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Glossary of Terms

ACRONYMS

ADA – Americans with Disabilities Act
CAV – Connected and Automated Vehicles
ITS – Intelligent Transportation Systems (ITS)
NHS – National Highway System
LRTP – Long Range Transportation Plan
MHVTMA – Mid-Hudson Valley Transportation Management Area
MNR – MTA Metro-North Railroad (Metro-North)
MPO – Metropolitan Planning Organization
MTA – Metropolitan Transportation Authority
NAAQS - National Ambient Air Quality Standards
NYNJPA – Port Authority of New York – New Jersey (Port Authority)
NYSDEC – New York State Department of Environmental Conservation
NYSDOT – New York State Department of Transportation
NYSTA – New York State Thruway Authority
OCTC – Orange County Transportation Council
SFW – New York Stewart International Airport
TAMP – Transit Asset Management Plan
TIP – Transportation Improvement Program
TMA – Transportation Management Area
TNC – Transportation Network Company
TOD – Transit-Oriented Development
UPWP – Unified Planning Work Program
VMT – Vehicle Miles Traveled

TRANSPORTATION (ROADWAY) TERMS

Functional classification - the process by which roads, streets, and highways are grouped into classes according to the character of service they provide. Functional classification describes the importance of a particular road or network of roads to the overall system and, therefore, is critical in assigning priorities to projects and establishing the appropriate highway design standards to meet the needs of the traffic served.

Interstate – The highest classification of the roadway network. Interstates were designed and constructed with mobility and long-distance travel in mind.

Highway – The second highest classification of roadway. Highways have directional travel lanes usually separated by some type of physical barrier, and access and egress points are limited to on- and off-ramp locations or a very limited number of at-grade intersections. Like Interstates, these roadways are designed and constructed to maximize mobility function, and abutting land uses are not directly served by them.

Other Principal Arterials – Classification of roadway based on the functional classification. These roadways serve major centers of metropolitan areas, provide a high degree of mobility and can also provide mobility through rural areas. Unlike their access-controlled counterparts, abutting land uses can be served directly.

Minor Arterials – Classification of roadway based on functional classification. Minor arterials provide service for trips of moderate length, serve geographic areas that are smaller than higher Arterial counterparts and offer connectivity to the higher Arterial system.

Collectors – Classification of roadway that serves a critical role in the roadway network by gathering traffic from Local Roads and funneling them to the Arterial network. Within the context of functional classification, Collectors are broken down into two categories: Major Collectors and Minor Collectors. Collectors generally serve primarily intra-county travel (rather than statewide) and constitute those routes on which (independent of traffic volume) predominant travel distances are shorter than on Arterial routes.

Local Roads - Locally classified roads account for the largest percentage of all roadways in terms of mileage. They are not intended for use in long distance travel, except at the origin or destination end of the trip, due to their provision of direct access to abutting land. As public roads, they should be accessible for public use throughout the year.

Federal Aid Highway System – The Federal-Aid Highway Program supports State highway systems by providing financial assistance for the construction, maintenance and operations of the Nation's 3.9 million-mile highway network, including the Interstate Highway System, primary highways and secondary local roads. The Federal Highway Administration (FHWA) is charged with implementing the Federal-aid Highway Program in cooperation with the States and local government.
**OTHER TERMS & DEFINITIONS**

**Average Annual Daily Traffic (AADT)** - The total volume of traffic on a highway segment for one year, divided by the number of days in the year.

**Accessibility** - the process of creating products that are usable by people with the widest possible range of abilities, operating within the widest possible range of situations.

**Americans With Disabilities Act (ADA)** – Legislation defining the responsibilities of and requirements for transportation providers to make transportation accessible to all individuals with disabilities.

**Commute** – Regular travel between home and a fixed location (e.g., work, school)

**Commuter** - A person who travels regularly between home and work or school.

**Congestion** – An excess of vehicles on a roadway segment at a particular time, resulting in lower than expected speeds and greater travel times.

**Connected and Automated Vehicles (CAVs)** – A category of technological advancements in vehicles that use connected wireless features to either communicate with other vehicles and roadway infrastructure (connected vehicle), or feature one or more functions that operate independently of a human driver (automated vehicle).

**Environmental Protection Agency (EPA)** – The federal regulatory agency responsible for administering and enforcing federal environmental laws, including the Clean Air Act, the Clean Water Act, the Endangered Species Act, and others.

**Fiscal Constraint** – Making sure that a given program or project can reasonably expect to receive funding within the time allotted for its implementation.

**Hazard Mitigation Plan** – A document that defines the variety of hazards that may pose a threat to the area and defines goals, priority projects, and responsible agencies. FEMA requires state, tribal, and local governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects.

**Infrastructure** - All the relevant elements of the environment in which a transportation system operates, including but not limited to: roads, bridges, transit, sidewalks, utility installations, parks, etc.

**Intelligent Transportation Systems (ITS)** – The application of advanced technologies to improve the efficiency and safety of transportation systems.

**Intermodal** – The ability to connect, and the connections between, modes of transportation

**Level of Service (LOS)** – A qualitative assessment of a road’s operating conditions. Level of service indicates the capacity per unit of demand for each public facility. This term refers to a standard measurement used by transportation officials that reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

**Long Range Transportation Plan (LRTP)** – A document resulting from regional or statewide collaboration and consensus on a transportation system, and serving as the defining vision for the region's transportation systems and services. In metropolitan areas, the plan indicates all of the transportation improvements scheduled for funding over the next 20 years.

**Maintenance Area** - Any geographic region of the United States previously designated nonattainment and subsequently re-designated to attainment subject to the requirement to develop a maintenance plan as amended.

**Metropolitan Planning Organization (MPO)** - Regional policy body, required in urbanized areas with populations over 50,000, and designated by local officials and the governor of the state. MPOs are responsible in cooperation with the state and other transportation providers for carrying out the metropolitan transportation planning requirements of federal highway and transit legislation

**Mode** – A specific form of transportation, such as automobile, subway, bus, rail, or air.

**National Ambient Air Quality Standards (NAAQS)** - Federal standards that set allowable concentrations and exposure limits for various pollutants. The EPA developed the standards in response to a requirement of the CAA. Air quality standards have been established for the following six criteria pollutants: ozone (or smog), carbon monoxide, particulate matter, nitrogen dioxide, lead, and sulfur dioxide.
Non-motorized Transportation - any form of transportation that provides personal or goods mobility by methods other than the combustion motor.

Paratransit – A comparable transportation service required by the American Disabilities Act (ADA) for individuals with disabilities who are unable to use fixed route transportation systems. These services usually serve the needs of persons that standard mass-transit services would serve with difficulty, or not at all. Often, the patrons include the elderly and persons with disabilities.

Particulate Matter (PM2.5) - Particulate matter consists of airborne solid particles and liquid droplets. Particulate matter may be in the form of fly ash, soot, dust, fog, fumes, etc. These particles are classified as "fine" if they are smaller than 2.5 microns.

Pedestrian – Any person not in or on a motor vehicle along a roadway.

Performance Measures – Indicators of how well the transportation system is performing with regard to such things as average speed, reliability of travel, and accident rates. Used as feedback in the decision-making process.

Public Participation – The active and meaningful involvement of the public in the development of transportation plans and programs.

Public Transportation – Transportation by bus, rail, or other conveyance, either publicly or privately owned, which provides to the public general or special service on a regular and continuing basis. Also known as "mass transportation", "mass transit" and "transit."

Smart Growth – A set of policies and programs design to protect, preserve, and economically develop established communities and valuable natural and cultural resources.

Transit Asset Management Plan (TAMP) – A strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the lifecycle of the assets at minimum practicable cost.

Transit-Oriented Development (TOD) – A type of urban development that maximizes the amount of residential, business and leisure space within walking distance of public transport.

Transportation Demand Management (TDM) – Programs designed to reduce demand for transportation through various means, such as the use of transit and of alternative work hours.

Transportation Improvement Program (TIP) – A document prepared by a metropolitan planning organization, in coordination with state agencies, which lists projects to be funded with FHWA/FTA funds.

Transportation Management Area (TMA) – A federal designation used to classify urbanized areas with populations of 200,000 or more.

Transportation Network Company (TNC) – An organization that pairs passengers via websites and mobile apps with drivers who provide such services. Examples of TNCs include Uber and Lyft, and are examples of shared mobility.

Unified Planning Work Program (UPWP) – The management plan for the MPO planning program. Its purpose is to coordinate the planning activities of all participants in the planning process.

Urbanized Area – An Area that contains a city of 50,000 or more population plus incorporated surrounding areas meeting size or density criteria as defined by the U.S. Census.
How to use this document

Core Values
Throughout the public process for the Orange County Comprehensive Plan 2018 Update, four “core values” emerged that informed the vision, goals, objectives and recommendations developed throughout Chapter 6: Transportation (“The Plan”).

The core values are: Environmental Quality and Sustainability, Economic Prosperity, Community Quality of Life and Social Equity. For ease of use, Orange County Department of Planning has developed a Key to identify the location of policy recommendations and action items throughout the document that correspond to the fundamental Core Values driving the Plan.

Look for these symbols throughout the Plan to find the transportation policies that are important to you!

- 🌿 Environmental Quality and Sustainability
- 🤑 Economic Prosperity
- 😊 Community Quality of Life
- 💑 Social Equity

Did you know...
Look for the question marks to find additional information on referenced reports, projects and organizations.

Public Comments
The coUrbanize Comprehensive Plan public outreach process identified the need to address countywide transportation planning and policy goals. CoUrbanize was an online community engagement and communications management platform that helped community members and stakeholders stay informed throughout the planning process.

Once signed in either using a Google account, Facebook account, or creating a coUrbanize account, followers had the ability to share their comments online, comment on others’ responses, and show their support or “like” for other comments.

Follow the exclamation points and see your comments here!
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INTRODUCTION

MOVEMENT OF PEOPLE AND GOODS IN ORANGE COUNTY

Orange County has had a robust transportation network for as long as there has been human settlement in the Hudson Valley. Our network of rivers, joined later by roads, then railroads, then interstate highways is a primary advantage for the County in attracting residents, businesses, and tourists, as is our proximity to New York City, Boston, Washington, Philadelphia, Baltimore, and Montreal. Over 60 million North American residents live within a six-hour drive of Orange County—approximately 1 in 7 US residents and approximately 1 in 5 Canadian residents.

The relative affordability of housing and the attractive, safe living environment in Orange County has encouraged population in-migration. Orange County has had, and is growing, its own employment base, with residents filling about 66 percent of jobs within the County. Much of the employment, housing and shopping is dispersed, making transit and other modes of travel difficult. This makes it a necessity to use personal vehicles for travel to work, shopping and recreation. There is one vehicle available for every licensed driver in the county on average. The primary exception to reliance on personal vehicles is commuting to New York City, Westchester County and New Jersey by way of bus, train, ferry and carpool.

Orange County is at the crossroads of three intersecting interstate highways: Interstate 84 (I-84), Interstate 87 (I-87 and commonly called the “Thruway”) and New York Route 17 (Route 17 and future I-86). These highways give Orange County unparalleled access to the Northeast, Midwest and South. A consequence of the County’s interstate road network is a clustering of big box...
distribution and retail uses near these interstate highways. This clustering provides important economic benefits, as well as challenges regarding truck access and safety. These commercial developments have challenged efforts to reinvigorate the commercial centers of traditional downtowns and weakened older suburban shopping centers.

Orange County is the northwestern-most county in New York State served by Metro-North Railroad (Metro-North) for passenger rail. While the Port Jervis line of the Metro-North transit system is limited in the number of trains per day, it is a vital link in our connection to the New York City Metropolitan Area. We are also served by four airports, the largest of which is New York Stewart International in New Windsor. All these elements are a part of our transportation infrastructure.

The Orange County Transportation Council (OCTC) is the Metropolitan Planning Organization (MPO) for Orange County and looks at multi-modal transportation needs and issues within the County and the region. The OCTC is a multi-agency consortium and is housed within the Orange County Department of Planning (OC Planning). Since travel behavior is often fluid and not contained within the boundaries of one county, transportation at the regional level is developed within three County MPOs (Orange, Dutchess, and Ulster) which makes up the Mid-Hudson Valley Transportation Management Area (TMA). The TMA studies a multitude of transportation issues such as congestion management and regional transit, as well as allocates federal dollars to these transportation programs.

Since 1982, the Orange County Transportation Council (OCTC) has been the designated Metropolitan Planning Organization (MPO) for Orange County. By federal law, an MPO is designated by each state’s governor for every urban area in the United States with at least 50,000 residents. MPOs look at regional transportation issues, which involves addressing land use, air quality, energy, economic development, commerce, and quality of life.

The OCTC produces three main products, required by federal law: the Unified Planning Work Program (UPWP), the Transportation Improvement Program (TIP), and the Long Range Transportation Plan (LRTP). The UPWP is the annual budget for the MPO and outlines all MPO planned tasks for the upcoming year. Tasks include things such as plans, studies, and working with our TMA partners on regional issues. The TIP is a five year capital program which sets a schedule for transportation projects to be built utilizing federal and local dollars. Finally, the LRTP looks at all aspects of transportation over the next 20 years, setting the vision and goals,
identifying priority projects and funding, and setting an implementation schedule.

A TMA is a federal designation used to classify Urbanized Areas with populations of 200,000 or more. The Mid-Hudson Valley TMA is based on the Poughkeepsie-Newburgh NY-NJ Urbanized Area, which includes portions of Dutchess, Orange, and Ulster counties, as well as Passaic County, New Jersey, covering a population of over 423,000 people. The three New York MPOs work together to manage the TMA, and coordinate with the North Jersey Transportation Planning Authority (NJTPA) as needed.

The MPO encompasses the county boundary, with the county executive acting as the Chairman of the MPO, and is staffed by OC Planning. Therefore, the LRTP is recognized as Orange County’s long term vision for federal transportation funding in the County, with OCTC as the responsible agency for implementation. The LRTP looks at a 25 year planning horizon and must be constrained. It identifies specific capital and planning project priorities that can reasonably be expected to be funded within the planning period. The LRTP has its own federally required public participation process, and content is dictated largely by federal requirements.

The Orange County Comprehensive Plan has not previously had a Transportation Chapter, despite the importance of our transportation network to our existing development and future growth. The purpose of this chapter is to review Orange County's existing transportation conditions and to set forth a plan that will allow for continued and improved efficiency in the existing network, expansion of the road network in a logical and equitable way, and improved services that will extend fair transportation opportunities to all users.
As stated in the Orange County Comprehensive Plan 2018 Update, throughout the public process, four "core values" emerged that defined the vision for our community and how we intend to shape the future of Orange County. These values are applied to the construct of the county transportation network in the following ways:

**PUBLIC OUTREACH**

The Orange County Comprehensive Plan 2018 Update was a process separate from MPO planning functions and was initiated in partnership with the Orange County Planning Board (Planning Board). To determine the focus of this new Comprehensive Plan, OC Planning performed public outreach to gauge what issues were most important to County residents. Outreach included discussions with the Planning Board, three public meetings held throughout the County, press releases, and an outreach project facilitated by coUrbanize. The coUrbanize Comprehensive Plan public outreach process identified the need to address countywide transportation planning and policy goals. A majority of the responses covered a wide range of transportation topics, including: availability and reliability of transit, biking, walking in downtown centers, traffic congestion, safety concerns, and trail, rail and ferry use. Because of the public interest and the importance of transportation in the development of the County, Orange County is producing its first Transportation Chapter, to be adopted as an amendment to the Comprehensive Plan.

**ENVIRONMENTAL QUALITY AND SUSTAINABILITY**

The transportation network should be energy efficient and climate resilient and encourage as many non-motorized trips as possible, in order to improve air quality throughout the County.

**ECONOMIC PROSPERITY**

Infrastructure investment provides jobs and is vital to a good economy, and so the transportation network should be as complete and connected as possible to ensure equal employment opportunity and efficient commuting and freight movement.

**COMMUNITY QUALITY OF LIFE**

The improved health and safety of the community should be considered a goal of transportation policy and land use planning in the County, designing roads and future development that is pedestrian, cyclist and public transit friendly.

**SOCIAL EQUITY**

A multi-modal transportation system provides Orange County residents access to safe, reliable, and affordable connections to employment, education, healthcare, and other essential services for all users including: the elderly and disabled, children, pedestrians, bicyclists, drivers, non-drivers and transit users.
These core values have informed our work in this document and the vision for Orange County (see below) has shaped the goals, objectives and recommendations presented by this plan. The objectives and recommendations to achieve each goal are shown at the end of each specific section in the Transportation Chapter.

**ORANGE COUNTY VISION**

Provide a transportation system that will enhance the community quality of life for Orange County residents and visitors over the long term, with a focus on providing robust inter- and intra-county transportation alternatives that support the strength and prosperity of the Orange County economy and provide transportation solutions that are socially equitable and environmentally sustainable.

**GOALS TO ACHIEVE THE VISION**

The public participation process identified nine goals to facilitate the path toward the vision. Those goals include:

- **Goal 1:** Enhance the footprint of the Orange County public transportation network and improve mobility, access and connectivity for all users.

- **Goal 2:** Develop and maintain an affordable and convenient transportation network that provides safe and accessible multi-modal options for all users.

- **Goal 3:** Invest in transportation system improvements that are necessary to support the current regional economy and future proposals for economic development.

- **Goal 4:** Transportation infrastructure will be maintained in a state of good repair, as the foundation for providing safe, efficient mobility.

- **Goal 5:** All users will have convenient, mode-neutral access to employment, education, services, and other destinations.

- **Goal 6:** Maintain and continue to develop a comprehensive intermodal network to support the movement of people and goods in Orange County and throughout the region.

- **Goal 7:** All users will be able to travel safely and with a sense of security, regardless of which mode they choose to use.

- **Goal 8:** Community sustainability will be supported in terms of reduced energy consumption and greenhouse gas emissions, improved public health and social equity.

- **Goal 9:** Improve resiliency across all aspects of the Orange County transportation network, through cooperative partnerships with Federal, State and local agencies, to mitigate adverse impacts from projected climatic shifts, and ensuring a safe, reliable and equitable network for future generations.
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I. CIRCULATION SYSTEM
How We Get There In Orange County

The roadway network in Orange County includes more than 2,800 centerline miles of roadway. The roads that comprise the network fall under the jurisdiction of the New York State Department of Transportation (NYSDOT), New York State Thruway Authority (NYSTA), Orange County, and its forty-two municipalities. Over 65% of the roadway mileage in Orange County is under the jurisdiction of municipal governments. NYSDOT has jurisdiction for about 14% of the mileage; Orange County has about 11%. Functional classification of a highway or roadway establishes a hierarchy of highways and roadways that is a valuable planning tool because it defines the intended purpose, design characteristics and funding parameters of a roadway.

A. ROADWAY TYPES IN THE COUNTY

Based on the Federal Aid System classification of roadways, there are three basic types of roads:

- **Local System:** Local roads provide access to land and serve short trips. Service for through traffic on these streets is generally inefficient. If there is heavy congestion on higher functional class facilities, local roads sometimes become short cuts. The use of navigation technology can further exacerbate this problem, as most traffic apps can identify where traffic jams are in real-time and offer alternative routes. This can result in reduced safety and quality of life along local roads not designed for heavy traffic. Examples of this activity are apparent on roads like Old Temple Hill Road in Vails.
Gate, Dolsontown Road in Wawayanda and Cheechunk Road in Goshen.

- **Collector System:** In urban areas, the collector system may service land identified for residential purposes as well as providing connections between local streets in residential neighborhoods and the arterial system. In rural areas, the collector routes generally serve intra-county rather than inter-county travel. Examples of urban collectors are Carpenter Avenue in the City of Newburgh and Monhagen Avenue in the City of Middletown.

- **Non-Limited Access Arterial System:** Limited-access arterials—roads with exits, such as interstate highways and other roads intended for long-distance travel—provide unhindered travel with free-flowing traffic. Non-limited access arterials—roads that do not require an entry ramp—are intended to move through traffic, not provide access for local traffic. Routes 17K and 300 in the Town of Newburgh and Route 211 in the Town of Wallkill are non-limited access arterials. Having a lot of development along arterials compromises the ability to move through traffic. Adding local trips to through trips on an arterial causes congestion and safety problems. Access management practices are intended to address these issues. In many cases, past (and current) land use decisions have led (and are leading) to congested arterials with many commercial curb cuts, and sometimes even residential driveways. All of these things reduce the ability to carry through traffic smoothly.

The Federal Aid System is, by definition, all roadways which are eligible for Federal Aid. This includes all roadways in urban areas, except those classified as local, and all roadways in rural areas except those classified as minor collector and local. Federal Aid eligible roads account for 646 miles of roadway in the County, or about 27 percent of the total mileage. These roads experience higher traffic volumes and the majority of vehicle miles traveled (VMT) in Orange County. All state and municipally owned bridges are Federal Aid eligible regardless of their functional classification.

![Fig. 6. Examples of different roadway types within the County](image)
B. INTERMODAL CONNECTIONS

At this time, five kinds of intermodal connection facilities exist in Orange County: park & ride lots, rail stations with substantial parking, bus terminals, airports, and the Newburgh Beacon ferry landing. Park & ride lots facilitate transfers between single occupant vehicles (SOVs), carpools, as well as local, commuter and intercity bus services. Parking is provided at all seven rail stations in the County. The bus terminals offer similar opportunities and also serve taxis and pedestrians. The ferry landing on the Newburgh waterfront and Stewart International Airport are the other major places where people can connect between various transportation modes.

i. Park & Ride Lots
Park & ride lots serve as an interface in the circulation system and encourage the use of public transit. In Orange County, there are two formal park & rides lot systems. One is the system of rail station parking lots owned and maintained by Metro-North. The other is a system of park & ride lots owned and maintained by the cooperative efforts of public and private entities, especially the NYSDOT, Orange County, and Coach USA/Shortline. Some of the park & rides lots are shared-use facilities that serve commuters and other users. The County encourages this type of shared-use parking.

The County’s goal (in its role as a host agency for the MPO) is to continue to work in conjunction with NYSDOT, Coach USA/Shortline and the relative municipalities to maintain and rehabilitate park & rides facilities so they remain safe, convenient and open to all users. Many park & ride lots are reaching capacity, and the County continues to look for opportunities to assist filling the demand for more spaces.

ii. Passenger Rail Service
Orange County is served by the Metro-North Port Jervis line (PJL) which runs from Hoboken, NJ to the City of Port Jervis. The PJL is operated by New Jersey Transit through a service contract with MTA Metro-North Railroad and includes seven stations in Orange County: Port Jervis, Otisville, Middletown, Campbell Hall, Salisbury Mills, Harriman, and Tuxedo. In order to access New York City, riders must transfer at the Secaucus Junction to take a New Jersey Transit train to New York-Pennsylvania Station, or at the Hoboken Terminal to take the Port Authority Trans Hudson (PATH) service or NY Waterway operated ferry.

Metro-North serves nearly 87 million customers annually in the New York Metropolitan area, but only a relatively small portion are from Orange County, due to the configuration of the rail lines.
and the barrier presented by the Hudson River. Annual ridership data collected in 2016 and 2017 show a decrease of 3.5% in ridership on the PJL. The Pascack Valley Line, also located on the west side of the Hudson River, provides service which is used by some Orange County residents from Spring Valley Station in Rockland County. It experienced a decrease of 3.8% in ridership between 2016 and 2017.

While external factors have contributed to the decline, two inherent infrastructure constraints limit Metro-North’s ability to make the service more attractive to potential customers. First, the PJL consists of mainly a single track, limiting the ability to operate trains in both directions. This results in long headways between trains and infrequent service, primarily limited to AM and PM peak hours. In addition, the line lacks a mid-point yard along the PJL. The two rail yards that serve the PJL, one in Port Jervis and one in Hoboken, are 95 miles apart and at or near capacity; a mid-point yard would permit a more robust peak period service.

In early 2018, Metro-North completed the Port Jervis Line Service Strategy Report which sought to address these infrastructure constraints. Completed in early 2018, the service strategy presented in the report will allow for more frequent service during the peak and off-peak, as well as the introduction of reverse peak service. The PJL Service Strategy Report recommended capacity improvements in the form of passing sidings and a mid-point yard. The construction of three passing sidings, each about a mile long, would permit trains to pass each other and enable greater train frequency (less wait time for trains). Construction of a passenger train rail yard located at Campbell Hall along the PJL would permit additional trains to be stored and serviced overnight in Orange County, allowing more frequent peak period service and relieving daily railcar servicing capacity issues at Hoboken.

iii. Newburgh-Beacon Ferry
The Newburgh-Beacon Ferry has been operating since 2005; connecting the City of Newburgh to the City of Beacon in Dutchess County. The Ferry is operated by New York Waterway under contract with Metro-North and carries between 250 and 300 passengers per day across the Hudson River. The Ferry docks adjacent to the
Metro-North Beacon station (which is on the Hudson Line) and extends north to the City of Poughkeepsie and south to Grand Central Terminal in New York City. From Grand Central Terminal there is access to the subway, local buses, and the Metro-North line to Connecticut. The Metro-North Beacon Station has a lot capacity of 1,534 vehicles and has an extensive waiting list for monthly parking permits. The ferry helps ease the high parking demand on this lot as well as reduce rush hour congestion over the Newburgh-Beacon Bridge and within the City of Beacon itself. Commuters using the ferry also experience reduced commuting costs when compared to driving and parking at the Beacon Station.

The passing sidings are to be constructed on the existing PLE trackbed, which had once carried two tracks. The environmental review and the preliminary design for the three passing sidings are being advanced in parallel. The passing siding locations are planned for locations west of the Tuxedo Station, east of the Moodna Viaduct, and west of the Middletown/Town of Wallkill Station.

The proposed rail yard is located in the Town of Hamptonburgh, adjacent to the Campbell Hall Station. The site was selected as the preferred alternative emerging from an exhaustive review of 40 sites. Environmental review and site planning activities will be initiated in late 2018.

Currently, Metro-North does not have the resources to subsidize additional ferry service. Extending ferry service hours to off-peaks and weekends would require a critical mass, meaning a significant number of customers who would use the service on a regular and consistent basis, as there are during the weekday AM and PM peak periods, which does not currently exist.

iv. Aviation
Orange County has four airports: New York Stewart International Airport, Orange County

Public Comments Regarding the Newburgh-Beacon Ferry
Comments collected using CoUrbanize

“Connecting public transportation networks via multiple modes (e.g., trains to buses) would make life easier for our region’s commuters, visitors, and intra-region travelers. Creating a connector from the Salisbury Mills station to Beacon via the Newburgh waterfront/ferry could open new possibilities for access to the regular train service on the east side of the Hudson.”

“Newburgh-Beacon Ferry off peak and in weekends!”

“I ride public transit because it's inexpensive, environmentally friendly and I don't have to drive! I would love to see the Newburgh-Beacon Ferry operate on weekends and all day long!”

“The ferry to Metro North needs an extra shift during the day to allow all day service. Also weekend service is a must. A light rail or bus rapid transit should be built from Stewart Airport straight down Broadway to meet the Ferry. Do NOT bypass Newburgh and build this to Salisbury Mills. More and more convenient bus and bus rapid transit should connect Newburgh N-S and E-W to allow residents to shop and dine and attend school without a car”.

Fig. 9. The Newburgh-Beacon Ferry approaches the harbor at sunset.
Airport, Randall Airport, and Warwick Airport. The largest by far is Stewart, which serves both the County and the region, facilitating the movement of both freight and people. The significance of air transportation in Orange County and the relationship to surface transportation and land use will be an increasing subject of interest, primarily due to the future development of Stewart International Airport.

1. New York Stewart International Airport:
New York Stewart International Airport (SWF) is operated by the Port Authority of New York – New Jersey (Port Authority) and with its 11,817-foot main runway, still partly serves a military purpose, for which it was originally constructed. It is the home of the 105th Airlift Wing of the New York Air National Guard and two Marine Air Squadrons. It is the only airport in the area which operates twenty-four hours per day and has a control tower. Passenger service is currently provided by Allegiant, US Airways, Delta, and JetBlue. Norwegian Air began passenger service to Stewart in 2017 and currently offers direct flights to Ireland, Northern Ireland, Scotland, and Norway, though it will cease direct flights to Belfast and Edinburgh sometime in 2019. Freight services at the airport are offered by Federal Express, United Parcel Service, and the US Postal Service.

Access to the Stewart facility is provided along Bruenig Road from State Route 207 and an entrance from Route 747. Route 747 provides access from I-84 at Exit 5A, and extends from a new intersection with Route 17K to Route 207 on the south. Regional transit access to the airport has been studied through the West of Hudson Regional Transit Access Study. This area was also the subject of focused analysis and planning as part of the Newburgh Area Transportation and Land Use Study.

Stewart has the potential to develop as the

The West of the Hudson Regional Transit Access Study (WHRTAS) was initiated in June 2008 by Metro-North in cooperation with the Port Authority, NYSDOT and New Jersey Transit (NJT). The study’s goal was to identify and assess transit solutions to improve mobility and accessibility between Orange County, New York Stewart International Airport and the surrounding regions, which would accommodate the airport’s development and regional growth.

The WHRTAS Study has a two-phase study approach. Phase I of the Study was completed in 2012 and resulted in a short list of four build alternatives for service to the Airport. The Phase I findings are detailed in The Alternatives Analysis Phase I Screening Report found at: http://web.mta.info/mta/planning/whrtas/documents.htm.

The goal of Phase II was to identify a locally preferred alternative (LPA). Phase II further refined and analyzed the four build alternatives which included rail and bus alternatives for serving the airport.

In the summer of 2018, the LPA was presented to the study stakeholder group. In the short-term, Metro-North recommends Direct Bus service as per B-XM (PABT) and B-XHA (Hackensack, NJ), building upon the success of the existing Stewart Airport Express Bus service. Metro-North will not operate the proposed bus service. The bus service operator and the lead agency for the construction of the bus only ramp at Route 207 are yet to be determined.

In the long-term, Metro-North recommends Direct Commuter Rail service to SWF, noting that there are future development plans at SWF that will need to be coordinated to move the commuter rail long-term alternative forward. Metro-North is in the process of conducting public meetings regarding the results and will publish the final report by the end of 2018.
New York metropolitan region’s low-cost, low-congestion alternative, making it an attractive option for both business and leisure travelers wishing to access the region. Increased bus services to New York City would help to expand the airport’s catchment area and attract airlines seeking to access the New York City market. Currently, the only bus routes into the airport connect SWF to the Beacon Metro-North Station and the Port Authority Bus Terminal. There are opportunities to increase the use of the airport by visitors to Woodbury Common Premium Outlets and West Point with properly timed shuttles jointly marketed with airlines. Stewart continues to grow as a major air cargo facility. The development of land in the surrounding area and the provision of air cargo storage and handling facilities at the airport are expected to continue this growth.

2. Orange County Airport

Orange County Airport is a large, County-owned general aviation airport which serves both smaller commercial, charter and general aviation entities to include corporate and flight school users. The facility is one of the state’s largest general aviation airports with over 165 based aircraft and two runways. Orange County is working to continually make improvements to the airport, including plans to potentially expand aviation activities through privately funded commercial hangars on county leased land. The airport is located just south of the Village of Montgomery on Route 211. I-84 passes within one mile of the airport with the nearest interchange two miles away (Exit 5, Maybrook). Based on its airport master plan forecast of 100,000 operations per year to and from the airport at 2015 operation levels, road improvements may be needed due to airport growth and accelerated local development along the County Route 99 (CR99 - Neelytown Road) corridor with newly constructed warehouse and distribution facilities. In addition, as a result of the Airport Master Plan Update in 2004 and the Finding of No Significant Impact (FONSI) issued for the Environmental Assessment in 2008, it was determined that there is a need to improve aviation safety by increasing the Runway Safety Area (RSA) of Runway 3-21 to meet current FAA requirements. The approved Runway 3-21 RSA Improvement Project involves the realigning and replacing of the existing runway via an eight-degree clockwise rotation and shifting it approximately 1,000 feet to the northeast. The
new runway project is currently in the third and final phase at a cost of approximately $33,000,000 funded 90% by the FAA, 5% by New York State and 5% through local funds. Anticipated runway completion is December, 2018. Once the project is complete, Orange County Airport is expected to be at capacity with approximately 200 based aircraft and a healthy increase in commercial activity.

3. Warwick Airport
Warwick Airport is a small airport serving general private aviation, providing rentals, instruction, and charter services. Only one of its runways is paved. Existing access to Warwick Airport is from County Route 13 (CR13 – King’s Highway). Airport plans include more parking areas, fueling facilities for aircraft, an area for helicopters, and a longer runway to allow utilization by more types of aircraft. Based on the projected levels of aircraft activity in its master plan, the Warwick Airport will probably not generate more than 100,000 annual vehicle trips on the local road system.

4. Randall Airport
Randall Airport is a small, privately owned airport in the Town of Wallkill and features one runway. Providing a soaring school as well as tie-down and hangar facilities, the airport is on Airport Road about two miles southeast of Middletown, between I-84 and Schutt Road. The Federal Aviation Administration (FAA) classes it as a reliever airport (meaning that it provides additional capacity for commercial airports in the area). For the twelve-month period ending May 24, 2018, there were 11 single-engine aircraft based on the field, 17,000 general aviation local operations, and 5,500 general aviation itinerant operations.
Fig. 15. Planes in formation at the New York Air Show, held every year at Stewart International Airport.

Fig. 16. The runway at New York Stewart International Airport.
OBJECTIVES & RECOMMENDATIONS

Intermodal Connections

OBJECTIVE 1: Work with appropriate agencies to expand the operation and use of Newburgh-Beacon Ferry.

Recommendations:
- Improve access to New York Stewart International Airport and other key Orange County destinations (i.e. privatization or working with local municipalities to coordinate additional service for specific local events.)
- Look at options to expand the Ferry's hours of operation to include off-peak and weekend hours.
- Look to increase ferry access on the Newburgh side.
- Work with local stakeholders to develop and support a campaign to increase ridership.

OBJECTIVE 2: Support improvements to Port-Jervis Line and West-of-the-Hudson railway service to make it a viable option for commuters and visitors traveling to and from Orange County.

Recommendations:
- Continue to work closely with Metro-North Railroad as the improvements to the Port Jervis Line are more fully developed and completed.
- Continue to look at the accessibility of passenger rail in the County.
- Further explore the possibility of expanding the Port Jervis Line or transit operations to other regional connectors, particularly Stewart International Airport.
- The County should advocate and support MTA/Metro-North funding proposals and capital planning that continue to prioritize service improvements, particularly to the PJL.

OBJECTIVE 3: Increase access and assist in the development, expansion, and convenience of park and rides in Orange County.

Recommendation:
- Complete a park and ride improvement plan updating the inventory and assessment of existing park and rides in the county, conducting an analysis of current and future needs for the system, and the development of physical, management, and fiscal plans to achieve the recommendations.

OBJECTIVE 4: Support air transportation and help grow the economy by understanding the interconnected network associated with freight and commercial expansions.

Recommendations:
- Support continued investment into the Orange County airport infrastructure including hangars, precision approach airport runways, and major highway interchanges – all vital in supporting the anticipated increased demand.
- Provide ongoing local airport services that support community and business needs.
- Coordinate transportation planning activities related to Stewart International Airport with appropriate agencies (OCTC, NYSDOT, the Port Authority, Metro-North, local governments) and others.
- Complete a countywide assessment of interconnections for freight, including the condition and capacity of the highway network, the rail network and the facilities at Stewart Airport, and incorporate into all current and future transportation, land use and transit studies.
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Train and bus service between Orange County and New York City can be difficult and not conducive to a typical 9-5 work schedule. The Port Jervis train line operated by Metro-North is the only passenger rail line remaining in Orange County, and it requires a transfer in Secaucus to NJ Transit to Penn Station, or alternatively a ferry or PATH to Lower Manhattan from Hoboken. The Coach USA bus line serves a number of destinations in Orange County, leaving from the Port Authority Bus Terminal more than 75 times a day Monday through Friday. There is also Coach USA service to Westchester County via OWL Lines. The estimated travel time between Port Jervis and Penn Station is 138 minutes on an AM peak hour express train, and the estimated travel time between the Port Authority and Port Jervis on a PM peak hour express bus at 95 minutes. Many commuters prefer to drive given
this estimated rail travel time, limited parking at park & rides lots, inconvenient departure and arrival times, or the ultimate destination of the commuter.

In many instances, workers commuting within Orange County, or to points north or west of the County, do not have a reliable public transportation option and therefore must drive. This issue is compounded by the need for multiple vehicles in a household with more than one worker, or households with the need to transport children. This can cause a distinct disadvantage to lower-income households in finding and keeping employment, due to the costs of vehicle ownership, their lack of access to transit services and their distance from employment opportunities.

Map 2. Residents of other counties who commute into Orange County for work.

Map 3. Orange County residents who commute out of the county for work.

OBJECTIVE & RECOMMENDATIONS

Commutation

Objective 1: Create and support innovations that allow for the safe, convenient and efficient movement of people throughout the transportation network.

Recommendations:

• Develop an online or application-based forum to arrange free ridesharing or carpools; promote this forum to large employers and employment hubs, County Social Services offices, schools, municipal buildings and courts, and other locations where people gather.
• Work with municipalities to coordinate and consolidate services such as Dial-A-Bus; design intermunicipal transit routes serving employment hubs and medical facilities in such a way as to reduce cost burdens on individual municipalities.
• Expand and improve non-motorized facilities such as multi-use trails for commuting purposes, including installation of safety features and amenities such as lighting, water stations and restrooms.
• Expand and improve the network, safety, and year-round maintenance of non-motorized facilities, including trails and bike lanes, to include amenities such as bike racks to allow pedestrian and bicycle commuters easy and safe access to employment centers.
III. IMPACTS OF TRANSPORTATION

A. LEVEL OF SERVICE

Driving within the County comes with its own difficulties. Extended road networks require significant maintenance, which is costly and can be burdensome, particularly to smaller or less well-funded municipalities. NYSDOT and the OC Department of Public Works use the Level of Service (LOS) Standards set forth in the Highway Capacity Manual and the American Association of State Highway and Transportation Officials Geometric Design of Highways and Streets, which uses a grading system of A through F. Grades A (free flow of traffic), B (reasonably free flow, with higher volume and slightly restricted maneuverability), and C (stable flow, at or near free flow, which restricts maneuverability and requires more awareness, as the road network is operating at near capacity) are the grades that...
allow the road network to operate most efficiently
while still allowing reasonable travel through
the County. Grades D through F demonstrate a
restricted traffic flow and significant delays.

**B. CONGESTION MANAGEMENT**

Congested roadways affect every day travel
patterns and behavior. Congested roadways
can lead to longer, less predictable commutes,
but can also cause issues with freight, transit,
and non-motorized transportation. Freight
congestion can lead to missing delivery windows
and loss of revenue for example. Transit
congestion can lead to delayed schedules and
poor performance on routes, possibly leading
to mistrust in local transit operators. Non-
motorized congestion is not a high concern in
Orange County, but as non-motorized options
such as multi-use paths, bicycle and pedestrian
networks are developed, planning for possible
use and congestion should be considered.

Congestion usually relates to an excess of
vehicles on a roadway segment at a particular
time, resulting in speeds that are lower than
the free flow speed. Historically, congestion has
been thought of in two categories: recurring
and non-recurring. Recurring congestion occurs
regularly at the same place and generally at the
same time, and typically reflects an imbalance
between roadway capacity and existing demand.
Some refer to this as volume-based congestion.
Non-recurring congestion occurs when there are
disruptions to the flow of traffic due to a crash,
road construction, poor weather, or traffic from a
special event (such as a concert event or holiday
shopping). This is sometimes referred to as
incident-based congestion. Incidents are difficult
to predict, making non-recurring congestion
challenging to manage.

Two major corridors through the County, I-87
between Rockland County and the Woodbury
Toll and Route 17 (future I-86) between the
Harriman Toll and Route 211, exhibit repeated
unacceptable weekend travel times during the
summer months attributable to people traveling
to Orange County, the Catskills and points
beyond. Corridors with numerous traffic signals
and surrounded with dense commercial and
residential development, such as those through
cities and villages, tended to experience higher
travel times and greater traffic congestion than
other less densely populated places.

The Mid-Hudson Valley TMA hired the traffic engineering firm of Eng Wong Taub to conduct a travel time
survey of major vehicle travel corridors in OC to determine the extent and severity of traffic congestion for the
morning (AM), midday (MD), evening (PM) and Saturday (Sat) MD timeframes. (Find the study here: https://
www.orangecountygov.com/997/Travel-Time-Survey-Project). The Travel Time Survey was completed
in 2011 and the results were integrated into the Congestion Management Process (CMP). The goal of the CMP is
to develop viable strategies to identify and mitigate transportation congestion and implement the results in OCTC’s
planning and programming of transportation projects.

The Mid-Hudson Valley TMA is currently undergoing an update of the CMP and exploring the use of probe-data (collected
from commercial vehicles, connected cars, and mobile apps) to better understand congestion on our roadways. Using
this information, the OC Planning Department will be updating its travel time data and congested routes to coincide
with the population and housing information provided through the US 2020 Census of Housing and Population. In so
doing, a correlation between growth in traffic congestion and growth in population and housing can be determined.
C. AIR QUALITY

Growth in Orange County presents opportunities for economic development, but it also presents challenges toward protecting the natural environment including water, air, and the preservation of open space and natural resources. Poor air quality can lead to severe health impacts for at-risk populations, including the young, elderly, and individuals with breathing or heart related issues, and lower quality of life in a community. Industry and transportation are both leading causes of Green House Gases (GHG) and have increased 4 percent in the last 20 years nationwide. Federal and state policies to maintain air quality have helped limit the growth of harmful air pollutants, and technological advancements have increased, promoting sustainable energy and cleaner vehicles.

Providing choices for multi-modal transportation, increasing connections to non-motorized networks, and encouraging smart growth practices are just a few steps Orange County can take to promote a healthier community and protect air quality. As part of the U.S. Environmental Protection Agency (EPA) designated “Newburgh-Poughkeepsie Moderate Ozone Non-Attainment Area” for 2008, Orange County must consider the carrying capacity of Single Occupancy Vehicles (SOVs) if federal funds are programmed to a transportation project. Projects must also consider travel demand reduction and operational management strategies for corridors where an increase in SOV capacity is proposed. Orange County is also in a Maintenance Area for small Particulate Matter (PM2.5) for the 1997 National Ambient Air Quality Standards (NAAQS). Therefore, projects using federal programmed dollars must meet state and local air quality thresholds set by the EPA to ensure particulate matter does not exceed the numbers generated for the maintenance plan.

As of 2015, transportation accounted for 34% of

**OBJECTIVES & RECOMMENDATIONS**

**Impacts of Transportation**

**Objective 1:** Maintain a good state of repair on roadways, bridges, culverts, sidewalks, and all other County-owned facilities.

**Recommendations:**

- Evaluate the levels of service within the existing road network.
- Work strategically with OC Department of Public Works, municipalities, and other agencies to improve levels of service in known problem areas.

**Objective 2:** Mitigate congestion and program into planning process at all project levels.

**Recommendation:**

- Continue to study congestion management at a regional and local level.

**Objective 3:** Further improve air quality by encouraging increased Electronic Vehicle (EV) use through careful planning and support of infrastructure improvements.

**Recommendation:**

- Orange County, in coordination with OCTC, will produce an EV charging station plan and guidelines.
Orange County is striving to be at the forefront of integrating cleaner transportation alternatives into our existing transportation infrastructure. Reducing the impact of transportation on our region’s air quality is possible by updating the bus fleets to clean diesel and diesel-electric hybrid buses through Transit Orange and supporting Electric Vehicle initiatives. Electric Vehicles (EVs) produce fewer emissions than conventional gasoline vehicles that contribute to harmful air pollution. Direct emissions from gasoline-powered vehicles include pollutants harmful to human health, such as ground level Ozone and GHGs, primarily carbon dioxide. Alternatively, EVs produce zero direct emissions, which helps improve air quality, specifically in urban areas. (U.S. Energy Department).

Suitability Study of Potential EV Charging Stations
Orange County, New York

Map 5. Suitability Study of Potential EV Charging Stations
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IV. TRAVELING WITHIN THE COUNTY

Using the Orange County Partnership’s Large Employment Center Database, self-reported businesses of greater than 25 employees were mapped to analyze employment clusters throughout the County to identify employment-based activity centers. The employment activity centers include both single job sites, known as “major employment centers” and multiple job sites in a close proximity, known as “clustered employment centers”. Major employment centers in Orange County include healthcare centers, such as Bon Secours in Port Jervis, the Orange Regional Medical Center and Crystal Run HealthCare near the intersection of I-84 and Route 17 in Wallkill, and the Horizon Medical Suite in Goshen at the junction of State Route 207 and Route 17. Major employment centers also include educational institutions such as Orange County Community College in Middletown and Newburgh, and West Point in the Town of Highlands. West Point is the single largest employment center in Orange County.

These employment centers are also destinations for people other than their employees. Health care centers see patients, educational institutions teach students, and retail centers serve the needs of residents for goods and entertainment services. While traffic flow in the area of these employment centers must accommodate the needs of the employees, the needs of the consumers of these goods and services must also be taken into account.

A. TOURISM

The tourism industry is a key sector of the Orange County economy, with nearly 8% of the
workforce employed in the Arts, Entertainment, Recreation, Accommodation and Food Services categories. Tourism is the fourth-largest sector by number of employees in Orange County, with an annual payroll of $220.6 million, according to the 2015 County Business Patterns. The tourism sector is a vital component of the County economy. As we look to accomplish our economic growth goals through expanded and diversified tourism, maintaining a safe and reliable transportation network is necessary for both visitors and residents.

One of the largest hurdles to attracting visitors is the ease of traveling to different attractions. The County offers historical, agricultural and recreational opportunities as well as stunning scenic views that are largely located in rural areas. While the preservation of open space is a common draw for visitors, most of these unique attractions can only be accessed through personal vehicles. As Orange County continues to develop and promote tourism opportunities throughout the County, transportation to these attractions should be considered not only by roadway, but also by bus, railway, multi-use trails, airways, and shared-ride services.

i. Key Destinations
Woodbury Common Premium Outlets (“the Common”) is a premier outlet center that generates approximately 13 million visitors per year. Congestion management is a major concern for residents, with the Common located on the minor arterial, Route 32, with an Average Annual Daily Traffic (AADT) count of approximately 19,500 vehicles. Route 17, Exit 131, which exits onto Route 32, is being upgraded to address traffic concerns. While most visitors access Woodbury Common by single-occupancy vehicle, buses are also a key transportation element with frequent daily bus service to the Common from New York City’s Port Authority Bus Terminal via Gray Line NY. A train stop on the Metro-North Port Jervis line has also been proposed at the Common.

West Point is an active service academy as well as a Revolutionary War historic site. West Point is the single largest employer in Orange County with over 3,000 employees. West Point sees a very low AADT at approximately 3,700 vehicles per day. West Point is a closed campus and many employees commute on foot making West Point one of the highest pedestrian traveled places in Orange County. Approximately 125,000 people visit the West Point History Museum each year by car or bus, and thousands attend sporting events and concerts throughout the year, making West Point a main tourist attraction within the County. Coach USA runs buses daily from the Port Authority to the West Point Visitor’s Center.

Storm King Art Center, located in the hamlet of Mountainville near the Salisbury Mills-Cornwall train station, is a renowned outdoor sculpture park. This cultural center showcases over 100 unique sculptures across 500 acres of fields, hills, and woodlands with a panoramic view of Schunnemunk Mountain. Storm King Art Center had approximately 206,000 visitors in 2017 during their operating season of April through
November, an increase of 42% over their 145,000 visitors in 2016. The majority of visitors travel by vehicle, with nearly 5,000 AADT per year. Coach USA offers trips to Storm King Art Center from the Port Authority, stopping at Woodbury Common Premium Outlets.

ii. Diversifying Tourism

While the majority of yearly visitors come to key destinations, Orange County offers many different tourism opportunities that can be categorized in groups:

- **Agritourism** includes the wineries, breweries, distilleries, and u-pick orchards and farms located throughout the county, although packages such as group wine tours are often assembled by regions.
- **Events** are occasions that attract large numbers of visitors at one time, including Warwick’s Applefest, Pine Bush’s UFO Fair and the Renaissance Faire located in Tuxedo.
- **Recreational tourism** includes outdoor recreational opportunities such as ski resorts and hiking trails. The County is home to various regional hiking trails such as the Appalachian Trail, Highlands Trail, and the Long Path that span multiple counties and/or states, as well as local
iii. Route 17: Gateway to Development

Route 17 serves as the primary east-west highway corridor across the southern part of the State, from the NYS Thruway interchange in Harriman west to Interstate 90 near Erie, Pennsylvania. The section within Orange County and stretching to Binghamton is known by many as the “Quickway.” Currently, this section of Route 17 is a limited access facility functioning in many ways like an interstate highway. There are safety issues, however, primarily concerning adequate access and egress ramp lengths, radii and weaving area distances. There were NYSDOT plans for a series of projects to convert the entire 381-mile length of Route 17 to interstate standards (Interstate 86.) However, with a lack of economic development along the parts of the corridor signed as I-86, and diminishing state funding, the project was postponed indefinitely, and the funding transferred to other projects. The projects currently underway were in development prior to this decision being made.

Exit 125

As part of the plans to convert Route 17 to I-86, the eastbound ramps for the Exit 125 interchange were to be improved to interstate design standards, while the westbound ramps were to be closed. Exit 125 is located in the Town of Goshen not far from NYS Routes 207 and Route 17A. Historically, Exit 125 supplied important access and egress to Arden Hill Hospital for emergency response services before Orange Regional Medical Center was constructed and Arden Hill was subsequently converted to a vocational school. More recently, the Legoland NY theme park has been proposed in the vicinity and has caused the need to reconstruct this interchange with a new bridge and ramps ‒ mile east of where it currently exists to accommodate the traffic generated. Legoland and the reconstructed interchange are anticipated to open in 2020.

Exit 131

The remaining program for conversion of Route 17 in Orange County includes the reconstruction of Exit 131, which is located at the intersection of New York Route 17 and New York State Route 32. It is adjacent to the New York State Thruway System and provides the primary means of access and egress to area shopping malls, notably Woodbury Common Premium Outlets, Harriman Commons, and Woodbury Centre. In addition to bringing this part of Route 17 up to Interstate standards, the purpose of the Exit 131 reconstruction project is to improve traffic conditions at the interchange and along NYS Route 32. NYSDOT Region 8 has completed the design process, environmental impact analysis and has received the necessary approvals from all involved agencies. Construction is well underway with completion anticipated in the year 2019. The project will cost approximately $150 million dollars. The selected design for the project is an innovative Double Crossover Diamond Interchange (DCD) that promises to speed construction, save money and increase safety.
iv. Future of Route 17

In 2013, NYSDOT completed a study of the Route 17 corridor through Orange County which recommended a general use, third lane with improved interchanges to mitigate congestion and improve safety from the New York State Thruway, west to Middletown and improved Route 17 interchanges in Orange and Sullivan counties. Since then, there have been numerous regionally significant tourism attractions proposed or developed along this corridor. Projects include the Legoland theme park, as well the Resorts World Catskills Casino and Kartrite Hotel & Indoor Waterpark in Sullivan County. All three projects hope to draw on the New York City metro area market and the opportunities provided by internationally significant airports. The projected volume increase may lead to adverse congestion and safety issues, and should be studied further to ensure both visitors and residents frequent the economically significant attractions. Currently, NYSDOT is undertaking a Route 17 Transportation Scoping/PEL Study to assess the engineering feasibility and environmental impact of the proposed corridor changes. The Route 17 Transportation Scoping/PEL Study will use a Scoping/PEL process to develop, evaluate and recommend transportation alternatives to address identified needs. The study will be completed in accordance with the FHWA Planning and Environmental Linkage (PEL) process. The study is anticipated to start in 2019 and be completed in 18 to 24 months.

B. TRANSIT

Orange County sponsors 15 individual transit operators providing service in four general categories: Commuter Bus, Local Bus (Fixed Route), Dial-A-Bus, and Paratransit services.

Orange County does not have a central countywide transit operator; however, through the work of the Orange County Planning Department (as host agency to the MPO), the services of the individual operators are coordinated. “Transit Orange” is now used to identify the individual and coordinated transit services in and around Orange County.

The provision of bus transit is crucial to managing a balanced and equitable transportation system for the general population, while reducing congestion along the County’s Roads, and creating fewer accidents, fewer emissions and other environmental impacts. The County seeks to provide a sustainable transportation system...
that will minimize negative impacts, while providing a good level of service. In addition, public transportation provides significant improved mobility for those considered to be transit dependent, including individuals who are too young to drive, senior citizens, people with disabilities and people with low incomes. Broadening transit alternatives can also result in a healthier community and greater access to job opportunities for those populations traditionally under-served.

Commuter bus service in Orange, which leaves from the many park & ride lots throughout the county, typically provides service between Orange County and New York City. Coach USA/ShortLine, the intercity carrier, provides significant local service throughout the county, but not to all communities, as well as other regional service. These commuter and regional transit services provide the majority of trips for Orange County with approximately two million passengers annually.

There is local fixed-route bus service provided in and around the City of Middletown, City of Newburgh, and Village of Kiryas Joel. Along with the local fixed-route services, the required Complementary Paratransit Service is provided within ¾ of a mile of those bus routes. The local fixed-route buses provided just over 300,000 trips in 2017, with the Complementary Paratransit service yielding nearly 27,000 trips in 2017.

There are also eight municipally operated demand-responsive bus services, known as Dial-A-Buses, around Orange County. These reservations-based transit services delivered nearly 115,000 trips in 2017. The Dial-A-Bus curb-to-curb services are open-to-the-public and are most critical for the disabled and senior populations. This transit dependent population is only expected to increase with aging population demographics. In addition, while overall ridership figures in the County have been relatively stable during the last several years, they can, historically, increase or decrease from other factors such as the economy and gas prices.

In Orange County, there are two formal Park & Ride lot systems which are owned, maintained and promoted as locations to park cars in order to make connections to transit services. The system is owned and maintained by the cooperative efforts of one or more public and private entities, including: New York State, Orange County, Coach USA/ShortLine, and local municipalities. The principal connecting transit services at these Park & Ride lots are for commuter, regional, and local bus services. There are other shared-use facilities in this system, ranging in size from over 500 parking spaces with shelters and other amenities to small parking lots with no amenities.
C. FREIGHT

Due to its location at the crossing of Interstates 84, 87, and Route 17 (future I-86), together with the rivers, airports, and rail lines, Orange County is an important center and conduit for freight movements. Efficient movement of goods in and through Orange County is important to both the regional economy and to New York State and beyond. Over-the-road freight movement is also a significant factor in regard to traffic, congestion, safety, security, road and facility design, and air quality.

The majority of freight traffic in Orange County is shipped by trucks. While some of that freight traffic is simply passing through along the interstate highways, there are 48 local freight movers and 36 long distance freight companies located within the County, and many trips that originate or terminate in the County at a distribution center. Approximately 55 trains on any given day run on Orange County’s existing freight lines, and while those lines are privately owned and operated, New York State is contributing to improved rail clearances on the existing system. This will allow intermodal and double-stack services, which will eventually expand market share for rail freight transport. Air freight is limited in the County at this time, but the state strategic plan for the downstate New York airports calls for expansion of air cargo operations at New York Stewart International Airport, potentially including an air cargo drop-off point at Stewart for trucks carrying cargo bound for JFK and Newark airports. Marine freight is also limited at this time, although it is important to have intermodal connections for freight loading, including shipment by barge.

The Port Authority, NYSDOT, and New Jersey DOT completed a Comprehensive Goods Movement Action Program (G-MAP) for the New York-New Jersey Metropolitan Region in 2014. These three agencies, through G-MAP, seek to support and enhance the New York-New Jersey metropolitan region’s position as a global center through strategic goods movement initiatives.

D. NON-MOTORIZED TRANSPORTATION

Once commonly only associated with recreation, non-motorized transportation is becoming an integral part of everyday life. This is partially due to the economic burden of transportation on individual and family budgets, but also burgeoning trends supporting healthy environments, economies, and people. Millennials cite walkability as a key factor in determining where to live and what constitutes a desirable community. Orange County offers a wide array of non-motorized transportation networks, including bicycle and pedestrian infrastructure, local and regional hiking trails, equestrian trails, and blueways. Maintaining non-motorized transportation networks, as well as identifying gaps and connecting existing networks, are integral to Orange County’s transportation system and key drivers for developing quality communities within the County.
E. SAFETY AND ACCESSIBILITY

Safety is a consideration throughout the planning, programming and operating of all transportation in Orange County. A growing number of people are finding alternative ways to get around other than driving or using transit, either by necessity or by choice. In order to proactively address the needs of all users and the safety issues and concerns that arise from growth and increased use of the transportation network, the Orange County Legislature adopted a Countywide Complete Streets Policy and ADA Transition Plan in July of 2017. By planning, designing, operating, and maintaining complete streets, Orange County can provide convenient and comfortable access to travel for all users regardless of their transportation mode.

F. RESILIENCY

Extreme weather events are a growing threat in Orange County with the potential to wipe out critical transportation infrastructure. These events can wreak havoc on the local and regional economy by preventing the circulation of people and goods. The shifting climate will contribute to an increase in these events - including elevated temperatures, droughts, extreme storm events, high winds, and storm surges associated with sea level rise – which must be considered in the future decision making and planning practices of OC Planning. Based on projected climate change data from the NYS DEC, FEMA and the Orange County Hazard Mitigation Plan, OC Planning has identified areas across the County that are particularly susceptible to the negative externalities associated with the above events. The areas and issues identified will impact the planning policies and coordinated efforts of the Department moving forward in an effort to mitigate the adverse impacts from projected climatic shifts while ensuring a safe, reliable and emergency responsive transportation network for future generations.
V. MOVING FORWARD IN ORANGE COUNTY

Orange County is a vital point of connection for transportation in the New York City Metropolitan Area, the Hudson Valley, New York State and the Eastern Seaboard. Our transportation network—the highway, railway, air and river and non-motorized connections—must be maintained and expanded in logical ways to allow people and goods to move efficiently and safely, our economy to grow, and our quality of life to be maintained.

Identifying funding for both small and large scale transportation improvement projects is often one of the largest barriers to communities seeking to maintain, improve or adapt roadway infrastructure. There are several options to explore when looking for transportation dollars, including Federal, State, and local funding, as well as grant funding and public/private partnerships. For a more detailed description of programmed funding, please see the OCTC’s Long Range Transportation Plan (LRTP) (www.orangecountygov.com/485/Long-Range-Transportation-Plan) or contact the OCTC staff for more information.

A. FUNDING TRANSPORTATION PROJECTS

i. Federal Funding

Federal funding sources are broken into different programs and administered by the appropriate agencies. The Federal Highway Administration (FHWA) distributes funds related to highways, bridges, the interstate system, and related facilities and programs. The Federal Transit Administration (FTA) directly distributes funds...
related to all forms of passenger transit through designated recipients. The use of these funds generally requires a local match and requires the adherence to federal rules on how the funds can be used. Orange County receives federal dollars for the implementation of projects through the OCTC’s Transportation Improvement Program (TIP). This five year capital program is updated every two years and the local MPO and State must show fiscal constraint for each federal fiscal year on the TIP.

ii. State Funding
Within the State there are a number of State Dedicated Funding (SDF) programs and fund sources which support transportation system operations, maintenance, and capital investment. Below are a few of the SDF funds utilized by NYSDOT and local municipalities.

- Highway State Dedicated Fund consists of 100% State funds for 100% State funded highway and bridge projects on the state highway system and for matching federal aid for federally aided projects on the state highway system.
- Consolidated Highway Improvement Program (CHIPS) provides formula based funds to municipalities to assist in financing construction, reconstruction, or improvement of local highways, bridges, highway-railroad crossings, and/or other local facilities.

iii. County and Local Funding
Local funding for the transportation system includes County, Village, City and Town revenues from various sources, including property taxation, excise taxes, and bonds. Local communities should become familiar with the transportation funding process at the federal, state, and local level and critically evaluate their projects and then decide what the most feasible funding sources may be. Sometimes this means foregoing federal dollars for local spending to shorten timelines and keep costs low. The most common local transportation funding options include:

- **Bond**—a local government can issue a bond, which would then be purchased by investors as an agreement to loan the government their money for a defined period of time at a variable or fixed interest rate.
- **General Fund through taxes**—tax money collected by a local government goes into a General Fund and is allocated through the budget process to be spent on the needs of the people served by that government, including road maintenance and repair.
- **Fees & Fines**—fees can be collected by local governments from developers, residents on private roads, or other users like motorists, and are typically allocated toward maintenance and repairs. Fines are collected by the court system and allocated toward roadwork.

iv. Grant Funding
Private grants and not-for-profit foundations provide money for a wide range of projects. These funding sources often have specific requirements for projects that they are willing to fund, and it may be difficult to design projects
to meet those requirements. Grant funding is often competitive and can be difficult to secure. Projects that already have a vision and can show commitment from municipal leaders, community members, and other partners often have an advantage in securing competitive funding. A municipal or County Comprehensive Plan, economic development plan, Long Range Transportation Plan, or other such planning document that identifies capital projects that require funding to complete can be very helpful in this process; it often indicates that the local government has conducted studies and evaluated project alternatives to determine the best use of limited resources. Although this process requires investment of time and money on the part of the local community beforehand, it often pays off in the long run.

v. Public/Private Partnerships
The basic approach of a Public/Private Partnership is for a public agency to enter into a working agreement with a private business to help fund, build, and/or operate a public facility. Generally, the three primary incentives that a public agency can offer are free land to place a facility (usually a park or other piece of public land), certain tax advantages, and access to the facility. As transportation funding dollars have remained fairly flat, this method of funding public transportation projects may become more commonplace.

B. IMPLEMENTATION

The Transportation Chapter of the Orange County Comprehensive Plan is a policy document, not a plan for capital improvements or a work schedule for the OC Department of Public Works. The objectives and recommendations at the end of each subsection of the Transportation Plan are a reasonable way to ensure that the County has a safe, efficient, and easy-to-use transportation network for many years to come. These recommendations are designed so that the County, working in partnership with other transportation agencies, other counties, and our own municipalities, can affect policy changes in areas not directly under our jurisdiction, so that the interstate highways, state roads, and local roads that are all part of the road network, as well as the railroad tracks and the airports, can all work together cohesively with County-owned facilities.

Fig. 20. Traffic around Woodbury Common. The Long Range Transportation Plan addresses problems such as air quality and congestion management.
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Public transit in Orange County encompasses regional and local services through a variety of modes: commuter rail; intercity and local bus services; van pools; ADA Paratransit, Dial-A-Bus services and other demand-responsive services; and ferries. Commuter rail and bus operations serve the County and connect to parts of northern New Jersey, Rockland County, Westchester County, and New York City. Rail commuters in Orange County are served by Metro-North’s Port Jervis and Hudson Lines. The Port Jervis Line, which is operated by NJ TRANSIT under contract with Metro-North, operates from Port Jervis in Orange County to Secaucus Junction and Hoboken in New Jersey, where connections can be made to PATH and ferry services to New York City and to other destinations. Metro-North’s Hudson Line can be accessed from Orange County at the Beacon Station by crossing the Hudson River via ferry, bus, car, or even by foot over the Newburgh-Beacon Bridge. The Hudson Line provides direct service to Poughkeepsie and Grand Central Terminal with connection to other Metro-North lines in eastern Westchester, Putnam, and Dutchess Counties in New York and Fairfield and New Haven Counties in Connecticut.

Within Orange County, a range of public and private sector providers operate these multiple modes of public transportation. The swath of services available in the County covers the traditional range typically found in areas that have disparate transportation needs. These needs include both travel to work and other aspects of daily life within the County, and a strong connectivity to external metropolitan areas where a significant proportion of resident’s work and travel for health care, recreation, and entertainment.
Orange County is the designated recipient for both Federal and State transit funds. The County Planning Department administers approximately $10-12 million dollars in Federal and State transit grants annually. These grants include funds for operations, as well as capital funds for the purchase of buses for the bus operators. In addition to managing these grants, the county oversees operator compliance with the Federal and State laws, rules, and guidelines connected to these funds.

Orange County does not have a central countywide transit operator; however, through the work of the Orange County Planning Department, the services of the individual operators are coordinated. The County sponsors 15 individual transit operators providing service in four general categories: Commuter Bus, Local Bus (Fixed Route), Dial-A-Bus, and Paratransit services. The County currently owns 93 buses that are leased to the transit operators. The makeup of the 93 buses is as follows: 36 Dial-A-Buses, 9 Paratransit buses, 29 commuter buses and 19 local transit buses. The 15 different transit operators are made up of nine municipalities and six private bus operators.

A. RANGE OF SERVICES
i. Commuter and Local Bus Service
Fixed route bus service in Orange County is of three main types: a) regional inter-county service including commuter service, b) intra-county transportation, and c) local services in major population centers. The local routes are largely limited to service within commercial and retail areas in the cities of Newburgh and Middletown and the Villages of Monroe and Kiryas Joel.

Coach USA/Shortline (Hudson Transit) is the largest provider of bus service in and through Orange County. County-wide service is provided for intercity travelers and commuters. Most of the service is provided along the I-84, Route 17, and Route 32/I-87/Route 9W corridors. Coach USA also serves a number of major trip generators including the Galleria at Crystal Run (Middletown), Orange Plaza (Middletown), and Woodbury Common Premium Outlet Center. Coach USA provides major commuter service to New York City during the morning and evening peak hours. Coach USA also provides service to the East Side of Manhattan via the George Washington Bridge and operates the Orange Westchester Link (OWL) which provides service to the White Plains area. Both services are provided via five daily weekday round trips.

Monroe Bus Corporation provides commuter and off-peak service to Manhattan and Brooklyn from and to the Village of Kiryas Joel. Monsey Trails connects Kiryas Joel and Monsey in Rockland County with five daily round trips. NJ Transit provides commuter and off-peak bus service to New York City and northern New Jersey from Warwick and Greenwood Lake. This bus service is provided along Route 210 and Route 17A and serves the Greenwood Lake and Warwick park & rides.
ii. Other Regional Transit Service

Adirondack Trailways provides bus service in the I-87 NYS Thruway corridor between New York City, Kingston, and Albany, as well as other destinations around New York State. Ulster County Area Transit provides five daily weekday round trips between Newburgh and New Paltz in Ulster County along the NYS Route 32 corridor. This service also has stops on Broadway in Newburgh, the Shortline Bus Terminal on Route 17K and the Newburgh Mall.

Under contract with NYSDOT, Newburgh Beacon Bus Corporation operates a commuter-focused route connecting the Newburgh Transportation Center on Route 17K with the Metro-North Railroad Beacon Station. This schedule also includes limited connections to Stewart Airport. Travelers can make a connection to and from Metro North’s Beacon Station across the Hudson River using the Newburgh Beacon bus shuttle. In addition, Coach USA operates service between the airport and the Port Authority Bus Terminal which links each incoming and outgoing flight. PANYNJ continues to market the airport to the airline industry, noting that these “rubber tire” connections for service to and from Manhattan can be expanded relatively quickly in step with added air service.
The Mid and Western County Transportation and Land Use Study is a cooperative planning effort being undertaken by OCTC. The project will begin with a comprehensive build-out analysis for the western portion of the county and, in particular, the fast-developing areas of Wallkill, Middletown and Port Jervis. The study will examine the potential impacts on transportation, transit, and land use. The project will include a focused examination of bus services in and around Wallkill and Middletown, as well as park & rides planning efforts to determine how improvements can be made. Both historical bus routes and scheduling will be studied, as well as future needs in this area.

iii. Local Public Transit Bus Services
The Newburgh Area Transit service operates within the City as well as to the Newburgh Mall and Wal-Mart on Route 300, the Shop-Rite on Route 32, the Five Corners area of Vails Gate, and the hospital in Cornwall. The Middletown Area Transit service operates on four different bus routes in and around the City of Middletown. Study and planning for the Middletown area service needs to be undertaken, together with study of the other intra-county services, and the park & ride lot system. The Village of Kiryas Joel provides service in the Village as well as destinations in Monroe and Woodbury.

CoachUSA/Shortline (Hudson Transit) operates “the Main Line” bus service, harkening back to the former Erie Railroad line, which served the villages along Route 17 (this rail bed is now the location of the Heritage Trail). The route runs between Middletown and Woodbury Common.

iv. Paratransit
Mandated by the Americans with Disabilities Act (ADA), Paratransit services are provided in all areas of Orange County with local fixed-route bus services for people unable to use the local bus system due to their disability. This Paratransit service is provided within ¾ of a mile of existing local fixed-route bus services. Currently, three areas within Orange County qualify for Paratransit service - the Middletown, Monroe, and Newburgh areas. The County operates this service under a contract arising from a competitive bidding process.

v. Dial-A-Bus Services
Dial-A-Bus service in Orange County is a demand responsive public transit system that is open to the public and requires a reservation. Reservations are made by calling at least 24
The Mid-Hudson Valley Transportation Management Area (MHVTMA) Regional Transit Study is a three-county initiative to examine major transit and intermodal hubs, evaluate bus routes and inter-system connectivity, as well as externally to the surrounding metropolitan areas (NYC and Albany) and assess potential integration with connecting services and connections with emerging urban and employment centers across the larger transportation management area. The study will focus on transit operations in the region, gathering data on these systems, providing public outreach, and making recommendations for better coordination in the future. To follow the progress of the MHVTMA Regional Transit Study visit the public participation site: https://www.connectmidhudson.com/

In contrast to fixed route public transit systems, Dial-A-Bus does not follow a specified route, but picks up and drops off passengers based on their current and anticipated origins and destinations. Origins and destinations are usually residential and commercial pairings, but can also be commercial to commercial, or residential to residential pairings.

There are several transit dependent groups within the county that may have above average dependence on public transit due to mobility challenges, language limitations or disability. Three that have been quantified in the county, from prior County transit studies, include low income individuals, seniors and disabled individuals. Low-income individuals may not have access to a vehicle or may not have enough vehicles to meet the needs of their household. Another group are seniors who may not be able to drive, may not feel comfortable driving, or may have limited driving abilities. The disabled transit dependent group are characterized as those who cannot drive due to their disability, which can include language limitations.

The Orange County Countywide Dial-A-Bus study, conducted in 2016 by Cambridge Systematics, indicated all operators, with the exception of Monroe, reported that the largest represented age group which uses their services are individuals aged 60 and over. The Town of Newburgh, Montgomery-Crawford and Warwick reported that 35 percent, 46 percent and 62 percent of their trips, respectively, are made by passengers in this age group. The second largest users were those who self-identify as disabled.

Twenty-four percent of Orange County’s total population self-identifies as a minority (and potentially non-English speaking). The highest concentrations of minority communities live in Wallkill’s service area, with Newburgh’s minority population second highest. High concentrations of minorities live in the Port Jervis, Monroe, Goshen-Chester, and Montgomery-Crawford service areas.

Almost 13 percent of Orange County residents live below the poverty line, compared to 15.6 hours in advance of the passenger’s trip, though the service is first-come-first-serve and fills up quickly. Typically passengers make a reservation in advance of the 24 hour minimum. Dial-A-Bus is not a door-to-door group taxi service but is a curb-to-curb public transit service that gives passengers a pick-up window and drops them off based on the most efficient route, not the order of boarding.
percent of New York State residents. The highest concentrations of residents that live below the poverty line, as a share of the total population, live in Kiryas Joel and Newburgh. Significantly-high concentrations live in the Port Jervis and Wallkill service areas. The lowest concentrations of individuals that live below the poverty line, relative to the total population, live in the Montgomery-Crawford, Goshen-Chester, Warwick and Highland service areas.

Another target for Dial-A-Bus services/public transit dependency are zero car households. The majority of Orange County is not walkable and bikeable enough to represent viable transportation alternatives. The overwhelming majority of Orange County residents travel by car, car service or Dial-A-Bus/public transit.

The Cambridge study indicated Monroe has the highest concentration of zero car households, with 23 percent not having a car, which indicates a strong need for a full-bodied Dial-A-Bus system. Port Jervis also has one of the highest shares of zero-car households. Because 18 percent of Port Jervis households do not have a car, this makes them especially dependent on Dial-A-Bus service.

The other Dial-A-Bus service areas have smaller concentrations of households that do not have access to a car, with Wallkill, Goshen-Chester, Warwick, Montgomery-Crawford and Highlands having decreasing concentrations. Newburgh has the lowest share of zero-car households compared to the other Dial-A-Bus service areas, at approximately 3 percent of households.

From a national perspective, the trend indicates as baby boomers continue to age, their need/desire to stay active and their greater use of smart phones and familiarity with technology will provide greater demand for accessible public transportation in many communities. Likewise, the millennial generation is increasingly choosing not to utilize single occupant vehicles for the majority of their travel needs.

While a large share of passengers are either seniors, disabled or low-income, not all passengers fall into these three categories. While age, income, and ethnic demographics are strong indicators of who uses Dial-A-Bus services, in order to increase ridership, Dial-A-Bus services have the unique challenge of having to plan for the public's full spectrum of ages, abilities, and incomes.

The world of mobility today is rapidly evolving both from customers’ need and on the available tools, such as evolving modes and technology applications that can be used to meet the needs of current and potential riders. Dial-A-Bus services can be a flexibly operated link which moves riders from rural and suburban settings, where fixed route transit is inefficient, to specific destinations or transit hubs or transfer points. However, it would be advantageous to Orange County and its passengers to conceive of Dial-A-Bus services as one part of an overall system.
B. PERCEPTION OF TRANSIT SYSTEMS

Several years ago, a rebranding process established Transit Orange as the nomenclature to establish a consistent way to communicate to the public the various pieces of the transportation network within the County. Transit Orange logos were developed to unify the diverse transit system of separate bus operators. The logos were placed on all County-owned buses and, currently, appear in printed materials related to County transit, such as schedules, transit promotion, and on bus stop signs and shelters.

Despite the rebranding efforts, and the array of transit services offered in the County, demographics and ridership patterns reveal that portions of the population are still unfamiliar with transit services. Navigating what transportation systems and services are available can be challenging. Mobility needs differ from person to person and there are no one-size-fits-all solutions to meet all needs. Orange County transit services must maintain relevance to a changing market, simplify services for customers, enable connectivity between systems, and promote an ease of transfer between systems and programs to create consistency across the Transit Orange brand. The County is currently examining ways to further expand the Transit Orange marketing strategy to include greater standardization of hard copy and website materials among service providers, a digital repository of available services, universal trip planning, and real time information.

C. TRANSIT HUBS

In settings such as Orange County, where a variety of providers offer services, and where there are areas without the density required to support frequent fixed route service, transfers between modes (or access to services without a transfer) at conveniently located hubs can be an effective way of meeting travel needs. The 2001 Multisystems Orange County Transit Improvement Study, known as the Transit Improvement Study, indicated a key component of the hub concept for Orange County is the provision of local collector and distributor services by Dial-A-Bus operators, to enable riders to access local and inter-city buses, or other Dial-A-Bus services, for travel to other communities in the county or points beyond. To provide the greatest access to hubs from as many communities as possible, it was suggested...
Dial-A-Bus services areas should be combined into five regional systems.

The establishment of primary hubs was recommended at several locations: the existing 17K bus terminal in Newburgh, Metro North’s Middletown/Wallkill station and Monroe/Woodbury (Woodbury Common.) Secondary hubs were recommended in Goshen and Port Jervis. Overwhelming public comment also suggests re-establishing a potential transit-oriented center within the City of Newburgh in the vicinity of upper Broadway. With the development of the hubs, Dial-A-Bus services would feed into the main line bus system, completing the three legs of the County triangle (see Map 9 on page 48). The use of hubs would heighten the visibility of Orange County’s public transportation services and make services more understandable to potential users. Utilizing more “transit” looking buses versus the Coach main line buses, which are often mistaken for charter buses, for example, could be one aspect of an expanded and effective marketing strategy that would support the appearance of a uniform, countywide public transportation system.

Other mode choices at hubs might include Paratransit buses and vans, cars, bicycles and walking. Scheduled fixed route and Dial-A-Bus services to hubs would be coordinated to facilitate transfers for riders who need to make them. New transit hubs would allow transit riders to access/transfer buses at one centralized location as well as provide facilities for a bicycle station, civic area canopy to protect riders from adverse weather, and green areas where social interaction can take place.

OC Planning, as the host to the MPO, should refresh and update the recommendations of the Transit Improvement Study through two transportation studies currently underway: The Mid and Western County Transportation and Land Use Study and the MHVTMA Regional Transit Study. The studies in progress should incorporate changes that have taken place since 2001, in particular: Orange County, Coach USA/Shortline and the City of Middletown, are currently working together to design and reconstruct

Public Comments
Regarding Public Transit
Comments collected using CoUrbanize

“We need buses that go on a steady schedule between all the towns and villages in the local area.”

“I ride public transit because it’s inexpensive, environmentally friendly and I don’t have to drive.”

“I ride public transit because I need to get to work.”
““We need more reliable schedules and notifications when busses are delayed.””

“I ride public transportation so I can have a little respite during my commute.”

“I take public transportation because it affords me the ability to be more productive, sharper at work, ease frustration on the road and the ability to meet great people with the same experience.”

“I ride Coach because it’s economical and convenient.”

”Arrange public transit stops at or near trails with signs to direct users.”

“I feel blessed I have the option of taking a train or bus to commute into my job in Manhattan.”

”More mass transit. More electric cars.”

”Where mass transit does not make sense, we should have car-sharing and other services to encourage car-free living.”

”Would it be possible to explore sharing services that are provided for seniors? No busses from small communities to drop residents off at a centralized location to get to their appointments.”
Map 9. Proposed Main Line Expansion

Legend:
- Metro-North Railroad
- Local Main Line Bus Route
- Proposed Main Line Expansion
- Metro-North Station
It is a commonly accepted TOD principle that people are willing to walk about ½ mile to access transit options. Based on this principle, municipalities could positively influence the development of successful mixed-use, walkable communities around transit hubs by creating form-based code districts within a ½ mile radius of existing transit stops. Form-based codes are development regulations (not just design guidelines) that focus on controlling the physical form of the built environment in a manner that produces a well-designed place indicative of a community's area vision. Each form-based code is unique to the community, and there are many resources out there to help understand and develop TODs.

**D. TRANSIT-ORIENTED DEVELOPMENT**

Transit-Oriented Development (TOD) is a development practice that encourages the construction of a mixture of housing, office, retail and/or commercial development and amenities that are integrated into a walkable neighborhood located in close proximity to quality public transportation. This limits the need for personal vehicle trips because what is not accessible within a walking distance can be reached using the transit network. While clustering housing near employment opportunities is another way to decrease commuter traffic, TODs can be an asset for future development that caters to both residents that work locally and those that choose to live in the County and work outside of their communities.

In Orange County, there is one existing transit hub that utilizes form-based code to create a walkable community. The City of Newburgh redeveloped their zoning code and included form-based codes in their 2015 Comprehensive Plan Update to attract commercial, retail, and housing opportunities within the neighborhood surrounding the Newburgh-Beacon Ferry. Another potential TOD community in Orange County is at the Harriman station in the Village of Woodbury. The surrounding parcels of the MNR station are zoned for Transit-Oriented Development.
heavy duty highway diesel motors are much cleaner today than they were 20 years ago. As a result, the difference in emissions between a clean diesel bus and a hybrid diesel-electric bus are minimal. There is, however, a significant cost difference between the two types of buses, with hybrid diesel-electric buses being more expensive. The hybrid diesel-electric bus also has the added, noteworthy expense of replacing the battery pack at least once during its useful life. In addition to the added expenses, even the densest areas of Orange County are not dense enough to allow a hybrid bus to be as effective as it could be in other city environments. As a result, the County considered it more cost effective to purchase clean diesel buses and steer the future cost savings into expanded bus operations. These expanded bus operations would get more people on buses, and out of cars, which would be more beneficial to the environment.

E. PUBLIC TRANSIT’S ROLE IN THE ENVIRONMENT

Efficient transit service has the potential to reduce energy consumption and air pollutant emissions. Transit use can help reduce passenger miles per gallon of motor fuel used. In some instances, it can also minimize the amount of highway system capacity needed to meet travel demands. Public transportation is estimated to reduce CO$_2$ emissions by 37 million metric tons annually. Those who choose to ride public transportation reduce their carbon footprint and conserve energy by eliminating travel that would have otherwise been made in a private vehicle.

In Orange County, much of the bus fleet is clean diesel which includes 15 diesel-electric hybrid buses added to the fleet in 2013. The few remaining older buses will be replaced with clean diesel, or electric vehicles, over the next couple of years, as they reach the end of their useful life.

Due to the EPA’s diesel emission standards,
condition assessment, performance analysis and modeling, risk management, and lifecycle cost management; and a prioritized list of investments to improve the state of good repair of capital assets. The new TAMP will guide the County through the migration from its current baseline to high-performance asset management. Along the way, the TAMP will also guide decisions that relate to improving the sustainability of the County fleet, and particularly, what is achievable with available funds and cost effective for the end user.

F. EMERGING TECHNOLOGIES

In addition to an increased demand for services, the expectation of mobility options is also growing. Transit systems will need to embrace change. Transportation Network Companies (“TNCs”) (ride-sourcing agencies such as Uber and Lyft) are now allowed to operate anywhere in New York State (outside of NYC) with state oversight. Other transportation ride-share options developing include bikeshare, car share, scooters, neighborhood electric vehicles, bike parking, dynamic parking management strategies and demand-based shuttle services.

County public transit systems have a responsibility to ensure that both the taxpayers and community benefit from well designed and efficient transportation service. The introduction of TNCs in an area currently served by public transportation adds a new mode of transportation and thus, raises a number of concerns, as well as opportunities to coordinate services or to partner. Increased coordination between transit systems and TNCs can improve access to transit. Ride-sourcing both compliments and competes with public transit services, but the existence of TNCs and other shared mobility options can reduce auto use and lead to greater transit use in the longer term.

While there is currently not a lot of data on the direct impact of TNC services on transit ridership, nationally, it now represents an alternative local option to address transit system challenges such as:

- Providing the first-mile/last-mile of a trip-TNCs can provide a subsidized ride to or from one or more designated transit stops or at the end of a transit route as part of a longer transit trip.
- Replacing under-utilized fixed route with on-demand services such as TNCs.
- Transit systems could subsidize TNC rides to accommodate work shift times outside normal transit system hours.
- Joint marketing of transit and TNC services (and sometimes other modes) through mobile apps will allow multimodal trip planning.
- Supplementing Paratransit service: TNCs could partner with Paratransit operators to provide some Paratransit service, allowing the transit system to serve some trips with TNCs, provide same day trip scheduling, and reallocate resources.

As with all modes of transportation, the use of TNCs should be implemented in a manner that will mitigate adverse effects such as: inequitable impacts on
service, i.e. a reduction of service for lower income riders who cannot afford TNCs, lack of accessible TNC vehicles, reduced mobility choices for persons without smart phones or credit cards, and potential negative environmental impacts with TNCs adding to traffic congestion.

i. Connected Automated Vehicles

The deployment of Connected Automated Vehicle (CAV) technologies is not a question of if, but how and when. There are many factors surrounding the use of CAVs currently under research, and as with any new technology, questions surrounding whether it will bring about fundamental changes in the social patterns of living, working and playing are still to be determined. However, the history of CAV development reveals, at a minimum, the need to modify transportation infrastructure to support these vehicles. While specific and technical needs will change over time for digitally connected and autonomous vehicles, the notion of vehicles and infrastructure operating as a single package is undeniable. One of the key considerations for the County will be to integrate those needs into the continuing, comprehensive, and coordinated transportation planning process.

The widespread deployment of CAVs will largely depend on public knowledge and acceptance of the technology and the speed at which the public comes to expect the benefits of CAVs as a normal feature of the transportation system, in the same way they do streetlights and roadside signage currently. This may be as soon as 2020, in some applications.

The benefits and challenges of CAVs and TNCs are still unfolding. The implication of these technologies will impact: land use patterns and urban design, transportation infrastructure, transit services, i.e. a reduction of service for lower income riders who cannot afford TNCs, lack of accessible TNC vehicles, reduced mobility choices for persons without smart phones or credit cards, and potential negative environmental impacts with TNCs adding to traffic congestion.

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An Autonomous Vehicle is a “driverless” vehicle. It is capable of navigating its environment without human input.
congestion management, goods movement and freight planning and travel demand modeling. We do not yet know in what direction. There is the potential for it to increase sprawl and VMT. Potential beneficial impacts include improved access to transportation, improved efficiencies and operations, the reduction of GHG emissions and improved air quality via electrification, and cost savings in terms of shared autonomous electric vehicle fleets. In addition, safety improvements are one of the most widely discussed benefits of CAV technology.

G. SYSTEM SAFETY

Orange County works to promote the safety and security of its passengers, operating equipment and facilities. The County began including cameras on all bus purchases, beginning in 2012. The bus operator who leases the bus may install two-way radios, but more typically, operators use push-to-talk phones and/or tablets. This technology also allows for automatic vehicle location (AVL), if a separate AVL system isn’t installed by the operator.

Accidents cause property damage and human suffering and can contribute substantially to the overall costs of operation, and the public funds required to operate the system. Incidences that jeopardize the security of passengers or transit system property may promote the perceptions that transit is not safe, adversely affecting the mobility of persons who must travel within areas the public deems unsafe. As such, the County requires operators to make every attempt to reduce the incidence and severity of accidents. Additionally, the NYSDOT Public Transportation Safety Board (PTSB) requires each bus operator to have a System Safety Program Plan (SSPP) in place that has been approved by the PTSB. The SSPP is required to be updated and approved every two years.

Each Orange County bus driver is required to follow safety practices included in Article 19-A of the NYS Department of Motor Vehicles Vehicle and Traffic Law. These requirements include pre-employment and biennial medical examinations, submission of pre-employment and annual driver’s license abstracts, submission of fingerprints of school bus drivers for DCJS & FBI criminal history review, completion of annual defensive driving observations, completion of biennial road tests, and completion of biennial oral/written tests. Motor carriers must review the driving records of their 19-A drivers annually, as well as attest to compliance with the requirements. In addition to the driver requirements and regulations, the buses themselves are subject to a strict inspection by a NYSDOT Safety Inspector once every six months.

Street conditions can also impact the safety of public transit. Public transit service should not be operated in street conditions that may be hazardous, including steep grades, narrow traffic lanes, uncontrolled intersections, poor pavement conditions, or lack of adequate pedestrian facilities. Bus stops should facilitate passenger use of crosswalks and convenience in transferring between routes, provide for adequate sight considerations for vehicle operators, and allow transit vehicles to utilize the intersection to merge into traffic. When a new bus shelter and/or transit stop is being considered, the exact location and placement is considered in a collaborative process which includes the
Advocate for the Transit Hub recommendations in 2001 Orange County Transit Improvement Study, re-assess capital and service planning needs and work toward implementation.

Support expansion and improvement of local and regional multi-modal commuter options that support transit operations including passenger rail, park and ride provisions, bus shelters, and bicycle and pedestrian facilities.

County should promote fare uniformity to maintain countywide consistency.

Explore public/private partnerships to assist with identifying and addressing service gaps that exist between employer and employee, both within the County and regionally.

Objective 2: Look for opportunities for cost savings via shared services.

Recommendations:

- As the County moves toward consolidation of services, it should work with local municipalities to develop a fair distribution of the local match contribution that accompanies the use of federal transit funding.

- Public-private partnerships for the funding of public transportation should be considered as an important way to maximize county, state, and local funding contributions.

- County should take the lead on large procurements, on behalf of individual operators, for purchasing items such as scheduling software and technology improvements.

Objective 3: Improve public transit travel options for people of all ages and abilities to connect to jobs and other opportunities, including historically underrepresented populations.

Recommendations:

- Encourage higher density and mixed use residential and employment centered transit-oriented development in priority growth areas that are served by, or could be served by rail service, local and regional

- Have an overall communications and infrastructure plan that will increase ridership for all populations.

- Develop a standardized branding design for all Transit Orange services that clearly links all modes and operators of service as one, unified countywide transit service and facilitates passengers’ ease of use and access to information.

- Work with local governments and private operators to discuss partnering opportunities for first-mile/last-mile solutions, paratransit service, joint marketing, integration of fare payment, and other potential mobility improvements.
### Recommendations:

- Orange County will use the data established with the Transit Asset Management Plan (TAMP) to establish targets and guide decisions about future capital projects, including transitioning to environmentally cleaner fleets, where feasible.

- Incentivize shared, automated, and electric vehicles to reduce the environmental impacts of vehicular travel and refocus planning on the principle of mobility as a service.

- Support the future vision of communities as great places to live, work, and play by using technology as a tool to change land use, as well as how streets are built.

- Rebalance the use of the right-of-way with less space for cars and more space for people walking, cycling, using transit and recreating.

- Review and update county policy, plans and universal design guidelines to accommodate connected and automated vehicles.

- Train county departments to understand the importance of walkability and active transportation to enact thorough county change and acceptance of new policies.

- Ensure electric vehicle and connected vehicle-supportive elements and Complete Streets guidelines are captured and included in infrastructure planning.

- Ensure environmentally sustainable transit elements are incorporated as a high priority in local funding prioritization and project scoring matrices.

### Objective 4: Explore using innovation and technology, where it is cost effective for both the operators and transit users.

**Recommendations:**

- The County should pursue the role of planning and coordinating mobility options in the area, focusing on serving the customer’s full trip.

- Participate in joint mobility technology platforms (apps) and make the application of technology a high priority.

- Utilize mobile applications and other technology improvements to tie new transportation modes together with legacy modes to improve mobility for all.

- Recognize that there will be environments where alternative modes of transit service may not operate, and that there will be customers who may not have access to mobile apps or other technology.

- Ensure that all customers have equitable access to service, information and fare payment options.

### Objective 5: Prioritize environmentally sustainable transit enhancements using a sensible, balanced approach.

**Recommendations:**

- NEW Bus routes should be considered, where feasible, to connect existing and proposed employment and residential centers. The planning analysis for this should not be limited to just ridership, but also should consider the economic and environmental benefit of new routing as well.

- Increase transit service by increasing frequencies, and/or consolidate services, where there is a demonstrated need and available funding.

- Make linkages between various Dial-a-Bus operators and fixed route services via technology, schedule coordination, and interjurisdictional and interagency agreements that foster better coordination and cooperation.

### Objective 6: Continue to monitor and improve the safety of all users of the public transit system.

**Recommendations:**

- Promote safety for pedestrians, bicyclists, transit riders, automated vehicle passengers, and all street users within the multi-modal urban context.

- Continue the implementation of technical systems and services that enhance the safety and efficiency of transit fleets, such as automated vehicle location systems, intermodal trip planning functions, inter-and multi-modal fare payments systems, and real time service alerts.
Due to its location at the crossing of I-84, I-87, and Route 17 (future I-86), Orange County is an important center and conduit for freight movements. Truck freight serves local businesses and a growing number of distribution and warehousing operations, some of which are also served by rail. A substantial number of trucks are simply passing through. Orange County imports 1.3 million tons and exports 1.1 million tons as “secondary traffic,” goods that are shipped to and from distribution centers or through intermodal facilities. Efficient movement of goods in and through Orange County is important to both the regional economy and to New York State and beyond. Over-the-road freight movement is also a significant factor in regard to traffic, congestion, safety, security, road and facility design, and air quality.

Governor Andrew Cuomo’s strategic plan for the downstate New York airports calls for expansion of air cargo operations at Stewart International Airport, which would add to the concentration of multi-modal freight activities in the area. Air freight currently accounts for 11,100 tons of imports and 3,500 tons of exports annually. The Port Authority also is investigating the feasibility of creating an air-cargo drop off facility where trucks from the north or west carrying shipments bound for John F. Kennedy (JFK) or Newark Liberty (Newark) airports could avoid traveling into the congested core of the region, with their cargo transferred to a scheduled truck shuttle for the last leg of the journey to JFK and Newark. The drop-off proposal would also highlight SWF’s efficient interstate highway connections, underscoring its potential to attract more direct air freight service.
The majority of freight delivered to and shipped from the County is carried by truck. There are numerous motor carrier terminals serving for-hire carriers and specific industries located in Orange County. According to the US Census Bureau County Business Patterns report for 2015, there were 48 Local General Freight Trucking companies operating in Orange County, and 36 long distance freight companies identified.Warehouses and manufacturing companies with significant levels of freight activity were also identified by local officials. The largest of these companies are concentrated near I-84 in the Towns of Montgomery and Newburgh. The majority of shipments passing through these facilities have origins and destinations outside Orange County, via travel on the interstate system. NYSDOT Region 8 reports that there are approximately 10,000 trucks a day traveling on I-84 east near East Fishkill, in Dutchess County, and estimates that a similar number are traveling daily on I-84 within Orange County. The major freight, distribution, and warehousing operations are clustered near I-84, Exit 5, in Montgomery, near I-84 and I-87 by Stewart International Airport in the Towns of Newburgh and New Windsor, and near NY Route 17 (future I-86) in the Town of Chester.

The Cities of Middletown and Newburgh have a variety of mid-sized employment centers. The greater Newburgh-area has larger distribution and manufacturing employment centers near major transportation nodes, including Stewart Airport and the I-84/I-87 intersection. Neelytown
Road is a Freight hub that sees heavy truck traffic with easy access to I-84 and proximity to Stewart Airport. The City of Port Jervis contains mostly manufacturing employment opportunities, as opposed to the more diverse options in the other cities.

B. RAIL FREIGHT OPERATIONS

The rail freight operators in the County are CSX, Norfolk Southern, New York Susquehanna and Western (NYS&W), and Middletown & New Jersey (MNJ). CSX and Norfolk Southern are the only Class I operators within the County, operating over 100 miles of track. The largest carrier is CSX, which operates approximately 52 trains per day on the West Shore River Line along the Hudson River.

Norfolk Southern (NFS) operates approximately two and four freight trains per day from Port Jervis to Tuxedo on the same track owned by Metro-North and used for the Port Jervis Line passenger service. NFS also operates three short rail lines. One of these, the Hudson Secondary, extends twenty miles from the Town of Montgomery to the Town of Warwick with approximately two trains operating per day. Two additional short lines run from Hamptonburgh to Montgomery, the seven-mile Maybrook Industrial Track, and from Hamptonburgh to Walden, the six-mile Walden Secondary. Approximately one train operates on each of these lines per week. NFS also operates a one-mile section of track within the Town of Warwick, the Belvidere Industrial Track, with one train per week.

The operating costs of the rail system are the responsibility of the private carriers. The State currently contributes toward improving rail clearances on the existing systems that will eventually allow inter-modal and double-stack services, thereby expanding market share for the rail system. Double-stack cars are currently being used by CSX on the River Line.

C. MARINE FREIGHT

There is little marine freight activity on the Hudson River transloaded within Orange County. The Port of Newburgh is served by rail service that is currently operated by CSX. Industrial access to the Hudson River waterfront can be supplied by barge via the Hudson River, by rail or by highway via I-84 and I-87, however, trucks must use local roads to reach the highway access points. Power plants and oil terminals have capitalized on the infrastructure in Newburgh.

Present and future freight trends for Orange County are not as well understood as they should be, and anecdotal evidence indicates the same is true elsewhere in the region. Orange County will need to devote planning resources to a detailed
freight study that will allow us to understand the existing conditions and potential for growth in the freight sector. This study should evaluate the quality of the existing local, regional and national freight transportation networks, together with already-planned improvements, and determine what other improvements will need to be made.

Fig. 28. The Newburgh-Beacon Bridge allows I-84 to cross the Hudson River. It remains a vital truck freight corridor for the region.

**OBJECTIVES & RECOMMENDATIONS**

**Freight**

**Objective 1:** Identify needs of the freight system through local and regional studies.

**Recommendations:**
- Conduct inventory of all modes of freight transportation, including types and volumes of freight shipments to and from County businesses and through-freight shipments.
- Evaluate the adequacy of the existing transportation system, together with already programmed improvements, to meet multimodal freight needs in the future; assess the need for additional facilities such as intermodal terminals.

**Objective 2:** Coordinate freight movement with local and regional agencies.

**Recommendations:**
- Work with other agencies including the Port Authority of New York and New Jersey to ensure consistent cooperation with the Comprehensive Goods Movement Action Program, the Statewide Freight Plan and other regional freight efforts.
- Create a local freight plan with Orange County agencies and other concerned agencies to ensure that our specific needs are met; ensure that this plan complements and complies with the Statewide Freight Plan and any regional freight plans. Include economic benefits of proposed actions.
VIII. NON-MOTORIZED TRANSPORTATION

Non-motorized transportation has become an important element for quality communities. With the high cost of transportation and trends supporting healthy environments, economies and people, non-motorized transportation provides opportunities as part of the transportation network. As Orange County continues to develop and grow, it is necessary to maintain open space, as outlined in the Open Space Plan, and to support recreational opportunities while integrating opportunities for alternative transportation. The needs of pedestrians and bicyclists have previously been treated as secondary to vehicular travel and should now be seen as equal.

Non-motorized transportation options in Orange County include walking, biking, rolling, hiking, horseback riding, kayaking and canoeing. These options are an important part of Orange County’s infrastructure, and they allow people to enjoy the county’s outdoor attributes. Non-motorized options have evolved over time, and residents are able to enjoy at least one form of non-motorized transportation in every part of the county.

Transportation and land use planning will be integrated in a way that optimizes the use of existing transportation and other municipal infrastructure within priority growth areas. Public transportation options and non-motorized connections not only decreases the amount of single-occupant vehicle trips, but it also provides opportunities to access employment centers, even without a car. Nearly ten percent of Orange County households do not have vehicles available, while approximately 30
percent are one vehicle households. This limits access for almost half of the County population to employment opportunities, health and educational services, shopping or getting to school. A connected non-motorized network allows for individuals that cannot drive or do not have access to vehicles to still enjoy a good quality of life.

Transportation is the second highest cause of GHG emissions and produces pollutants such as Carbon Dioxide (Ozone) and Particulate Matter that are directly related to negative health impacts. Lower vehicle trips produce fewer emissions, leading to better air quality and a healthier environment. Non-motorized transportation alternatives decrease the negative environmental impacts on our communities. Whether a person does not have access to a vehicle, or they choose to use alternative modes of transportation, a connected non-motorized transportation network provides opportunity. With that opportunity, non-motorized transportation infrastructure promotes equity, increases safety, and improves both individual and community health.

A. CONNECTING ORANGE COUNTY

The Mid-Hudson Valley has unique opportunities to connect not only on the roadways through different modes, but also across a vast trailway system that feeds into regionally and nationally significant trails. There are approximately 750 miles of trails within County or State Parks and almost 100 miles of connector trails within the county borders. Connector trails are defined as regional trails that connect users to multiple counties. The New York-New Jersey Trail Conference maintains three regional trails which run through Orange County, including the Appalachian Trail, the Long Path and the Highlands Trail. There are hiking trails throughout state and privately-owned parks, including the Harriman State Park, Sterling Forest, Storm King State Park, Schunnemunk Mountain State Park and Stewart State Forest. (See Map 11 on page 62).

While Orange County does not maintain connector trails or state parks, these destinations provide key tourism and recreational opportunities for residents and visitors. In some cases, connector trails run through urban areas, have sections on county or local roads, or, like the Long Path, have a section on multi-use paths like the county-owned and maintained Heritage Trail. Other connector trails also pass through County Parks, such as the Appalachian Trail and Warwick County Park. Such connections between County facilities and regional amenities will be made when feasible.

B. HIKE, BIKE, PADDLE, AND RIDE

Recreation is a key opportunity to improve the quality of life for Orange County residents and to attract visitors to the county. The Heritage Trail is a county-owned, 14-mile linear park from Goshen to Harriman built on abandoned railbeds. It is popular with residents and expansion of the trail is planned and new sections are in progress. The Heritage Trail can be accessed currently at the Monroe park & rides. Expansion plans are underway with Segment 2 which will
Map 11: Multi-Use & Regional Trails
Orange County, New York

Legend
- Multi-Use Trails
- Future/Potential Trails
- Regional "Connector" Trails
- Parks With Trails
- Parks
- Water Bodies
- Rivers & Streams
connect to the Coach USA Transit Hub in the City of Middletown. Once completed, the Heritage Trail will span from the Village of Harriman to the Town of Wallkill, offering over 20 miles of a protected multi-use path. The completed path will also run through four downtown centers, including the City of Middletown, the Village of Goshen, the Village of Chester, and the Village of Monroe. The Harriman Metro-North train station is zoned for Transit Oriented Development, and if a connection from the station to the Heritage Trail can be made, it will promote access for recreational use and commuters.

Connecting local bus routes, regional bus routes, and train stations with non-motorized transportation options, such as park entrances and trail access points, can increase their use substantially. Multi-modal connections promote a non-motorized transportation network that is both beneficial to local users and visitors. Orange County will promote transit connections to multi-use paths and trails. Regional bus options and the Metro-North Port Jervis rail line stops connect Orange County to New York City.

C. ACCESS FOR ALL

While regional non-motorized transportation networks connect the County to other communities for recreational, tourism, and commuting purposes, communities can benefit from increasing their non-motorized transportation networks locally. Adopting and employing Complete Streets policies and practices can improve neighborhood health and downtown economic vitality. Promoting access to businesses through the non-motorized transportation system can improve the health of village and city centers and can help attract residents and visitors alike.

Aside from the robust trail system in Orange County, other recreational opportunities include equestrian trails and waterways. Orange County Parks and Recreation Department (OC Parks) acquired land at Blackburn Farm and is currently exploring the development of a new park predominately for equestrian use. Another ongoing effort through a consortium of different agencies is the development of waterways, or non-motorized boating opportunities such as canoeing and/or kayaking. As these various recreational opportunities continue to develop, communities will be encouraged to consider how to connect to these amenities and draw residents and visitors alike.

Public Comment Regarding Non-Motorized Transportation

“Love the Heritage Trail. Would be even better if it connected more towns and villages in Orange County and beyond!”

“Orange County would benefit by having a long term plan that would make towns and villages walk and bikeable, with access to quality public transportation. This would mean fewer cars on the road and greater access to amenities for all age groups.”
individuals from outside the community to visit, spend money, and create economic prosperity. Active transportation can improve individual health. Individuals are more likely to use bicycle and pedestrian facilities when they feel safe and can access destinations without being inconvenienced. Infrastructure such as protected bike lanes, bike routes and sidewalks not only signal drivers to be cautious of other non-automobile users, but also helps non-motorized users feel a sense of safety, making them more likely to use the amenity. Destinations such as retail and commercial facilities benefit from walkable and bikeable routes, especially mixed-use areas and downtown centers. Gaps in the non-motorized network tend to be between destinations and the attractions, specifically residential development and commercial hubs.

Employment centers also benefit from the non-motorized transportation networks. Communities will be encouraged to work with businesses that are large employers to develop congestion mitigation plans which offer alternative modes of transportation and commuting options. Such options can include transit stops near the employment center, shared ride and carpool information, signed safe bike routes, on-site bicycle storage and clean-up facilities, and connections to existing multi-use paths, such as the Heritage Trail. Mitigation plans should be based on type of employment center and implementation should be as appropriate.

There are many lakes, streams, and rivers in Orange County, some of which are recreationally navigable. The County has identified improvements to access points, including boat, canoe, and kayak launch sites as an important step in developing the County’s waterways. In December 2017, the Orange County Water Authority (OCWA) was awarded a grant from the Hudson River Valley Greenway Conservancy Trail Grant Program to develop a public recreational water trail along the Wallkill River from the New York / New Jersey state line in Warwick, Orange County to New Paltz in Ulster County.

The Wallkill River Water Trail will provide recreational water-based opportunities for residents and visitors of Orange and Ulster counties. The development of this water trail will improve accessibility to the Wallkill River for scenic and recreational use for kayaking, canoeing, fishing, walking, hiking, and enjoying nature as well as the unique, historic landscape of this valley.

The trail will directly intersect with the Greenway Trail System via the Wallkill Valley Rail Trail and the Hudson River Trail, which are both part of the Empire State Trail. There will also be connections to the Wallkill Wildlife Refuge, managed by the US Fish & Wildlife Service, as well as Orange County’s Heritage Rail Trail and the Long Path foot trail which connects to the Appalachian Trail. The Wallkill River Water Trail will preserve and increase access to the Hudson Valley’s recreational, scenic, natural, cultural, historic, and agricultural resources while providing economic growth for the town centers and businesses along the Wallkill River.
Map 11. Wallkill River Water Trail
OBJECTIVES & RECOMMENDATIONS

Non-Motorized Transportation

Objective 1: Promote and maintain a connected non-motorized transportation system in Orange County.

Recommendations:
- Work with responsible public and private agencies to create a connected multi-use network.
- Promote signage on bicycle routes to encourage use where safe and feasible.
- Support non-motorized facilities such as dedicated bike lanes, signage, and parking to increase visibility in communities.

Objective 2: Foster an increase of non-motorized activity within Orange County.

Recommendations:
- Evaluate existing network of non-motorized routes and desired expansion of the system.
- Identify potential connections between existing regional and local routes.
- Connect local and regional trails to access NY Empire State Trail where feasible.
- Support educational campaigns, workshops, and trainings for, but not limited to, municipal officials, officers, drivers, users, and children to promote the safe use of the non-motorized network.

Objective 3: Explore non-motorized transportation alternatives to decrease the negative environmental impacts on our communities.

Recommendations:
- Encourage bicycle and pedestrian facilities at transit hubs to offer alternative modes of transportation and reduce the reliance of SOVs to reach such places.
- Support amenities along multi-use trails to promote such facilities as viable alternatives to SOV travel for non-recreational trips.

Objective 4: Facilitate access to businesses through the non-motorized transportation system to help improve the health of village and city centers.

Recommendations:
- Support bicycle and pedestrian facilities at businesses for easier access to amenities, such as bike parking, ADA compliant entrances, and signage that assists users to find public bathrooms and water sources.
- Help identify potential linkages from existing non-motorized transportation facilities to downtown centers and central business districts.
- Encourage communities to explore and implement wayfinding signage in central business districts to attract visitors and promote walking and biking.
- Boost social equity and economic opportunity by affording alternative modes of transportation to work for transit dependent populations.
- Work with employers in the County to identify where there are gaps in non-motorized accessibility to businesses.

Objective 5: Encourage the diversification of recreational opportunities in Orange County.

Recommendations:
- Collaborate with public and private agencies to encourage development of recreation on waterways throughout the County.
- Assist communities to explore connections to waterways through access points and identifying gaps and linkages.
- Assess, explore and support opportunities for equestrian trails in Orange County.

Objective 6: Make healthy lifestyles through active transportation a safe, reliable, and affordable alternative in Orange County.

Recommendations:
- Work toward and prioritize the provision of walkable communities.
- Encourage Complete Street Designs, where appropriate and feasible, as outlined in the Orange County Complete Streets Policy.
- Support and facilitate active community development through the provision of educational workshops and events.

Objective 7: Continue to develop and promote the Heritage Trail as a unique and vital asset to transportation in Orange County.

Recommendations:
- Expand the multi-use trail system to include northsouth connections.
- Recommend the development of recreational and economic opportunities in proximity to the Heritage Trail, especially in downtown centers, through various techniques such as wayfinding signage and informative materials (online and on-site maps, pamphlets, etc.)
- Support access to Trail from Harriman Station.
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A. TRANSPORTATION SAFETY

The total number of vehicular crashes within Orange County has decreased between 2011 and 2016 based on a five-year rolling average. The five year rolling averages for fatal, serious injury, and property damage resulting from a crash have also seen a decrease from 2011-2016 (see Fig. 29 below).

The decline in crashes seen in Orange County reflects the statewide trend as reported by NYSDOT, showing a continued overall decrease in crash averages statewide between 2011 and 2015. The decrease in crashes within both Orange County and New York State can be attributed to the implementation of effective safety countermeasures. Under the Highway Safety Improvement Program (HSIP) (23 U.S.C. § 148), NYSDOT is required to produce and

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update the Strategic Highway Safety Plan (SHSP) every five years. The SHSP is a comprehensive five-year transportation safety plan that encompasses all public roads and identifies the State’s safety needs, sets goals for reducing fatalities and injuries, and allocates investments in safety projects and programs (https://safety.fhwa.dot.gov/shsp/).

As part of the performance measures required under the Federal transportation law, Fixing Americas Surface Transportation (FAST) Act, the OCTC has adopted the statewide targets for crash reductions. These performance measure targets have been established for number of fatalities, rate of fatalities per 100 million vehicle miles traveled, number of serious injuries, rate of serious injuries per 100 million VMT, and number of non-motorized fatalities and non-motorized serious injuries. The OCTC will plan and program projects on the OCTC TIP to support these targets.

### B. NON-MOTORIZED SAFETY

A walkable community is one in which pedestrians have safe places to walk that take them to the places they want to travel to on foot (or via wheelchair). Walkability deals with the level of risk to pedestrians when attempting to walk along or across the network of roads in a community. It is measured by the number of pedestrians killed or injured in collisions with motor vehicles and by the public’s perception of the risk of being hit by a motor vehicle. Pedestrian safety can be enhanced by a variety of facility improvements, traffic calming strategies, education programs, and enforcement efforts.

Roadway design, land use planning and policy reforms are the contributing factors which can either prevent pedestrian traffic injuries or magnify the risk.

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Fig. 30. OC Non-Motorized Crashes: Number and Type 5 Year Rolling Average
Traffic calming is a term used to refer to a variety of strategies designed to reduce speed and congestion in residential and commercial areas. These strategies might include street plantings, traffic roundabouts at neighborhood intersections and speed humps and tables to reinforce correct road user behavior and improve conditions for non-motorized street users.

The issue of pedestrians not being properly visible is frequently attributed to risk for pedestrian injury. Inadequate visibility of pedestrians arises from:
- inadequate, or lack of, roadway lighting;
- vehicles and bicycles not equipped with lights;
- pedestrians not wearing reflective accessories or brightly colored clothes, especially at night and at dawn or dusk; and
- pedestrians sharing road space with fast-moving vehicles.

The total number of pedestrian and bicycle crashes have remained fairly flat in Orange County between 2013 and 2016 (see Fig. 30 on page 69). This trend is also reflected in the statewide pedestrian fatality rates which have also remained fairly flat with an average of 306 deaths per year between 2004 and 2013. Improving pedestrian safety is one of seven emphasis areas identified in New York's SHSP and is the focus of the Pedestrian Safety Action Plan (PSAP): (https://www.ny.gov/sites/ny.gov/files/atoms/files/pedestriansafetyactionplan.pdf)

Along with supporting the State's efforts, Orange County will work to improve pedestrian safety through partnering with the State as well as with local municipalities. The County should strive for a reduction or elimination of the risks faced by pedestrians.

C. SAFETY PROGRAMS AND PLANS

i. Complete Streets

A complete street enables users of all ages and abilities - whether walking, wheeling, bicycling, driving cars, or riding public transportation - to share the right-of-way safely. Studies show that communities implementing complete streets bolster economic growth and stability by...
The following principles form the basis for bicycle and pedestrian design guidelines included in a Complete Streets Policy:

1. Accommodations for bicycles and pedestrians should be integrated into roadway construction projects through design features appropriate to the context and function of the transportation facility.
2. The design and construction of new facilities should anticipate likely demand for bicycling and pedestrian facilities within the design life of the facility.
3. The design of intersections and interchanges should accommodate bicyclists and pedestrians in a manner that addresses the need to safely cross roadways, as well as to travel along them.
4. The design of new and reconstructed roadways should not preclude the future accommodation of bicyclists and pedestrians along and across corridors.
5. While it is not the intent of maintenance resurfacing to expand existing facilities, opportunities to provide facilities or to enhance safety for pedestrians and bicyclists should be considered during the development of these projects.

Included in County efforts to proactively address both motorized and non-motorized safety issues and concerns is the adoption of a Countywide Complete Streets Policy in July 2017: (https://www.orangecountygov.com/1013/Complete-Streets-Policy.) This policy formalizes the County’s intent to develop and maintain a safe and accessible transportation network for all county residents and visitors by implementing comprehensive improvements at the county level. This includes all transportation-related elements of projects involving county property, as well as public and private projects over which the OC Department of Public Works has permitting authority. OC Planning is also working with the OCTC to provide education and technical assistance to municipalities interested in implementing complete streets, including a model policy, informational toolkit and technical assistance to communities interested in walkability assessments.

Recent data collected from almost every school district in Orange County revealed that 28% of elementary students and nearly 40% of middle and high school students are either overweight or obese. In 2015, the OC Health and Planning Departments were awarded funding through the Creating Healthy Schools and Communities (CHSC) Grant Program from New York State to increase safety and reverse the alarming trend toward obesity and inactivity in Orange County. This initiative includes an active transportation component that aims to increase opportunities to walk, bike, and roll in the school districts and associated communities of Newburgh, providing accessible and efficient connections between destinations, increase road safety by reducing crashes, improve air quality by encouraging non-motorized transportation alternatives, and increase the overall capacity of the transportation network through enhanced access for residents and visitors who do not have access to a vehicle.
Less than 50 years ago, nearly 50% of all children in the United States walked or bicycled to school. Today, that number has plummeted to fewer than 15%. During the morning commute, driving to school represents an average of 10-14% of traffic on the road.

ii. Orange County Traffic Safety Board
The OC Traffic and Safety Board (OCTSB) operates under the auspice of the OC Emergency Services Department. The OCTSB’s goal is to “reduce the incidents of fatal and serious personal injury motor vehicle accidents occurring on the roadways within OC...” In order to meet this goal, the OCTSB works with individuals and agencies representing law enforcement, education, prevention, as well as community members. In accordance with the SHSP, recently updated in 2017, the OCTSB will make recommendations on implementation activities that will contribute towards the goal of reducing fatalities and injuries.

iii. ADA Accessibility
The Americans with Disabilities Act of 1990 (ADA) requires state and local governments to make their programs and services accessible to persons with disabilities. In July 2017, the Orange County Legislature adopted the OC ADA Transition Plan. This plan will identify ADA barriers and how they will be addressed. This includes an inventory of all sidewalks, crosswalks, curb ramps, and other County owned property.


"Forty-three percent of people with safe places to walk within 10 minutes of home met physical activity levels; among those without safe places to walk just 27% met the recommendation." - Powell, K.E., Martin, L., & Chowdhury, P.P. (2003). “Places to walk: convenience and regular physical activity.” American Journal of Public Health, 93, 1519-1521

Fig. 31. Crosswalks and crossing guards help prevent traffic fatalities and injuries.

Fig. 32. A photo of the Port Jervis Promenade while it was still under construction. The City of Port Jervis implemented many pedestrian safety-oriented features while constructing the promenade.
Objective 1: Collaborate with relevant partners to ensure compatibility of policies, plans, and procedures to ensure the accessibility and connectivity of existing and planned transportation networks.

Recommendations:
- OC Planning will collaborate with OC Department of Public Works to integrate Complete Streets infrastructure and design features into street design and construction of county projects.
- OC Planning will develop template language to ensure consideration of Complete Streets and other safety measures in transportation elements of County land use reviews in accordance with responsibilities for §GML 239.
- The Departments of Planning, Public Works, and Parks and Recreation will incorporate Complete Streets principles into proposed and existing programs, plans, and manuals, as appropriate.
- Planning staff will collaborate with the Orange County Traffic Safety Board and Complete Streets Policy Committee to continue to prioritize safety and cultivate safety advocates for each community.
- Expand the work of the CHSC grant and work with other school districts to ensure safe routes to school and increase the health benefits gained from walking and cycling.
- Support the County Legislative “Think DIFFERENTLY” resolution and work with OC Parks and Recreation to encourage supportive environments for residents with special needs and monitor implementation of ADA accessibility at County-owned facilities.

Objective 2: Access federal, state, and local data and collect baseline information to identify county safety issues and assess the impact of policies and plans designed to address identified issues.

Recommendations:
- OC Planning can access crash data and GIS applications to map high-crash locations and crash rate analysis for municipalities.
- In collaboration with the MPO, the County can establish performance standards with measurable outcomes to assess safety, functionality, and actual use by each category of user.
- Collect baseline data and regularly gather follow-up data to assess impact of policies, for both Complete Streets implementation and the ADA Transition Plan.
- Identify intersections and other locations where collisions have occurred or that present safety challenges for pedestrians, bicyclists, or other users; consider gathering additional data through methods such as walkability/bikeability audits and sidewalk inventories.

Objective 3: Provide and coordinate opportunities to continue professional development and training on safety and accessibility.

Recommendations:
- Orange County, as host to the MPO, can offer expertise in analyzing safety problems, by developing a program to conduct Road Safety Road Safety Assessments.
- Assemble design guidelines and best management practices and make training available to municipal leaders, local planning/zoning board officials, public works departments and county departments on the importance of Complete Streets and the implementation and integration of multimodal infrastructure and techniques.
- The County will work on behalf of municipalities to provide education, outreach and awareness campaigns for Bike Safety.
- County staff will work to identify current and potential funding sources and grants for implementation of Complete Streets policies, plans, and practices within Orange County.
- OC Planning can provide guidance to municipalities interested in conducting their own walkability audits.
The transportation network throughout Orange County faces a multitude of unique challenges in the face of a shifting climate. Heat waves, droughts, tropical storms, high winds, and storm surges associated with sea level rise are all growing hazards due to this climatic shift. In an effort to define the potential effect the County faces in the future, the Orange County Hazard Mitigation Plan (HMP) assessed the risk the County faces from the following ten hazards of particular concern:

- Extreme temperatures
- Severe thunderstorm/wind/tornado
- Hurricanes and tropical storms
- Floods
- Drought
- Landslides
- Earthquakes
- Winter storm/ice storm
- Wildfires
- Ice jams

Although all of these hazards have the potential to wreak havoc on transportation infrastructure, Orange County’s geography makes heavy downpours from extreme storm events and the associated riverine flooding of particular concern for the transportation infrastructure. Both hazards are becoming more frequent as the climate changes. As such, the data within the following sections focus on these hazards as the main area of concern. Potential impacts to the infrastructure from extreme temperatures, landslides, wildfires, and ice jams, which certain areas of the County are also susceptible to, will also be discussed. The data and potential impacts discussed will be used to guide future decision making and planning practices within the Department of Planning.
Flood Zones
Orange County, New York

Legend
- Municipalities
- Water Bodies
- Streams

Flood Zones
- 100-Year Flood Zone
- 500-Year Flood Zone
A. CLIMATE PROJECTIONS

Map 12 on page 75 shows the current FEMA designated 100-year and 500-year flood zones in Orange County. As visible on the map the major waterbodies that contribute to flooding are the Neversink River and tributaries in the western portion, Wallkill River and its tributaries in the central portion, and Satterly, Woodbury and Moodna Creeks in the eastern portion of the County.

According to projections provided by the NYS DEC, the northeastern United States saw a 71% increase in the amount of precipitation falling in heavy rain/snow events between 1958 and 2010. Average temperatures and precipitation levels are expected to continuously rise across New York State. Fig. 33 below depicts anticipated estimated mean annual changes in temperature and precipitation levels for the Catskill Mountains and West Hudson River Valley Region of New York as derived from NYSDEC climate data.

Increasing temperatures and precipitation are likely to increase the duration and frequency of extreme weather events. These events overwhelm stormwater management systems and cause streams and rivers to overflow their banks, leading to extensive flooding. The associated deluge of floodwater inundates and washes out roadways and culverts and scour bridges, often leading to extensive and costly repair work.

Although it poses less of a threat to the County, sea level rise has the potential to impact communities along the Hudson River, inundating roadways and disrupting the freight transportation that relies on railways along its banks. Fig. 34 below shows sea-level rise projections from the NYSDEC for the NYC and Lower Hudson region.

Based on these projections, low lying roadways and infrastructure along the Hudson in the Cornwall, Newburgh and New Windsor areas will be particularly susceptible to flooding and inundation even if the low estimates come to fruition.

Roadways, bridges and culverts, freight and passenger railways, and airports are

<table>
<thead>
<tr>
<th>Fig. 33. Estimated Mean Change in Annual Temperature &amp; Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
</tr>
<tr>
<td>Temperature</td>
</tr>
<tr>
<td>Precipitation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fig. 34. Projected Sea-Level Rise for NYC and Lower Hudson Region</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low</strong></td>
</tr>
<tr>
<td>2020s</td>
</tr>
<tr>
<td>2050s</td>
</tr>
<tr>
<td>2080s</td>
</tr>
<tr>
<td>2100</td>
</tr>
</tbody>
</table>

SOURCE: NYS Dept. of Environmental Conservation
all susceptible to the negative externalities associated with climate change induced extreme weather events and sea-level rise. In order for Orange County’s transportation infrastructure to adapt to the changing climate, all of the above must be considered in future planning, design, and decision making for these vital elements.

B. ROADWAYS

Orange County’s road network is particularly susceptible to flooding in many areas near the rivers and streams that snake through, bringing water to the Hudson and Delaware Rivers. During heavy rainfall and extreme storm events these waterbodies are often inundated with stormwater runoff and flow out onto nearby roads. The built environment often makes this problem worse due to the increased speed and volume that stormwater runs off impermeable surfaces. As a result, these susceptible roadways become impassable, cutting off vital pathways for the movement of goods, people, and emergency services around the County.

Map 13 on page 77 was derived from an analysis of the current road network that lies within the County’s FEMA designated 100- and 500-year floodplains. “Hot spots” for roadway flooding around the County were created by determining the segments of roadways that are most vulnerable to flooding.

Port Jervis and Deerpark, areas of Warwick, Middletown, Goshen, Hamptonburgh, Montgomery, Washingtonville, Harriman, Tuxedo, Cornwall, Newburgh and New Windsor; almost every municipality in the County, is susceptible to flooded roads. Based on an analysis of current NYSDOT and FEMA data, there are approximately 1,939 potential flood inundation points totaling 93.62 miles of roadway within the 100-year floodplain and 1,064 points totaling 38.34 miles of roadway within the 500-year floodplain. In total, County-wide there are approximately 3,131 potential inundation points totaling 131.96 miles of roadway that may flood in an extreme storm event based on past climate estimates and current flood zones.

Fig. 35a, 35b, 36a and 36b show a break out of the road segments by functional class within the 100-year and 500-year floodplains respectively. As the charts show, the majority of roadways within floodplains in Orange County are Local Roads maintained by each respective municipality. When Local Roads flood it can potentially prevent area residents from accessing higher order roadways, essentially cutting them off from the rest of the transportation network until flooding subsides. Also, flooded local roadways can potentially prevent emergency services from accessing areas and residents affected by extreme weather events, hampering rescue and recovery efforts.

Another significant takeaway from the data is the high number of potential inundation points on Principal and Minor Arterials meant to handle the greatest amount of vehicle traffic. When these roads flood it reduces the functionality of the entire transportation network by preventing high volume traffic flow and pushing vehicles on to Local Roads ill equipped to handle the
Map 13. Flood Prone Roadways

Legend
- Waterbodies
- Roadway Inundation Points
- Streams
- Interstate
- 100 Year Floodplain
- Federal Highway
- 500 Year Floodplain
- State Route
- County Road
- Local Road

Orange County, New York
Extreme heat is also a growing threat to the road network in Orange County. Extended periods of high temperatures can cause the roadway pavement to soften and expand, increasing the vulnerability to rutting and potholes. Heat waves also limit construction activities, making it more expensive to build and maintain the network. Heavy rain events can also cause landslides and wash-outs to occur more frequently, while droughts can increase the likelihood of wildfires that reduce visibility and threaten roads and infrastructure.

The inundation points on these roadways and locations where there is a high instance of localized flooding that can potentially cut off Local Roads from higher order roadways represent areas around the County that should be prioritized as an opportunity to employ mitigation methods and boost resilience in the road network.

The table below lists the major flood prone locations and roadways for Principal and Minor Arterials around the County that are visible on the “hot spot” map.

<table>
<thead>
<tr>
<th>Functional Class</th>
<th>Number of Flood Inundation Points</th>
<th>Total Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Arterials</td>
<td>160</td>
<td>7.8</td>
</tr>
<tr>
<td>Minor Arterials</td>
<td>217</td>
<td>9.27</td>
</tr>
<tr>
<td>Collectors</td>
<td>323</td>
<td>15.23</td>
</tr>
<tr>
<td>Local Roads</td>
<td>1239</td>
<td>61.32</td>
</tr>
</tbody>
</table>

Fig. 35b. Flood Inundation Points for Roadways in the 100-Year Floodplain

Fig. 36b. Flood Inundation Points for Roadways in the 500-Year Floodplain

<table>
<thead>
<tr>
<th>Functional Class</th>
<th>Number of Flood Inundation Points</th>
<th>Total Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Arterials</td>
<td>113</td>
<td>5.7</td>
</tr>
<tr>
<td>Minor Arterials</td>
<td>142</td>
<td>4.52</td>
</tr>
<tr>
<td>Collectors</td>
<td>180</td>
<td>6.3</td>
</tr>
<tr>
<td>Local Roads</td>
<td>629</td>
<td>21.82</td>
</tr>
</tbody>
</table>
C. BRIDGES AND CULVERTS

Bridges and culverts are both integral pieces of the transportation infrastructure because, when properly designed, they allow flowing water to pass underneath while maintaining a continuous roadway network. As visible in the chart below, there are over 200 bridges throughout the County located within the 100-year and 500-year floodplains. Of these, only 118 are considered to be in good condition based on NYSDOT structural element inspection standards. This means that 42% of the bridges in the County are considered to be deficient.

![NYSDOT Rating of Bridges in Floodplain](chart)

A deficient condition rating does not necessarily indicate that a bridge is unsafe for daily traffic. It does, however, indicate deterioration at a level that requires corrective maintenance or rehabilitation to restore the bridge to its fully functional, non-deficient condition. These bridges have a potentially higher vulnerability to structural element failure when taxed during extreme weather-induced flooding.

A major issue that impacts bridges during flood events aside from the increased shear from the higher volume and velocity of water flow is scour; the erosion of the river or stream bed at the base of the bridge column foundation. According to AASHTO, scour is the cause of the majority of bridge failures in the US due to water currents eroding the stability of the column foundation. Also, if vertical clearance of bridges over the water channel is too low then flood events have the potential to inundate the bridge itself and float bridge decks off the supports. Similarly, if culverts are not designed with a large enough opening to allow flood water through, the force of the rushing water can wash away the culverts and roadways above them. All of these impacts lead to costly repairs and cut off roadways at river and stream crossings.

Higher temperatures also pose a threat to bridges, placing added stress on bridge joints that can lead to costly repairs. Landslides could increase with projected increased precipitation across the County. This can potentially threaten the structural integrity of bridges and wipe out culverts along roads in steep areas of the County. Ice jams caused when flowing ice bottle-necks underneath undersized bridges or culverts is also a growing area of concern. These dams have the potential to damage bridge and culvert infrastructure while causing flooding upstream and downstream due to the restriction of flowing water.

D. FREIGHT AND PASSENGER RAIL

Orange County is home to seven commuter stations of the Metro-North Port Jervis Line through a service contract with New Jersey Transit. The predominantly single-track line provides Orange County commuters access to Manhattan through New Jersey Transit connections at Secaucus Junction that travel into Penn Station, as well as PATH and ferry connections at the Line’s final stop in Hoboken.
The Metro-North Port Jervis Line shares train traffic with freight. Freight trains also utilize tracks along the western shore of the Hudson River and through the central portion of the County to move a variety of goods in both directions. Map 15 on page 82 shows the extent of the freight tracks currently located within the 100-year and 500-year floodplains across the County. As visible in the map below, much of the track through Warwick and Chester and almost all of the track adjacent to the Hudson lies within either the 100- or 500-year floodplain.

Rising sea-levels, the effect of tides, and extreme weather events all impact the freight track Terminal that provide access to Lower Manhattan and the Financial District.

As visible Map 14 below, several areas of track in between the Port Jervis, Otisville, Middletown, Campbell Hall, Salisbury Mills/Cornwall, Harriman, and Tuxedo stations are susceptible to flooding. Much like the issue roadways experience during flood events, these areas represent potential pinch points that have the potential to cut off commuter train traffic entirely if inundated with flood water. Areas of track that lie within the 100-year and 500-year floodplain south of Salisbury Mills/Cornwall Station to Harriman and Tuxedo Stations are particularly susceptible to flooding.

Map 14. Flood Prone Passenger Rail
along the Hudson. If the sea-level projections are correct, major portions of the track may face inundation at high tide or even permanent inundation. The severity of the flooding could also increase drastically in the event of extreme weather events.

Flooding from extreme weather events can have catastrophic effects on railway infrastructure. Rushing floodwater has the potential to wash out the track ballast that forms trackbeds, leaving the railroad ties and track unsupported and destabilized. In some instances, the entire track can be washed out. Another major issue is floodwater inundating signal cables and equipment, leading to power outages and equipment failure that is often costly and time consuming to repair. Service disruption also causes headaches for commuters that rely on the trains, forcing them to seek alternative modes of transportation. Freight companies are essentially forced to halt operations until repairs are done, causing major supply chain disruptions and adding delay costs.

High temperatures can cause rail tracks to expand and buckle or kink. Repairing the tracks leads to service disruptions and delays. If unchecked, buckled tracks can even lead to train derailments. More frequent and severe heat waves may require more track repairs or speed restrictions to avoid derailments. Landslides can
block and damage rail lines and lead to costly repairs and clean up delays. In Orange County, the freight rail along the Hudson River is most susceptible to slides.

**E. AIRPORTS**

Although the majority of Orange County’s airports are not susceptible to flooding, the Orange County Airport in Montgomery and the Warwick Airport both lie within flood zones. The Orange County Airport is particularly susceptible, as visible in the map below, with over 97% of the total land area of the airport within the 100- and 500-year floodplains. Warwick is less severe, with nearly 45% of the airport within the floodplains.

Flooding has the potential to disrupt air travel to and from both airports by effectively cutting off use of the runways. Additionally, flooding can damage airport facilities and lead to extended closures. Extreme heat can also impact air service by affecting aircraft performance leading to cargo restrictions, flight delays, and cancellations. Climate change may increase the frequency and severity of these events and the number of airports that are affected.

When Hurricane Irene swept into the area in August of 2011 it brought torrential rains and caused widespread flooding across the County. The Port Jervis Line suffered catastrophic damage along 14 miles of track between Harriman and Sloatsburg, just over the border in Rockland County, when the banks of the Ramapo River crested.

Rushing floodwaters swept away trackbed at 50 separate washouts totaling two miles of right-of-way. The earth was scoured away to a depth of seven feet, leaving twisted tracks and ties dangling in the air. Five bridges along the section of track had damage to abutments and piers and the signalization equipment was heavily damaged.

The reconstruction of the track required crews to work 24/7 for three months to restore full service. After all was said and done, 150,000 tons of ballast was trucked in and final costs are estimated at $65 million.
OBJECTIVE & RECOMMENDATIONS

Resiliency

Objective: Foster cooperative partnerships with Federal, State and local agencies and incorporate planning best practices to work toward resiliency goals.

Recommendations:

- Support coordinated efforts to pursue Federal, State, local, non-profit and private funding for transportation improvements that seek to boost infrastructure resiliency.

- Further cooperation among County DPW, DEM and other appropriate agencies to work towards goals outlined in the 2017 Hazard Mitigation Plan.

- Acquire and maintain an up-to-date and comprehensive database of hazard data, including susceptible transportation infrastructure, for use in future modeling and for distribution to appropriate Federal, State, and local governments.

- Use the vulnerability datasets and asset maps created to integrate goals, objectives, and performance measures related to resiliency into future TIP and LRTP updates to track the success of planning efforts over time.

- Develop design guidelines, best management practices, and performance measures for resilient transportation infrastructure projects.

- Create template language to ensure consideration of hazard mitigation and resiliency in transportation elements of County land use reviews in accordance with responsibilities for §GML 239.

- Provide public outreach, education, and technical support to local governments and residents to guide Municipal decision making, promote funding opportunities, and assist in local plan development to support efforts that boost infrastructure resiliency.

- Foster close coordination within the MPO planning areas and adjoining jurisdictions of the TMA to support resiliency efforts on matters related to funding; management of existing transportation networks; planning and programmed improvements; data collection and modeling; emergency through routes; land use plans and coordinated legislative actions.

- Incorporate hazard mitigation and resiliency considerations aligned with the principles set forth by Federal and State agencies in future plan updates, including the LRTP.

- Promote a multi-dimensional, holistic approach to project planning, considering increased storm frequency and severity when designing new infrastructure/upgrading existing by designing for the 500-year storm event rather than the 100-year event.
CREDITS

COVER:
- Orange County Tourism
- Transit Orange

SECTIONS:
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I. Google Maps
II. Orange County Dept. of Planning
V. Orange County Tourism
VI. Transit Orange
VIII. Orange County Tourism
IX. Orange County Dept. of Planning
X. Case, Daniel: https://commons.wikimedia.org/wiki/File:Flooded_farmland_after_Tropical_Storm_Lee,_Campbell_Hall,_NY.jpg

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2. Transit Orange
3. Orange County Dept. of Planning
4. Orange County Tourism
5. Transit Orange
6. Google Earth
7. Transit Orange
8. Transit Orange
11. Orange County Airport: https://www.orangecountygov.com/178/Airport-Orange-County

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23. Transit Orange
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27. New York State Dept. of Transportation; Port Authority of New York and New Jersey
29. Orange County Dept. of Planning; New York State Dept. of Transportation
30. Orange County Dept. of Planning; New York State Dept. of Transportation
31. Orange County Dept. of Planning
32. Orange County Dept. of Planning
33. New York State Dept. of Environmental Conservation
34. New York State Dept. of Environmental Conservation
35. Federal Emergency Management Agency; New York State Dept. of Transportation
36. Federal Emergency Management Agency; New York State Dept. of Transportation
37. New York State Dept. of Transportation
38. Orange County Water Authority
39. Orange County Water Authority

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