

Development of A Strategy for a Congestion Management Process for the Baltimore Region – Defining the CMP Network

This memo identifies and defines the CMP network that will serve as the basis for the Congestion Management Process (CMP). Defining the CMP network involves defining two aspects of the system that will be examined as part of the process - 1) the geographic boundaries or area of application and 2) the system components/network of surface transportation facilities. Several other data sources for the bicycle and pedestrian networks have been identified and are relevant to exploring congestion and mobility performance but are not anticipated to be part of the on-going “monitoring” and data collection. All of the geographic boundaries, components of the CMP network, and other relevant networks were delineated in a GIS shapefile.

Geographic Boundaries

The geographic boundaries of the CMP Network will be consistent with the BRTB’s member jurisdictions, which include the following:

- City of Annapolis
- City of Baltimore
- Anne Arundel County
- Baltimore County
- Carroll County
- Harford County
- Howard County
- Queen Anne’s County

The geographic boundaries are shaded in the provided shape file. The geographic boundaries are shown to the right in Figure 1.

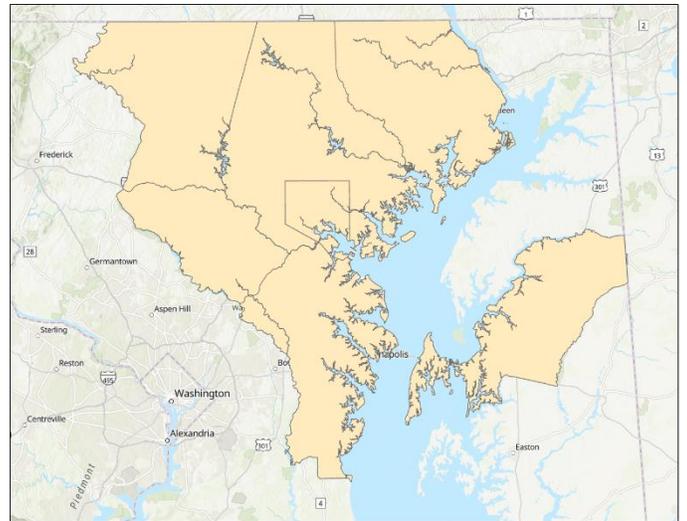


Figure 1 CMP Network Geographic Boundaries

Components of CMP Network

The CMP network will incorporate all available data throughout the region for multiple modes of transportation (i.e. vehicles, freight, transit) and will include the following components in the GIS shapefile:

Maryland Centerlines

Maryland Roadway Centerline data consists of linear geometric features which represent the street centerline for all public roadways (i.e. interstates, arterials, collectors, local roads) in the State of Maryland. The Maryland Centerline data (Figure 2) contains 12,224 miles of centerline (32,809 segments) and was compiled from the following source:

- [MD iMAP](#), 9/16/2019

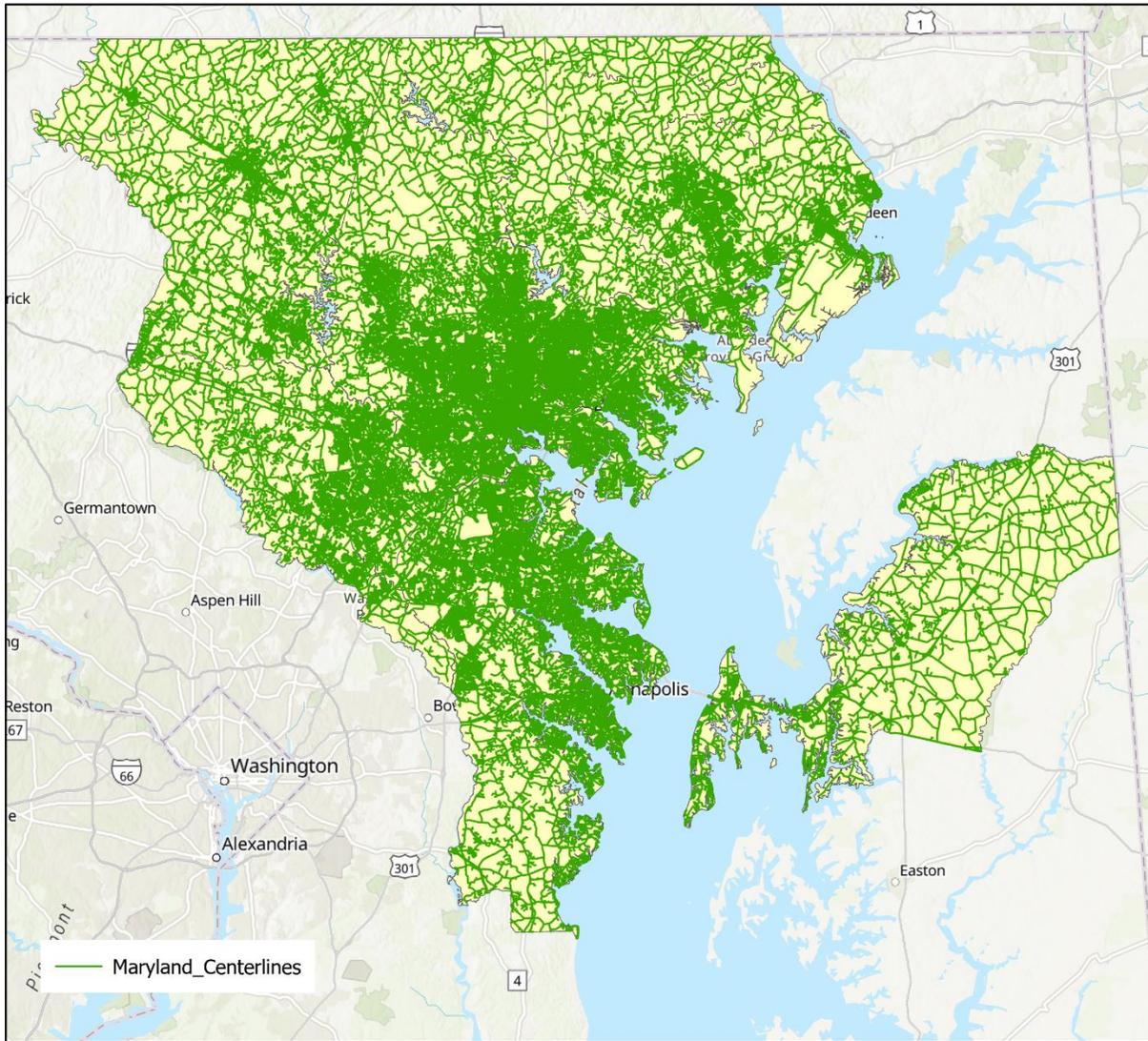


Figure 2 MD Centerlines

BMC Travel Demand Model

The region's aggregate trip-based model supports regional plan development and assists transportation engineers in the design of projects. The trip-based model predicts person travel for home and non-home based purposes in addition to medium and heavy trucks and commercial vehicles based on Traffic Analysis Zones (TAZ). The 2019 conformity files were included as a component of the CMP network, which include the following:

- BMC 4.4C model
- Round 9 demographic files updated march – June 2018
- Conformity 2019 networks
- Scenarios: 2012, 2020, 2030, 2040, 2045

It should be noted that the BMC Travel Demand Model contains network detail beyond the geographic boundaries of the BMC member jurisdictions, because nearby areas affect the travel demands within the geographic boundaries. The BMC travel demand model network is shown on the right in Figure 3, which contains all regionally significant roadways (i.e. interstates, arterials) and may include collectors and local roads depending on the TAZ structure and other factors. The BMC travel demand model covers the following percentages of centerline mileage for each roadway classification type listed below in Table 1.

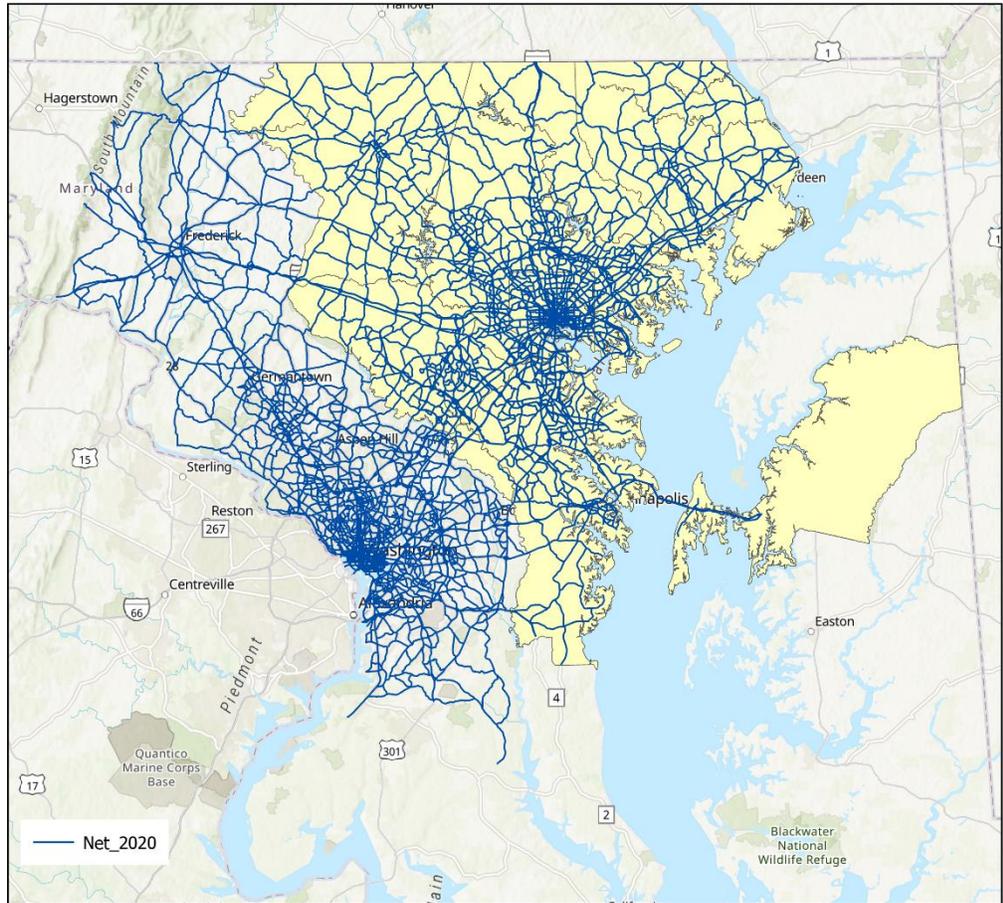


Figure 3 BMC Travel Demand Model Network

Roadway Type	Total Centerline Mileage	BMC Network Mileage Coverage	BMC Network Mileage Percent Coverage
Interstate	390	365	94%
Principal Arterial-Other Expressways and Freeways	264	239	90%
Principal Arterial-Other	611	569	93%
Minor Arterial	1000	952	95%
Major Collector	1326	1040	78%
Minor Collector	415	224	54%
Local	7632	1069	14%

Table 1 BMC Network Coverage of MD Centerline by Roadway Type

Maryland Statewide Transportation Model

Since the BMC Travel Demand Model has limited coverage in Queen Anne’s County, the Maryland Statewide Transportation Model (MSTM) was used for greater coverage in Queen Anne’s County. The MSTM is a multi-layer travel-demand model working at national, statewide

and urban zone levels to forecast and analyze key measures of transportation system performance. A screenshot of the network detail in Queen Anne’s County is provided in Figure 4 and is based on the data in the following version:

MSTM V 1.1.0 (04.24.18)

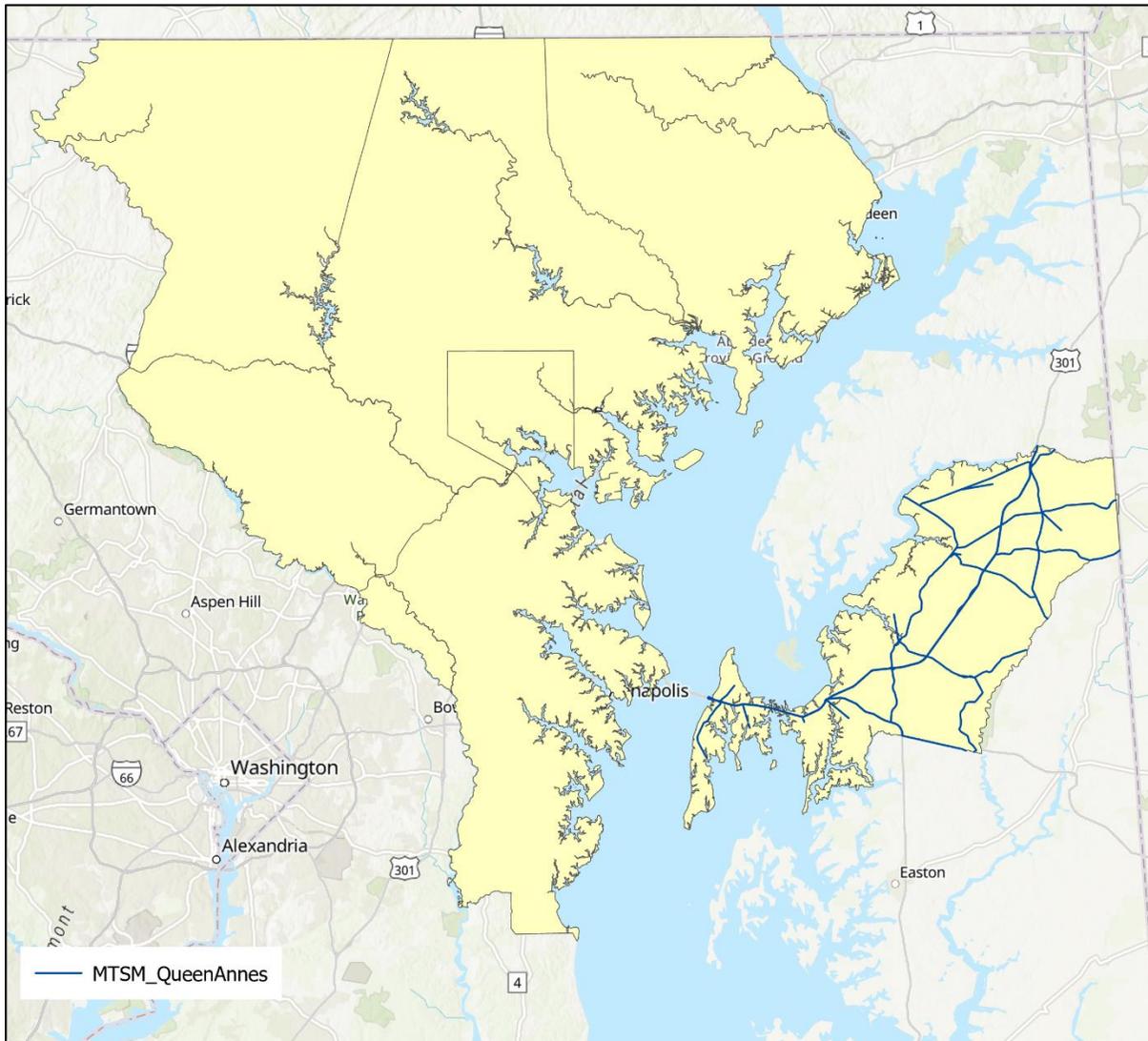


Figure 4 MSTM Coverage in Queen Anne's County

TMC Segments

The Regional Integrated Transportation Information System (RITIS) is an automated data sharing, dissemination, and archiving system that includes many performance measure, dashboard, and visual analytics tools that help agencies to gain situational awareness, measure performance, and communicate information between agencies and to the public. The Probe Data Analytics Suite, within RITIS, allows agencies to support operations, planning, analysis, research, and performance measures generation using probe data mixed with other agency transportation data. Among many

other uses, the Probe Data Analytics Suite can provide insight on real-time speed data, travel time index, travel time reliability metrics, queue measurements, statewide bottleneck ranking, and corridor congestion charts. Several sources of data are available within the Probe Data Analytics Suite including INRIX and HERE data by TMC. The TMC segments contain most of the regionally significant roadways (i.e. interstates, arterials) but not many of the lower classification roadways (e.g. collectors and local roads). The defined TMC segments for which data is available was included as part of the CMP network (Figure 5) and were downloaded from the link below.

- [RITIS, 2019](#)

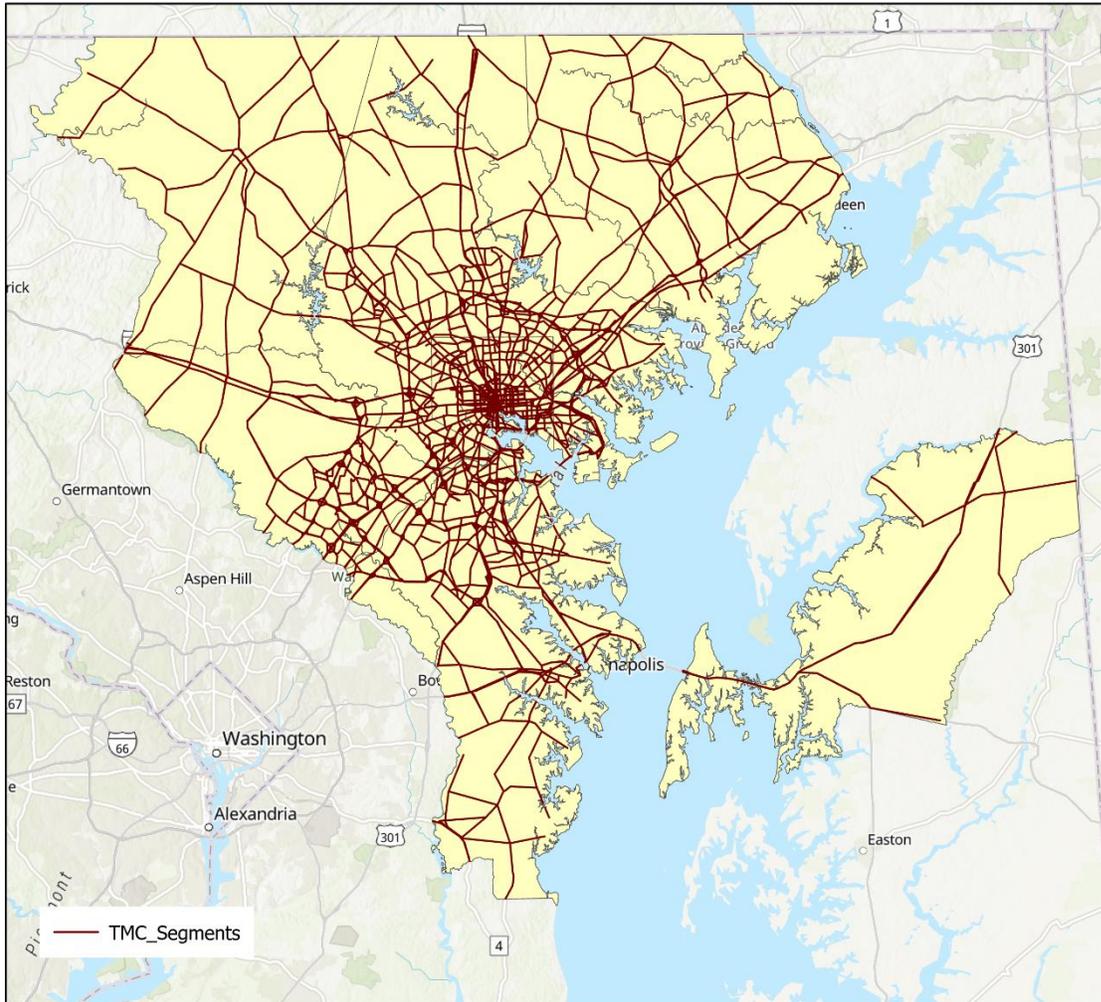


Figure 5 RITIS TMC Segments

The TMC segments cover the following percentages of centerline mileage for each roadway classification type are listed in Table 2.

Roadway Type	Total Centerline Mileage	Inrix TMC Mileage Coverage	Inrix TMC Mileage Percent Coverage
Interstate	390	205	52%
Principal Arterial-Other Expressways and Freeways	264	239	90%
Principal Arterial-Other	611	587	96%
Minor Arterial	1000	872	87%
Major Collector	1326	394	30%
Minor Collector	415	42	10%
Local	7632	48	1%

Table 2 TMC Segment Coverage of MD Centerline by Roadway Type

It should be noted that the interstate mileage is only 52%, because interchange ramps are not included as TMC segments.

Transit

Transit routes and facilities throughout the region were compiled and mapped as part of the CMP Network. The following data sources were included:

- Airports
 - [FAA's National Airspace System Resource Aeronautical Data Product](#), 2019
- Amtrak Lines
 - [Federal Railroad Administration's \(FRA\) Amtrak Station database](#), 2019
- Amtrak Stops
 - [Federal Railroad Administration's \(FRA\) Amtrak Station database](#), 2019
- Annapolis Bus Lines
 - [GTFS](#), 2019
- Annapolis Bus Stops
 - [GTFS](#), 2019
- Baltimore Region Public Transit Routes
 - [GTFS/ CMRT Data](#), 2019
- Baltimore Region Public Transit Stops
 - [GTFS/ CMRT Data](#), 2019
- BWI Shuttle Stops
 - [GTFS/ CMRT Data](#), 2019
- BWI Shuttle Routes
 - [GTFS/ CMRT Data](#), 2019
- Carroll County Transit System Routes
 - [MD iMAP](#), 2019
- Carroll County Transit System Stops
 - [MD iMAP](#), 2019
- Charm City Circulator Routes
 - [MD iMAP](#), 2019
- Charm City Circulator Stops
 - [MD iMAP](#), 2019
- Delmarva Community Transit Routes
 - [MD iMAP](#), 2019
- Delmarva Community Transit Stops
 - [MD iMAP](#), 2019
- Harford County Transportation System (HCTS) Stops
 - [BMC Regional GIS Data Center](#), 2019
- MTA MARC Train Lines
 - [MD iMAP](#), 2019
- MTA MARC Train Stops MD
 - [iMAP](#), 2019
- MTA Bus Lines
 - [MD iMAP](#), 2019
- MTA Bus Stops
 - [MD iMAP](#), 2019

- MTA Light Rail Lines
 - [MD iMAP](#), 2019
- MTA Light Rail Stops
 - [MD iMAP](#), 2019
- MTA Baltimore Metro Subway Lines
 - [MD iMAP](#), 2019
- MTA Baltimore Metro Stops
 - [MD iMAP](#), 2019
- Queen Anne's County Ride Routes
 - [MD iMAP](#), 2019
- Queen Anne's County Ride Stops
 - [MD iMAP](#), 2019
- Rabbit Transit (PA) Bus Stops
 - [BMC Regional GIS Data Center](#), 2019
- Rabbit Transit (PA) Bus Routes
 - [York County Planning Commission](#), 2019
- RTA Lines
 - [MD iMAP](#), 2019
- RTA Stops
 - [MD iMAP](#), 2019
- WMATA Metro Lines
 - [DC Geographic Information System](#), 2019
- WMATA Metro Stops
 - [DC Geographic Information System](#), 2019
- WMATA Metro Bus Lines
 - [MD iMAP](#), 2019
- WMATA Metro Bus Stops
 - [MD iMAP](#), 2019

There are 278 transit routes and 11,509 transit stops within the geographic boundaries of the CMP network. The local routes and stops are shown in Figure 6 and commuter routes and stops are shown below in Figure 7.

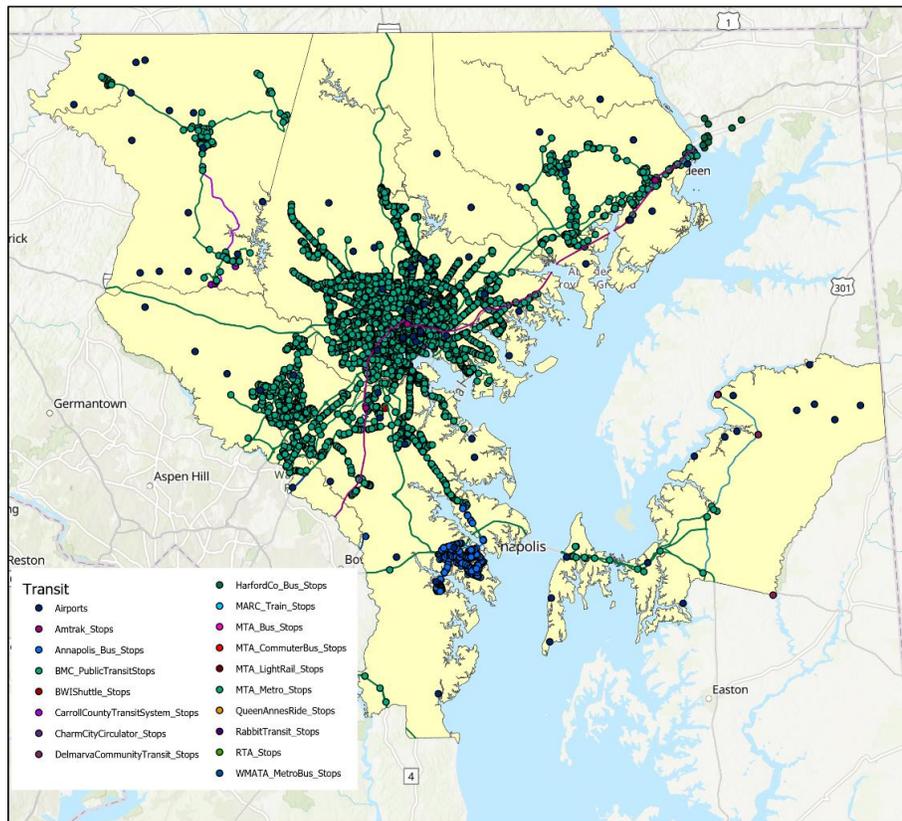


Figure 6 Interstate, Statewide, Regional, and Local Transit Routes and Stops

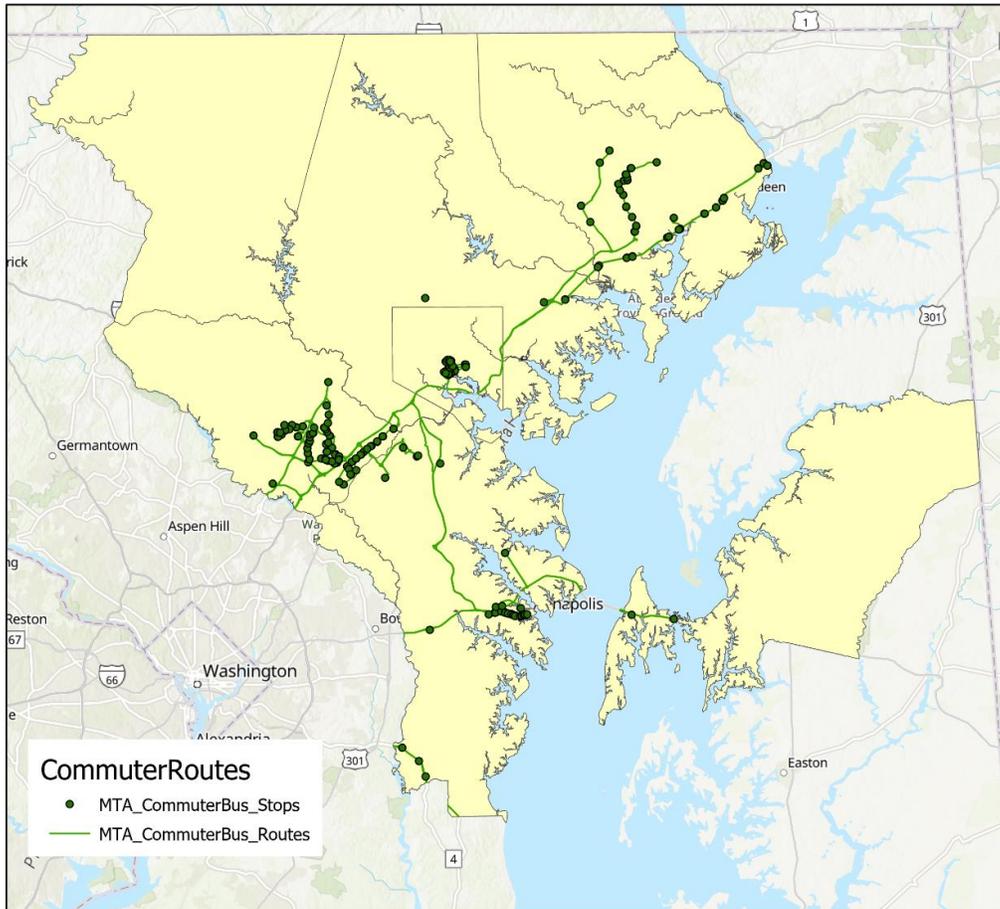


Figure 7 MTA Commuter Routes and Stops

Park & Ride Facilities

Locations of Park & Ride facilities throughout the region were mapped as part of the CMP network. The Park & Ride locations also include capacity of the Park & Ride lots, where available. The locations of Park & Ride Facilities owned and maintained by the Maryland Department of Transportation State Highway Administration (MDOT SHA) as well as those owned by local jurisdictions (i.e. cities and counties) are included. There are 50 MDOT SHA Park & Ride facilities and 55 facilities owned by local jurisdictions (Figure 8). The following sources were used:

- Commuter Connections Park and Rides
 - [Commuter Connections](#), 2019
- MDOT Park and Ride
 - [MD iMAP](#), 2019

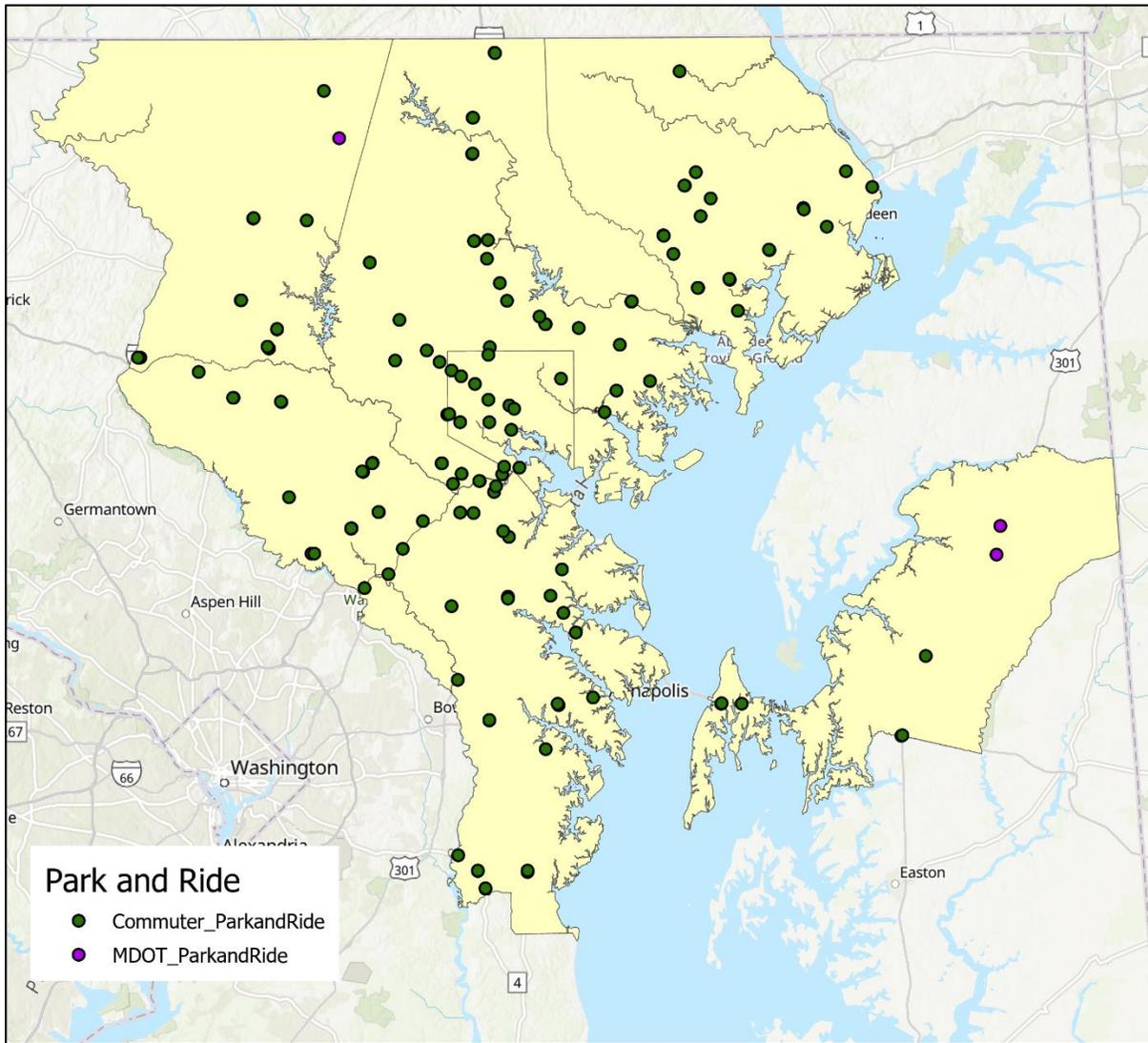


Figure 8 Park and Ride Locations

Freight

Freight routes within the Baltimore Region geographic boundaries were mapped based on the National Highway Freight Network and the Baltimore City freight map (within its boundaries). Segments with truck AADTs and data for commercial facilities at the principal U.S. Coastal and Inland Ports in Maryland were also included (Figure 9).

- National Highway Freight Network *Critical Rural*
 - Federal Highway Administration, 2019
- National Highway Freight Network *Critical Urban*
 - Federal Highway Administration, 2019

- National Highway Freight Network *Non Primary Highway Freight System*
 - Federal Highway Administration, 2019
- National Highway Freight Network *Primary Highway Freight System*
 - Federal Highway Administration, 2019
- SHA Existing Freight Truck Routes
 - MDOT SHA, 2019
- SHA Proposed Truck Routes (DRAFT)
 - MDOT SHA, 2019
- BMC *Moving People and Good Safely and Efficiently – Critical Urban Freight Corridors in the Baltimore Region*
 - BMC, 2017
- Baltimore City Freight Network
 - [MD iMAP](#), 2019
- Truck AADT
 - [MD iMAP](#), 2019
- Sea Ports
 - [MD iMAP](#), 2019

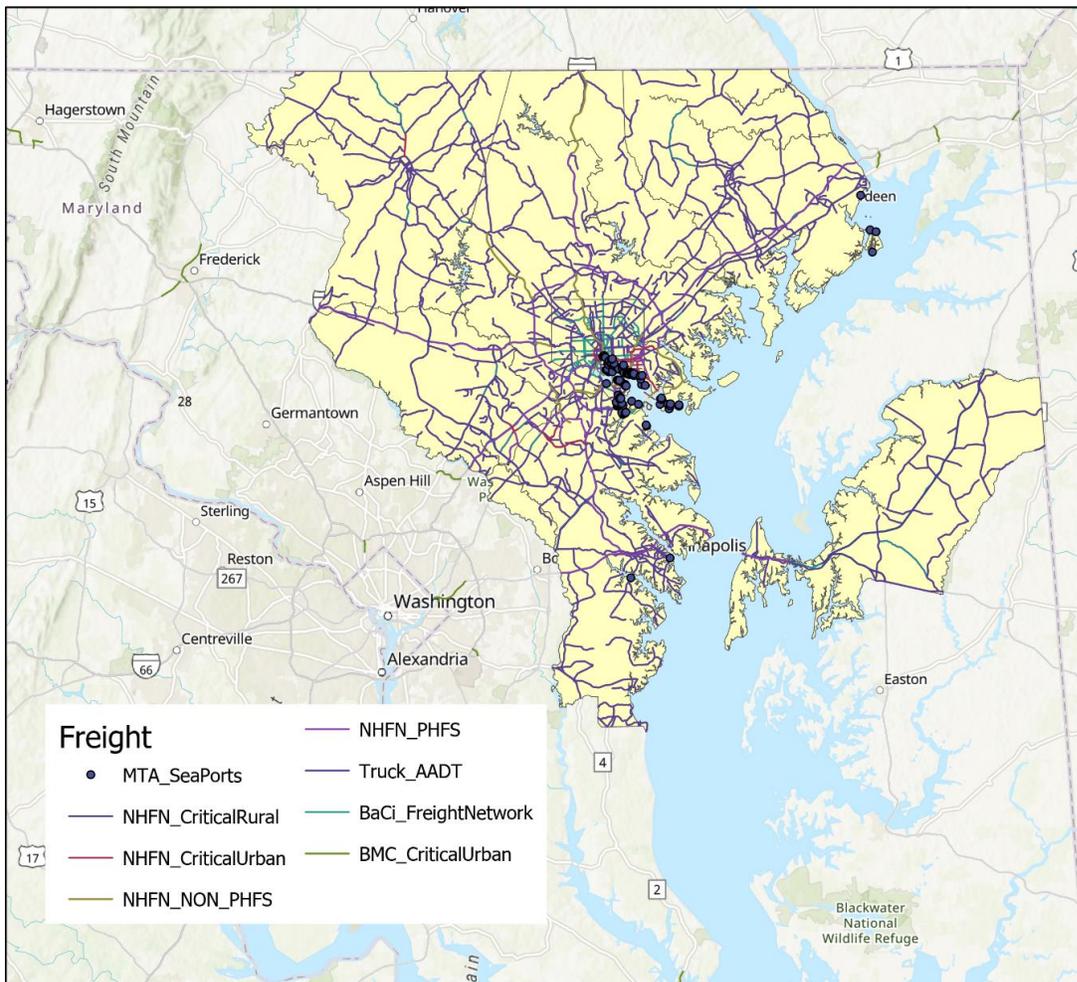


Figure 9 Freight Routes

Other Relevant Network

Other networks that will be considered include the bike facilities network and sidewalk network. These networks are relevant to exploring congestion and mobility performance, but these will not be parts of the on-going “monitoring” as we do not anticipate having data on usage.

Bike Facilities Network

Bike facilities throughout the region were included in the CMP network (Figure 10). This data contains all existing bicycle trails and lanes (facilities) in the region. Planned, programmed, and under construction bicycle and pedestrian facilities are not included. The data was compiled by local jurisdictions using planning data, bicycle master plans, and capital improvement reports. The primary source of this data was the BMC Regional Bicycle Facilities layer provided on their website, but other data sources were included as detailed below:

- BMC Regional Bicycle Facilities
 - [BMC Regional GIS Data Center](#), 2019
- MDOT Bike Spine (Scenic Byways)
 - [MD iMAP](#), 2019
- Anne Arundel County Bike Lanes
 - [Anne Arundel County Land Use Activity & GIS Data](#), 2018
- Howard County Bike Lanes
 - [Howard County Department of Planning](#)

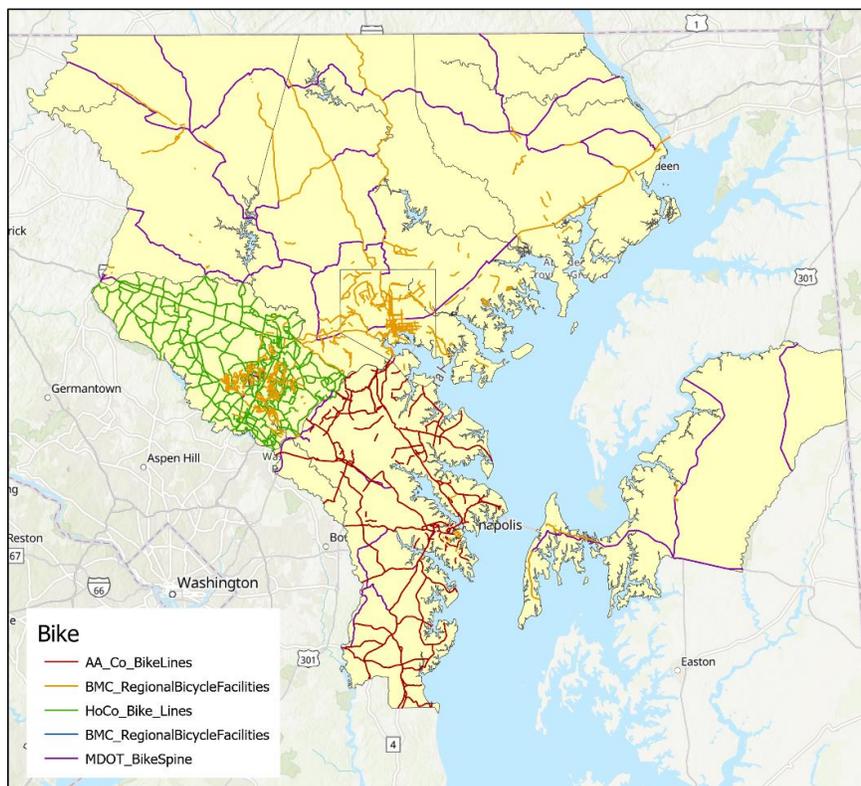


Figure 10 Bike Routes

Sidewalk Data

Sidewalk data was compiled, where available. Only a few of the member jurisdictions had available sidewalk data (Figure 11).

- Anne Arundel County Sidewalks (includes City of Annapolis)
 - [Anne Arundel County Land Use activity & GIS Data, 2017](#)
- Baltimore City Sidewalks
 - No data found
- Baltimore County Sidewalks
 - BMC, 2019
- Carroll County Sidewalks
 - BMC, 2019
- Harford County Sidewalks
 - BMC, 2019
- Howard County Sidewalks
 - [Howard County Department of Planning](#)
- Queen Anne’s County Sidewalks
 - No data found

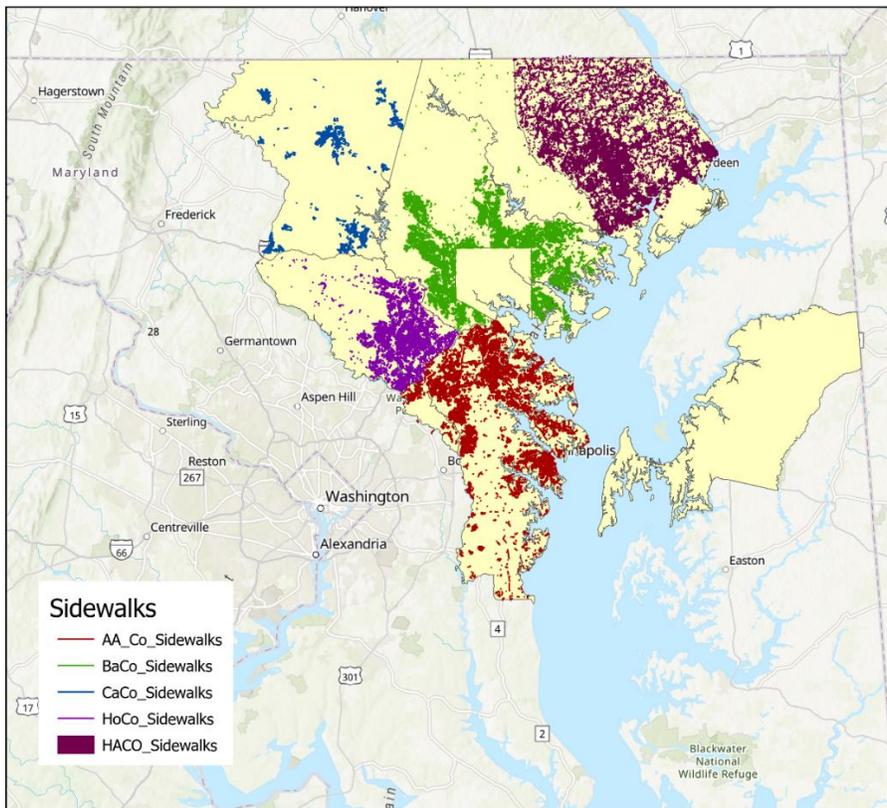


Figure 11 Sidewalk Locations