2018 Chittenden County ECOS Plan

Supplement 5 – Metropolitan Transportation Plan
Adopted 6/20/2018

For a healthy, inclusive, and prosperous community

This plan is the Regional Plan, Metropolitan Transportation Plan, and Comprehensive Economic Development Strategy in one.

This plan can be found online at: www.ecosproject.com/plan

Chittenden County RPC
Communities Planning Together

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Good Jobs In A Clean Environment

Contents

List of Figures

List of Tables

List of Maps

Metropolitan Transportation Plan

Introduction and Background

The MTP is the region's principal transportation planning document that sets regional transportation priorities. It consists of short- and long-range strategies to address transportation needs that lead to the development of an integrated, inter-modal transportation system that facilitates the efficient movement of people and goods.

As mandated by federal regulations, the MTP must both articulate and work towards the region's comprehensive long-range land use plans, development objectives, and overall social, economic, environmental, system performance and energy conservation goals and objectives. It should also be consistent with the statewide transportation plan. In addition, the CCRPC is required to make special efforts to engage all interested parties in its development.

Federal regulations also mandate that the MTP considers the following:

- Ten planning factors:

  ***"(1)** Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;*

  ***(2)** Increase the safety of the transportation system for motorized and non-motorized users;*

  ***(3)** Increase the security of the transportation system for motorized and non-motorized users;*

  ***(4)** Increase accessibility and mobility of people and freight;*

  ***(5)** Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;*

  ***(6)** Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;*

  ***(7)** Promote efficient system management and operation;*

  ***(8)** Emphasize the preservation of the existing transportation system;*

  ***(9)** Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and*

  ***(10)** Enhance travel and tourism."*

- Look out a minimum 20 years into the future and be updated every five;

- Identify existing and proposed projects and strategies that together function as an integrated metropolitan transportation system;

- Maintain a multi-modal focus that includes transit and bicycle and pedestrian facilities;
- Estimate costs and identify revenue sources that are reasonably expected to be available for operation, maintenance and capital investments;
- Identify measures and targets to gauge transportation system performance;
- Determine ways to preserve existing facilities and services and make efficient use of the existing system; and
- Discuss potential environmental mitigation of MTP projects and strategies.

The MTP is one of three primary responsibilities of Metropolitan Planning Organizations or MPOs (the CCRPC is serving as the MPO for Chittenden County). The others are the Transportation Improvement Program (TIP) and the Unified Planning Work Program (UPWP). The TIP is the annually updated four-year list of project priorities identified for federal funding. The UPWP, also updated every year, is the CCRPC's work program that describes, and allots funding for transportation planning activities in the county by CCRPC staff, its consultants, and other transportation and planning partner agencies in the region.

The 2018 MTP incorporates by reference two plans that were adopted/approved by the CCRPC Board. These are: 1) Regional Active Transportation Plan (https://www.ccrpcvt.org/our-work/our-plans/regional-bikeped-plan/), adopted April19, 2017; and 2) Chittenden County Intelligent Transportation Systems (ITS) Plan (https://www.ccrpcvt.org/our-work/our-plans/intelligent-transportation-systems/), approved January 20, 2016.

Following this introduction, here is the sequence of MTP elements of this ECOS Supplement:

- Transportation Goal, Issues, and Summary of MTP Investments
- Key Transportation Indicators & Performance Measures
- Existing Metropolitan Transportation System
- Financial Plan
- Scenario Planning Review and Future Conditions
- MTP Corridors
- MTP Investments and Project List
- Environmental Impacts and Mitigation Report

Transportation Goal, Issues, and Summary of MTP investments

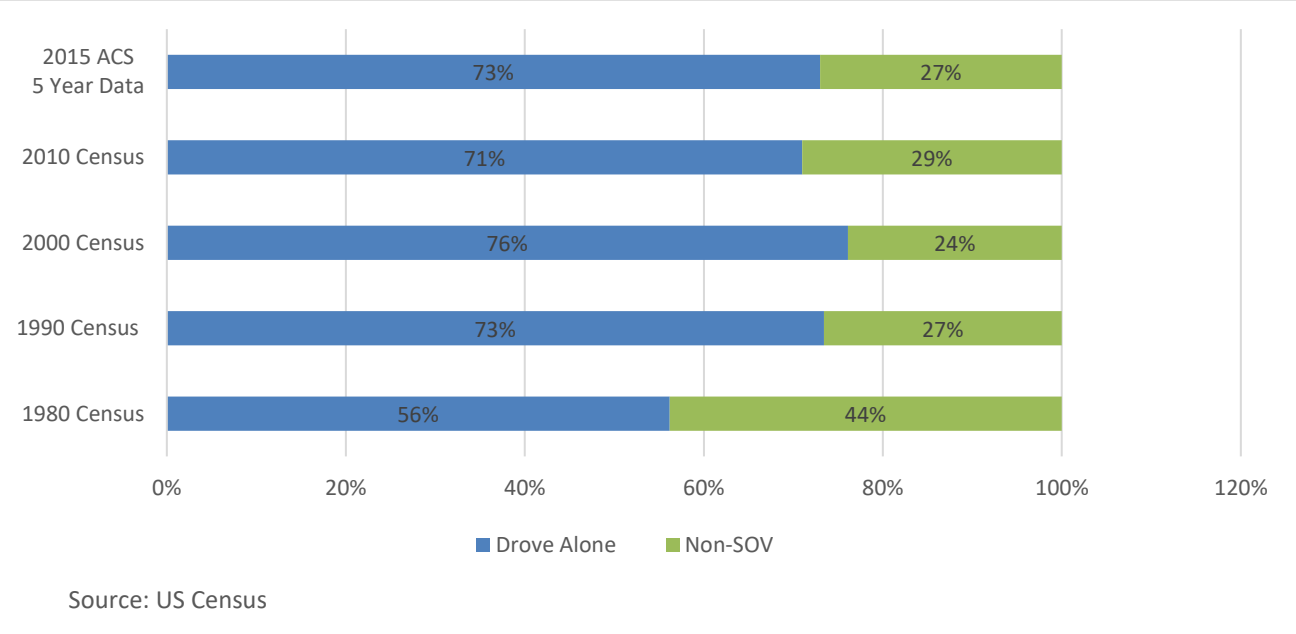
Provide accessible, safe, efficient, interconnected, secure, equitable and sustainable mobility choices for our region's businesses, residents and visitors.

ISSUES, TRENDS, OBSERVATIONS & SUMMARY OF MTP INVESTMENTS

The CCRPC advocates for the concentration of at least 80% of future growth in 15% of Chittenden County's land area. Low-density development in rural areas will raise Vehicle Miles Traveled (VMT), increase traffic congestion and contribute to more harmful air pollutants and greenhouse gases. Directing transportation investments to serve mobility and accessibility in compact settlements will result in a more cost-effective and efficient transportation system.

In Chittenden County, our rate of driving alone to work increased from 56% in 1980 to 73% according to the latest 5-year American Community Survey average. On the other hand, VMT per person has been on a downward trend. From 2007 to 2014, VMT per capita declined from 27 daily miles driven to 25. However, since 2014, it has increased slightly to 25.3 daily miles driven, probably due to significantly lower fuel prices in the past few years. Continued increases in VMT could increase congestion and traffic delays on our highways and have negative impacts on economic development, the environment and human health.

FIGURE 1 – PERCENT OF WORKERS COMMUTING BY SOV AND NON-SOV



Even though low fuel prices have a number of negative impacts on transportation behavior and choices, we should be cognizant that as fuel prices rise, rural and low-income residents are disproportionately impacted by increases in household transportation costs.

It is imperative that we continue to support efforts to reduce VMT per capita and single-occupancy vehicle (SOV) travel. More robust investment in transit, walking/biking, carsharing and ridesharing, and other Transportation Demand Management (TDM) measures could reduce VMT, traffic delays and congestion and the use of single-occupancy vehicles; enhance the economic well-being of our residents, businesses and visitors; reduce social isolation and improve public health. The lack of safe and convenient alternatives to automobile travel disproportionately affects vulnerable populations.

Some population segments – youth, the elderly, low-income, minorities and new Americans– lack access to viable public and private transportation options. The lack of safe, reliable, and complete connections within the transportation system and between transport modes reduces access to employment, and social, economic, and recreation opportunities; and limits access to basic needs by means other than a personal vehicle.

There is a significant link between transportation choices and public health. The degree to which individuals in a community are physically active is directly dependent on transportation opportunities, infrastructure, and community design. Walkable communities with safe and contiguous infrastructure to support active transportation and a robust transit network, generally encourage physical activity and have a lower dependency on automobiles. The health benefits of physical activity and its role in reducing risk for chronic disease has a cross-cutting societal impact.

According to the 2017 VTrans Public Transit Route Performance Report, over half of all public transit trips in Vermont occur in Chittenden County. While access to public transit has improved in the greater Burlington area, some suburban and most rural populations lack access to transit. Implementing the recommendations from Green Mountain Transit's NextGen Transit Plan will improve the service levels, route directness and service convenience on their urban network.

The overall condition of the arterial highways in Chittenden County has improved significantly since 2013. In 2013, over 50% of Chittenden County arterials were rated poor or worse in terms of roadway condition. Today, that figure has dropped to just under 28%. While roadway conditions have improved, there is still a concern that transportation funding is overly reliant on the state and federal gas taxes, which are decreasing in value as inflation lowers purchasing power and revenues decline due to improved vehicle fuel efficiency and a growing number of electric and hybrid vehicles. The prospect of less funding to maintain our existing system and invest in new transportation improvements is a disconcerting trend that has not been adequately addressed at the federal or state level.

The MTP must be fiscally constrained to the funding anticipated for investment in the planning horizon through 2050. **Table 1** outlines the funds anticipated to be available to address transportation needs in Chittenden County through 2050.

TABLE 1 – CHITTENDEN COUNTY FUTURE FUNDING ESTIMATES

Chittenden County Future Funding Estimates (Federal, State and Local Funds)	Cost in Millions (2016$)
Total Available Funding for Transportation System	$1,744.72
Funding to Paving, Bridge and Transit Operations and Maintenance	$1,221.30
Cost of 2017 Transportation Improvement Program (TIP) Construction Projects	$102.75
Total Available New Funding to address new transportation needs excluding TIP	$420.67
Estimated Cost of Anticipated New Projects (the sum of all items on the MTP Project List excluding TIP Projects)	$422.43

SUMMARY OF MTP INVESTMENTS

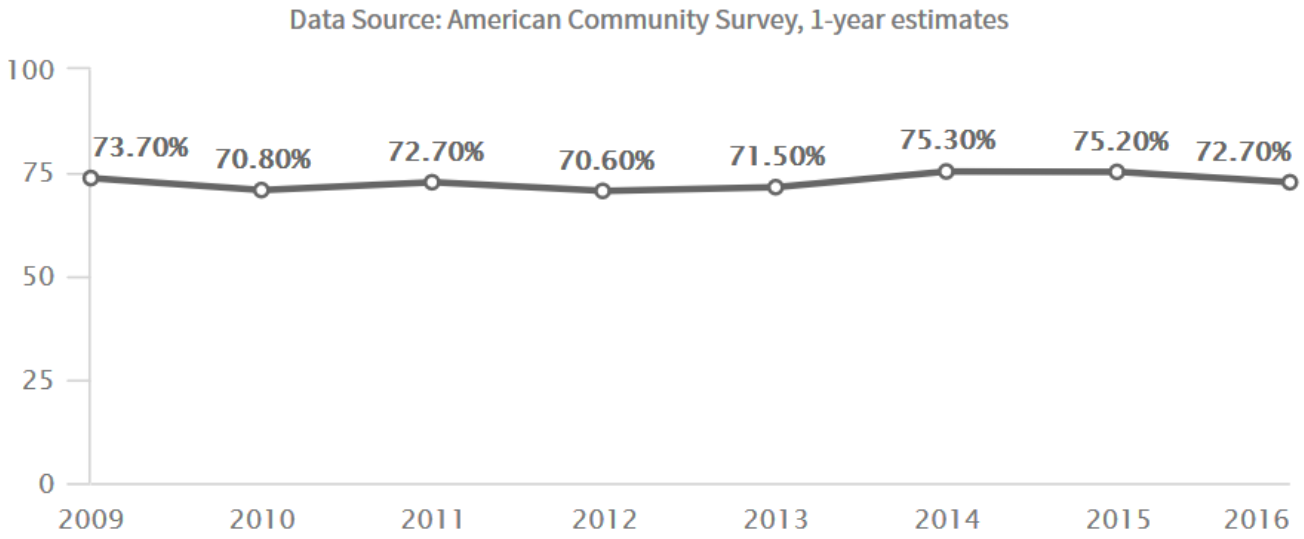
A summary of recommended MTP investments is provided below. Further discussion on these investments is included in the subsequent *MTP Investments and Project List* section of this Supplement.

- Maintaining our existing transportation system.
- Address safety and localized congestion issues on our roadways.
- Expand bike and pedestrian infrastructure and provide interconnection with the region's transit system
- Improve transit services in the county by providing 15-minute headways for all existing trunk routes in the county (US2, US7, VT15, and North Avenue); 20 to 30-min headways for all other routes; a new VT-127 to Colchester transit loop service; and increased service during weekends.
- Support Transportation Demand Management (TDM) programs and partners such as CATMA, CarShare Vermont, Local Motion, NeighborRides, and others.
- Invest in Intelligent Transportation Systems (ITS) to facilitate traffic flows on our arterials and minimize the need for major roadway expansion projects.
- Address lane capacity and Interchange access issues on Interstate 89.
- Promote a shift away from gas/diesel vehicles to electric or other non-fossil fuel transportation options.
- Support and enhance our rail infrastructure for both passenger and freight transportation.

Key Transportation Indicators & Performance Measures

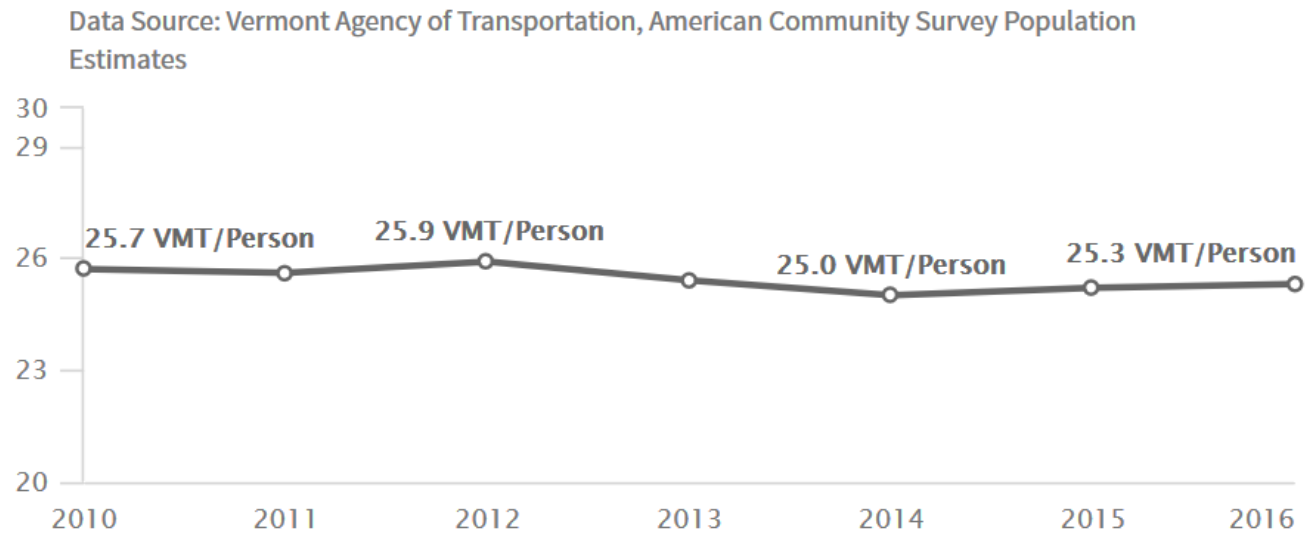
The 2013 ECOS/MTP Plan developed a number of regional transportation indicators which were expanded and updated annually since the plan was adopted. All current regional indicators for Chittenden County are presented below and posted on the ECOS Scorecard site at: https://app.resultsscorecard.com/Scorecard/Embed/8502.

FIGURE 2 – CHITTENDEN COUNTY DRIVING ALONE TO WORK



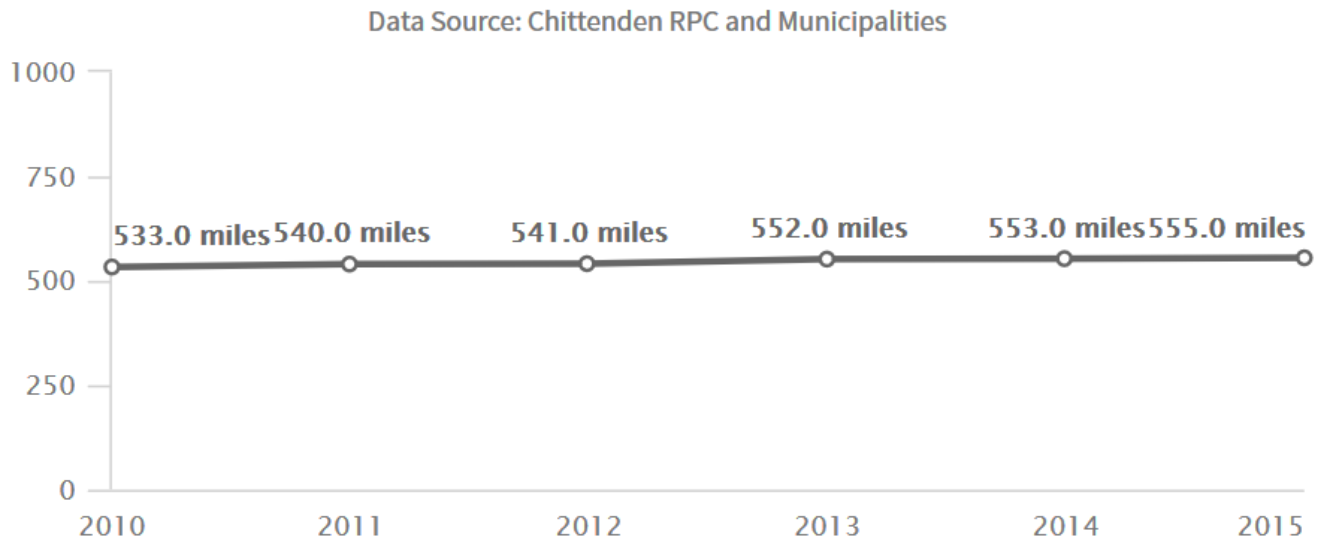
The smaller the share of work trips taken via single occupant vehicle modes and the more residents choose to commute by bus, carpool, walking, biking, or telecommuting, the more efficient our transportation system functions. There are also environmental, safety, financial, and health benefits that can accrue to society and individuals as the percentage of the population that drives alone to work decreases.

FIGURE 3 – CHITTENDEN COUNTY DAILY VEHICLE MILES TRAVELED PER PERSON



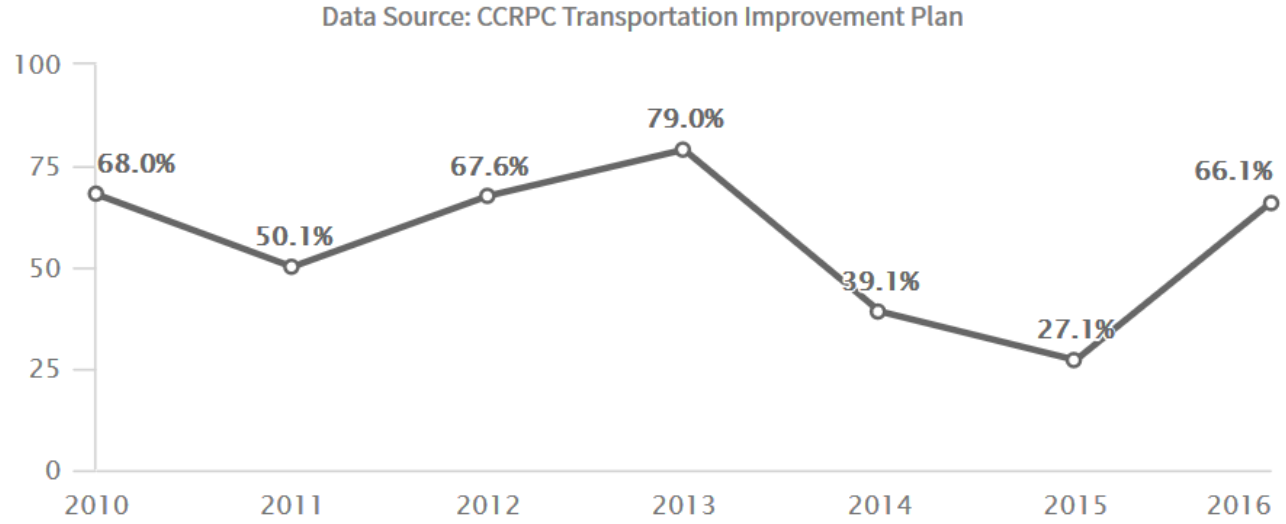
We would like to see a continued downward trend for this indicator to demonstrate less driving alone. A decrease in VMT per person indicates more efficient use of our system and a greater reliance on transportation alternatives – factors that contribute to a more sustainable and balanced transportation system.

FIGURE 4 – CHITTENDEN COUNTY WALKING & BIKING INFRASTRUCTURE



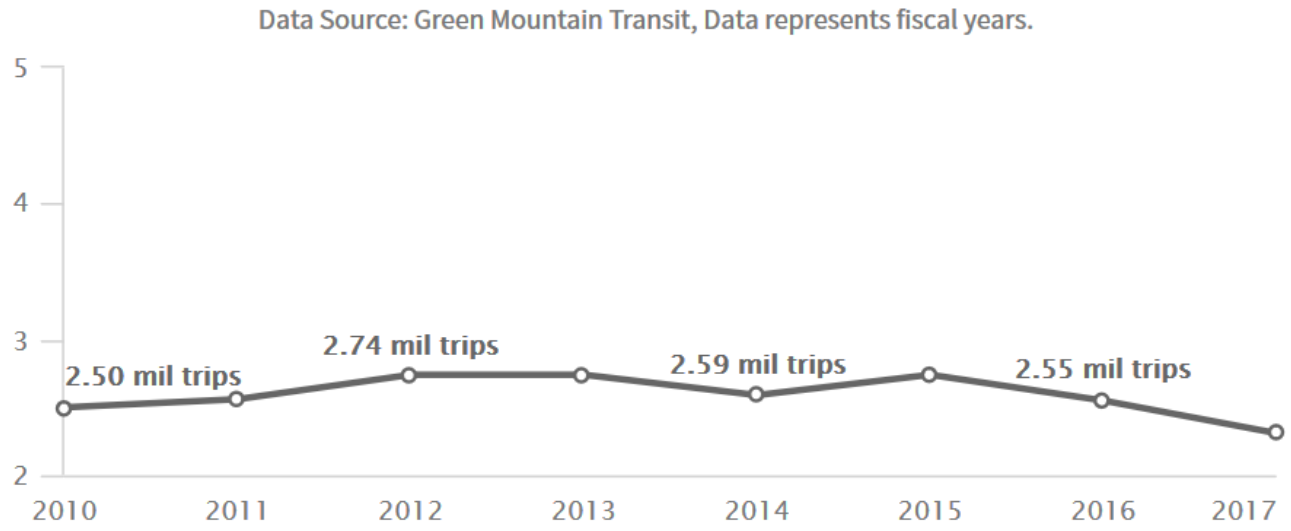
The greater length of these facilities means more facilities available for pedestrians and bicyclists – two modes we would like to see more people utilize more frequently. These facilities can take vehicle trips off roads and boost public health. We hope to see the lengths of these facilities go up each year.

FIGURE 5 – SUSTAINABLE FUNDING, SYSTEM PRESERVATION BY FISCAL YEAR



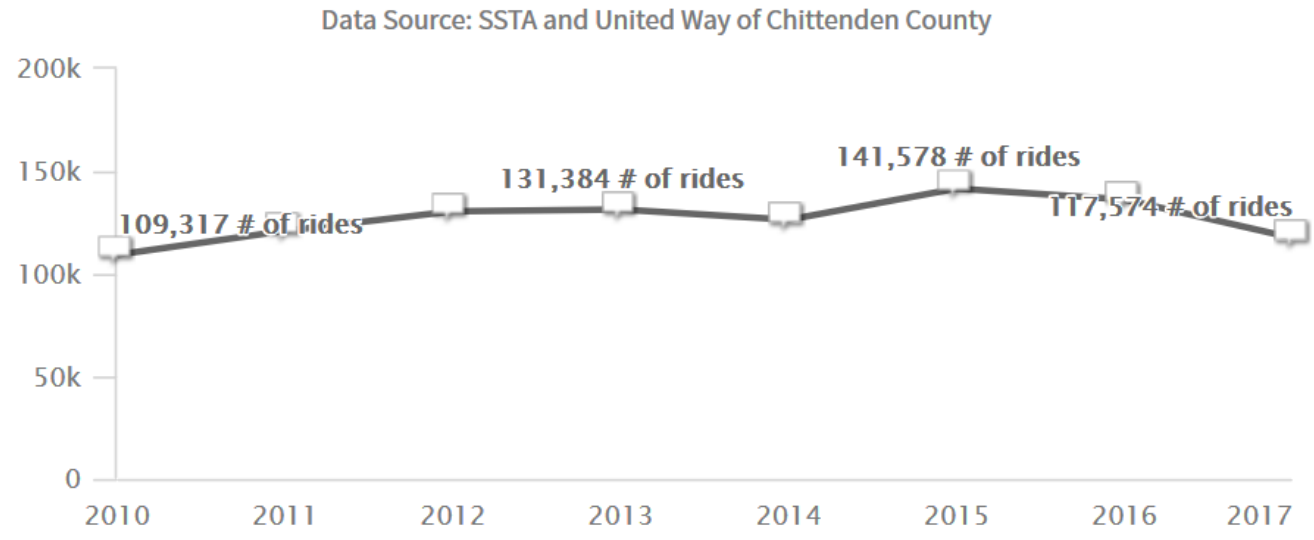
Maintaining our existing transportation system is a critically important task and a top sustainable transportation priority. The ECOS Plan estimates that 64% of anticipated future transportation funds, on average, will need to go to system preservation in order to sustain its integrity and protect public safety. This annual calculation will be tracked to assure adequate system maintenance investment (while realizing there may be year to year fluctuations).

FIGURE 6 – GMT RIDERSHIP IN CHITTENDEN COUNTY



Public transit not only provides essential mobility for those without a vehicle, it also removes cars from the roads for those who choose this mode for other reasons. Higher transit use helps sustain an efficient transportation system.

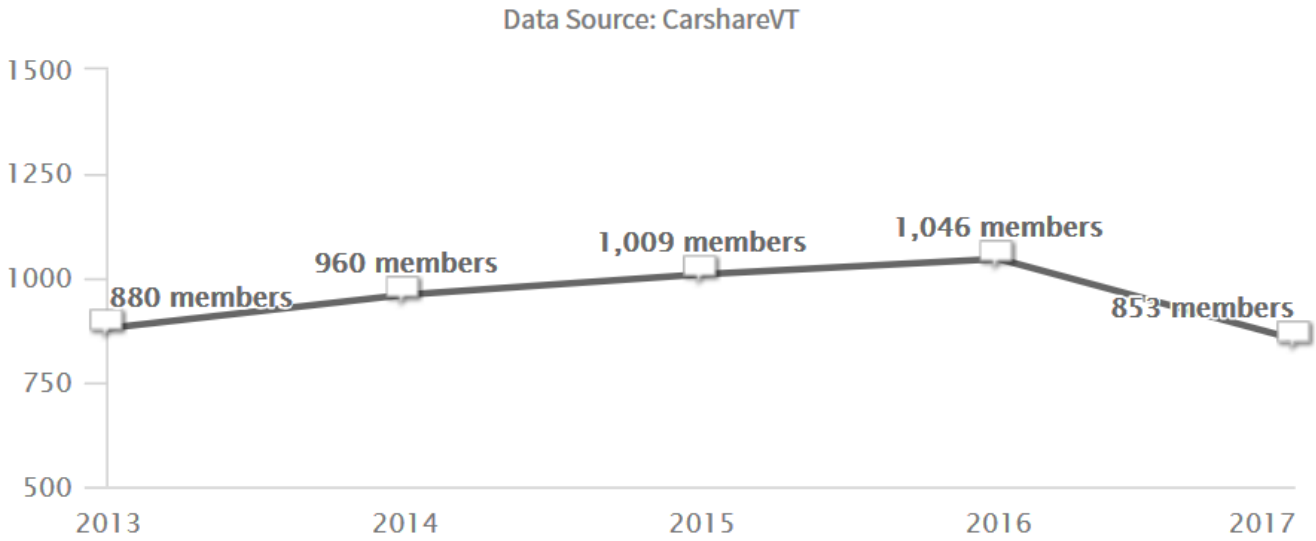
FIGURE 7 – NUMBER OF TRIPS PROVIDED BY THE SPECIAL SERVICES TRANSPORTATION AGENCY (SSTA)



The Special Services Transportation Agency is a private not-for-profit corporation that provides Americans with Disabilities Act (ADA) paratransit services for persons unable to use the GMT fixed

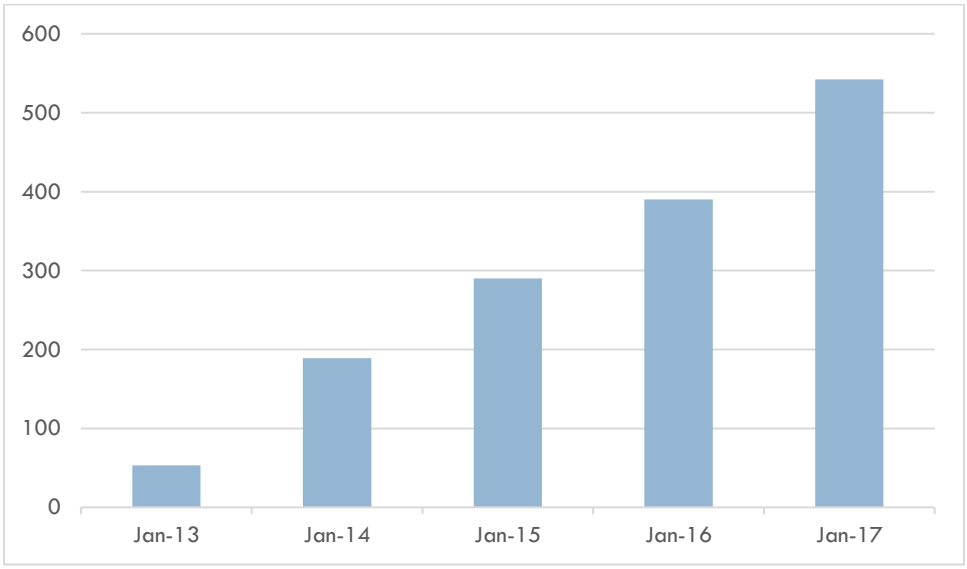
route bus system because of a disability. This is a critical service that gives elderly and disabled populations that transportation needed for social interaction, job training and employment, medical services and therapy.

FIGURE 8 – CARSHARE VERMONT MEMBERSHIP



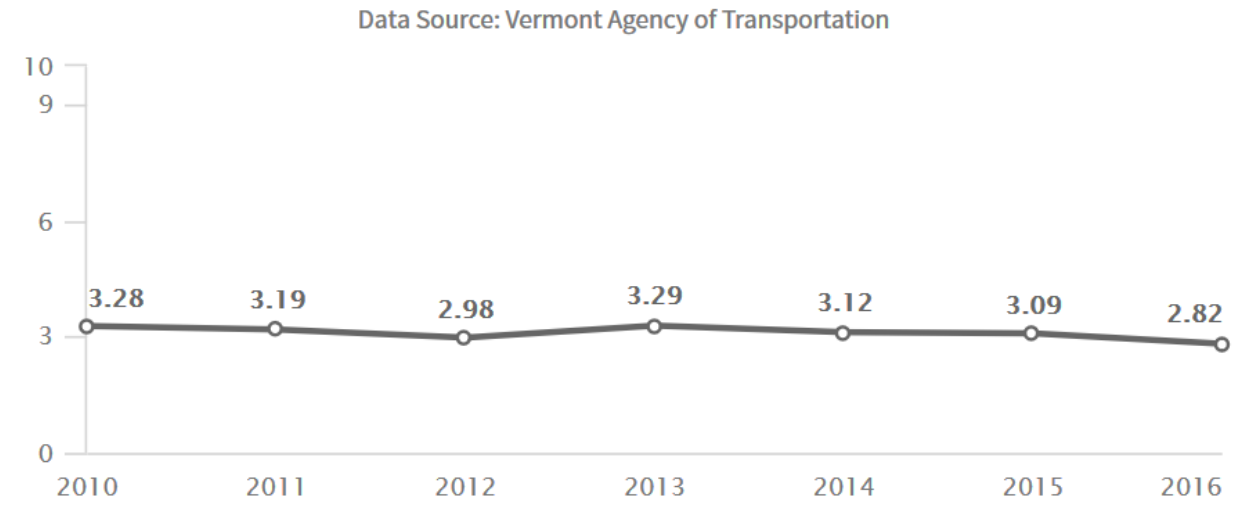
Car share is yet another alternative to vehicle ownership proven to reduce the number of overall trips and improve transportation system efficiency. More members, a greater fleet and wider geographic distribution of vehicles expands this option and contributes to transportation sustainability.

FIGURE 9 – CHITTENDEN COUNTY ELECTRIC VEHICLE REGISTRATIONS



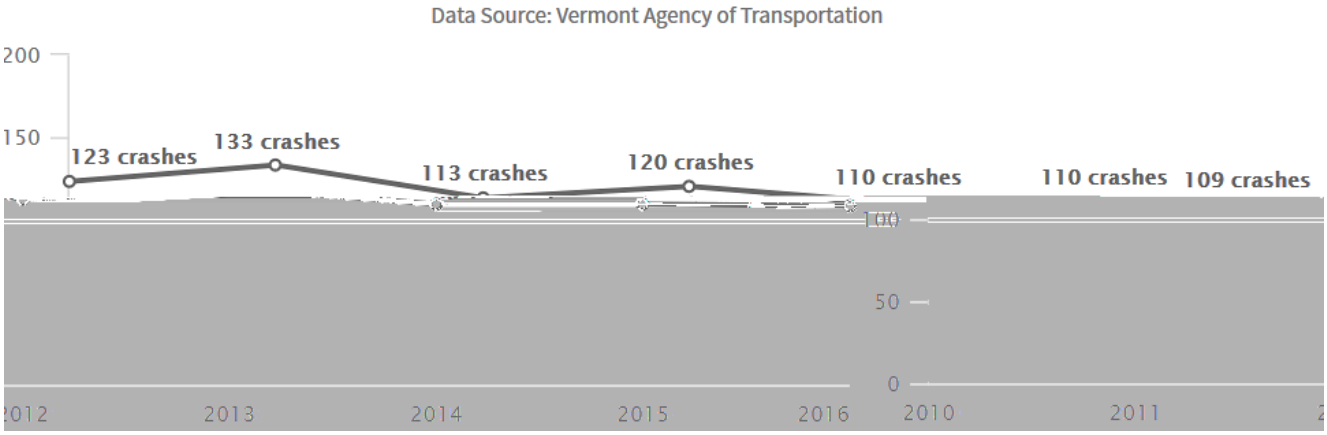
Increasing the number of electric vehicles is key to reducing the use of fossil fuels for transportation and to reducing transportation energy use. Currently, electric vehicles make up a very small part of Chittenden County's vehicles. In 2015, there were 106,936 vehicles registered in Chittenden County. As of July 2017, there were 601 electric/plug-in hybrid vehicles registered in Chittenden County.

FIGURE 10 – NUMBER OF VEHICLE CRASHES PER MILLION ANNUAL VEHICLE MILES TRAVELED IN VERMONT



If the indicator ratio is decreasing, we are seeing improvements in motor vehicle related safety – fewer crashes per miles travelled is better than more. The desire is for this ratio to trend downward.

FIGURE 11 – NUMBER OF REPORTED VEHICLE CRASHES INVOLVING BICYCLES OR PEDESTRIANS IN VERMONT



A reduction in crashes involving bicycles and pedestrians is a key measure that highlights safety improvements for active transportation users.

PERFORMANCE MANAGEMENT

The most recent federal law on transportation authorization (FAST-ACT) places considerable emphasis on system performance and directs State Departments of Transportation (DOTs) and MPOs to evaluate how well the system is doing. At the national level, Performance Management has become part of the Federal Highway Administration's (FHWA)Transportation Performance Management (TPM) program. The TPM program is a strategic initiative implemented to achieve national transportation performance goals. The intent is to measure progress against the national goals through a reliable data-driven process. FHWA has established measures in the following areas:

- Safety
- Infrastructure Condition
- Congestion
- System Reliability
- Freight
- Air Emissions

The established performance measures under each of these categories are:

- Safety
    1. Number of Fatalities
    2. Rate of Fatalities per 100 million Vehicle Miles Traveled (VMT)
    3. Number of Serious Injuries
    4. Rate of Serious Injuries per 100 million VMT
    5. Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries
- Infrastructure Condition
  Pavement
    1. Percentage of pavement on the Interstate in good condition
    2. Percentage of pavement on the Interstate in poor condition
    3. Percentage of pavement on the non-Interstate National Highway System (NHS) in good condition
    4. Percentage of pavement on the non-Interstate National Highway System (NHS) in poor condition

  Bridges
    1. Percentage of NHS bridges in good condition
    2. Percentage of NHS bridges in poor condition
- Congestion
  NOTE - Not required in Vermont because we don't exceed national air quality standards
- National Highway System Reliability
    1. Interstate travel time reliability
    2. Non-Interstate NHS travel time reliability
    3. Freight reliability measure (truck travel time)
- Air Emissions – percent change in tailpipe carbon dioxide (CO2) emissions on the National Highway System (**NOTE**: FHWA now proposes repeal of this measure)

Having established the measures, it's up to state DOTs and MPOs to set quantifiable targets to gauge progress toward national goals. The schedule to establish targets, varies by measure. Federal

regulations generally have state DOTs set performance targets in the various categories and then give MPOs another 180 days to either adopt the State targets or establish their own.

In addition to the FHWA, the Federal Transit Administration (FTA) has a performance management program as well. Their program establishes a system to monitor and manage public transportation assets for improved safety, reliability and performance with the goal of maintaining transit assets in a State of Good Repair (SGR). Green Mountain Transit (GMT formerly CCTA), under this program, is tasked with developing a Transit Asset Management (TAM) Plan to include the following elements:

- An inventory of their capital assets.
- Condition assessment of these assets
- Description of the analytic or support tool used to prioritize investments
- Investment prioritization

GMT will develop their TAM plan, establishing performance targets, in cooperation with the CCRPC and VTrans.

Along with target setting comes reporting progress to FHWA and FTA. Currently reporting dates for the various measures varies by measure. Several national transportation organizations have request that USDOT extend by one year some reporting deadlines to establish a common reporting date for all measures and their targets.

Safety Performance Measures & Targets

Five performance measures were established under the Safety category in support of the Highway Safety Improvement Program (HSIP). Targets are set by DOTs and MPOs to evaluate performance on reducing fatalities and serious injuries on our highways. State HSIP targets are reported by August 31 each year and MPOs must establish targets within 180 days of the State reporting their targets or by February 27 of each year.

VTrans has developed and reported the following safety targets in the summer of 2017, in collaboration with the CCRPC and other partners. The CCRPC Board accepted the statewide targets set by VTrans and decided not to establish separate targets for the MPO area at their February 21, 2018 meeting.

TABLE 2 – VTRANS AND CCRPC SAFETY PERFORMANCE TARGETS 2018

VTrans Safety Performance Management Targets (5-Year Averages)	2018 Target
Number of Fatalities	57.0
Number of Fatalities per 100M VMT	0.830
Number of Serious Injuries	280.0
Number of Serious Injuries per 100M VMT	4.0
Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries	39.4

The following charts illustrate the Chittenden County and statewide data tracked to help establish VTrans' and CCRPC's safety targets:

FIGURE 12 – ANNUAL FATALITIES & 5-YEAR AVERAGE FATALITIES

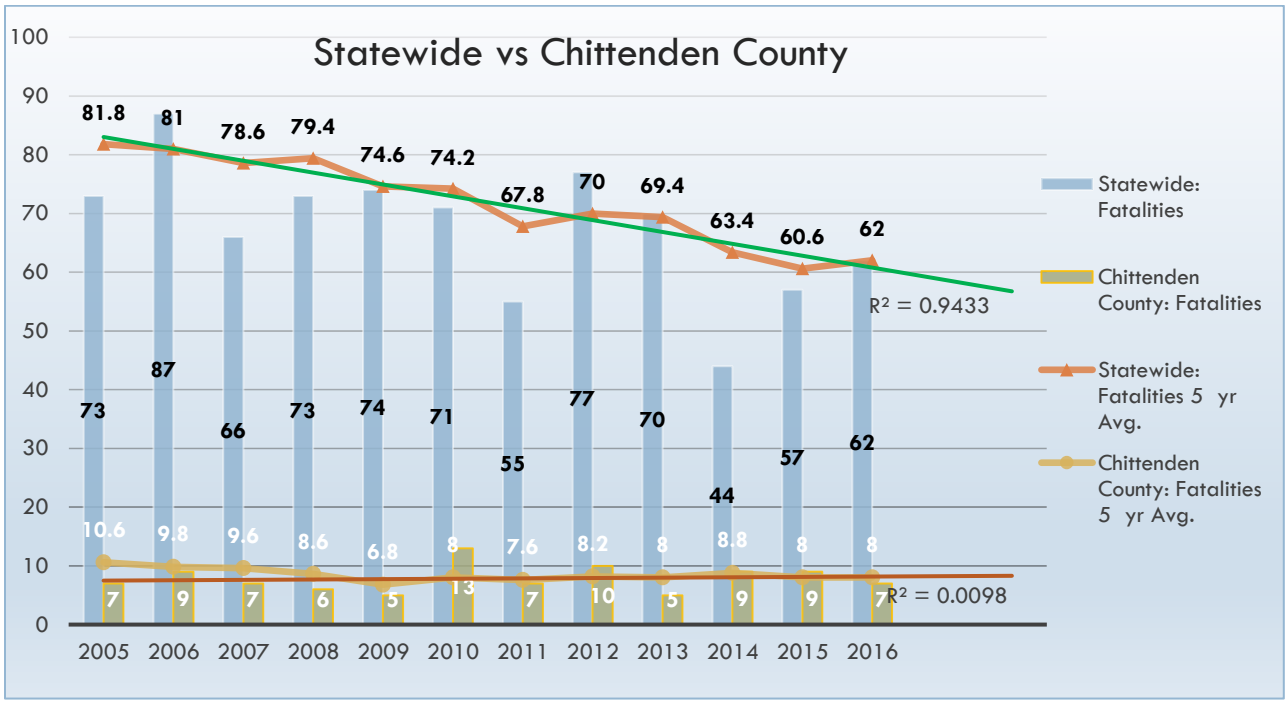


FIGURE 13 – ANNUAL SERIOUS INJURIES & 5-YEAR AVERAGE SERIOUS INJURIES

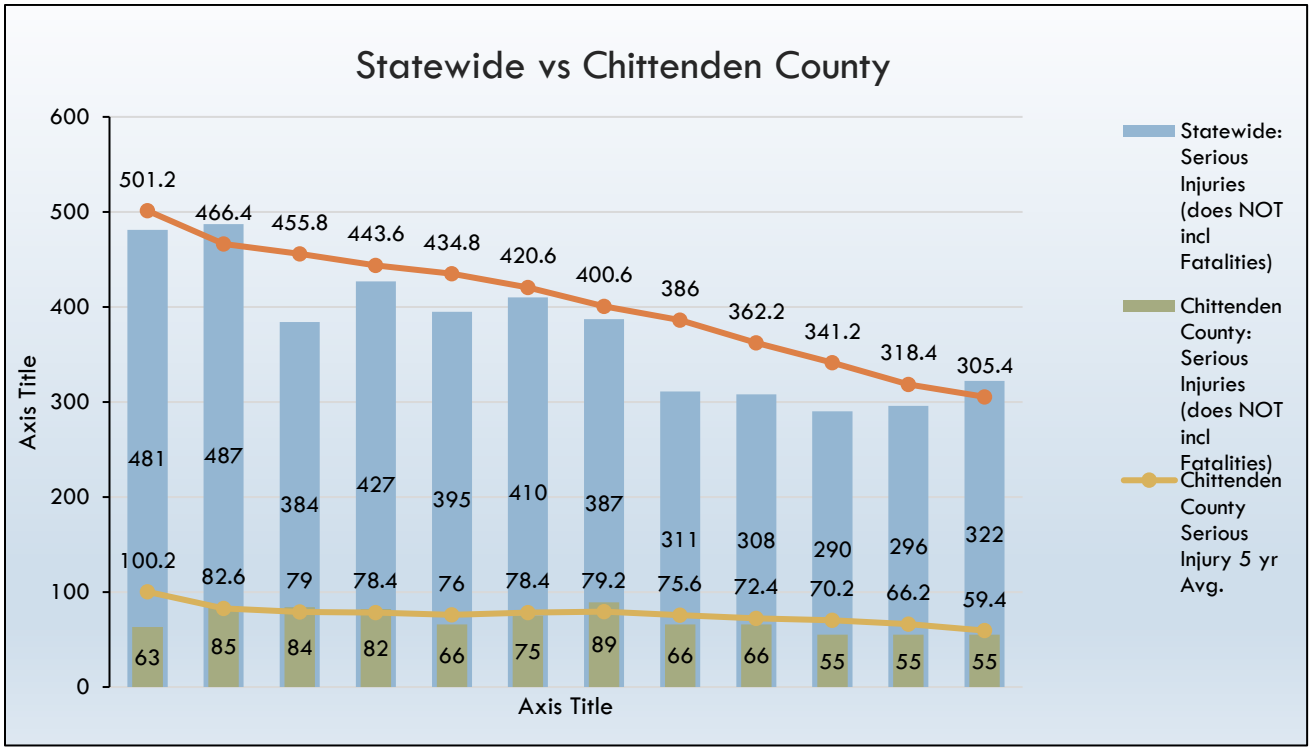


FIGURE 14 – 5-YEAR FATALITY RATE

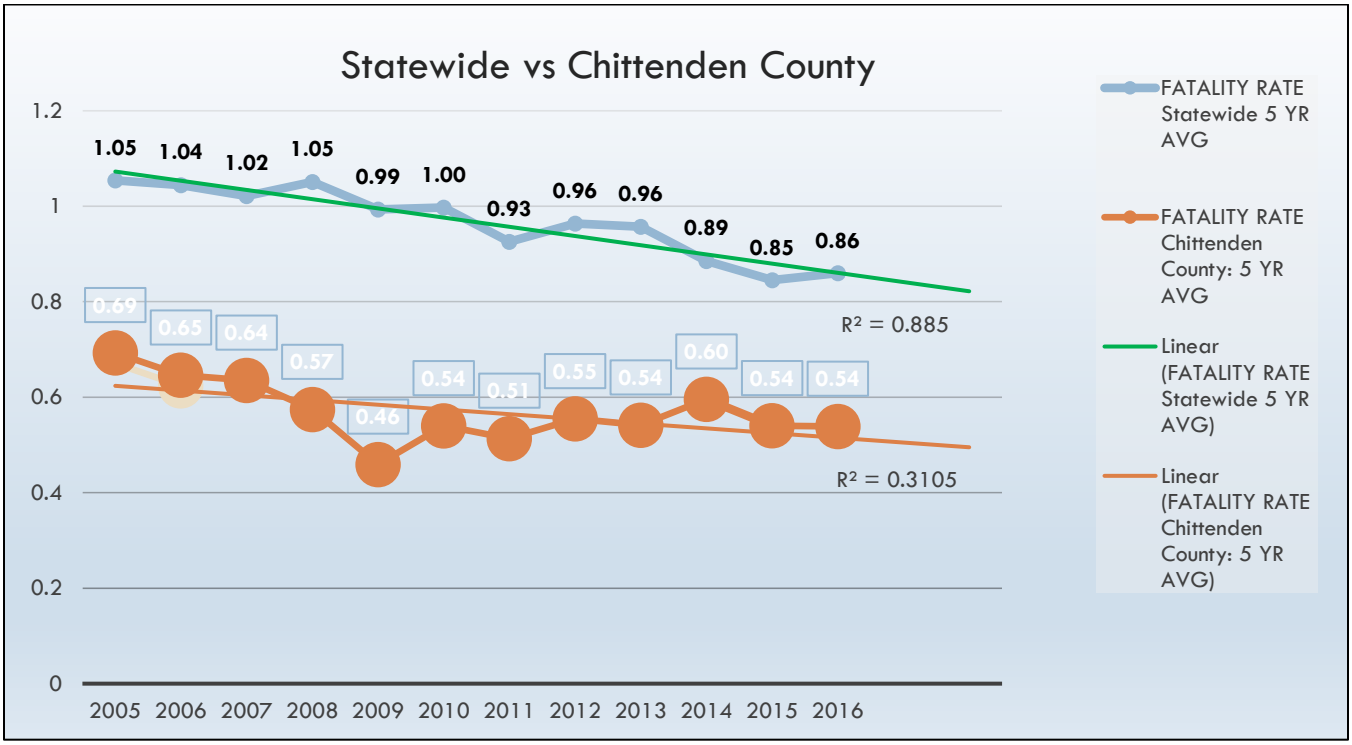


FIGURE 15 – 5-YEAR AVERAGE SERIOUS INJURY RATE

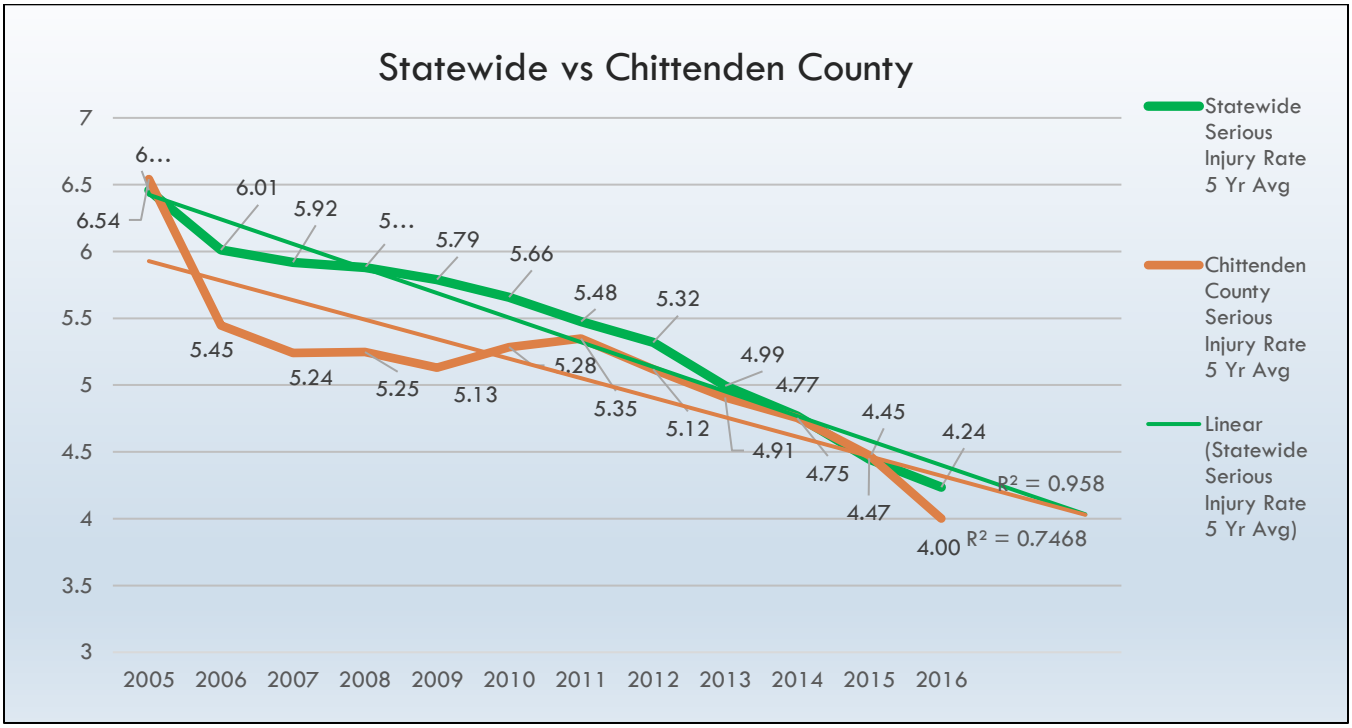


FIGURE 16 – STATEWIDE ANNUAL BIKE & PEDESTRIAN FATALITIES AND SERIOUS INJURIES

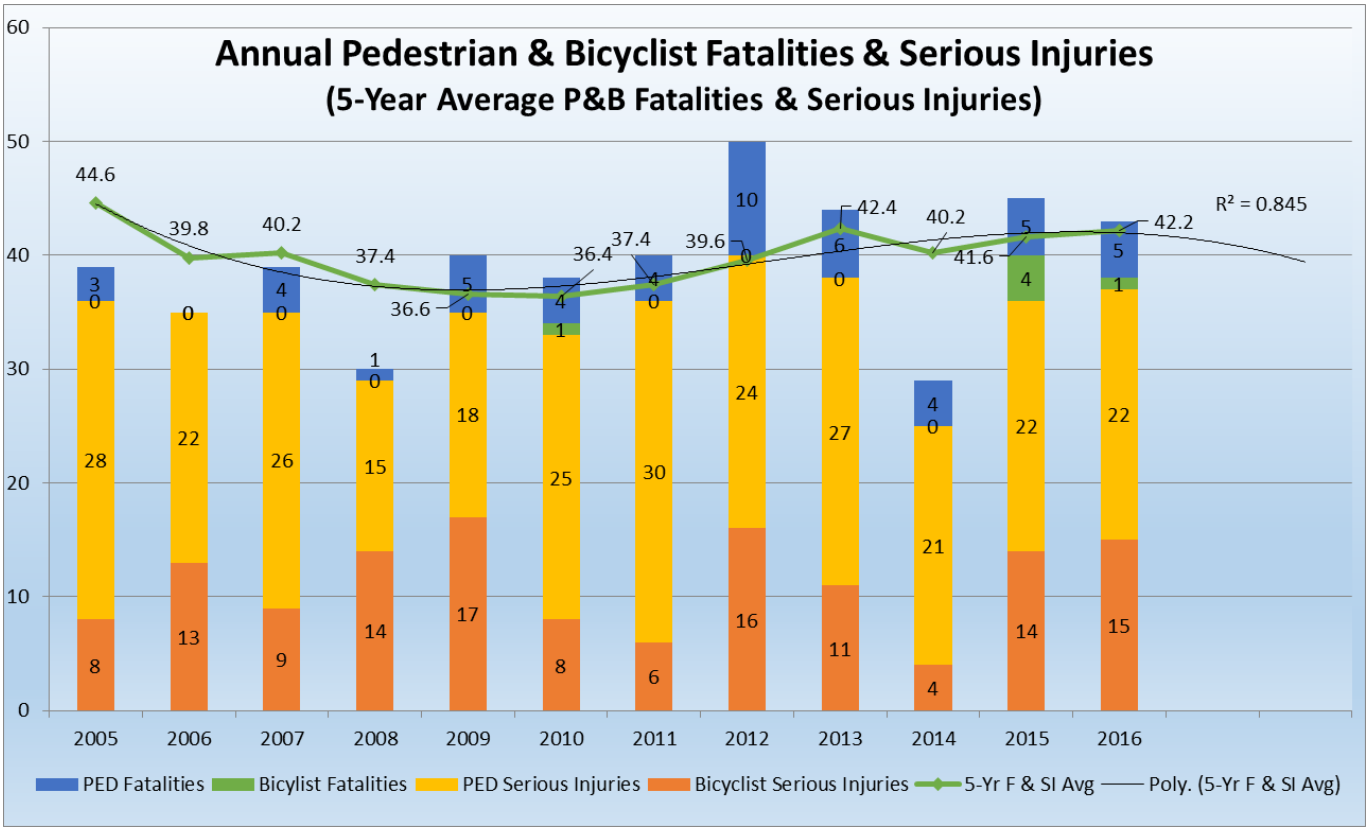
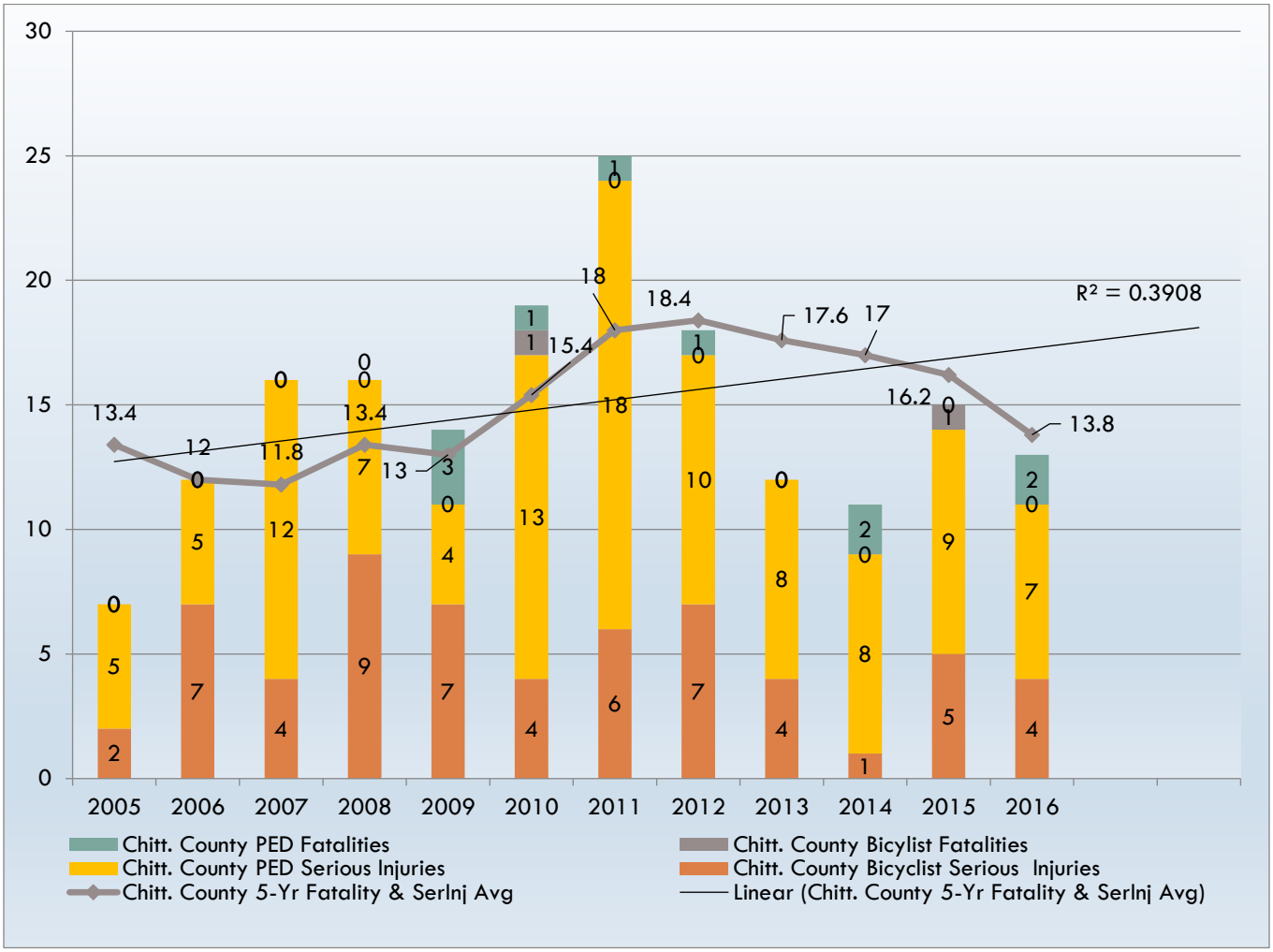


FIGURE 17 – CHITTENDEN COUNTY ANNUAL BIKE & PEDESTRIAN FATALITIES AND SERIOUS INJURIES



CCRPC's Transportation Performance Management Report

The CCRPC will continue to coordinate and collaborate with VTrans and GMT (as appropriate) to set targets for performance measures under the general categories of Safety, Infrastructure Condition, National Highway System Reliability and the Transit Asset Management (TAM) Plan, to ensure that national, state and regional transportation goals are achieved.

The CCRPC will develop a separate Transportation Performance Management Report for the metropolitan region where all relevant performance measures and targets will be presented and discussed. This report will also discuss how the CCRPC is achieving the established targets and will detail how future investment priorities are linked to various measures and targets.

Lastly, the CCRPC has an agreement with VTrans and GMT dated May 18, 2016 (https://www.ccrpcvt.org/wp-content/uploads/2016/02/CCTA-CCRPC-VTrans-Agreement-May-2016.pdf) that describes our intent to work collaboratively in carrying out the performance based planning as outlined in the discussion above.

Existing Metropolitan Transportation System

The primary focus of the MTP is the Metropolitan Transportation System (MTS). The MTS is the multimodal network of highways, arterial and major collector roadways, transit services, traffic signal systems, rail lines and stations, walk/bike facilities, park-and-ride facilities, Burlington International Airport, and other intermodal facilities critical to the movement of people and goods in the region. It is also the system (with the inclusion of all public bridges over twenty feet in length) eligible for federal transportation funding investment. **Map 1** depicts the existing Chittenden County MTS. To examine in detail, see the larger scale version here: https://map.ccrpcvt.org/ChittendenCountyVT/

While not specifically addressed in this plan, local roads are also an important part of the road network in Chittenden County. Local roads are owned and maintained by the municipality in which they are located and are generally not eligible for federal transportation funding investment.

Evaluating transportation facilities on a system-wide basis using the MTS framework facilitates identifying problems, developing solutions, and evaluating performance across the entire interrelated transportation system. The MTS distinguishes locally important transportation facilities and services from those that are strategically significant at the regional, state and federal levels. The regionally significant facilities and services form the modal components critical to Chittenden County's mobility needs. As the transportation system evolves and grows over time based on the recommendations later in this MTP, the MTS continues to change to accommodate those new facilities and services. The MTS is not stagnant but a dynamic system requiring periodic updates.

This MTP recognizes that by addressing the transportation system as a single entity of interrelated elements, we become more aware of and address potential conflicts at the planning stage, rather than finding unexpected consequences later in the project implementation phase.

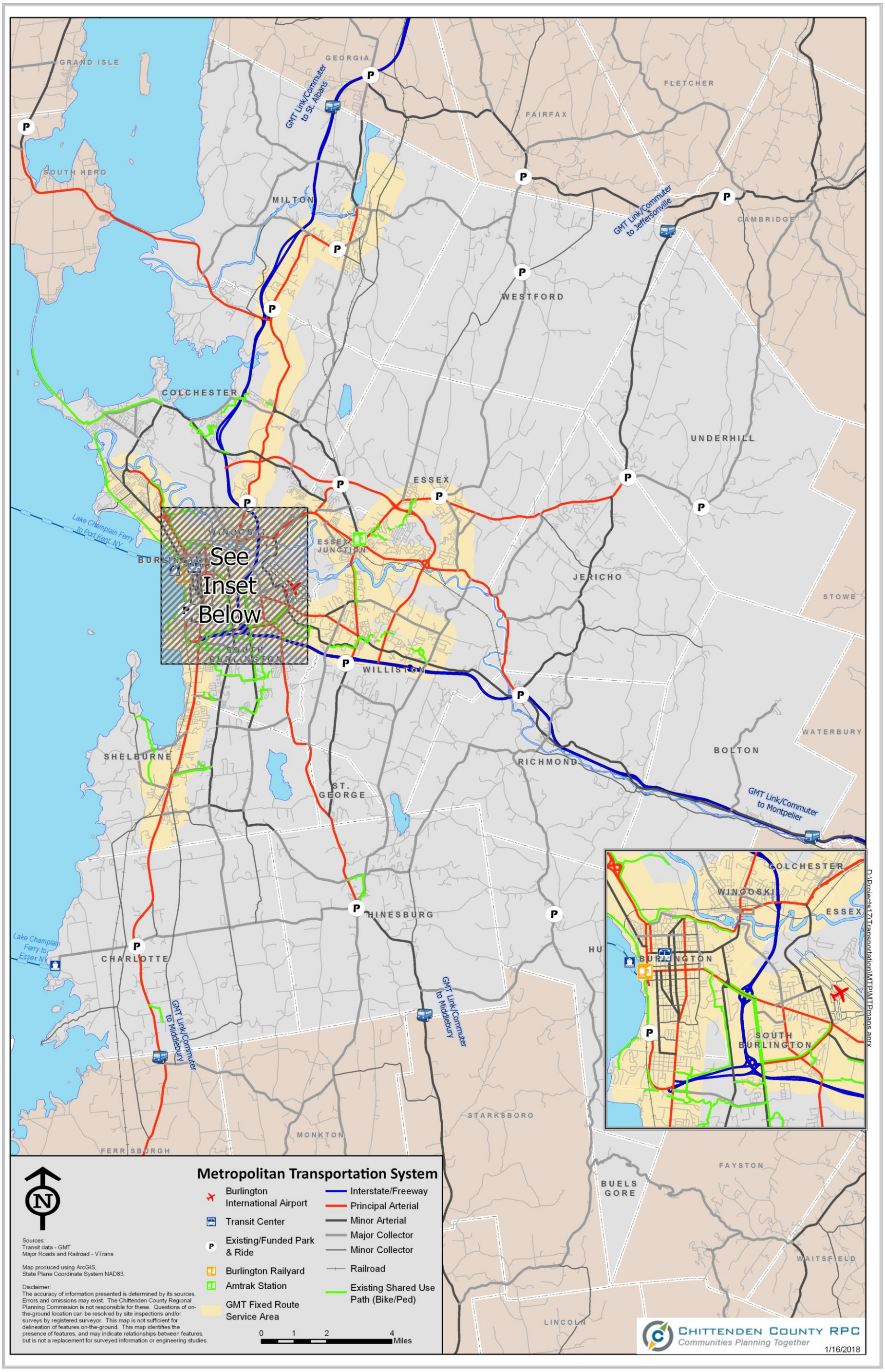
CURRENT TRANSPORTATION CONDITIONS

The current condition of the region's Metropolitan Transportation System is assessed in the following sections. This assessment supports the need for maintaining the existing MTS, and also highlights the major issues and concerns about the system condition and identifies areas where improvements are necessary.

Roadways, VMT, and Congestion

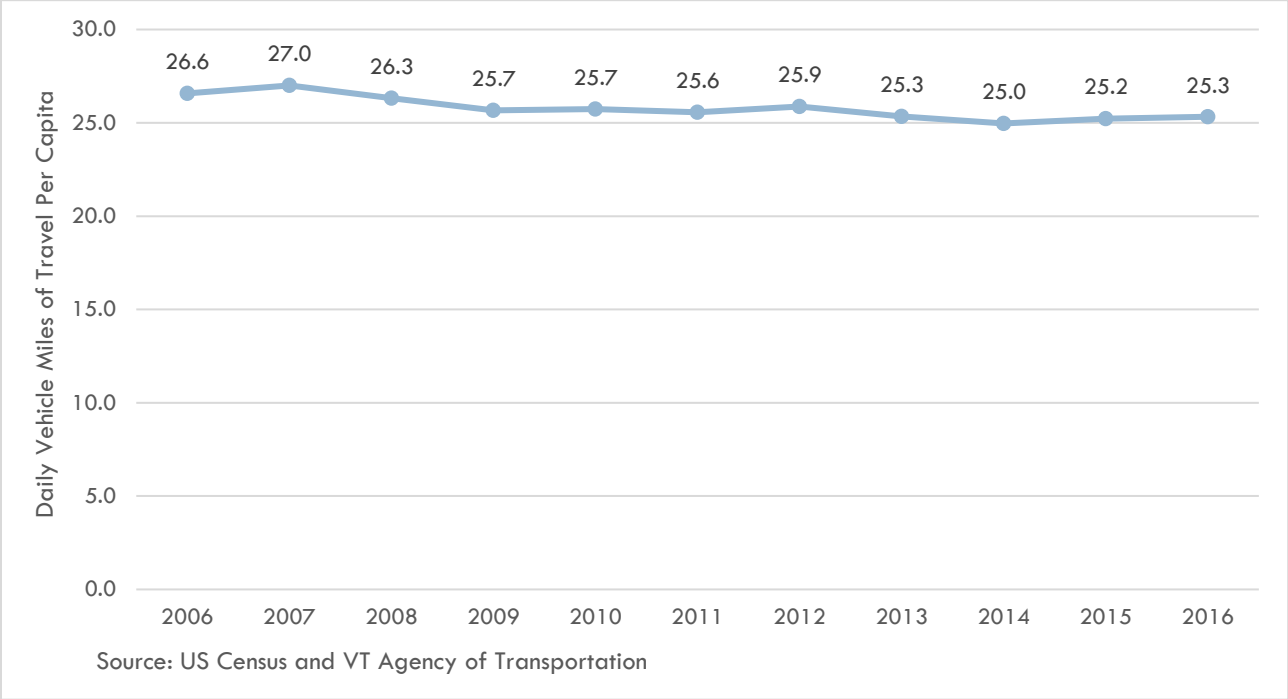
The MTS in Chittenden County consists of highways classified as Interstate Highways, Principal Arterials, Minor Arterials, Major Collectors, and Minor Collectors. The classification system is organized as a hierarchy of facilities based on the degree to which the roadway facility serves mobility and access to adjacent land uses. Interstates and Arterials make up just over 12 percent of County road mileage, yet carry 67 percent of all vehicle miles traveled (see: VTrans 2015 VMT data: http://vtrans.vermont.gov/sites/aot/files/2015_Extent_and_Travel_Report.pdf).

MAP 1 – 2017 METROPOLITAN TRANSPORTATION SYSTEM



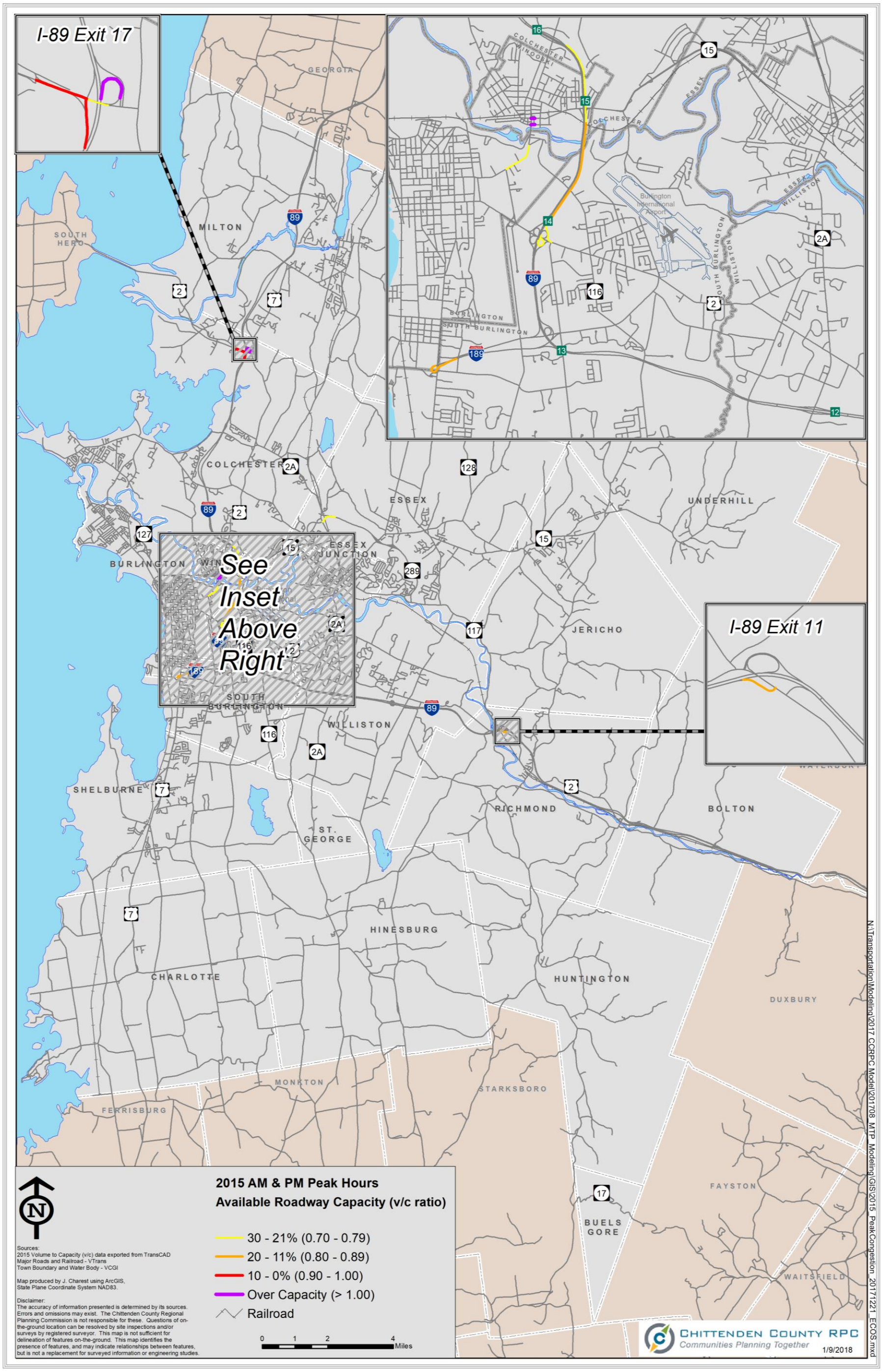
Vehicle Miles Traveled (VMT) is a measurement of miles traveled by all motor vehicles in a specified region over a specified period of time. VMT data are collected at the state level and disaggregated down to the County level. As historic auto ownership spread along with the construction of our roadway system, VMT rose year after year, especially post WWII. More recently, that rise slowed and then appeared to fall as less driving, other mode use and economic conditions seemed to impact the long-term trend. However, since 2014, there has been a slight increase in daily vehicle miles of travel per capita, possibly due to low fuel prices. As part of the ECOS Regional Sustainability Plan, the CCRPC tracks both Chittenden County VMT and VMT per capita. The last several years of vehicle miles travelled per capita are shown in the graph below.

FIGURE 18 – CHITTENDEN COUNTY VMT PER CAPITA



Using the traffic engineering measure of volume to capacity ratio (v/c) the CCRPC's Regional Transportation Demand Model (regional model) identifies roadway capacity problems in the morning and/or afternoon peak hours of travel on several road segments identified in **Map 2** on the following page (for more information and model outputs see Scenario Planning Review and Future Conditions section). It's important to note that there are operational issues on arterial corridors that are associated mainly with signal operations that the v/c metric doesn't capture. In the regional model this metric is primarily used to evaluate where there may be too few through lanes between intersections as opposed to too few lanes (turn or through) at intersections. One of the areas of concern is the northbound section of Interstate 89 between exits 14 and 15 since it is shown to have 20% or less available capacity remaining and is the most congested section of Interstate in the county, excluding off/on ramps.

MAP 2 – 2015 AVAILABLE ROADWAY CAPACITY (VOLUME/CAPACITY)



High Crash Locations

High Crash Locations (HCLs), as defined by VTrans, are road segments and intersections where the rate of crashes exceeds an established threshold known as the critical rate. Locations are ranked by calculating a ratio between the critical rate and actual rate. According to the VTrans High Crash Location Report for 2012 through 2016, there are 113 HCL road segments in Chittenden County, and 47 HCL intersections. Fourteen of the top 20 intersections in Vermont with the highest crash ratios are located in Chittenden County. On the other hand, only three of the top 20 road segments in Vermont with the highest crash ratios are located in the county.

The location of Chittenden County's high crash intersections and road segments are identified in **Map 3**. The most severe intersection sites are located in Burlington, Winooski and Essex. The most severe road segments for crashes are in Buels Gore and South Burlington. Nearly all high crash intersections fall within the urban or suburban towns, while the road crash segments are spread throughout both urban and rural communities. Since 2011, the total number of vehicle crashes in Chittenden County has been declining, with the exception of a small spike upward in 2015 (see **Figure 19**). The number of crashes that resulted in injuries declined from 2011 through 2014 but increased slightly in 2015 and 2016 (see **Figure 20**). During this same period of time, there were 4 to 8 annual fatalities on Chittenden County roadways.

FIGURE 19 – 2011 – 2016 CHITTENDEN COUNTY VEHICLE CRASHES

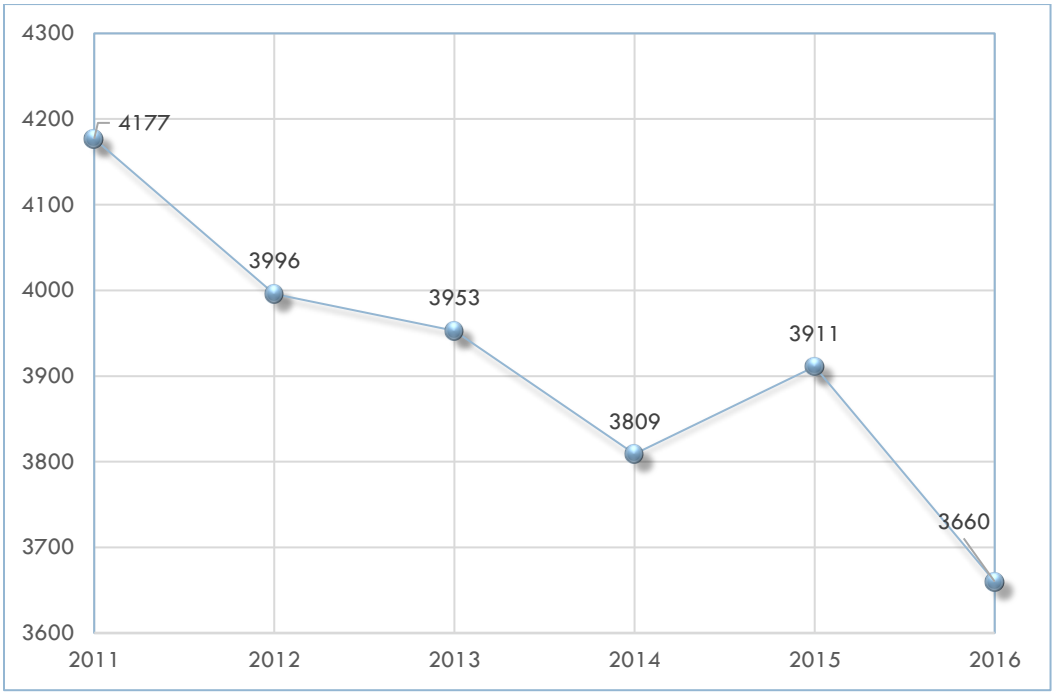
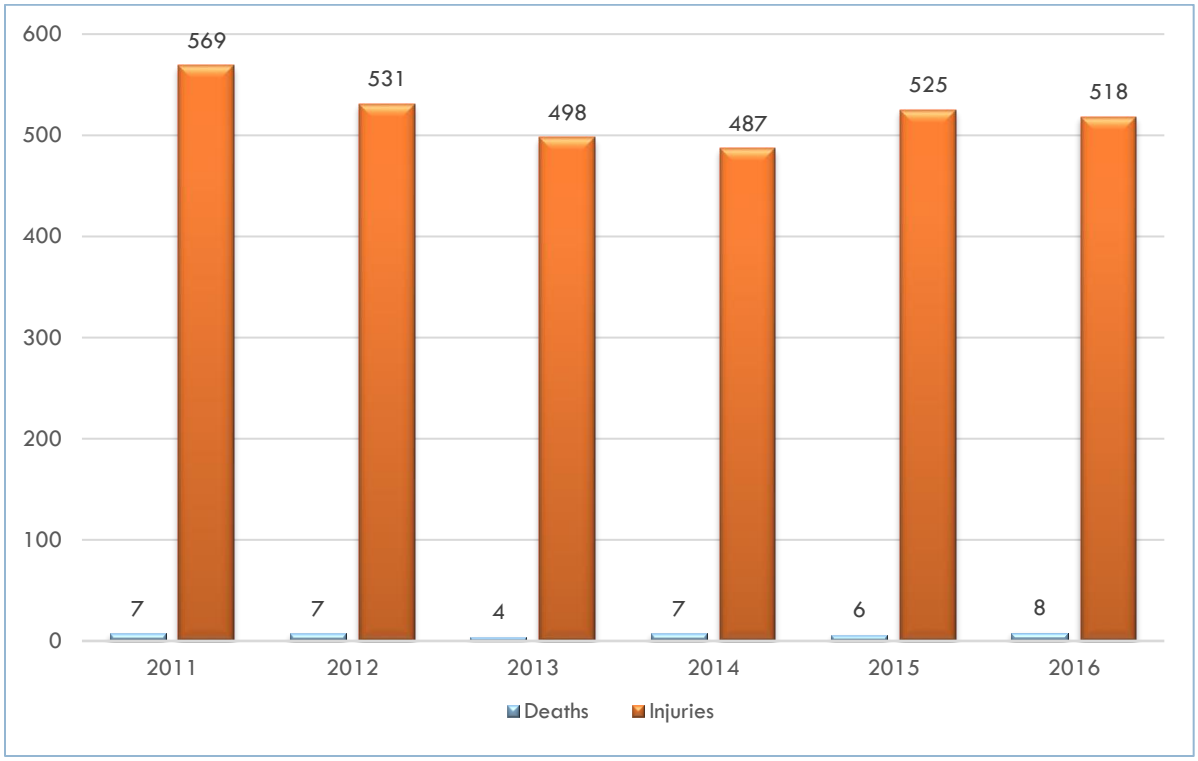
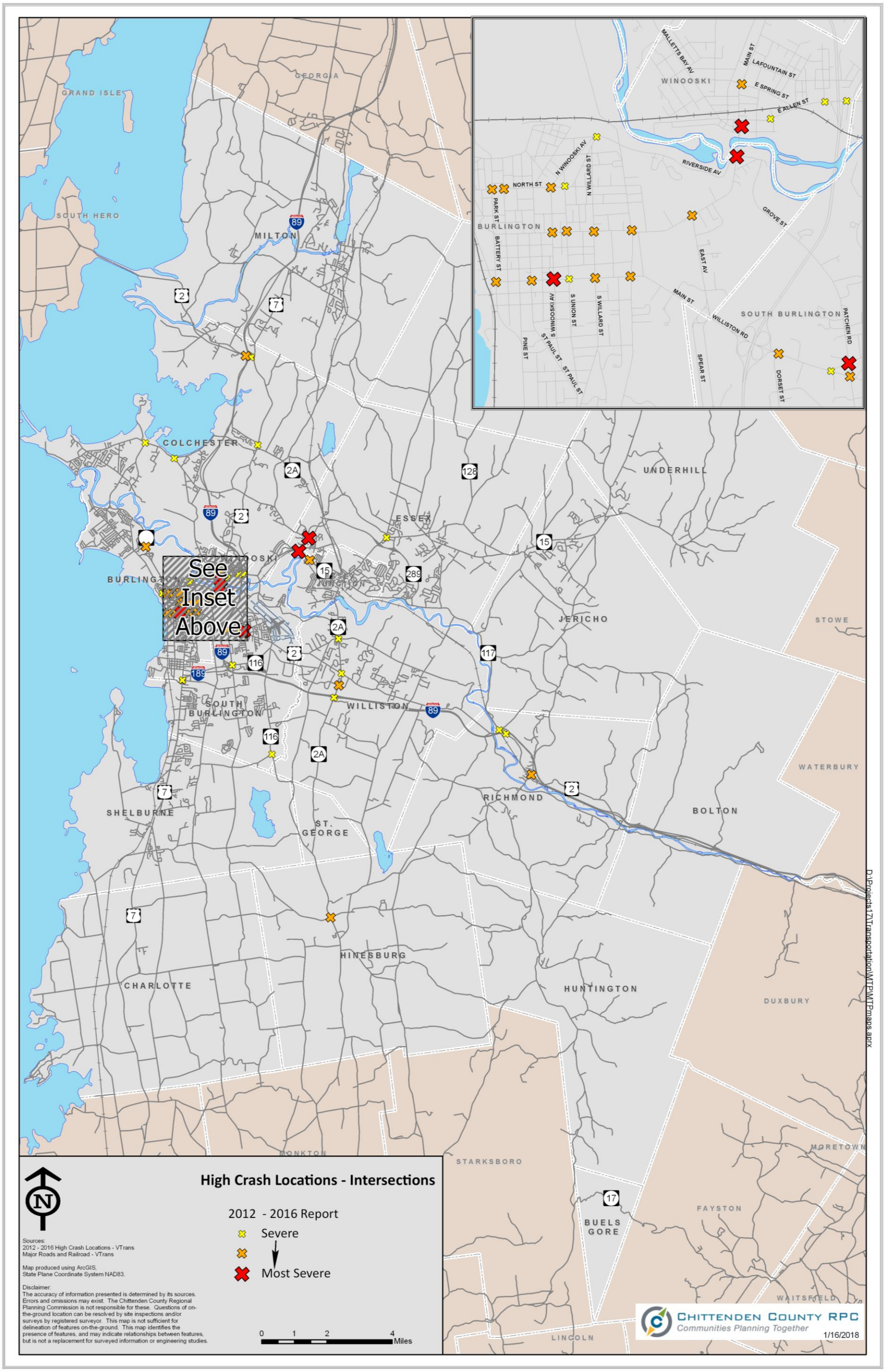


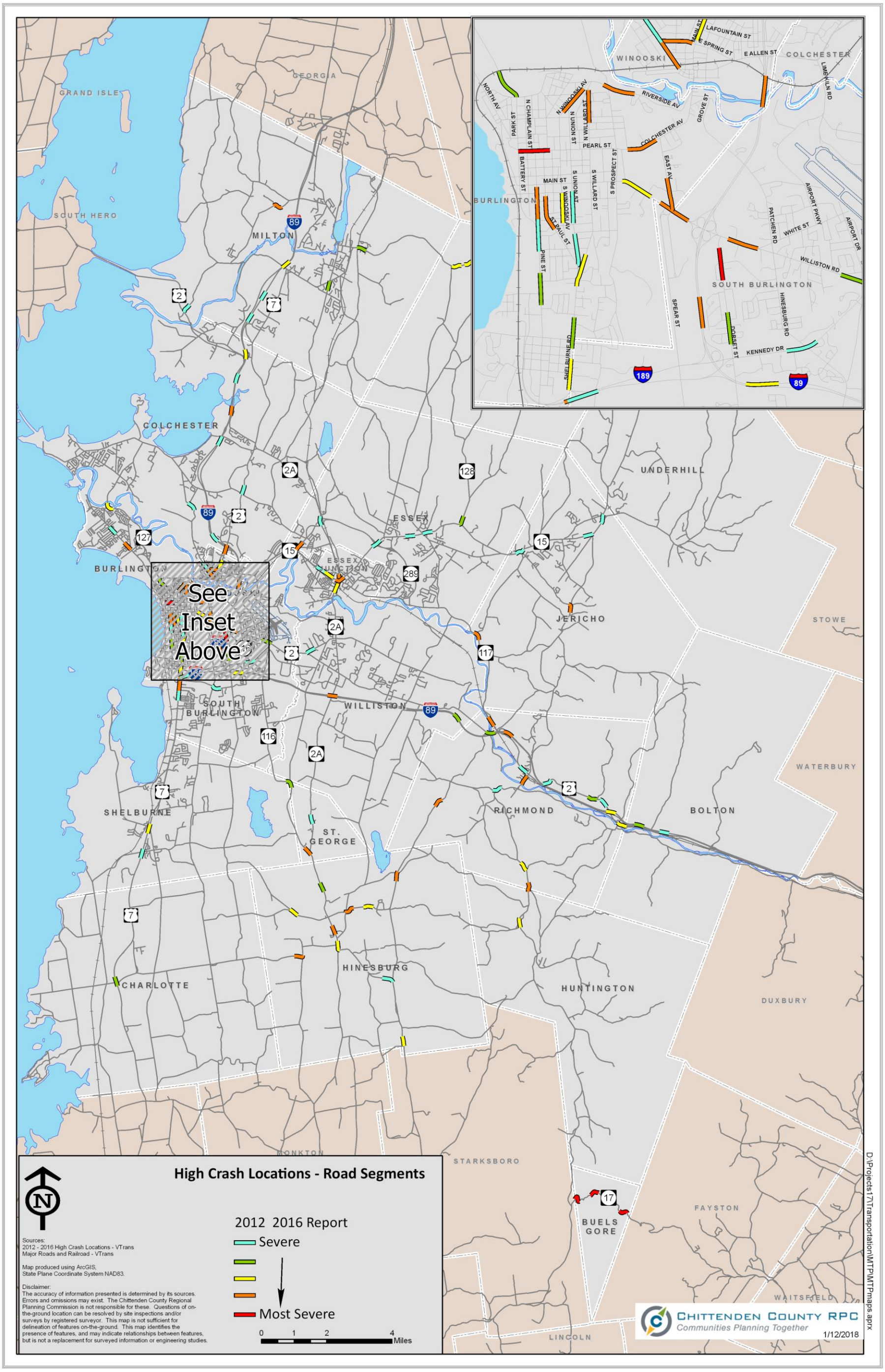
FIGURE 20 – CHITTENDEN COUNTY VEHICLE CRASHES RESULTING IN DEATHS AND INJURIES



MAP 3 – 2012-2016 HIGH CRASH LOCATIONS – INTERSECTIONS



MAP 4 – 2012-2016 HIGH CRASH LOCATIONS – SEGMENTS



Public Transit

In 2016, after completing a merger with the Green Mountain Transit Authority, the Chittenden County Transportation Authority (CCTA) became Green Mountain Transit (GMT). This regional public transit provider has been providing transit services in parts of Chittenden County since 1974, and with the merger, now all of northwestern Vermont. GMT currently serves the Chittenden County communities of Burlington, Essex, South Burlington, Shelburne, Williston, Winooski, Milton, Hinesburg, Jericho, Underhill and a section of Colchester with over a dozen scheduled transit routes. Additionally, GMT operates LINK Express routes that connect Chittenden County communities with Montpelier, Middlebury, and St. Albans. School tripper service, limited Sunday service, and targeted shuttle services round out GMT's transit offerings.

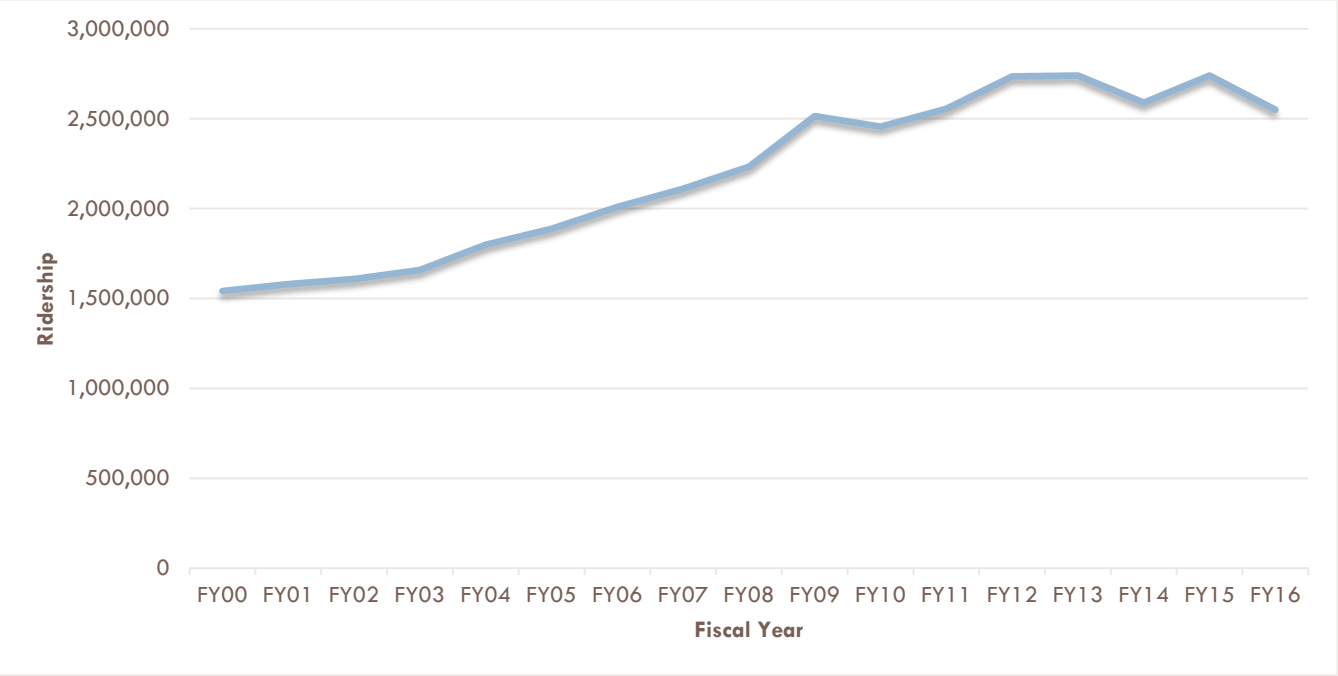
GMT is also responsible for providing Americans with Disabilities Act (ADA) paratransit services for persons unable to use the GMT fixed route bus system because of a disability. Paratransit services are required to be provided to areas within three-quarters of a mile of each side of each fixed transit route. The ADA service is currently contracted out to the Special Services Transportation Agency (SSTA), a private not-for-profit paratransit operator whose service area covers most of Chittenden County. Of SSTA's total 136,000 rides in 2016, 40% were ADA trips. SSTA is also the contracted transportation provider to a number of other client groups through a variety of social service agencies.

GMT also runs a program with area colleges - UVM, Champlain and St. Michael's - called Unlimited Access, allowing faculty, staff, and students to use their college ID cards as fare-free unlimited transit passes. This privately funded program was first initiated in 2003 through a collaborative partnership with GMT and the Chittenden Area Transportation Management Association (CATMA). Additionally, GMT also partners with the Go! Chittenden County program to provide employers with support and information to facilitate transportation benefit offerings to their employees with support from CATMA, CarShare Vermont, and Local Motion. More information on these organizations is provided in later sections of this plan.

GMT currently provides over two-and-a-half million trips per year, a 65% increase over the past seventeen years. However, in recent years, GMT has experienced a downward trend in ridership, which matches the overall national trend due in large part to low gasoline prices. (See **Figure 21** - GMT Ridership, FY2000 – 2016). Note that the ridership dip in FY14 was likely due to the three-week drivers' strike when virtually all service was halted. In the past, public transit service in Chittenden County had served mostly non-driving segments of the population (low income, seniors and children) with a limited ability to attract people with access to cars. However, GMT has made significant strides to improve passenger amenities and services with onboard Wi-Fi, fifteen-minute frequencies at peak times on select local routes (Essex Junction, Williston and Pine Street) and enhanced multimodal coordination. GMT's entire fleet is also equipped with bike racks to encourage this type of multimodal trip making.

During the fall of 2016, GMT unveiled its new Downtown Transit Center on St. Paul Street in Burlington. The Downtown Transit Center replaced the former Cherry Street station, which was originally constructed over 30 years ago. Plans for a new transit center in Burlington date back to 1992. The Downtown Transit Center features free wireless internet, a climate-controlled indoor waiting area, bathrooms, real-time electronic bus monitors, outdoor radiant heating, and a roof that covers the outdoor platform. Moreover, long-distance transit providers such as Megabus, Vermont Translines, and Greyhound have included the new Downtown Transit Center for regional pickups and drop-offs.

FIGURE 21 – GMT RIDERSHIP: FY2000 - FY2016



GMT is in the process of developing its NextGen Transit Development Plan to improve transit service throughout its northern Vermont service area. The NextGen Plan will identify methods to enhance public transportation by making it more convenient, direct, and simple to use. GMT will also evaluate ways to better integrate urban and rural services throughout its service area. A comprehensive service analysis will also be conducted to improve outdated service routes and address shifting demographics. Furthermore, GMT will gather extensive public and stakeholder input throughout the development of the NextGen Plan. For more information see: http://ridegmt.com/nextgen/

A complement to transit and paratransit services is Neighbor Rides, a volunteer driver program of the United Way of Northwestern VT. Neighbor Rides uses a collective impact approach, partnering with multiple organizations, to improve access to transportation for elders and persons with disabilities in the region. The program began in 2013 with initial funding from the ECOS project and others with the intent to improve efficiencies of the transportation system. By utilizing volunteer drivers, Neighbor Rides is lowering the cost of trips while providing needed transportation for those without other transport options.

Passenger Rail

Passenger rail service available in Chittenden County consists of Amtrak's Vermonter train, with Vermont stops in Essex Junction, Brattleboro, White River Junction, Montpelier, Waterbury, and St Albans. This service was established in April 1995 as a reconfiguration of the discontinued Montrealer train from Montreal to Washington, D.C. The Vermonter service runs daily between Washington, D.C., and St. Albans, with numerous stops including Baltimore, Philadelphia, and New York City. **Table 3** provides the most recent history of ridership on this service. As with GMT's public transit ridership, Amtrak has also experienced a decrease in ridership from 2015 to 2016.

TABLE 3 – AMTRAK VERMONTER RIDERSHIP

YEAR	2008	2009	2010	2011	2012	2013	2014	2015	2016
RIDERS	72,655	74,016	86,245	77,783	82,086	84,109	89,640	92,699	89,318

Source: Amtrak

In recent years, the State of Vermont has been pursuing multiple initiatives to expand passenger rail service. Planning is underway to extend Amtrak's Vermonter service north to Montréal. In 2015, U.S. and Canadian officials signed an agreement to develop a preclearance facility for both U.S. Customs and Border Protection and the Canada Border Security Agency at Central Station in Montréal. This facility would allow Amtrak passengers to clear the customs and immigration process without the need to physically stop at the border between the U.S. and Canada. The U.S. Congress signed the necessary legislation into law in December 2016 and the Canadian Parliament passed the enabling legislation required to construct the preclearance facility in December 2017. However, there are several operating agreements that must be finalized with various stakeholders before this cross-border service can be officially restored.

Another top priority for VTrans has been to reconnect Rutland to Burlington through the Ethan Allen Express, which currently operates between Rutland and New York City by way of Albany. In 2016, Vermont's congressional delegation announced that they had secured a $10 million Transportation Investment Generating Economic Recovery (TIGER) grant to fund three new passenger platforms, replace numerous crossing gates, and upgrade 11 miles of track. After the track improvements are made, passenger trains will be able to reach a maximum speed of 59 miles per hour while traveling from Rutland to Burlington's Union Station.

Commuter Rail

While no commuter rail service currently operates within Vermont, there has been renewed interest in establishing a commuter rail network. In early 2017, VTrans published the Montpelier to St. Albans Commuter Rail Service Feasibility Study to examine the feasibility of developing a commuter rail line between Montpelier, Burlington, and St. Albans. Conceptual capital cost estimates to establish commuter rail service were between $300 million and $363 million for upgraded rail infrastructure, stations, new rolling stock and additional implementation costs. Moreover, the annual operating expenses were projected to be up to $9 million. There are currently about 7,814 daily commute trips within the Montpelier to St. Albans corridor. When evaluating existing daily transit demand, the study envisioned a system-wide transit demand of between 135 transit users on the low end and 2,850 users in the highest percentage scenario. The higher ridership estimate factors in an aggressive promotional campaign along with new transit-focused policies. In response to this study, several rail advocates have asserted that the cost of this service could be dramatically reduced by purchasing refurbished rolling stock, which was not evaluated in this study.

Intercity Bus

There are currently three carriers that provide intercity bus services in Chittenden County: Greyhound Lines, Megabus, and Vermont Translines. These services carry passengers, baggage and packages on fixed routes and schedules. Greyhound runs four daily trips between Montreal and Boston with stops in White River Junction, Montpelier, Burlington International Airport and GMT's Downtown Transit Center.

Megabus connects Burlington (at Downtown Transit Center) to both Montpelier and Boston with one trip daily. In the past, Megabus had operated a route from Burlington to New York City, but the carrier recently cut this service due to dwindling demand. Vermont Translines is the most recent addition to the intercity bus options available to Vermonters. Founded in 2013 by Premier Coach and funded in part by VTrans, Vermont Translines offers three Chittenden County pickup and drop-off locations; in Colchester, Burlington, and South Burlington, with service along the Route 7 corridor to Albany, New York.

Freight: Rail and Truck Facilities

Since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, MPOs have been strongly encouraged to include freight planning as part of the metropolitan transportation planning process. Freight transportation plays a fundamental role in the economic health of Chittenden County communities. About 6.3 million tons of freight flow into, out of, or within the region each year, far more than in any other region of Vermont. According to the 2012 Vermont Freight Plan, over 9 million tons of freight will pass through Chittenden County annually by 2035. As reported by the 2001 CCMPO *Regional Freight Study and Plan* (the most recent detailed look at freight in the region), more than 91 percent of the freight tonnage moved in the County moves by truck, while rail moves 5.7 percent. Rail has historically been used to carry large volumes of bulk materials, such as fuel, stone, wood chips, and salt. Nearly 60 percent of the region's freight flows to or comes from nearby – other parts of Vermont, New Hampshire, or New York.

In recent years, the County's freight distribution system has had to adapt to a changing and more competitive marketplace. With the advent of new information technologies truck containers, rail cars and airplanes are increasingly viewed as mobile warehouses that feed goods into the production process or on to market shelves to meet immediate demand.

The *Regional Freight Study* noted that the freight infrastructure in Vermont does not meet national industry standards for motor carriers and railroads and this affects freight access to Chittenden County. These freight system deficiencies were also cited in the more recent 2010 Western Corridor Study. For example, US 7 and VT 22A do not meet industry standards and are the only north/south highways in western Vermont. Further, part of the Essex-Burlington rail line has weight and clearance limits that affect its ability to function effectively in the regional, national and North American rail systems. The amount of freight transported by rail has decreased over the last few decades and, as a result, the number of direct rail sidings and transload facilities – facilities that connect rail to trucks in order to transfer goods – has reduced. However, a new transload facility opened in late 2010 in the Vermont Railway yard in Burlington.

Since the *Regional Freight Study* was completed, there have been numerous upgrades to address freight-related deficiencies. In 2010 Vermont received a $50 million federal grant award which, combined with the NECR's $19.5 million match, provided a sizeable reinvestment opportunity for the entire NECR line through the state. Now completed, the improvements allow 286,000 pounds gross weight rail car capacity from St. Albans to the VT/MA state line, bringing this entire line up to the national standard. These improvements do not apply to the NECR spur from Essex Junction to Burlington, where track and bridge repairs are still needed.

There are two rail freight operators in Chittenden County: 1) The Genesee & Wyoming who purchased the New England Central Railroad (NECR)/RailAmerica and currently has a base in St. Albans. The former NECR was Vermont's largest privately owned and operated rail operating freight service from

Alburgh, VT to New London, CT. NECR, now G&WR, also operates on the spur line that connects their mainline in Essex Junction to Burlington. 2) The Vermont Railway is based on the waterfront in Burlington and operates on state owned lines south to Bennington, branching off in Rutland to Whitehall, NY and Bellows Falls, VT.

In 2017, representatives from the CCRPC, FHWA, and VTrans formed a Vermont freight working group to evaluate freight provisions of the FAST Act, identify national goals and plans that are relevant to Vermont, and discuss ongoing freight issues. In addition to monitoring national freight policies and strategies, the working group will also evaluate potential corridors to designate as Critical Urban and Rural Freight Corridors. These corridors provide access and connection to the Primary Highway Freight System and the Interstate with ports, public transportation centers, and intermodal transportation facilities. The Primary Highway Freight System is an identified network of highways that contain the most vital portions of the U.S. freight transportation system, based on measurable and objective national data.

Active Transportation Facilities

Active transportation facilities create opportunities to increase physical activity, support healthy communities, enhance economic development, and promote environmental sustainability. Furthermore, communities that support walking and biking provide transportation access to all residents regardless of age, gender, or socioeconomic status. Chittenden County has a range of dedicated transportation facilities to accommodate bicyclists, pedestrians, and other physically active forms of transportation. Facilities dedicated to non-motorized uses (such as sidewalks and off-road, shared use paths) are concentrated in and around the metropolitan core. Non-dedicated facilities that bicyclists and pedestrians share with motorized users are located throughout the region. According to ECOS Scorecard data (https://app.resultsscorecard.com/Scorecard/Embed/8502) since the last comprehensive inventory in 2008, there has been an increase in the shared use path mileage. Most shared use paths were recently built and are currently in good condition. There are also about 404 miles of existing sidewalks in Chittenden County. These mileage figures are expected to increase annually as planned bicycle and pedestrian projects continue to be implemented.

Between 2005 and 2015, the CCRPC facilitated a municipal sidewalk grant program to provide communities with access to federal funds to improve public sidewalk systems. The program was established to advance the development of an integrated sidewalk system and encourage connections between neighborhoods, schools, parks, town centers, and other public spaces to support active transportation in Chittenden County. Since 2005, 12 Chittenden County municipalities have received a total of nearly $3 million for 38 new sidewalk projects. Sidewalk projects have been, and continue to be, funded through two VTrans programs: Transportation Alternatives and the Bicycle & Pedestrian Program.

Community support for non-motorized facilities is substantial, as surveys in 2000, 2006, and 2012 revealed. These facilities have rated second highest (only following transportation system maintenance) on the list of transportation improvements the public desires. This survey will be replicated again in 2018 to evaluate the transportation-related attitudes and opinions of Chittenden County residents.

The CCRPC has regularly updated its regional Pedestrian/Bicycle Plan, most recently in 2017 – see: http://www.ccrpcvt.org/our-work/our-plans/regional-bikeped-plan/. The updated Chittenden County Active Transportation Plan (ATP) identifies its goal as creating a safe, comfortable, and connected

regional network of pedestrian and bicycle routes that appeal to all ages and abilities. After a robust public input process, detailed existing conditions assessment, and a Level of Traffic Stress model analysis, the ATP outlines recommendations for both non-infrastructure and infrastructure improvements to enhance network connectivity for active transportation in Chittenden County. The ATP recommendations focus on priority corridors as opposed to defining detailed facility types in specific places.

Intermodal Facilities

There are numerous strategically located intermodal transportation facilities in Chittenden County. These multi-functional facilities serve as hubs where connections occur between transportation systems and various travel modes. The CCRPC is committed to advancing the development of new and existing intermodal facilities to support the efficient movement of people and goods throughout Chittenden County. Current facilities fitting this category are the Downtown Transit Center on St. Paul Street in Burlington, the Essex Junction Amtrak station, University Mall in South Burlington, Burlington International Airport, the Vermont Railway Yard in Burlington, two privately operated ferry terminals (Charlotte and Burlington), and eight designated park-and-ride facilities scattered around the region.

Park-and-ride facilities span a spectrum from small undesignated lots to large, federally funded, high-capacity facilities like the one at I-89 Exit 11 in Richmond, which was enlarged in 2014 with 53 new spaces and improved bus accommodations. The most common intermodal connection made by commuters at park-and-ride facilities is transferring to a shared carpool. However, some facilities such as the Richmond and Colchester park-and-ride facilities off of I-89 also offer links to public transportation. VTrans' 2015 Park-and-Ride Facilities Plan calls for enhanced transit access at State-owned facilities. (http://vtrans.vermont.gov/sites/aot/files/planning/documents/planning/Appendix_2015-12.pdf)

The CCRPC regularly updates a regional park-and-ride plan, most recently in 2011. The 2011 Park-and-Ride & Intercept Facility Plan details high-priority sites and projects, while also offering recommendations to support a regional network of park-and-ride facilities that are accessible by multiple modes of transportation. A robust network of strategically spaced and located park-and-ride facilities will help to promote multimodal transportation options, decrease carbon emissions, and reduce traffic congestion. See http://www.ccrpcvt.org/wp-content/uploads/2016/01/Parknride_InterceptFacility_FinalPlan_20110615.pdf.

The Railyard Enterprise Project in Burlington is a current and significant intermodal planning projects. The project encompasses the Burlington Railyard, which is a National Highway System (NHS)-designated intermodal facility located on Burlington's south waterfront. The overall purpose of the project is to expand a network of multimodal transportation infrastructure to support economic development, improve neighborhood livability, and enhance intermodal connections to the Burlington Railyard.

Air Service Facilities

Burlington International Airport (BTV) is the largest airport in the State of Vermont. BTV is located in South Burlington and owned by the City of Burlington. It is governed by an Airport Commission that oversees general airport operations and guides future development. The airport is accessed primarily from US 2 (Williston Road) and serves as a vital link to the national air transportation system for the residents and businesses of northwestern Vermont and northern New York State. Additionally, about

40% of BTV's passengers are from Quebec, Canada. There are currently five commercial airlines that provide 31 daily departures directly serving 12 destinations from BTV. The airport is also serviced by UPS Air Cargo and FedEx Express commercial parcel carriers, two general aviation/fixed base operators, and two airframe and power plant maintenance facilities. The airport also serves as home to a unit of the Air National Guard fleet of F-16s (soon to be upgraded to F-35s), a National Guard Blackhawk helicopter air ambulance service and a maintenance and repair facility for Blackhawks and F-16s. There are 94 aircraft based at BTV, which includes both general aviation and military aircraft.

Since it saw a record of 759,021 enplanements in 2008, BTV has experienced a steady decline in passenger volumes through 2015. However, from 2015 to 2016, enplanements rose by 1.77% to 604,576, ending the seven-year decline. The 2016 enplanements data represent a 20% drop since 2008, which is in contrast with the 2011 BTV Airport Master Plan vision of 1.6 million annual enplanements by 2030.

Landside connections to the airport are provided by private auto, taxi, GMT fixed route service, and intercity bus via Greyhound Lines and Vermont Translines. Vermont's recent Statewide Intercity Bus Study (2013) noted that there is a public transportation service gap between the airport and GMT's Downtown Transit Center as this trip is not direct, requiring a transfer at University Mall.

Bridges

There are 178 bridge structures greater than or equal to 20 feet in length in Chittenden County. Of these, 85 are owned by the State and the remaining 93 by local governments. Nearly all of the state-owned bridges over 20 feet long are located on major highways, i.e. principal arterials and major collectors. The majority of municipally owned bridges over 20 feet long are located on less heavily traveled highways, i.e. minor collectors and local roads. Note that many bridges and other structures less than 20 feet long are also owned and maintained by both the State and municipalities.

The condition of all bridges over 20 feet in length on public roadways are evaluated every two years by VTrans. Using a sufficiency rating system developed by the U.S. Department of Transportation, bridges are assigned a value between 0 and 100. Ratings are based on evaluations in three areas – structural adequacy and safety, importance of the bridge for public use, and serviceability and functional obsolescence – with special reductions given for extreme safety problems and lack of alternative routes.

Since the sufficiency rating of a bridge is a single aggregate number that is based on a variety of factors, a low sufficiency rating does not necessarily mean that a bridge is unsafe or in need of immediate repair but indicates that upgrades may be necessary. Based on this system and VTrans' latest inspection reports, 4 percent (7 of 178) of Chittenden County bridges have a sufficiency rating below 50, or in poor condition, and nearly half of the total number of bridges hold a rating between 50 and 80 (87 of 178) indicating that rehabilitation may be necessary. The remaining 83 bridges (47 percent) are deemed sufficient with ratings above 80. Of the bridges with a sufficiency rating below 50, replacement is being planned for one bridge. The CCRPC has requested another to be added to the bridge replacement candidate list. The remaining bridges are on low volume roads that have been deemed adequate for current uses as of the most recent inspection reports. Since 2010, there has been a marked improvement in the number of bridges with a sufficiency rating below 50, down to 7 from 18, a 56 percent improvement. Bridge rating data can be found here: http://vtransparency.vermont.gov/#.

Transportation Demand Management Programs

Transportation Demand Management, or TDM, is a general term for policies, programs or strategies that result in more efficient use of transportation resources. Two organizations in the region have notable programs generally fitting this broad category. These are 1) CarShare Vermont, and 2) the Chittenden Area Transportation Management Association (CATMA).

CarShare Vermont, a non-profit organization founded in 2008, strives to provide an accessible and affordable car sharing service to reduce the need for individuals to own vehicles and to improve mobility for people of all income levels. CarShare Vermont currently has a fleet of 17 vehicles at 11 locations around the Greater Burlington area. Vehicles are available 24 hours a day, 7 days a week and can be used to drive to any destination. CarShare members pay for vehicle use based on how much they drive. The organization provides routine maintenance, roadside assistance, car washes, insurance, gas, and parking. The program is designed to save members money (less need to own a vehicle) and reduce unnecessary trips that impact the environment. Since 2013, CarShare Vermont has added seven vehicles to its fleet and 166 new members, for a total of 1,046 members in 2016. CarShare Vermont recently expanded into Winooski by adding a vehicle pod behind Winooski City Hall. In 2015, CarShare Vermont partnered with VTrans to implement a two-year pilot project to add two vehicles outside Montpelier's City Hall. However, a year after the start of the pilot, CarShare Vermont announced that it would cease service in Montpelier because of declining membership and revenues.

CATMA, also a non-profit membership-based organization, was formed in 1992 to jointly address, plan and manage a viable, cost-effective and sustainable transportation and parking network in and around Burlington's educational institutions. CATMA's founding members -- UVM, UVM Medical Center, Champlain College and American Red Cross – worked to efficiently coordinate land use planning, share resources, and administer transportation and parking programs, infrastructure and associated facilities through CATMA, while minimizing environmental impacts. In order to effectively promote and administer transportation demand management programs at a larger scale, CATMA expanded its service area to businesses and developers throughout Chittenden County starting in 2015. CATMA TDM strategies include: free and reduced-cost transit pass, bike-walk rewards program, the guaranteed ride home program, CarShare Vermont campus membership program, staggered work and class scheduling, coordinated carpool and vanpool services, frequent drawings and contests, and outreach and consistent messaging.

In 2011, after receiving a grant from the Transportation, Community and System Preservation program (TCSP), the CCRPC established Go! Chittenden County. Go! Chittenden County is a regional TDM program that serves as a one-stop resource for information about transit, carpooling, vanpooling, car-sharing, bicycling, and walking. The Go! Chittenden County project was a comprehensive effort to achieve regional transportation goals outlined in the ECOS Regional/Metropolitan Transportation Plan, as well as address national policy objectives including the need to conserve energy, reduce reliance on energy imports, lessen congestion, and clean our nation's air. With specific TDM projects funded by the TCSP grant successfully completed, and with the countywide expansion of CATMA, specific promotion of Go! Chittenden County as a brand and resource will cease at the end of 2017. The goal of Go! Chittenden County to connect individuals and businesses with transportation resources and solutions will continue through individual partners including CATMA, CarShare Vermont, Local Motion, Green Mountain Transit and VTrans.

In addition to reducing roadway congestion and providing multiple ways to get around, the impact of widespread TDM program implementation could significantly benefit Chittenden County municipalities by enhancing mobility, reducing dependence on fossil fuels, improving air quality, and supporting high levels of community livability. While only 5.9% of Chittenden County workers currently work from home (2011-2015 American Community Survey), the CCRPC's 2012 Transportation Survey revealed that over 23% of Chittenden County employees work for an employer that allows them to work from home. Employers need encouragement and support to implement an employee commute program that will assist in reducing congestion and parking demand, resulting in less strain on our existing roadways and influencing individual transportation behavior. There is an opportunity to focus on shifting transportation costs to a sustainable model and better integrating land use and transportation.

Transportation and Climate Change

The overwhelming majority of scientists agree that changes in climate worldwide can be mainly attributed to human activities, primarily the burning of fossil fuels. In Vermont, the largest contributor of greenhouse gas (GHG) emissions is the transportation sector – mostly carbon dioxide (CO_2) coming from the combustion of petroleum-based fuels, like gasoline and diesel in internal combustion engines. Transportation's 45% statewide contribution to GHG emissions is closely mirrored by our 49% Chittenden County estimate (http://climatechange.vermont.gov/climate-pollution-goals) and is substantially higher than the nationwide share of 27% from transportation according to the 2015 EPA Greenhouse Gas Emissions data. Transportation's higher contribution is mainly due to the rural nature of Vermont and the higher annual Vehicles Miles Traveled (VMT) per Capita in the state (11,680,000) compared to the nationwide VMT per Capita (9,630,000) according to the 2017 Vermont Transportation Energy Profile.

To address this continuing and growing environmental issue, while also combating climate change, emissions from the transportation sector need to be reduced. By 2025, Vermont's Comprehensive Energy Plan has a goal to reduce statewide transportation energy by 10%. Reducing the number of vehicle miles traveled (VMT), increasing investment in alternative forms of transportation, and shifting to low or zero-emission fuels, are strategies that could be implemented to achieve this goal. Transportation planning looks at the problem from two perspectives: 1) How to mitigate climate changes through policies, programs, and technologies, and 2) How to adapt transportation infrastructure and services to the coming climate changes.

Climate change is only one of many factors to consider as we plan the region's future transportation investments, but we need to carefully monitor its potential impacts while implementing programs that will slow its progress. For more information go to the air quality and climate sections of the CCRPC website.

Transportation and Public Health

The ten principles that the ECOS Plan uses to guide planning efforts are integrally linked to community health. This connection underscores the need for public health professionals to be included in transportation and community planning. There is an extensive body of research that details the impact of transportation on health, particularly with regard to safety/injury, air quality, physical activity, equitable access to opportunities and noise.

Physical Activity - The degree to which individuals in a community are physically active is directly dependent on transportation opportunities, infrastructure and community design. The health benefits of

physical activity and its role in reducing the risk for chronic disease has numerous positive societal impacts. Most risk factors for chronic disease do not occur randomly but are closely linked to the characteristics of neighborhoods in which people live, work, and play.

In Chittenden County, 71% of adults report using community resources for physical activity. Walkable communities with a reliable transit network generally have a lower dependence on automobiles and encourage physical activity. Hybrid commutes, that is, trips completed using several modes are an effective option when distance and areas not served by transit are barriers to a more active commute, such as walking or biking. With few exceptions, proximity to public transit stops is linked to higher transit use and higher levels of physical activity among adults. A study in the Journal of Preventative Medicine found that commuting by public transportation instead of by car increased energy expenditures equivalent to the loss of one pound of body fat per six weeks.

Access – Access to education, healthy food, healthcare, recreation, social interactions and employment all contribute to health and quality of life. A lack of safe and convenient alternatives to automobile travel limits an individual's options forcing trade-offs in money or time thereby compromising equitable choice. This dearth of options disproportionately affects vulnerable populations, the elderly, people living in poverty, persons with disabilities, and children. Improvements to walking and bicycling facilities benefit current and new users, particularly those who are living with physical disability and/or economic hardship, by providing access to essential services and activities.

Air Quality – Motor vehicle emissions are a major contributor of contaminants such as particulates, nitrogen oxides and carbon monoxide. Chemical reactions between nitrogen oxides and volatile organic compounds (VOC) in the presence of sunlight produce surface ozone which also compromises air quality. Overall, Vermont's air quality is good. Even so, there are days when high levels of fine particulate matter in the air create potentially unhealthy conditions for groups such as older adults, children, and people with chronic conditions such as asthma to engage in outdoor activity. Chittenden County has a very low percentage of days per year when the surface ozone level and concentration of ambient particulate matter register above National Ambient Air Quality Standards (NAAQS). As the population of Chittenden County increases over the coming decades, bolstering the transit system, creating a contiguous infrastructure for active modes of transportation, and focusing on dense development patterns that encourage non-motorized trips will help to maintain healthy air quality.

Injury Prevention – Nationally, in 2015 nearly 190,000 pedestrians, just under 500,000 bicyclists and over 2,600,000 motor vehicle occupants were injured. The most current available data shows Chittenden County has the lowest non-fatal motor vehicle related injury rate in the state, but over decades the projected population increase may begin to have a bearing on that indicator. Motor vehicle crashes are a leading cause of injury in Vermont. Established safety measures such as safety belts, air bags and car seats and emerging safety technologies such as pedestrian detection systems, lane departure warnings and the like are improving safety on our roads. Policies to reduce VMT, increase investment in safe and efficient walking and biking facilities, transit and TDM programs will promote healthier behaviors by making the default choice the healthier choice. A health impact assessment (HIA) of public transportation estimated that increased spending on public transportation and sustainable modes of transportation can benefit health and reduce social inequalities.

The State of VT Health in All Policies Task Force has identified best practices that take into consideration the evolution and growth of our transportation system and the health of Vermonters. The task force recommends support for the development of cleaner bus and truck fleets and investment in

freight rail infrastructure to reduce greenhouse gas emissions, improve local air quality, promote health, and foster energy independence. It is important to increase investments in public transportation and walk/bike infrastructure improvements to support active transportation modes and emphasize accessibility instead of simply mobility, in transportation policies and programs.

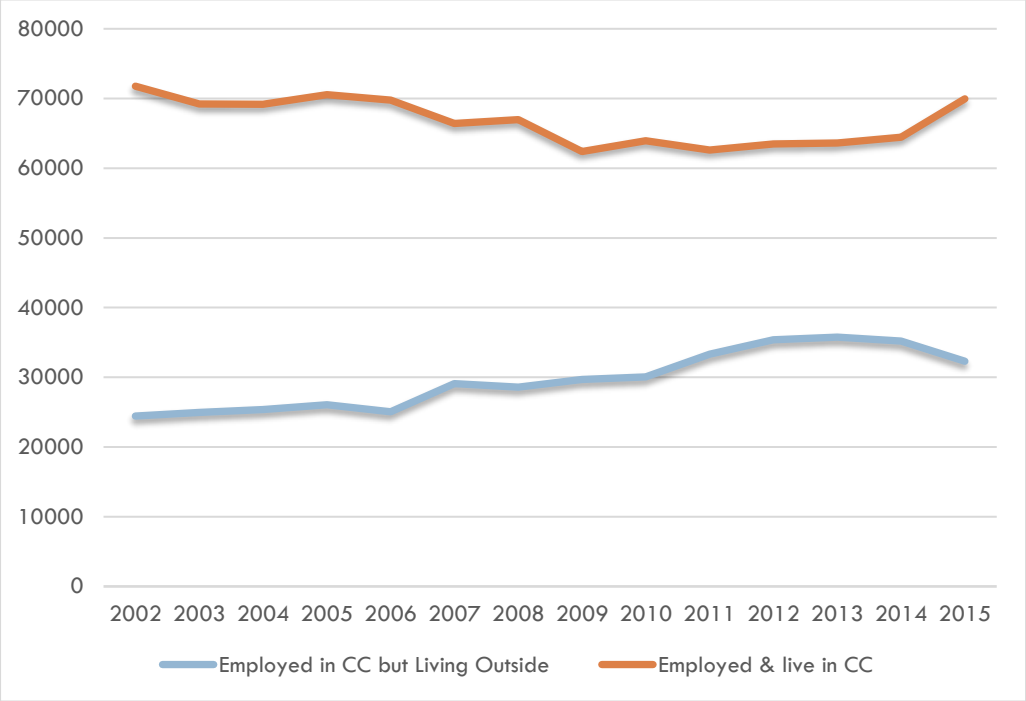
Regional Travel Patterns

Residents of Chittenden County make hundreds of thousands of trips every day by various means of transportation (driving, biking, walking, or busing). Transportation planners often categorize travel as either peak or off-peak. Peak travel consists of the trips that coincide with the typical commute to work in the early morning (AM peak) and back home in the late afternoon (PM peak) while off-peak trips occur the remaining hours of the day. Peak and off-peak trips make different demands on the transportation network. Peak period travel places the greatest strain on the transportation system, because of high traffic volumes in shorter time periods, that consequently exhibits the worst congestion seen throughout the day. Even though it is important to evaluate peak hour conditions on our roadways it is equally important to understand off-peak conditions – the CCRPC's Regional Travel Demand Model has the capability to examine both peak and off-peak (daily) travel and its impact on roadway congestion.

Chittenden County is the population and employment center of a larger area encompassing all of northwestern Vermont. Its economic and cultural impacts spread well beyond the county boundaries. Data from the U.S. Census Bureau's Longitudinal Employer-Household Dynamics show that 32,295 residents from neighboring counties come to Chittenden County for work, while 69,948 Chittenden County residents are employed within Chittenden County. Proximity and easy highway access to Chittenden County have been determinants as to which towns in our neighboring counties have grown the fastest. Franklin County's fastest growing towns are those along the I-89 corridor and/or bordering our northern municipalities. The northern tier communities in Addison County have likewise grown at faster rates than other towns, and in Lamoille County, Cambridge and Stowe have been two of the fastest growing communities.

Figure 22 shows a slight increase over time in the number of people that work in Chittenden County but live outside the county. Even though this trend is based on various factors (housing affordability in Chittenden County, highway accessibility, and others) it directly impacts and exacerbates capacity issues on Interstate 89, especially between Exits 14 and 15. Unless this trend is reversed and there is a substantial shift from SOV travel to other modes of transportation, Interstate 89 will continue to experience congestion during the peak hours and a major capacity project between Exits 14 and 15 might be necessary in the future.

FIGURE 22 – WHERE DO CHITTENDEN COUNTY EMPLOYEES LIVE?



2016 Statewide Transportation Public Opinion Survey

In 2016, VTrans initiated an update to its Long-Range Transportation Plan (LRTP) to guide multimodal transportation initiatives and investments through 2040. The public participation process for the LRTP included a statewide transportation survey that was conducted by Resource Systems Group, Inc. (RSG). The survey had four focus areas (Travel Behavior, Customer Satisfaction, Policy and Funding, Emerging Trends and Technology) and was administered in five distinct geographic regions through an address-based random sample. Chittenden County residents were grouped within the Champlain Valley region, which also included residents from Addison, Franklin, and Grand Isle Counties.

In total, nearly 900 respondents completed surveys in the Champlain Valley region. Results from the survey showed that the Champlain Valley region had the lowest percentage of respondents who drove alone (79%) when compared to the other regions. Furthermore, the Champlain Valley region also stands out as the region with the highest percentage of respondents reporting that they walk, bike, or take public transit. Additionally, while less than 14% of statewide respondents reported biking frequently, 20% of Champlain Valley respondents reported biking frequently. When asked about congestion frequency, the Champlain Valley region had the lowest proportion of respondents (32%) reported that traffic negatively effects their overall quality of life. Within the policy and funding section, the questionnaire prompted respondents to rate the importance of a variety of services or issues. Champlain Valley respondents reported that ensuring the safety of the traveling public was the most important transportation-related issue.

Financial Plan

INTRODUCTION

The CCRPC's long range transportation plan must incorporate a financial section that estimates how much funding over the life of the plan will be needed, how much will be available for the recommended transportation investments, and the costs to maintain and operate the existing system. The financial section must outline how the CCRPC can reasonably expect to fund all included projects and programs within a fiscally constrained environment, drawing on all anticipated revenues from the federal and state governments, regional or local sources, the private sector and user charges.

Federal regulations establish the requirement for the financial plan in *23 CFR 450.324(g)(11)*[1]. The operative requirements of that regulation are summarized here. The adopted MTP shall include:

> *(11) A financial plan that demonstrates how the adopted transportation plan can be implemented. Key components of this plan to include:*
>
> *(i) System-level estimates of costs and revenues to adequately operate and maintain Federal-aid highways and public transportation.*
>
> *(ii) Agreed upon estimates of funds that will be available to support plan implementation.*
>
> *(iii) Recommendations on any additional financing strategies with strategies for ensuring their continued availability.*
>
> *(iv) Funding to include all federally funded projects, both highway and transit. Projected funds to reflect "Year of Expenditure dollars." (YoE)*

The financial projections extend to the MTP planning horizon of 2050.

The completed financial plan will contain three parts:

1. The overall level of fiscal constraint including projection of future transportation funding in Chittenden County and factors that are anticipated to affect this.
2. The base level of investment required for system operations and maintenance as called for under 23 CFR 450.324(g)(11)(i).
3. An estimate and analysis of the costs associated with MTP recommended improvements themselves.

FINANCIAL PLAN PART 1: OVERALL CONSTRAINT

CCRPC MTP funds, guided by the contents of the 2050 MTP, are limited to federal transportation funds allocated to the Chittenden County metropolitan area under federal transportation acts. The Fixing America's Surface Transportation Act or "FAST Act" is the current law governing the use of federal

[1] For more details on federal regulations regarding MPO long range planning, see

https://www.ecfr.gov/cgi-bin/text-idx?c=ecfr;sid=e2662fc63c225d496d1fa6ce22ea6cb8;rgn=div5;view=text;node=23%3A1.0.1.5.11;idno=23;cc=ecfr#sp23.1.450.c

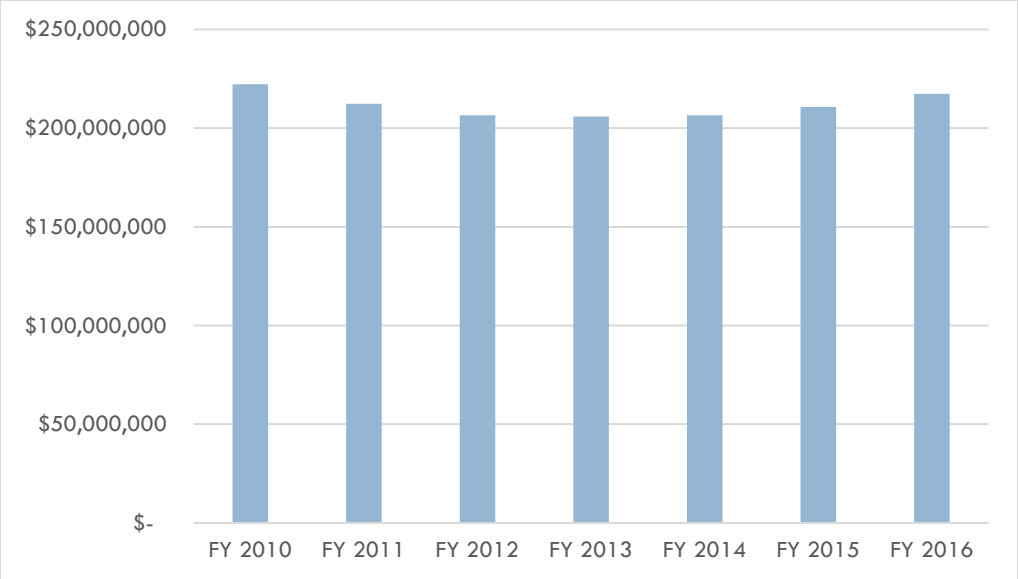
transportation funds. FAST Act was signed into law on December 4, 2015 and largely maintains previous program structures and funding shares between highways and transit.

The Chittenden County region does not currently access other sources of transportation funding such as tolls or private contributions. The primary funding source for significant transportation projects on highways, and transit eligible for federal aid, is expected to be federal funds plus state and local match.

The single most critical issue for establishing how much MTP funding will be available between 2016 and 2050 is therefore the future availability of federal funds. For the purposes of this plan, an estimate of available future funding has been developed based on the history of statewide federal funding and CCRPC's historic share of that funding. This methodology represents the most reasonable estimate of funding availability for two reasons:

- Actual funding available to the CCRPC over the past ten plus years is variable and has depended on the timing of specific projects. Statewide spending patterns exhibit a more consistent trend, and
- The FAST Act will continue funding programs at levels similar to what its predecessors MAP-21 and SAFETEA-LU previously provided.

FIGURE 23 – VERMONT FEDERAL TRANSPORTATION FUNDING HISTORY IN 2016 $ FY10 TO FY16



Source: FHWA and FTA Formula Fund amounts provided by VTrans and adjusted to 2016 dollars using US Inflation Calculator

Total statewide federal funding was projected for future years based on historical funding levels as depicted on the chart above. NOTE: The estimates began in FY2010 because FY2009 included an infusion of additional funding from the American Recovery and Reinvestment Act (ARRA)

Over the last seven years there was no discernable increasing or decreasing trend in constant dollar funding to Vermont. Therefore, the MTP assumes flat statewide funding over the 25-year planning horizon at the level of $211,609,103 per year in 2016 dollars. See **Table 4** for recent history.

TABLE 4 – VTRANS FEDERAL TRANSPORTATION FUNDING BY YEAR

	Year of Expenditure (YOE)	Constant 2016 $
FY 2010	$201,834,075	$222,152,066
FY 2011	$199,004,872	$212,335,621
FY 2012	$197,467,517	$206,423,453
FY 2013	$199,746,293	$205,791,234
FY 2014	$203,614,734	$206,428,095
FY 2015	$208,080,804	$210,705,770
FY 2016	$217,427,482	$217,427,482
	AVERAGE	**$211,609,103**

Source: FHWA and FTA Formula Fund amounts provided by VTrans and adjusted to 2016 dollars using US Inflation Calculator

The next step is to calculate CCRPC's estimated share of the statewide federal funds. As shown in the **Table 5**, CCRPC's share of the total statewide funds has fluctuated significantly between 7.5% (FY14) and 40.6% (FY05) between 1999 and 2016.

TABLE 5 – CCRPC'S SHARE OF STATEWIDE FEDERAL FUNDS

Federal Fiscal Year	Statewide FHWA and FTA Formula Funds	Chittenden County Federal Funds	CC as Percentage of State
FY1999	$141,644,879	$20,716,152	14.6%
FY2000	$137,475,720	$34,124,215	24.8%
FY 2001	$141,162,474	$26,574,888	18.8%
FY 2002	$153,992,216	$37,213,939	24.2%
FY 2003	$149,892,007	$42,359,853	28.3%
FY 2004	$161,396,138	$55,511,396	34.4%
FY 2005	$147,008,522	$59,717,025	40.6%
FY 2006	$149,970,687	$32,022,092	21.4%
FY 2007	$156,335,139	$24,053,735	15.4%
FY 2008	$157,949,734	$25,990,323	16.5%
FY 2009	$156,442,879	$27,373,347	17.5%
FY 2010	$222,152,066	$27,663,934	12.5%
FY 2011	$212,335,621	$26,643,026	12.5%
FY 2012	$206,423,453	$32,458,183	15.7%
FY 2013	$205,791,234	$43,519,161	21.1%

FY 2014	$206,428,095	$15,517,128	7.5%
FY 2015	$210,705,770	$18,450,521	8.8%
FY 2016	$217,427,482	$31,321,866	14.4%
		AVERAGE	**19.4%**

Source: FHWA and FTA Formula Fund amounts provided by VTrans and GMT and adjusted to 2016 dollars using US Inflation Calculator

The average proportion of statewide federal funding going to CCRPC projects over the 1999 - 2016 period was 19.4%[2]. This is a bit lower than Chittenden County's proportion of statewide population at 25.8% (US Census, 2016 estimate) and Vehicle Miles of Travel (VMT) at 20.3% (VTrans, 2016) and appears to represent a reasonable estimator of available funding in the County. As a result, CCRPC's annual funding is estimated to be 19.4% of the total federally supported transportation funding coming to Vermont. This nearly one fifth share results in $41,052,166 (in 2016 dollars) for Chittenden County projects annually.

Table 6 presents CCRPC's estimated annual funding beginning in 2016 and at five-year intervals from FY20 to FY50. This is based on the projected flat statewide funding and the County's 19.4% historic share of statewide funds. In constant year 2016 dollars the annual 5-year increments accumulate over the 34 years to $1.395 billion. The year-of-expenditure (YoE) row applies an annual inflation rate of 3%[3]. Adjusting for inflation, and compounding over 34 years, results in significantly higher annual amounts – particularly closer to 2050 when the compounding effect is more pronounced.

TABLE 6 – PROJECTED ANNUAL AND CUMULATIVE FUNDING AVAILABLE FOR CHITTENDEN COUNTY PROJECTS (MILLIONS) AT 3% ANNUAL INFLATION

Federal Fiscal Year		2016	2020	2025	2030	2035	2040	2045	2050
Annual	Constant 2016 $	$41.05	$41.05	$41.05	$41.05	$41.05	$41.05	$41.05	$41.05
	Year of Expenditure $	$41.05	$44.86	$52.00	$60.29	$69.89	$81.02	$93.92	$108.88
Cumulative	Constant 2016 $	$41.05	$164.21	$369.47	$574.73	$779.99	$985.25	$1,190.51	$1,395.77
	Year of Expenditure $	$41.05	$171.75	$417.05	$701.43	$1,031.10	$1,413.28	$1,856.33	$2,369.95

Source: CCRPC

Potential Adjustments to Projected Funding

While there are a number of factors that could change the projected level of funding detailed in **Table 6**, the likelihood of significant changes is low. Looking back over the past 20 years, there have been efforts, discussions, and other initiatives to increase the funding for transportation. These have occurred on the regional, state, and national levels. For example, the CCRPC established a Blue-Ribbon Commission in 2007 to identify alternative and/or innovative funding, especially to boost transit funding and reduce reliance on the property tax. That work concluded without any firm implementation measures, therefore new potential funding sources were deemed too uncertain to include in this

[2] This percentage is intended to represent a best estimate of available funding and is in no way intended to be construed as a CCRPC "entitlement" or "rightful share" of statewide funds.

[3] 3% is the most recent 10-year average inflation construction cost increase from the Engineering News Record (ENR)

estimation of future available funds. The Vermont Legislature has also tinkered with transportation finance, allowing limited bonding and modest fuel tax increases for transportation uses and, while these funding sources could lead to an increase in funding for the MPO region, they are too small or inconsistent to reliably count on for a 35-year planning horizon.

At the federal level, given the passing of the FAST Act in late 2015, it appears that funding from this source should remain stable for the near future. However, future federal funding levels are determined by the federal government and may change over time.

In general, the above factors related to funding adjustments and potential uncertainty are too questionable or short lived to significantly impact the quantitative estimates of future transportation funding for Chittenden County. The discussion is intended to highlight some of the uncertainties which may affect CCRPC's ability to fund transportation projects into the future.

Overall Funding Constraint Conclusion

Funding for CCRPC transportation projects is presently dependent on federal funding, which is generally matched on an 80% federal / 20% non-federal basis at the state and local levels. Historically, CCRPC has accounted for 19.4% of the annual federal transportation funds available statewide. A review of funding levels over the past seven years reveals that funding is essentially flat in constant dollar terms. Total funding available, over the coming 35 years, is estimated to be $1,395.8 million in constant 2016 dollars, however budget decisions in Washington DC could impact future funding levels. Additional funding sources, especially for transit operating, will be critical for the preservation and future expansion of transit services in the region.

FINANCIAL PLAN PART 2: SYSTEM OPERATIONS & MAINTENANCE ELEMENT

The operations and maintenance element is a fundamental component of the MTP financial plan. As directed by federal regulations, the estimate of funds available to implement new plan initiatives is the total constraint amount as detailed in Part 1 minus the funds necessary to operate and maintain the existing investment in transportation infrastructure to an acceptable standard of service. Defining the acceptable standard and the appropriate programs to operate and maintain facilities and services is the purpose of this element of the financial plan.

To calculate anticipated future maintenance and operations funding for the existing system, we have looked at historical expenditures (see **Table 7**) in the relevant funding categories from annual Transportation Improvement Programs (TIPs). When reviewing the TIP obligation history over the past 17 years (FY00 – FY16) and using the categories of Bridge, Paving, Slope and Ledge Improvements, and Transit Operations and Maintenance, as our maintenance/operation proxies, the average percent of the overall funding to those categories is just under 55.1%. However, if we examine a shorter window of time – the past 7 years (FY10 – FY16) we feel are more representative of current maintenance first policies – the maintenance/operations share goes to 73.6%. Projecting this higher share into the future defines a reasonable, if conservative, standard of system operation and maintenance investment.

Given the significant historical fluctuation in the share of funding for operations and maintenance, and to simplify our analysis of future funding, we've rounded the 73.6% down to 70%. (For historical comparison we used 64% in our last MTP). The total annualized costs (applying the 70% to the projected $41+ million) for system operations and maintenance are $28.74M in 2016 dollars.

TABLE 7 – COMPARISON OF CHITTENDEN COUNTY FEDERAL FUNDING HISTORY BY PROJECT CATEGORIES

Use Category	FY2000 - FY2016 No Earmarks	% of Total	FY2010 - FY2016 No Earmarks	% of Total
Paving	$83,348,715	17.3%	$42,917,307	22.8%
Bridge	$103,223,336	21.5%	$57,186,462	30.4%
Slope and Ledge Improvements	$5,098,295	1.1%	$3,179,610	1.7%
Transit Operations & Maintenance	$73,141,240	15.2%	$35,341,817	18.8%
Preservation Total	**$264,811,586**	**55.1%**	**$138,625,196**	**73.6%**
Roadway Corridor Improvements	$19,095,871	4.0%	$4,491,984	2.4%
Safety/ Traffic Operations/ ITS	$28,106,086	5.9%	$13,734,842	7.3%
New Facility/Major Roadway Upgrades	$105,422,522	21.9%	$8,522,390	4.5%
Bike & Pedestrian/ Enhancement	$29,217,067	6.1%	$10,908,684	5.8%
Intermodal	$7,265,577	1.5%	$4,762,049	2.5%
Stormwater/ Environmental	$280,538	0.1%	$188,000	0.1%
Rail	$7,920,000	1.6%	$0	0.0%
Transit Expansion	$10,109,672	2.1%	$7,009,935	3.7%
Other	$8,210,543	1.7%	$0	0.0%
Other Total	**$215,627,876**	**44.9%**	**$49,617,884**	**26.4%**
Grand Total	**$480,439,462**	**100.0%**	**$188,243,080**	**100.0%**

Source: FHWA and FTA formula fund amounts provided by VTrans and GMT. Funds are shown in Year of Expenditure dollars

Operations and maintenance funding comes from a variety of sources depending on the type of facility. Interstate highways and bridges receive federal funds through special programs, state highways receive funding through both federal and state programs, and local highways and bridges on the federal aid system receive maintenance funding through local, state, and federal programs. Transit purchases of new and replacement rolling stock are often supported with federal funds through the Federal Transit Administration (FTA) and FHWA Congestion Mitigation & Air Quality (CMAQ) funds and, in past years, earmarks. Municipal contributions and farebox revenues are also important sources of ongoing transit operations and maintenance costs.

The next calculation in Part 2 of the financial plan is determining funds available for new projects, after accounting for system maintenance and operations. This subtracts the estimated $28.74 million in annual operations and maintenance costs from the funds available to Chittenden County established earlier - $41.05 million. This results in an estimated $12.32 million per year. The total funding available for new (as well as already committed TIP – see next section) projects is shown in 5-year increments

below. The forecast funding resources available for planned improvements in the MTP is estimated at $418.73 million in 2016 constant dollars.

TABLE 8 – PROJECTED ANNUAL FUNDING FOR NEW OR COMMITTED PROJECT IN CHITTENDEN COUNTY (MILLIONS)

Federal Fiscal Year		2016	2020	2025	2030	2035	2040	2045	2050
Annual	Constant 2016 $	$12.32	$12.32	$12.32	$12.32	$12.32	$12.32	$12.32	$12.32
	Year of Expenditure $	$12.32	$13.46	$15.60	$18.09	$20.97	$24.31	$28.18	$32.67
Cumulative	Constant 2016 $	$12.32	$49.26	$110.84	$172.42	$234.00	$295.58	$357.15	$418.73
	Year of Expenditure $	$12.32	$51.52	$125.12	$210.43	$309.33	$423.98	$556.90	$710.98

Notes: Inflation based on 3% annual and system preservation requirements are estimated at $28.7 million annually in 2016$.

CONCLUSION AND PROPOSED FUTURE ALLOCATIONS

This financial plan concludes that Chittenden County has $12.32 million per year for new transportation investments and for projects already committed to as identified in our TIP (see more on this below). This level of funding is expected to remain fairly stable in terms of buying power to 2050. By the plan horizon year in 2050 CCRPC expects to have $418.73 million (2016 $) in cumulative **federal only** funding available for new projects. When factoring inflation into the calculation of the cumulative funding available, the total amount of funds increases to $711 million in year of expenditure dollars.

There is, however, one more factor to take into account before finalizing the level of funds available for new projects. Maintenance and operations needs have been well documented but the CCRPC has other funds committed to projects not accounted for here, namely those non-preservation projects identified in our Transportation Improvement Program (TIP). **Table 9** summarizes all anticipated revenues and costs out to 2050 for two System Preservation scenarios, including the new factor of already committed TIP funds.

NOTE: All of the calculations above only included funds from the federal government. As stated earlier almost all federal funds require a 20% non-federal match. As a result, the non-federal match of 20% is added into Table 9 and all subsequent sections of this financial plan content. The total committed to TIP projects is calculated at $102.75 million in 2016 constant dollars.

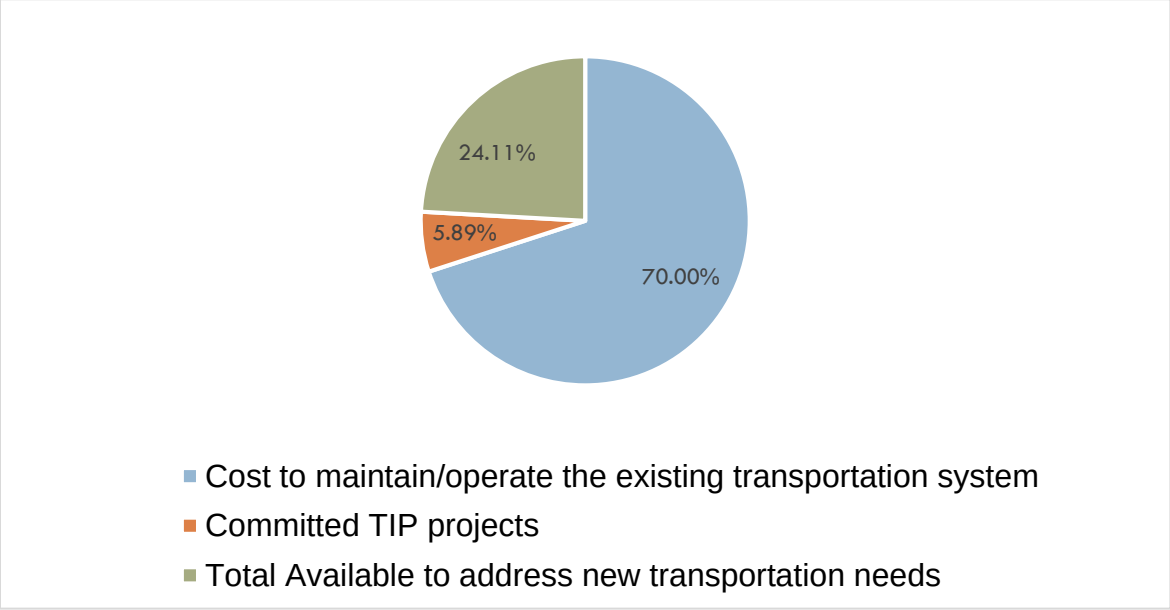
TABLE 9 – ESTIMATED FEDERAL FUNDING FOR CHITTENDEN COUNTY: COMPARISON OF MAINTENANCE FUNDING OPTIONS

Future Funding Estimates (Includes State and Local Match)	70 Percent to System Preservation Millions (2016$)	55 Percent to System Preservation Millions (2016$)
Total Funding for Transportation System	$1,744.72	
Funding to Paving, Bridge and Transit Operations and Maintenance	$1,221.30	$959.59
Cost of 2017 Transportation Improvement Program (TIP) Construction Projects	$102.75	
Total Available New Funding to address new transportation needs excluding TIP	**$420.67**	**$682.38**

Source: CCRPC

Maintaining and operating the existing transportation system is a critically important task and it has been estimated that $1,221.30 million will be required to accomplish this – nearly three quarters of the total (see the pie chart below) The plan also identifies $102.75 million for projects listed in the current Transportation Improvement Program (TIP) including transit projects funded with CMAQ funds. The remaining funding available for new transportation needs is estimated at a little over $420 million. Shares for each category are illustrated in the chart below.

FIGURE 24 – ESTIMATED FUNDING SHARES 2016-2050



Source: CCRPC

Having determined the we have $420.67 million available for investment in new projects (maintenance and committed projects factored out) out to 2050, we propose allocating that total as follows:

TABLE 10 – PROPOSED 2050 PROGRAM ALLOCATIONS

Program Category	MTP Allocations	Percent	FY00-16 TIP Obligation Percentages
Interstate and Interchange Projects	$74,300,000	17.7%	12.6%
Multimodal Roadway Improvements (includes Corridor Improvements, New Facilities/ Major Roadway Upgrades, and Safety/ Traffic Operations/ ITS)	$214,700,000	51.0%	61%
Bike/Pedestrian/ Enhancement	$70,000,000	16.6%	14.1%
Transit Expansion	$40,000,000	9.5%	4.9%
Park &Ride/ Intermodal	$5,700,000	1.4%	3.5%
Rail	Outside our Fiscal Constraint		3.8%
Stormwater/ Environmental	$16,000,000	3.8%	0.1%
New Improvements	$420,700,000	100.0%	100.0%
Total Funding (2050):			$1,744.72 million
TIP/Capital Program Front of the Book Projects:			$102.75 million
Preservation Projects (Operate and Maintain Transit, Pavement, Bridges):			$1,221.30 million

Source: CCRPC

The last column showing 17 years of historical obligations has been added for comparison purposes and reveals that while not a radical departure from historic norms, we do propose significant increases to transit and environmental projects.

Scenario Planning Review and Future Conditions

INTRODUCTION

The previous section examined our transportation system conditions as they are today. This section will look into the future (2050) and evaluate different land use and transportation scenarios using recently approved Chittenden County population, housing and employment numbers (see **Table 11**).

TABLE 11 – CHITTENDEN COUNTY DEMOGRAPHICS

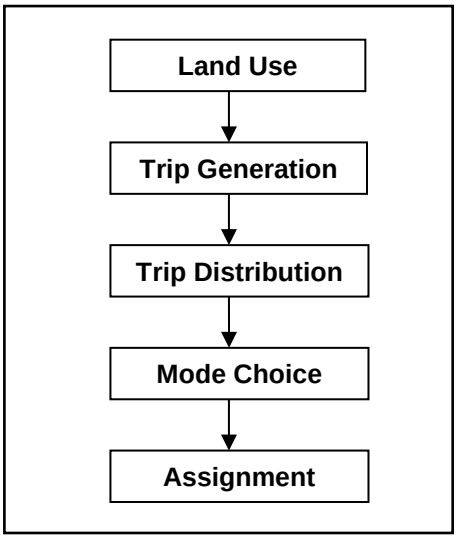
Demographics	2015	2050	2015 to 2050 % increase
Population	161,382	183,172	**14%**
Employment	135,511	182,688	**35%**
Household	63,498	79,151	**25%**

A total of nine transportation and land use scenarios were evaluated as part of this plan. This was done using the CCRPC Regional Travel Demand Model (the model) of Chittenden County. By looking at numerous scenarios we were able to better understand the impacts of different land use and transportation investment decisions. The scenarios are described in **Table 12** in the following section.

Transportation models have been used in Chittenden County since the mid-1980's. The current model framework was developed in 1994 and was updated and enhanced in 1998, 2011, and 2017. It uses custom designed computer software to examine travel impacts on roadway capacity and congestion in the county based on various land use, demographic, mode share, highway network, and other scenarios. The model is a sophisticated tool that simulates the interaction of trips generated by households and employment and evaluates their impact on the transportation system. It is also sensitive to how congestion impacts trip making decisions.

The model can analyze morning (AM) and afternoon (PM) peak hour as well as daily conditions. For the current MTP analyses, daily results of specific metrics were used to gauge county-wide performance of each scenario relative to one another. The AM and PM peak hour results highlight specific network problems of each scenario. The AM and PM peak hour results are used for this purpose since they represent the time in which the network exhibits the greatest levels of congestion. It is important to look at both AM and PM peak hours to ensure potential future problems are not overlooked.

TRAVEL MODEL PROCESS



The model follows a five-step process as shown at the diagram on the left**.** This process is built first to replicate existing travel conditions and then adapted to simulate future scenarios.

The five model steps break-down the relationship between the land use, economic activity and travel behavior. Trip generation estimates the total number of trips produced and trip distribution estimates where these trips will go. Both of these steps are based on where the households and employment are located. Mode choice evaluates how people will travel (i.e. drive, bike, walk, or bus) and trip assignment estimates which route travelers will use.

Careful input data, combined with powerful software analysis and real-world calibration make the model a reliable tool to assess our potential future. For more information on the regional model visit https://www.ccrpcvt.org/our-work/transportation/transportation-resources/modeling/.

The Chittenden County Transportation Model is a powerful and important analytical tool, but it is just that – a tool for helping us to better understand transportation issues. The model does not make decisions but is one of numerous resources the CCRPC calls upon to make more informed choices about how to invest limited resources to improve the region's transportation system.

FUTURE TRANSPORTATION SCENARIOS

Descriptions of the various transportation and land use scenarios that were analyzed using the model are provided in **Table 12** below.

TABLE 12 – SCENARIOS FOR TRANSPORTATION

Scenario Name	Scenario Elements/Assumptions /Description
1. 2050 Base	• 2050 housing and employment growth plus: – TIP projects that are also front of the book in VTrans' Transportation Capital Program
2. Scenario A: Road Capacity Scenario	• 2050 Base plus: – All TIP Projects and MTP roadway projects as listed in the 2013 ECOS/MTP Plan (http://www.ecosproject.com/plan/).
3. Sub-Scenario A – Interstate-89 Interchange Improvements	• 2050 Base plus: – Discrete I-89 interchange improvements or additions: 12B (new interchange at VT116), full Exit 13, full Exit 15, 14N (new interchange north of the Patchen Road overpass)

4. Scenario B1: Connected and Autonomous Vehicles (CAVs) – Partial market penetration	• 2050 Base plus: – Substantial deployment (80% Market Penetration) of connected and autonomous vehicles (CAVs) – 50% of person trips are with privately owned CAVs and 50% are with a shared service – Slight increases in interstate and signalized intersection capacities since 20% of vehicles remain unconnected – Induced demand associated with increased mobility for the youth and the elderly – Accounting for Zero Occupancy Vehicle (ZOV) trips circling the block while people run errands for areas that parking is at a premium and ZOV trips traveling to and returning from remote parking areas
5. Scenario B2: Connected and Autonomous Vehicles (CAVs) – Total market penetration & increased benefits of higher percentages of people sharing trips	• 2050 base plus: – 100% of vehicle fleet is comprised of CAVs – 35% of person trips are with privately owned CAVs and 65% are with a shared service – Shared CAVs operate with an average occupancy of 2.5 people per car (higher than scenario B1). – Significant increases in interstate, roadway and intersection capacities due to 100% CAV adoption – Induced demand associated with increased mobility for the youth and the elderly – Accounts for Zero Occupancy Vehicle (ZOV) trips circling the block while people run errands for areas that parking is at a premium and ZOV trips traveling to and returning from remote parking areas
6. Scenario C: Transportation Demand Management	• 2050 Base plus: – Increased transit service including: ▪ 20-minute headways for all transit routes (excluding the LINK express) ▪ New VT-127 to Colchester transit loop service ▪ Bus Rapid Transit (10-minute headways) on a dedicated lane/ROW for the following corridors: US 2 (University Place in Burlington to Taft Corners in Williston); VT 15 (Exit 15 in Winooski to Five Corners in Essex Junction); US 7 (Shelburne Street Roundabout in Burlington to Webster Road in Shelburne); Colchester Avenue (University Place in Burlington to Winooski River Bridge) – Increased numbers of walk/bike trips in Center and Village planning areas

7. Scenario D1 – Increase land use density	• 2050 Base with following land use: – 90% of adopted 2050 household growth is allocated to the Center and Village planning areas for all towns
8. Scenario D2 – Increase land use density	• 2050 Base with following land use: – 90% of the approved 2050 household growth is allocated to Areas Planned for Growth with concentration in the Urban Centers and Village planning areas
9. Scenario D3 – Increase households in the county to improve our jobs/housing balance	• 2050 Base with following land use: – County population and households are increased by 10% over adopted projections. – Additional household growth is allocated to Center and Village planning areas for all towns as in scenario D1

SCENARIO RESULTS

The capacity building scenario (A) resulted in reduced congestion and delay on the transportation system when compared to the 2050 Base. The sub-scenarios that looked at individual I-89 interchange expansions or additions did not have substantial reductions in countywide delay (see **Figure 25**). When the interchange sub-scenarios were analyzed in greater detail, results indicated that they all helped to decrease congestion at areas around the interchanges, with Exits 12B (VT 116) and 14N (Patchen Rd) having the most benefit. On the downside the capacity building scenarios caused the vehicle miles traveled (VMT) to slightly increase compared to the 2050 Base since the reductions in delay made it easier to travel.

The Connected and Autonomous Vehicle (CAV) scenarios (B1 & B2) were developed to begin to consider how this technology could affect our transportation system, land use patterns and our communities overall. Scenarios B1 and B2 are two vastly different possible futures. Scenario B1 exhibited the greatest increases in vehicle miles traveled (VMT), delay, and trip making. Scenario B2 also saw increases in VMT and trip making (see **Figure 25**) but saw decreased delay when compared to the 2050 Base (see **Figure 25**). This was due to the assumptions of CAV proliferation, 80% vs 100%, and private ownership, 50% vs 35%, for Scenarios B1 and B2 respectively. The jump to 100% CAV proliferation in Scenario B2 allowed for significant increases in the carrying capacity of existing roadways and intersections. Drivers currently keep a distance equivalent to 1 to 3 seconds of travel time behind the vehicle in front of them whereas CAVs can reduce this distance to one-half a second or less. Scenario B1 was not as efficient as B2 due to the assumption that 20% of vehicles remained unconnected and prone to human error. The ownership assumptions in Scenario B2 helped reduce congestion because of the increase in the number of shared trips (2-3 people sharing a vehicle at a time) whereas the assumption is that privately owned vehicles are typically only moving one person. The increased number of zero-occupancy vehicle (ZOV) trips assumed with privately owned CAVs also contributed to the poorer performance of Scenario B1 when compared to B2.

The Transportation Demand Management (TDM) scenario (C) reduced an individual's delay as much as the capacity building scenario (A) (see **Figure 25**). This is directly related to the increase in mode

shift towards transit, walking and biking, as shown in **Figure 29**. This scenario also had a slight decrease in VMT when compared to the 2050 Base.

The land use scenarios (D1, D2, and D3) analyzed the effect of concentrating land uses and increasing densities on the transportation system. Generally, these scenarios decreased delay and VMT when compared to the 2050 Base (see **Figure 25**). This was due to the increased viability of transit, walking, and biking that occurs when more people live closer to transit routes and there is transportation infrastructure that supports walking and biking. Scenario D3 is the only scenario that analyzed an increase in households and consequently population in the county beyond the adopted population forecasts. This scenario was designed to see what might happen if Chittenden County were able to reverse the trend of people living outside and commuting into the county for work. Results of Scenario D3 indicated that despite a 10% increase in county households, the overall delay per capita, VMT and total number of vehicle trips decreased (see **Figure 25**).

FIGURE 25 – COUNTYWIDE DAILY DELAY PER CAPITA

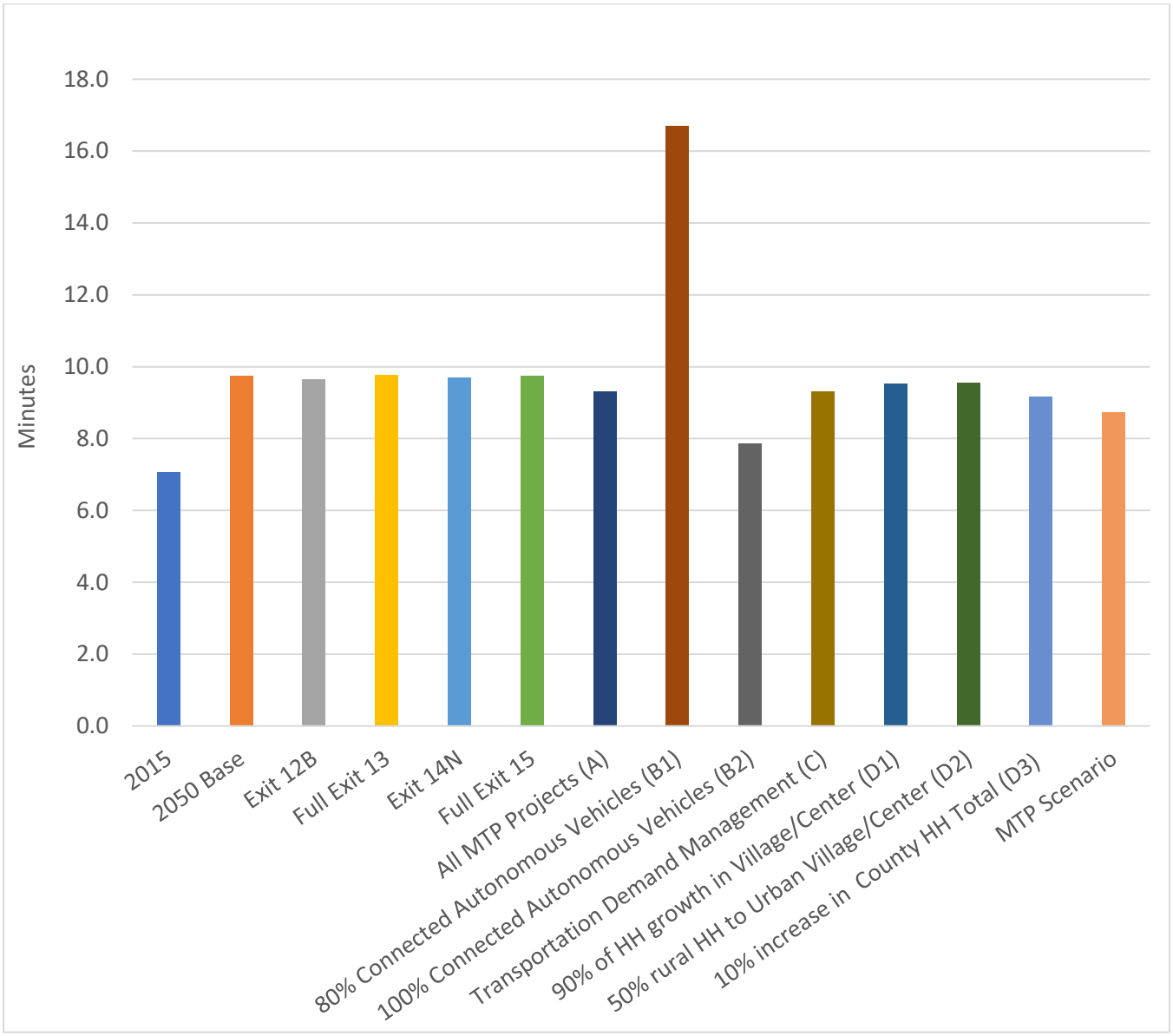


FIGURE 26 - COUNTYWIDE DAILY VEHICLES MILES TRAVELED (VMT)

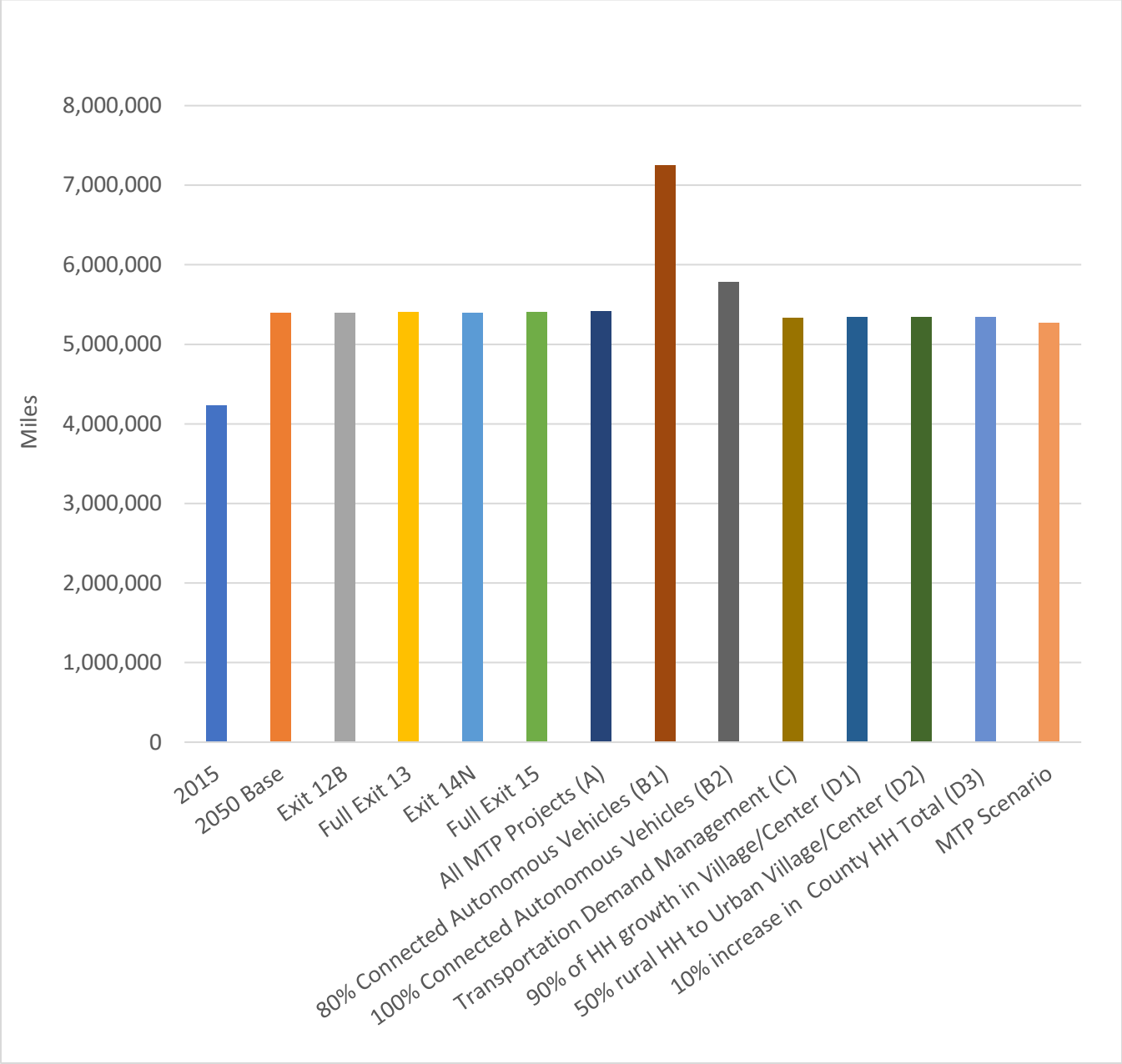


FIGURE 27 - COUNTYWIDE DAILY TOTAL VEHICLE TRIPS

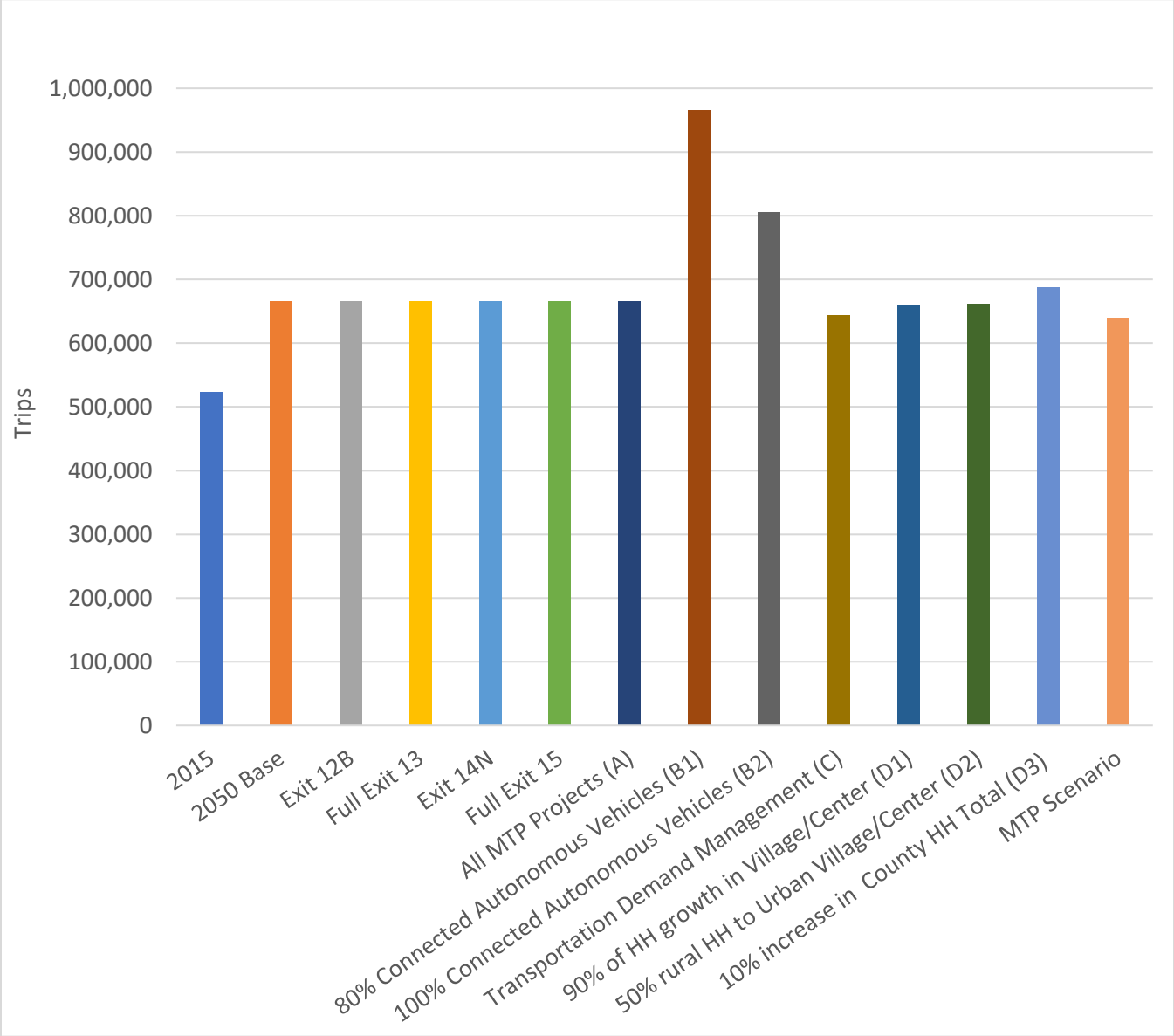


FIGURE 28 - COUNTYWIDE DAILY VEHICLE MILES TRAVELED (VMT) PER CAPITA

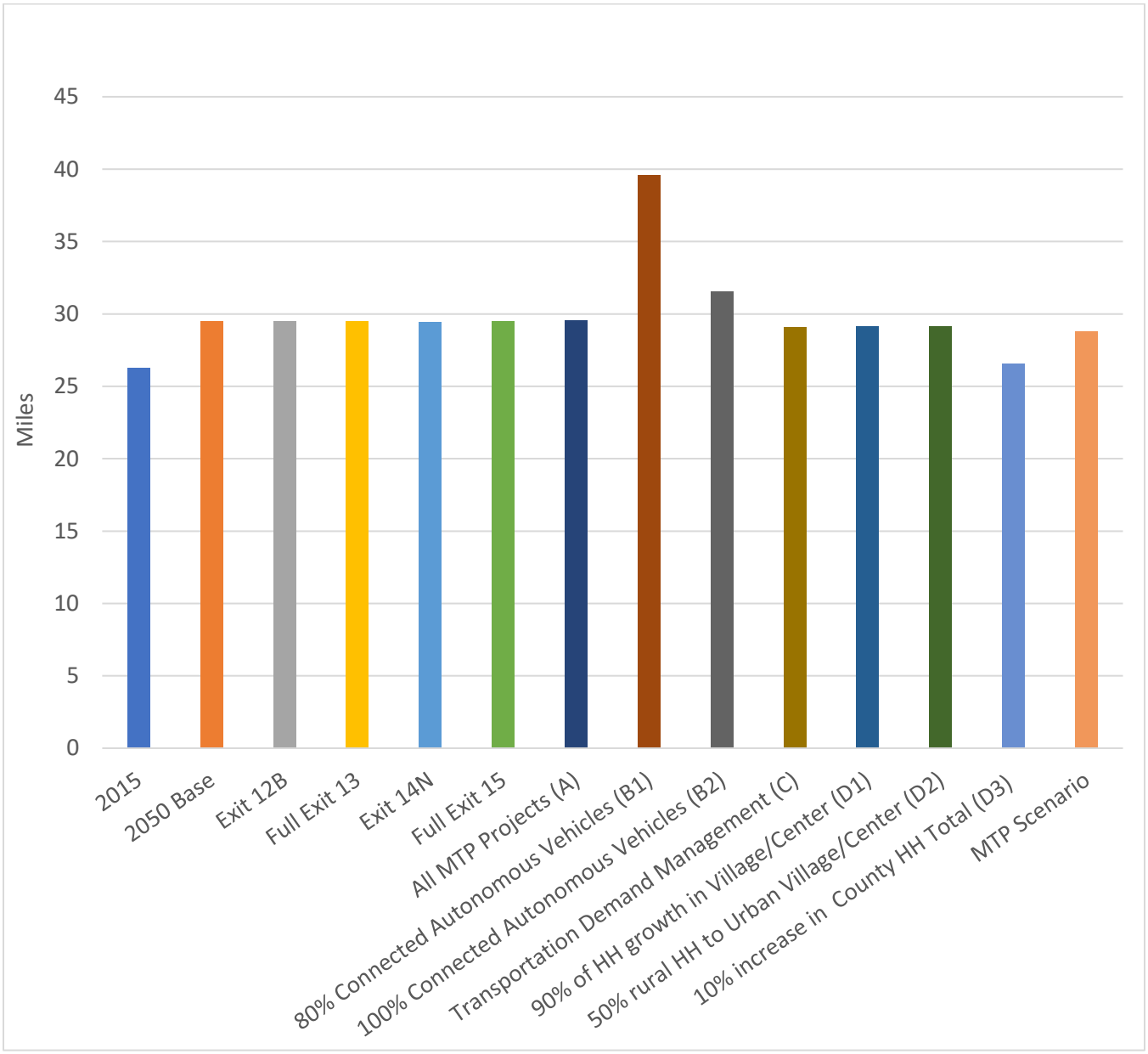
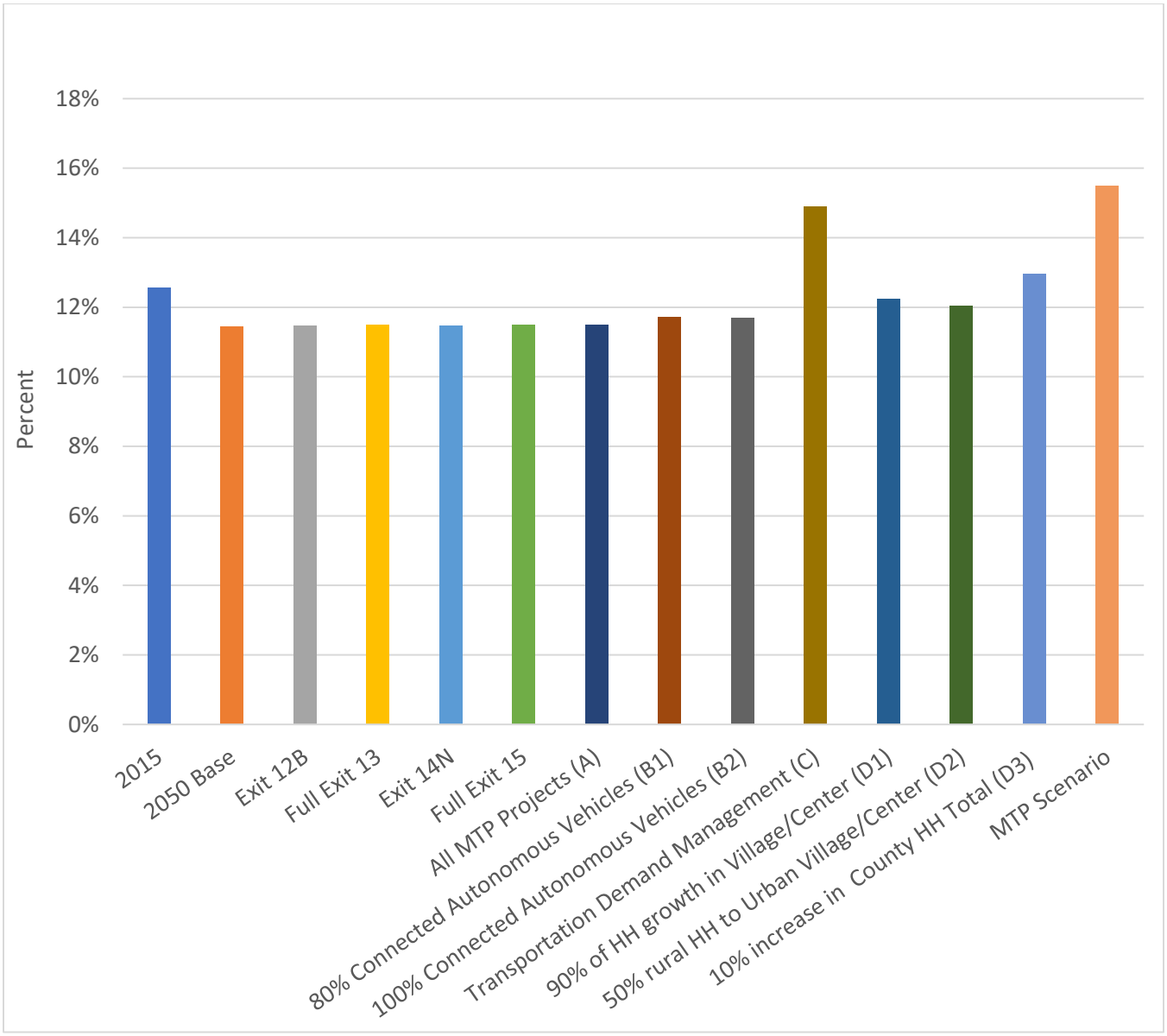


FIGURE 29 - COUNTYWIDE DAILY TRANSIT, WALKING, AND BIKING MODE SPLIT



MTP SCENARIO

All future scenarios developed and evaluated are starkly different from one another and from the past historical programmatic transportation investments and are unlikely to proceed in the manner outlined in each individual scenario. However, results from the various scenarios helped frame the conversation about what to include in our MTP Scenario so it is a more balanced, achievable and sustainable future transportation program. The MTP Scenario is described in **Table 13**.

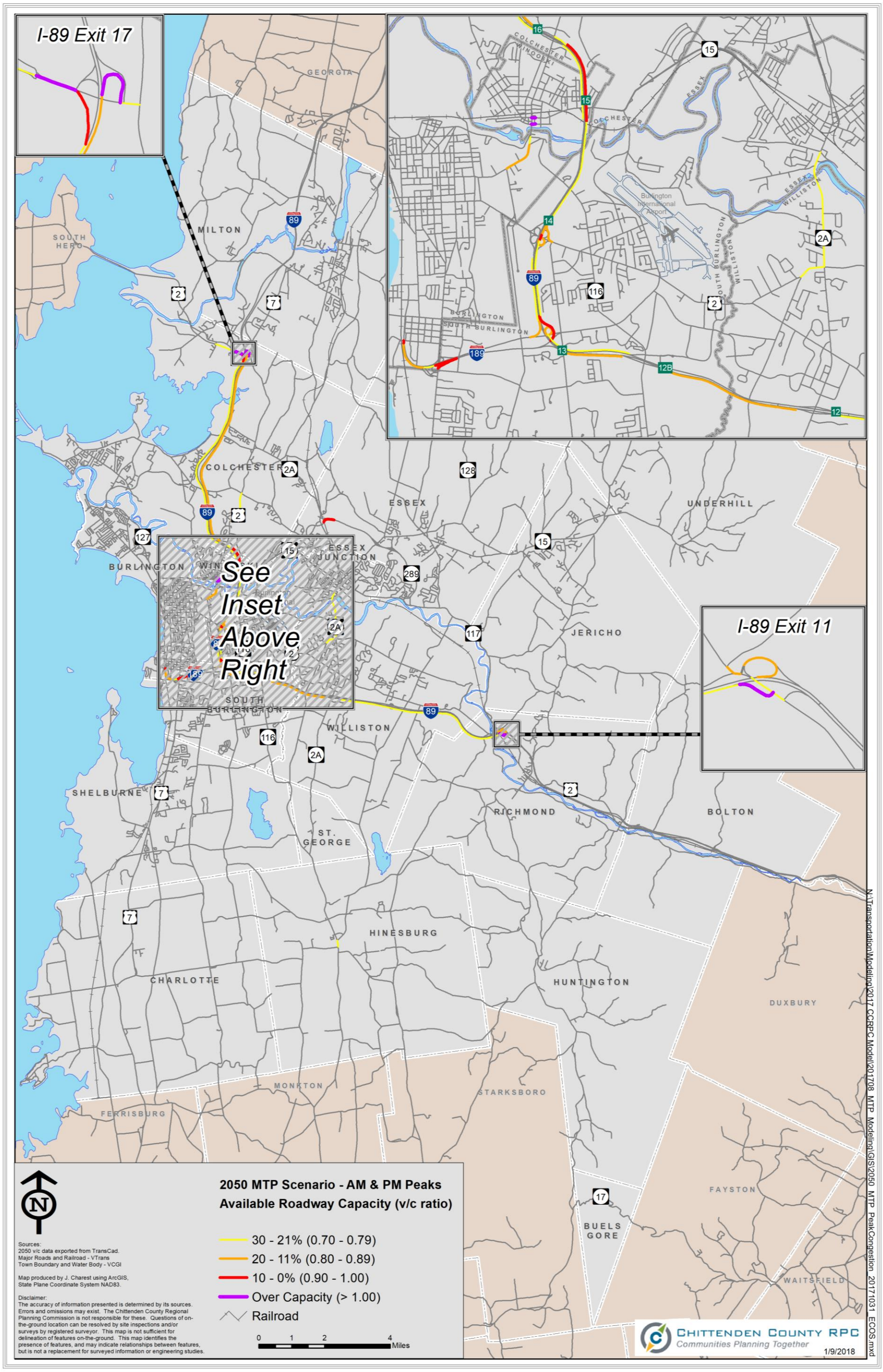
TABLE 13 – MTP SCENARIO DESCRIPTION

2050 Metropolitan Transportation Plan Approx. $420 million	• All MTP Projects including: – Third lane on I-89 between Exit 14 and Exit 15 – Exit 12B is included as a placeholder for a future interchange improvement between Exits 12 and 16 including new 12B or 14 N Interchange or reconstructing Exit 14. – Intelligent Transportation System investments and signal upgrades for major arterials in the county. – Local projects identified by municipalities and the CCRPC through various planning studies and plans. – 15-minute headways all day for the existing trunk routes in the county (US2, US7, VT15, and North Avenue); 20 to 30-min headways for all other routes; and a new *VT-127 to Colchester* transit loop service. – Substantial increase in walk/bike infrastructure in Villages and City/Town Centers. – Land Use: 90% of the approved 2050 household growth is allocated to TAZs that correspond to areas planned for growth with concentration in the urban center and village planning areas. ▪ The 90% concentration of HH was deemed appropriate as the county has been averaging 86% - 89% HH growth in the areas planned for growth in the past five years.

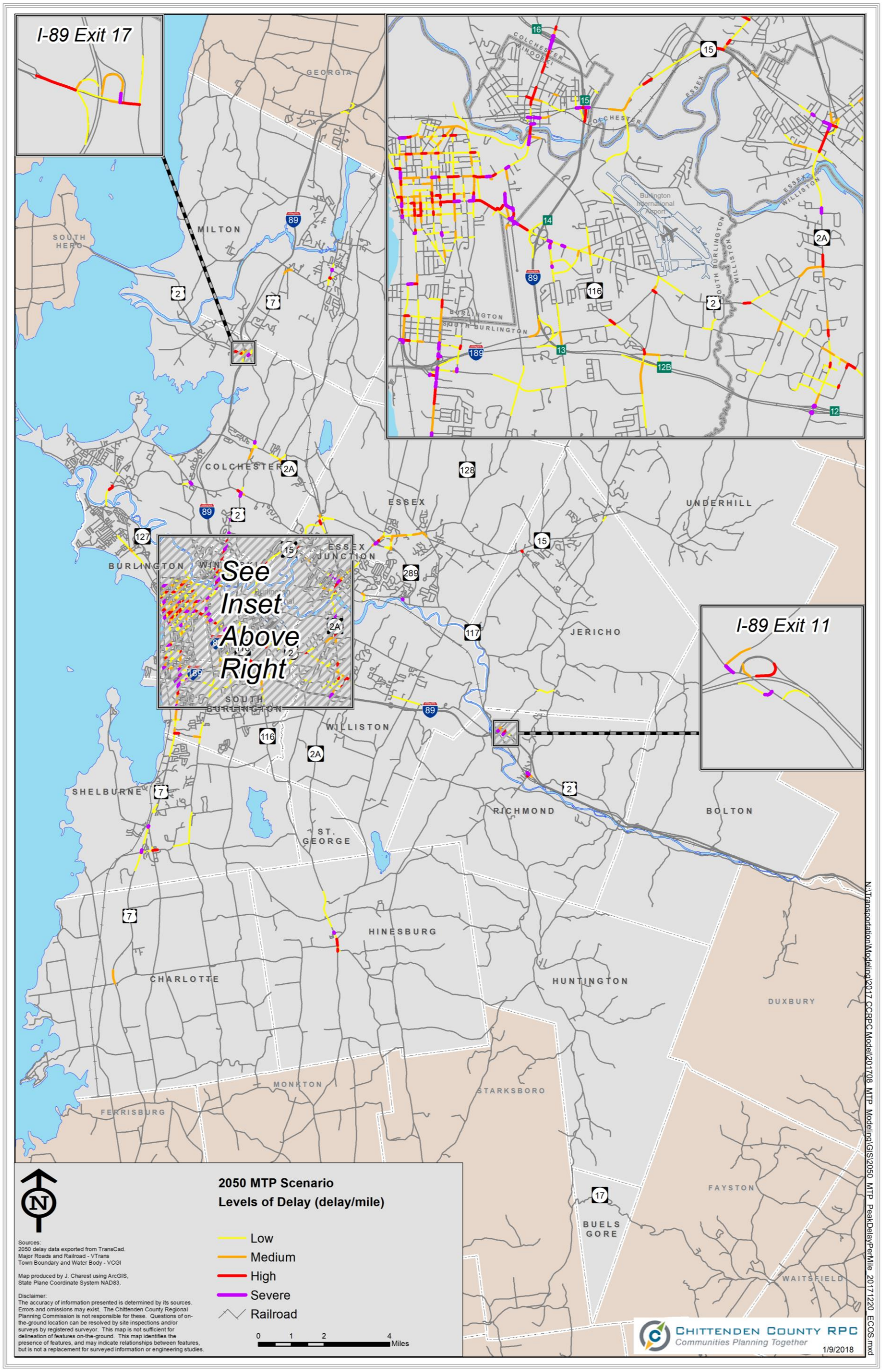
MTP SCENARIO RESULTS

The MTP scenario was developed through an iterative approach and collaborative effort with the Transportation Advisory Committee (TAC), the Long-Range Planning Committee (LRPC) and the CCRPC Board. Comments received by committee members and the Board were incorporated into the scenario to the degree possible. The MTP Scenario strives to strike a balance between improving roadway safety; increasing roadway capacity where demand is exceeded; increasing the viability of walking, biking, and transit; and concentrating land use in all areas planned for growth with increased density in the urban centers and villages. Even though we acknowledge that CAVs have the potential to change travel as we know it today, this scenario does not incorporate any CAV assumptions of Scenarios B1 and B2 as it is impossible to predict the future of this rapidly evolving technology with any certainty. As previously shown in **Figure 25**, the MTP Scenario reduces delays, trips, and VMT while increasing transit, walking and biking trips compare to the 2050 Base. **Map 5** on the following pages display traffic results of the MTP scenario. Please note that **Map 5** illustrates the effect of increasing the number of lanes to 3 per direction on the I-89 segment between Exits 14 and 15. In the 2050 Base Scenario the northbound lanes were shown to be over capacity with the southbound lanes having less than 10% available capacity. **Map 6** indicates the levels of delay which are greater than those experienced today. **Map 7** showcases the effects of implementing the MTP Scenario when compared to the 2050 Base.

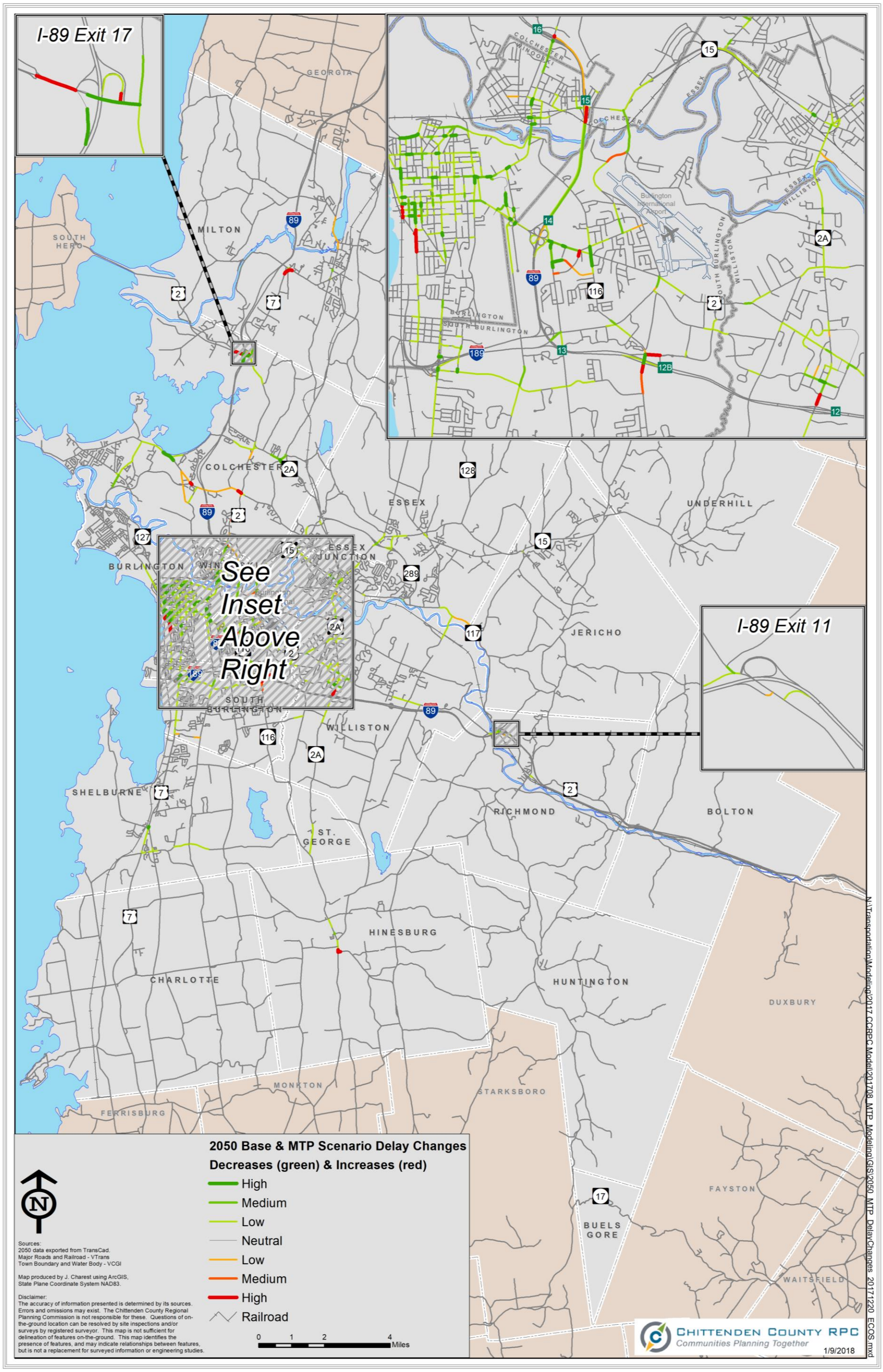
MAP 5 – 2050 MTP SCENARIO AVAILABLE ROADWAY CAPACITY (VOLUME/CAPACITY)



MAP 6 – 2050 MTP SCENARIO LEVELS OF DELAY (DELAY/MILE)



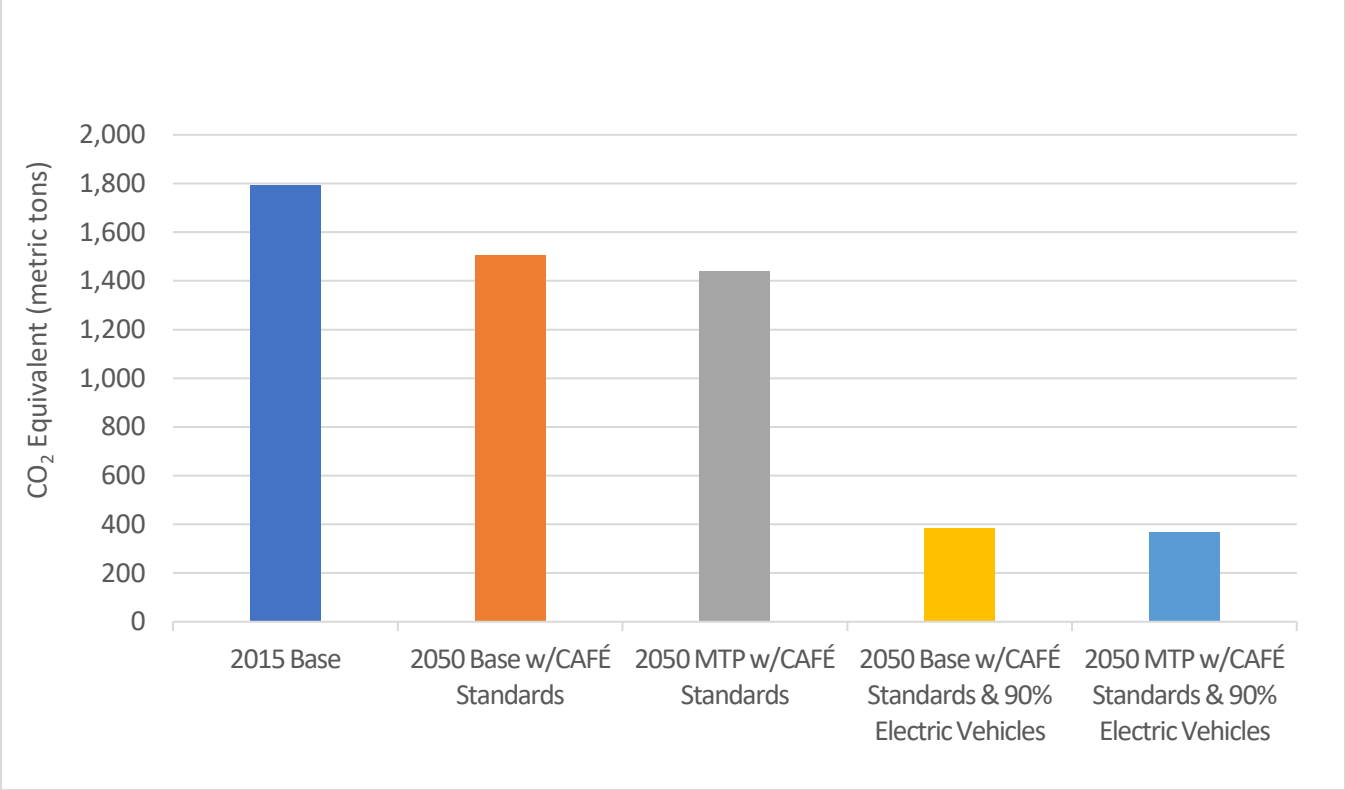
MAP 7 – 2050 MTP SCENARIO DELAY CHANGES VS 2050 BASE



MTP SCENARIO GREENHOUSE GAS EMISSIONS

Estimations of Greenhouse Gas (GHG) emissions were evaluated using the Environmental Protection Agency's (EPA's) MOtor Vehicle Emission Simulator (MOVES) for the 2015 Base, 2050 Base, and 2050 MTP scenarios. Future emissions for the 2050 Base and 2050 MTP scenarios were analyzed through two different lenses: 1) increases in internal combustion engine efficiency via 2025 Corporate Average Fuel Economy (CAFÉ) standards alone and 2) with the addition of a 90% conversion of the entire vehicle fleet (light, medium and heavy-duty vehicles) to electric vehicles. This is a slightly more ambitious assumption than was considered in CCRPC's energy analysis found in ECOS Supplement 6 which assumed an 89% conversion to electric vehicles for light duty vehicles only. The energy analysis utilized the Long-range Energy Alternative Planning (LEAP) tool and is based on the Vermont Total Energy Study conducted in 2014 which didn't consider the conversion of heavy and medium-duty vehicles to electricity but rather biofuels. Given the advancements in electric vehicle technology that have taken place in the past few years, updated assumptions which reflect these advancements were warranted. The substantial fleet conversion to electric vehicles is necessary to achieve Vermont's and the county's energy goal of having *90% of Vermont's overall energy needs from renewable sources by 2050*. As shown in **Figure 30** below, as increases in vehicle efficiency and/or conversion to electric vehicle technology take place, the countywide emissions will decrease despite the anticipated increases in vehicle miles traveled.

FIGURE 30 – COUNTYWIDE DAILY GREENHOUSE GAS EMISSIONS



MTP Corridors

This section presents the projects, programs, and strategies to implement MTP recommendations by roadway corridor. Building the MTP around these corridors facilitates an inter-municipal/regional understanding of transportation conditions and priorities and can help decision-makers as they grapple with the diverse needs of a complex system. Corridor-oriented planning also strengthens the CCRPC's ability to look across municipal boundaries and beyond isolated single-mode solutions to holistically address transportation issues on these corridors. As we invest in new projects and programs within the corridors listed below, it is important to repeat and stress that ***maintaining our existing transportation infrastructure is critically important and should remain the County's top priority*.**

The broad priorities established here include:

- System maintenance, defined as keeping the existing transportation infrastructure of roads, bridges, transit, bicycle and pedestrian facilities, and intermodal facilities in acceptable operational condition. Future conditions will be evaluated using the Performance Management measures and targets set by VTrans and the CCRPC as well as other infrastructure management measures.
- Encouraging higher density and mixed-use land development, as proposed by the CCRPC's ECOS Regional Plan to improve the efficiency of transportation investments.
- Completing all projects identified in the CCRPC's FY2018-2021 Transportation Improvement Program (TIP).
- Expanding the Green Mountain Transit's system for more reliable and productive service levels in urban and suburban areas and into adjoining regions.
- Expanding the bicycle and pedestrian networks with on- and off-road bike facilities and more sidewalks.
- Implementing Complete Streets as required on all roadway projects to facilitate multimodal travel by users of all ages and abilities.
- Employing more Transportation Demand Management (TDM) strategies through employer-based trip reduction programs, an expanded network of park-and-ride facilities, and by supporting the efforts of Green Mountain Transit (GMT).
- Implementing Transportation System Management (TSM) strategies and investing in Intelligent Transportation Systems (ITS) as well as access management along major arterials, to improve the operational efficiency of the system.
- Addressing corridor congestion and safety issues along key arterials with operational and capacity enhancements as needed.

Corridor-oriented planning considers the transportation connections between major settlement areas of Chittenden County. These corridors represent easily recognizable and dominant directional movements of persons and goods, while also accounting for localized travel. The corridor delineations identified below are based on the analysis of existing and emerging travel and land use patterns. They are tied to the various trip origins and destinations both within and outside of the region. The defining feature of each corridor is one or more major state highway.

Map 8 presents key corridors in Chittenden County. These include:

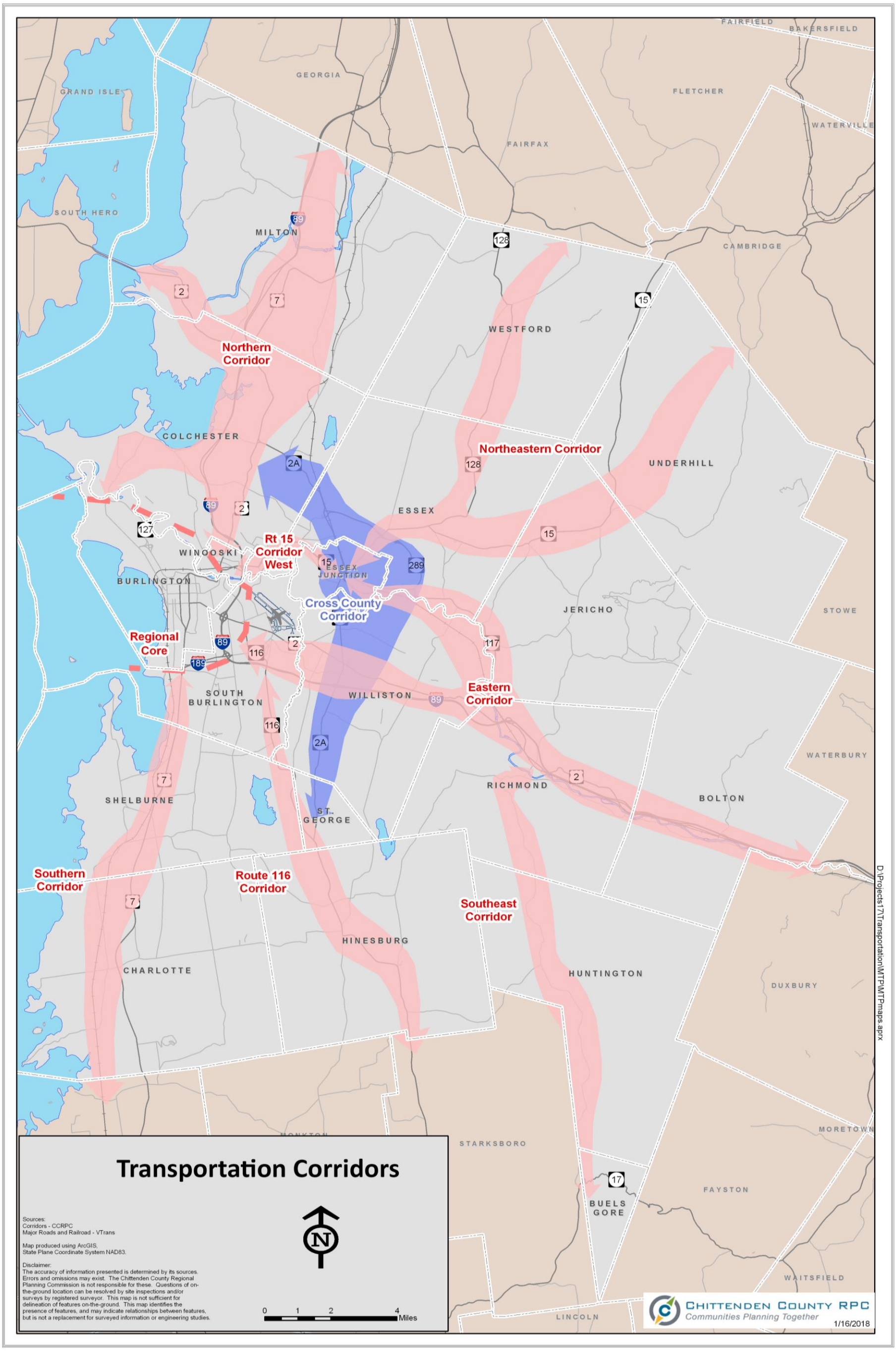
1. **Regional Core:** The transportation network in the Greater Burlington area;
2. **Northern Corridor:** US 2/7 and I-89 from Winooski to the County line, VT 127 through Colchester, and the rail line north from Essex Junction;
3. **Northeast Corridor:** Essex Junction to the County line along VT 128 and VT 15;
4. **Route 15 West Corridor:** Winooski to Essex Junction including Winooski Branch rail line;
5. **Southeastern Corridor:** Richmond to Buels Gore, including Huntington Road and Main Road;
6. **Route 116 Corridor:** VT 116, South Burlington, through Hinesburg, to the County line;
7. **Eastern Corridor:** US 2, I-89, VT 117, and the Burlington and Essex Junction rail line east to the County line;
8. **Southern Corridor:** US 7 and rail line from Burlington south to County line;
9. **Cross County Corridor:** VT 2A and VT 289 from St. George/Williston to Essex and Colchester.

REGIONAL CORE

The Regional Core is defined as the City of Burlington and adjoining areas of Winooski and South Burlington. This area is both origin and destination for much of the region's travel, and the evolution of the road network servicing it clearly demonstrates its relative importance in the state's economic and cultural history.

Multimodal options in the Regional Core are the best in the state. Part of the reason modes other than Single Occupancy Vehicles (SOVs) are attractive is due to the dense development and resulting volume of vehicles producing congested conditions. This is the region's primary activity center and congestion is a condition of its vibrancy and vitality. The walk/bike/transit modes will remain attractive as alternatives as long as the vehicle speeds remain relatively low.

MAP 8 – TRANSPORTATION CORRIDORS



Establishing intercept park-and-ride facilities at the Regional Core's periphery that focus on commuter trips - intercepting SOV trips by employees and transferring them to other modes - is a strategy used currently for the Hill Institutions (UVM Medical Center, UVM, Champlain College) and is examined more closely to relieve this area's parking and congestion issues.

Because the Regional Core has a significant residential component yet provides a conduit for high traffic volumes and possesses a well-connected grid street system, knowledgeable drivers can use neighborhood streets to avoid congested arterials. To minimize this practice, traffic-calming techniques should be used in those cut-through neighborhoods to maintain safety, enhance street life, encourage walking and bicycling, and direct the cut-through traffic back onto the arterials.

Parking is perceived as constrained despite inventory information to the contrary. However, parking costs are higher than elsewhere in the region, where undeveloped land is considerably less expensive. Locating, designing, and funding parking facilities poses a dilemma and businesses can be attracted by less costly and more welcoming expansion opportunities outside the Regional Core. Striking a parking balance between many competing interests is a vexing challenge here.

A well-developed sidewalk network already exists in the Regional Core, although due to its age it needs significant reinvestment to maintain its integrity and meet federal accessibility requirements. Bicycling is well provided for in the shared use path network around this area; however, many of these trips start and end in places served only by city streets. A well signed and designed on-street network, especially focusing on north/south travel, is needed to provide area-wide, safe, on-road bicycle travel.

Public transit coverage here is superior to anywhere else in the state. However, new services, with adequate funding, can improve this. Higher frequency levels, more hours of service during the day, and more weekend service, will help the system grow and attract a wider traveling public. GMT's new Downtown Transit Center is a welcome enhancement to transit service quality.

Go! Vermont, Travel Smarter and TDM programs at the Hill Institutions and beyond, provided by CATMA, have helped promote transportation alternatives, reduce parking pressures, and have better managed traffic flow in and around these facilities served by their programs. Expanding these programs to additional Regional Core employers could help relieve congestion and parking demand.

VT Railway operates a line within this corridor and has its headquarters and railyard on the Burlington waterfront. Another rail line, now owned by Genesee & Wyoming links the waterfront to their mainline in Essex Junction. Bringing Amtrak service into Burlington along the western rail corridor is a state goal and service is expected to begin in 2020.

Corridor Strategies/Projects

Because the character of the Regional Core significantly differs from the corridors that feed and sustain its vibrancy, the types of transportation strategies and projects recommended below differ from those recommended in other corridors. **Table 14** identifies the regional project and program priorities for this area. NOTE: Transportation Improvement Program (TIP) projects are listed first. These are the region's near term (next four years) project priorities. The listed sequence beneath the TIP projects does not denote priority rank.

TABLE 14 – REGIONAL CORE STRATEGIES/PROJECTS

Municipality	Project	Type
Burlington	Champlain Parkway -- **TIP Project**	Multimodal Roadway Improvement
Burlington	Shelburne Street Roundabout -- **TIP Project**	Multimodal Roadway Improvement
Burlington	Colchester Avenue Side Path -- **TIP Project**	Bike & Pedestrian
Burlington	Champlain Elementary Pedestrian Crossing Improvements -- **TIP Project**	Bike & Pedestrian
Burlington	North Avenue Crosswalks -- **TIP Project**	Bike & Pedestrian
Burlington	Railyard Enterprise Project -- **TIP Project**	Multimodal Roadway Improvement
Winooski	Gateways Crosswalk Enhancements -- **TIP Project**	Bike & Pedestrian
Burlington	Burlington Bike Path Rehabilitation	Bike & Pedestrian
Burlington	Colchester Avenue/East Avenue Intersection Improvements	Multimodal Roadway Improvement
Burlington	Colchester Avenue/Prospect Street Intersection Improvements	Multimodal Roadway Improvement
Burlington	Colchester Avenue/Riverside Avenue Intersection Improvements	Multimodal Roadway Improvement
Burlington	Depot Street Improvements for Waterfront Access	Multimodal Roadway Improvement
Burlington	Sherman to Depot Stairway Street	Bike & Pedestrian
Burlington	North Avenue Improvements	Multimodal Roadway Improvements
Burlington	Winooski Avenue Improvements	Multimodal Roadway Improvements
Burlington	Main Street Great Streets Project	Multimodal Roadway Improvement
Burlington	Battery Street Improvements	Multimodal Roadway Improvement
Burlington	Shelburne Street Complete Streets Project	Multimodal Roadway Improvement
Burlington	Cherry St Complete Streets Project	Multimodal Roadway Improvement
Burlington	Pearl St Complete Street	Multimodal Roadway Improvement
Burlington	Bike/Ped Crossing over the Winooski River in the vicinity of the Railroad bridge to the Burlington Intervale	Bike & Pedestrian

Burlington	Bike/Ped Crossing over the Winooski River near the US 2/7 Bridge (dependent on scoping for the adjacent road bridge)	Bike & Pedestrian
Burlington	Intervale Road Access Improvements	Bike & Pedestrian
Burlington	Champlain Elementary Safe Routes to School, Phase II	Bike & Pedestrian
Burlington	I-89 Exit 14 Intercept Park-and-Ride	Park-and-Ride
Burlington	Main St. Complete Street	Multimodal Roadway Improvement
Winooski	Riverwalk East – Access to Casavant Park	Bike & Pedestrian
Winooski	Main Street (US RT 7) Revitalization – Transportation, Utility, Stormwater	Multimodal Roadway Improvement
South Burlington	Three Lanes on I-89 Between Exits 14 and 15	Multimodal Roadway Improvement

NORTHERN CORRIDOR

The Northern Corridor serves north/south travel needs connecting the Regional Core area (and points further east and south) to Colchester, Milton, and Franklin and Grand Isle counties.

North/south, as well as east/west, movement in this corridor is currently relatively efficient and non-congested with some delays mostly at the major intersections of US 7. Future congestion problems will mostly be confined to I-89 and Exit 17 with some intersection delays along VT 127 in Colchester and US 7 in both Colchester and Milton, including the US7/US2 intersection.

Bicycle and pedestrian accommodations are improving, especially within the village areas, although connecting travel between the more heavily settled areas by bicycle and on foot is encumbered by narrow road shoulders in some areas. By contrast, the road shoulders on US 2 from Chimney Corners to the Sandbar Causeway are exemplary examples of adequate width to accommodate cyclists and walkers.

Public transportation services here are limited. While Milton has become a GMT member and has commuter service to the Regional Core, Colchester remains a non-member but has begun partnering with GMT on limited service along US 7 from Milton to Water Tower Hill. Colchester also sees transit service from the Essex Route along VT 15 in the town's southeast corner as well as LINK (by on-board request) and Commuter stops at the park-and-ride near Chimney Corners.

The Genesee & Wyoming Railroad line travels through this corridor and is used for freight trains. While there are currently no passenger stations located along this corridor, there are freight rail sidings in both Colchester and Milton.

Recommended Corridor Strategies/Projects

The following projects and strategies are recommended for this corridor. NOTE: The listed sequence does not denote priority rank.

TABLE 15 – NORTHERN CORRIDOR STRATEGIES/PROJECTS

Municipality	Project	Type
Colchester	VT2A/US7/Creek Road/Bay Road Intersection -- **TIP Project *(constructed in 2017)***	Multimodal Roadway Improvement
Colchester	Blakely Road/Laker Lane Intersection Improvements -- **TIP Project**	Multimodal Roadway Improvement
Colchester	Exit 16 Improvements -- **TIP Project**	Multimodal Roadway Improvement
Colchester	Severance Corners -- **TIP Project**	Multimodal Roadway Improvement
Colchester	West Lakeshore Drive/Prim Road Intersection Improvements –**TIP Project**	Multimodal Roadway Improvement
Colchester	US 7/I-89 Exit 16 Park-and-Ride -- **TIP Project**	Park-and-Ride
Colchester	Mountain View Drive Sidewalk -- **TIP Project *(constructed in 2017)***	Bike & Pedestrian
Colchester	West Lakeshore Drive Path -- **TIP Project**	Bike & Pedestrian
Milton	US7/Middle Road/Railroad Street Safety Improvements – **TIP Project**	Multimodal Roadway Improvement
Milton	Cherry Street – **TIP Project**	Bike & Pedestrian
Milton	US7 Sidewalk – Nancy Drive to Haydenberry Drive – **TIP Project**	Bike & Pedestrian
Colchester	West Lakeshore Drive Path, Phase II - Harbor View to Boat Launch	Bike & Pedestrian
Colchester	West Lakeshore Pedestrian Tunnel at Bayside Park	Bike & Pedestrian
Colchester	VT127 Roadway and Intersection Improvements	Multimodal Roadway Improvement
Colchester	Roundabout at Bayside Park	Multimodal Roadway Improvement
Colchester/Winooski	ITS Improvements, US 7 Corridor	Multimodal Roadway Improvement
Milton	US7/Main Street Intersection Improvements	Multimodal Roadway Improvement
Milton	US7/Racine/Legion/West Milton Road Improvements	Multimodal Roadway Improvement
Milton	Town Office Park-and-Ride	Park-and-Ride

Milton	I-89/West Milton Road New Interchange	Multimodal Roadway Improvement
Winooski	Main Street (US7) Revitalization – Transportation, Utility, Stormwater	Multimodal Roadway Improvement

NORTHEASTERN CORRIDOR

The Northeastern Corridor serves the municipalities of Essex, Westford, Jericho, and Underhill, providing a link to the employment and commercial centers of the greater Burlington area via VT 15 and VT 128. These roads also connect parts of Franklin and Lamoille counties to Chittenden County. Old Stage Road in Essex and Westford, and River Road/Pleasant Valley Road in Underhill form parallel collectors channeling traffic through this corridor as well.

Travel into this corridor from the outlying towns and counties flows relatively well today. However, it is expected that in the out years of this plan's horizon (2050), stretches of VT 15 through the Lang Farm, Essex Center, and VT 289 area will experience relatively high levels of traffic delay.

Bicycle and pedestrian improvements are advancing in this corridor, especially in the designated growth areas of Essex Junction, Lang Farm/Essex Center, and Underhill Flats. Roadway improvements to accommodate bicyclists are needed and are planned for when the arterials are rehabilitated or reconstructed. Currently, much of the corridor features inadequate shoulder width for safe bicycling but should see steady incremental improvements over the coming years.

There is peak hour high frequency public transportation available in the more densely populated southwestern part of the corridor linked to the Burlington area. Northeast from Essex Junction, transit is less frequent with two limited routes to Essex Center and Jeffersonville.

Minor intersection improvements and signal upgrades along the VT 15 corridor from Five Corners in Essex Junction through Essex Center are planned to improve traffic flow.

Corridor Strategies/Projects

The Plan identifies specific projects and strategies to meet existing and future needs. In this corridor these are identified below. NOTE: The listed sequence does not denote priority rank.

TABLE 16 – NORTHEASTERN CORRIDOR STRATEGIES/PROJECTS

Municipality	Project	MTP Category
Jericho	VT15/Browns Trace Intersection – **TIP Project**	Multimodal Roadway Improvement
Jericho	Browns Trace Multimodal Connection – Pratt Road to Lee River Road – **TIP Project**	Bike & Pedestrian
Jericho	Browns River Middle School and Union ID school Crossings –**TIP Project**	Bike & Pedestrian
Jericho	Lee River Road Sidewalk – **TIP Project**	Bike & Pedestrian
Essex	VT15/Sand Hill Road Traffic Signal – **TIP Project**	Multimodal Roadway Improvement

Essex Junction	Crescent Connector Road – **TIP Project** (*project also listed under Cross County Corridor and Eastern Corridor*)	Multimodal Roadway Improvement
Essex	Towers Road Sidewalk – **TIP Project**	Bike & Pedestrian
Underhill	Underhill Flats Sidewalk – **TIP Project**	Bike & Pedestrian
Jericho	Browns Trace Multimodal Connection – MMU to Lee River Road	Bike & Pedestrian
Jericho	VT 15/Dickinson Street Modifications	Multimodal Roadway Improvement
Essex	Essex Center, VT15/VT289 Park-and-Ride	Park-and-Ride
Essex	VT 15 Sidewalk – Old Stage Road to Essex Way	Bike & Pedestrian
Westford	Browns River Path, Common to school	Bike & Pedestrian

ROUTE 15 WEST CORRIDOR

Parts of the roadway network from the Northeastern, Northern, and Eastern corridors intersect in the Route 15 West Corridor, and feed into the Regional Core area. This results in significant traffic volumes substantially put on one arterial roadway, VT 15 from Essex Junction to Winooski. One of the feeder roads, Susie Wilson Road in Essex Town, carries the majority of traffic to and from the Northern and Northeastern Corridors.

In contrast to the other major corridors discussed, significant traffic volumes travel on VT 15 west with no parallel alternative route available. Not surprisingly, the capacity of the Genesee & Wyoming freight rail line running by its side has, in the past, been examined for its potential to alleviate some of VT 15's traffic demands. Congestion problems have also spurred interest in Intelligent Transportation Systems (ITS) investments, such as improved signal coordination and enhanced real time traveler information, to improve traffic flow.

GMT's most heavily used route (the Essex Junction Route) follows VT 15 and features 15-minute headways in the peak hours.

The pedestrian environment is relatively good in this corridor with extensive sidewalk networks in Essex Junction and Winooski. Along VT 15, there is a sidewalk along the north side primarily but both sides in Essex Junction that provides safe pedestrian travel all along the corridor. However, the need for a parallel bicycle facility has been clear, as on-road bicycle travel on high-volume arterials with limited roadway shoulders make for a stressful experience for most cyclists. A shared use path from Susie Wilson Road to Lime Kiln Road is on the TIP and should be constructed in 2019.

A corridor carrying such high traffic volumes—over 25,000 vehicles per day with no alternative routes—needs to be managed carefully to keep the traffic moving efficiently, including signal coordination, access management, and multimodal strategies. As development increases, access demands to VT 15 will increase as well. Effective access management, in combination with more and safer walking, biking and transit, will be crucial to keep people and goods moving safely and efficiently.

Corridor Strategies/Projects

The list that follows identifies each of the projects or strategies that are part of the 2050 MTP. These were analyzed and shown to be effective in addressing future transportation problem areas. NOTE: The listed sequence does not denote priority rank.

TABLE 17 – ROUTE 15 WEST CORRIDOR STRATEGIES/PROJECTS

Municipality	Project	Type
Essex Junction	Pearl Street/Post Office Square/Five Corners Improvements – **TIP Project** ***(constructed in 2017)***	Multimodal Roadway Improvement
Colchester/Essex/Essex Junction	VT 15 Multi Use Path, Lime Kiln Rd to Susie Wilson Rd –**TIP Project**	Bike & Pedestrian
Colchester	Fort Ethan Allen Sidewalks – **TIP Project** ***(constructed in 2017)***	Bike & Pedestrian
Essex	Pinecrest Drive Sidewalk – **TIP Project**	Bike & Pedestrian
Colchester	VT 15/Lime Kiln Road Intersection Improvements	Multimodal Roadway Improvement
Colchester/Essex/Essex Junction	VT 15 Multi Use Path, I-89 Exit 15 to Lime Kiln Road	Bike & Pedestrian
Colchester/Essex/Essex Junction	VT 15 Multi Use Path, Susie Wilson Road to West Street Extension	Bike & Pedestrian
Essex Junction	VT15/West Street Intersection Improvements	Multimodal Roadway Improvement
Essex	Susie Wilson Road Improvements and Intersections Including VT 15 and Kellogg Road	Multimodal Roadway Improvement

SOUTHEASTERN CORRIDOR

The Southeastern Corridor serves the rural southern part of Richmond and the Huntington River Valley. Though the least-traveled of the corridors examined, the Southwestern Corridor is one of the most scenic. Most morning peak-hour traffic is headed north, then west to the greater Burlington area for jobs, shopping and other activities. There is some tourist traffic using the corridor to get to the recreational areas to the east in the Mad River Valley, accessing Camels Hump hiking trails or enjoying the fall foliage. There is also a notable use of the corridor by heavy log trucks bringing timber from the north to processing facilities to the south.

Traffic volumes are very low in this corridor by regional standards and congestion is only an issue in the morning peak hour at the Bridge Street/US 2 intersection in Richmond. No congestion problems are foreseen in this corridor over the life of this Plan. Heavy log truck use may lead to surface and subsurface road deterioration sooner leading to more frequent road maintenance.

Pedestrian opportunities are limited and increasing traffic volumes will likely impact walkers' safety. Similarly, with bicyclists, the potential for more vehicle conflicts exists with increasing traffic thereby reducing safety margins. The Huntington Road/Main Road and Hinesburg Hollow Road are identified in

the Active Transportation Plan and the towns are expected to find ways to accommodate bicyclists when major road rehabilitation or reconstruction work takes place.

No regular transit services currently exist or are planned, although paratransit service that focuses on the elderly and disabled populations is available

Corridor Strategies/Projects

This corridor's rural character, light traffic levels, and peripheral location, not surprisingly leads to few regional level transportation recommendations.

TABLE 18 – SOUTHEASTERN CORRIDOR STRATEGIES/PROJECTS

Municipality	Project	Type
Huntington	Lower Village Traffic Calming and Bike/Ped Improvements	Bike & Pedestrian

VERMONT ROUTE 116 CORRIDOR

This corridor links the Town of Hinesburg and rural northeastern Addison County towns to Chittenden County's employment and commercial centers. Northbound traffic during the weekday morning peak hour and the reverse in the evening are the dominant traffic movements in this corridor.

Existing congestion levels throughout the corridor remain relatively low except during commuter peak hours through Hinesburg Village and towards the northern terminus in South Burlington. In the future, delay issues are expected to worsen only through Hinesburg Village north past CVU Road.

Along VT 116 shoulder widths are inconsistent and, in some areas, too narrow for safe bicycle and pedestrian travel. Over the long term, improvements are expected to accommodate bicyclists on Hinesburg's stretches of VT 116 and Silver Street, and improvements are also expected to the sidewalk network within and adjacent to Hinesburg Village. While on-road bicycle facilities are currently not planned north of the intersection of VT 116 and VT 2A, bicycle and pedestrian travel within South Burlington should be improved as their long-term commitment to provide these facilities through their development permitting process continues.

A peak hour public transportation service runs through Hinesburg Village connecting the regional core to the north and Bristol and Middlebury in Addison County to the south – GMT's 116 Commuter.

Corridor Strategies/Projects

In order to address future anticipated problems and needs in this corridor, the following are recommended (NOTE: The listed sequence does not denote priority rank.)

TABLE 19 – VERMONT ROUTE 116 CORRIDOR STRATEGIES/PROJECTS

Municipality	Project	Type
Hinesburg	VT116/CVU Road Improvements – **TIP Project**	Multimodal Roadway Improvement

Hinesburg	Village North Sidewalk – **TIP Project**	Bike & Pedestrian
Hinesburg	Village South Sidewalk – **TIP Project**	Bike & Pedestrian
Hinesburg	Richmond Road Sidewalk, CVU Road to North Street	Bike & Pedestrian
Hinesburg	VT116/Charlotte Road Signal Improvements	Multimodal Roadway Improvement
Hinesburg	Hinesburg Village Park-and-Ride	Park-and-Ride
Hinesburg	Route 16 East Sidewalk – Commerce Street to Mechanicsville Road	Bike & Pedestrian
Hinesburg	Mechanicsville Road Sidewalk	Bike & Pedestrian
South Burlington	VT 116 Bike Path – US 2 to Kennedy Drive	Bike & Pedestrian
St. George	VT116/VT2A Intersection Improvements	Multimodal Roadway Improvement
St. George	VT116/VT2A Intersection Park-and-Ride	Park-and-Ride

EASTERN CORRIDOR

The Eastern Corridor serves east/west travel needs connecting suburban Chittenden County and points further east and south to the Regional Core area. The primary road facilities are Interstate 89, US 2, and VT 117, which branches off US 2 in Richmond and serves parts of Jericho and Essex before terminating in Essex Junction.

Traffic flow along US 2 is currently delayed through several intersections and along some segments during commuter peak hours, including Taft Corners (VT 2A), Industrial Avenue, Airport Drive/Kennedy Drive, Hinesburg Road and especially Dorset Street. These same areas are anticipated to be the main points of traffic delay in the future. VT 117 through parts of Jericho and Essex is not expected to see any significant areas of delay until reaching the Five Corners area in Essex Junction.

Bicycle and pedestrian travel is relatively low in the eastern part of the corridor, although adequate shoulder widths on US 2 through Bolton make for relatively safe conditions. Moving closer to Burlington, the level of bicycle and pedestrian travel increases, as well as the presence of off-road shared-use paths and sidewalks. Richmond, however, has some shoulder choke points especially between the Village and I-89 Exit 11. US 2 lane widths are mostly adequate through Williston, and increasingly in South Burlington, despite the higher traffic volumes and more numerous curb cuts that can make for challenging on-road bicycling. Along VT 117 bicyclists and walkers face a less than ideal environment although with relatively lower traffic volumes and fewer curb cuts than US 2. Once into Essex Junction the environment changes with on-road designated bicycle lanes, slower vehicular speeds, and sidewalks. Both US 2 and VT 117 through Richmond/Jericho are scheduled for repaving in the near future and, to the extent feasible, additional shoulder width will be designated for bike lanes.

GMT transit services have expanded into Williston over the past decade. Additionally, the LINK Express inter-regional commuter bus from Burlington to Montpelier now runs with a stop at the I-89 Exit 11 Richmond Park-and-Ride. The frequency of transit service diminishes the further east one travels in this corridor. Over time, growth and development in Williston will likely lead to demands for increases in

transit service. In order to improve the multimodal travel options here, more investments in park-and-ride facilities are planned –a new facility at Exit 12 and possible another in the Taft Corners vicinity.

The Genesee & Wyoming rail line traverses the corridor moving freight and the Amtrak Vermonter to and from points north and south.

Corridor Strategies/Projects

In order to meet future transportation needs, while managing increased congestion, the following multimodal approach is recommended. NOTE: The listed sequence does not denote priority rank.

TABLE 20 – EASTERN CORRIDOR STRATEGIES/PROJECTS

Municipality	Project	Type
Essex Junction	Crescent Connector Road – **TIP Project**	Multimodal Roadway Improvement
South Burlington	Market Street – **TIP Project**	Multimodal Roadway Improvement
Williston	US2/Industrial Avenue Intersection – **TIP Project**	Multimodal Roadway Improvement
Williston	Park-and-Ride South of I-89 – **TIP Project**	Park-and-Ride
Williston	US2/Trader Lane Signal – **TIP Project**	Multimodal Roadway Improvement
South Burlington	VT116 Sidewalk to Tilley Drive – **TIP Project** ***(constructed in 2017)***	Bike & Pedestrian
Bolton	US 2/Bolton Access Road Park-and-Ride	Park-and-Ride
Richmond	US 2 Path – Village to Exit 11 Park-and-Ride	Bike & Pedestrian
Essex	VT 117/North Williston Road Intersection Improvements	Multimodal Roadway Improvement
Essex	North Williston Road Flood Plain Notification Improvements	Multimodal Roadway Improvement
Williston	Exit 12 Improvements – All stages (*project also listed under Cross County Corridor*)	Multimodal Roadway Improvement
Williston/South Burlington	Shared Use Path over Muddy Brook	Bike & Pedestrian
Williston	Industrial Avenue Sidewalks	Bike & Pedestrian
Jericho	VT 117/Skunk Hollow Road intersection	Multimodal Roadway Improvement
South Burlington	US2 – Dorset Street to Hinesburg Road Improvements	Multimodal Roadway Improvement

South Burlington	Airport Drive Extension to Airport Parkway	Multimodal Roadway Improvement
South Burlington	I-89 Interstate Access Improvement Between Exit 12 and Exit 15 (possible location Exit 12B, 13, 14 or 14N)	Multimodal Roadway Improvement
South Burlington	Bike/Ped Bridge over I-89 near Exit 14	Bike & Pedestrian
South Burlington	Airport Parkway Shared Use Path, Kirby Road to Winooski River Bridge	Bike & Pedestrian
South Burlington	ITS – Signals and Communications, US 2 Corridor	Multimodal Roadway Improvement
South Burlington	I-89 Widening, Exit 14 to Exit 15, 3 Lanes Each Direction	Multimodal Roadway Improvement
South Burlington	Williston Road intersection and roadway improvements, Garden Street to VT 116	Multimodal Roadway Improvement
South Burlington	Williston Road intersection and roadway improvements, Dorset Street to Garden Street	Multimodal Roadway Improvement
South Burlington/Burlington	Exit 14 signal upgrades	Multimodal Roadway Improvement
Williston	Taft Corners Park-and-Ride (*project also listed under Cross County corridor*)	Park-and-Ride
Williston	US2/North Williston Road/Oak Hill Road Intersection Improvements	Multimodal Roadway Improvement

SOUTHERN CORRIDOR

The heart of the Southern Corridor is US 7, the main north/south arterial on the western side of the state. A 3.5-mile segment in South Burlington and Shelburne was reconstructed several years ago improving capacity and providing multimodal enhancements. To a lesser extent, the parallel local roads of Spear and Dorset Streets also provide a north/south route along the western edge of Chittenden County. While US 7 serves the majority of the traffic, and can experience significant delays during the peak hours, the two parallel roads increasingly serve as alternate routes, sometimes to the dismay of local officials and neighborhood residents. As the primary north/south route in western Vermont, US 7 also sees a considerable amount of truck traffic.

The improvements to Shelburne Road have significantly helped bicycle and pedestrian travel along the improved sections. However, north of the recently improved 3.5-mile segment, bicycling will remain difficult and the sidewalk system will continue to require improvements to enhance walkers' safety. Any improvements to Spear and Dorset streets should include the needs of bicyclists and walkers in order to encourage the use of these modes. The GMT Shelburne bus route and Middlebury LINK express are the primary public transportation services in the corridor.

The northern end of Shelburne Road (US 7) features some of the region's highest traffic volumes and is prone to delays in the morning and afternoon peak hours. Truck freight traffic adds to the US 7 corridor

delays and finding ways to divert freight to the parallel rail line could help both congestion levels and wear-and-tear on the roadway.

Parallel to US 7 is the Vermont Railway's line whose primary role is to move freight and support their customers in its Burlington yard and move cargo to the Genesee & Wyoming's line via the Winooski Branch to Essex Junction. Future Amtrak service to Burlington connecting to points south is anticipated to begin in 2020 along the western rail corridor.

While the Southern Corridor moves north/south traffic relatively efficiently, it has long been recognized that east/west movement across the corridor is quite limited and inefficiently connected. As development has increased toward Williston, the need for better east/west connections has become evident. The City of South Burlington has recognized this need and proposed new roadways to address the problem. These connections are planned to coincide with residential developments in the City's Southeast Quadrant as this area grows and recognized on the City's Official Map.

Corridor Strategies/Projects

The following will address the longer-term issues over the wider corridor. NOTE: The listed sequence does not denote priority rank.

TABLE 21 – SOUTHERN CORRIDOR STRATEGIES/PROJECTS

Municipality	Project	Type
Charlotte	US7 Reconstruction – **TIP Project** ***(constructed 2017)***	Multimodal Roadway Improvement
Charlotte	US 7/Ferry Road intersection improvements – **TIP Project**	Multimodal Roadway Improvement
Shelburne	Village Sidewalks and Crosswalks – **TIP Project**	Bike & Pedestrian
Charlotte	Village Parking Improvements	Park-and-Ride
Charlotte	Town Link Trail	Bike & Pedestrian
Shelburne	Falls Road Bike/Ped Bridge	Bike & Pedestrian
Shelburne	Bay Road Pedestrian Bike Safety Improvements	Bike & Pedestrian
Shelburne	Southern Gateway (South of Bostwick/Marsett)	Bike & Pedestrian
Shelburne	Town Center Park-and-Ride	Park-and-Ride
Shelburne	US7/Harbor Road Improvements	Multimodal Roadway Improvement
South Burlington	Implement Signal Control and Pedestrian Upgrades on Shelburne Road between IDX Drive and Queen City Park Road	Multimodal Roadway Improvement

South Burlington	Shelburne Road Streetscape and Bike/Ped Improvements from IDX Drive to Queen City Park Road	Multimodal Roadway Improvement
South Burlington	Swift/Spear Street Intersection Improvements	Multimodal Roadway Improvement
South Burlington	US7/I-189 Intersection Intercept Park-and-Ride	Park-and-Ride
South Burlington	Spear Street Shared Use Path, South of US 2	Bike & Pedestrian
South Burlington	Lindenwood Drive Path and Crossing Improvements	Bike & Pedestrian
South Burlington	Spear Street Bike/Ped Improvements – Allen Road to Exiting Path north of I-189 Underpass	Bike & Pedestrian
South Burlington	Dorset Street Shared Use Path, from Nowland Farm South	Bike & Pedestrian
South Burlington	Allen Road Shared Use Path West From Spear Street	Bike & Pedestrian
South Burlington	Allen Road Shared Use Path – US 7 to Existing Path	Bike & Pedestrian

CROSS COUNTY CORRIDOR

The corridors discussed previously either directly link other parts of the region to the Regional Core or primarily feed those corridors. The Cross County Corridor is different. While it feeds other corridors to and from the Regional Core, it also provides links between activity centers separate from and bypassing the Regional Core. The corridor provides connections between points south and the activity and employment centers in Williston, Essex, and Essex Junction, and to the growing residential and mixed-use areas of Colchester.

The primary road in the corridor today is VT 2A complimented in part by Marshall and Kimball Avenues and completed segments of the Circumferential Highway – VT 289. Those segments of the Circumferential Highway through Essex, along with Kellogg Road and Severance Road, also form part of the corridor.

The pace and scale of growth in the Taft Corners area has led to peak hour traffic delays, most notably on VT 2A. This applies to segments and intersections from I-89 Exit 12 all the way to the Five Corners in Essex Junction and north into Colchester. The MTP's combination of intersection, Interchange, transit, park-and-ride, walk/bike and ITS/signal projects are anticipated to improve traffic delays throughout the corridor.

Corridor Strategies/Projects

The list below identifies the projects and transportation strategies designed to address the corridor's transportation needs. NOTE: The listed sequence does not denote priority rank.

TABLE 22 – CROSS COUNTY CORRIDOR STRATEGIES/PROJECTS

Municipality	Project	Type
Colchester	VT2A Colchester Village and Mill Pond/East Roads Intersection -- **TIP Project**	Multimodal Roadway Improvement
Essex	VT2A/VT289 Interchange Improvements - **TIP Project**	Multimodal Roadway Improvement
Essex Junction	Crescent Connector Road -- **TIP Project** (*project also listed under Eastern Corridor and Northeastern Corridor*)	Multimodal Roadway Improvement
Essex/Williston	Signal Upgrades on VT2A and VT15 - **TIP Project**	Multimodal Roadway Improvement
Williston	VT2A/James Brown Drive -- **TIP Project**	Multimodal Roadway Improvement
Williston	VT 2A/Industrial Avenue Improvements and VT2A Improvements to James Brown Drive -- **TIP Project**	Multimodal Roadway Improvement
Williston	VT 2A Infill Sidewalks -- **TIP Project**	Bike & Pedestrian
Colchester	Severance Road Shared Use Path	Bike & Pedestrian
Colchester	Mill Pond/Severance Roads Intersection Improvements	Multimodal Roadway Improvement
Essex/Williston	ITS Improvements – Signals and Communications, VT2A	Multimodal Roadway Improvement
Williston	Exit 12 Improvements – All stages (*also listed under Eastern Corridor*)	Multimodal Roadway Improvement
Williston	Taft Corners Park-and-Ride (*project also listed under Eastern corridor*)	Park-and-Ride
Williston	Mountain View Road Multimodal Improvements: Old Stage to VT 2A	Multimodal Roadway Improvement
Williston	US2 – Taft Corners to Williston Village Shared Use Path	Bike & Pedestrian
Williston	North Williston Road Improvements - scoping underway. Cost to be updated 2/18	Multimodal Roadway Improvement

While nearly all projects can be identified by the corridor(s) they're located in, some defy that categorization and are less place-specific. **Table 23** identifies such projects whose precise location has yet to be determined or reflect a more regional scale strategy. NOTE: The listed sequence does not denote priority rank.

TABLE 23 – OTHER COUNTYWIDE STRATEGIES/PROJECTS

Municipality	Project	Type
Regional Sidewalks	Sidewalks and Paths in Areas Planned for Growth	Bike & Pedestrian
Regional Bicycle Improvements	Regional projects that facilitate inter-county bicycle travel	Bike & Pedestrian
Regional Stormwater	Regional Stormwater Projects	Multimodal Roadway Improvement
Regional Transit	Capital needs to expand transit services in the urbanized area:15-minute headways on the trunk routes of US2, US7, VT15 and North Avenue all day; 20 to 30-minute headways for all other routes.	Transit
Regional Rail	Burlington Rail Station Upgrades	Rail
Regional Rail	Essex Junction Rail Station Upgrades	Rail
Regional Rail	Upgrade all Trackage in Chittenden County to Class 4 Standard	Rail
Regional Rail	Freight Improvements to Bridges, Sidings, Railyards, Crossings and Clearance	Rail
Regional Rail	Essex Junction to Burlington 286 Rail Upgrade	Rail

CORRIDOR SUMMARY

The corridor approach to transportation system description and solutions was selected due to its simplicity and logical, systematic methodology. Traffic flow is easiest explained using this approach and multimodal strategies are easily presented and understood as solutions. This methodology also was previously used in the CCMPO's *1997 Long Range Transportation Plan,2005 Metropolitan Transportation Plan* and 2013 ECOS Plan

Each of the MTP's recommended projects and strategies was identified by the corridor to which they apply. A complete MTP project list is presented in the section below, including projects not identified as priorities in the corridor discussion above. This list is a comprehensive compilation of projects from many sources: The 2013 ECOS/MTP, recently completed CCRPC scoping and corridor studies, the Active Transportation Plan and Park-and-Ride Plan updates, GMT's Next GEN Plan (in process), and input from each of the CCRPC member towns.

Metropolitan Transportation Plan Investments and Project List

In order to meet the major ECOS transportation goal and specific MTP scenario objectives, a number of major investments are necessary that over the years will help support a balanced, achievable and sustainable transportation future for Chittenden County. These major MTP investments are discussed below.

MTP MAJOR INVESTMENTS

a. Adequately fund the maintenance and preservation of our existing transportation assets including roads, bridges, rail, transit, walking/biking, park-and-ride facilities, and transportation demand management (TDM) programs.
b. Invest in our transportation system by addressing safety and localized congestion issues on our roadways.
c. Expand the deployment of Intelligent Transportation Systems (ITS) to facilitate efficient flow of traffic on the roadway system which will improve safety, reduce delays and congestion, decrease transportation energy use, and minimize the need for major roadway expansion projects.
d. New transportation system investment should focus on the transportation projects as detailed in the ECOS/Metropolitan Transportation Plan (MTP) Project List. Transportation Improvement Program (TIP) projects are expected to be implemented within the next seven years.
e. Future transportation investments will support our areas planned for growth by facilitating a shift away from Single Occupancy Vehicle (SOV) trips; and focusing on the following areas and programs:
    i. Encourage increased use of public transit by:
        1. Increasing investment in GMT transit services in the county to achieve 15-minute headways all day for all trunk routes in the county (US2, US7, VT15, and North Avenue) and 20 to 30-minute headways on all other routes (Excluding the LINK Express).
        2. Working in cooperation with GMT on their NextGEN Transit and Transit Development Plans to identify new and future opportunities for transit expansion. Integrate park-and-ride facilities with transit routes; including access to the Montpelier LINK at the future Exit 12 Park-and-Ride.
        3. Invest in transit signal priority technology in partnership with GMT, VTrans and municipalities.
        4. Maximize ridership for public school buses and minimize use of private vehicles for student transport.
    ii. Expand walking and biking infrastructure to support active transportation and to provide interconnection with the region's transit system by:
        1. Implementing the strategies, projects and priorities identified in the 2017 Chittenden County Active Transportation Plan to provide safe and efficient facilities to connect common trip origins and destinations.
        2. Working with municipalities to update municipal road standards (for maintenance and new construction) to reflect complete streets principles.

3. Reviewing state and municipal transportation projects to ensure that complete streets are implemented.
4. Ensuring that site plans include adequate bike and pedestrian infrastructure and safety measures, through participation in the Act 250 hearing process.
5. Assisting municipalities with scoping of future bike and pedestrian facilities to improve safety, accessibility, efficiency and continuity of the system. Municipalities could use the outcomes of the scoping studies to apply for various VTrans implementation grants.

iii. Promote Transportation Demand Management and Car Sharing programs:

1. Promote and support the Go! Vermont program that links travelers to a variety of transportation resources and choices and the TravelSmarterVT initiative.
2. Support the continued development and expansion of Chittenden County Park-and-Ride facilities as recommended in the 2011 Regional Park-and-Ride Plan.
3. Work with the Chittenden Area Transportation Management Association (CATMA) to support employer programs to encourage telecommuting, carpooling, vanpooling, walking, and biking for employee commute trips.
4. Support CarShare Vermont's initiatives.

f. Promote a shift away from gas/diesel vehicles to electric or other non-fossil fuel transportation options through the following actions:

1. Work with the Clean Cities Coalition to encourage municipal fleets to switch to biodiesel for heavy-duty vehicles.
2. Work with local employers and nonprofit partners such as the Vermont Energy and Climate Action Network and Vermont League of Cities and Towns to encourage broader implementation of EV incentives, such as free or reduced parking costs for EV and fuel-efficient vehicle owners and preferential access to parking spaces limited in supply.
3. Promote the Drive Electric Vermont webpage, which connects users to financial incentives dealers, and recharging stations for EVs.
4. In partnership with Drive Electric Vermont, Vermont Clean Cities Coalitions and other entities, increase awareness of the benefits of and access to EVs and alternative-fuel vehicles by:
    - Organizing high-visibility events where people can see and test drive EVs, such as county fairs, energy fairs, and summer festivals. Events should also leverage local newspaper and public access coverage to showcase local residents and organizations that are helping to propel the transition to EVs.
    - Encouraging municipalities and other entities that operate fleets to switch a portion of their vehicles to electric or biodiesel-fueled vehicles.
    - Providing technical assistance and support to communities interested in accessing VW diesel settlement funds for EV charging and/or heavy-duty vehicle replacements according to VT ANR's mitigation plan that will detail eligible activities.
    - Assisting with deploying EV Infrastructure at workplaces and key public locations.

- Assessing current access to public and workplace charging (to the extent known) in the community or region and identify strategic locations in busy areas (large employers or areas of high visitation in downtowns) where charging stations should be added or expanded.
- Encouraging electric utilities to invest in charging infrastructure, offer incentives to increase EV ownership, and build awareness of charging opportunities as part of their strategy for complying with the state's Renewable Energy Portfolio Standard.
- Seeking grants to fund the installation of DC fast-charging infrastructure at strategic locations along major travel corridors and in transit hubs such as park and-ride locations and along the Interstate 89 Alternative Fuels Corridor (I-89 from New Hampshire to the Canadian border).
- Educating municipalities and providing technical assistance on amending zoning regulations to include electric vehicle charging infrastructure.

g. Support and enhance our rail infrastructure for both passenger and freight by investing in Amtrak facilities and the Essex Junction to Burlington line (Winooski branch). Where needed, provide additional rail infrastructure for the support and promotion of more efficient and safe movement, handling and storage of goods by rail, thus helping relieve the burden on our existing roadway network.

MTP PROJECT LIST

The MTP project list in **Table 24** and illustrated in **Map 9** includes projects identified through the various CCRPC and municipal planning processes in coordination with VTrans, Chittenden County municipalities, GMT and other partners, as appropriate. Through the planning process, the CCRPC and municipalities identify, evaluate and develop alternatives to address transportation needs in various categories including safety, bike and pedestrian, transit, multimodal connectivity, roadway congestion and capacity deficiencies, rail, and others.

The MTP project list proposes how federal transportation funds might be spent in Chittenden County over the next 34 years. However, almost all federal transportation funds received by Vermont flow through VTrans, and how those funds are spent is detailed in the VTrans Transportation Capital Program which is approved by the Vermont Legislature. The CCRPC and VTrans work closely on transportation planning in Chittenden County and VTrans support is necessary to advance any future transportation projects.

The MTP project list identifies projects that are in the current Chittenden County Transportation Improvement Program (TIP) and on the VTrans Transportation Capital Program. These projects have had funding programmed and are considered committed projects. The MTP project list also identifies projects that are on the VTrans Development and Evaluation List and Candidate List. These projects have been identified as future needs by VTrans and may have some project development studies completed or underway. Finally, the MTP list includes projects that municipalities identified as future needs to improve the transportation system and address multimodal needs in their communities and are not currently on any VTrans program.

As part of this MTP, the Regional Travel Demand Model was used to prioritize roadway needs based on safety (high crash locations), congestion and capacity issues to determine the potential need and the timing of all future MTP roadway projects. Municipalities were then asked to provide comments on their projects regarding need and priority/implementation timing (short, medium or long). The MTP Project list reflects conversation with and comments received by all Chittenden County municipalities.

The MTP project list includes a time frame (e.g., short, medium, long) which represents a municipality's identified timing need for improvements but may not represent a realistic time frame for project implementation. In addition, the short-medium time frame indicates that some elements of a project could move towards implementation in the short-term (by 2025) but the bulk of the project will probably be implemented in the medium-term (2025 to 2035).

The MTP Financial Plan calculates funding availability beginning in Federal Fiscal Year 2017, which begins on October 1, 2016. To be consistent with this approach the MTP Project List includes projects expected to spend funds beginning on October 1, 2016 and does include projects constructed in 2017. The Estimated Project Cost is the cost estimate as of November 2017 and excludes any funds spent prior to FY17 -- before October 1, 2016.

TABLE 24 – MTP PROJECT LIST BY MUNICIPALITY AND VTRANS CAPITAL PROGRAM STATUS - FEDERAL FISCAL YEARS 2017 - 2050

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
	Bolton				
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
1	Bolton	Park and Ride	US2/Bolton Access Road Park & Ride	$50,000	Medium
	Burlington				
	Capital Program - Front of the Book and On CCRPC TIP				
2	Burlington	Multimodal Roadway Improvements	Shelburne Street Roundabout	$2,460,000	Short
3	Burlington	Multimodal Roadway Improvements	Champlain Parkway	$25,000,000	Short
4	Burlington	Bike & Pedestrian	Champlain Elementary Pedestrian Crossing Improvements	$405,000	Short
5	Burlington	Bike & Pedestrian	Colchester Avenue Sidepath	$281,437	Short
6	Burlington	Bike & Pedestrian	North Avenue Crosswalks	$246,750	Short
	Capital Program - Development & Evaluation and On CCRPC TIP				
7	Burlington	Multimodal Roadway Improvements	Railyard Enterprise Project	$6,285,000	Short-Medium
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
8	Burlington	Bike & Pedestrian	Burlington Bike Path Rehabilitation - Oakledge to Maple Street ($10m project funded at 50% federal)	$5,000,000	Short
9	Burlington	Bike & Pedestrian	Depot Street Improvements (Bike/Ped) ($1.1m project funded at 50% federal)	$550,000	Short
10	Burlington	Bike & Pedestrian	Sherman Street Connection to Depot Street - Stairway Street (0.775m project funded at 50% federal)	$387,850	Short
11	Burlington	Bike & Pedestrian	Intervale Road Access Improvements	Further planning needed	Short
12	Burlington	Bike & Pedestrian	Champlain Elementary Safe Routes to School - Phase II ($425,000 project funded at 20% federal)	$85,000	Short
13	Burlington	Multimodal Roadway Improvements	Main Street Great Street ($10.3m project funded at 50% federal)	$5,150,000	Short-Medium
14	Burlington	Multimodal Roadway Improvements	Cherry Street Complete Street	$500,000	Short
15	Burlington	Multimodal Roadway Improvements	Pearl Street Complete Street ($3.3m project funded at 50% federal)	$1,650,000	Short
16	Burlington	Multimodal Roadway Improvements	Winooski Avenue Improvements ($12.9m project funded at 50% federal)	$6,450,000	Short-Medium
17	Burlington	Multimodal Roadway Improvements	Colchester Avenue/Prospect Street Intersection Improvements ($1m project funded at 50% federal)	$500,000	Short

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
18	Burlington	Multimodal Roadway Improvements	North Avenue Improvements ($16.35m project funded at 50% federal)	$8,175,000	Short-Medium
19	Winooski / Burlington	Bike & Pedestrian	Winooski River Bicycle/Pedestrian Bridge (dependent on outcome of Winooski Main Street Bridge scoping)	$1,680,500	Medium
20	Burlington	Multimodal Roadway Improvements	Main Street Complete Street - US2 Section	$400,000	Medium
21	Burlington	Multimodal Roadway Improvements	Battery Street Improvements ($3.5m project funded at 50% federal)	$1,750,000	Medium
22	Burlington	Multimodal Roadway Improvements	Shelburne Street Improvements - Complete Streets	$12,900,000	Medium
23	Burlington	Multimodal Roadway Improvements	Colchester Avenue/Riverside Avenue Intersection Improvements	$3,400,000	Medium
24	Burlington	Multimodal Roadway Improvements	Colchester Avenue/East Avenue Intersection Improvements ($0.78m project funded at 50% federal)	$390,000	Medium
25	Burlington / Winooski	Bike & Pedestrian	Bike/Ped Bridge Crossing of the Winooski River in the vicinity of the "Blue Bridge"	Further planning needed	Long
26	Burlington	Park and Ride	I-89 Exit 14 Intercept Park & Ride Facility	Further planning needed	Long
	Charlotte				
	Capital Program - Front of the Book and On CCRPC TIP				
27	Charlotte	Multimodal Roadway Improvements	US7 Reconstruction ***(constructed in 2017)***	$2,500,000	Short
28	Charlotte	Multimodal Roadway Improvements	US7/Ferry Road Intersection Improvements	$535,000	Short
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
29	Charlotte	Bike & Pedestrian	Town Link Trail	Further planning required	Short
30	Charlotte	Park and Ride	Charlotte Village Parking	$215,000	Medium
	Colchester				
	Capital Program - Front of the Book and On CCRPC TIP				
31	Colchester	Bike & Pedestrian	Ft Ethan Allan Sidewalks ***(constructed in 2017)***	Earmark	Short
32	Colchester	Bike & Pedestrian	Mountain View Drive Sidewalk ***(constructed in 2017)***	$370,000	Short
33	Colchester / Essex / Essex Junction	Bike & Pedestrian	VT15 Multi-use Path - Phase 1 Lime Kiln Road to Susie Wilson Road - CIRC ALT PHASE II	$1,430,066	Short
34	Colchester	Bike & Pedestrian	West Lakeshore Drive Path - Phase I	$1,800,000	Short
35	Colchester	Multimodal Roadway Improvements	VT2A/US7/Creek Road/Bay Road Intersection ***(constructed in 2017)***	$5,754,281	Short
36	Colchester	Multimodal Roadway Improvements	Exit 16 Improvements - CIRC ALT PHASE I	$8,050,000	Short

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
37	Colchester	Multimodal Roadway Improvements	Severance Corners Improvements - CIRC ALT PHASE II	$3,848,257	Short
38	Colchester	Multimodal Roadway Improvements	W Lakeshore Drive / Prim Road Intersection Improvements - CIRC ALT PHASE III	$1,900,000	Short
39	Colchester	Multimodal Roadway Improvements	Blakely Road / Laker Lane Intersection Improvements - CIRC ALT PHASE III	$425,000	Short
40	Colchester	Park and Ride	US7/I-89 Exit 16 Park & Ride	$500,000	Short
	Capital Program - Development & Evaluation and On CCRPC TIP				
41	Colchester	Multimodal Roadway Improvements	VT2A Colchester Village and Mill Pond Road/East Road Intersection and Multimodal Improvements - CIRC ALT PHASE III	$3,900,000	Medium
	Capital Program - Candidate List				
42	Colchester	Multimodal Roadway Improvements	I-89 Exit 17/US2/US7 Interchange Improvements	$17,238,000	Medium
43	Colchester / Essex / Essex Junction	Bike & Pedestrian	VT15 Multi-use Path - Phase 2, I-89 Exit 15 to Lime Kiln Road	$305,700	Long
44	Colchester / Essex / Essex Junction	Bike & Pedestrian	VT15 Multi-use Path - Phase 3, Susie Wilson Road to West Street Extension	$537,500	Long
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
45	Colchester	Bike & Pedestrian	West Lakeshore Drive Path Phase II - Harbor View Plaza to Public Boat Launch	$900,000	Medium
46	Colchester	Multimodal Roadway Improvements	VT15/Lime Kiln Road Intersection Improvements	$1,030,000	Medium
47	Colchester	Multimodal Roadway Improvements	Roundabout at Bayside Park Intersection	$3,310,000	Medium
48	Winooski, Colchester	Multimodal Roadway Improvements	Intelligent Transportation System Improvements - Signal and Communications - US7	$600,000	Medium
49	Colchester	Bike & Pedestrian	Severance Road Shared Use Path - CIRC ALT PHASE III	$2,086,500	Long
50	Colchester	Bike & Pedestrian	West Lakeshore Pedestrian Tunnel at Bayside Park	$2,000,000	Long
51	Colchester	Multimodal Roadway Improvements	VT127 Roadway and Intersection Improvements	$24,000,000	Long
52	Colchester	Multimodal Roadway Improvements	Mill Pond Road/Severance Road Intersection Improvements	$277,000	Long
53	Colchester	Multimodal Roadway Improvements	Heineberg-Blakely Bypass and Shared Use Path	$18,952,000	Long
	Essex				
	Capital Program - Front of the Book and On CCRPC TIP				
54	Essex	Multimodal Roadway Improvements	VT2A/VT289 Interchange Improvements - CIRC ALT PHASE II	$1,467,400	Short

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
55	Essex	Multimodal Roadway Improvements	VT15/Sand Hill Road Signal - CIRC ALT PHASE II	$1,140,453	Short
56	Essex, Williston	Multimodal Roadway Improvements	Signal Upgrades on VT2A and VT15	$3,100,000	Short
57	Colchester / Essex / Essex Junction	Bike & Pedestrian	VT15 Multi-use Path - Phase 1 Lime Kiln Road to Susie Wilson Road - CIRC ALT PHASE II	See Line 33	Short
58	Essex	Bike & Pedestrian	Pinecrest Drive Sidewalk	$242,770	Short
59	Essex	Bike & Pedestrian	Towers Road Sidewalk	$169,050	Short
	Capital Program - Development & Evaluation and On CCRPC TIP				
60	Essex	Multimodal Roadway Improvements	Susie Wilson Road Improvements and Intersections including VT15 and Kellogg - CIRC ALT PHASE III	$8,500,000	Short-Medium
61	Essex	Multimodal Roadway Improvements	VT117/North Williston Road Intersection Improvements - CIRC ALT PHASE III	$3,175,000	Medium
	Capital Program - Candidate List				
62	Essex	Multimodal Roadway Improvements	North Williston Road Flood Plain Notification Improvements - CIRC ALT PHASE III	$405,000	Medium
63	Colchester / Essex / Essex Junction	Bike & Pedestrian	VT15 Multi-use Path - Phase 3, Susie Wilson Road to West Street Extension	See Line 44	Medium
64	Essex	Bike & Pedestrian	VT15 Sidewalk - Old Stage Road to Essex Way - CIRC ALT PHASE III	$160,000	Medium
65	Colchester / Essex / Essex Junction	Bike & Pedestrian	VT15 Multi-use Path - Phase 2, I-89 Exit 15 to Lime Kiln Road	See Line 43	Long
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
66	Essex	Park and Ride	Essex Center, VT15/VT289 Park & Ride	$186,000	Long
	Essex Junction				-
	Capital Program - Front of the Book and On CCRPC TIP				
67	Essex Junction	Multimodal Roadway Improvements	VT15 Improvements - Post Office Square to Five Corners Improvements - CIRC ALT PHASE II ***(constructed in 2017)***	$2,750,000	Short
68	Essex Junction	Multimodal Roadway Improvements	Crescent Connector Road - VT2A to VT15 - CIRC ALT PHASE I	$6,000,000	Short
	Capital Program - Candidate List				
69	Colchester / Essex / Essex Junction	Bike & Pedestrian	VT15 Multi-use Path - Phase 2, I-89 Exit 15 to Lime Kiln Road	See Line 43	Long
70	Colchester / Essex / Essex Junction	Bike & Pedestrian	VT15 Multi-use Path - Phase 3, Susie Wilson Road to West Street Extension	See Line 44	Long

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
	Needs Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
71	Essex Junction	Multimodal Roadway Improvements	VT15/West Street Extension Intersection - Additional NB lane on West Street Extension	$206,000	Long
	Hinesburg				
	Capital Program - Front of the Book and On CCRPC TIP				
72	Hinesburg	Multimodal Roadway Improvements	VT116/CVU Road Improvements	$2,872,760	Short
73	Hinesburg	Bike & Pedestrian	Village North Sidewalk	$170,000	Short
74	Hinesburg	Bike & Pedestrian	Village South Sidewalk	$165,000	Short
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
75	Hinesburg	Multimodal Roadway Improvements	VT116/Charlotte Road Improvements to facilitate Concurrent Signal Phasing	$150,000	Short
76	Hinesburg	Bike & Pedestrian	Route 116 East Sidewalk - Commerce Street to Mechanicsville Road	$365,500	Medium
77	Hinesburg	Bike & Pedestrian	Mechanicsville Road Sidewalk	$142,000	Medium
78	Hinesburg	Bike & Pedestrian	Richmond Road Sidewalk, CVU Road to North Street	$2,485,000	Long
79	Hinesburg	Park and Ride	Hinesburg Village Park & Ride	$90,000	Long
	Huntington				
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
80	Huntington	Bike & Pedestrian	Huntington Lower Village Traffic Calming and Bike/Ped Improvements	$894,100	Medium
	Jericho				
	Capital Program - Front of the Book and On CCRPC TIP				
81	Jericho	Multimodal Roadway Improvements	VT15/Browns Trace Intersection	$2,004,190	Short
82	Jericho	Bike & Pedestrian	Browns Trace Multimodal Connection -- Pratt Road to Lee River Road	$410,000	Short
83	Jericho	Bike & Pedestrian	Browns River Middle School and Union ID School Crossing Improvements	$193,200	Short
84	Jericho	Bike & Pedestrian	Lee River Road Sidewalk	$350,000	Short
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
85	Jericho	Bike & Pedestrian	Browns Trace Multimodal Connection - MMU to Lee River Road	$471,300	Medium
86	Jericho	Multimodal Roadway Improvements	VT15/Dickinson Street Modifications	$1,600,000	Medium

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
87	Jericho	Multimodal Roadway Improvements	VT117/Skunk Hollow Road Improvements	Further planning needed	Medium
88	Jericho	Park and Ride	VT15 Park and Ride	$120,000	Medium
	Milton				
	Capital Program - Front of the Book and On CCRPC TIP				
89	Milton	Multimodal Roadway Improvements	US7/Middle Road/Railroad Street Safety Improvements	$3,650,000	Short
90	Milton	Bike & Pedestrian	Cherry Street Railroad Crossing	$65,500	Short
91	Milton	Bike & Pedestrian	US7 Sidewalk - Nancy Drive to Haydenberry Drive	$1,078,000	Short
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
92	Milton	Multimodal Roadway Improvements	US7/Racine/Legion/Bartlett/West Milton Road Improvements	$515,000	Medium
93	Milton	Park and Ride	Milton Town Office Park & Ride	$870,000	Medium
94	Milton	Multimodal Roadway Improvements	US7/Main Street Intersection Improvements	$1,030,000	Long
95	Milton	Multimodal Roadway Improvements	I-89/West Milton Road New Interchange	$30,000,000	Long
	Richmond				
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
96	Richmond	Bike & Pedestrian	US2 Path - Park and Ride to Richmond Village	$3,388,000	Long
	Shelburne				
	Capital Program - Front of the Book and On CCRPC TIP				
97	Shelburne	Bike & Pedestrian	Village Sidewalks and Crosswalks ***(constructed 2017)***	$137,971	Short
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
98	Shelburne	Bike & Pedestrian	Falls Road Bike/Ped Bridge	$838,800	Medium
99	Shelburne	Bike & Pedestrian	Bay Road Pedestrian Bike Safety Improvements	$20,000	Medium
100	Shelburne	Multimodal Roadway Improvements	US7/Harbor Road Improvements	$1,420,000	Medium
101	Shelburne	Bike & Pedestrian	Shelburne Southern Gateway (South of Bostwick/Marsett)	$2,500,000	Medium
102	Shelburne	Park and Ride	Shelburne Village Park & Ride	$15,000	Medium

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
	South Burlington				
	Capital Program - Front of the Book and On CCRPC TIP				
103	South Burlington	Multimodal Roadway Improvements	Market Street ($5m project to be funded with earmark funds)	Earmark	Short
104	South Burlington	Bike & Pedestrian	VT116 Sidewalk to Tilley Drive ***(constructed 2017)***	$173,000	Short
	Capital Program - Candidate List				
105	South Burlington	Multimodal Roadway Improvements	Airport Drive Extension to Airport Parkway	$12,167,000	Medium
106	South Burlington	Multimodal Roadway Improvements	I-89 Interstate Access Improvement between Exit 12 and 15 (possible location 12B, 13, 14 or 14N)	$37,302,000	Long
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
107	South Burlington	Bike & Pedestrian	Bike/Ped Bridge over I-89 in the vicinity of Exit 14 ($14m project to be funded at 50% federal (excludes possible future grants))	$7,000,000	Medium
108	South Burlington	Bike & Pedestrian	Airport Parkway Bike/Ped Facility, Kirby Road to Winooski River Bridge	$1,647,400	Short
109	South Burlington	Bike & Pedestrian	Spear Street Shared Use Path, South of US2	$452,400	Short
110	South Burlington	Bike & Pedestrian	Lindenwood Drive Path and Crossing Improvements	$360,000	Short
111	South Burlington	Bike & Pedestrian	Dorset Street Shared Use Path, Nowland Farm Road South 3.500 feet	$610,000	Short
112	South Burlington	Bike & Pedestrian	Allen Road Shared Use Path West of Spear Street - 800-foot gap	$283,600	Short
113	South Burlington	Bike & Pedestrian	Allen Road Shared Use Path - US7 to Existing Facility	$200,000	Short
114	South Burlington / Williston	Bike & Pedestrian	Shared Use Path Connection over Muddy Brook	$3,639,200	Short
115	South Burlington	Multimodal Roadway Improvements	Williston Road Intersection and Roadway Improvements - Garden Street to VT116 ($3.3m project to be funded with local funds)	Locally funded	Short
116	South Burlington	Multimodal Roadway Improvements	Williston Road Intersection and Roadway Improvements - Dorset Street to Garden Street ($10m project to be funded with 50% federal funds)	$5,000,000	Short
117	South Burlington	Multimodal Roadway Improvements	Implement Signal Control and Pedestrian Upgrades, Shelburne Road between IDX Drive and I-189 ($1.236 m project to be funded with AID grant)	AID Grant	Short
118	South Burlington	Bike & Pedestrian	Spear Street Bike/Ped Improvements - Allen Road to US Forest Service/ I-89	$4,000,000	Medium

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
119	South Burlington	Multimodal Roadway Improvements	Shelburne Road Streetscape and Bike/Ped Improvements - IDX Drive to Queen City Park Road	$5,000,000	Medium
120	South Burlington	Multimodal Roadway Improvements	Exit 14 Area Signal Upgrades	Earmark	Medium
121	South Burlington	Multimodal Roadway Improvements	Swift Street/Spear Street Intersection Improvements ($572,000 project to be funded with local funds)	Locally funded	Medium
122	South Burlington	Bike & Pedestrian	VT116 Bike Path - US2 to Kennedy Drive	$500,000	Long
123	South Burlington	Multimodal Roadway Improvements	I-89 Widening, Exit 14, South Burlington to Exit 15, Winooski (3 lanes in each direction)	$37,000,000	Long
124	South Burlington	Park and Ride	US7/I-189 Intercept Park & Ride	Further planning needed	Long
	St. George				
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
125	St. George	Park and Ride	VT116/VT2A Intersection Park & Ride	$248,000	Medium
126	St. George	Multimodal Roadway Improvements	VT116/VT2A Intersection Improvements	Further planning needed	Long
	Underhill				
	Capital Program - Front of the Book and On CCRPC TIP				
127	Underhill	Bike & Pedestrian	Underhill Flats Sidewalk	$360,000	Short
	Westford				
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
128	Westford	Bike & Pedestrian	Browns River Path Common to School	Further planning needed	Short
	Williston				
	Capital Program - Front of the Book and On CCRPC TIP				
129	Williston	Multimodal Roadway Improvements	US2/Trader Lane Signal - CIRC ALT PHASE II	No Federal	Short
130	Williston	Multimodal Roadway Improvements	US2/Industrial Avenue Intersection	$5,760,000	Short
131	Williston	Multimodal Roadway Improvements	VT2A/James Brown Drive - CIRC ALT PHASE I	$1,889,189	Short
132	Williston	Multimodal Roadway Improvements	VT2A/Industrial Avenue Improvements and Improvements to VT2A to James Brown Drive - CIRC ALT PHASE III	$4,550,000	Short
133	Essex, Williston	Multimodal Roadway Improvements	Signal Upgrades on VT2A and VT15	See Line 56	Short
134	Williston	Park and Ride	Park and Ride South of I-89	$1,400,000	Short

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
135	Williston	Bike & Pedestrian	VT2A Infill Sidewalks	$86,083	Short
	Capital Program - Development & Evaluation and On CCRPC TIP				
136	Williston	Multimodal Roadway Improvements	Exit 12 Stage 1 - Shared Use Path and VT2A lane, Marshall to I-89 - CIRC ALT PHASE III	$2,000,000	Medium
137	Williston	Multimodal Roadway Improvements	Exit 12 Stage 2 - New Grid Streets and VT2A Intersection - CIRC ALT PHASE III	$9,300,000	Medium
138	Williston	Multimodal Roadway Improvements	Exit 12 Stage 3 - Diverging Diamond Interchange - CIRC ALT PHASE III	$22,900,000	Medium
139	Williston	Multimodal Roadway Improvements	Exit 12 Stage 4 - VT2A Boulevard - CIRC ALT PHASE III	$11,400,000	Long
	Capital Program - Candidate List				
140	Williston	Bike & Pedestrian	US2 - Taft Corners to Williston Village - Shared Use Path - CIRC ALT PHASE III	$2,900,000	Medium
141	Williston	Multimodal Roadway Improvements	Mountain View Road Multimodal Improvements: Old Stage Road to VT2A - CIRC ALT PHASE III	$3,853,000	Long
142	Williston	Park and Ride	Taft Corners Park & Ride	$255,000	Long
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
143	South Burlington / Williston	Bike & Pedestrian	Shared Use Path Connection over Muddy Brook	See Line 114	Medium
144	Williston	Multimodal Roadway Improvements	US2/North Williston Road/Oak Hill Road Intersection	$989,000	Long
145	Williston	Bike & Pedestrian	Industrial Avenue Sidewalks	$421,600	Long
146	Williston	Multimodal Roadway Improvements	North Williston Road Improvements - scoping underway. Cost to be updated 2/18	TBD	Long
	Winooski				
	Capital Program - Front of the Book and On CCRPC TIP				
147	Winooski	Bike & Pedestrian	Gateways Crosswalk Enhancements	$360,580	Short
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
148	Winooski / Burlington	Bike & Pedestrian	Winooski River Bicycle/Pedestrian Bridge	See Line 19	Medium
149	Winooski	Multimodal Roadway Improvements	Main Street (US7) Revitalization - Transportation, Utility, Stormwater	Further planning needed	Short-Medium
150	Winooski, Colchester	Multimodal Roadway Improvements	Intelligent Transportation System Improvements - Signal and Communications - US7	See Line 48	Medium
151	Winooski	Bike & Pedestrian	Riverwalk East- Access to Casavant Park	$1,800,000	Long
152	Burlington / Winooski	Bike & Pedestrian	Bike/Ped Bridge Crossing of the Winooski River in the vicinity of the "Blue Bridge"	See Line 25	Long

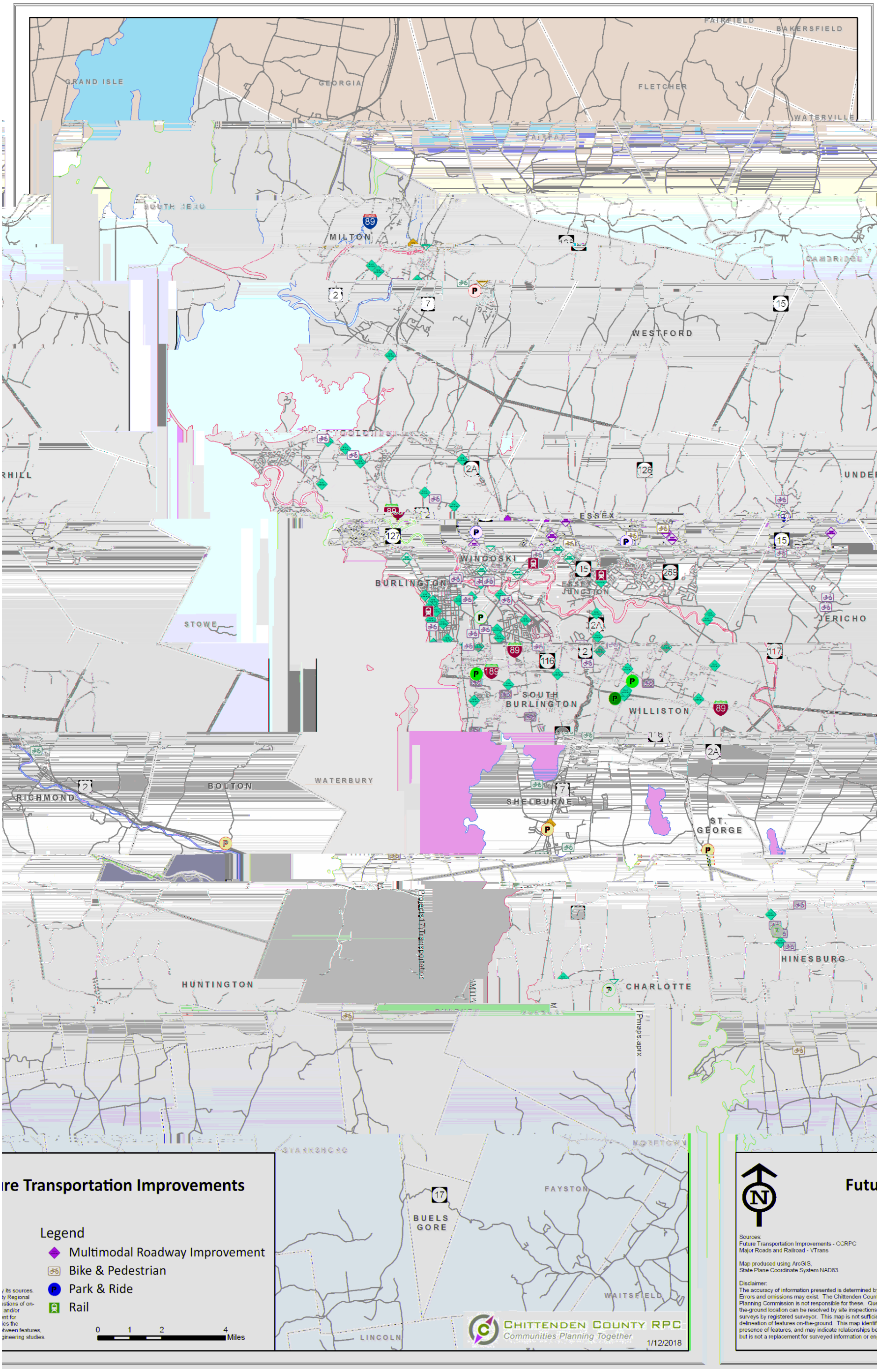
	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
	Regional Stormwater				
153	Regional	Stormwater	Regional Stormwater Projects	$16,000,000	Ongoing
	Regional Sidewalks				
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
154	Regional	Bike & Pedestrian	Sidewalks/Paths In Areas Planned for Growth	$2,000,000	Ongoing
	Regional Transit				
	On CCRPC TIP				
155	Regional	Transit	Burlington-Montpelier Inter-Regional Bus Service	$152,166	
156	Regional	Transit	Burlington-Waterbury Inter-Regional Bus Service	$341,031	
157	Regional	Transit	Essex Evening	$186,869	
158	Regional	Transit	Hinesburg Route	$348,646	
159	Regional	Transit	Jeffersonville Commuter (CMAQ funding ending in FY18)	$172,000	
160	Regional	Transit	Milton Route	$880,958	
161	Regional	Transit	Milton/Colchester to Burlington (CMAQ funding ends in FY18)	$59,676	
162	Regional	Transit	North Avenue Increased Peak Frequencies (CMAQ funding begins in FY20)	$690,000	
163	Regional	Transit	US2 Corridor	$3,834,722	
164	Regional	Transit	Williston Mid-Day (CMAQ funding ends in FY18)	$30,670	
	Need Identified in a Scoping or Planning Study, Not in Capital Program or on TIP				
165	Regional	Transit	Transit Capital	$40,000,000	
	Regional Rail				
166	Regional Rail	Rail	Burlington Rail Platform Upgrades - $1,000,000	TIGER Funding	
167	Regional Rail	Rail	Essex Junction Train Station Upgrades - $3,000,000	$3,000,000	
168	Regional Rail	Rail	Bring all Tracks in Chittenden County to Class 4 standard - $67,000,000	FTA or FRA	
169	Regional Rail	Rail	Freight Improvements to bridges, sidings, railyards, crossings and clearance - $10,000,000	FTA or FRA	
170	Regional Rail	Rail	Essex Junction to Burlington 286 Rail Upgrade - $15,000,000	FTA or FRA	

	Municipality	Project Type	Project	Estimated Cost *	Time Frame **
	Regional Aviation				
171	Regional	Aviation Projects	Aviation projects at Burlington International Airport	FAA	Ongoing
			Total Cost of All Projects	**$525,177,625**	
			TIP/Capital Program Front of the Book Projects	**$102,747,675**	
			Costs Excluding TIP Projects	**$422,429,950**	
			Estimated Funds Available	**$420,669,379**	
			Excess Project Cost	**-$1,760,571**	

Notes:

* The Estimated project cost is the cost estimate as of November 2017 and excludes any funds spent prior to October 1, 2016. This cost estimate includes federal as well as state + local match.
**Time frame: Short -- by 2025, Medium -- from 2025 to 2035, Long -- from 2035 to 2050

MAP 9 – FUTURE TRANSPORTATION PROJECTS MAP

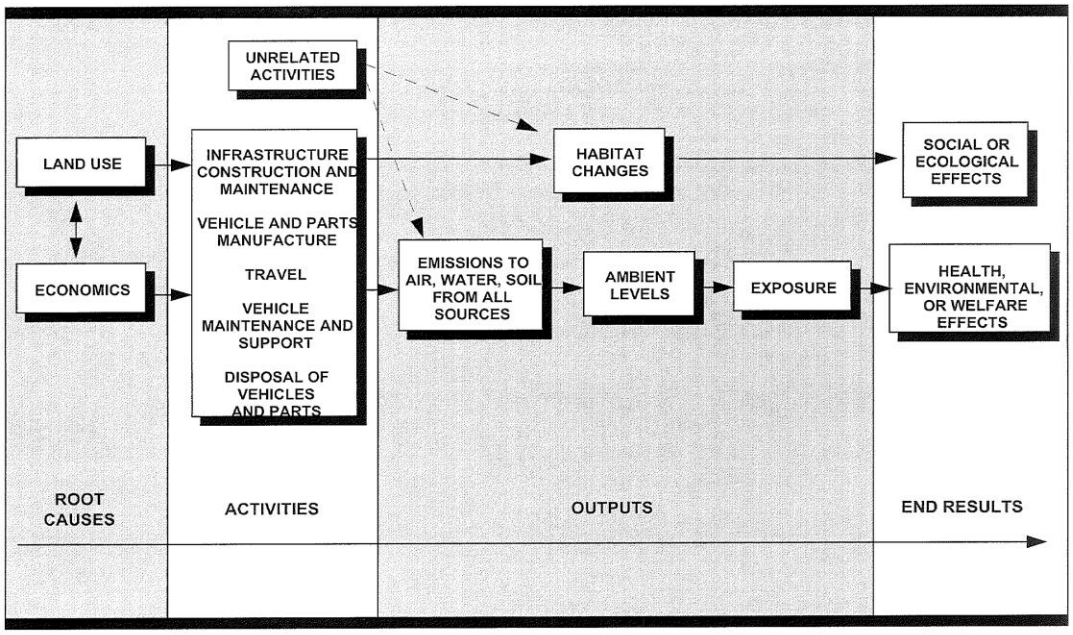


Environmental Consultation and Mitigation

INTRODUCTION

The construction, maintenance and operations of any transportation infrastructure, facility or services, while enhancing economic and social well-being, can also contribute to environmental degradation and cultural resource impacts. Such impacts are not always clear, and they can be direct or indirect and can accumulate over time. Impacts can also be at different geographic (local to global) and temporal (momentary to many years) scales. The chart below (EPA, 1996) provides a broad overview of causes and effects of transportation activities through consequent environmental and societal impacts. For the purposes of this regional transportation plan we focus on the impacts from infrastructure construction and upgrades as well as travel activities – those factors that our planning can clearly influence.

CAUSES AND EFFECTS OF TRANSPORTATION ACTIVITIES



Federal requirements call for all MTPs to consult with groups that represent environmental and cultural resource constituencies to discuss and identify mitigation strategies for those planned MTP projects or services that could impact environmental and cultural resources.

As noted in previous sections, a significant thrust of this MTP is to 1) focus first on system preservation and maintenance and less on major system expansion; 2) invest in alternative modes (walking, biking and transit) and Transportation Demand Management programs that improve the efficiency of the existing system; 3) Address safety issues and improve localized congestion on our roadways; and 4) invest in Intelligent Transportation Systems (ITS) to improve operational performance on major arterials in the county.

CONSULTATION BACKGROUND

The CCRPC began its first environmental consultation process while updating the previous MTP in May 2009. A comprehensive list of natural resource related interest groups and government agencies was assembled, and their representatives invited to a meeting to inform/educate these groups on transportation plans and the CCRPC's responsibilities regarding environmental mitigation. RPC staff explained the federal guidelines requiring input from resource agencies, gave background information on CCRPC responsibilities, and presented the strategy areas from the previous MTP. Staff also explained that it was likely that many recommendations in the updated MTP could mirror those from previous plans.

In November 2017, staff repeated this process, inviting representatives from resource agencies to a consultation meeting to discuss potential resource impacts of MTP projects. The presentation included an overview of MTP content as well as development process. The draft chapters were also presented, and the following synopsis of its recommendations offered:

- Maintenance first – keep what's been invested in in acceptable operational condition
- Transit enhancements – more buses, more often, every day on all routes
- Intelligent Transportation System (ITS) Investments – employ computing and communications technologies to improve the existing systems efficiency, such as signal system upgrades
- Active transportation – more safe walking and biking facilities, especially in areas planned for growth
- I-89 improvements – three lanes between Exits 14 and 15 and possible interchange expansions
- Select roadway improvements to address localized congestion and safety issues – various locations around the County
- Concentrating land use development – continue the trend of up to 90% of all new housing growth in areas planned for growth.

Staff also described the financial element and briefly explained the regulations on resource consultation and mitigation. The 2013 ECOS Plan's environmental impact table was shown where each recommended project was identified along with its potential resource impacts. The comparison was done using CCRPC's GIS map viewer: http://map.ccrpcvt.org/ChittendenCountyVT/ A list of potential mitigation strategies from the last plan was also shown and discussed.

For this update the project specific approach was not used but rather a broader discussion of how MTP policies, programs and strategies will address the consultation and mitigation requirements

THE ECOS IMPACT IN DEVELOPING TRANSPORTATION STRATEGY

The thrust of the ECOS project, which our last MTP was a component of, was to look at transportation more comprehensively than before with the intent to move transportation priorities in a more sustainable direction. The broad ECOS goal under which transportation was included states: *Make public and private investments in the built environment to minimize environmental impact, maximize financial efficiency, optimize social equity and benefits, and improve public health.*

As a result, the ECOS project pushed our recommendations toward investing in more alternative modes and efficiency programs and projects – and away from facility expansion. That shift is reflected in the financial plan's apportionment of funding assigned to these categories.

ENVIRONMENTAL MITIGATION

The MTP recommends a series of specific projects, and more broadly transportation strategies, to meet current and projected future transportation demand. These recommendations are designed to provide a safe system meeting the public's needs, while limiting any negative environmental and cultural impacts and thus more closely reflecting the overall values expressed in ECOS. Some impacts however may be unavoidable. The focus of this section is to highlight potential impacts and discuss ways to mitigate potential negative consequences when projects move to implementation.

Mitigating the environmental and cultural resource impacts of transportation projects and strategies covers a spectrum of possible actions. For example, mitigation can mean any of the following:

- Avoiding impacts altogether
- Minimizing impacts by limiting the extent of the action
- Repairing the impact through a restoration or rehabilitation process
- Reducing impacts through on-going preservation and maintenance operations
- Compensating for the impact by replacing or providing a substitute resource

Whichever option above is used, the intent is the same: Restore, enhance or preserve natural resources to compensate for the resource impacts, and to ensure ecosystems remain sustainable and productive into the future.

It should be noted the MTP's general direction and overall investment recommendations appear to have low environmental impacts. In fact, some recommendations will likely have positive environmental contributions. For instance, the Bike, Pedestrian, Transit system improvements recommended and the investments in Transportation Demand Management (TDM) programs should reduce the single occupancy vehicle travel and congestion on our roads thereby reducing GHG emission and improve air quality. Buses use the existing road network therefore do not impact natural or cultural resources through expansion projects outside existing rights-of-way. Similarly, the TDM and Intelligent Transportation System (ITS) programs recommended in this MTP are designed to facilitate the shift of people out of Single Occupancy Vehicles (SOVs) and into alternative transportation modes and to more efficiently use the transportation infrastructure already in place. These programs and projects would reduce the need for major expansion/capital roadway projects.

Other MTP projects will more clearly impact our natural environment and cultural resources, and some in negative ways should we fail to recognize them and identify appropriate mitigation strategies. One way to identify natural and cultural resource impacts is by employing the map viewer described earlier: CCRPC's Geographic Information Systems (GIS) resources inventory maps which can then be overlain with the recommended transportation project to identify impacts and reveal potential resource conflicts. Other resources such as steep slopes, impaired watersheds, contaminated sites, and agricultural soils can also be considered in reviews.

The online mapping tool at the CCRPC (http://map.ccrpcvt.org/ChittendenCountyVT/) can reveal potential impacts in considerable detail. These maps can be viewed at relatively large scales to more precisely detail the impacts and interested readers are encouraged to use this tool for their own analysis. Natural and cultural resource data layers included in CCRPC's map viewer are:

- rare plant and animal communities,
- natural areas, parks and other conserved lands,
- floodplains, wetlands,
- streams, deer wintering areas, historic sites/buildings, and
- historic districts

While the MTP can point out some of the resource conflicts early on, identification, evaluation and mitigation of environmental and cultural impacts of transportation projects start at the project definition phase (scoping) and continues into the environmental permitting phase. Depending on funding and other factors, project could go through various reviews and permitting processes including the National Environmental Policy Act (NEPA), the Federal Advisory Council on Historic Preservation's Section 106, FHWA's Section 4(F), and possibly Vermont Act 250. In these regulatory proceedings the precise mitigation strategy, if needed, will be defined.

Table 25 identifies the organizations that need to be involved in the respective resource issues and identifies possible mitigation strategies and locations. Through project definition and the project development phases beyond, these parties and activities will become more prominent.

TABLE 25 – POSSIBLE MITIGATION STRATEGIES

Resource	Regulatory and Information Contacts	Mitigation Activities	Mitigation Areas
Cultural and Historic Resources	VTrans Historic Preservation and Archeology Officers, VT Agency of Commerce and Community Development Historic Preservation Office	Avoid or minimize impacts; appropriate landscaping; excavation for archeological sensitive areas; project design exceptions; environmental compliance monitoring	Preserve in place; on-site landscaping; on-site mitigation of archeological impacts
Water Resources, Wetlands, Rivers and Floodplains	VT Agency of Natural Resources: Dept. of Environmental Conservation Watershed Management Division, Dept. of Fish and Wildlife. US Army Corps of Engineers, US Fish and Wildlife Service, US EPA's Green Infrastructure Collaborative, Lake Champlain Basin Program, Winooski Valley Park District	Mitigation sequence: avoid, minimize, compensate (could include preservation, creation, restoration, riparian buffers); design exceptions; environmental compliance monitoring; floodplain management for eligible activities; stormwater system retrofits; application of Green Stormwater Infrastructure; low-cost, low-tech infiltration improvements	On site to the extent possible/appropriate; off-site through mitigation banking program as permitting requires
Parks/Recreation Areas	VT Agency of Natural Resources Dept. of Parks and Recreation,	Avoidance, minimization, mitigation; design exceptions;	On site screening or facility

	Winooski Valley Park District, Municipal Parks and Recreation departments	environmental compliance monitoring	replacement; offsite replacement adjacent to existing
Conserved Lands/Natural Areas	Winooski Valley Park District, Nature Conservancy, Vermont Land Trust, Municipal Land Trusts, Dept. of Fish and Wildlife Natural Heritage Program	Avoidance, minimization; any replacement to be of equal value and of equivalent usefulness; design exceptions; environmental compliance monitoring	Landscaping within existing rights-of-way; replacement property to be contiguous
Endangered Plants or Animals	VT Agency of Natural Resources: Dept. of Environmental Conservation, Dept. of Fish and Wildlife Natural Heritage Program	Avoidance, minimization; time of year restrictions, construction sequencing/timing; design exceptions; environmental compliance monitoring	Species relocation to suitable habitat adjacent to project limits
Air Quality	VT Agency of Natural Resources Air Quality Division, Vermont Climate Collaborative, Vermont Energy Investment Corporation, VTrans Policy and Planning Division	Transportation Demand Management programs; ITS projects; No Idling ordinances	Throughout the region

The MTP's primary focus, as has been previously noted, is to maintain and preserve the transportation infrastructure and services already in place – as recommended, 70% of all future funding will go towards that purpose. With the limited amount of anticipated funding available for new projects, and a higher proportion of that funding going to transportation alternatives – transit, walk, bike, TDM, ITS – major roadway expansion projects are relatively few and most of them are addressing localized safety and congestion issues, some of them within the existing right-of-way. This will result in fewer and less significant environmental and cultural impacts from the proposed projects. Nonetheless, impacts however small may occur and the purpose of this report is to make us aware of these as early as possible.