-specific maps and schedules and/or web-based trip planners. The regional system map is most valuable in showing the interconnectivity of the entire system.
- Use color carefully, either to convey service frequency or geographic grouping of routes. The most effective maps make clear and obvious color choices, rather than use randomly selected colors.
- Clearly show transit centers and transfer points.

BMC will continue to work with MTA and other regional transit providers to improve transit service mapping in the region.

How Does the Public Get Information?

CALL CENTERS AND TRAVELER INFORMATION WEBSITES

Each transit system has its own mechanisms for providing interactive traveler information, either in person, by telephone, or through a website:

- The MTA has a Transit Information Contact Center that is available in person or by telephone Monday through Friday from 6 a.m. to 7 p.m. MTA also has an online trip planner through its website.
- Annapolis Transit (operated by the Annapolis Department of Transportation) has hours of operation from 8:30 a.m. to 4:30 p.m. Monday through Friday.
- Carroll Transit System operates a call center with hours of operation from 7 a.m. to 5 p.m. Monday through Friday.
- Harford Transit operates a call center from 5 a.m. to 7 p.m. Monday through Friday.
- The Regional Transit Agency of Central Maryland call center is available from 6 a.m. to 7 p.m. Monday through Friday, with limited weekend call service.

Beyond MTA's online trip planner, Central Maryland Regional Transit (CMRT), a non-profit organization, maintains an online transit planner known as Transportation Resource Information Point (TRIP – see www.mdtrip.com). CMRT also operates a call center. CMRT has a federal grant to work with all of the regional transit providers to develop scheduling that will be compatible with the transit feature of Google Maps.

REAL-TIME TRANSIT TRACKER / NEXT BUS/TRAIN

Accurate real-time transit information is cited as one of the main wishes for all types of transit riders. This technology is being introduced through website features, mobile apps, call-aheads, and displays at stations and stops.

Real-time information on the MTA system differs based on the mode of transit. MTA has MARC train tracker and light rail tracker systems available on its website. MTA also has launched the MyBusTracker program and has indicated that likely improvements are coming with the purchase of new GPS technology. Next-train information is available at MARC and light rail stations.

Local transit systems vary in terms of their use of real-time information. Harford Transit has upgraded its real-time information service and calls ahead for paratransit pickups.

INNOVATIONS IN TRANSIT INFORMATION SHARING

Many new products are available now to help transit users gain better knowledge of the options available to them as they decide how to get from one place to another. These products, which optimize trips based on parameters the user can define (e.g., time, cost, combination), can get riders where they want to go by combining transit options. These options may allow riders to get to their destinations faster, perhaps by taking a previously unfamiliar bus and switching to another bus or mode at a transfer point.

Mobile apps show all the options and let the user decide. Some include car-share, bike-share, taxi, and parking options, and newer ones include a means for a full accounting of travel costs to the user. These factor in a type of opportunity cost—that is, the value of time a person spends driving when he or she could be doing other productive things. These mobile apps can keep track of such values and help the system user calculate whether cost, time, or reliability is more important. In this way, the user can make more informed decisions.

RATE-YOUR-RIDE

MTA's Rate-Your-Ride program enables riders to provide real-time feedback via text messaging on the quality of their rides on any part of MTA's system. The Central Maryland Transportation Alliance originally developed the program with funding from Open Society Institute – Baltimore, the Ford Foundation, and the Clayton Fund.

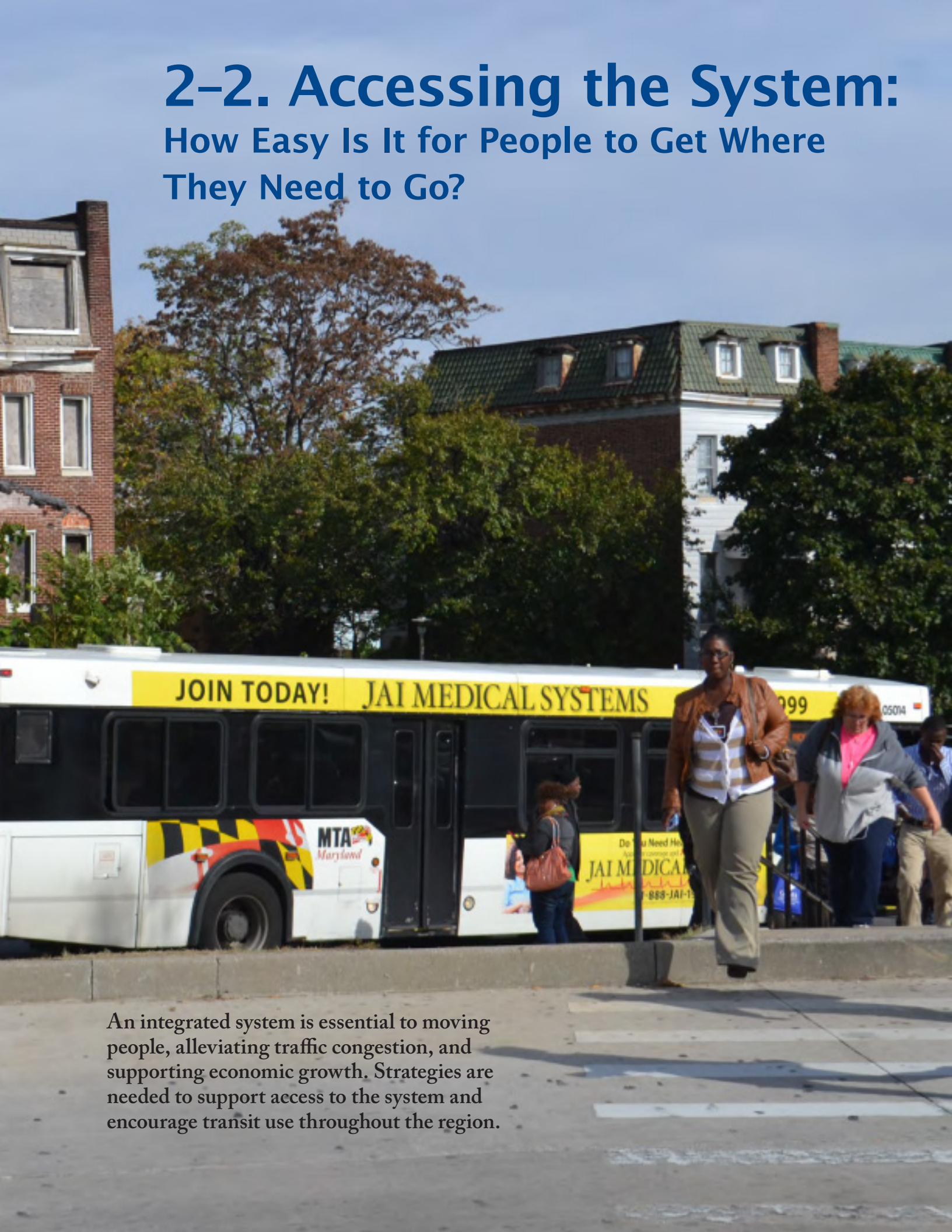
Data from customers submitting feedback through Rate-Your-Ride is aggregated with data from other riders. The MTA can use the aggregated data to determine trends or patterns and to help make decisions and service adjustments to address frequently occurring issues (both good and bad).

Customers do not receive individualized responses to every submission. Rate-Your-Ride does not replace the MTA's Transit Information Services complaint and comment line, accessible by calling 410-333-2354.

The last formal report of synthesized data available on the MTA website is from 2012. It is not clear if there are any other reports completed or how MTA now utilizes the information collected.

2-2. Accessing the System:

How Easy Is It for People to Get Where They Need to Go?



An integrated system is essential to moving people, alleviating traffic congestion, and supporting economic growth. Strategies are needed to support access to the system and encourage transit use throughout the region.

2-2. Accessing the System

Access to transit in the Baltimore region should not be difficult. Section § 7-102 of the Transportation Article gives the MTA a broad mandate to improve and expand transit facilities and services to provide a unified and coordinated regional transportation system. This system is essential to moving people, alleviating traffic congestion, enhancing the economy, and supporting growth of the Baltimore metropolitan area.

Strategies are needed to support access to the system and encourage transit use and functionality throughout the region. The following sections describe some of these strategies.[1]

First Mile / Last Mile Connections

Providing a "first mile" or "last mile" connection means getting people from their home or last transit stop to their final destination. While riders may be able to use transit to get most of the way to their destination, the difficulties involved in going from their home or from a last transit stop to a final destination can be a real deterrent to using transit.

Ensuring that people can easily get from transit stops to workplaces is important for the continued vitality of the Baltimore region. Though the studies referenced in the following sections do not cover the entire Baltimore region, they are useful illustrations of both the scale of the first/last mile issues and of common types of solutions that may be employed to address them. In addition to these recommendations, the long-term integration of land use and transportation planning can help to ensure that future development is both transit- and pedestrian- friendly.

CMTA LAST MILE REPORT

A 2014 report by the Central Maryland Transportation Alliance (CMTA), in partnership with the BWI Business Partnership, sums up this growing problem with the statement that "transportation does not get me where I need to go."[2] Where transit riders live, land development patterns, and the availability of public transit all influence the significance of the last mile problem. Even as employment in Baltimore City has dropped 28.5 percent since 1969, employment in the Baltimore suburbs has increased by more than 182 percent.[3] The growth in suburban jobs has made it more difficult for public transit to connect people to jobs throughout the region. Transportation access to employers and the last mile gap are particularly burdensome for those without access to a car and low-income persons living in central cities.[4]

> **"The growth in suburban jobs has made it more difficult for public transit to connect people to jobs throughout the region."**
>
> **– Report from the Central Maryland Transportation Alliance**

1 Transportation Demand Management, or "TDM," is a general term for various strategies that increase transportation system efficiency. TDM strategies were evaluated with respect to their potential to support more efficient modes as needed, particularly under the congested and space-constricted conditions found in denser areas. The strategies evaluated are not new to the region and have met with some success. Still, these can be improved, as described in the following sections.

2 Central Maryland Transportation Alliance in partnership with the BWI Business Partnership Inc. (2014). *The Last Mile: Transit Doesn't Get Me Where I Need to Go*, Baltimore, MD. p. 1.

3 National Center for Smart Growth Research and Education (2012). *Challenges and Opportunities for Economic Prosperity in the 21st Century*, College Park, MD. p. 16.

4 Hanson, Susan (2006). "Chapter 1: The Context of Urban Travel" in *The Geography of Urban Transportation*, edited by Susan Hanson and Genevieve Giuliano, The Guildford Press: New York, NY. p. 12.

How Easy Is It for People to Get Where They Need to Go?

The CMTA report surveyed employees working in three target areas in the Baltimore region: Fort George G. Meade, Arundel Mills / Maryland Live!, and BWI Thurgood Marshall Airport. These locations were chosen as they are centers of job growth and job density and are state leaders in the creation of new jobs. This is largely due to the expansion of the National Security Agency and relocation of the U.S. Cyber Command to Fort Meade, the growing popularity of the Maryland Live! Casino, and the growth in travel volumes through BWI Airport. These employment centers are home to a wide variety of industries, including consulting, information technology, manufacturing, transportation, and warehousing. They are currently served by a combination of commuter rail, light rail, commuter bus, local bus, and private shuttles.

The report revealed a significant last mile problem at all three target areas. Surveyed employees who use public transportation for part of their commute reported a gap that was frequently greater than ¼ mile and/or 20 minutes in length. Forty-six percent reported a final-transit-stop-to-employer gap of at least a mile, while 27 percent reported taking at least 20 minutes to cover the gap. In contrast, 27 percent were within ¼ mile of their employer at their last transit stop. The CMTA report found that this gap was most frequently covered by walking, though other methods included shuttles, bicycles, and rides from coworkers. Low-income individuals, defined in the report as persons living in households with an annual household income of less than $35,000, were disproportionately affected by the last mile problem.

The CMTA report recognized that last mile connection is a local problem. As such, it divided the three target areas into eight sub-areas and analyzed potential solutions for each. Workers in many of these sub-areas reported distances to work of more than ½ mile, with some commuters having to travel 1½ miles from their last transit stop. For example, none of the closest transit stops (BWI Business District and Cromwell light rail, BWI and Dorsey MARC) are within a mile of the sub-area south of BWI near the intersection of Dorsey Road and Connelly Drive. Frequency of service and lack of night and weekend hours are other common barriers. Specific recommendations are local in nature, but common themes emerge:

Changing Transit Service

- **Provide more frequent service on bus routes**. An example is the MTA Number 17 bus that stops at nearby light rail and MARC stations. More frequent service could help to close the last mile gap. Increased frequency of service and/or additional off-peak service was a recommendation in nearly all eight sub-areas.
- **Make existing service more efficient**: Eliminate underused local bus stops or stops that can be served by other modes (such as light rail) and shift increased service to target employer areas.
- **Create new routes serving existing transit hubs and target employer areas**.

Shuttles

One recommendation is to reach out to employers to create more private shuttles. Another location-specfic recommendation is to create a circulator route connecting BWI Airport, the BWI MARC/Amtrak station, and the light rail line with the business district.

Pedestrian Improvements

The absence of a dense street network and the use of suburban or rural road standards surrounding the target areas has resulted in many gaps in pedestrian infrastructure. Recommendations:

- **Add crosswalks, particularly near existing transit stops**.
- **Close existing pedestrian gaps between transit stops and target areas**. For example, add sidewalks and/or pedestrian walkways.

The MTA No. 17 bus drops off passengers on a weekday morning in the BWI Business District.

Bicycle Infrastructure

- **Encourage regional bicycle networks that increase access to major employment centers**. For example, the BWI trail is an existing 13-mile hiker/biker path around the BWI Airport. It includes access to the Cromwell, BWI Business District, and Linthicum light rail stations and the BWI MARC/Amtrak station. The BWI trail connects to the Baltimore & Annapolis Trail, another hiker/biker path extending through Glen Burnie, Pasadena, and Severna Park. Bicycle facilities elsewhere connecting target areas to transit are limited.
- **Modify MARC passenger trains to accommodate standard bicycles**. Full-size bicycles are currently not allowed on weekday MARC trains. Limited weekend MARC Penn Line trains are now equipped with a bike car capable of accommodating up to 23 full-size bicycles (6 of 9 round trips on Saturday, all 6 round trips Sunday). MTA does allow bicycles on buses and on light rail cars. Folding bikes are permitted on all MARC trains. CMRT does not allow bikes on buses, and most CMRT buses do not have a bicycle rack.
- **Install bicycle storage racks at transit hubs**. Locations include the Cromwell light rail station, BWI Business District light rail station, BWI MARC/Amtrak station, Arundel Mills (near a bus stop), the Odenton MARC station, and the Savage MARC station.
- **Encourage employers to provide showering facilities**.
- **Develop a bicycle sharing program at the Odenton MARC station and Fort Meade**. This would be possible after a safe route between the station and the base gates is constructed. A current State Highway Administration project extends along Annapolis Road (MD 175) from MD 295 to MD 170. Once complete, the corridor is slated to include bicycle and pedestrian accommodations.

IMPROVING ACCESS TO RAIL STATIONS

In addition to the CMTA report, the BRTB developed an inventory of conditions and an analysis of bicycle and pedestrian accommodations around the Baltimore region's Metro, light rail, and MARC stations. This report, titled *Access to Rail Stations*, was completed by a consultant in cooperation with BMC staff in 2011. The project revealed a set of improvements that can be made to improve pedestrian and bicycle accommodations at rail stations throughout the region. These include:

- Installing more wayfinding signage
- Eliminating sidewalk gaps
- Providing more lighting
- Improving pedestrian crossings
- Replacing drainage grates
- Adding signage for shared-use lanes and shoulder bike accommodations
- Providing bicycle lanes through restriping

Park-and-Ride Facilities

Park-and-ride facilities are valuable ancillary resources supporting the transportation infrastructure. They vary in size and complexity, and are principally used by commuters as a means to park personal vehicles and commute to work via carpool, vanpool, and bus or rail transit. Serving this function, facilities often act as multimodal hubs, encouraging use of alternate forms of travel rather than the single-occupant vehicle.

In the Baltimore region, more than 100 dedicated park-and-ride lots serve commuters with transit or carpool parking. Most major commuter routes are well served by park-and-ride facilities, with the only notable geographic gaps being in the Jarrettsville area of Harford County and the area north of Westminster between MD 140 and MD 97.

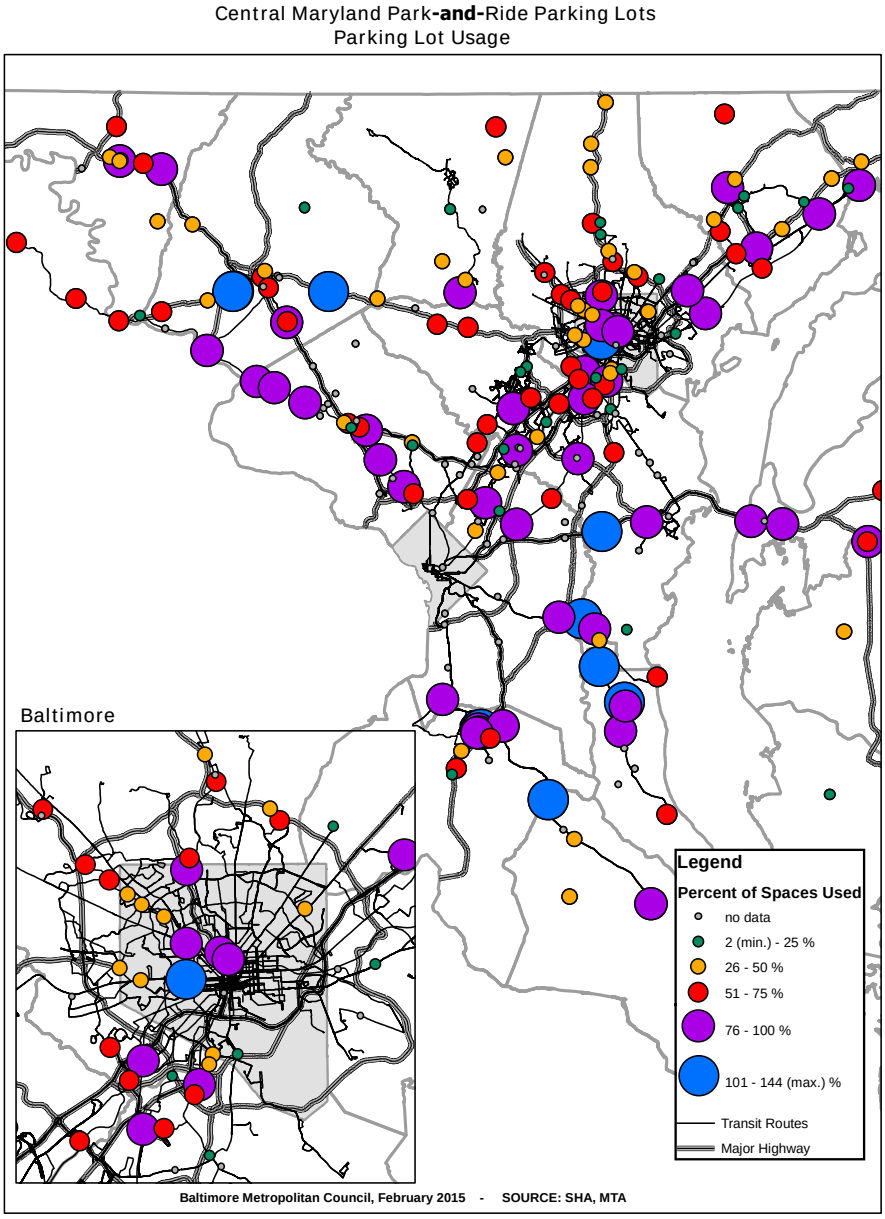
Usage for the lots varies, with Halethorpe and Laurel operating over capacity. Both of these lots commonly experience overflow parking of up to a mile in either direction. Odenton is near capacity and bears close attention in the near future. Lack of transit connectivity in suburban counties has presented challenges for commuters seeking to travel long distances.

Improved park-and-ride inventory procedures would allow accurate reporting, mapping, and marketing of alternate commute modes to ease congestion. The primary weakness in the park-and-ride system is a lack of a central depository for lot information. Often local coordinators are not informed when a lot is opened or closed by the owner. Lots are currently inventoried sporadically, and no single entity is informed of changes by owners. Because lots may be owned by MTA, SHA, local jurisdictions, Amtrak, local rail operators, or private owners with park-and-ride agreements, the region would benefit from a single entity with a directive to keep track of inventory and the authority to require regular reporting.

"The region would benefit from a single entity with a directive to keep track of [park-and-ride lot] inventory and the authority to require regular reporting."

The map below shows park-and-ride lot usage (2014) and the demand in the southern and western parts of the region. This demand is most heavy on the west side of Baltimore and between Baltimore and Washington, DC.

Figure 1



Water Transit

As discussed in the section on transit services, the Baltimore Water Taxi is a privately operated water taxi service focused on visitors to the Inner Harbor area. The Baltimore City Department of Transportation (BCDOT) operates the Harbor Connector as a free service for commuters. Both services provide point-to-point taxi service by vessel and can serve a first/last mile purpose. Service areas for both include the Inner Harbor, Maritime Park, Tide Point, Canton Waterfront Park, Harbor View, and Harbor East.

"The City should continue to coordinate the water taxi and Harbor Connector services with other transit and TDM activities to support the ability of the transit network to help workers reach jobs."

BCDOT has been investigating the effectiveness and potential of these services and a range of actions to increase their function, usage, and utility. BCDOT also has identified potential time savings and market segments as well as latent market potential. The City should continue to coordinate the water taxi and Harbor Connector services with other transit and TDM activities to support the ability of the transit network to help workers reach jobs.

Transit-Oriented Development and Stop/Station Design

The station and infrastructure components that support the operation of transit greatly affect the environments and communities in which they are located. With thoughtful planning and coordination, transit can be leveraged to support and enhance surrounding land development. When considering plans for private development along a transit-served corridor, local governments should coordinate with MDOT and MTA early in the development process.

MDOT and MTA should provide clear and concise guidance to local governments and private sector developers on system requirements and clarify what is necessary for ongoing system and station/stop function. This encompasses basic principles of station planning and design, design specifications, and maintenance requirements/obligations. As early as possible, local governments should routinely reach out to MDOT and MTA on community desires and any changes to planning parameters that might affect the function of a station/stop. MDOT, MTA, and local governments should meet to define how these might be best accomplished and cooperatively study these issues. The BMC and BRTB can help in this regard.

"MDOT and MTA should provide clear and concise guidance to local governments and private sector developers on system requirements and clarify what is necessary for ongoing system and station/stop function."

Amenities of Bus Stops

Around the region, roughly 250,000 trips are taken daily on MTA buses, using 6,188 bus stops. This service and physical footprint is the bulwark of the transit network and the most common transit experience for residents. While most of this experience is related to the time spent on the bus, time spent at the bus stop is equally important. Whether serving regular bus riders or occasional riders, bus stops are a part of the public face of the bus-riding experience seen on a daily basis.

"The location, size, and design of bus stops have far-reaching impacts on customers and on transit operation in areas such as safety, accessibility, convenience, and attractiveness."

– ***Better On-Street Bus Stops: a Synthesis of Transit Practice*, Transportation Research Board**

MTA has boarding and alighting (on-off) data for 5,736 out of the 5,588 bus stops. The data shows a range from over 10,000 daily rider on-offs at Mondawmin Mall to just 1 or 2 on-offs at 368 different stops in the network.

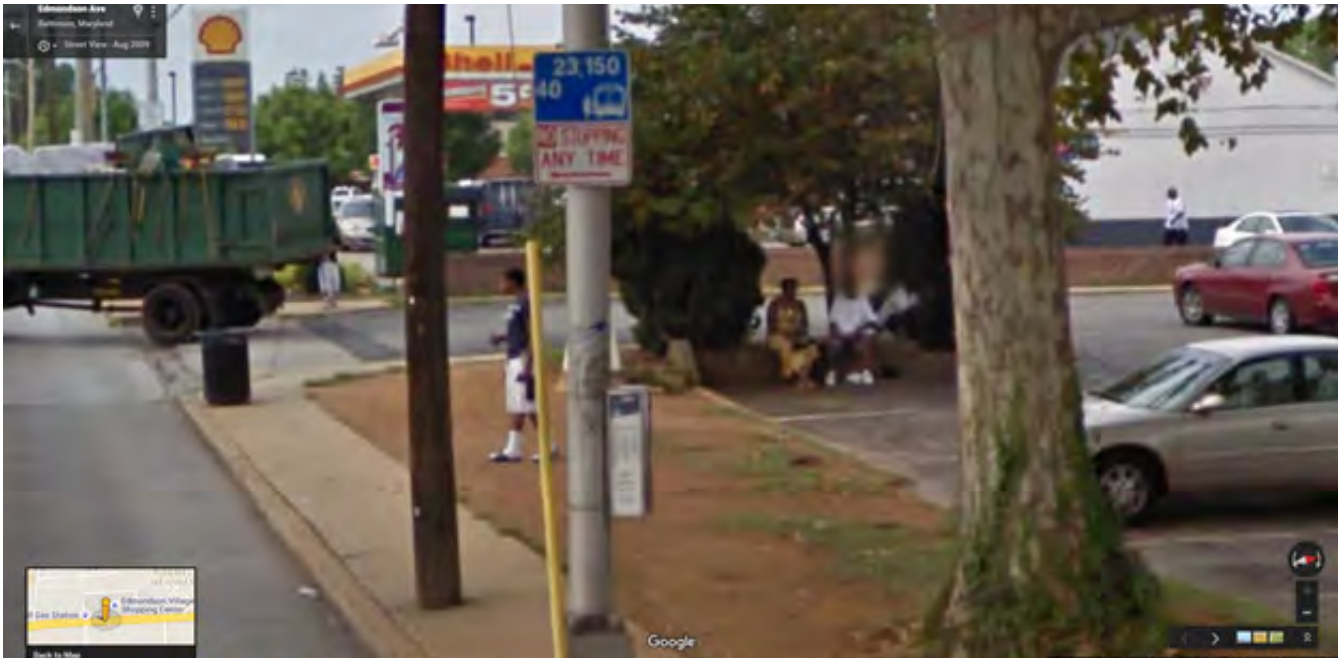
Data is needed on the roughly 212 stops with zero on-offs to determine if these stops are truly unused on a daily basis. The top 175 stops, those with roughly 500 or more on-offs a day, make up 36 percent of the total daily on-offs, making them the most important stops in the network. A quick review of these stops shows that the amenities available, their placement, and their size vary significantly.

Some of these stops have new shelters, hardscapes, electronic signage, trash receptacles, advertising, multiple benches, and amenities such as shade trees, planters, and lighting. Together, these infrastructure elements and amenities often create a stop that is attractive and safe. The bus stop at York Road and Northern Parkway, where many transfers take place, is one such stop.

Below is the Google street view of the Northern Parkway and York Road bus stop.

Conversely, the stops near Edmondson Avenue / Swann Avenue do not feature these amenities. **Signage is important**. The bus route sign is the only indicator that this is a bus stop. The area serves a nearly identical amount of riders as the York Road / Northern Parkway stop, but, like many stops in the region, it lacks defined space, hardscape, and amenities. Passengers are forced to use adjacent retail lots and sidewalks to wait for their bus, likely leading to complaints to the MTA from both riders and the businesses adjacent to the stop.

Below is the Google street view of the Edmondson Road / Swann Road bus stop.



Closer to Baltimore's central business district, bus stops have less and less room, often creating pedestrian impediments to retail and commercial businesses. These stops are some of the region's busiest, yet they often only feature only one bus shelter with three seats.

Below is the Google street view of the Fayette Street / Charles Street mid-St. Paul Street westbound bus stop.

ANALYSIS: THE ROLE OF BUS STATIONS AND STOPS

In 2010, as part of a Recommended Practice activity, the Bus Rapid Transit (BRT) Working Group of the American Public Transportation Association issued a *Bus Rapid Transit Stations and Stops* document. This document provides guidance to transit agencies, planners, developers, and others on BRT stations. The document provides details on the role of BRT stations and stops, some of which are very applicable to traditional bus stops. Good bus stops can:

- Attract new riders
- Promote visibility and facilitate branding of the system
- Provide shelter from the weather
- Ensure safe accessibility for all, including those with disabilities
- Provide passengers with information, including system maps and real-time arrival information
- Provide passengers with amenities such as newspaper boxes, signage, waste recycling, special lighting, seating, and bicycle parking
- Provide passengers with an attractive environment, using features such as landscaping and public art
- Create a sense of place within the community, encouraging development and other activities to occur near the station or stop
- Ensure ease of access to users of other modes, including pedestrians, bicyclists, and automobile drivers
- Ensure easy connections with other local and intercity modes of transportation

As MTA's core bus service has evolved over time, routes and ridership have changed. Yet bus stops do not necessarily reflect the current system's needs. Transit studies such as the TRB's *Better On-Street Bus Stops* recognize that, over time, stops become difficult to improve or move as they become part of the fabric of a neighborhood. So, while both MTA and the local jurisdictions have worked to make improvements to some stops and to relocate others, a more systemic approach may be in order.

EXAMPLES FROM A PEER REGION: PORTLAND, OREGON

TriMet is Portland's transit agency, providing bus, light rail, streetcar, and commuter rail service throughout the Portland, Oregon region. Portland's 2010 bus stop guidelines include a set of goals and priorities that can serve as a model for the Baltimore region.

Portland TriMet – Bus Stop

Portland – Guidelines

The guidelines include a set of Bus Stops Program goals:

- A basic bus stop should consist of an accessible, paved area and easily identifiable signage. Bus stop shelters and other amenities shall be provided consistent with a set of bus stop development criteria.
- Bus stops should be placed to ensure customer convenience and provide for the safety of pedestrians and vehicles. Stops shall be visible, near crosswalks, and well lit. Bus stops should be clearly and consistently identifiable with up-to-date information for riders about services at the bus stop.

- TriMet should solicit community input for all bus stop installations and changes, and respond promptly to inquiries and complaints from customers and bus stop neighbors.
- The design of bus stops shall be sensitive to the community setting and may incorporate features that identify the stop with the community (such as art, bus stop naming, or inclusion of a community bulletin board).
- Where reasonable, bus stops should be accessible. Americans with Disabilities Act (ADA) considerations will be given top priority in the siting and design of new and existing bus stops.

"Portland's 2010 bus stop guidelines include a set of goals and priorities that can serve as a model for the Baltimore region."

- Bus stops shall be located in support of institutions and with clients having special needs, large employers, and community centers. Bus stops will be spaced to maximize the efficient operation of transit service while not requiring riders to walk more than a quarter mile to the bus stop.
- TriMet will work with local jurisdictions, communities, and land developers to construct sidewalk connections to bus stops, advocate for safe and comfortable street crossings, and improve the overall walking environment near bus stops. Regional planning targets, new or sustained transit service, and bus stop investments will be used to encourage those improvements.
- Bus stops shall be well maintained and free of trash and vandalism. TriMet will seek partnerships that share responsibility for maintaining bus stops.

Portland – Priorities

Portland's 2010 bus stop guidelines also include a set of priorities for making decisions about improvements:

- Improve underdeveloped stops where (1) supporting infrastructure exists, (2) improvements are physically feasible, and (3) improvements are fiscally responsible. Improvements start with pavement and access upgrades, followed by shelters and other customer amenities.
- Improve customer information through expansion of existing methods and implementation of innovative new methods. Examples include shelter and pole-mounted printed information and electronic real-time (Transit Tracker) displays.
- Replace all bus stop signage with signs that riders can readily distinguish, even in active streetscapes, and identify equally from both directions. Locate bus stops, signs, and amenities consistent with guidelines and equitably among all communities served by TriMet.
- Evaluate all sites for the placement of bus stop amenities. Place shelters where feasible and where existing protection is unavailable (i.e., no awnings, etc.), According to TriMet guidelines.
- Work with jurisdictions to identify deficiencies in the pedestrian network. Establish priorities based on pedestrian safety and existing and potential transit use. Develop strategies to work with property owners to improve the pedestrian connectivity to bus stops, where viable.
- Pursue agreements with jurisdictions and public utility agencies to facilitate placement of shelters, benches, lighting, and trash cans.
- Find revenue-generating opportunities through the use of ad shelters, ad benches, and similar programs.
- Maintain and expand public outreach programs and find more effective ways to solicit feedback and respond to community and customer input.
- Improve operating efficiencies through bus stop spacing that is consistent with these guidelines.

Such goals and priorities can guide transit agencies and local jurisdictions as they review, construct, improve, and maintain bus stops. They also can give the public a set of standards by which to gauge bus stop experiences. This helps to set a clear path forward for transit agencies and local jurisdictions seeking to improve bus stops.

EXAMPLES FROM A PEER REGION: PHILADELPHIA, PENNSYLVANIA

The Delaware Valley Regional Planning Commission's 2012 SEPTA Bus Stop Design guidelines divide the design of a bus stop into four categories:

Elements of a Bus Stop

1. **Stop location**: A stop's placement relative to other stops, to the nearest intersection, and to the development it serves.
2. **In-street design**: The space allocated for the transit vehicle to pull to the curb for passenger loading and to exit and reenter the flow of traffic.
3. **Curbside design**: The space reserved for passengers to wait for and board the transit vehicle, as well as the connectivity between this space and nearby development.
4. **Passenger amenities**: Includes elements such as shelters, lighting, and seating.

Philadelphia SEPTA – Bus Stop

REVIEW OF BUS STOP ELEMENTS IN THE BALTIMORE REGION

The temptation is to focus on the fourth item in the list: passenger amenities. However, the other elements of a bus stop matter just as much if not more. Passenger safety, comfort, and convenience are the most critical issues to consider in designing bus stops. Beyond these issues, the location, in-street design, and curbside design of stops are significant factors in on-time performance of buses and overall congestion on the region's roads.

MTA, with assistance from local transit agencies as appropriate, should organize a review of the region's bus stops. This review should cover each of the four bus stop elements noted in SEPTA's bus stop design guidelines.

"MTA, with assistance from local transit agencies as appropriate, should organize a review of the region's bus stops. This review should cover each of the four bus stop elements noted in SEPTA's bus stop design guidelines."

Amenities of Fixed-Rail Stations

In Maryland, the term "station" has applied to fixed-guideway systems and, outside of recent discussions on Bus Rapid Transit, has not pertained to bus systems. A station (broadly defined) is a high-quality public transportation facility that acts as a central departure/destination and/or transfer point to accommodate high passenger volumes. Both terms are used internationally as appropriate descriptions and as a broad definition. The Baltimore region has approximately 60 transit stations along the fixed-guideway transit network. The transportation state law (Transportation Article § 7-101) defines a transit station and transit facilities as:

(l) Transit facility. -- "Transit facility" includes any one or more or combination of tracks, rights-of-way, bridges, tunnels, subways, rolling stock, stations, terminals, ports, parking areas, equipment, fixtures, buildings, structures, other real or personal property, and services incidental to or useful or designed for use in connection with the rendering of transit service by any means, including rail, bus, motor vehicle, or other mode of transportation, but does not include any railroad facility.

(o) Transit station. --

(1) "Transit station" means any facility, the primary function of which relates to the boarding and alighting of passengers from transit vehicles.

(2) "Transit station" includes platforms, shelters, passenger waiting facilities, parking areas, access roadways, and other real property used to facilitate passenger access to transit service or railroad service.

Many factors outside of the station operations (i.e., operational capacity and network characteristics) influence the functionality of a station. Ultimately, the location characteristics within the transit system are the key drivers for passengers using the station and public transit. However, as a key point of connection between the transit service and user destinations, stations function most effectively when supported by the appropriate land uses conducive to high levels of passenger activity. The site-specific characteristics of a station's design must be considered to create an attractive, seamless integration with the surrounding environment and ensure that a particular station becomes a fundamental part of the surrounding community. Station design and maintenance is critical to safe and reliable operations for both the transit agency and the transit users/riders.

"The MTA has used a context-sensitive approach as an opportunity to engage communities in discussions about future services and should be encouraged to continue and broaden this practice to include maintenance of its existing stations (and stops)."

While each station in the region varies somewhat in design, function, and operation characteristics, most of a station's features consist of of standardized components. However, station characteristics are site-specific, with no two stations ever really being exactly the same. The MTA has used a context-sensitive approach as an opportunity to engage communities in discussions about future services and should be encouraged to continue and broaden this practice to include maintenance of its existing stations (and stops). Such practices can form an important part of the customer experience and help to make transit a competitive and viable alternative to the automobile.

Fare Collection

Fare collection at MTA varies by mode. Bus, Light Rail, and Metro Subway fare collection is distinct from commuter bus and MARC fare collection. The CharmCard and Passes purchased for Bus, Light Rail, and Metro Subway cannot be used on commuter buses, MARC, or other locally operated bus systems.

BUS, LIGHT RAIL, AND METRO SUBWAY

Various types of fares and passes can be purchased for bus, light rail, and Metro subway service. Fares and passes can also be acquired through a variety of methods. These, along with the CharmCard, are summarized below.

- Single Trip Fare
  - Bus: Pay at farebox in cash with no change given.
  - Light rail and Metro subway: Purchase with cash or credit card at a Ticket Vending Machine (TVM). The machine will then issue a "Go Pass" for the trip.
- Round Trip Fare – Light rail and Metro subway only
  - Light rail and Metro subway: Purchase with cash or credit card at a TVM. The machine will then issue a "Go Pass" for the trip. The first trip must be completed within 90 minutes of purchase on the mode where the fare is purchased and the return trip must be made on the day of purchase.
- Day Pass – Valid for unlimited travel on bus, light rail, and Metro subway from time of purchase until 3:00 a.m. the next day.
  - Bus: Purchase on the bus with exact change.
  - Light Rail or Metro Subway: Purchase with cash or credit card at a TVM.
- Weekly Pass – Valid for unlimited travel on bus, light rail, and Metro subway for 7 days beginning at 12:01 a.m. on Sunday and ending at 3:00 a.m. the following Sunday.
  - Purchase at a TVM, walk in vendors (see *http://mta.maryland.gov/vendor-locations*), and at the MTA Transit Store (6 St. Paul Street 1st Floor Baltimore, MD 21202).
- Monthly Pass – Valid for unlimited travel on bus, light rail, and Metro subway from the first day of the calendar month until 3:00 a.m. the first day of the following month.
  - Purchase at a TVM, walk in vendors, and at the MTA Transit Store.
- Express Monthly Pass – identical to the monthly pass except that it adds express bus service to this pass with no additional charge.

MTA passes use a magnetic strip that encodes dates and expiration times to help to ensure that they are used only during the appropriate time period. Swiping the pass also sets a time waiting period to ensure that passes cannot be immediately handed off to a different passenger. MTA has also adopted contactless smart card technology for bus, light rail, and Metro subway via the CharmCard.

CharmCard: The CharmCard is a rechargeable smart fare card that can be used on Local Bus, Metro Subway, and Light Rail as well as anywhere in the Washington, DC region where the SmarTrip symbol is shown. These cards can be purchased online, at the MTA Transit Store, at limited MTA Pass Vendor Locations, and at many CVS and Giant stores throughout the region.

- Cards can be loaded with cash value and/or pass products. Adding value:
  - Bus: CharmCard users can add up to four bills or $20 stored value at a bus farebox as well as a 1-Day Pass. Transactions are cash only.
  - TVM: CharmCard users can add up to $200 in stored value as well as 1-day, 7-day, or 30-day Passes. Transactions are via cash or credit card.
  - Online: Registered CharmCard users can purchase stored value and pass products on-line after creating an online account.
- Stored cash value can be used to purchase single-trip fares, 1-day passes at a bus farebox, and 1-day, 7-day, or 30-day Passes at a TVM. No paper tickets are issued and all transactions are stored on the CharmCard.
- 7-day and 30-day passes are more flexible than the magnetic strip weekly and monthly passes for bus, light rail, and Metro subway. Unlike weekly and monthly passes, 7-day and 30-day passes on the CharmCard are not tied to a specific week or month and instead begin the first time the card is used.
- Users are encouraged to register their CharmCard for balance protection in the event a card is lost, stolen, or damaged.

COMMUTER BUS

- One-way fare for commuter bus trips may be purchased on the bus with cash. No change is provided.
- 10-trip tickets, monthly passes, and Transit Link Cards (TLC) can be purchased online at mta.commuterdirect.com or at any commuter store. A list of vendor locations is available at *http://mta.maryland.gov/marc-and-commuter-bus-ticket-outlets*.
- Transit Link Cards are valid for unlimited commuter bus travel for one month within the designated zone as well as:
  - MTA local and express buses, light rail, Metro subway, and Baltimore neighborhood shuttles
  - WMATA Metrorail and Metrobus
- CharmCard and SmarTrip cards cannot be used for MTA commuter bus.

MARC COMMUTER RAIL

- One-way, weekly, and monthly MARC tickets can be purchased:
  - at an Amtrak Quik-Trak ticket machine
  - from a ticket agent at Baltimore Penn Station; BWI Thurgood Marshall Airport light rail station; and New Carrollton, Odenton, Frederick, and Washington Union stations
  - on board from the conductor (one-way tickets only)
- One-way, weekly, and monthly MARC tickets as well as Transit Link Cards can be purchased:
  - online at mta.commuterdirect.com
  - at any Commuter Store
- One-way tickets are good for one trip in either direction and are usable for six months from the date of purchase
- MARC weekly, monthly, and Transit Link Cards are valid for unlimited travel on MARC for the period covered by the ticket as well as:
  - MTA local bus, neighborhood shuttles, light rail, and Metro subway
  - WMATA Metrobus (base fare)
  - WMATA Metrorail (Transit Link Card only)
  - Montgomery County RIDE ON buses
  - Frederick County TransIT
  - MTA Commuter Bus No. 515 between Frederick and Shady Grove
- CharmCard and SmarTrip Cards cannot be used for MARC commuter rail.

ALTERNATIVE FARE COLLECTION TECHNOLOGIES

In addition to contactless smart card technology such as the CharmCard and passes using magnetic strips, alternative fare collection technologies are emerging. These include:

- Account-Based Systems: Account-based and open payment systems enable customers to pay with smart transit cards, contactless bankcards, and mobile wallets such as Apply Pay.
- Mobile ticketing: Both bar code and Near Field Communication (NFC) technologies enable riders to use their mobile phones for purchases and ticketing.
- Mobile apps: Similar to mobile ticketing, mobile apps enable users to purchase and access transit tickets directly from their mobile device. Other functionality such as trip planning, trip optimization, and real-time transit tracking can be integrated with these apps. Locally, Frederick County TransIT is piloting a new ezFARE mobile ticketing app that gives users access to trip planning tools, TransIT's Twitter page, and ticketing options. See *https://frederickcountymd.gov/5906/Mobile-App*.

Fare collection decisions are complex and affect transit riders as well as most aspects and departments within transit agencies themselves. Effects on ridership, revenues, operating expenses, maintenance of equipment, safety, and security are just a few of the issues that must be considered. While new technologies can ease the ticketing experience for many customers, they also can add complexity and new risks. Employees and riders alike will need to be trained as new options emerge and are adopted. Furthermore, not all riders will be able to access new technologies such as mobile purchasing and ticketing. Therefore, it is important that fare collection decisions are placed within the context of an agency's goals and objectives as well as the demographics of the population served.

LOCALLY OPERATED TRANSIT SYSTEM (LOTS) AGENCIES

Annapolis Transit

- In addition to single-trip fares, users can purchase day, weekly, monthly, quarterly, and annual passes.
- Single-trip fares and day passes can be purchased on the bus with exact change.
- All types of passes can be purchased at Annapolis Transit Offices (308 Chinquapin Round Rd) and at Annapolis City Hall (160 Duke of Gloucester Street).

Carroll Transit System

- Riders can purchase single-trip fares or books of 10 tickets.
- Single-trip fares and books of 10 tickets can be purchased on the bus with exact change and at Carroll Transit offices (1300 Old Meadow Branch Road, Westminster, MD).

Harford Transit Link

- Riders can purchase single-trip fares or 12-ride passes.
- Single-trip fares and 12-ride passes can be purchased on the bus with exact change.
- 12-ride passes can also be purchased at Harford Transit Link offices (1311 Abingdon Road, Abingdon, MD) and at Harford Community College (401 Thomas Run Road, Bel Air, MD).

Regional Transportation Agency of Central Maryland (RTA)

- Riders can purchase single-trip tokens as well as 10-ride and monthly passes.
- Single-trip tokens can be purchased on the bus with exact change.
- Single-trip tokens and all passes can be purchased:
  - Online at *http://marylandtransit.org/index2.php/fares-tickets/*.
  - RTA offices (8510 Corridor Road, Suite 110, Savage, MD).
  - Ticket sales outlet centers in Howard County, Anne Arundel County, Laurel, and northern Prince George's County, including the Howard County Library Central Branch, Oakland Mills Community Association, and several senior centers. The full list of outlet locations is available at *http://marylandtransit.org/index2.php/fares-tickets/ticket-centers/*.

FARES AND ACCESS

Fare collection can directly impact transit use and transit costs for both the transit agency and the transit users. Saving time on collection can relieve stress for riders (no fumbling for change to buy a ticket or refill a fare card before the vehicle pulls out of the stop or station), and can allow the service to reduce dwell times and improve on-time performance. Technologies are improving and can help. Improving the technology associated with fare collection can reduce costs, by eliminating redundant payments for each mode of transportation, and generating a lot of useful data for transit agencies.

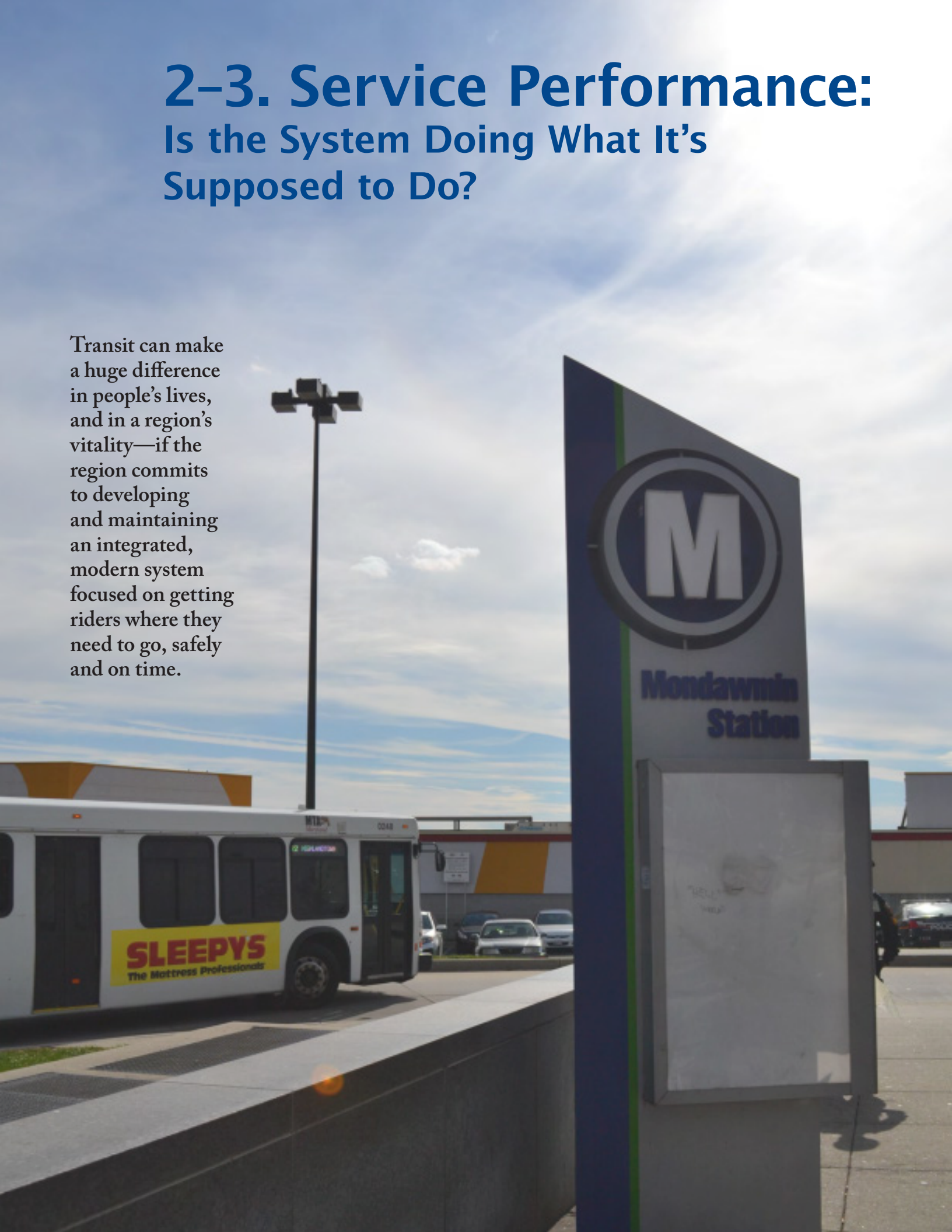
Both transit users and the transit agency can improve tranfers by seamlessly transitioning between modes of transit. The right technology can produce savings for the transit agency not needing to spend as much money purchasing and installing collection machines, or security services necessary to count and collect the coin and cash deposits. Some methodologies promise to makes things easier for ticket inspectors who make the rounds on the Central Light Rail line. Minimizing the issuance of citations to passengers who didn't buy the proper ticket by scanning a mobile device or digitally readable ticket and printing it on a portable Bluetooth-tethered printer can speed that process.

The transit operator will also have a massive live stream of data on how many people are buying tickets, where they are, where they're headed, and allow for much more responsive management. They can tweak bus routes based on how the customers actually buy bus tickets and ride.

Regular research regarding the ongoing stream of innovations that could make fare collection and commuting easier and more efficient should be undertaken to determine if benefits are substantial enough to warrant implementation here in the Baltimore region.

2–3. Service Performance:
Is the System Doing What It's Supposed to Do?

Transit can make a huge difference in people's lives, and in a region's vitality—if the region commits to developing and maintaining an integrated, modern system focused on getting riders where they need to go, safely and on time.



2-3. Service Performance

Data for Performance Measurement

Transit operators have gone from using passive electronic data collection methods for real-time applications to highly effective collection services that archive real-time data for analysis to improve transit performance. These new data are supporting improved management practices in areas such as service planning, scheduling, and service quality monitoring.

The Maryland Transit Administration (MTA) was an early adopter of real-time data technology. Starting in 1986, MTA employed the Bus Communication and Control Program, a radio communication system between the control center and buses. This program was intended to help MTA meet goals of providing the public with more efficient and reliable service. In 1988, a LORAN-C based computer-aided dispatch (CAD) Automatic Vehicle Location (AVL) system was installed on 50 buses for route-schedule adherence data[1].

More recently, MTA developed a data interface for the CAD/AVL system to communicate with the software on which the real-time application (My MTA Tracker for Bus) is built. MTA currently is investing in a new real-time system using General Transit Feed Specifications (Real Time GTFS-RT, currently the industry standard), which the agency hopes to implement in a few years[2]. Once fully in place, data from the investment in a new GTFS-RT based AVL system could be applied to analyze schedule adherence, headway regularity, and passenger waiting time. The large sample sizes from archived AVL data can be used to reliably estimate extreme values for measurements of service quality that reflect passengers' experiences and viewpoints.

MTA, as part of its DGPS AVL system, has operated Automatic Passenger Count (APC) since 1997, with an initial 25 bus installation[3]. Beginning in March of 2013, MTA initiated a move away from using farebox machines to measure bus ridership by adopting the more sophisticated APC system. Working with the vendor and implementing filtering tools, MTA validated the APC data with manually observed ride checks. MTA has requested and received FTA approval to derive ridership counts using the APC system, which is believed to be more accurate than the farebox counting method. APC data lends itself to a variety of passenger demand analysis, including determining load profiles and using demand rates to set headways and departure times.

MTA has begun a transition to a data-driven "organization incorporating data collection and analysis into every major program, project and procurement."[4] The current technology infrastructure, based on the legacy enterprise system with its corresponding AVL and APC hardware issues, lacks a comprehensive storage strategy. Data analysis is limited to pre-programmed reporting of first-level aggregated data with limited application of visualization. MTA is developing an agency-wide strategic plan and training key analytical staff on data analysis and business process improvement. A Ridership Data Technician position was created and filled to further the analysis of collected data in support of MTA Key Performance Indicator monitoring. Improvements should continue.

The effort to validate APC data and receive FTA approval allows MTA to report consistent monthly ridership by mode through the Maryland open data portal.[5] This enables transit users and interested parties to monitor ridership trends and develop performance measures.

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1 See http://trrjournalonline.trb.org/doi/abs/10.3141/1760-11?journalCode=trr.

2 *The Daily Record*, "MTA Responds to Transit App over Bus Tracker," February 25, 2015.

3 See https://books.google.com/books?id=FFWwSl_xcdEC&pg=SA2-PA95&lpg=SA2-PA95&dq=baltimore+mta+apc+data+installation&source=bl&ots=20KPU1F7FN&sig=nfNUUBn4S4_WY2Zdc_OKsWqo-Uc&hl=en&sa=X&ved=0CFIQ6AEwCGoVChMI6vDHtdznxwIViRU-Ch3yUgLz#v=onepage&q=baltimore%20mta%20apc%20data%20installation&f=false

4 "Creating-a-Data-Drive-Organization," Michael J. Walk, APTA, 2012 Multimodal Operations Planning Workshop.

5 See **https://data.maryland.gov/Transportation/MTA-Average-Weekday-Ridership-by-Month/ub96-xxqw.**

Performance Measures

ON-TIME PERFORMANCE SUMMARY REPORTS

Current Practice – MTA generates a monthly route level on-time performance report with an 80 percent route level goal for bus stop schedule adherence. Appendix __ has additional information on this report.

Nationally, transit operators typically report their best on-time performance during the summer months as a result of schools not being in session and commuters being on vacation. In July 2015, MTA recorded an 85.9 percent system-wide bus stop on-time performance. MTA's July performance is not surprising as it is the result of less roadway congestion, fewer conflicts with commuters in vehicles, fewer trucks making deliveries, and fewer roadway detours—all of which combined to minimize service disruptions.

On-time performance measurement can be an effective management tool, improving rider experience, especially for infrequent service (defined as headways greater than 15 minutes / service of four buses an hour). With infrequent service, the transit user is more likely to consult transit time tables and schedule travel around published bus stop scheduled arrivals. For infrequent users, reliable on-time performance minimizes bus stop wait time, thus providing predictability in arriving to work or job training on time, keeping medical appointments, and/or accessing daily household maintenance activities. On-time performance for infrequent service improves reliability and results in higher levels of ridership retention and possibly ridership gains.

National studies on travel behavior suggest that the cost of unreliable service may actually be greater than the cost of travel time. Over time, the inconvenience, uncertainty, and added time costs of unreliable service diminish user confidence and can result in ridership declines. Thus, improving the consistency of transit waiting and travel time could foster a larger, more satisfied, and more committed base of customers.

> **"Improving the consistency of transit waiting and travel time could foster a larger, more satisfied, and more committed base of customers."**

After reviewing the 2015 on-time performance summary report and FY 2014 total weekday ridership for routes with multiple weekday trips with infrequent service, BMC staff recommends that MTA further analyze the following 10 bus routes:

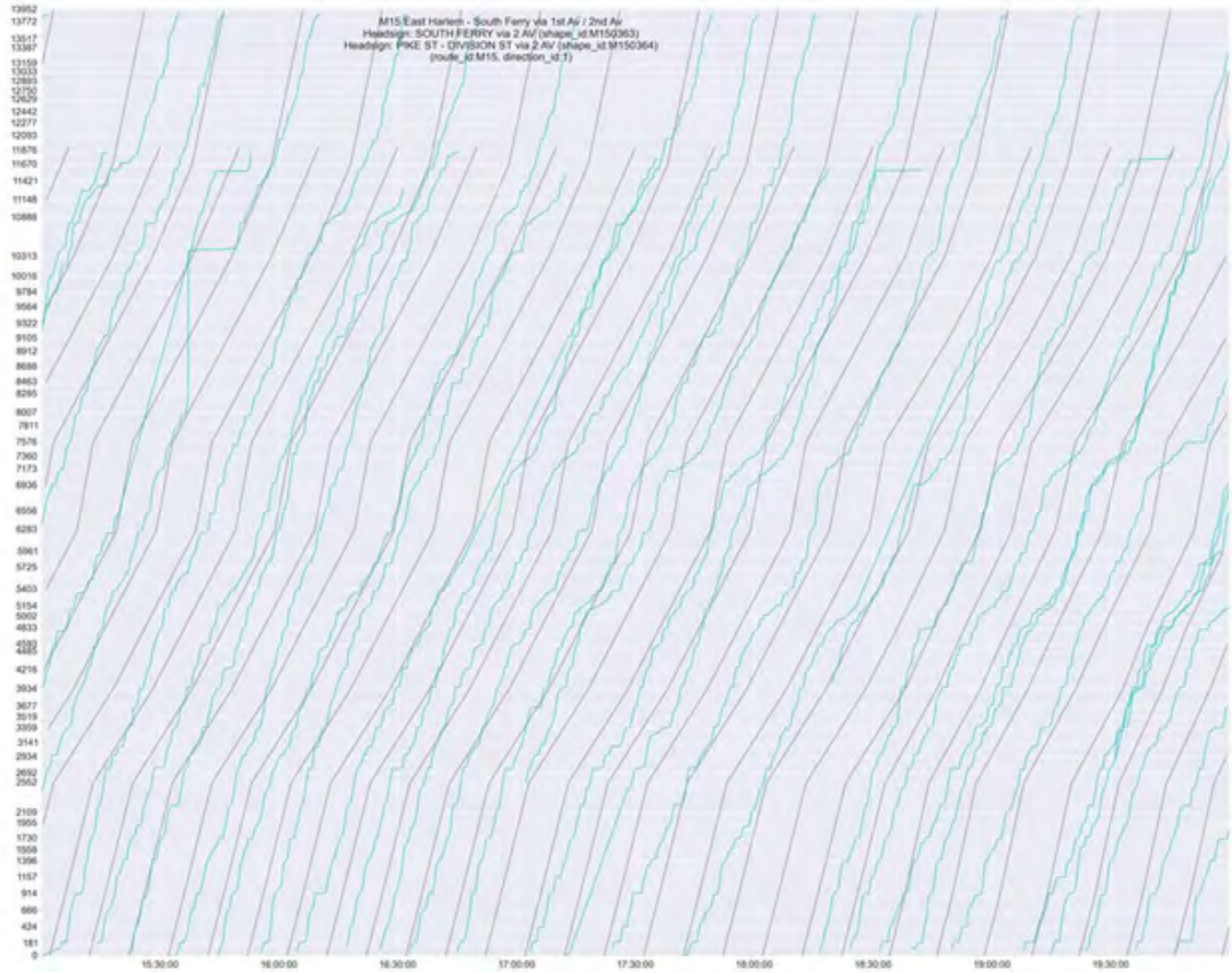
- #77, #27, #14, #55, #11, #4, #21, #58, #9, #24

All 10 routes had more than 300,000 annual weekday transit riders, with the #77, #27, and #14 having more than one million annual weekday transit riders in 2014. For the routes identified above, half have weekday peak-period headways 30 minutes or longer, with the other five having 20-minute weekday peak-period headways. The on-time performance summary report for these 10 routes is consistently in the 70% range (one out of every four trips is either early or late). MTA has identified the on-time performance of these routes as needing improvement for multiple months since January 2015.

Analyzing the 10 identified routes will require greater disaggregation of data than that provided in the on-time summary report. It is unclear if MTA's current CAD/AVL system is capable of providing data for a route by trip level information. If available, this data would allow analysts to identify time and/or location performance route issues. It is important to identify the time period (a.m./p.m. peak period or daily) and/or the particularly congested roadway segments disrupting bus services. Data of this sort would enable an effective and broad range of traffic operation actions to be implemented, from low-cost traffic enforcement (intersection box block or double-parked vehicles loading/unloading), to capital investments in signal coordination, or transit priority treatment such as queue jumping.

Figure 2 shows an example of the type of detailed analysis that could be performed using AVL and GTFS data. The graph displays transit service on New York City's M15 East Harlem route for one day (the horizontal axis is time and the vertical axis is distance). The gray lines display the GTFS scheduled service, and the blue lines display the AVL (GTFS-RT) data.

Figure 2



In a perfect situation, AVL data would align with the GTFS schedule. Service planners and schedulers could see graphically when bus AVL data is ahead of schedule (above GTFS) or behind schedule (below GTFS). Such information displays also would enable schedulers to identify bus "bunching" (when bus AVL data from a later departing trip overtakes the preceding bus trip). Archived AVL data displays would enable operators to identify time periods and/or locations where transit service is not adhering to published schedules.

Frequent transit service (headways <15 minutes) is best measured using wait time, not on-time performance. Riders who use routes with frequent service are less likely to consult a transit schedule since they are assured that a transit vehicle will arrive soon after they arrive at a stop. For example, if a route operates on 15-minute headway and every bus is exactly 15 minutes late, the on-time performance equates to 100 percent failure. However, from a transit user perspective, the system is functioning fine with a bus arriving every 15 minutes. Consequently, calculating the average wait time for services would be a more meaningful measure.

"MTA should partner with state and local economic development offices to map employment locations, identifying specific corridors with businesses employing workers outside the traditional 9-to-5 workday. Surveying these businesses, along with identifying corridors with transit service span gaps, could help to identify work shifts when transit service is needed."

It is unclear if the current MTA CAD/AVL system provides the trip level data necessary to calculate wait time. If the CAD/AVL trip level data is available, the suggestion is for MTA to calculate bus stop wait time for high-frequency routes using procedures identified in the Transit Cooperative Research Program (TCRP) Report 100, 2nd Edition, *Transit Capacity and Quality of Service Manual*. The manual uses headway adherence to determine reliability, measuring time departure between trips. A Level of Service (LOS) (see table below) is assigned based on the standard deviation of headways divided by the mean. For LOS A, wait time is minimal, with bus stop departure during the peak period close to the mean stop departure. Greater variance in bus stop departure from the mean indicates longer passenger wait times, resulting in a poor LOS reliability indicator.

Reliability Level of Service (LOS) – Headway Adherence

LOS	Coefficient of Variation
A	0.00 – 0.10
B	0.11 – 0.20
C	0.21 – 0.30
D	0.31 – 0.40
E	0.41 – 0.50
F	>0.50

SPAN OF COVERAGE – HOURS OF SERVICE

The numbers of hours during the day when transit service is provided along a route plays an important role in meeting transit users' travel needs, especially for third shift (late shift) workers. BMC staff used the 2013 American Community Survey (ACS) to estimate the number of regional workers by time of departure. For Baltimore region workers, 40 percent depart for work outside the traditional a.m. peak period (6:30 a.m. to 9:29 a.m.). Approximately 10 percent of workers depart for work off peak. Because of these off-peak work shifts, many workers depart from home or work during hours when there is limited transit service.

To meet the needs of workers traveling outside the traditional a.m. peak period, MTA should partner with state and local economic development offices. Using local knowledge and existing information in employer databases that classify business by type (manufacturing, health care, government, and others) and number of employees, MTA could geocode and map employment location, identifying specific corridors that include businesses employing workers outside the traditional 9-to-5 workday. Matching identified corridors with existing transit service spans could provide an initial screening of potential service span gaps. Surveying businesses in corridors with transit service span gaps could help to identify periods when transit service is needed. This type of analysis could lead to business accessing larger labor pools and improve employee retention, leading to increases in business productivity. Connecting workers to employment, especially better paying manufacturing employment, supports the goals and objects in the adopted *Regional Plan for Sustainable Development*.

This strategy would be more suitable in identifying weekday service span gaps, but it should be recognized that there is a need to provide services for those who work on weekends. Currently, weekend transit span and service are more limited. The types of employment opportunities available during weekends appear to be oriented more toward the retail and service sector, with locations and corridors different from traditional Monday through Friday employers.

A regional success story is the MTA Route 17 service to the BWI hotel district, aas described in the sidebar at right. Staff suggests that MTA continue to partner with business associations to explore grant funding to initiate weekend service. With proven success in establishing weekend commuter markets, MTA should address weekend commuter service needs if and when grant funding ended.

REGIONAL SUCCESS STORY: MTA'S ROUTE 17 SERVICE

MTA's Route 17 has provided bus service to the BWI Airport hotel district since the summer of 2014.

Previously, the BWI Business Partnership, using a federal Job Access / Reverse Commute (JARC) grant, had operated the weekend Sunrise Shuttle service to provide bus service to the hotel district. A June 13, 2014 press release from MTA[1] noted that the Partnership was able to demonstrate the transit needs of BWI area employees, "meeting the growing demand of non-traditional 24/7 workforce needs." With the expiration of the JARC grant at the end of June 2014, an opportunity arose for an organization to fill the resulting gap in transit service.

According to the June 2014 press release, "MTA's local 17 bus line [added] two additional trips to the Sunday schedule to assist those who need to get to Baltimore/ Washington International Thurgood Marshall Airport Sunday mornings between 4:22 a.m. and 6:30 a.m. The early morning service will fill the void . . . left by the BWI Business Partnership's successful Sunrise Shuttle Service, which expires at the end of the month."

1 See http://mta.maryland.gov/mta-local-bus-route-adds-two-new-sunday-morning-trips-bwi-thurgood-marshall-and-arundel-mills-mall.

RIDERSHIP – OVERCROWDING

Transit bus overcrowding is an important measure of comfort level from the passenger perspective. MTA has captured concerns about overcrowding through its customer satisfaction surveys. From the passenger perspective, overcrowding is simply the inability to find a seat on a transit vehicle when boarding. Establishing an overcrowding performance measure would assist MTA in adjusting service frequency or vehicle size, reducing crowding and increasing passenger comfort. Performance measure service adjustments would lead to shorter dwell times for passengers boarding and alighting at bus stops, resulting in improved schedule adherence and on-time performance improvements with more reliable service.

An overcrowding performance measure will require route level bus stop loading data. It is possible to extract such data from the existing APC database. Disaggregated data is needed to measure overcrowding from the passenger perspective as opposed to the trip perspective. For example, if half the trips were empty and half were overcrowded, then only 50 percent of the trips would be overcrowded, yet 100 percent of the passengers would experience an overcrowded trip.

The Transit Cooperative Research Program (TCRP) Report 113, *Using Archived AVL-APC Data to Improve Transit Performance and Management*, 2006, identifies a classification of crowding as a performance measure from the passenger viewpoint (see table on next page).

At LOS A load levels, passengers are able to spread out and can use empty seats to store parcels, bags, etc. At LOS B, some passengers have to sit next to others, but others do not. All passengers can still sit at LOS C, although the choice of seats is very limited. Some passengers are required to stand at LOS D load levels, while at LOS E, the transit vehicle is as full as passengers will normally tolerate. LOS F represents crush loading levels.

Crowding Thresholds	
Passenger Comfort	LOS
Can sit next to unoccupied seat	A
Can choose seat	B
Seated	C
Standing but not crowded	D
Full	E
Borderline of crowded and overcrowded	F

Staff suggests that MTA adopt an overcrowding performance measurement. The TCRP Report 113 developed an easy-to-use Excel spreadsheet (tcrp_rpt_113_crowding_analysis.xls) for transit operators to calculate overcrowding using archived APC data. To calculate load, the overcrowding performance measurement spreadsheet requires data input on bus seating capacity (number of seats, bus length and width to estimate standing capacity with deduction for wheelchair area, rear door channels, interior aisle stairs, and low-floor bus wheel well) and APC route level bus stop boarding and alighting data. Working with MTA staff, BMC obtained APC route level ridership data, but MTA was unable to generate the route boarding and alighting data at the stop level using the APC database interface. In evaluating the spreadsheet for usability, BMC staff was only able to use use random bus stop boarding and alighting loads owing to the lack of disaggregated data.

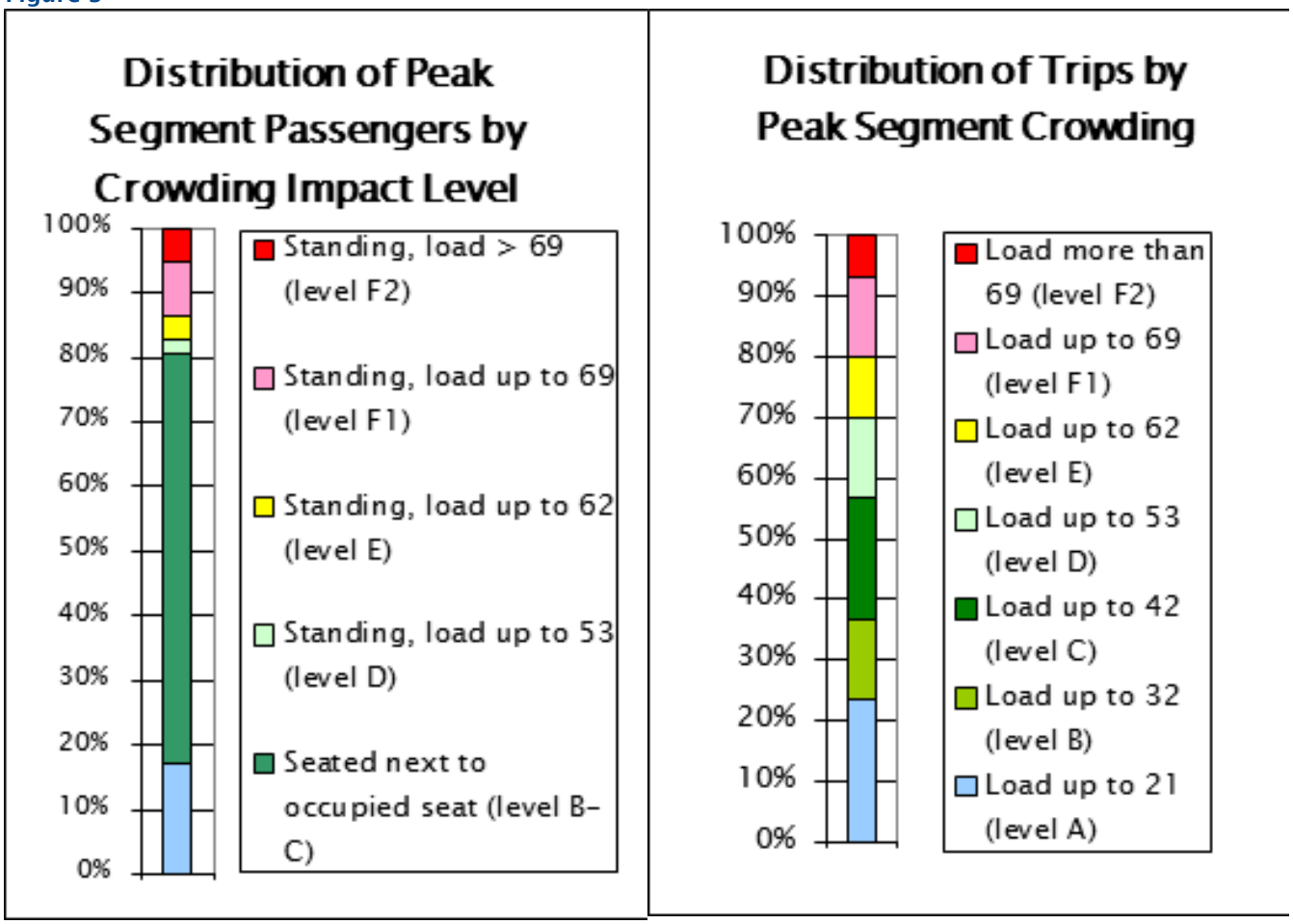
The crowding analysis spreadsheet generates two charts (see Figure 3):

1. Distribution of Peak Segment Passengers by Crowding Impact Level
2. Distribution of Trips by Peak Segment Crowding

These charts summarize the input data. Figure 3 shows the results from an analysis using random numbers for bus stop loading and alighting for one trip. The first chart shows the share of passengers at the various LOSs. The results of the random numbers show that 80 percent of the passengers have a seat and that 5 percent of the passengers are at the maximum standing point. The second chart uses the same random numbers and shows that 57 percent of the trip segments (defined as travel between stops) feature passengers being able to find a seat, while 7 percent of the segments feature passengers at the maximum standing point.

Adopting the suggested overcrowding spreadsheet using existing archived APC data would enable MTA to evaluate route overcrowding visually. The analysis could lead to headway or service adjustments that increase customer satisfaction and improve ridership retention. Improving overcrowded routes could lead to smoother boarding and alighting at many bus stops, especially major transfer points. Evenly distributed peak loads would decrease bus dwell times, resulting in better adherence to schedules and increasing reliability.

Figure 3



FREQUENCY – HEADWAYS (PEAK / OFF-PEAK)

Users of transit typically think of frequency of transit in two ways. First, frequency can be referred to as the hours of operation of transit service and when service is available (e.g., days or nights and weekdays or weekends). Frequency of this nature is covered in the previous section, "Span of Coverage – Hours of Service." The second interpretation of frequency is how often buses arrive when the route is being operated.

The Best Practices in Transit Service Planning, Center for Urban Transportation Research, University of South Florida, March 2009[6] provides a service frequency definition that is useful for this discussion: how often buses arrive at a particular stop.

Intervals

Headways refer to the interval in minutes between two successive bus departures. The terms "frequency" and "headways" are often used interchangeably. There are three different aspects to consider when setting headways for transit: headways based on policy, headways based on demand, and headways based on the clock face.

Policy headways are headways that are defined by transit system policy and are usually modified by time of day or day of the week. They are typically used when passenger loads are light enough to require time intervals in excess of 10-15 minutes between vehicles to conform to loading standards. Time of day is a predominant factor in determining varying headway intervals. The common practice is to have more frequent service during peak hours and less frequent service during off-peak hours.

Demand-based headways are established to provide a sufficient number of trips to accommodate the maximum passenger volume within the loading standards. Demand-based headways are typically used only when service demand requires less-than-30-minute service intervals. Overcrowding of buses on a route is a sign that either larger vehicles need to be used or demand-based headway should be instituted to increase the overall capacity of the route.

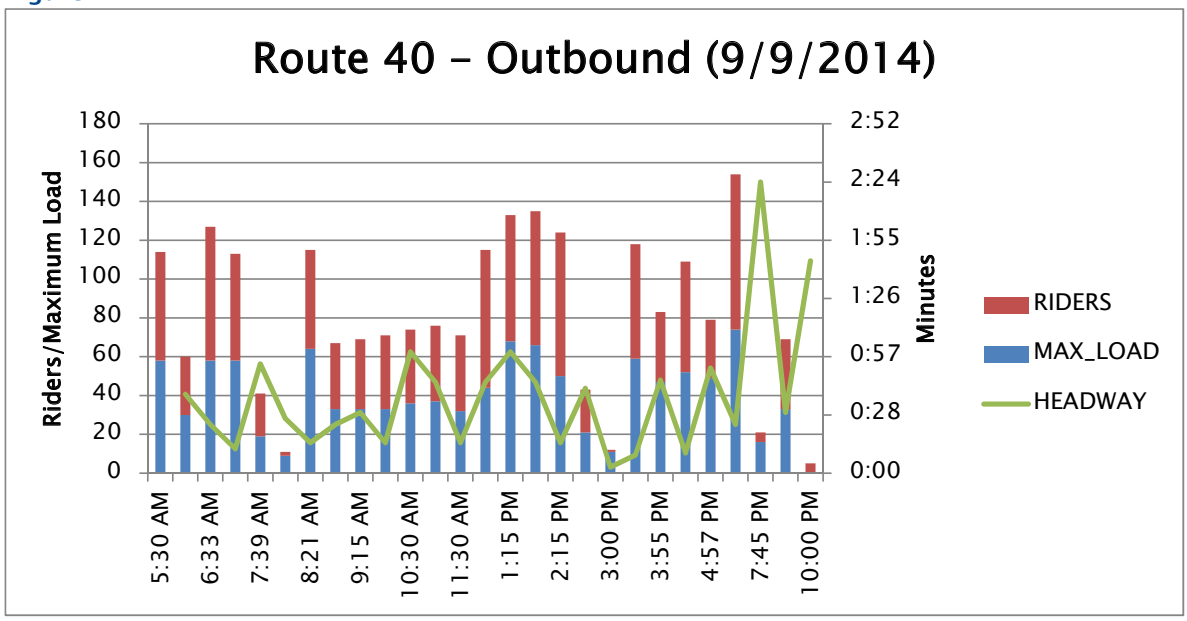
Clock-face headways refer to setting headways to intervals that divide evenly by 60. For example, 12- or 15-minute schedules are used, but 13 or 17 minutes are not used. For use with policy headways, it is highly recommended and common practice to use clock-face headways. However, using clock-face headways in conjunction with demand-based headways at intervals greater than every 10 to 12 minutes is somewhat controversial in the transit industry. Clock-face headways help passengers better predict bus arrival times at stops and eliminate the need for complex schedules, thus allowing passengers to be less dependent on timetables. User-friendly clock-face headways are more attractive to riders. However, from the cost-accounting viewpoint it may be more expensive to write schedules around this criterion.

BMC staff suggests that MTA evaluate costumer-reported or APC-identified overcrowded routes (see "Ridership – Overcrowding" section) for possible demand-based headway adjustments. Archived MTA APC data could aid in the analysis.

6 See http://www.nctr.usf.edu/pdf/77720.pdf.

Figure 4 shows archived Route 40 – Outbound ridership data for September 9, 2014. This data could assist in identifying service demands requiring shorter headways. On September 9, 2014, the four mid-day Route 40 trips beginning at 12:15 had an average load of 70 passengers with an average frequency of 40 minutes (two trips at 45 minutes, one trip at 1 hour, and one trip at 15 minutes). Further analysis using bus stop level APC data for these four trips would identify heavy load locations. Using this type of information, MTA analysts could evaluate headway adjustments to distribute the peak ridership loads during the mid-day period.

Figure 4



Transfers

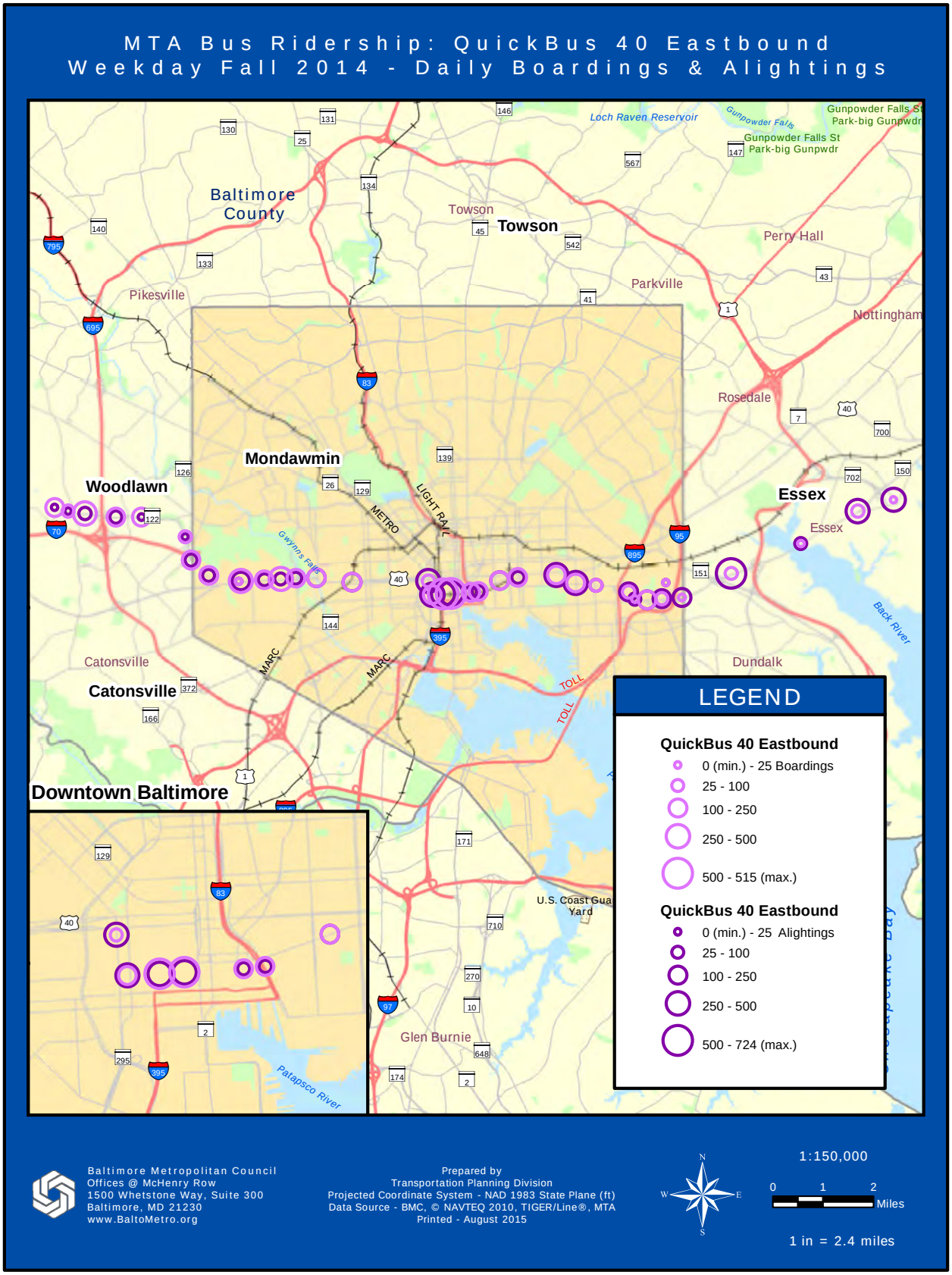
Another consideration in evaluating headways relates to transfers. Transit users normally view transfer time as particularly onerous. Transit riders making trips that require one or more transfers are likely to view the frequency of the second and subsequent routes or service as especially important because those frequencies dictate the amount of time the rider can expect to spend making transfers.

Greater than 40 percent of the 2008 On-Board Transit Survey participants reported at least one transfer. MTA staff is aware of the high transfer rate among riders (especially in downtown Baltimore) using routes to connect from one radial corridor to another. As an example, traveling from Edmondson Village to Towson requires riders to transfer from the Quick Bus 40, eastbound, to the Quick Bus 48, northbound, transferring at South Charles Street and East Baltimore Street.

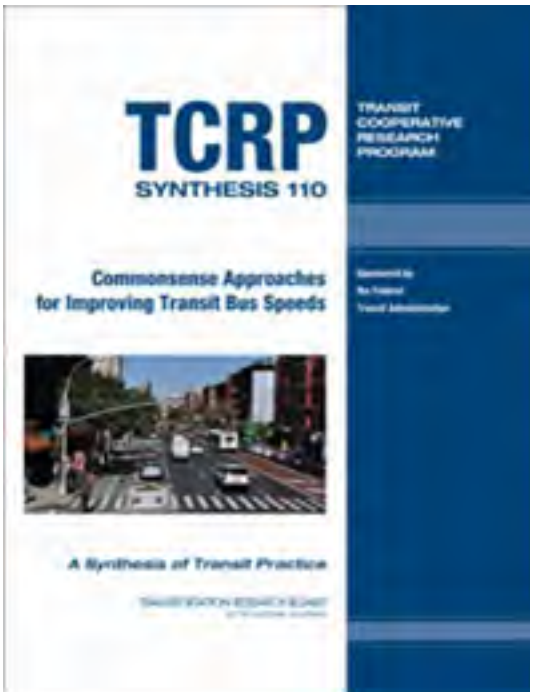
Figure 5 shows the Quick Bus 40 weekday 2014 boarding and alighting. The observed heavy downtown boarding and alighting are evident. Unfortunately, the APC data is unable to distinguish the share of boardings and alightings related to those transferring versus those transit riders who have reached their final destination.

MTA may consider identifying important origin-to-destination pairs, either using local knowledge or analysis of observed ridership data. Observed ridership data could come from the 2008 On-Board Transit Survey, or if more current data is desired, an analysis of Census data and use of transit planning networks could be used in developing the major origin-to-destination pairs. MTA should also consider an accurate means to measure the time transit users spent transferring, possibly starting with stops where the greatest amount of time transferring is known and then evaluating possible headway adjustments to minimize time spent in transferring.

Figure 5


MTA Bus Ridership: QuickBus 40 Eastbound
Weekday Fall 2014 - Daily Boardings & Alightings
Baltimore County
Towson
Perry Hall
Pikesville
Parkville
Nottingham
Rosedale
Mondawmin
Woodlawn
Essex
Catonsville
Dundalk
Downtown Baltimore
Glen Burnie
Loch Raven Reservoir
Gunpowder Falls
Gunpowder Falls St Park-big Gunpwdr
LIGHT RAIL
METRO
MARC
TOLL
Back River
Patapsco River
U.S. Coast Guard Yard
LEGEND
QuickBus 40 Eastbound
0 (min.) - 25 Boardings
25 - 100
100 - 250
250 - 500
500 - 515 (max.)
QuickBus 40 Eastbound
0 (min.) - 25 Alightings
25 - 100
100 - 250
250 - 500
500 - 724 (max.)
Baltimore Metropolitan Council
Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
www.BaltoMetro.org
Prepared by
Transportation Planning Division
Projected Coordinate System - NAD 1983 State Plane (ft)
Data Source - BMC, © NAVTEQ 2010, TIGER/Line®, MTA
Printed - August 2015
1:150,000
0 1 2 Miles
1 in = 2.4 miles

TRANSIT BUS SPEEDS



A common customer complaint received through the MTA "rate my ride" program is buses "traveling too slow and not arriving on time." The Transit Cooperative Research Program (TCRP) Synthesis 110 summarizes strategies that 59 transit agencies have implemented to enhance bus travel speeds. The report documents transit agencies' experiences in operating buses more quickly through streamlined routes, increasing stop spacing, implementing all-door boarding and alighting, improving stop placement, instituting fare payment policies, constructing dedicated bus lanes, assigning signal priority for buses, enacting yield-to-bus laws, and improving general traffic flow through traffic engineering methods.

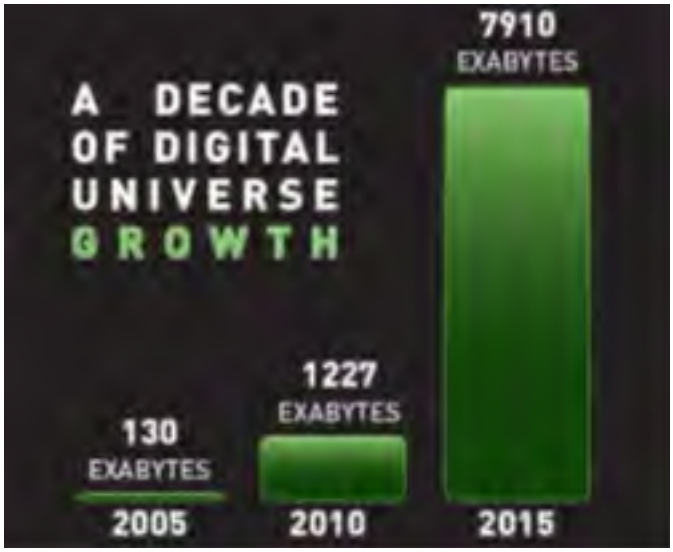
A summary of TCRP Synthesis 110[7] noted the following 11 ways to improve urban bus speeds. MTA's Bus Network Improvement Project (BNIP) has used many of these approaches.

1. **Consolidate stops**: More than half of the agencies surveyed have thinned bus stops, some by focusing on pilot corridors and others by gradually phasing in policy changes. Many agencies moved stops to the far side of intersections at stoplights, and 13 agencies adopted physical changes such as longer bus stops or bulb-outs, which help passengers board faster and more conveniently.
2. **Streamline routes**: Straightening out routes, trimming deviations, eliminating duplication, and shortening routes didn't just simplify service; it also sped up service for two-thirds of the agencies that tried this approach.
3. **Transit signal priority**: The 22 agencies with signal priority can change stoplights for approaching buses. They mostly report a minor to moderate increase in bus speeds as a result. In fact, agencies singled out traffic engineering approaches like TSP as the closest to a "silver bullet," one-step solution.
4. **Fare policy**: Several agencies changed fare structures or payment methods. The one agency that collects fares before passengers board, and lets them board at both bus doors, decreased bus running times by 9 percent.
5. **Bus Rapid Transit**: Ten agencies combined multiple approaches on specific routes and launched BRT service. Of those that measured the effect, almost all reported a significant increase in speed, typically around 10 to 15 percent.
6. **Vehicle changes**: More than half of the agencies have moved to low-floor buses, which reduce loading times by one second per passenger. Smaller buses might be more maneuverable in traffic, and ramps can speed loading for wheelchairs and bicycles.
7. **Limited-stop service**: While new limited-stop services resulted in only slightly to moderately faster speeds, this is a simple step and 18 agencies reported launching new limited routes.
8. **Bus lanes**: Dedicated lanes are used by 13 agencies, and one reported that "most routes are on a bus lane somewhere." When implemented on wide arterial streets, this moderately improves speeds.
9. **Adjust schedules**: Almost all of the surveyed agencies have adjusted running time or recovery times (the time spent turning the bus) or have moved to more flexible "headway schedules." All of these actions improve on-time performance reliability for customers and reduce the need for buses to sit if they're running early.
10. **Signal timing**: Synchronized stoplights along transit routes can make sure that buses face more green lights than red, but this approach has only a small effect on operating speeds.
11. **Express service on freeways**: This strategy had the largest effect on speeding up buses for the three agencies that tried it.

7 "11 Simple Ways to Speed Up Your City's Buses," Payton Chung, Streetsblog USA, April 18, 2014

It is possible to improve local bus transit speeds. Success stories from the 59 agencies "emphasize strong positive relationships with municipal agencies and stakeholders (elected officials, unions, and customers) and an internal agency commitment to the program, especially on the part of upper management." (TCRP Synthesis 110)

Open Transit Data



We are in the era of big data, and the public expects access to and the use of public agency data. MTA produces and archives a significant amount of valuable data. Public access to data allows data users to make contributions that are often cost- and time-prohibitive for the public sector. Since public agencies can benefit from providing open data access, agencies have offered data online to developers who are interested in creating innovative applications that can meet a need. Another approach is to sponsor "hackathons" to get relatively inexpensive expertise to address specific problems. Even when access is not provided, developers often improvise, as was seen with the release of My MTA Tracker for Bus.

BMC staff suggests that MTA explore its open data policies to consider broader access to real-time data instead of static data. In addition, consider if a complete state-of-the-transit-system dataset or a precise subset of transit data can be provided. Nationally, transit operators with open data policy have established simple terms of service, used GTFS naming conventions, and used matching/consistent IDs among datasets. Several transit providers also have created developer pages with access to resources, created developer email lists to announce data releases, and encouraged collaboration among groups. MTA also should consider sponsoring "hackathons" to address specific issues.

"MTA should explore its open data policies to consider broader access to real-time data instead of static data. MTA also should consider sponsoring "hackathons" to address specific issues."

2–4. Passenger Welfare:
How Safe and Secure Is the System?

Feeling safe and secure is one of the basic human desires. People who don't feel safe and secure will not use a transit system unless there is no alternative. Addressing this issue should be a priority.

2-4. Passenger Welfare

Safety and Security and Regional Transit Services

The sharing of safety and security responsibilities between state and local governments reflects, to a large extent, the historic development of these services. Given the unique local circumstances, distance, and difficulty of communication prior to the modern era, public safety necessarily evolved as a local government function.

The MTA Police Force was founded (along with the creation of MTA) in 1971 by state legislation, as a fully commissioned, full-service police force. This force has full police authority throughout the state of Maryland. The MTA police investigate all state law and city/county code violations occurring within MTA vehicles, stations, facilities, and property. Since the bus, Metro, light rail, MARC commuter rail, and mobility systems are built to be accessible to all members of society, there is a fundamental challenge when considering how to effectively protect transit customers and assets against criminal and terrorist activity. MTA has accepted this responsibility and safety is embedded as part of its mission statement. Safety and security efforts are also shared with MTA's Office of Safety, Quality Assurance and Risk Management.

RECENT ACTIVITIES

Daily patrols of service with person-to-person contact and close monitoring are key elements of their efforts. The MTA Police have implemented state-of-the-art technologies of enhanced Closed Circuit Television (CCTV) and sophisticated intrusion detection systems to keep our customers safe while utilizing MTA services modes. MTA Police provide citizens routine recognition for their help in assisting crime prevention and resolution. MTA has added explosive detection K-9 dogs to patrols of its service and facilities. The MTA Police also perform Zone Enforced Unified Sweeps (ZEUS) Operations which are unannounced surge sweeps deployed on a regular basis to better protect MTA customers and properties against potential terrorist and criminal activity.

The MTA has received national recognition as the GOLD Award for Safety winner from the American Public Transportation Association (APTA) for its Safety Rules and Compliance Program. The award honors the best rail transit agencies in North America for their excellence in safety and security programs and operations. MTA's Safety Rules and Compliance Program (SRCP) was designed to keep customers and employees safe, and to ensure the safety of MTA equipment by implementing shared responsibilities across the Agency's operating and support departments. SRCP encourages shared responsibility across multiple departments as MTA personnel conduct field test and manage constrained resources and manpower. Through this program, MTA has developed custom software which streamlines implementation and provides analytics which helps track performance and trends. Managers are held accountable for the program's success through the use of custom-designed software that provides feedback and analytics to track performance and trends. MTA had designed and implemented the Safety Rules and Compliance Program (SRCP) over the past three years.

How Safe and Secure Is the System?

The MTA Police Force consists of approximately 150 sworn officers and 80 civilian employees. These staff members undertake policing approaches and services that include:

- Uniform Patrol and Plainclothes Unit
- Detective Unit
- Visible Intermodal Prevention and Response (VIPR) Teams/Tactical Unit
- Video Surveillance Teams
- Bicycle Patrol Squad
- Motorcycle Patrol Squad
- K-9 Police Officer Unit
- Homeland Security Drills
- Weekly Zone Enforced Unified Sweeps.

BUS SAFETY

MTA provided incident data by route and direction for FY 2015. The database included number of incidents along approximately 60 bus routes in the Baltimore Metropolitan region. The data provided was limited to numbers of incidents by six categories:

1. traffic (e.g., vehicle and passenger related conflict)
2. passenger (e.g., passenger medical emergencies)
3. security (e.g., police alerted to in-vehicle or stop related emergency)
4. equipment (e.g., passenger injury resulting from equipment failure)
5. other (e.g., anything not specifically falling under categories here)
6. employee (e.g., employee injury on board)

The individual records also included data on weather, direction, intersection and/or crossing streets and if a vehicle was being used for training. However, the data did not include any information on whether the incidents resulted in any type of injury or property damage or any fatalities.

Based on the data provided, during FY 2015, there were approximately 3,700 incidents. Approximately 39 percent of these incidents involved traffic while 17 percent involved passengers. Almost 38 percent of the incidents are under the category "other."

Of the roughly 3,700 incidents, about 111 (3 percent) were categorized as "preventable." MTA implements a Bus Safety Performance Evaluation System (SPES) which holds operators accountable for the accidents they are involved in, requires retraining after these accidents and corrective action/disciplinary actions associated with the accident based on a points system[1].

Routes 15, 36, 8 and 23 are among the routes with the most number of traffic incidents (between 40 and 50) while routes 8, 91, 10 and 15 appear to have the most number of passenger related incidents (between 19 and 27). Route 8, 15 & 23 are in top five CY 2014 boarded routes. Further, routes 8, 10, 15, and 23 are in the top ten most boarded routes for CY 2014.

For a more comprehensive safety analysis, BMC will need access to more in-depth data that includes incident information and geo-referencing of incident locations for several years.

1 From 2014 MDOT Annual Attainment Report – page 16.

2-5. Reaching Destinations:
Can Transit Take Us Where We Need to Go?

Helping people reach essential destinations, particularly places of employment, is a vital funtion of a transit system.

2-5. Reaching Destinations

Access to Jobs

Improving access to jobs has been a clear role of transit in the recent efforts to investigate transit service in the Baltimore region. To review this issue, BMC staff examined three sources:

- Opportunity Collaborative
  - Transportation Workgroup Transit Analysis and Recommendations
  - Workforce Development Committee's *Regional Talent Development Pipeline Study*
- MTA Stakeholder Work Group Survey of Business Transit Needs
- Greater Baltimore Committee Employer Survey of Employee's Access to Work

OPPORTUNITY COLLABORATIVE – TRANSPORTATION WORKGROUP TRANSIT ANALYSIS AND RECOMMENDATIONS

The Opportunity Collaborative is a 25-member coalition consisting of six local governments, the BRTB, three Maryland state agencies, two universities, and local philanthropic and advocacy organizations. Funding for The Collaborative's work was through a $3.5 million Sustainable Communities planning grant from the U.S. Department of Housing and Urban Development (HUD). The Baltimore Metropolitan Council, the council of governments for the Baltimore region, provided the Opportunity Collaborative with technical and staff support.

On June 8, 2015, the Opportunity Collaborative released the Baltimore *Regional Plan for Sustainable Development* (RPSD), the first ever plan that brings together housing, workforce development, and transportation for the region. The intent is to identify ways to reduce disparities and better connect all residents to opportunities.[1]

The Collaborative established a Transportation Committee to develop specific location-based recommendations for coordinating transportation, housing, and workforce development efforts. This analysis work grew out of recommendations from the 2012 *Analysis of Impediments to Fair Housing Choice* (AI) as well as analyses from the Collaborative's Housing and Workforce Development committees.

One of the observations of the AI was:

- **"The lack of adequate public transportation between the urban core of Baltimore City and the employment growth centers expected in the upcoming years will exacerbate the intractable concentrations of poverty and disenfranchisement in the City. A key component of future regional planning initiatives must involve the linking of inner city residents with job opportunities in the outlying suburban areas."**

To address this issue, the Transportation Work Group identified quality transit access to employment centers as a key focus.

1 See http://www.baltometro.org/our-work/the-opportunity-collaborative for more information.

OPPORTUNITY COLLABORATIVE – WORKFORCE DEVELOPMENT COMMITTEE'S TALENT DEVELOPMENT PIPELINE STUDY

The Workforce Development Committee of the Opportunity Collaborative developed the Baltimore *Regional Talent Development Pipeline Study*. This study identified six industry sectors that offer the greatest promise for low-skilled workers to move into family-supporting, medium-skilled jobs. These include:

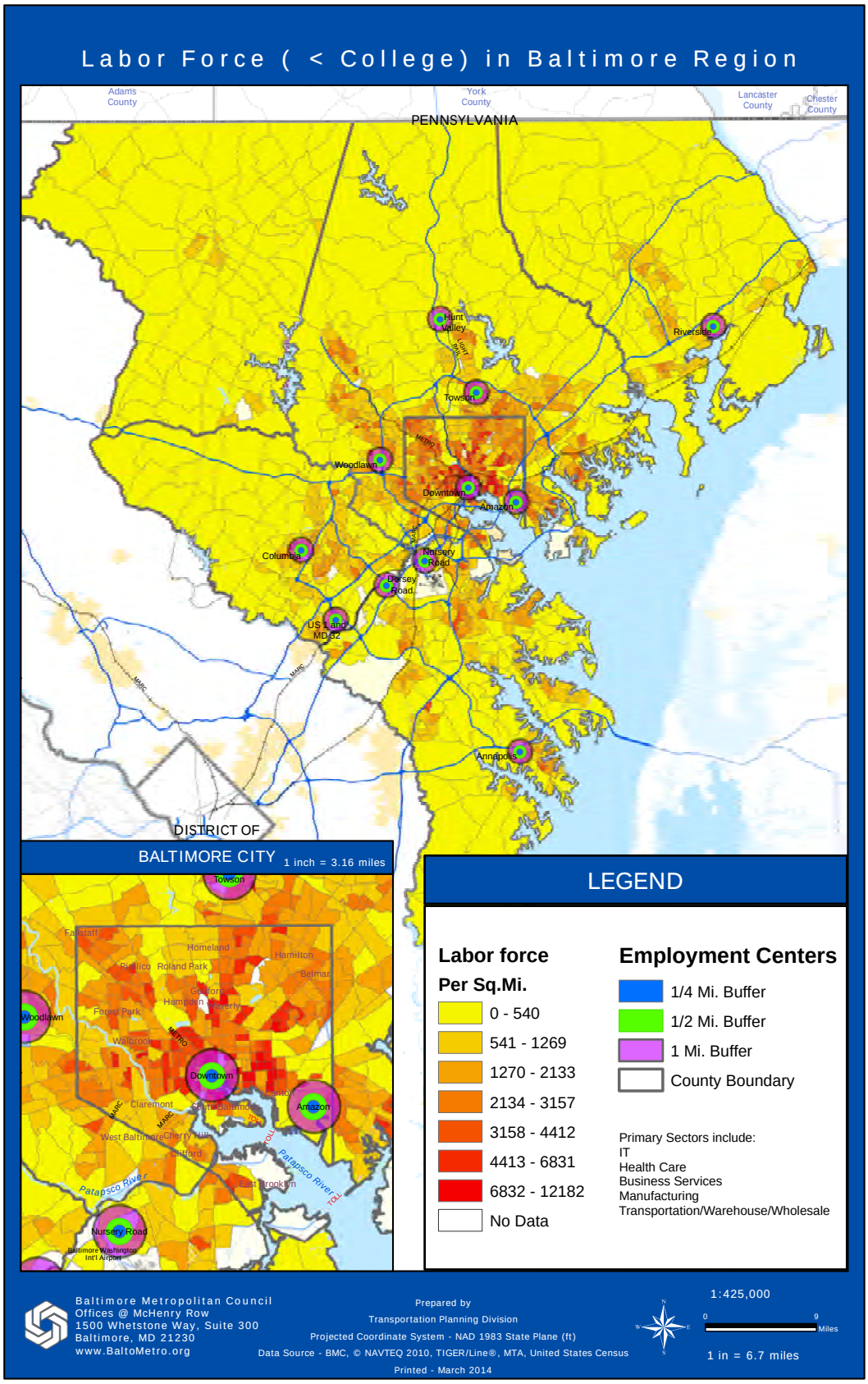
- Health care
- Construction
- Information technology (IT), including cybersecurity
- Transportation and warehousing
- Business services
- Manufacturing

The Transportation Workgroup identified key employment centers for each of these industry sectors. The committee engaged BMC staff to review existing transit service for targeted populations to access these employment centers. Relative to existing transit service, the Committee recommended further study of potential enhanced service or additional service.

The Transportation Workgroup identified employment centers for the Baltimore metropolitan area based on employment density. The Workgroup identified 11 employment centers, most of which are along major highway corridors (e.g., I-95) and close to transit lines, particularly MARC, Metro (subway), and light rail. For the sake of convenience in the analysis, each employment center, represented as a point on the map in Figure 1 (see next page), is positioned as the largest employer in that area.

- Amazon
- Annapolis
- Coca Cola Drive
- Columbia
- Downtown Baltimore
- Hunt Valley
- MD32 and U.S. 1
- Nursery Road
- Riverside Business Park
- Towson Circle
- Woodlawn

Figure 1



Baltimore Metropolitan Council

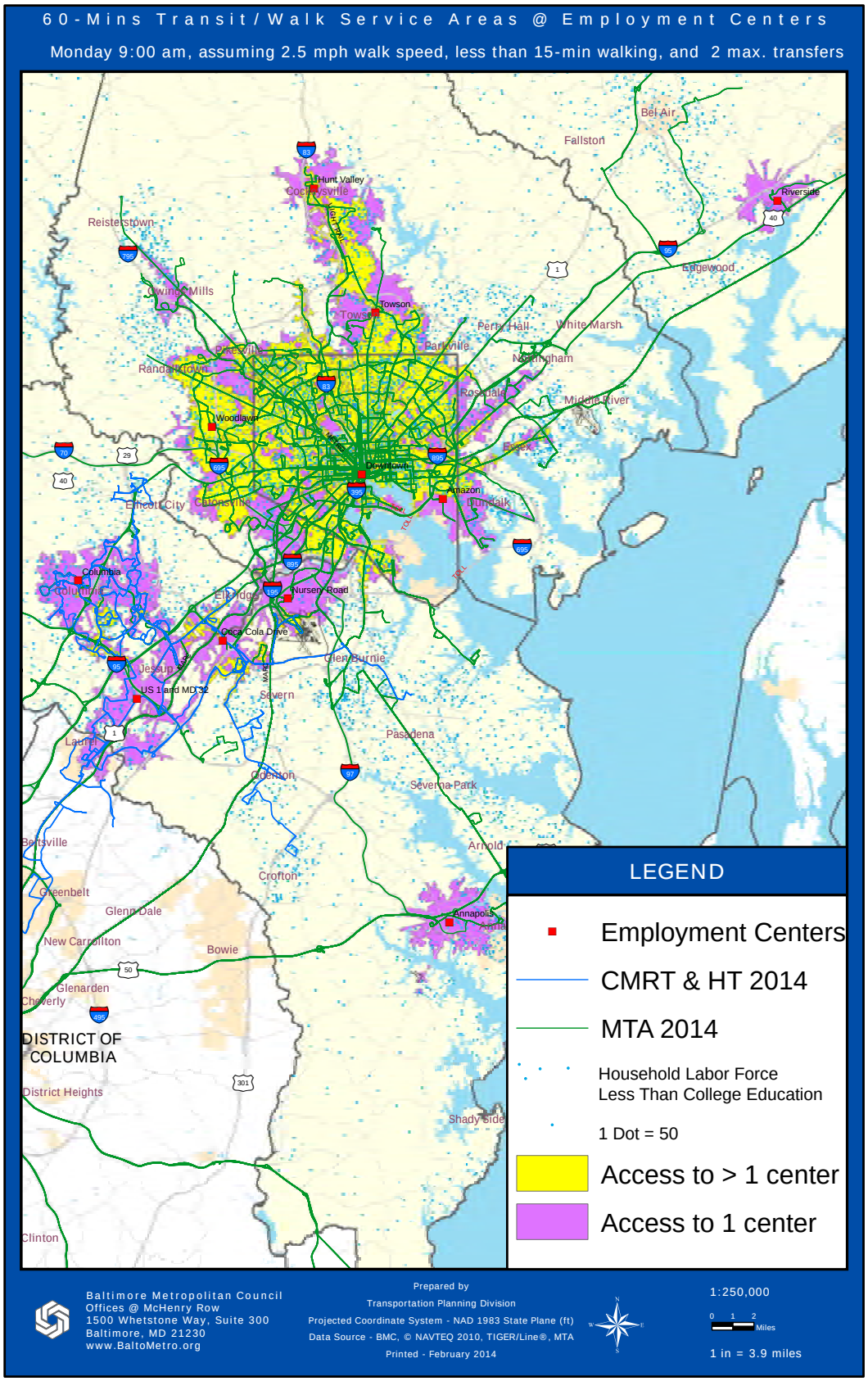
As part of the Transportation Workgroup analysis, the group explored transit access to each employment center to identify areas within which a worker can reach the center via transit service or by walking within certain time frames: 0-30, 31-60, and 61-90 minutes. This analysis reports the number of workers (with and without a college degree to define potential candidates for entry-level, medium-skilled positions) within each transit/walk access zone (0-30, 31-60, and 61-90 minutes) relative to the employment centers.

Figure 2 on the next page shows the composite transit access to all of the employment centers. Figure 3 shows the transit acess to the Coca Cola Drive employment center.

As a result of the transit/walk access analysis, the Transportation Workgroup identified several areas for potential enhancements to improve access to medium-skill jobs. BMC staff recommends that specific transit enhancements for these areas be studied further and, as appropriate, considered for implementation.

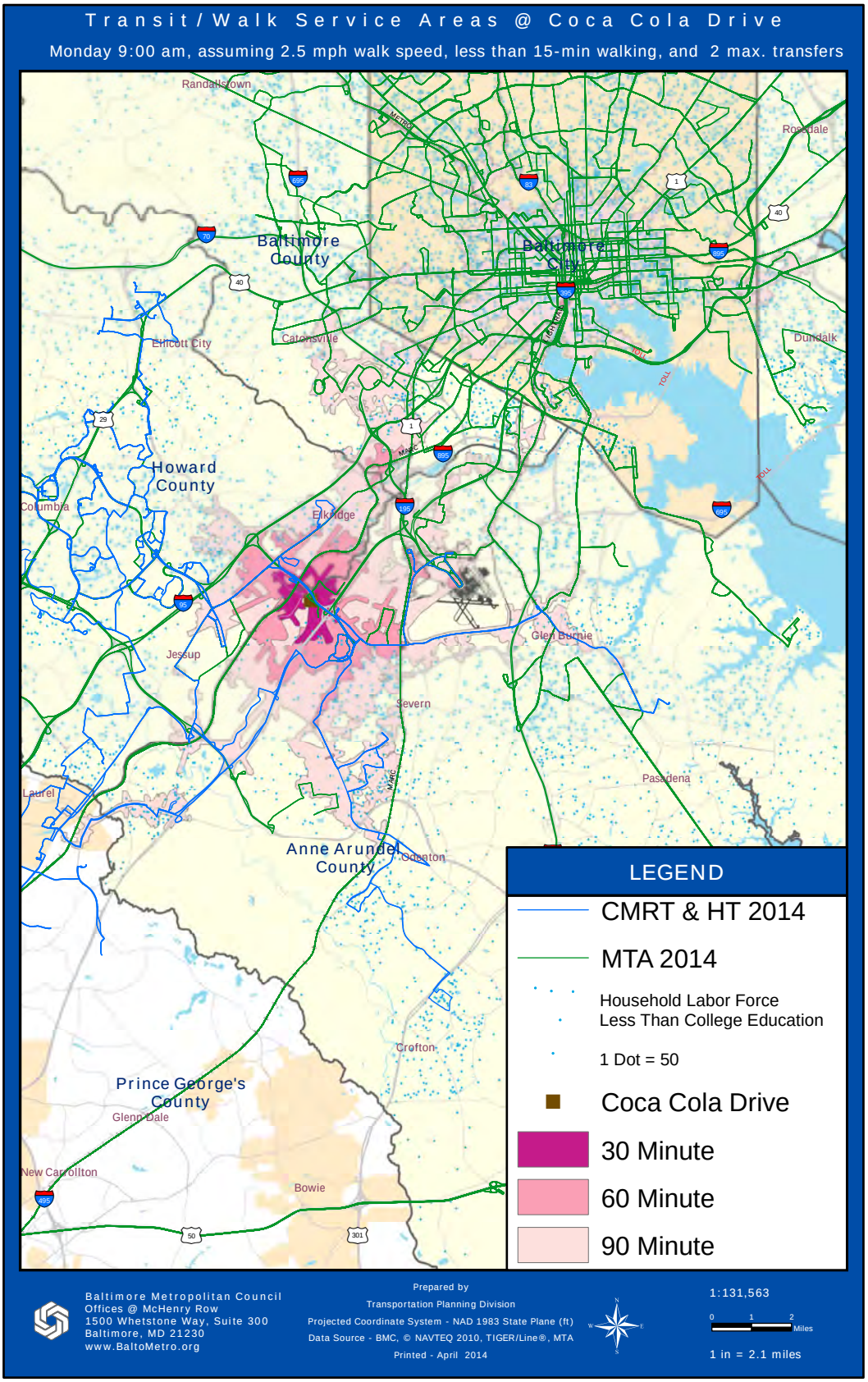
The Transportation Workgroup also found that access to jobs can be enhanced through improved "first mile / last mile" connections. For example, improvements to provide safe pedestrian and bicycle facilities could improve last-mile access. Employer shuttles are also an important alternative, particularly for more remote suburban centers.

Figure 2



Baltimore Metropolitan Council

Figure 3


Transit/Walk Service Areas @ Coca Cola Drive
Monday 9:00 am, assuming 2.5 mph walk speed, less than 15-min walking, and 2 max. transfers
Randallstown
Rosedale
Baltimore County
Baltimore City
Ellicott City
Catonsville
Dundalk
Howard County
Columbia
Elkridge
Glen Burnie
Jessup
Severn
Pasadena
Laurel
Anne Arundel County
Odenton
Crofton
Prince George's County
Glenn Dale
New Carrollton
Bowie
LEGEND
CMRT & HT 2014
MTA 2014
Household Labor Force
Less Than College Education
1 Dot = 50
Coca Cola Drive
30 Minute
60 Minute
90 Minute
Baltimore Metropolitan Council
Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
www.BaltoMetro.org
Prepared by
Transportation Planning Division
Projected Coordinate System - NAD 1983 State Plane (ft)
Data Source - BMC, © NAVTEQ 2010, TIGER/Line®, MTA
Printed - April 2014
1:131,563
0 1 2 Miles
1 in = 2.1 miles

MTA STAKEHOLDER WORK GROUP – SURVEY OF BUSINESS TRANSIT NEEDS

One of the focus areas of the current MTA Stakeholder Work Group process is meeting the transit needs and expectations of businesses. MDOT recently summarized "Key Issues and Themes for Improving Transit in the Baltimore Region as Identified by Businesses." BMC recommends that this process continue so that MDOT can address these issues and thems. Key themes and issues include:

Increase Transit Ridership

- Make the transit experience safer and more secure.
- Provide a better, more reliable, quality experience.
- Keep transit fare rates affordable.
- Increase positive user experiences; attract those with alternative sources of transportation to use transit, such as younger people who typically like to take transit.
- Consider marketing/branding certain bus lines to promote "cool," easily identifying routes, etc.

"BMC recommends that this process [of identifying key transit issues and themes of concern to businesses] continue so that MDOT can address these issues and themes."

Need Safe and Secure Transit

- Need more bus shelters and bus shelters with lighting.
- Need shuttles for the "last mile" for business access.
- Need more safety on transit and to transit.
- Need more police presence on and off transit.

Access to Jobs

- Provide connections to work site locations; provide the last mile of access to jobs.
- Connect jobs and people in the Baltimore region; identify gaps in the current transit system.
- Provide access to jobs, schools, and commerce.
- Increase reliability of service.
- Connect to Port of Baltimore employers/employees.
- Connect to all of the universities, hospitals, and larger employers / key activity centers in the region, including Fort Meade, Arundel Mills, Sparrows Point, etc.
- Connect Annapolis, as the state capital, to the region through transit (bus and rail).
- Need frequent transit headways for the 24/7 businesses (casinos, hotels, hospitals, etc.)
- Need east/west county transit access without having to go through Baltimore City.
- Link employment centers outside of Baltimore City with workers within the city.
- Provide better transit service between the beltways, where 45 percent of the employment is located.

Ease of Use; Transit Experience

- Integrate and map all of the public and private transit for ease of access and use.
- Need a universal fare card or payment as the fares can be confusing.
- Consider the use of smaller vehicles for some of the lesser utilized transit services/routes.
- Market the bus routes. The Charm City Circulator does well because of good marketing, reliability, and public perceptions. It is simple, easy to use, frequent, and has NextBus information.
- Consider using short and longer routes, including circulators.
- Make the bus experience "cool" and fun.

Flexibility and Efficiency of the Transit System

- Accommodate and adjust transit to the longer peak commute periods and the peak-hour service that is changing with 24-hour needs (hotels, casinos, hospitals, Amazon).
- Consider flex-time to enable better employee access through transit.
- Refocus/redesign the transit access in/out of Baltimore City, as travel patterns have changed.
- Make transit timely and convenient.
- Evaluate the duplication of public/private transit and shuttle bus services.

Redesign Bus Routes

- Use a data-driven approach to defining routes.
- Ensure that we don't block parts of Baltimore City from jobs and opportunities.
- Note that public transit cannot get to the door of all businesses
- Redesign the entire system for today/tomorrow rather than adjusting existing routes.
- Suggest looking at demographic shifts, needed movement(s), as well as shift changes (especially at the Port of Baltimore employment areas).
- Maximize efficiencies with the number of state and local transit providers.
- Assess how to address/link transit to the suburbanization of employment.
- Consider that the MTA buses provide bus access to school children in the City of Baltimore. [should we reword this: Consider providing alternatives for schoold children using local buses
- Consider fewer bus stops (based on use and presence of shelters) for more reliable bus service.

Incentivize Transit

- Find opportunities to direct employees to transit options.
- Identify programs for employers/employees to incentivize or take advantage of transit.
- Promote bicycle/pedestrian access at transit stations/stops.
- Promote shuttle bus service into major growth areas / cities and use transit hubs/ transfer centers.
- Need transit funding; business partners need to provide funding for transit options.
- Large employers / locally operated transit agencies should help with the last mile of travel.
- Consider options for Transit Oriented Development, especially at light rail stations.

GREATER BALTIMORE COMMITTEE EMPLOYER SURVEY OF EMPLOYEE'S ACCESS TO WORK

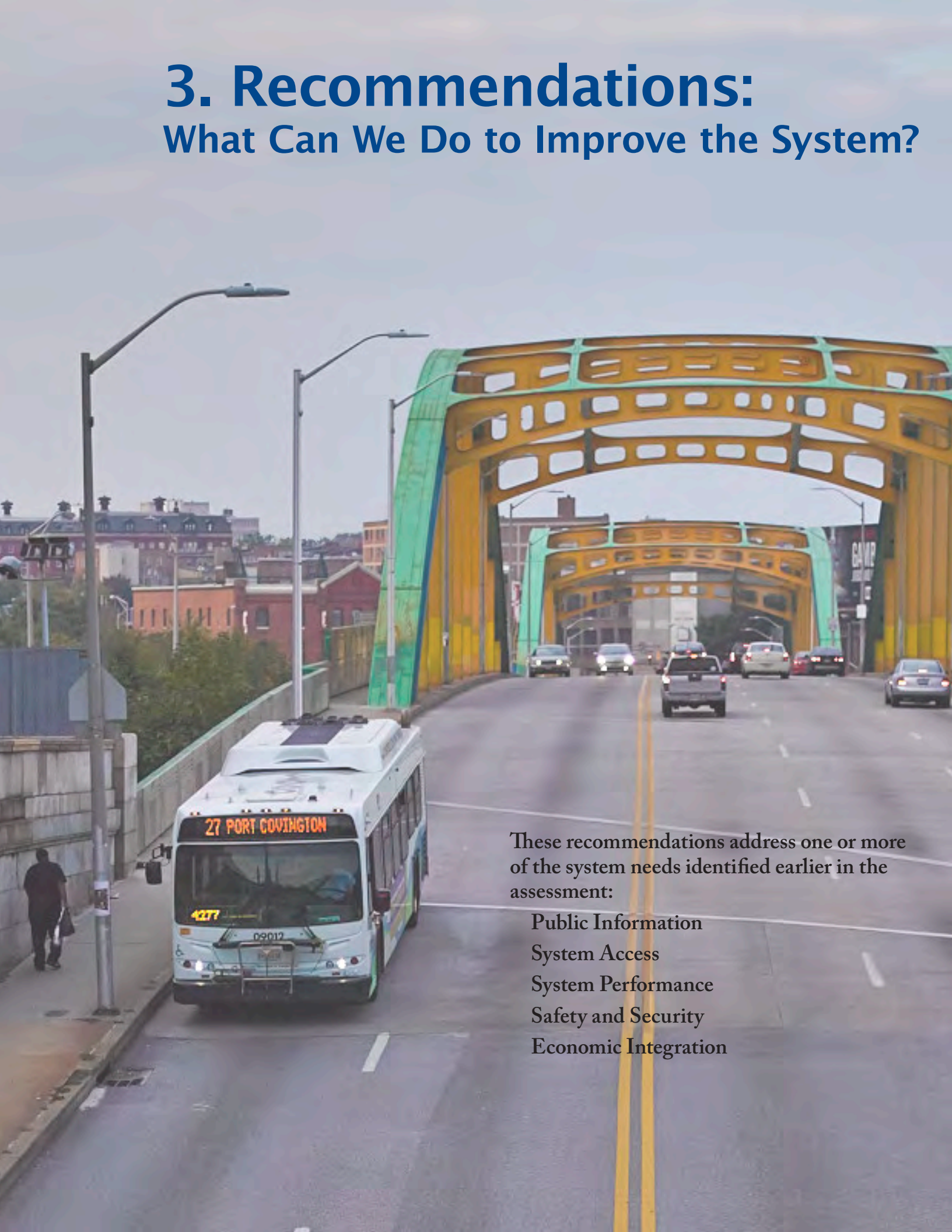
Utilizing a grant from the Opportunity Collaborative, the Greater Baltimore Committee surveyed 50 businesses in the Baltimore region to determine employer awareness of employees' access to work needs as well as potential interest on the part of employers in engaging employees in getting assistance from home to work. From the responses, it is evident that employers surveyed know of their employee's transportations situation. This includes a plurality of respondents acknowledging involvement in local transportation issues and groups. Similarly, a clear majority expressed awareness of the average commuting distance for their employees.

Other indicators of awareness of employees' commuting concerns consisted of:

- knowledgeable responses as to mode of travel to work
- complaints as to transit performance
- lack of safe infrastructure
- insufficient parking spaces
- lack of transit access

Still, a fair number of employers indicated that they do not receive complaints from employees. Despite this, it is interesting to note that current transportation options were cited by employers as affecting employee recruitment and retention.

3. Recommendations:
What Can We Do to Improve the System?



These recommendations address one or more of the system needs identified earlier in the assessment:

- Public Information
- System Access
- System Performance
- Safety and Security
- Economic Integration

3. Recommendations

Transit in the Baltimore Region: Synthesis and Recommendations

The Baltimore Regional Transit Needs Assessment is designed to serve as an informative and functional tool for state and local government partners considering improvements to public transportation in the greater Baltimore region. In an effort to ensure the utility and user accessibility of the assessment, a three-tiered approach has been used to categorize the recommendations.

First, the recommendations are arranged, for the most part, by MTA mode. As previously noted, MTA is one of the largest transit agencies in the country, and one of a handful of statewide systems. While MTA's mode-centric structure does not always support system integration, it does allow for detailed performance measurement and targeted, user focused improvements.

The modal categories in the assessment are:

1. Multimodal or universal recommendations
2. Core bus service
3. MARC
4. Metro
5. Commuter Bus
6. Light Rail
7. Other

Second, a time horizon is assigned to each recommendation.

Short Term	0-5 years
Medium Term	5-10 years
Long Term	10+ years

Third, each recommendation addresses one or more of the system needs identified earlier in the assessment:

PUBLIC INFORMATION – How the system communicates pertinent information, such as arrival/departure times and route options.

SYSTEM ACCESS – The ways in which riders can access the system ranging from cost and type of fare to station area amenities.

SYSTEM PERFORMANCE – Objective and subjective measurements that assess the efficiency, reliability and functionality of the transit network.

SAFETY AND SECURITY – Infrastructure and policies that lessen risk of harm from mechanical failure, criminal activity, or accident on transit vehicles or in transit stations.

ECONOMIC INTEGRATION – Transit's ability to serve as a reliable economic engine that serves the needs of workers and employers alike.

What Can We Do to Improve the System?

The primary sources for these recommendations were projects identified in the priority letters of BMC's member jurisdictions, transit investments called for in the region's long-range transportation plan, and recommendations from BMC's professional transportation staff. Public involvement in this planning process was sought through an online survey. Additionally, previous comments from the Council's public engagement efforts were included in this effort.

Specific cost estimates are available for only a handful of these recommendations. In most cases, a cost estimate cannot be developed until a project-specific strategy is developed. In lieu of available hard estimates, each recommendation has been assigned an estimated range:

$ Cost neutral - $10 million

$$ $10M - $100 million

$$$ $100 million +

Underlying all of the recommendations contained herein is the need for a renewed focus on system integration and performance improvements. On paper, the Baltimore region has the individual components of a strong transit network. However, these components are disconnected and often fail to complement each other, leaving riders with a system that the public perceives as less than the sum of its parts.

Through targeted investments and policy changes, we can realize the untapped potential of our transit system. The return on these public and private investments is measured through increased economic growth and mobility, reduced congestion, and improved quality of life throughout the region.

Recommendations – All Modes	
Establish a unified transit fare card – Complete efforts to enable seamless integration among all public transit services within the region. A unified fare card system—whether using bus, Central Light Rail, Metro, Mobility, MARC, Transit Link (WMATA, VRE), or a local transit system—would permit easy access and transfers between services and reduce costs associated with fare equipment. It also can faciltate management by using new data to track services and demand. Need to formalize partnerships with car and bike share companies/organizations to permit members to use their integrated transit fare card for access to shared car and bike services anywhere in the Baltimore area network, making it easier to seamlessly switch between transit, bike, and car sharing. Chicago provides a simple example of where a sticker was placed on the back of the transit card as a means to access shared car/bike services. Unified fare technology can bring collection costs down, resulting in savings that can be reinvested in the form of improved transit services.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Improve accessibility at transit stations and stops – The MTA and local governments in the region should partner to improve amenities and access to transit stations and stops throughout the region. Amenities such as bus shelters, furniture, sidewalk improvements, and lighting would enable all riders, particularly challenged riders, to more easily access the system and to transfer. Amenity and access improvements to regular services could deflect requests for Mobility trips. Priority should be given to improving "high value" bus stops near large numbers of regular MTA and Mobility customers.	**Timing**: Ongoing **Estimated Cost:** $ **Needs:**

Recommendations – All Modes	
Maintain a State of Good Repair for transit – Transit providers need to follow an asset management approach, beyond recent FTA Transit Asset Management rulemaking. This approach establishes schedules for routine maintenance, upgrades, facility rehabilitation, and overhaul of systems and vehicles. Additionally, there is a need to increase activities to ensure high standards of vehicle and station/stop cleanliness. This would improve users' perceptions of and experiences with the system, which in turn would help to spread the word about improved vehicles and facilities.	**Timing:** Ongoing **Estimated Cost:** $$ **Needs:**
Use transit fares as an economic development tool to incentivize participation in the work force by all economic sectors – Transit is an asset that can be used to access jobs and allow participation by all economic classes in the labor market. Improving transit by structuring fares and increasing employer transit subsidies can increase overall affordability and basic accessibility. It would support those seeking jobs and those looking to fill jobs. Additionally, reducing the number of vehicles a household must own can provide significant savings, and these savings can be considered equivalent to an increase in household income. There needs to be further analysis of how transit fares can be structured to encourage economic development. Establishing jobs adjacent to and along transit corridors is another area for study.	**Timing:** Short Term (legislation changes may be required) **Estimated Cost:** $ **Needs:**
MTA should routinely articulate its long-term vision for transit in the region – The long-term transit plan completed in 2000 is no longer relevant. Updating this plan would provide MTA with a clarity of purpose and a common direction for transit planning and priority setting. This would focus initiatives, establish priorities for budget decisions, and provide a baseline for measuring desired outcomes. The plan should identify gaps in transit service and coverage and define priority transit corridors to optimize access and mobility of existing streets, particularly in the congested, urban parts of the region where giving preference to transit, walking, and cycling makes most sense. A long-term plan should be updated in coordination with local transit development plans (TDPs), the region's Constrained Long-Range Plan (CLRP), and the Maryland Transportation Plan (MTP) for consistency and relevance.	**Timing:** Short Term (and ongoing) **Estimated Cost:** $ **Needs:**
MTA should develop and routinely update functional plans for each of its modes – While MARC has a Growth and Investment Plan, most of MTA's modes (bus, light rail, Metro, and Mobility) do not have functional plans. This results in unplanned/unscheduled investments that are often capitalized independently and without coordination within and among modes. This undermines system functions and performance. Specific detailed (i.e., modal functional) plans should be developed and updated on a rolling basis (suggestion of one mode per year), in coordination with local TDPs, the region's CLRP, and the MTP, for consistency and relevance. These plans should have performance measures that clearly interrelate with MTA's strategic plan and MDOT's annual attainment report. As performance is central to this report, a specific set of recommendations appears separately at the end of this table.	**Timing:** Short Term (and ongoing) **Estimated Cost:** $ **Needs:**
MTA, the region, and local governments should routinely coordinate with one another to ensure consistency of regional policies – The region benefits from a coordinated approach with state and local governments. BMC and BRTB are structured to help enable such activity by providing a variety of forums in which jurisdictions can work to develop and coordinate regional policy and transit project development. This document is one way BMC and the BRTB stand ready to assist in this effort. BMC and BRTB remain ready to help in any way.	**Timing:** Short Term (and ongoing) **Estimated Cost:** $ **Needs:**

Recommendations – All Modes	
Encourage opportunities for Transit-Oriented Development (TOD) – More opportunities for TOD are needed at and around existing station areas throughout the region. MDOT, MTA, BRTB, and the local jurisdictions should develop an initiative to identify and encourage opportunities at these station areas and to promote them to the private sector.	**Timing**: Short Term (and ongoing) **Estimated Cost:** $ **Needs:**
Provide real-time arrival information and safety statistics – Keeping customers better informed with real-time arrival information would help to ensure reliability across transit modes. Current service does not provide the notice and certainty that transit riders, in particular commuters, have come to expect of transit service. In addition, regular safety reports should be prepared by service providers to keep the public informed about the overall safety of the system.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Evaluate and expand transit support programs – This would increase the effectiveness of support programs such as rideshare / ride matching, Guaranteed Ride Home (GRH), and other Transportation Demand Management (TDM) efforts. These efforts should also be better coordinated at a regional level. This includes improving the number and quality of park-and-ride facilities in the region, adding spaces and pedestrian and bicycle elements. These are relatively low-cost, effective solutions provided by the public or private sectors.	**Timing**: Short Term (and ongoing) **Estimated Cost:** $ **Needs:**

Recommendations – Bus	
Provide funding for the Charm City Circulator – MDOT/MTA should provide operating funding to continue Baltimore City Circulator service at current service levels. The Circulator has enjoyed high customer satisfaction and ridership. MTA should consider providing operating funding that could come from cost benefits associated with reductions from the elimination of duplicative MTA routes operated in parallel with Circulator service.	**Timing**: Short Term (and ongoing) **Estimated Cost:** $$ **Needs:**
Expedite Implementation of the Bus Network Improvement Project (BNIP) – MTA has identified and documented many needs through the BNIP effort. MDOT should publish the entire set of findings, including alternatives considered from the BNIP effort. It also should consider providing funds to implement appropriate projects and services. Though improved bus service is not a complete solution for the transportation issues that the Red Line would have addressed, providing a functional, reliable bus system for the region is a priority.	**Timing**: Short Term (and ongoing) **Estimated Cost:** $$$ **Needs:**

Recommendations – Bus

Establish and fund a two-year effort to review local bus stops – This is consistent with the preceding recommendation to improve accessibility at transit stations and stops, with an emphasis on local bus stops. With 5,588 stops supporting the Baltimore region's local bus system, setting priorities for work on bus stops is a critical step toward creating a better regional system. State, regional, local, and private sector leaders should lead an effort to: • **Undertake a system-wide review of the 175 most used bus stops to determine individual stop needs**. This review should be founded on best practices that focus on improving safety, on-time performance, rider experience, and aesthetics. • **Using this review, create an 18-month binding action plan within the first six months**. This plan should include short- and medium-term goals for these stops. • **Oversee, coordinate, and implement this plan**. As a follow-up, MTA should report every six months on progress and additional needs to accomplish goals. • **Create a long-term plan and a state/local framework to standardize and optimize all of the region's bus stops**. This plan should include MTA's current Bus Stop Optimization Pilot Program.	**Timing**: Short Term **Estimated Cost**: $ **Needs**:
Study BRT and "Bus on Shoulder" (BoS) – MDOT, MTA, BRTB, and local governments should study how to implement BRT and BoS on select corridors in the region to address future capacity constraints and congestion. This includes developing BRT corridor concepts and identifying opportunities for implementation. The BoS concept could be studied as a means to queue-jump congested intersections and/or significant road segments. Potential corridors for BRT include: Columbia to Montgomery County along U.S. 29 and Broken Land Parkway and Annapolis to Washington, DC via U.S. 50.	**Timing**: Short Term **Estimated Cost**: $ **Needs**:
Expand operating assistance to locally operated transit system (LOTS) agencies – MTA should expand operating assistance to local governments to enable increased service (by up to 30 percent) on the most productive LOTS routes. This would increase transit connectivity in the region. As demonstrated in the demographics analysis, LOTS agencies serve growing population and employment centers and the growing elderly and disabled populations.	**Timing**: Medium Term (and ongoing) **Estimated Cost**: $ **Needs**:
Provide additional capital assistance to LOTS agencies – The region should increase the amount of capital funds available to local transit agencies for ongoing bus purchases and bus system improvements to maintain current fleets and meet expansion needs. This would increase transit connectivity in the region. LOTS programs are at the forefront of serving growing population and employment centers and the elderly and disabled populations. LOTS programs also can significantly help in connecting outer suburbs with employment centers such as Annapolis, the Ft. Meade / BWI Airport area, Bel Air, Westminster, and Columbia.	**Timing**: Medium Term (and ongoing) **Estimated Cost**: $ **Needs**:

Recommendations – Bus	
Evaluate bus route performance – MTA, in collaboration and coordination with BRTB and local governments, should study the performance of the top 10 bus routes for congestion, overcrowding, and safety. This study should consider amenities at stops with the highest boardings/alightings, as well as routes with the highest incidents, to determine the need for and feasibility of strategies that could improve performance in these areas.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Evaluate bus priority strategies – MTA, in collaboration and coordination with BRTB and local governments, should study the potential benefits and feasibility of service performance strategies outlined in TCRP Synthesis 110. Examples include "bus only" lanes and bus signal prioritization. These approaches could improve travel time and transit speeds along key bus routes and corridors in the region.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**

Recommendations – MARC	
Improve the Odenton MARC station – This station provides drive-up access to more than 2,000 transit boardings a day. Structured parking would free up space for other, more productive uses to the community. This would be consistent with the comprehensive plan for the area by encouraging growth. MDOT/MTA should consider providing capital funding for the planning, engineering/design, and construction of improvements to the station, access, and amentities. This would support potential TOD and economic development of this important station and growth area.	**Timing**: Short Term **Estimated Cost:** $$ **Needs:**
Improve the West Baltimore MARC station – MDOT/MTA should provide capital funding for the planning, engineering/design, and construction of station improvements. MDOT/MTA and the City should continue to provide technical assistance to support and advance TOD efforts at the site. This would foster sustainable economic development at and around the station. Improvements to address ADA compliance at the West Baltimore MARC Station, including elevator access to platforms, are critical.	**Timing**: Short Term **Estimated Cost:** $$ **Needs:**

Recommendations – MARC

Construct a new Bayview MARC station – MDOT/MTA should provide capital funds for all phases of project development for a new Bayview MARC station, station access, and amenities on the City's east side. Enhanced local transit connectivity to a new Bayview MARC station could ease congestion by providing a new option for commuters traveling from areas in eastern Baltimore County and Harford County into the City's central business district. Further, this new station along the Penn MARC line would connect the National Institute of Health (a major economic growth opportunity) with the region's transit system. Investment would support and strengthen relationships between NIH's facilities at the Bayview Medical Center and suburban Washington, DC.	**Timing:** Medium Term **Estimated Cost:** $$ **Needs:**
Evaluate new Madison Square and Upton MARC stations – MDOT/MTA should provide funding to study and evaluate locations to advance the creation of these MARC stations on either side of Penn Station. A Madison Square MARC station represents a significant opportunity to connect commuter transit through MARC to the local Metro system in east Baltimore's active Johns Hopkins Hospital Metro station. Similarly, a MARC stop at the existing Upton Metro station, as identified in the 2007 MARC Growth and Investment Plan, would provide a new and needed connection in west Baltimore between the local Metro system and MARC.	**Timing:** Long Term **Estimated Cost:** $$ **Needs:**
Focus on Penn Station redevelopment and TOD efforts – MDOT should officially designate Penn Station as a TOD site and provide funds for ongoing technical and staff support for TOD at the site and consider capital investment in the area immediately surrounding Penn Station. Penn Station is central Maryland's most significant passenger rail hub. Because the station is a significant generator of pedestrian traffic in the Mount Vernon / Charles North corridor, there is a unique opportunity to redevelop unused land surrounding it into mixed-use TOD.	**Timing:** Short Term **Estimated Cost:** $ **Needs:**
Focus on Aberdeen MARC station TOD efforts – MDOT should provide capital funding for station, station access, and station area improvements. Improvements to the station and the surrounding area would support ongoing and future MARC patron use from this growing area.	**Timing:** Short Term **Estimated Cost:** $$ **Needs:**
Expand MARC Penn Line service, Phase 1 – MDOT should consider providing ongoing operating funding for additional evening service on the Penn Line and enhanced weekend service on the Penn line north to Aberdeen in Harford County. The MARC Penn Line has become a vital transportation service to regional residents traveling to and from Washington, DC for work or leisure. Increased service is needed, particularly during the evening commute, to address overcrowding issues and demand for more evening service on the Penn Line. This also would address demands for reverse commute as well as late night and weekend service.	**Timing:** Short Term **Estimated Cost:** $$ **Needs:**

Recommendations – MARC

Expand MARC Penn Line service, Phase 2 – MDOT should consider providing ongoing operating funding to establish regular weekday and weekend service to Newark, DE on the Penn line north and to connect with SEPTA service to the north and VRE service to the south (at Union Station in Washington, DC). This would relieve traffic growth on the I-95, MD 295, U.S. 29, and U.S. 40 corridors and provide critical cross-regional connections.	**Timing**: Long Term **Estimated Cost:** $$$ **Needs:**
Expand MARC Camden Line service – MDOT should consider providing capital funding to add new mainline track and sidings for three mainline tracks between the Savage and Jessup MARC stations. MDOT also should consider providing additional operating funding for midday and weekend Camden Line service. The Camden Line has limited midday service. Weekend service on the Camden Line could help to reduce traffic congestion, particularly congestion related to major sporting events.	**Timing**: Medium Term **Estimated Cost:** $$ **Needs:**

Recommendations – Metro

Extend the Green Line to Morgan State University – MDOT/MTA should fund the study and evaluation to advance a phased Green Line expansion. Connecting the existing Metro at the Johns Hopkins Hospital complex to another major activity center such as Morgan State University would enable more people to access reliable, efficient transit. It also would enhance regional connectivity by providing a way to access a potential Madison Square MARC station.	**Timing**: Long Term **Estimated Cost:** $$$ **Needs:**
Redesign the Lexington Market station – Lexington Market is a major transit hub connecting MTA's light rail and Metro services directly to downtown Baltimore. MDOT/MTA should provide funds to implement planned capital improvements to this hub. The *2010 Strategic Plan to Enhance the Howard Street Corridor* identified a need for improved connectivity and recommended creating a consolidated light rail and Metro station to better serve customers transferring between the two systems.	**Timing**: Short Term **Estimated Cost:** $$ **Needs:**

Recommendations – Commuter Bus and Commuter Services

Expand commuter bus services – MDOT/MTA should consider providing capital and operating funding to expand commuter bus services in the region. Specific expanded services should link Baltimore City's central business district and Harbor East areas with Annapolis, Columbia, Bel Air, White Marsh/Essex, and Towson. In addition, improved suburban connections, such as between Annapolis and Ft. Meade / BWI Airport / Columbia, should be explored. This should be considered as part of a larger Commuter Bus Growth and Investment Plan.	**Timing**: Medium Term **Estimated Cost:** $$ **Needs:**
Evaluate Annapolis/Parole intermodal facility and U.S. 50 Bus Rapid Transit (BRT) – MDOT/MTA should consider funding a study of a potential intermodal facility and a study of the feasibility of premium bus/BRT service along U.S. 50. This would address current and growing demand for transit services connecting the Baltimore, Washington, and Annapolis areas, including capacity constraints related to the demand for park-and-ride facilities in the area and a hub to support future premium bus/BRT services.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Improve park-and-ride facilities throughout the region – MDOT, MTA, BRTB, and local governments should study the park-and-ride system and identify opportunities to make improvements. The region's system of park-and-ride lots would benefit from improved signage, marketing, real-time transit service information, more capacity, improved accessibility for pedestrians and bicyclists, and security enhancements.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Study BRT and "Bus on Shoulder" (BoS) – MDOT, MTA, BRTB, and local governments should study how to implement BRT and BoS on select corridors in the region to address future capacity constraints and congestion. This includes developing BRT corridor concepts and identifying opportunities for implementation. The BoS concept could be studied as a means to queue-jump congested intersections and/or significant road segments. Potential corridors for BRT include: Columbia to Montgomery County along U.S. 29 and Broken Land Parkway and Annapolis to Washington, DC via U.S. 50.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**

Recommendations – Central Light Rail	
Evaluate light rail signal coordination / signal priority – MTA, in collaboration and coordination with Anne Arundel and Baltimore counties and Baltimore City, should study the potential benefits and feasibility of transit signal prioritization on the light rail system as a means to improve travel time and transit speeds in the corridor.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Address revitalization of Howard Street – MDOT, MTA, BRTB, and Baltimore City should work together to address how transit can better support existing and planned development along the Howard Street corridor. The *2010 Strategic Plan to Enhance the Howard Street Corridor* identified a need to establish a consolidated light rail and Metro station to better serve customers transferring between the two systems.	**Timing**: Short Term **Estimated Cost:** $$ **Needs:**

Recommendations – Mobility	
Improve special transportation for the elderly and disabled – Improving transit services for the elderly and persons with disabilities remains a need in the region. MDOT, MTA, BRTB, and local governments should continue to coordinate and expand programs and services and to facilitate the efficient use of funds allocated to transportation for the elderly and persons with disabilities. This could include increases in the Statewide Specialized Transportation Assistance Program.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**

New Initiatives – Mode Not Yet Specified	
Evaluate a fixed-guideway connection from southeast Baltimore to a new major transit hub – Southeast Baltimore City is undergoing rapid development, with a need for high-capacity rapid transit to help move people in, around, and through this congested corridor. As a first step in providing a Red Line alternative, MDOT/MTA should provide funding to evaluate feasible alternatives for east-west movement in southeast Baltimore, including Harbor East, Fells Point, and Canton, with a potential connection to a new Bayview MARC station. Connection points to the west (Shot Tower Metro station and the Camden MARC / light rail station) also should be examined.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**

New Initiatives – Mode Not Yet Specified	
Evaluate a fixed-guideway connection from Woodlawn to Lexington Market – Without the Red Line, there remains a need for a high-capacity transit system connecting the Social Security Administration and the Center for Medicare and Medicaid Services (major employment centers west of the City/County line) with the Lexington Market transit hub and downtown, with a connection to the West Baltimore MARC Station. Creating such an important east-west transit option could dramatically affect commuter travel patterns and unlock development potential in west Baltimore and throughout the region. MDOT/MTA should evaluate an extension to advance a fixed-guideway connection from Woodlawn to Lexington Market, connecting to West Baltimore MARC. Any study of this corridor should build on the previous work of the canceled Red Line's Final Environmental Impact Statement.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Provide ongoing technical support – There is a need for ongoing broad technical support among MDOT/MTA, BMC/BRTB, and the region's local governments to coordinate key planning efforts, including: • **TOD/station area planning efforts**. These efforts can lead development instead of following it. This would improve regional mobility through enhanced accessibility, function, and reliability of the transit system. • **Complete Streets programs**. Such programs encompass plans and policies that identify and support a network of streets that are safe and accessible for all roadway users: transit riders, pedestrians, bicyclists, and motorists. Safety of all users must be a top priority.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Establish first / last mile transit connections – First and last mile connections to transit are crucial. Relevant stakeholders should plan and implement accessible and convenient first and last mile transportation options at key points on the transit system in the region. The region must ensure the inclusion of disadvantaged communities that could benefit the most from such connections. A first / last mile initiative would link various forms of transportation, give the public greater mobility, and create opportunities for entrepreneurs. Examples include bike and car sharing programs and/or a demand response-based system (e.g., Zipcar, Alta, Uber, or Lyft). As a part of this initiative, MDOT should give the BRTB total authority over programming CMAQ funds available to the region (or allow the BRTB the authority to program other FHWA funds such as STP-suballocated funds, as is done in other regions around the country). Such funds could be the source of start-up money and funding to cover operational costs for first / last mile services. Services could be completely contracted and performance measures and milestones built into contracts.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Evaluate transit service to Sparrows Point – Over the next 10 years, the redevelopment of the Sparrows Point property is expected to create more than 10,000 jobs. There is a need to examine the feasibility of and to provide support for expanded transit services to the Sparrows Point site. Transit services that support the redevelopment already under way would further advance the potential of the area. Transit services should connect Bayview, downtown Baltimore, and this site.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**

Performance Metrics	
Develop capacity and systems to generate, archive, and routinely report data on performance of the regional transit system – MTA, in collaboration and coordination with BRTB and local governments, should cooperatively develop and maintain a regional transit evaluation dataset and review process. This includes routinely reporting simple and clear data on performance. Training for staff to undertake this process is needed. MTA should complete efforts to create a new, real-time system using General Transit Feed Specifications-Real Time (GTFS-RT, currently the industry standard) for its system. Additionally, the MTA, in collaboration and coordination with BRTB and local governments, should routinely develop on-board transit user surveys such as the one last done in 2008. These surveys would provide a useful benchmark to measure performance, usage, and customer perceptions.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Provide on-time performance summary reports – MTA should report and improve on-time performance of transit to address reliability issues. MTA should focus on the following 10 bus routes: #77, #27, #14, #55, #11, #4, #21, #58, #9, and #24 (all high weekday ridership lines) to: • **Provide consistency of transit waiting and travel time**. This should foster a larger, more satisfied, and more committed base of customers. • **Use wait time and not on-time performance measures for lines with frequent transit service (headways <15 minutes)**. Riders who use high-frequency routes are less likely to consult a transit schedule since they are reasonably assured that a transit vehicle will arrive soon after they arrive at a stop. It is unclear if the current MTA CAD/AVL system provides the trip level data necessary to calculate wait time. Nonetheless, if the CAD/AVL trip level data is available, MTA should calculate bus stop wait time for high-frequency routes using procedures identified in the Transit Cooperative Research Program (TCRP) Report 100, 2nd Edition, *Transit Capacity and Quality of Service Manual*.	**Timing**: Short Term (and ongoing) **Estimated Cost:** $ **Needs:**
Span of Coverage / Hours of Service – MTA, state and local economic development offices, and regional business associations should create a partnership to meet the needs of workers traveling outside the traditional a.m. peak period. This partnership would identify corridors that house businesses that either do or plan to employ workers outside the traditional 9-to-5 work day. Such employees coud be in need of transit services. Using local knowledge and employer databases that classify businesses by type (manufacturing, health care, government, etc.) and number of employees), MTA could geocode and map employment locations and align those locations with existing transit services as an initial screening of potential service span gaps. Further, MTA could survey businesses in transit-service-span-gap corridors to identify periods when transit service is needed. This type of analysis could lead to businesses accessing larger labor pools and improving employee retention, thus leading to increases in business productivity. Connecting workers to employment, especially better paying manufacturing employment, supports the goals and objectives in the Opportunity Collaborative's *Regional Plan for Sustainable Development*. This partnership should also explore grant funding to initiate weekend service to corridors that demonstrate a need.	**Timing**: Short Term **Estimated Cost:** $$ **Needs:**

Performance Metrics	
Adopt ridership/overcrowding measure – MTA, in collaboration and coordination with BRTB and local governments, should define and adopt an overcrowding performance measure. TCRP Report 113 provides an easy-to-use Excel spreadsheet (tcrp_rpt_113_crowding_analysis.xls) to calculate overcrowding using archived APC data. Adopting the suggested overcrowding spreadsheet would enable MTA to visually evaluate route overcrowding almost immediately. The analysis could lead to headway or service adjustments that would increase customer satisfaction, thus improving ridership retention. Improving overcrowded routes could lead to smoother boarding and alighting at many bus stops, especially major transfer points. Evenly distributed peak loads could decrease bus dwell times, leading to better adherence to schedules and increasing reliability.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Analyze frequency and headways (peak/off-peak) – MTA should analyze overcrowded routes for possible demand-based headway adjustments. Archived MTA APC data and customer reports could aid in this analysis. MTA also should consider evaluating headways related to transfers. Transit riders normally view transfer time as particularly onerous. Transit riders making trips that require one or more transfers are likely to view the frequency of the second and subsequent routes or services as especially important because those frequencies will dictate the amount of time the rider can expect to spend making transfers. Greater than 40 percent of the people who participated in the 2008 on-board transit survey reported at least one transfer.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**
Consider opening up transit data to the public – MTA should reexamine its open data policies to consider allowing broader access to real-time data instead of static data. Specifically, MTA should consider: • allowing public access to a complete state-of-the-transit-system dataset or a precise subset of transit data • creating developer pages with access to resources • creating a developer email list to announce data releases • developing a group collaboration program such as other agencies have done • sponsoring "hackathons" to address specific issues, encourage discussion, and take advantage of experience and technologies that could help the agency and transit users.	**Timing**: Short Term **Estimated Cost:** $ **Needs:**

TRANSIT PROJECTS FROM PRIORITY LETTERS AND CONSTRAINED LONG-RANGE TRANSPORTATION PLAN

Priority Letters

Each jurisdiction has provided the Maryland Department of Transportation with a "priority letter" that outlines locally identified transit priorities. These priority projects and services are central to the recommendations. The following table lists the local transit priorities from the most recent priority letter from each jurisdiction.

Needs Expressed in Most Recent Local Priority Letters to MDOT

	Need	Description	Request	Jurisdiction
1	Odenton MARC Station TOD	Improve accessibility to the Odenton MARC station and MARC services at this station. A garage for parking to accommodate additional MARC users is needed.	Provide capital funding for garage and access improvements to station and station parking.	Anne Arundel County

Needs Expressed in Most Recent Local Priority Letters to MDOT				
	Need	Description	Request	Jurisdiction
2	Commuter Bus	With growing auto operation costs and an aging workforce/population, an investment in commuter bus between Baltimore and Washington, DC is needed.	Provide capital and operating funding for expanding services.	Anne Arundel County
3	Annapolis/Parole Intermodal Facility	Support current and growing demand for transit services connecting Baltimore, Washington, and Annapolis areas. Addresses capacity constraints from demand for park-and-ride facilities in the area and serves as a hub to support future BRT services and economic development in the area.	Provide capital funding and technical support for study of facility and feasibility of premium bus/BRT service along U.S. 50.	Anne Arundel County
4	Fixed-Guideway Connection from Southeast Baltimore to New Major Transit Hub	High-capacity rapid transit to address transportation issues in, around, and through this congested corridor. Serve rapidly developing areas in southeast Baltimore City (Harbor East, Fells Point and Canton), and potentially connect to a new Bayview MARC station. Connection points to the west that should be examined are the Shot Tower Metro station and the Camden MARC/light rail station.	Provide capital funding for study and evaluation of feasible alternatives.	Baltimore City
5	Green Line Extension to Morgan State University	Connecting the existing Metro system to another major activity center such as Morgan State University will expand access to reliable, efficient transit to a greater number of people and enhance connectivity through a connection to a potential Madison Square MARC station.	Provide capital funding for study and evaluation of an extension to advance a phased Green Line expansion.	Baltimore City
6	Madison Square and Upton MARC Stations	A Madison Square MARC station represents a significant opportunity to connect commuter transit through MARC to the local Metro system in East Baltimore's active Johns Hopkins Hospital Metro station. Similarly, a MARC stop at the existing Upton Metro station, as identified in the 2007 MARC Growth and Investment Plan, would provide a new and needed connectivity in west Baltimore between the local Metro system and the commuter MARC train.	Provide capital funding for study and evaluation of locations to advance the creation of these MARC stations.	Baltimore City
7	Fixed Guideway Connection from Woodlawn to Lexington Market	Connection with a high-capacity transit system between the Social Security Administration and the Center for Medicare and Medicaid Services (major employment centers west of the City/County line) to the Lexington Market transit hub and downtown, with a stop connecting to the West Baltimore MARC Station, would dramatically affect commuter travel patterns and unlock development potential in west Baltimore and throughout the region.	Provide capital funding for the study and evaluation of an extension to advance a fixed-guideway connection from Woodlawn to Lexington Market, connecting to West Baltimore MARC.	Baltimore City
8	West Baltimore MARC Station	Continue significant investments to improve station and MARC infrastructure at the West Baltimore MARC Station. Continue to support and advance transit-oriented development (TOD) at the site by providing ongoing technical assistance to foster sustainable economic development at and around the station. Improvements to make the West Baltimore MARC Station ADA-compliant are critical, including elevator access to platforms.	Provide capital funding for planning (PP), engineering/design (PE), and construction (CO) to improve station (including but not limited to full ADA compliance).	Baltimore City

Needs Expressed in Most Recent Local Priority Letters to MDOT				
	Need	Description	Request	Jurisdiction
9	Bayview MARC Station	A new station along the Penn MARC line to the National Institute of Health is a major economic growth opportunity as it will support and can strengthen relationships between NIH's facilities at the Bayview Medical Center and suburban Washington, DC. Enhanced local transit connectivity to a new Bayview MARC station could ease congestion by providing new options to commuters travelling from areas in eastern Baltimore County and Harford County into the central business district in Baltimore City.	Provide capital funds for all phases of project development.	Baltimore City
10	MARC Penn and Camden Line Service Expansion	The MARC Penn Line has become a vital transportation service to regional residents traveling to/from Washington, DC for work/leisure. Increased service on the Penn Line is needed, particularly during the evening commute, to address demand and overcrowding issues. Camden Line midday service has few eastbound or westbound trains running between 8 a.m. and 3:30 p.m. Weekend service on the Camden Line could provide an opportunity to reduce traffic congestion, particularly congestion created by sporting events.	Provide operating funding for additional evening service on the Penn Line, and midday and weekend Camden Line service.	Baltimore City
11	Lexington Market Station Redesign	Lexington Market is a major hub connecting MTA's light rail and Metro services. As identifiede and recommended in the *2010 Strategic Plan to Enhance the Howard Street Corridor*, creating a consolidated light rail and Metro station would better serve customers transferring between the two systems.	Provide capital funds for implementing planned capital element improvements.	Baltimore City
12	Commuter Bus Service Expansion	Commuters from jurisdictions surrounding Baltimore City are a significant contributor to congestion levels in Baltimore's central business district. Specifically, Baltimore City experiences heavy commuter traffic into its downtown and Harbor East areas from locations such as White Marsh / Essex; Towson; and Howard, Montgomery, and Prince George's counties from the south.	Provide capital funds to expand service to include new routes from Harford County/White Marsh, Hunt Valley/Greenspring Station and Howard County.	Baltimore City
13	Expedite Implementation of Bus Network Improvement Project (BNIP)	The MTA currently struggles to fulfill its obligation to provide a reliable and efficient core bus service. BNIP was announced after MTA conducted extensive public outreach to gain community support for the project. BNIP was shelved by MDOT this March. Though bus service is in no way a solution for the transportation issues that the Red Line was to have addressed, providing a functional, reliable bus system for the region is a state responsibility.	Provide capital funds to fully fund the implementation of Phase 1 of BNIP.	Baltimore City
14	Charm City Circulator	Sustain the success that the Circulator has enjoyed, yielding high customer satisfaction and ridership. Reduce or eliminate duplicative MTA routes with Circulator service.	Provide $12 million in operating funds annually for the Circulator service to remain at an acceptable level of operation.	Baltimore City

Needs Expressed in Most Recent Local Priority Letters to MDOT				
	Need	Description	Request	Jurisdiction
15	Penn Station TOD/ Redevelopment	Penn Station is central Maryland's most important passenger rail hub and a significant generator of pedestrian traffic in the Mount Vernon / Charles North corridor. There is a unique opportunity to redevelop unused land surrounding this station into mixed-use TOD.	Provide capital funds for ongoing technical and staff support for TOD, and the economic development possibilities surrounding Penn Station. Officially designate Penn Station as a TOD site.	Baltimore City
16	Sparrows Point transit service	Provide premium bus services to support the economic development under way. Services should connect Bayview, downtown Baltimore, and this site.	Provide capital and operating funds expand transit services to the site.	Baltimore County
17	MARC Aberdeen station TOD	Station and station area improvements to support ongoing and future MARC patron use from growth in the area.	Provide capital funding of $46.2M for station improvement. $2.6M parking expansion $36M station square plaza improvements.	Harford County
18	LOTS capital assistance	Eight new clean-diesel buses to improve service and replace retiring buses. Automated "annunciators" for 40 buses to improve customer experience.	Provide capital funds for bus purchases and bus system improvements.	Howard County
19	Expanded LOTS Operating assistance	Expand operating assistance to increase service by 30 percent on the most productive routes: Red, Green, Silver, and "E."	Provide operating funds for service expansion and increases.	Howard County
20	BRT Planning support	Columbia BRT along the U.S. 29 and Broken Land Parkway corridors to address future capacity constraints / congestion.	Provide capital funding for study and evaluation of feasible alternatives.	Howard County
21	MARC Camden Line track capacity and increased service	Add mainline track and sidings to provide three mainline tracks between the Savage and Jessup MARC stations. Increase weekday service to two weekday round trips and four weekend round trips.	Provide capital and operating funding and put into place necessary trackage agreements for the expansion of services on this line.	Howard County

Constrained Long-Range Plan Transit Projects

Each jurisdiction has provided the BRTB with a list of locally identified transit priorities for use in the 2040 long-range transportation plan, known as *Maximize 2040: A Performance-Based Transportation Plan*. These priority projects and services are also central to the recommendations of this report. The local transit priorities from the draft *Maximize2040* are listed in the charts below. This list contains projects and services anticipated to be funded, those desired (i.e. "illustrative") if more money than anticipated becomes available to the region, and "mega" projects. The last category ("mega" projects) consists of projects likely be funded privately or with some special arrangements.

Anticipated Transit Projects, FY 2020-2029

	Project Name	Limits	Description	Estimated Cost (YOE)
1	MARC Growth and Investment Phase 1		Improvements to MARC mainline capacity, maintenance facilities, and station areas	$258,000,000
2	MTA Bus Expansion Program Phase 1		Purchase of buses to meet increasing ridership demands (beyond replacement needs), 2020-2029	$60,000,000
3	MTA Commuter Bus Service	Harford County to downtown Baltimore and Harbor East; from Baltimore to Aberdeen Proving Ground (APG)	Additional service to downtown Baltimore / Harbor East; reverse commute from Baltimore to APG; connection of U.S. 40 service with Harford Transit	$2,000,000
4	Bayview MARC and Intermodal	Lombard Street at Bayview Boulevard	New station to support local economic development efforts and connect to a major employment center at Johns Hopkins Bayview Medical Center.	$73,000,000
5	West Baltimore MARC station		Continued sStation upgrades	$64,000,000
6	TrailBlazer Transit Hub	Undefined; general Westminster area	Centrally located facility to enable transfers and travel training for TrailBlazer riders	$2,000,000

Anticipated Transit Projects, FY 2030-2040

	Project Name	Limits	Description	Estimated Cost (YOE)
7	U.S. 50 Bus Rapid Transit	Proposed AnnapolisParole Intermodal Center to Prince George's County line	New bus rapid transit service	$711,000,000
8	Bus Rapid Transit to BWI Airport	Dorsey MARC station to BWI light rail station	New bus rapid transit service: Dorsey MARC station to Arundel Mills to BWI consolidated rental car facility to BWI light rail station	$293,000,000
9	Green Line	Johns Hopkins Hospital to North Avenue	Extension of Metro line, including two new stations (at Amtrak line and North Avenue)	$1,692,000,000
10	Aberdeen MARC Station Transit Oriented Development (TOD)	U.S. 40 at MD 132 / Bel Air Road	New train station, additional parking, U.S. 40 "Green Boulevard," Station Square Plaza	$70,000,000
11	U.S. 29 Bus Rapid Transit	U.S. 29 at Mount Hebron to MD 198 / U.S. 29 (Burtonsville)	New bus rapid transit service	$480,000,000

Anticipated Transit Projects, FY 2030-2040				
	Project Name	Limits	Description	Estimated Cost (YOE)
12	MARC Growth and Investment Phase 2		Improvements to MARC mainline capacity, maintenance facilities, and station areas	$410,000,000
13	MTA Bus Expansion Program Phase 2		Purchase of buses to meet increasing ridership demands (beyond replacement needs), 2030-2040	$95,000,000

illustrative Projects – Could be Amended into Maximize2040 Should Future Funds Become Available				
	Project Name	Limits	Description	Jurisdiction
14	MARC Service	DC to Delaware	Additional service in Harford County, including reverse commute, late night, and weekend.	Harford County / Regional
15	Bus Rapid Transit	Dorsey MARC Station to College Park MARC Station	Link commuters from Dorsey to Laurel and Laurel to College Park, and future Purple Line	Howard County / Regional

"Mega-Regional" Projects				
	Project Name	Limits	Description	Status
16	B&P Tunnel	Baltimore City	A primary chokepoint along the freight corridor. Improve to allow double-stack movement	Alternatives identified.
17	Amtrak / Freight Rail Bridge over the Susquehanna River	Harford Co	Replace the two-track bridge, with two bridges that will each have with two tracks each.	Preliminary engineering under way Construction cost estimated at $22,000,000.
18	MagLev Train	DC to Baltimore City	Super MagLev service from DC to Baltimore	Feasibility study pending Federal Railroad Administration grant award.
19	Northeast Corridor (NEC)	Through region	Federal Railroad Administration study to improve NEC operations	In planning.

Baltimore Metropolitan Council

Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
410-732-0500
www.baltometro.org