2.1 – MASTER TRANSPORTATION PLAN

ISSUES CONFRONTING OUR TRANSPORTATION SYSTEM...

TODAY
- Land use largely accommodates automobile-oriented corridors
- Suburban land use design for majority of developed City
- Transportation infrastructure investment supporting suburban roadway system
- Increasing travel times
- Many older narrow roadways, particularly in the rural area of the City

IN THE FUTURE
- Improve and sustain the City’s existing suburban and rural roadway network
- Facilitate strategic growth within the City’s Strategic Growth Areas, including Transit-Oriented Development, will need to be supported by a multi-modal transportation system
- New or renovated roadway projects to follow a Complete Streets approach
- Emphasis on regional coordination to fund and implement transportation mega-projects
- Maximize Transportation Demand Management to complement transportation infrastructure investments as another tool to reduce traffic congestion

The following topics in relation to goals, policies, and action strategies are all equally important in the development of the City’s transportation network and this Master Transportation Plan. The framework for the Master Transportation Plan is:

- Citywide Transportation Policies/Complete Streets
- Roadways
- Transit
- Active Transportation
- Other Regional Scale Transportation Planning
- Transportation Demand Management
- Intelligent Transportation Systems

INTRODUCTION

The City of Virginia Beach Master Transportation Plan (MTP) envisions the future of a multi-modal local and regional transportation network. The City of Virginia Beach has the largest population of any city in the Commonwealth and projections indicate our city will continue to grow. In the next ten years, changing demographics, technology, and environmental changes will have major impacts driving transportation choices and strategies. Our city is one that is in transition. Dramatic shifts in technology and changes in travel behavior will cause the Hampton Roads region to focus on urban mobility and creating sustainable transportation networks to meet transportation needs. As a result, the primary transportation goals for Virginia Beach include:
Following the Complete Streets philosophy of designing roadways considering the needs for all users and modes in an attractive and environmentally sustainable manner.

- Promoting walkable, transit supportive, mixed-use neighborhoods in the Strategic Growth Areas (SGAs).
- Preserving and meeting the transportation needs of the City’s Suburban Area and Rural Area south of the Green Line by concentrating the majority of future development in the SGAs.
- Prioritize transportation improvements to achieve the greatest benefits due to the magnitude of the transportation needs throughout the City.

The Master Transportation Plan, in accordance with the Code of Virginia §15.2-2223, is a mandatory comprehensive planning assessment of existing conditions with consideration of future trends and needs. This plan must consider designation of transportation infrastructure needs, contain maps showing road and transportation improvements, and be in accordance with the Commonwealth of Virginia Six-Year Improvement Program (SYIP). ¹ The SYIP is the Commonwealth’s fiscal plan to build and maintain new roads.

Since the mid-1990s, the expansion of local comprehensive planning requirements has led to the preparation of more comprehensive transportation plans by Virginia localities. The purpose of this Master Transportation Plan is to present a system of transportation needs and recommendations. It addresses Code of Virginia requirements by providing for a roadway hierarchy and a multi-modal transportation system, while aligning transportation facilities with affordable housing and community services. This plan provides maps of capital improvement projects and the cost estimates associated with their completion. Accountability of this plan will include review by the Virginia Department of Transportation (VDOT) to ensure that it aligns with the vision of the Six-Year Improvement Program (SYIP) and is consistent with the Commonwealth Transportation Board’s (CTB) Statewide Transportation Plan. This plan will need review and approval for any subsequent revisions.

This Master Transportation Plan also aligns with Envision Virginia Beach 2040 by considering transportation “a key priority, focusing on multi-modal means of connecting within our neighborhoods, across the City, region and beyond.” ² It also aligns with the City’s recent adoption of a Complete Streets policy that promotes street safety by creating and managing streets, which “shall be comfortable for pedestrians, bicyclists, transit riders, motorists, and other users.”

Existing Conditions, Recent Trends and Projections

Several trends and projections will influence the overall transportation needs of the City and region as follows:

- **Demographic Shifts**
  - By 2045, the number of Americans over age 65 is expected to increase by 77%. About one-third of those over 65 will likely have a disability that limits mobility. Their access to critical services will be more important than ever.
  - There are 73 million Millennials aged 18 to 34 who will be an important engine of our future economy. Millennials are driving less, as evidenced by a reduction of 20% fewer miles over the 2000s decade. ³³
  - The demographic shifts identified above are influencing the need to increase the type of living and corresponding transportation choices throughout the city.
• **Physical Environment**
  - Not only will the City address shifting trends in travel, but we will also assess how to deal with our changing physical environment. Constrained transportation corridors require our transportation planners and engineers to be as efficient as possible with the use of limited rights-of-way. Taking a proactive approach to these trends, the City adopted a Complete Streets policy in 2014 that is designed to enable safe access for all users of the road right-of-way.
  - Historically included in roadway project design as aesthetic treatments and for the many other benefits they provide, trees are now thought of as integral infrastructure for well-designed, multi-modal transportation corridors. Interception of storm water, reduction in urban heat islands, and providing shade for walkers, bikers, and transit users are all reasons for including trees along our transportation corridors. It is also important to note that, unlike other transportation infrastructure, the environmental benefits of well-cared for trees only increase over time.
  - Greater emphasis is being placed on improving public transit services, transit oriented development, transportation demand management, intelligent highway systems, and promotion of active transportation to reduce the reliance on driving single occupancy vehicles.
  - Since the City has an extensive shoreline and water features, environmental impacts such as sea level rise and recurrent flooding will play a key factor in how and where we travel (see Chapter 2, Section 2.2 - “Environmental Stewardship Framework”).

• **Funding**
  - There has been a distinct downward trend of federal and state funding for local road projects. This, in combination with the parallel downward trend of city revenues collections, necessitating that the City conduct more detailed analyses and prioritization of transportation projects.
  - It has been thirty years since the City has undertaken extensive modeling of its transportation network. Preparation of this Master Transportation Plan used a macro modeling as an additional tool for greater analysis of the primary roadway network and to aide in planned roadway infrastructure prioritization.

• **Technology**
  - There has been a notable advancement in technology that will affect modes of travel, along with the implementation of traffic demand management (TDM) and intelligent transportation systems (ITS). There is also the implication of new methods of technology still under development, such as autonomous (self-driving) vehicles.
CITY-WIDE TRANSPORTATION POLICIES

Transportation underlies many aspects of successfully planning the growth and sustainability of a city. It is important to address the transportation needs of all people in an equitable manner. Transportation planning decisions must be balanced with compatible land use planning and provide necessary efficiencies. It is also important to prepare for decision making by modeling traffic behavior while understanding the community's needs in the future. With these factors in mind, the City of Virginia Beach has recently woven transportation goals into its various community vision plans as follows:

- Envision Virginia Beach 2040 (2013)
- A Community Plan for a Sustainable Future (2013)
- City of Virginia Beach Strategic Plan, 2015-2017
- Area Master Plans approved since 2007 (Strategic Growth Area Master Plans (2007-2013), Interfacility Traffic Area & Vicinity Master Plan (2011), Virginia Aquarium & Owls Creek Area Plan, etc.)
- Visioning Sessions with City Council (i.e., Annual and Mid-Year Retreats)

Most recently, the City adopted a Complete Streets policy and accompanying Administrative Directive (AD) in November 2014. This policy and AD guide transportation planners and engineers in the design and operation of the entire right-of-way to enable roadways to create safer access for all users, regardless of age, ability or mode of transportation. This policy and AD mean that every transportation project will make the street network better and safer for drivers, transit users, pedestrians, and bicyclists. A Complete Streets approach will be applied to all new roadway and roadway renovation projects to the greatest extent feasible, without compromising the primary functional use of the right-of-way.

The goals of the City of Virginia Beach Complete Streets policy are:

- Consider all users in all aspects of the project development process for surface transportation projects to the fullest extent practicable.
- Match and balance roadway functions with user needs, both at the roadway segment level and as part of the larger transportation network.
- Develop the public rights of way in harmony with the adjacent land uses.
- Develop an attractive and sustainable transportation system.
- Promote public health by supporting healthy lifestyle choices and improved air quality.
• Promote safety and crash reduction.
• Increase the economic value of business districts and neighborhoods.
• Strengthen the community by creating a sense of place.

The entire Administrative Directive that implements the City’s Complete Streets Policy is found in the Comprehensive Plan’s Reference Handbook. More information about Complete Streets can also be found on the City’s website at:
http://www.vbgov.com/government/departments/sga/transportation-planning/Pages/complete-streets.aspx

MASTER TRANSPORTATION PLAN FRAMEWORK

ROADWAYS

Primary Roadway Network Plan Map

A key component of the Master Transportation Plan is the “Primary Roadway Network Plan Map” (see next page). This Map is a key planning tool for the development of the City’s street network. The map was developed in conjunction with current specifications and standards used by the City’s Public Works Department. The Primary Network Plan Map identifies the general road corridor locations, classification, and the ultimate proposed motor vehicular lane number and general configuration. The details of what amenities are incorporated in a given road section are identified in the City’s Typical Section Standard Drawings contained within the Public Works Design Standards (see exhibits pp. 2-8 and 2-9). Each roadway cross section has alternative cross sections for constrained sections where right-of-way may be limited by the natural or built environment. The currently adopted typical sections will serve as a guide to determine ultimate rights-of-way required for new roads. Deviations to the typical section are subject to the approval of the Director of Public Works as per the general guidance of the City’s Complete Streets Policy. A listing of the current major street network ultimate rights of way and estimates of cost in today’s dollars are included in the Reference Handbook.

For the first time in over thirty years, the development of the Primary Roadway Network Map was accomplished through the utilization of a Travel Demand Model. This Model was developed with the inclusion of the Southeastern Parkway and Greenbelt Project (SEP&G). The City has contracted with Old Dominion University’s Virginia Modeling, Analysis, and Simulation Center (VMASC) to perform a detailed micro modeling analysis of traffic impacts of including or not including the SEP&G. Until the results are available from the VMASC Analysis, the Comprehensive Plan Primary Roadway Network will contain the SEP&G. If in the future this roadway is removed from the network, the Primary Roadway Network Map will be amended to include new alignments or modified lane calls for roads with traffic volumes negatively or positively impacted by removal of the SEP&G.

The model results provide a tool for staff to decide on the following future ultimate lane call changes from the 2009 Map to the current 2016 map shown below. The lane call changes resulting from this analysis are found on p. 2-10.
Primary Roadway Network Plan Map
TYPICAL SECTION STANDARD DRAWINGS

(source: City of Virginia Beach Public Works Design Standards Manual)
Increases in future ultimate lanes (from the 2009 to 2015 Map for the year 2040)

- Princess Anne Road (from Providence Road to just south of Ferrell Parkway) from 4 to 6 lanes.
- Military Highway (from Norfolk City limit to Chesapeake City limit) from 6 to 8 lanes

Decreases in future ultimate lanes (from 2009 to 2015 Map for the year 2040)

- Diamond Springs Road (from Northampton Boulevard to Newtown Road) from 6 to 4 lanes
- Baker Road (from Wesleyan Drive to Newtown Road) from 4 to 2 lanes
- Salem Road (from Nimmo Parkway to Indian River Road) from 4 to 0 lanes
- Birdneck Road (from Norfolk Avenue to General Booth Boulevard) from 6 to 4 lanes
- First Colonial Road (from Old Donation Parkway to Great Neck Road) from 6 to 4 lanes
- West Neck Creek Parkway (from Nimmo Parkway to Indian River Road) from 4 to 2 lanes
- Shore Drive (from Diamond Springs Road to Norfolk City limit) from 6 to 4 lanes

Other modifications

- Reflects the existing lanes for all primary roadways within the Oceanfront Transportation Planning Area shown on the 2009 Map. The model results did not indicate the need for increased lane calls for any of these roadways.
- Moved the alignment of West Neck Parkway (from North Landing Road to Indian River Road) to the area just west of Courthouse Estates and line it up with the north-south portion of Landstown Road (from North Landing Road to Landstown Road).
- Adjusted the right of way width on Nimmo Parkway/Sandbridge Road (from Atwoodtown Road to Sandfiddler Road) to accommodate a two lane Parkway section. Adjusted the right of way width of Nimmo Parkway to accommodate a four lane Parkway section (from Atwoodtown Road to Upton Road). Reclassified Nimmo Parkway to a Minor Arterial from Upton Road to General Booth Boulevard.

The results are summarized below and detailed modeling information is contained in the Reference Handbook. This model calculated the need and lane call for a facility based upon the traffic generation of existing and projected land uses throughout the city and region for the year 2040. The model was calibrated by aligning recent year traffic assignments with the corresponding existing traffic count data. A unique feature of this model is that the lane calls are based on the implementation of a prioritized group of road improvements that have the greatest cost benefits and value for reducing system-wide delay. It is important to note that the Travel Demand Model is only one analysis tool to provide data and projections for creating the Roadways section of the city's Master Transportation Plan, as well as prioritizing the transportation projects funded through the city's Quality Physical Environment Capital Improvement Program (CIP).

Access Controlled Roadways

There are many ways to improve traffic flow on the City's busier roads. The most expensive way, in many cases, is to add additional pavement or concrete and travel lanes to existing roads. This method increases storm water runoff, and right-of-way and can have a negative impact on surrounding communities and safety. Limiting access on selected corridors may be a more cost effective method to maintain and improve the capacity of these roads. Limiting the turning movements to and from these roads can increase roadway capacity and improve traffic flows on the corridors.
The management of access points (driveways, intersections, etc.) is important to the safety and proper functioning of our roadways. Certain roads, due to their function in the overall roadway network, need a higher level of access control than roads whose function is to provide more direct access. Roads designated “Access Control” are shown on the following Access Controlled Roads Map and has restricted direct access to and from that roadway segment for new developments. Private direct access is not permitted on these roadway segments, except when the property in question has no other reasonable access to the circulation system. Developers are encouraged to utilize building orientation and signage to help identify the businesses along these corridors. The following corridors are designated as "Access Control":

- Northampton Boulevard between Diamond Springs Road and Shore Drive
- Indian River Road from Providence Road to Ferrell Parkway and from South Independence Boulevard to North Landing Road
- Ferrell Parkway
- Princess Anne Road from Ferrell Parkway to Nimmo Parkway
- Lynnhaven Parkway from I-264 to South Lynnhaven Road
- Dam Neck Road from Rosemont Road to General Booth Boulevard
- Nimmo Parkway
- General Booth Boulevard
- South Independence Boulevard from Holland Road to Lynnhaven Parkway
- London Bridge Road/Drakesmile Road from I-264 to Dam Neck Road
Regional Transportation Plan Highway Network

Due to the fact that 46% of all workers in the Hampton Roads Region work in a different jurisdiction than where they live (US Census Bureau, 2013), transportation planning must have a regional focus. The primary tool to accomplish coordinated regional planning is the Hampton Roads 2040 Long Range Transportation Plan (LRTP), which is scheduled for adoption by the end of 2015. Shown in the Technical Report is the Southside Hampton Roads roadway network from the 2040 LRTP, regional congested highway maps and information pertaining to the regional “mega” projects funded through the recent House Bill 2313.

Roadway Safety

Equally important to the goal of reducing congestion is the goal of improving roadway safety. As with congestion reduction, Intelligent Transportation Systems (ITS) can have a strong role in improving safety. The Commonwealth of Virginia has a federally-required Strategic Highway Safety Plan. The most recent update to the plan was in 2012 and addresses the four E’s of transportation safety – education, enforcement and regulation, engineering, and emergency response.

The Virginia Safety plan focuses on seven primary safety areas with the greatest promise to reduce crashes and serious injuries including:

- Speeding
- young drivers
- occupant protection
- impaired driving (includes texting, cell phone use, eating, etc.)
- roadway departure
- intersections

Strategies to address several of the primary safety areas listed above will require extensive educational efforts and traffic enforcement. The focus of this plan’s recommendations relate to the need for physical roadway improvements to address speeding, roadway departure and intersections. The chief non-local funding source for roadway safety improvements is the Highway Safety Improvement Program (HSIP). The HSIP process requires a data-driven, strategic approach to evaluation safety based on performance. As cited in the 2015 HRTPO State of Transportation report, the following trends are apparent:

- Total number of crashes from 2005-2014 has dropped 24%.
- Total number of injuries has fallen 13%.
- Total number of fatalities has dropped 10%.

The total number of crashes reached its low point in 2010 and has slightly increased since that date. The Comprehensive Plan’s Technical Report includes a listing of ranked interstate interchanges and intersections in Virginia Beach, which would provide the greatest safety benefits if targeted for necessary funding for improvements.
Recommended Policies: Roadways

- Require traffic impact studies for any development proposal that yields a net 150 trips or more during the a.m. or p.m. peak hour.
- Evaluate funding options for infrastructure needs created by new development.
- Be creative with highway funding strategies and pursue all available grants and alternative funding strategies to reduce reliance on the shrinking federal and state funding sources.
- Promote mixed use development, higher density development, and transportation demand management, especially in designated growth and activity centers, to reduce the need for single occupancy vehicle trips and encourages transit-oriented development.
- When developing and updating the City’s Capital Improvement Plan (CIP), review the CIP for conformity with the Comprehensive Plan (A listing of the current 2015-2020 CIP roadways is included in the Technical Report).
- Evaluate the specific transportation project impact on quality of life and aesthetics for surrounding and proposed land uses.
- Continue to improve the process of coordination between roadway and utility projects to minimize pavement cuts and traffic disruption.
- Continue to implement transportation policies that reduce cut-through traffic and calm traffic in and through neighborhoods, while ensuring connectivity for pedestrian and bicycle users and emergency vehicles.
- Utilize Intelligent Transportation Systems (ITS) to maximize the efficiency of the existing transportation system (see separate ITS section).
- Continue to participate in the refinement of the Regional Hurricane Evacuation Plan.
- Adhere to the recommendations of the 2014 Regional Safety Study strategies to address speeding, young drivers, occupant protection, impaired driving, roadway departure, intersection safety, and reliance on good data.
- Prioritize interstate interchange and local road intersections based on safety cost/benefit analysis outlined in the 2014 Safety Study.

Agenda for Future Action Recommendations: Roadways

- Adopt updated general typical sections and plan views to be consistent with those currently in the Public Works Design Standards.
- Implement the improvements shown on the City’s Primary Roadway Network Map, the Regional 2040 Long Range Transportation Plan, and the Bikeways and Trails Plan to the extent funding is available in the City Capital Improvement Program and the State’s Six Year Improvement Program (SYIP).
TRANSIT

Regional Transit Planning

The *Hampton Roads Regional Transit Vision Plan* was completed in 2011 under the guidance of the Virginia Department of Rail and Public Transportation. This plan looks into the future, 2025 and beyond, to visualize the possibilities for the region's transit services. Transit services can be conveniently categorized as those that connect the region to other areas of the State and Nation and those that provide connections between and within the various localities.

More recently, Hampton Roads Transit (HRT) has begun a transit planning effort titled "Connect Hampton Roads (CHR)" that will serve to update the Regional Transit Vision Plan. The campaign's purpose is to create a community outreach process to "rethink mobility for the entire region." Collectively, there are 1.6 million residents in the Coastal Virginia region, and there is a prediction that the population will grow to 2 million in the next two decades. The results of the public input survey indicated that citizens feel there is a lack of transportation choices and a need for a multi-faced transportation network. Maps and detailed information related to the regional transit plan and the initial stages of the Connect Hampton Roads effort are included in the Technical Document.

Intercity Passenger Rail

Intercity passenger rail (Amtrak) service is the primary public transit service that connects the region to the rest of the country. The private Greyhound bus company also serves to connect Virginia Beach and Hampton Roads to the rest of the state and nation. In December 2012, Amtrak began providing passenger service to Southside Hampton Roads via a new train station at Harbor Park in Norfolk. The below maps show the Amtrak routes within Virginia and the Northeast Region.

This single daily train service serves to connect the Hampton Roads region to Richmond, Washington D.C., and the Northeast Passenger Rail Corridor. Previously, the only other option was to drive or take a shuttle bus to the Newport News train station. The number of passengers who boarded or departed Amtrak trains in Hampton roads has increased 66% over the last decade. Use of this new Southside service has led the Commonwealth to commit to expanding Amtrak service to three trains in the near future. There is long term interest in pursuing high speed rail service and the Hampton Roads Transportation Planning Organization (HRTPO) took the lead in hiring a consultant to develop a detailed passenger rail vision plan that makes the business case to bring high speed rail to the region.
Regional/City High Capacity Transit Network

The Norfolk Tide Light Rail line opened in 2011 and is considered to be a High Capacity Transit technology. This line connects the medical center in Downtown Norfolk with the Virginia Beach City line. HRT conducted an Origin and Destination Survey during 2013 and 2014 to determine points of origin and destination for passengers using The Tide vi. Results of this study indicate that a surprising 33% of all the Norfolk Tide light rail users reside in Virginia Beach. The busiest stations for Virginia Beach riders are at the eastern end of the line, including Newtown Road (57% of riders) and Military Highway (21% of riders) stations. Virginia Beach ridership is fairly dispersed throughout the remainder of the system and this study reflects that there are multiple destinations within the City of Norfolk. The vast majority of trips were from home to work. Other secondary trip purposes include colleges/universities, personal business, shopping, social visits, and medical appointments.

In 2015, the Virginia Beach City Council adopted a Locally Preferred Alternative (LPA) resolution for an extension of The Tide from the Newtown Road station in Norfolk to the Virginia Beach Town Center, with new station locations at Witchduck Road, Kellam Road, and Constitution Avenue and above grade crossings at Witchduck Road and Independence Boulevard in order to bypass those roadways that experience high motor vehicle traffic volumes (see exhibit p. 2-18).

With this action, Virginia Beach set in motion a multi-faceted approach to the provision of enhanced transit services to Virginia Beach for the future as follows:

- A 3-mile extension of The Tide connecting Downtown Norfolk to Virginia Beach Town Center described above, thereby making the system truly regional, as intended, for the first time.
- Design of an end-of-line station that can be expanded to become a major passenger hub in which additional north/south and east transit corridors can logically interconnect. The City has studied the ridership potential of these extensions using the Federal Transit Association (FTA) STOPS model described later in this chapter.
- Design efforts are underway for the development of a shared use pathway running parallel to the light rail corridor to enhance connectivity between stations, along with the trail connectivity benefits as a multi-modal corridor.
- Walking/biking audits are underway for the SGAs and will form the basis of necessary infrastructure improvements to provide first mile/last mile connectivity to the transit
stations and bus stops along the initial Tide segment, and eventually to all of the SGAs and future transit station locations.

- An approximate doubling of the feeder bus network for The Tide extension will effectively double bus service within the City by establishing two new routes and increasing the timespan and frequency of several routes to match The Tide system operating schedule.
- Strategic land use planning and economic development to maximize transit-oriented development (TOD) along the transit rail corridor and future high capacity transit corridors connecting the SGAs. This growth strategy will focus the most intense development in these appropriate areas and help preserve the character of the City’s Suburban and Rural Areas.

To further evaluate the feasibility of High Capacity Transit along various transportation corridors of the City, the Federal Transit Authority (FTA) STOPS (Simplified Trips-on-Project Software) program was utilized to model potential future transit ridership. STOPS is a stand-alone software package that applies a set of travel models to predict detailed transit travel patterns for the various transit extensions; quantify the trips-on-project measure for all travelers and for transit dependents; and, compute the change in automobile VMT based on the change in overall transit ridership between the two scenarios.

The Virginia Beach High Capacity Transit Extension Map shown below indicates the approximate location for future extensions to the Newtown to Town Center alignment that is currently under detailed study. The modeling results indicate that the proposed alignments warrant inclusion in the Comprehensive Plan with recommendations for additional detailed study. Details associated with the modeling exercise are included in the Comprehensive Plan’s Reference Handbook. Below is a brief description of the various alignment alternatives:

- The Blue line represents the Newtown Road to Town Center extension that is currently under detailed study.
- The Orange line represents the eastward extension of the Tide to the Oceanfront.
- The Green line serves the central spine of the City connecting Town Center to the north with Princess Anne Commons and the Municipal Center to the south.
- The Red line serves the central spine of the City from Town Center in the south to Joint Expeditionary Base Little Creek to the north. This alignment then turns west and south to potentially service Norfolk International Airport.
- The Purple line serves the vast suburban residential areas of Kempsville from an approximate midway point in the Green line to a potential connection with the City of Chesapeake.
VIRGINIA BEACH HIGH CAPACITY TRANSIT EXTENSIONS
*precise lines and stations subject to further study*
Regional & Local Bus Transit

The “Connect Hampton Roads” initiative found that reliable, frequent, and accessible local bus serves as the backbone of every successful transit system. The report describes the condition of the region’s current bus system as inadequate, with routes that do not effectively connect across city boundaries, and operating with inconsistent times, days, and frequencies. Below are the types of HRT bus routes that currently serve the City of Virginia Beach:

- **Fixed Regular Routes** – Regular routes at scheduled times and days of operation and service hours vary by route. There are currently 11 fixed routes within Virginia Beach.
- **MAX Express Routes** – The MAX, or Metro Area Express, is a regional express service connecting commuters to cities across Hampton Roads. It offers an economical, stress-free, fast ride to major employment centers from established park and ride lots. There are currently 5 fixed routes that pick up Virginia Beach residents at the Oceanfront, Silverleaf Park and Ride lot or the Indian River Park and Ride lot and take riders to major employment centers, such as the naval bases, shipyards, and Downtown Norfolk with limited stops. The Max routes cost twice the fare of traditional buses but provide limited stops and extra comfort such as free Wi-Fi. Passengers can also partake in the guaranteed ride home program.
- **Seasonal Bus Routes** – In Virginia Beach, there are 3 special shuttle routes to support the concentration of visitors at the Oceanfront. Efforts are underway to expand these shuttle service operations to include new routes from the Oceanfront to the Shore Drive/Great Neck Road business area, and a shuttle to supplement light rail and make connections in the Town Center area.
- **Special Event Shuttles** – HRT operates shuttle service for several special events within Virginia Beach, since parking is best planned to accommodate average daily visitation for general areas, rather than during peak periods or at specific venues that experience extreme congestion during events.

Virginia Beach shares the most utilized bus route in the region with the City of Norfolk (Route 20). Route 20 connects the Oceanfront to Downtown Norfolk and serves approximately 5000 passengers daily. It has the greatest frequency and time duration of all the Virginia Beach routes. This route parallels the proposed light rail extension and bisects six of the City’s eight SGAs. Most of the remaining routes serve the City’s Suburban Area with hourly headways and five days a week daytime service. The current bus route map for the City can be found in the Technical document.
The City has begun to incrementally fund enhanced services with the recent extension of evening hours on two of the suburban routes. The short term strategy to increase bus ridership will be to implement the feeder bus service for the light rail extension as depicted in the Virginia Beach Transit Extension Study, by HRT\textsuperscript{viii}. The map below shows the feeder bus network with the various transit extension options.

The feeder bus network targets new service along Witchduck Road/Kempsville Road (Route 35) from the Chesapeake’s Greenbrier area to the proposed Witchduck Road station. An additional newly configured Route 39 would link Sentara Princess Anne Hospital, Lynnhaven Mall, the Hilltop SGA, and the Oceanfront. Numerous routes in the eastern portion of the City will connect to a new express bus service, which will operate from the Oceanfront to the proposed Town Center station. Bus service on seven of the City’s eleven fixed routes would have greatly expanded service times and days to match the operating characteristics of light rail (see Proposed Feeder Bus Network map below and the Comprehensive Plan’s Technical Report for more details regarding the proposed bus improvements).

Recognizing the need for transportation services to be aligned with affordable housing and community services, maps are included in the Comprehensive Plan’s Technical Report that show the location of facilities for seniors care, community services, and other transit dependence indicators.

HRT and the City of Virginia Beach have acknowledged that, to improve transit services, there is a need to address basic infrastructure needs. Clean, safe, and comfortable waiting areas at light rail stations and bus stops are essential to an effective transit system. The City has an extremely low percentage of bus stops with shelters for weather protection. This is due to a combination of low funding and low ridership for justification purposes. Currently, the City has approved funding to effectively double the number of bus stop shelters within an approximate 5-year period. HRT has a similar strategy to increase the number of shelters regionally, particularly at high volume stops. A map showing the location of existing and proposed shelters for implementation in next 5 years is included in the Comprehensive Plan’s Technical Report.

**Paratransit**

The American with Disabilities Act of 1990 (ADA) requires localities to provide “comparable transportation service for individuals with disabilities, who are unable to use fixed route transportation systems.” HRT provides Active Paratransit customers a demand-response service along its fixed-route services. The service is provided origin-to-destination within ¾ mile of the fixed bus routes and utilizes a variety of vehicles. Paratransit service is reliant on the fixed route bus service, because any changes in the HRT bus routes will affect the paratransit service area. Paratransit service currently accounts for approximately 1/6 of the City’s entire budget devoted to transit. The service can be unpredictable for annual budgeting purposes. Paratransit usage continues to increase at a rate significantly higher than bus or light rail.

There are approximately a dozen private companies, charitable organizations, and community social service agencies that also provide transportation services to serve clients who might...
otherwise utilize paratransit. On demand transportation providers, such as taxicabs, Uber, Lyft, and App-A-Cab also have services that may benefit senior community and disabled persons.
Recommended Policies: Transit

- Support the increased frequency of Amtrak train service to both the Southside and Peninsula to connect Virginia Beach and the region to Richmond, the Northeast Corridor, and the soon-to-be enhanced Southeast Corridor.
- Align Transportation Improvements and Services with affordable, accessible housing and community services through the following recommendations:
  - Provide public transit service to as many transit dependent users as possible through major bus operations restructuring with the completion of light rail and thereafter, concurrent with the annual review process. Transit dependent users include, but are not limited to, persons 65 or over, persons at or below the poverty line, and persons who have no car available.
  - For compliance with new Code of Virginia Section 15.2-2223, provide public transit service to the following transit dependent locations, including but not limited to, adult daycare, assisted living, dialysis centers, human services, libraries, nursing homes, senior residences. Enhance ADA-compliant pedestrian infrastructure from transit dependent uses to transit stations/stops to provide convenient access to transit routes and limit expensive paratransit service.
  - Discourage the approval of multi-family or group home development applications that are located over ½-mile from a fixed transit route. Although the current HRT standard for the provision of paratransit services is ¾-mile, it is necessary to provide the suggested walkable distance to accommodate many of the transit dependent users who may not be eligible for paratransit service. Many studies indicate that ½-mile is the maximum distance one should walk to access transit services.
- Bus Stop Accessibility and Shelter Improvements:
  - Continue to coordinate with HRT to increase the number of bus shelters within Virginia Beach from its current coverage of approximately 5% of all stops to 10% within the next 5 years and doubling this new amount by the year 2040.
  - Continue to enhance bus shelter/transit station design to include enhanced lighting, bicycle storage, and signage/real time information regarding schedules.
  - Consider the needs of the disabled persons and seniors community when deviations are considered for transit routes. Maintain a paratransit service area map reflecting the ¾-mile service radius from City transit routes. Discourage uses with likely transit-dependent persons from being developed in areas outside of a ½ mile radius of a fixed route, especially multi-family residential development, age-restricted, senior or assisted living communities, employment centers, and medical and educational institutions.
  - Continue to enhance the ADA-compliant pedestrian infrastructure, particularly along transit routes, to better serve the senior/disabled persons and reduce the cost of expensive paratransit service.
- Alignment of Land Use and Economic Development Initiatives with Transportation Improvements:
  - Encourage mixed-use development throughout the Urban and Suburban Areas, and encourage the highest density development within the City’s Strategic Growth Areas. This form of development will induce the highest ridership for public transit and many shorter trips can be made by foot or by bicycle.
Agenda for Future Action Recommendations: Transit

- City Council has adopted a Locally Preferred Alternative to extend The Tide from the Newtown Road station in Norfolk to terminate at a new station in Town Center near Constitution Avenue. Plan for the future extension of this high capacity transit system as follows:
  - East to the Oceanfront
  - North to Joint Expeditionary Base Little Creek and south and west to Norfolk International Airport area
  - South to Princess Anne Commons and the Municipal Center
  - West to Chesapeake
- Evaluate appropriate technology for these high capacity corridors include light rail, maglev, bus rapid transit and others that depend on a rail or similar fixed guideway that separates the transit from normal vehicular use.
- Light Rail System Planning - Construct the eastern terminus of the light rail station proposed at Constitution Avenue so that it can easily be expanded to serve as a major passenger hub, with enhanced amenities and platforms to serve future east, north, and south high capacity transit corridors.
- Establish an east-west multi-modal corridor - Develop a shared use path generally within the old Norfolk Southern railroad alignment from the Newtown Road light rail station to Town Center. Study extension of this path along this railroad alignment to the east of Town Center. This proximity will allow for greater connectivity to light rail stations and greater multi-modal choice (see also see Active Transportation recommendations).
- Light Rail Station Connectivity - Enhance pedestrian/bicycle connections to all high capacity transit stations and bus route stops to provide safe access and enhanced modal choice.
- Proactive Bus Service planning recommendations:
  - Coordinate annual evaluation of new bus routing, frequency of service, and duration of service. In the near future (within 5 years), implement the proposed feeder bus network needed to serve the light rail extension from Norfolk to Virginia Beach Town Center.
  - Enhance local bus service to become a viable option for people who could choose to drive, otherwise referred to as “choice riders.” The provision of frequent, reliable, comfortable service can reduce single occupancy automobile travel and, thus, address traffic congestion and reduce the need for additional construction of highway lane miles.

ACTIVE TRANSPORTATION

“Active Transportation” is the combination of walking, bicycling, and other use of other non-motorized wheeled vehicles that may benefit from the same infrastructure. Benefits can include:

- healthy activity and improved fitness
- increased social interaction and engagement
- reduced use of fossil fuels and the concomitant reduced pollution
- reduced costs of living
The vision for active transportation in Virginia Beach, adopted in the 2011 Bikeways and Trails Plan reads:

*Virginia Beach will be a City where people can walk, run and ride anywhere safely, efficiently and enjoyably.*

Virginia Beach developed in the 1960s thru the 1990s with a suburban pattern that fostered the development of residential neighborhoods that, in some cases were isolated from the adjacent areas. This, in part, led to development of a transportation network that relied more and more on higher speed roadways to span the larger distances between the starting and ending points of trips. As this network developed, biking and walking as useful modes of transportation were not as much in the forefront of design, often including small narrow sidewalks as the primary pedestrian/bicycling infrastructure.

Virginia Beach’s historically predominant suburban-style development model can make walking and biking challenging for the following reasons:

- **Distance.** Work centers are scattered, with limited aggregation of large employment centers, like Town Center/Pembroke and the Resort SGAs, and the military bases that draw the majority of workers. Therefore, it is harder to match facilities to predictable work commutes. If employment is not close to home, the commute can be long. Regionally, 46% of workers commute to work in a different city than where they live.
- **Lack of desirable facilities.** Casual bike riders generally need continuous, connected facilities that match their comfort level from end to end of each trip. At present, the City’s system of sidewalks, bikeways, and trails is not yet consistent in providing that continuity.
• **Perceived threats from traffic.** Most of the larger roads have speed limits of 45 miles per hour, with large volumes of traffic moving at least that fast. Few cyclists are comfortable in such conditions for on road cycling, and those that do often report hostile behavior from motorists.

• **Neighborhood islands.** Many neighborhoods are like islands surrounded by obstacles such as waterways and high-speed, high-volume roadways. Casual cyclists cannot get far without the challenge of navigating a major roadway or other hindrance.

• **Interstate barriers.** I-264 is a barrier running east-west across Virginia Beach, and I-64 does the same across the western portion of the City and leading into Norfolk and Chesapeake. Commuting across these barriers is very difficult, funneling cyclists and pedestrians into limited crossing spots, some of which can be difficult and dangerous. For cyclist commuters who work in Downtown Norfolk and in Chesapeake's Greenbrier area, it can be hard to reach these destinations.

Virginia Beach is not an island and our active transportation system needs to coordinate with our neighbors in Chesapeake, Norfolk, and North Carolina, as well as beyond. Several initiatives are underway, and the staffs of the cities are collaborating on a variety of new connections:

• **South Hampton Roads Trail** (SHRT) will run 41 miles from the Oceanfront connecting the downtowns of Virginia Beach, Norfolk, and Portsmouth, and through Chesapeake to Downtown Suffolk (see concept plan map below).

• **Beaches to Bluegrass Trail (B2B)** is in planning stages with both the Virginia Department of Conservation and Recreation and Virginia Department of Transportation. It will be a “braided trail” following the SHRT, extending all the way to Cumberland Gap at the westernmost end of Virginia.

• **The East Coast Greenway** (ECGW) does not enter Virginia Beach, but connects to both SHRT and B2B, providing north-south connectivity from Maine to Florida.

• **Bike Route 76 (BR76) spur** The Transcontinental Bike Route runs from Astoria, Oregon to Yorktown, VA. Many cyclists, who have made the journey east, and are starting their westward journey, want to do a “wheel dip” in both oceans as part of the journey, and thus they opt to begin or end their treks at the Virginia Beach Oceanfront. Creating a spur route would formalize this and provide direction for them.

• **Blueways and Greenways.** While sidewalks, bikeways, and trails are obvious elements of an active transportation system, blueways and greenways are growing as components too. In Virginia Beach, we are developing the Thalia Creek Greenway around Town Center. The Green Sea Byway is a wide swath running from Chesapeake to Sandbridge, generally parallel to Indian River Road.

• **The 2040 Regional Long Range Plan and Map,** prepared by the Hampton Roads Transportation Planning Organization (HRTPO), includes a new Active Transportation component. This plan highlights the many planned active transportation connections within the various localities.
Recommended Policies: Active Transportation

The vision adopted in the 2011 Bikeways and Trails Plan still applies. This vision leads to several broad policy initiatives about how to move forward:

- Continue to implement projects using the Complete Streets policy in accordance with the City's Administrative Directive.
- Continue to prioritize active transportation facilities through the Capital Improvement Plan, the development review process, federal/state grant programs and opportunities present with the maintenance/upkeep of roads and linear utility corridors.
- Focus on facilities that serve the middle majority of active transportation users.
- Focus on continuity and connectivity within the existing system, beginning with a gap analysis.
- Enhance the bike safety and pedestrian safety educational efforts in schools, for visitors, and to the general public.
- Support regional trail systems, especially the South Hampton Roads Trail, Beaches to Bluegrass, and BR76 spur, each of which ties to the paths along the City's proposed light rail corridor.

Agenda Items for Future Action Recommendations: Active Transportation

- Develop a study to identify additional and improved crossings of I-264 and I-64 to serve both the existing demand and the likely increases in demand for active transportation modes as The Tide extension begins service. The most urgent specific connection is in the Town Center area, to relieve the hazardous crossings along Independence Boulevard.
- Continue to utilize the City's Bikeways and Trails Plan as the guiding active transportation policy document and initiate a plan update.

OTHER MODES OF REGIONAL TRANSPORTATION

Air Travel

Air travel for Virginia Beach residents and businesses is primarily through Norfolk International Airport. The airport experienced a drop in passengers of 24% from 2005-2014. Nationally, airport passenger levels have increased by 3% during the same ten years. A substantial reason for the decrease in passengers was the increase in the average airfare. In 2005 average airfares were $304 which was similar to the national average. By the end of 2014, the average airfare had increased 52% to $463 which is well above the national average of $393. Other factors in passenger and flight reductions include fewer trips made by the military and the negative impacts of airline consolidation. Results from these consolidations left the two Hampton Roads Airports with nine fewer nonstop destinations and 54 fewer daily flights offered when compared to 2006.

The Norfolk International Airport Master Plan was most recently updated in December, 2008 and is intended to provide the Authority with a plan that identifies necessary capital improvements (see Master Plan exhibit below).
The current update includes projects that will extend the useful life and value of the Airport to meet the air transportation needs of the Coastal Virginia region through 2024. Projections from this Master Plan indicated an annual growth rate in passengers of 2.6% per year, from 1.9 million in 2006 to nearly 3.3 million in 2024. Recent capital improvements at the airport include terminal renovations in 2014.

The FAA recently terminated the Environmental Impact Statement (EIS) for improvements at the Airport as not currently meeting the purpose and need. However, FAA continues to support the inclusion of these improvements in its Master Plan.

The purpose of the proposed improvements at Norfolk International Airport is to:

- To meet relevant FAA airfield safety standards and enhance airfield safety without reducing runway availability. Relevant airfield safety standards include:
  - Runway Safety Area, which is designed to provide additional safety in the event an aircraft leaves the runway;
  - Runway Protection Zone, which is area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground; and,
  - Runway Object Free Area, which is designed to provide an area clear of objects surrounding a runway.
To enhance operational efficiency and maintain airfield utility while considering surrounding airspace and the Airport’s critical design aircraft; and,
To provide a safe, efficient southern vehicular access, on Airport property, to the Airport’s terminal area.

Primary components of the Airport’s proposed project include:

- Decommissioning and demolition of Runway 14/32.
- Constructing a relocated secondary parallel to and separated by 876 feet from the existing Runway 5/23. The proposed Runway 5R/23L would be 6,500 feet long by 150 feet wide.
- Access improvements to the Airport’s passenger terminal area (on Airport property).

The location of the airport along the Norfolk/Virginia Beach line provides many residents and businesses with convenient access to air travel and its associated economic benefits. However, the adjacent Burton Station and nearby neighborhoods experience some negative impacts such as noise, cut through traffic impacts, overall environmental impacts and incompatible land uses. The Burton Station SGA Plan described in the land use section provides greater information regarding these benefits and impacts.

Ports

Over 19 million tons of general cargo, primarily transported in containers, was handled by the Port of Virginia (POV) in 2014, a record year. The amount of general cargo handled by the Port has increased 19% between 2005 and 2014. The maritime industry also measures containerized cargo using a standard called “20 foot equivalent units, or TEU’s. The POV ranked third highest among East Coast ports in volume (in terms of TEU’s) of containerized cargo handled in 2014, and seventh highest among all US ports.\textsuperscript{xii}

The POV is comprised of four primary facilities in Hampton Roads (the photo below shows the locations within Hampton Roads):

- Newport News Marine Terminal
- Norfolk International Terminals
- Portsmouth Marine Terminal
- Virginia International Gateway Portsmouth

Although there are no Virginia Port facilities within Virginia Beach, many of the longshoreman and spin off businesses are located within the City. Like the Norfolk International Airport, the POV is impacted by national/international economic factors and competition from other ports. The POV is well positioned for additional growth. The Panama Canal expansion will be open by 2016 and Hampton Roads is one of the few East Coast ports that can serve the largest ships. Additional, there have been recent rail expansions to handle additional cargo.
The 2040 Master Plan is POV's infrastructure investment strategy to create economic benefits and unconstrained growth opportunities to Virginia through maritime commerce. Critical components of this strategy include:

- Expanding terminal capacity at a sufficient pace to keep up with growing demand.
- Remaining flexible to new opportunities and conditions.
- Coordinating terminal access improvements with state transportation and economic development plan.

The POV attracts diverse businesses seeking efficient access to growing markets via international trade lanes and inland freight corridors. It is well-positioned to continue capturing a significant share of future container cargo growth due to its excellent facilities, shifts in global trade patterns, and efficient intermodal connections.

Economic activity related to the POV currently employs more than 343,000 Virginians, with $13.5 billion in compensation, and generates $41.1 billion in revenues and $1.2 billion in taxes. As port capacity increases, growth in trade-related businesses will spur further growth in local businesses, creating more jobs, economic activity, and opportunities for a prosperous Commonwealth. Competitive participation in the global market depends in part on being able to efficiently transfer goods through Port facilities. Business growth will result in greater need for terminal facilities. The POV, in its mission to stimulate maritime commerce, will use the 2040 Master Plan to ensure the capacity to support growth in Virginia is available when it is needed. By 2040, demand for terminal capacity is forecasted to be over three times the existing demand (2.1 million TEU today vs. 7.2 million TEU in 2040). Existing capacity must more than double to meet forecasted demand (3.4 million TEU existing).

Capacity improvements will initially be achieved at APMT and NIT (4.6 million TEU total build out capacity), but further growth must look to the construction of new terminals, or the redesign of
existing terminals, in order to provide the 2.6 million TEU remaining shortfall in capacity. The 2040 Master Plan schedules the projects and identifies the funding necessary to construct the improvements in time to meet demand.

Other Maritime

The Atlantic Intracoastal Waterway (AIWW) is a major maritime facility that accommodates a variety of commercial and recreational water uses within the City including:

- US Coast Guard
- Federal Law Enforcement Training Center for Homeland Security
- Barge traffic supporting intermodal transportation to deep draft ports
- Military equipment and supply transportation barges and vessels
- Commercial fishing vessels and charter fishing vessels
- Cruise and tour boats
- Recreational vessels
- NOAA research vessels
- Department of Energy research vessels
- US Army Corps of Engineers and industry dredging vessels

The Elizabeth River system, the Lynnhaven River system, Back Bay, and Owl’s Creek also provide a variety of recreational and commercial activities throughout the City.

Freight

Trucks are the primary mover of freight within Hampton Roads. Roadway congestion adds to the operating costs of companies and shippers, impacting the economic competitiveness of the Port of Virginia, Hampton Roads, and the State of Virginia. The overall tonnage of domestic goods that will be moved into, within, and out of Hampton Roads by truck is expected to increase 65% from 66.9 million tons to 110.1 million tons between 2010 and 2040. HRTPO published a series of technical reports regarding freight and identified several major bottlenecks. Virginia Beach is fortunate to not contain one of these bottlenecks within its borders. However, all of the major routes out of Hampton Roads to the west of Virginia Beach contain major bottlenecks which affect many Virginia Beach residents and businesses.

General cargo volumes at the Port of Virginia continue to rise. About 30-35% of all containers handled by the Port of Virginia are transported by rail, which accounted for a total of 448,100 containers shipped by rail in 2014. This is up from 231,100 containers in 2009. The Hampton Roads network is owned and operated by two large Class I railroads (CSX and Norfolk Southern) and four smaller Class III railroads. With the increasing number of freight trains and the reintroduction of passenger rail into South Hampton Roads, safety and congestion at crossings are major concerns. There are 620 crossings, of which over 80% are at grade.
Recommended Policies: Other Regional Transportation Modes

- Support the implementation of the Port of Virginia’s Master Plan to enhance the state and regional economy, while ensuring that the impacts of the port operations on the region are mitigated.
- Support the implementation of the Norfolk International Airport Master Plan to ensure its continued role in serving the Southside Hampton Roads with convenient air travel, while ensuring that future actions of the Airport properly consider the impacts on the adjacent built and natural environment. This includes opportunities to enhance multi-modal connections to and from the airport.
- Work with the US Army Corps of Engineers, the US-Coast Guard, and various other agencies to support maintenance and improvements that enhance water travel for both commercial and recreational purposes.

TRANSPORTATION DEMAND MANAGEMENT

Transportation demand management, traffic demand management or travel demand management (all TDM) is the application of strategies and policies to reduce travel demand, specifically that of single-occupancy private vehicles, or to redistribute this demand in space or in time. Congestion in Virginia Beach, like that in most major US cities, is primarily concentrated during the morning, school hour, and particularly the afternoon rush hours. During off peak hours, many of the same roadways function at an acceptable level. In 2013, 82% of the commuters in Hampton Roads drove alone to work with a mean travel time of 24 minutes. Although Hampton Roads and Virginia Beach employment centers are dispersed throughout the region, there are several large employment centers that lend themselves well to TDM strategies.

Because of these traffic patterns, some congestion could be alleviated by reducing demand during the peak hours. By increasing roadway capacity through relatively inexpensive technological improvements, such as signal coordination and “Intelligent Transportation Systems (ITS)” or the changing of traffic habits, more expensive road widening could be delayed or avoided. TDM congestion management strategies and a continued push for the use of alternative transportation modes are targeted at the reduction of congestion and the need for more road construction projects.

Many regional TDM programs are offered through the regional TRAFFIX program. TRAFFIX was established in 1995 and is supported administratively by HRT. TRAFFIX receives annual state funding and promotes a variety of programs and incentives, including the following: 

- Carpooling and commuter matching
  
  Carpool matches have increased from 6,987 in 2010 to 14,952 in 2014.
• Guaranteed ride programs for anyone who gets to work by means other than driving alone

The NuRide reward program is for anyone who gets to work by means other than driving alone. NuRide registrations have roughly doubled from 673 in 2010 to 1,258 in 2014 and even more impressive is the total trips recorded have increased from 96,211 in 2010 to 457,266 in 2014.

• Information regarding Park and ride/Park and sail lots

VDOT owns and maintains several lots where commuters may park to join car/vanpools or take transit to their work destinations. There are two park and ride locations within Virginia Beach, including Silverleaf (located at the intersection of Independence Boulevard and Holland Road) and Indian River (located at the intersection Indian River Road and Reon Drive).

• Vanpooling/leasing

TRAFFIX works with area employers, including the military, to educate, develop, and implement transportation alternative programs for their employees.

Other effective TDM strategies include:
• Local ordinances that encourage mixed use development and integration of land uses to reduce the amount of distance between residential, work and other activities to make active transportation and transit choice alternatives.
• Parking pricing strategies to discourage use of automobiles and encourage the use of transit.
• Flexible work hours.

Transit and Active Transportation use are considered important components of TDM, as described in the previous sections.

Recommended Policies: Transportation Demand Management

• Continue to emphasize alternatives to road widening/new construction to alleviate congestion. Multi-modal transportation, ITS, and the various TDM strategies outlined in this chapter are the key alternatives to accomplish this.
• Strive for a per-capita net reduction of motor vehicle trips and trip distances.
• Continue to focus on changing land use development patterns to encourage mixed use and TOD development in appropriate areas throughout the City, particularly in the Strategic Growth Areas.
• Continued support of the TDM programs such as the region’s “TRAFFIX” program, which offers programs and incentives for car/van pooling and other trip reducing services.
• Encourage and provide incentives for employers to reduce peak hour demand by utilizing flexible or off-peak work schedules and telecommuting.
Agenda for Future Action Recommendations: Transportation Demand Management (TDM)

- Develop a comprehensive TDM Plan, including telecommuting, flexible work schedules, and off-peak business hours, especially in the City’s main employment centers. Utilize TRAFFIX staff to survey major employers in these centers to formulate the TDM plans with necessary incentives.
- Recognize and reduce the impacts of parking supply on travel demand by developing new fee-based parking strategies and regulations in appropriate areas with good transit service.

INTELLIGENT TRAFFIC SYSTEMS (ITS)

Even since the late 2000s, there have been substantial technological advancements that have improved or otherwise made information easier to obtain to make travel decisions. This section describes both the regional and local implementation of this technology by discussing the City’s Traffic Management System; the effect of Mobile Apps; the City’s Parking Management approach; a variety of Future Trends in transportation; and, and recommended future action items.

Various cities throughout the region maintain ITS infrastructure as part of their transportation management systems. At a regional level, VDOT maintains infrastructure at nearly every mile along the interstate highway. Technology currently in use by VDOT includes:

- Transportation Operation Centers – Centers that incorporate various ITS technologies to assist staff with traffic monitoring, incident response, and information dissemination.
- CCTV Cameras – Provides roadway images to transportation operations centers and the public.
- Vehicle Detection Devices – Records traffic volumes and speeds. Notifies transportation operations center staff of congestion and incidents.
- Electronic Toll Collection – Allows travelers to pass quickly through special lanes, avoiding backups and delays due to paying tolls.
- Reversible Roadway Gates – Allows traffic on limited access roadways to be reversed based on commuting patterns, maximizing the use of the existing roadway.
- 511 Virginia – Provides up-to-date traveler information via telephone, the internet, and other methods.
- Transit Automatic Vehicle Location (AVL) – Provides the location of transit vehicles, aiding on-time performance.
- Emergency Vehicle Signal Preemption – Changes the traffic signal when emergency vehicles approach, improving the safety and response time of emergency vehicles.
- Changeable Message Signs – Provides up-to-date information to the traveling public.
- Advanced Signal Systems – Improves the coordination and timing of traffic signals in a corridor or throughout an entire city, reducing the number of stops and delays.

In January 2006, the City of Virginia Beach formed the Traffic Management Center (TMC). The TMC has a direct connection to VDOT's TOC, which allows for data and video sharing. The TMC facilitates a transportation communication network applying technology and engineering to traffic management and disseminating traffic related information. The City of Virginia maintains a traffic management system which:

- Consists of a 100-mile fiber optic cable backbone, 50-miles of twisted pair copper cable, and 54 closed-circuit television cameras;
- Controls all of the city’s 380 traffic signals;
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- Provides a connection to the Virginia Department of Transportation's Traffic Operations Center (TOC), and will provide the City of Virginia Beach with direct access to video from the TOC's interstate cameras;
- Includes seven permanent, changeable message signs and 50 systems detectors (to detect instantaneous changes in traffic flow); and,
- Features traffic data collectors to provide information for analysis. xxvi

Mobile Apps

In the age of smartphones, apps have become a commuter's modern-day compass. Mobile apps are transforming the way we travel and how we think about mobility. A wealth of travel related information is now at the fingertips of all commuters. We are only beginning to value the data generated from and the utility of these apps. The creation of real-time and historical data may shape the future landscape of our transportation networks and transform the way we currently travel. The apps are inclusive of all types of travel modes and, in some cases, have the ability to streamline those travel modes into one seamless journey.

Parking Management

The Virginia Beach Parking Management Office manages more than 8,250 off-street spaces in eight parking garages and ten surface lots at the Oceanfront (Resort), Croatian Beach, Sandbridge Beach, Little Island, and Town Center. These locations are intended to accommodate long-term parking use and to provide overnight parking. Monthly leases are available at the Oceanfront and Town Center garages. Weekly leases are available at the Oceanfront garages to accommodate hotel guests that have multiple vehicles. When there is coordination of effective parking management with transit infrastructure and services, it can have a combined positive impact on traffic congestion. xxvii Currently, the City of Virginia Beach has implemented the use of this app at on-street parking locations at the Oceanfront. “Parkmobile” allows users to start and manage parking transactions using a mobile app. xxviii

Smarter Systems

The future of traffic management systems will improve vastly with advances in technology. Adaptive traffic signal control technology, otherwise known as smart traffic signals, will both reduce harmful vehicle emissions and travel times. New technology combines concepts of artificial intelligence and traffic theory to allow traffic signals to communicate with one another and adapt to traffic conditions in real time. States are adopting active traffic management (ATM) systems. These systems are found on interstate highways and consist of a system of computer software, sensors, and cameras. The system is built to recognize issues and reduce secondary accidents. In Virginia, an ATM pilot is currently in use on I-66. The system uses overhead lane signs to provide advance notice of traffic conditions, such as:
- Variable speed limit signs direct drivers to incrementally reduce their speeds
- Symbols direct drivers to change lanes due to lane blockage
- Overhead message signs warn drivers of slowdowns, backups and collisions ahead xxix

Emerging technologies in Information and Communication (ICT), Global Positioning Systems (GPS), and ITS will continue to advance and affect the way we currently travel. Communicating real-time traffic information has become instantaneous with digital platforms provided by the internet. Most
state Departments of Transportation use social media and mobile apps to communicate time-sensitive traffic and travel information to a broader audience than in decades past.

Connected Vehicles

Research is currently underway by the United States Department of Transportation (USDOT) and National Highway Traffic Safety Administration (NHTSA) to develop connected vehicle technology, including vehicle-to-vehicle (V2V) technology. Connected vehicle applications provide connectivity between vehicles, infrastructure, and wireless devices to prevent crashes, reduce carbon emissions, and promote continuous real-time connectivity. Vehicle safety applications will provide data such as speed and location flowing from nearby vehicles. Vehicles will identify risks and provide drivers with warnings to avoid other vehicles preventing collisions involving rear-end, lane change, and intersection crashes.

Vehicle Automation

In June 2015, Governor Terry McAuliffe announced efforts to move forward with an automated industry partnership. The partnership includes VDOT, the Department of Motor Vehicles (DMV), the Virginia Tech Transportation Institute (VTI), and Transurban. As a result of the work, the Commonwealth will create Virginia Automated Corridors (VAC). The new initiative will streamline the use of Virginia roads and state-of-the-art test facilities for automated-vehicle testing, certification, and migration towards deployment. A more detailed description of vehicle automation is provided in the Technical Report.

Recommended Policies: Intelligent Transportation Systems (ITS)

- Utilize Intelligent Transportation Systems (ITS) to maximize the efficiency of the existing transportation system.
- Encourage the use of ITS to optimize road capacity, in conjunction with VDOT and regional efforts. Examples of ITS include traffic signal systems, variable message signs, traffic cameras and electronic toll collection.
- Consider leveraging third party traffic data and analytics for real-time traffic management, incident response how data from apps and other credible sources can assist in future planning and predicting trends.
- Continue to develop technology to manage varying transportation needs that take into consideration the characteristics of urban development areas.
- Continue to support ITS technology as developed and maintained by VDOT at the regional level.
- Work in unison with all Hampton Road cities, the Hampton Roads Transportation Planning Organization (HRTPO) and VDOT to improve effective regional planning with coordination provided through the Transportation Operations Committee (TOC).

Agenda for Future Action Recommendations: Intelligent Transportation Systems (ITS)

- Update plans for traffic signalization every three years.
- Monitor trends regarding emerging technologies in the area of Information and Communication (ICT), Global Positioning Systems (GPS), and ITS. Stay current with trends in ITS to develop it as an on-going resource for transportation network infrastructure.
• Create parking strategies that merge technology and infrastructure. Adopt innovations to deliver live parking data to citizens including heat maps that can show drivers available parking on a block-by-block basis. Consider dynamic meter pricing raising the price for on-street parking during peak time to make some spaces available. When spaces are available, drivers spend less time searching for parking.
• Consider developing dynamic pricing mechanisms for roads, parking spaces, and shared-use assets to balance supply and demand.
• Continue to develop and implement adaptive signal control in coordination with FHWA. The City is currently developing an application and is awaiting approval from FHWA.
• To promote the use of local transit, consider equipping parking garages with more internal directional signage to show the location of transit stops.