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Adapting to the Challenges of Tomorrow

White Papers
Issue 3 - March 2022

Overview of Freight Movement in the Baltimore Region

Freight movement is vital to both Maryland and the Baltimore region. The 2.8 million people in the Baltimore region require a large amount of freight to be moved in, out and through the region. Without the efficient movement of freight, hospitals would not get needed supplies, grocery stores would not receive food, and gas stations would run dry. Nearly everything we need or use in our daily lives is dependent on freight being moved throughout the country and throughout the Baltimore region in one form or another. Without trucks transporting cargo, key services would begin to shut down within 24 hours.

The greater Baltimore region is Maryland's leading goods movement center. Each year, more than 307 million tons of freight valued at nearly $1 trillion move over Baltimore's highway, rail, port, and airport facilities, serving domestic and international demand for a wide range of goods. The Baltimore region is home to the nation's sixth largest port, the Port of Baltimore, two Class I and three regional railroads, as well as the Baltimore/Washington International Thurgood Marshall Airport. Situated at the midpoint on the eastern seaboard, the Baltimore region also has an extensive roadway network. Maintaining and improving our existing transportation network will improve freight movement and economic growth for our region.

BRTB Activities to Maintain and Improve Freight Movement in the Region

The Baltimore Metropolitan Council (BMC) and Baltimore Regional Transportation Board (BRTB) work with stakeholders to ensure our transportation system supports the safe and efficient movement of freight upon which our economy, jobs, and consumers rely. The Freight Movement Task Force (FMTF) is a subcommittee of the BRTB that includes representatives from the Maryland Department of Transportation State Highway Administration (MDOT SHA), Maryland Port Administration (MPA), Maryland Transportation Authority (MdTA), Maryland Motor Truck Association (MMTA), Federal Highway Administration (FHWA), Federal Motor Carrier Safety Administration (FMCSA), railroads (NS and CSX), private sector consultants and others. The mission of the FMTF is to provide the freight/goods movement community a voice in the regional transportation planning process and to serve as a forum for Baltimore region freight stakeholders to share information and discuss concerns.

The National Highway Freight Program, established in 2015, provides dedicated funding for planning, engineering, and construction activities that contribute to the efficient movement of freight on the National Highway Freight Network (NHFN). Critical Urban Freight Corridors (CUFCs) are one component of the NHFN. In coordination with MDOT, the BRTB designated 25 miles of roadways in the Baltimore region as CUFCs in 2017 and re-designated them in 2021.

Facilitating freight is facilitating quality of life, literally delivering for Baltimore and Maryland residents and businesses. Solving shared transportation, safety, trade, manufacturing and supply chain challenges is essential to driving economic success and expanding opportunities for all. Achieving those goals requires collaboration and perseverance to bring together a broad range of public and private stakeholders, often through vehicles like the Baltimore Regional Transportation Board and the Freight Movement Task Force. Now is the time to work together and chart a course for the future that recognizes the true role of freight, not just delivering goods, but delivering good for our region and beyond.

-Tom Madrecki, Vice President, Supply Chain, Consumer Brands Association (CBA), Chair, BRTB's Freight Movement Task Force (FMTF)

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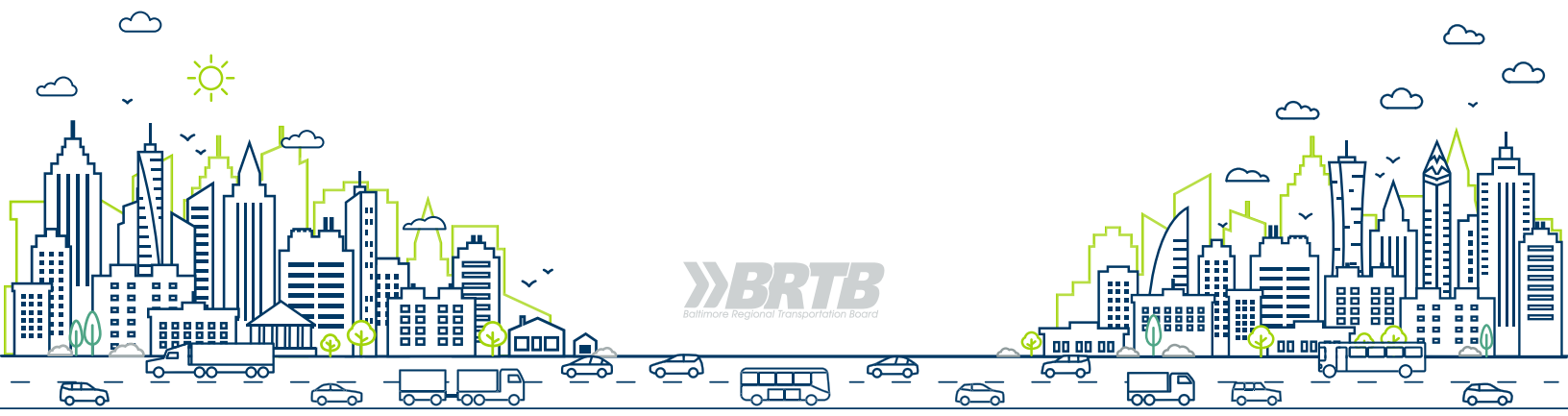

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Freight Movement White Paper

Introduction

According to Merriam-Webster, the official definition of freight is “Goods or cargo carried by a ship, train, truck, or airplane”. But freight, in the broader sense, means much more than that. Freight should not be confused with parcel delivery, where smaller parcels are handled by carriers such as UPS, USPS and FedEx and are generally delivered in small trucks or vans.

Freight moved by truck, rail, ship, air or pipeline helps move goods on a large scale. These types of goods can come in many shapes and sizes ranging from pallets to crates to containers and generally require larger vehicles for transport and delivery. Both freight delivery and parcel delivery are important when we consider how we receive our goods. But each impacts us in different ways.

Freight delivered by ship, rail, pipeline and air may not appear to have a major impact on our everyday lives. However, nearly all freight ultimately ends up on a truck regardless of its initial method of transport. These trucks are the backbone of freight transportation, accounting for over 72% of freight weight and nearly 58% of freight value in the United States. Nearly everything we need in our everyday lives moves by truck. The vast majority of trucks are found on Interstates, U.S. Routes and other freight corridors. Parcel deliveries tend to be more localized and are seen more frequently in communities and along local roadways.

Freight Movement in Maryland and the Baltimore Region

Freight movement is vital to both Maryland and the Baltimore region. The 2.8 million people in the Baltimore region require a large amount of freight to be moved in, out and through the region. Without the efficient movement of freight, hospitals would not get needed supplies, grocery stores would not receive food, and gas stations would run dry. Nearly everything we need or use in our daily lives is dependent on freight movement throughout the country and throughout the Baltimore region in one form or another. Without trucks transporting cargo, key services would begin to shut down within 24 hours.

Port of Baltimore

In 2019, the Port of Baltimore handled a record 43.6 million tons of cargo, including 37.4 million tons of international cargo. The Port of Baltimore ranks 11th among major U.S. ports for tons of cargo handled and 9th nationally for total cargo value.

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Unlike many industries, the impacts of COVID-19 on the Port were mixed. Total cargo volume in the 2nd quarter of 2020 was down compared to 2019, but automobiles and light trucks were up 55%, general cargo was up 15% and containers were up 12%. Much of this can be attributed to the rising demand of e-commerce.

Several cruise lines also depart from the Maryland Cruise Terminal. In 2019, Carnival and Royal Caribbean cruises from the Maryland Cruise Terminal carried over 224,000 passengers. By Mid-March of 2020, cruises were halted as a result of the pandemic. By September 2021, some cruises had resumed departures from the cruise terminal.

The Maryland Port Administration periodically updates the economic impacts of the Port of Baltimore on the State of Maryland. Statistics from 2017, the most recent year of data availability, on the economic impacts for cargo and cruise activity are detailed below:

- **Approximately 37,300 jobs in Maryland are generated by port activity.**
  - **15,330** are **direct jobs** generated by cargo and vessel activities at the Port. Examples include jobs with railroads, trucking companies, terminal operators, cargo handling (International Longshoreman's Association), manufacturing, security agencies, towing, pilots, ocean carriers, agents, freight forwarders, Customs and Border Protection, Coast Guard, etc.

  - **16,780** are **induced jobs**, i.e. jobs supported by the local purchases of goods and services by direct employees. These jobs would be lost in the short term if the direct jobs were lost. Examples include sales clerks, mechanics, teachers, dry cleaners, restaurateurs, coffee shop owners, tutors, government employees, dentists, etc.
  - **5,190** are **indirect jobs**, i.e. jobs supported by the business purchases of the employers who create the direct jobs. These jobs, too, would be lost in the short term if the direct jobs were lost. Examples include those who provide office supplies and equipment, utilities, communications, repair, legal, architectural, engineering and financial services, etc.
- **The Port of Baltimore is a major source of personal and business revenues in Maryland.**
  - The Port was responsible for **$3.3 billion in personal income**.
  - The Port's average annual salary for direct job holders is **9.5% higher** than the average annual wage for Maryland, (as reported by the U.S. Bureau of Labor Statistics).
  - The Port generated **$2.6 billion in business revenues**.
  - Activities of the Port generated **$395 million in state, county and municipal tax revenues**.

- **Approximately 101,880** other jobs in Maryland are **directly related to activities at the Port**. Related jobs are those jobs with Maryland companies that choose to import and export their cargo through the Port of Baltimore, but have the option of shipping their products or supplies (e.g. containerized items, autos or steel products for construction) through other ports. These companies (e.g. manufacturing firms, distributers, coal mines, automobile dealers, etc.) benefit from having a healthy port nearby in Baltimore to assist with their logistics. If the Port of Baltimore were not available to them, these firms could suffer an economic penalty over the longer term but would likely survive by shipping through another port. It should be noted that although the number of related jobs is high, this category of impact is much less dependent upon the Port than the impacts that are generated by the direct, induced and indirect jobs.
- Combining direct, induced and indirect jobs with related jobs yields over **139,180 jobs linked to the Port.**

Rail Freight in Maryland

Maryland has a rich history of railroads including North America's first railroad. The Baltimore & Ohio Railroad (B & O) was chartered by Baltimore merchants in 1827. The B & O Railroad expanded south to Washington, D.C. and westward to help capture growing trade within the interior of the U.S.[1]

The B & O Railroad was essentially the only rail service in Maryland until 1866 when the Pennsylvania Railroad (PRR) constructed a second direct link between Baltimore and Washington, D.C. By the mid-1870's the PRR and B & O Railroads had expanded to new markets and dominated both passenger and freight needs between the two cities.

With the emergence of automobiles and specifically trucks, and the development of the interstate highway system, rail freight and passenger service began to decline. In the 1970's, Amtrak and the Consolidated Rail Corporation (Conrail) were established to help revitalize both passenger and freight rail service. Norfolk Southern Corporation (NS) and CSX purchased Conrail in 1997. Both NS and CSX still operate today as the main rail freight transporters in Maryland.

In 1982, Maryland purchased 191 miles of bankrupt rail lines that were then managed by the State Roads Administration and subsequently by the Maryland Transit Administration and Maryland Department of Transportation. These 191 miles of track would eventually become what are now known as short lines, several of which still operate today.

Maryland's freight and passenger railroads carry millions of passengers and millions of tons of cargo each year. Railroads are designated by class I, II, or III according to their annual revenue. There are seven Class I railroads in the U.S., but only NS and CSX operate in Maryland. Freight rail accounts for just

under 800 miles of track as shown in Figure 1 below. Figure 1 also includes details on passenger rail in Maryland, including Amtrak, MARC, and tourist railroads. Freight railroads transport eleven percent (11%) of the tonnage and four percent (4%) of total value that passes to, from, and within Maryland. Maryland's freight railroads employ over 2,500 people, which includes direct, indirect and induced jobs, according to the American Association of Railroads (AAR). In addition, nearly 2,700 Marylanders are employed by MARC and Amtrak.

Figure 1. Railroads Operating in Maryland

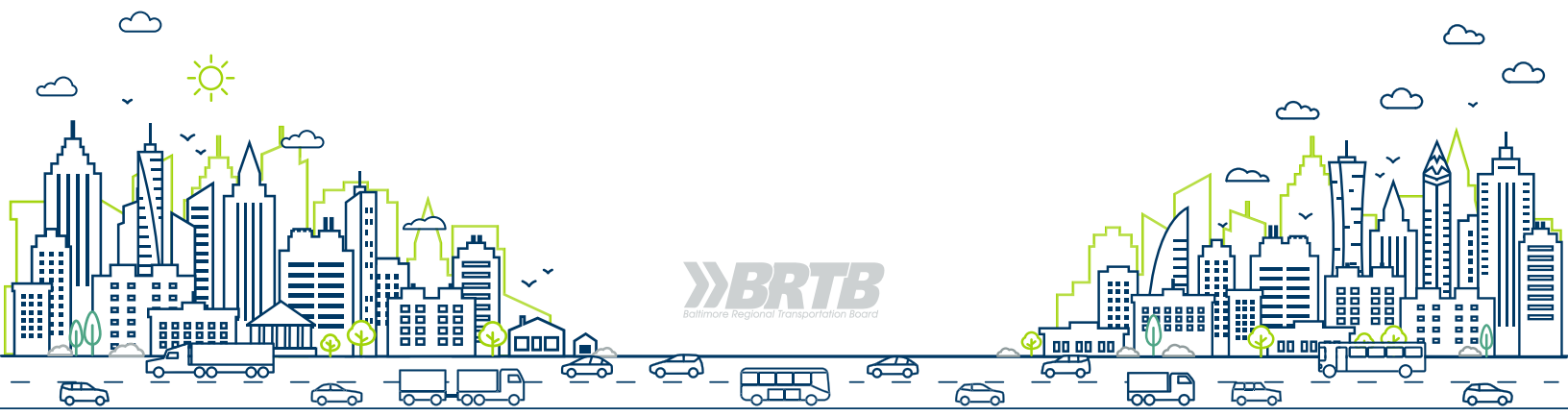
RAILROAD	MILES LEASED	MILES OWNED/ OPERATED	TOTAL MILES OPERATED (EXCLUDING TRACKAGE RIGHT)
Class I Railroads	5	514	519
Class II Railroads	0	0	0
Class III Railroads	115	132	247
Amtrak	0	97	93
MARC	0	3	3
Tourist Railroads	7	17	24
Total Mileage	**127**	**763**	**886**

In the Baltimore region, CSX operates a railyard and a bulk transfer terminal as well as automotive distribution centers in Baltimore and Jessup.[2] Norfolk Southern operates the Bayview railyard in Baltimore on Amtrak's Northeast Corridor line.

Both passenger and freight rail have benefits to the state transportation system and the environment. More people and goods moved by rail means less people and goods on already congested highways and interstates. Rail services also help to reduce wear and tear on roadways and provide a safe and affordable transportation option. The AAR estimates that rail is four times more fuel efficient than trucks and produces 75% less greenhouse gases on a per ton-mile basis.

Howard Street Tunnel

Maryland has long been considered a freight bottleneck because of the inability to provide double stack trains through the Howard Street Tunnel. By stacking two freight containers on top of each other, double stacking essentially allows for double the efficiency and doubles the amount of freight moved. CSX and NS, along with public sector stakeholders, are making significant investments to provide double stack clearance along the National Gateway and Crescent Corridors.



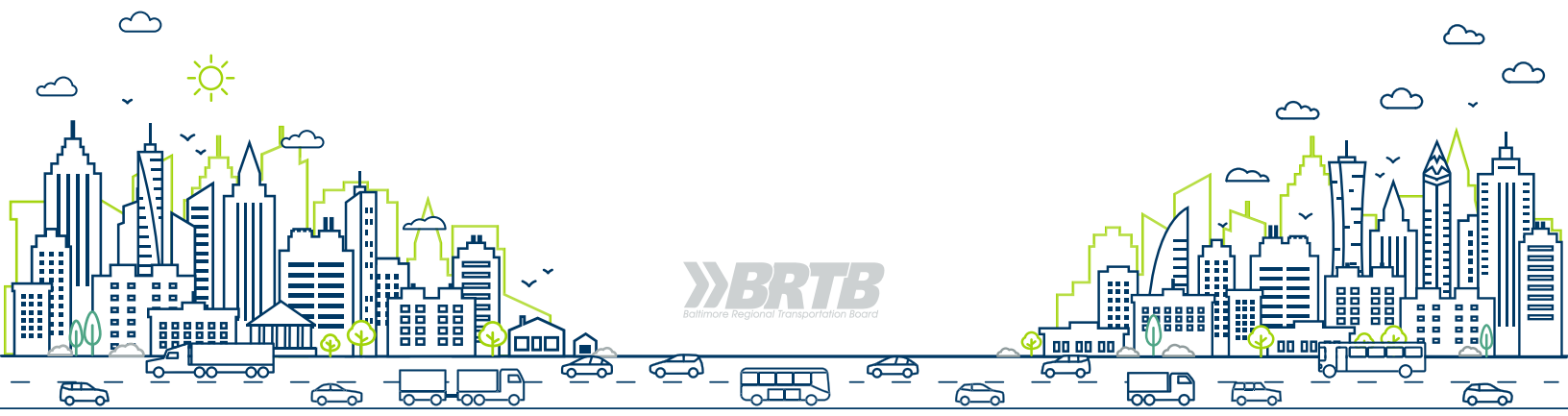
The Howard Street Tunnel was originally constructed in 1895 and is the primary bottleneck preventing double stacking along the I-95 corridor between the Port of Baltimore and Philadelphia. The tunnel requires reconstruction to provide the 21-foot clearance necessary to accommodate double stacked freight containers. While the Howard Street Tunnel is the largest impediment, there are 21 other clearance obstructions, including 11 in Baltimore City. Figure 2 details the locations of necessary projects in Baltimore City.

Figure 2. Baltimore City projects necessary to accommodate double stacking

LOCATION IN BALTIMORE CITY	SCOPE OF WORK
Howard Street Tunnel	Tunnel Modifications
Mount Royal Avenue	Track Lowering
MTA Bridge	Track Lowering
North Avenue	Bridge Modifications
Sisson Street	Track Lowering
Huntington Avenue	Track Lowering
Charles Street	Track Lowering
St. Paul/Calvert Streets	Track Lowering
Guilford Avenue	Bridge Replacement
Barclay Street	Track Lowering
Greenmount Avenue	Track Lowering
Harford Road	Bridge Replacement

The Howard Street Tunnel project is a $466,000,000 project funded with a combination of federal INFRA grant funds, state funds from Maryland and Pennsylvania, and private funds from CSX. When complete, the project will eliminate all remaining double stack obstructions between Baltimore and Philadelphia. Economic benefits include additional containers at the Port of Baltimore, economic growth, and additional jobs for the Baltimore region. The project will also reduce truck trips, yielding other benefits including reduced congestion on Maryland's highway system, increased roadway safety, decreased fuel consumption, and improved air quality.

Engineering for the Howard Street Tunnel and related projects is underway. Construction is expected to begin in early 2022 in Pennsylvania, with completion expected in mid-2025.[3]



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Air Freight in Maryland

The Baltimore/Washington International Thurgood Marshall Airport (BWI) employs over 9,700 people, with thousands more employees related to airport operations. Air cargo at BWI has averaged annual increases of more than 19% over the last 5 years and has more than doubled since 2015. BWI also recently became one of Amazon's top 5 busiest air cargo facilities in the nation (out of 35).[4]

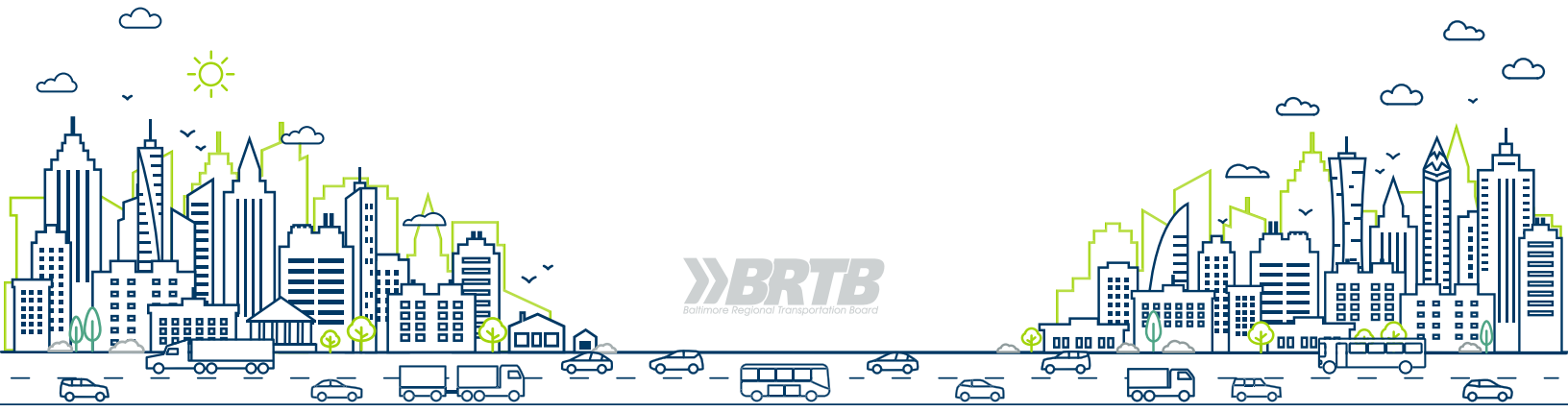
Air cargo at BWI accounts for 57% of regional air cargo and exceeds the amount of cargo at Dulles International and Reagan National airports combined. The pandemic has had varying impacts on air cargo. According to the Metropolitan Washington Airport Authority, cargo movement at Dulles decreased 47.4% in June of 2020 compared to 2019. Reagan National showed a 50% decrease in freight movement. However, cargo activity at BWI increased by 36.2% primarily due to Amazon Air.[5]

The pandemic has had a great deal of impact on air travel. Business and leisure travel were greatly reduced due to travel restrictions and public health concerns. This led to an unprecedented demand for e-commerce. Indeed, data shows that freight (by weight) increased by 17.4% from February 2019 to February 2021. BWI set a new annual record for cargo operations in 2021, with more than 618.8 million pounds of cargo transported - an increase of 4% compared to 2020. In 2021, BWI's cargo operations accounted for more than 55% of the total air cargo flown through the region's three major commercial airports. July 2021 marked a record month for cargo shipments at BWI, with nearly 56.3 million pounds of cargo. BWI's increase in cargo volumes has been fueled by growth of the e-commerce industry during the pandemic. The airport's 200,000 square-foot Midfield Cargo Building H, which opened in 2019, has helped accommodate cargo increases. BWI's new Midfield Air Cargo Expansion will help air cargo to continue to increase in the future. Construction included 11 acres of additional apron pavement, including 0.6 acres of dedicated truck staging, 7.6 acres of additional truck parking area, and a 200,000 square foot warehouse and cargo processing center.[6]

Passenger traffic also rebounded in 2021, with airline traffic at BWI reaching 18,868,429 passengers last year, an increase of 68% compared to 2020. BWI remains the busiest airport in the Washington-Baltimore region.

Regional Freight

In the U.S., commodities are moved on a complex transportation network. There are over 4.1 million miles of roadways, 100,000 miles of railroad, 1.4 million miles of pipelines moving natural gas and other essential liquids, 20,000 public and private airports and over 5,000 coastal, inland and Great Lakes waterways moving cargo.[7]



Freight movement in the U.S. can be categorized as inbound freight, outbound freight or freight moving within the country. The Baltimore region is a microcosm of the country and the State of Maryland. Freight moves into the region from other parts of the state or country, freight moves out of the Baltimore region to other areas of the state or country, and freight moves within the region itself.

Freight is measured by both weight and value. The top commodities in the Baltimore region by weight and value for freight moved within the region, outbound freight, and inbound freight include:

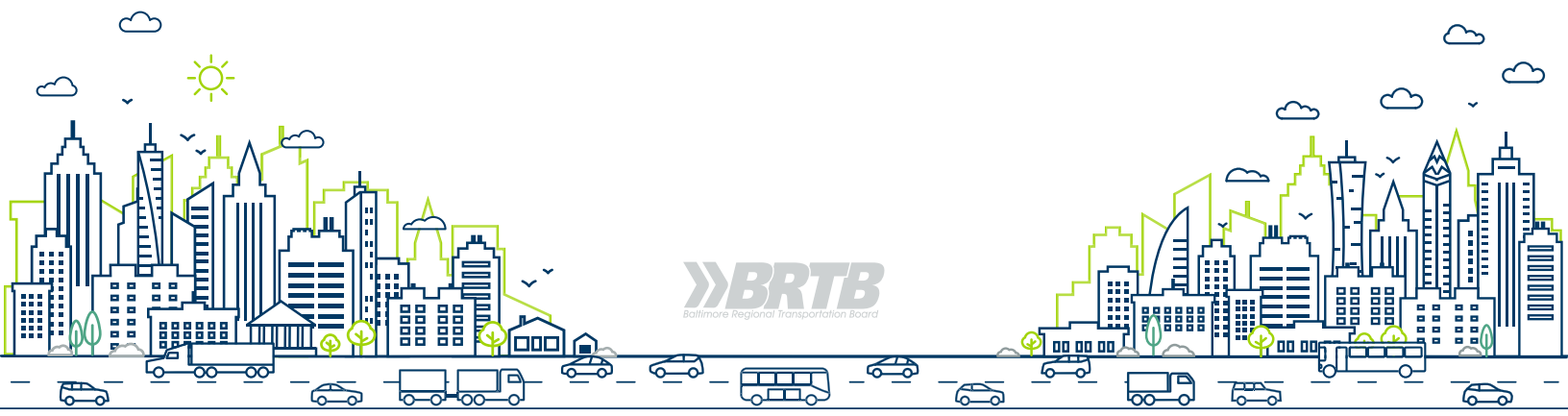
- Within the Baltimore region:
  - Weight: Gasoline is the top product by weight followed by gravel, nonmetal mineral products, and waste and scrap materials.
  - Value: The top products by value include gasoline, motorized vehicles, and mixed freight.
- Outbound from the Baltimore region:
  - Weight: The top products by weight include coal n.e.c. (not elsewhere classified), crude petroleum, and gravel.
  - Value: The top products by value include motorized vehicles, electronics, and mixed freight.
- Inbound to the Baltimore region:
  - Weight: The top products by weight include coal n.e.c., coal, and food products.
  - Value: The top products include electronics, motorized vehicles, and mixed freight.

Figure 3 summarizes the value and weight of freight originating and terminating in Maryland for various freight modes.

Figure 3. Freight Originating and Terminating in Maryland[8]

METHOD FOR MOVING FREIGHT	TOTAL VALUE (MILLIONS)	TOTAL TONNAGE (THOUSANDS)
Air	$7,433	103
Other*	$60,162	6,405
Pipeline	$8,005	26,553
Rail	$13,662	35,503
Truck	$304,289	203,652
Water	$1,580	7,019
All Freight	**$395,131**	**279,235**

*includes multiple modes, mail, and other and unknown categories



Legislation

Federal legislation to assist with freight mobility and efficiency began in earnest with the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. This authorization was ground breaking and set the tone for many highway, transit, bicycle and pedestrian policies. While freight movement has always been an integral part of the U.S. economy, the federal government didn't separately fund freight activities until ISTEA.[9] The Moving Ahead for Progress in the 21st Century Act (MAP-21) of 2012 was the most significant transportation legislation to date in regards to freight regulations. MAP-21 established the efficiency of freight movement as a critical item to be addressed in the transportation bill and those that followed.

MAP-21

MAP-21 addressed many aspects of freight movement. Key regulations and categories are summarized below.

Safety: MAP-21 included several commercial motor vehicle (CMV) safety initiatives. CMV's were required to add safety devices that record drive times and capture data on the vehicle's engine, location, speed, miles driven and off-duty time. Other initiatives included a drug and alcohol clearinghouse for truck and bus drivers, developing standards to notify employers of changes in their employees driving status, new registration requirements, and guidance to new drivers regarding safety rules.[10]

National Freight Policy and Network: MAP-21 established the first National Freight Policy. This policy was intended to improve the performance and condition of the national freight network and to increase the U.S.'s global competitiveness. The National Freight Policy established numerous goals including reducing congestion; increasing productivity and economic efficiency; improving safety, security and resilience; improving the condition of the network; use of advanced technology; and reducing environmental impacts.

A key component of the National Freight Policy was the establishment of the National Freight Network (NFN). The NFN consisted of three components. The Primary Freight Network consists of the most critical corridors for freight movement. The second component includes portions of the Interstate not designated as part of the Primary Freight Network. The third component designates Critical Rural Freight Corridors (CRFC). State Departments of Transportation (DOT) were encouraged to consider a variety of factors and statistics related to freight movement when designating their freight network.

Planning: Another extremely important inclusion in MAP-21 was the establishment of a National Freight Strategic Plan. The plan directed the USDOT to:

- assess the condition and performance of the NFN
- identify the top freight bottlenecks and the cost to address each bottleneck
- forecast freight volume for the next 20 years
- identify major trade gateways

States were also encouraged to develop State Freight Plans designating short and long-term planning activities and investments in freight including:

- descriptions of freight trends, policies, strategies and performance measures guiding freight investment
- details on how the plan will meet national freight goals
- consideration of innovative technologies
- an inventory of bottlenecks and strategies to address them

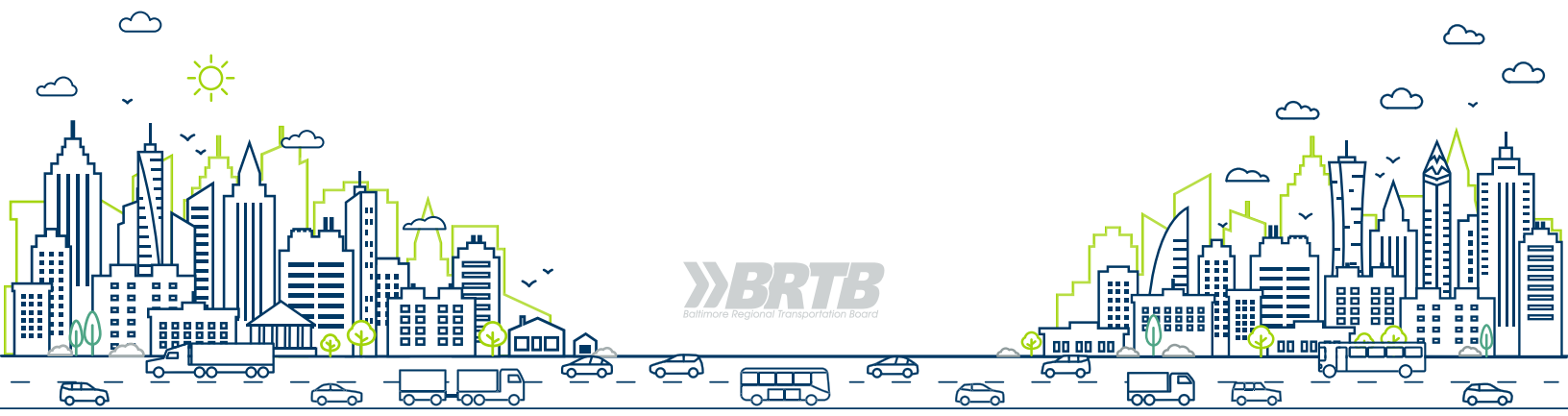
Funding: Most large-scale transportation projects include a variety of funding sources, including federal and state funds. While the federal share of projects can vary, 80% is a common share for federally funded projects. MAP-21 helped to prioritize projects improving freight movement by increasing the federal share of funding to 95% for projects on the Interstate and to 90% for other projects as determined by the Secretary of Transportation. In order to qualify for increased federal funding, projects had to be in the state's freight plan, demonstrate the project will improve the efficient movement of freight, and make progress towards meeting federal freight performance measurement goals.

Coordination: States were encouraged to establish State Freight Advisory Committees consisting of a cross-section of public and private sector freight stakeholders. This could include ports, shippers, carriers, industry workers, State DOT's, and local governments.

FAST Act

The Fixing America's Surface Transportation Act, or FAST Act, was signed into law in 2015. The FAST Act built on previous legislation and strengthened previous policies and regulations.

The FAST Act established two funding programs related to freight. The Nationally Significant Freight and Highway Projects Program was a competitive grant program providing funding assistance for projects with national or regional significance. The National Highway Freight Program provided funds intended to improve the efficient movement of freight on the National Highway Freight Network (NHFN) (known as the NFN in MAP-21). While the specific goals of each program varied, they were both intended to



facilitate freight movement, improve the safety and efficiency of the freight network, provide economic benefits, reduce freight bottlenecks, and improve the environment.

Infrastructure Investment and Jobs Act

In November of 2021, President Joe Biden signed the Infrastructure Investment and Jobs Act or IIJA. As with other previous transportation bills, the IIJA has a major freight component and continues to build on past legislation. This bill adds roughly $244 billion in new investments affecting freight transportation, including $110 billion for roads and bridges, $66 billion for railroads and $25 billion for airports.[11]

IIJA establishes the Office of Multimodal Freight Infrastructure and Policy. The primary functions of this office are to administer multimodal freight grant programs, facilitate information sharing between the private and public sectors, conduct research on freight mobility, provide technical assistance to cities and states, and manage planning activities including the National Freight Strategic Plan and the National Multimodal Freight Network.

The IIJA also provides additional guidance on freight planning. Key updates to the National Freight Plan include assessing the environmental impacts of freight movement on air quality and wildlife habitat loss, considering the unique impacts of the national freight system on rural, underserved, and disadvantaged communities, and considering the impacts of e-commerce on the national multimodal freight system. The IIJA also recommends that states consider the impacts of e-commerce and the impacts of extreme or severe weather on freight infrastructure when developing state freight plans.

Issues Facing Truck Drivers

There are a plethora of issues that truck drivers face every day, both on and off the road. Several issues consistently rise to the top of the list of concerns for truck drivers, including driver shortages, truck parking and congestion or bottlenecks. The issue of congestion and bottlenecks continues to plague both truck drivers and the average automobile driver.

Driver Shortage

Nationally, the truck driver shortage ranks as the top issue facing the trucking industry for the fifth year in a row.[12] This is also the top issue for motor carriers. The American Transportation Research Institute (ATRI) estimates a shortage of over 80,000 truck drivers in 2022, up from 60,000 just two years ago. This is not just a problem in the U.S. The European Union and China, as well as many other regions around the world, are also experiencing driver shortages.

The driver shortage could reach devastating numbers in the next 10 years. The average age of a commercial truck driver in the U.S. is 55, with many of these drivers anticipated to retire over the next decade. The American Trucking Associations (ATA) indicates there could be a shortage of 160,000 drivers by 2030, nearly double the current shortage. If there aren't younger drivers to replace retiring drivers, supply chain issues will persist since nearly all imported goods ultimately require delivery by truck.

So what is causing the driver shortage? Certainly, the pandemic has played a key role over the last two years as some drivers left over health concerns. In addition, lockdowns stalled much of the training and testing required for drivers. As a result, the industry lost about 6% of its workers since the beginning of the pandemic.[13] However, the problem existed long before the pandemic.

Another issue is the age at which a driver can legally drive across state lines. While this issue is currently under discussion by the Biden administration, the current law generally prohibits anyone under 21 from holding an interstate commercial driver's license. This creates a three year gap between when people usually finish school around age 18 and the ability to drive across state lines at age 21. Many eligible drivers decide to find work elsewhere as opposed to waiting years to become a truck driver.

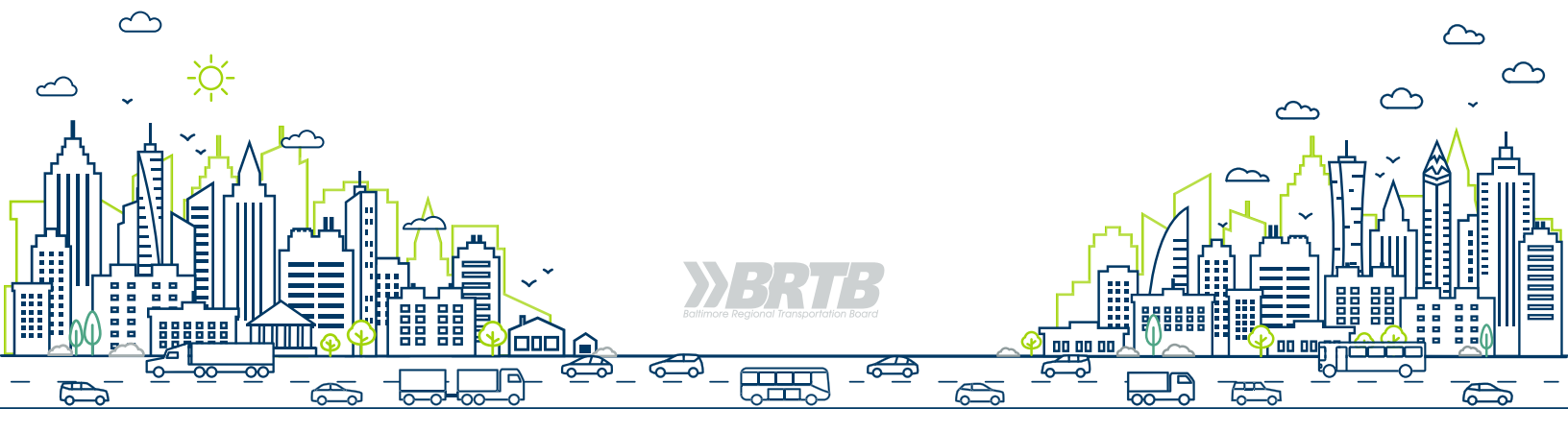
Attracting women drivers is another concern. While there are more women drivers now than ever before, men still far outnumber women. Women account for 47% of the nation's workforce but only about 6% of commercial truck drivers.[14] There are several likely reasons that women drivers are difficult to attract. Aside from the obvious stereotype that truck driving is for men, there is a definite safety concern both on the road and at rest stops. Additionally, accommodations for women at truck stops and rest areas are often lacking or non-existent since most drivers have been men.

The lifestyle of a truck driver is another key factor leading to the driver shortage. New drivers are often assigned the worst routes that keep them on the road for extended periods of time. It can be difficult for new drivers to adapt to being away from home, living in a truck, and showering at rest stops.

There are a number of potential solutions to help recruit and retain drivers. The first and most obvious is to increase pay and benefits. Many trucking companies have begun to offer sign-on bonuses and increases in pay that may incentivize potential new recruits, especially for long haul drivers. Decreasing time on the road and increasing time at home is another incentive. Companies could create more localized routes that allow drivers to be home most nights. Other solutions include lowering the regulated driving age to 18 and diversifying recruiting methods to attract more minorities, women, and veterans.

Bottlenecks

Over the last few decades, the U.S. has seen steady growth in the demand for freight transportation. Unfortunately, freight transportation capacity, and especially highway capacity, has failed to keep pace with the growing demands. The combination of growing demand and limited capacity results in



congestion, less reliable trip times and difficulties meeting delivery times.

Bottlenecks on roadways that serve a high volume of trucks can be considered "freight bottlenecks." These roadways tend to serve international gateways such as the Port of Baltimore or BWI airport, major domestic freight hubs such as TradePoint Atlantic, and major urban areas such as Baltimore City or Towson. While a majority of delays or bottlenecks (60%) can be attributed to non-recurring events such as weather, work zones, crashes, breakdowns, and poorly timed traffic control, recurring bottlenecks have the greatest impact on the efficient movement of freight.

There are many causes for recurring truck bottlenecks. Steep grades, lane drops, merges, and signalized intersections are just a few potential causes. Most freight bottlenecks occur on Interstate highways or arterial roadways, but bottlenecks can also happen in localized places such as entrances to ports and airports.

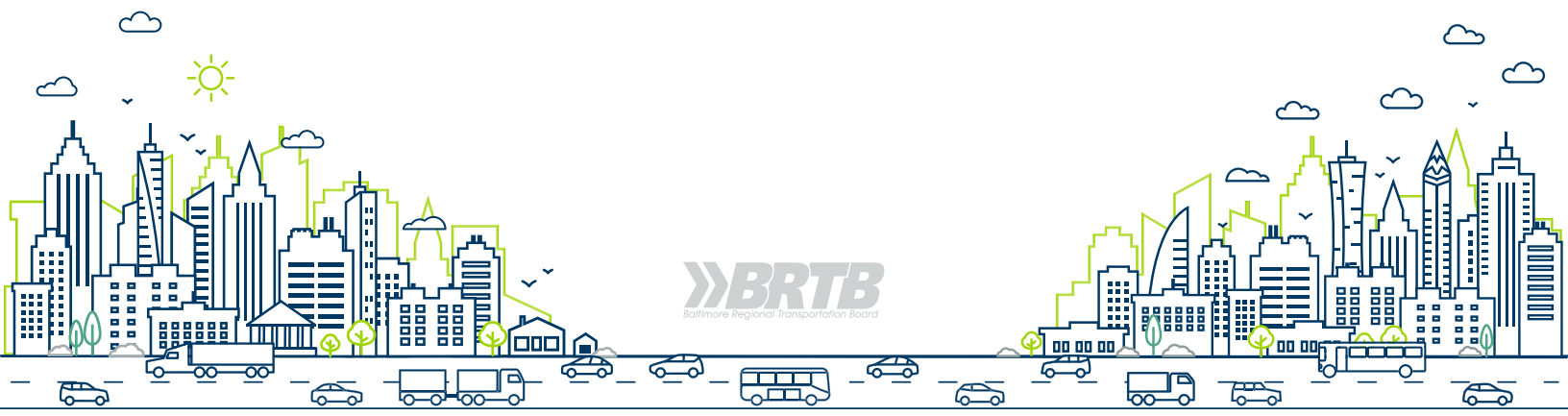
Bottlenecks cause significant delays and costs in the Baltimore region. Since 2019, there were 1.97 million truck person-hours of delay with an estimated cost of over $110 million per year. Figure 4 summarizes hours of delay and its associated costs for jurisdictions in the Baltimore region. Data for Queen Anne's County, which is also in the BRTB region, was not available.

Figure 4. Truck Person-Hours of Delay and Costs in Baltimore Region Jurisdictions

LOCATION	HOURS OF DELAY	COST OF DELAY
Anne Arundel County	387,835	$21,884,206
Baltimore County	665,560	$37,341,134
Baltimore City	84,182	$4,855,175
Carroll County	128,085	$7,283,923
Harford County	207,290	$11,666,376
Howard County	494,873	$27,360,254
Totals	**1,967,825**	**$110,391,068**

Parking

ATRI continually lists truck parking as one of the top concerns in their annual top 10 list for truck drivers and motor carriers. Truck parking is a safety concern from both a national and local perspective. Commercial truck drivers need safe, secure and accessible truck parking. The demand for truck parking is already outpacing the supply. This problem will likely get worse without action since the industry anticipates continued growth in the number of trucks on the road.



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Maryland has over 2,900 designated truck parking spaces, including 595 spaces at Maryland Department of Transportation (MDOT) facilities and 2,307 at private truck stops. MDOT facilities include 12 rest areas, travel plazas and welcome centers with 333 spaces. MDOT also has 262 additional spaces at 14 Truck Weigh and Inspection Stations (TWIS), several of which are in the Baltimore region. Unfortunately, truck drivers are hesitant to park at the TWIS for fear of being subjected to inspections.

The bulk of the truck parking is located along three of Maryland's most truck trafficked interstates. I-95, I-70 and I-68 account for over 70% of truck parking spaces with I-95 alone accounting for over 50%. Several other major truck corridors such as I-83 and I-695 lack sufficient truck parking.

What happens when the demand for parking outweighs the supply? As designated spaces fill up, trucks begin to park in undesignated areas such as shoulders, freeway ramps, local roadways, and private parking lots. According to a study by ATRI[15], drivers begin looking for parking an average of 56 minutes before the end of their hours of service. This translates into nearly $5,600 per year in lost wages. In Maryland, that equates to over $130 million in lost wages due to parking concerns.

Both public and private stakeholders consider safety to be the top concern. Parking on shoulders and ramps endangers both truck drivers and other roadway users. In Maryland, trucks parked on roadway shoulders caused fatal crashes in 2011 and 2018. Many other rear-end collisions have occurred due to trucks parked on ramps and shoulders. In addition to the dangers for truckers and drivers, trucks parking on shoulders or ramps adds to roadway maintenance costs. Roadway shoulders and ramps are not typically designed for truck parking, leading to premature deterioration and costly rehabilitation. This issue is getting worse in Maryland. From 2012 to 2017, Maryland saw a 20% increase in trucks parking in undesignated spots. Communities are also concerned over the real or perceived safety impacts of trucks parking in their communities.

There are numerous obstacles and challenges when trying to resolve truck parking issues. The main obstacle, of course, is the lack of a sufficient number of spots. In Maryland alone, nearly 200 trucks a day are unable to find safe, secure and accessible parking each night. In addition, many drivers don't know where or how to find truck parking. For example, many drivers are unaware that the TWIS can be used for parking. Moreover, those that are aware are hesitant to park at TWIS for fear of inspection-related delivery delays.

Different areas of the state present different challenges. Urban areas have fewer parking spaces available overnight when parking is most needed for the staging of morning deliveries. Rural truck parking is typically used by long haul drivers who need to stop to meet their required hours of service breaks.

While the lack of parking itself is a problem, the lack of amenities for drivers is also a problem. Many TWIS parking areas lack the amenities required by long haul drivers, such as restrooms and showers.

Eighty percent of all drivers feel that having access to restrooms and showers is extremely important. Other amenities desired by truckers include proximity to their routes, availability of food and internet service and the ability to do laundry.

A lack of legislation, regulation, and planning is a final challenge. Freight generators are not currently required to provide truck parking. Local jurisdictions could include truck parking when planning projects for warehouses and distribution centers. Regulation and planning could dramatically reduce the number of trucks parked in undesignated areas.

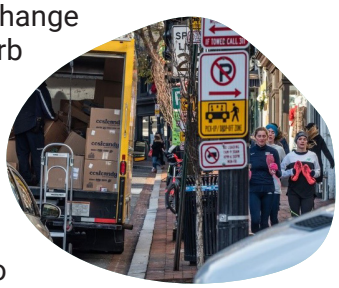
Some states have developed real-time truck parking systems that provide drivers with timely information on space availability. These parking systems use sensors, cameras or other solutions to provide real-time information about location and availability. Maryland considered a pilot project that would have installed real-time parking sensors along I-95 southbound in Howard County, but the project was never completed.

There are numerous potential steps that could improve truck parking issues in Maryland, including:

- MDOT should expand its annual truck count program
- MDOT should develop a truck parking committee including state agencies, MPOs, trucking companies, community representatives, law enforcement and other freight stakeholders
- Local jurisdictions should integrate truck parking into land use planning

Curb Utilization

Most people think of the curb along a street as a place to park the car. However, many other uses compete for curb space including trash collection, food delivery service, bus stops, taxi stands, e-commerce deliveries (FedEx, Amazon), and freight delivery zones. Curb uses change over time and throughout the course of a single day. For instance, the same curb could be used for garbage collection and freight delivery in the early morning, for transit during peak morning hours, for food and parcel deliveries mid-day, and for car parking overnight. These competing needs often overlap, creating a battle for the limited space. Planning, design and policy decisions can help to address these challenges.



Several solutions may be available for curb management. Flex zones can be used to serve multiple functions simultaneously such as combined commercial and passenger loading zones. Time-of-day restrictions can help to accommodate different functions at different times of the day. For example, a peak hour travel lane can transition to an off-peak loading zone or parking lane. In some cases, on-street parking can be converted to provide loading zones or parklets.[16]

Freight access to the curb is essential to facilitate commerce and to avoid blocking travel lanes. This is especially true with recent increases in the demand for e-commerce and the associated increase in delivery vehicles. Several curb solutions for the delivery of freight and goods include:

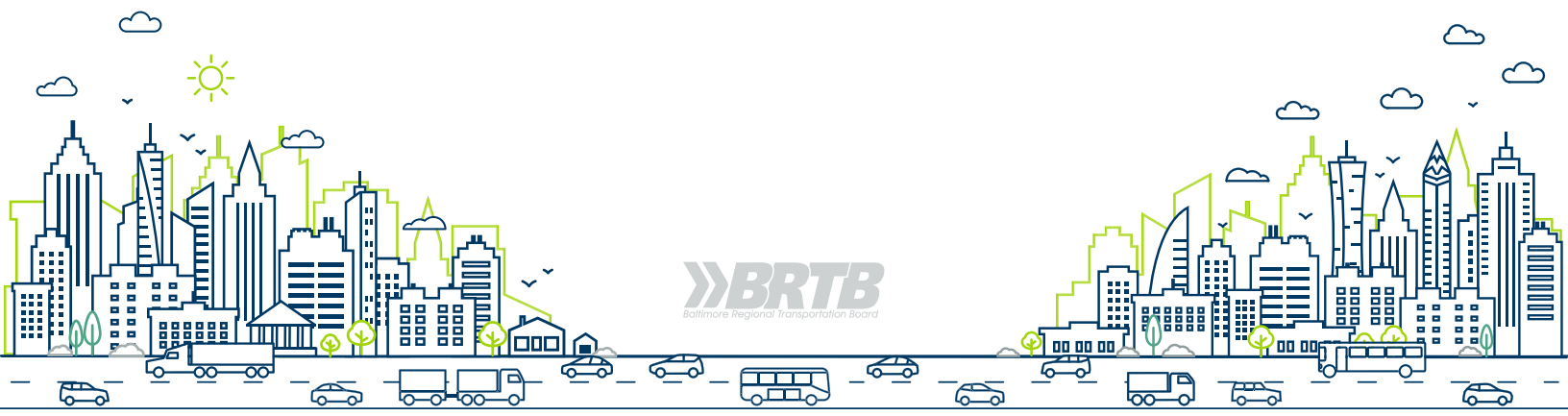
Off-Peak Delivery: Pricing mechanisms can incentivize off-peak freight delivery. For example, some cities have imposed a delivery charge for peak hour deliveries. Businesses with extended hours and large chain businesses have seen the most benefit from off-peak delivery programs. Pilot projects have shown that implementing long-term off-peak deliveries can lead to travel time savings of 3-5 minutes per trip for all roadway users. Carriers saved up to 48 minutes in travel time and anywhere from one to three total hours of time for each delivery tour. Off-peak delivery is estimated to save carriers 30-40% over regular daytime deliveries. However, off-peak delivery can also increase operating costs for businesses and lead to nighttime noise concerns.

Delivery vehicle staging zones: Dedicating on-street space to transport trucks waiting to access high demand delivery locations can reduce illegal parking and lane blocking. It can also reduce trucks unnecessarily circling the block while waiting for a spot.[17]

Urban consolidation centers: These facilities can increase the efficiency and reduce the duration of deliveries. Delivering goods the last mile to your doorstep is expensive and time consuming. Urban consolidation centers are facilities at which high numbers of low volume goods from multiple sources are delivered, sorted and consolidated. This allows a neutral freight carrier to perform the local delivery, resulting in fewer deliveries to the final destination. Multiple businesses can use this system to share freight services.

Paid Access to Freight Zones: Paid access to freight loading or unloading zones can reduce the duration that a vehicle is parked in a loading zone and helps to ensure that zones are more frequently unoccupied. The District of Columbia utilizes paid permit control allowing commercial vehicles to park in loading zones during designated times while also allowing vehicles to pay for loading space. Companies are generally willing to pay this fee since it saves time and reduces parking violations.

Moving delivery locations: Another effective solution is simply moving loading and unloading access to a less impactful location. Relocating the loading and unloading zones to adjacent blocks or streets within a reasonable distance to the intended destination can reduce congestion in the busier area. This frees up curb priority in busy areas for transit and bicycles. Delivery drivers often prefer more reliable, legal, but slightly more distant loading space over potentially illegal parking closer to their destination.



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What the BRTB is Doing to Address Issues

The Baltimore Metropolitan Council (BMC) and Baltimore Regional Transportation Board (BRTB) work with stakeholders to ensure that our transportation system supports the safe and efficient movement of freight upon which our economy, jobs, and consumers rely.

The Baltimore region is home to the nation's sixth largest port, the Port of Baltimore, two Class I and three regional railroads, as well as the Baltimore/Washington International Thurgood Marshall Airport. Situated at the midpoint on the eastern seaboard, the Baltimore region also has an extensive roadway network. Maintaining and improving our existing transportation network will improve freight movement and economic growth for our region.

The BRTB is the federally designated Metropolitan Planning Organization (MPO) for the Baltimore region. The Freight Movement Task Force (FMTF) is a subcommittee of the BRTB that includes representatives from the Maryland Department of Transportation State Highway Administration (MDOT SHA), Maryland Port Administration (MPA), Maryland Transportation Authority (MdTA), Maryland Motor Truck Association (MMTA), Federal Highway Administration (FHWA), Federal Motor Carrier Safety Administration (FMCSA), railroads (NS and CSX), private sector consultants and others. The mission of the FMTF is to provide the freight/goods movement community a voice in the regional transportation planning process and to serve as a forum for Baltimore region freight stakeholders to share information and discuss concerns. The chair of the FMTF is Mr. Tom Madrecki, Vice-President of Supply Chain at the Consumer Brands Association.

Critical Urban Freight Corridors (CUFCs)

MPOs may designate CUFCs, in consultation with the state, in urbanized areas with a population of 500,000 or more individuals. A public road designated as a CUFC must meet one or more of the following four elements:

- connects an intermodal facility to the highway freight system, the Interstate System, or an intermodal freight facility
- is located within a corridor of a route on the highway freight system and provides an alternative highway option important to goods movement
- serves a major freight generator, logistic center, or manufacturing and warehouse industrial land; or
- is important to the movement of freight within the region, as determined by the MPO or the State.

Freight deliveries are vital to the economic success of the Baltimore metropolitan region. Maryland Motor Truck Association appreciates the opportunity to work with the Baltimore Regional Transportation Board (BRTB) to reinforce the importance of coordination among planning, transportation, and economic development agencies to ensure a connected and safe freight transportation system so the industry can continue to deliver the goods Marylanders need. Without trucks, America stops.

-Louis Campion, President & CEO, Maryland Motor Truck Association (MMTA)

BRTB
Baltimore Regional Transportation Board

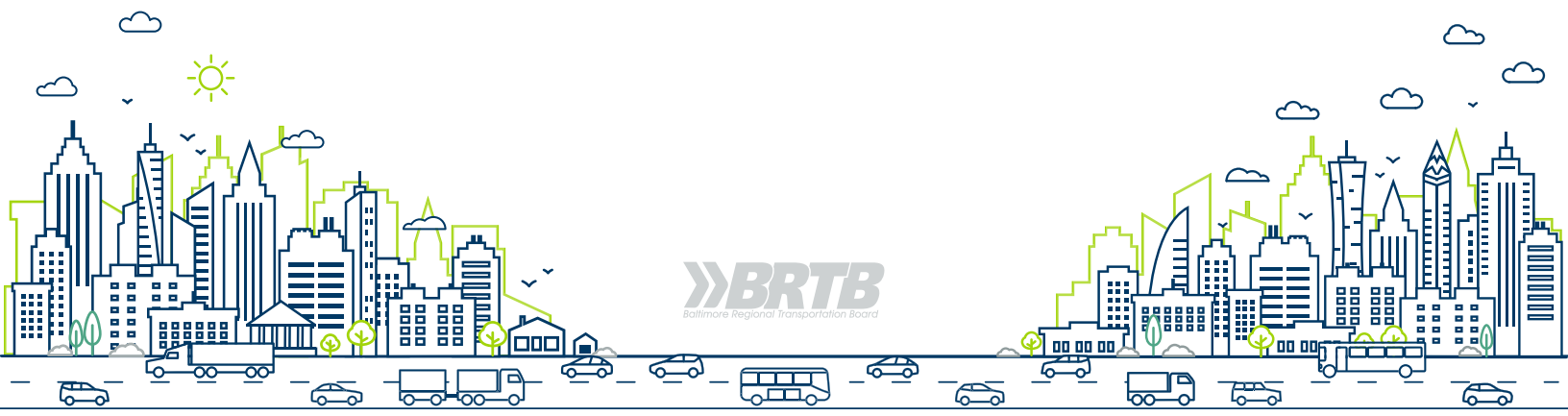
The BRTB approved CUFCs for the region in June of 2017. See BRTB Resolution #17-26 for more information.

The BRTB is also responsible for approving both a short-term program and long-range plan of transportation improvements for the region. The short-term program, known as the Transportation Improvement Program, has included several capital projects that include federal freight program funds from the National Highway Freight Program. These projects were sponsored by MDOT SHA and include:

- I-695: US 40 to MD 144 – NHFP funds in FY 2018
- I-83 Bridge Replacement over Padonia Road – NHFP funds in FY 2018
- I-695: I-70 to MD 43 – NHFP funds in FY 2022 and 2023
- I-695: Reconstruction of Interchange at I-70 – programmed for FY 2025-2026
- I-695: Bridge Replacements at Benson Ave. and US 1 – NHFP funds in FY 2018 (Complete)
- I-695: Bridge Replacement on Crosby Road – NHFP funds in FY 2018 (Complete)

MDOT SHA is also pursuing planning efforts to better facilitate freight travel and truck parking across Maryland. A summary of truck parking initiatives follows:

- MDOT SHA completed a Statewide Truck Parking Study in 2020 that helped to identify the needs for truck parking throughout the state. This study included a partnership with truck drivers and companies operating trucks to pinpoint solutions. The parking study can be found here.
- MDOT SHA has had, and was the first in the nation to have, an emergency truck parking program opening up park and ride locations for trucks during emergencies such as storms or major roadway disruptions. MDOT SHA continues to support this program and to work with the trucking community on awareness. An app is available to help truckers locate adequate parking. MDOT SHA's interactive map depicting emergency truck parking locations is available here.
- MDOT SHA is currently assessing truck parking data (where trucks are parking) and identifying state-owned property and potential partnerships with other property owners that could support truck parking expansion.
- Private sectors partners are communicating to MDOT SHA where they will allow trucks to park safely so that information can be disseminated to the trucking community. This includes non-traditional parking locations such as big lot properties that do not mind truckers on site. This helps to increase safe parking opportunities.



- MDOT SHA has added spaces to existing truck parking locations and continues to work on planning, engineering, and reconfiguration to help add spaces. MDOT SHA also allows truck parking at all weigh-in-motion sites and select state properties throughout Maryland. This information is distributed to truck drivers in a variety of ways to increase awareness.
- MDOT SHA continues to work with the driver community to assess truck parking data and with local governments on parking needs, including development of a web-based dashboard to continuously monitor parking shortages.
- MDOT SHA participates with the National Coalition on Truck Parking and other efforts regionally such as the Eastern Transportation Coalition (formerly the I-95 Corridor Coalition) to identify, plan, and implement solutions that support the trucking community.

Conclusion

Maryland's diverse transportation network continues to strengthen economic growth in the State and the Baltimore region. Freight trains, cargo planes, trucks, and giant post-Panamax cargo ships transport goods throughout Maryland and to regions beyond. Those who work, live, and visit Maryland use the passenger rail, buses, and highways to get to their destinations and back home. These same links in the transportation network convey millions of tons and billions of dollars of goods within Maryland.

Planners need to consider some questions related to how goods might be delivered in the future. For example:

- What role might autonomous trucks play in freight delivery over the next 5, 10, or 20 years? Are there other factors particular to the trucking industry that transportation planners, economists, and regional decision makers should consider?
- How will consumers' changing habits (for example, increases in on-line shopping) continue to shape how goods are delivered? A February 2019 analysis by the American Transportation Research Institute noted that the annual growth of e-commerce has ranged between 13 and 16 percent over the last five years, compared to the 1-5 percent annual growth in traditional retail sales. How will this trend affect the trucking industry?

> *Facilitating freight is facilitating quality of life, literally delivering for Baltimore and Maryland residents and businesses. Solving shared transportation, safety, trade, manufacturing and supply chain challenges is essential to driving economic success and expanding opportunities for all. Achieving those goals requires collaboration and perseverance to bring together a broad range of public and private stakeholders, often through vehicles like the Baltimore Regional Transportation Board and the Freight Movement Task Force. Now is the time to work together and chart a course for the future that recognizes the true role of freight, not just delivering goods, but delivering good for our region and beyond.*
>
> -Tom Madrecki, Vice President, Supply Chain, Consumer Brands Association (CBA), Chair, BRTB's Freight Movement Task Force (FMTF)

- How will the changing habits of consumers affect land use decisions about whether and where to place stores and distribution centers? And how will the locations and operating hours of stores and distribution centers affect decisions on how customers, workers, and freight operators will access such facilities?
- Will expectations about the amount of time needed to deliver goods continue to evolve—from next-day to same-day to, potentially, same-hour?
- Could drone deliveries eventually become a viable alternative to traditional shipping, and how might this affect the trucking industry?

These are just some of the questions that planners will need to consider over the next 20 or so years. Planners don't have the answers to these questions yet. But evolving preferences and business models demand at least an awareness of the potential for change. That is, there could be great opportunities to operate more efficiently as well as major disruptions in "business as usual" approaches. The more that planners, businesses, and regional decision makers think about and discuss these types of questions, the more the region will be prepared to accommodate change. The BRTB and its advisory group, the Freight Movement Task Force (consisting of representatives of freight carriers as well as state and local planners), will continue to stay informed about trends in freight delivery.

What's next?

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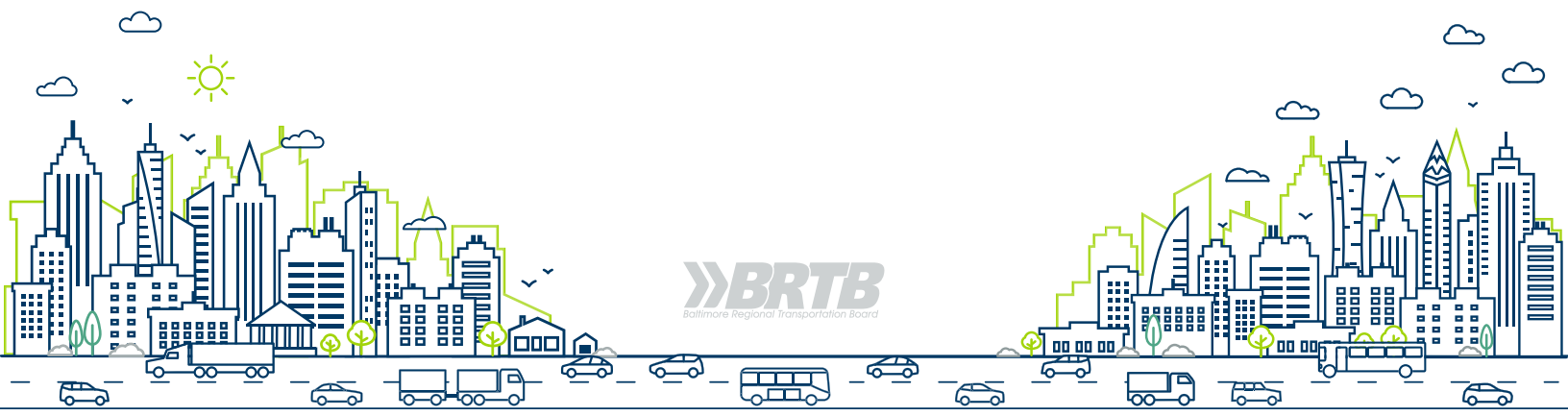

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Citations

1. Maryland Department of Transportation State Rail Plan 2015
2. CSX Transportation. “CSX and Maryland Fact Sheet”
3. Maryland Department of Transportation Ports Administration – Howard Street Tunnel project page
4. Maryland Department of Transportation 2022-2027 Consolidated Transportation Program
5. Washington Business Journal
6. MDOT SHA 2021 Annual Attainment Report
7. FHWA “Freight Story”
8. U.S. Department of Transportation Freight Analysis Framework (FAF4) Version 4.5.1
9. U.S. Department of Transportation
10. Federal Motor Carrier Safety Administration
11. Freightwaves daily newsletter
12. American Transportation Institute “Critical Issues in the Trucking Industry” 2021 Report
13. Forbes “There is a Massive Trucker Shortage Causing Supply Chain Disruptions and High Inflation”
14. Redwood Logistics “What is Causing the Truck Driver Shortage and How Can We Fix It”
15. Boris, C. and R. M. Brewster, December 2016. “Managing Critical Truck Parking Case Study - Real World Insights from Truck Parking Diaries.” American Transportation Research Institute.
16. Institute of Transportation Engineers – Curbside Management Practitioners Guide
17. Institute of Transportation Engineers – Curbside Management Practitioners Guide