June 2019

BURLINGTON COUNTY

Highway Master Plan

PREPARED BY:

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

PREPARED FOR:

BURLINGTON COUNTY, N.J. · BOARD OF CHOSEN FREEHOLDERS · 1694

The Delaware Valley Regional Planning Commission is the federally designated Metropolitan Planning Organization for a diverse nine-county region in two states: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey.

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

DVRPC's vision for the Greater Philadelphia Region is a prosperous, innovative, equitable, resilient, and sustainable region that increases mobility choices by investing in a safe and modern transportation system; that protects and preserves our natural resources while creating healthy communities; and that fosters greater opportunities for all.

DVRPC's mission is to achieve this vision by convening the widest array of partners to inform and facilitate data-driven decision-making. We are engaged across the region, and strive to be leaders and innovators, exploring new ideas and creating best practices.

DVRPC is funded through a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for the findings and conclusions herein, which may not represent the official views or policies of the funding agencies.

E Main Street (CR 616) west of McGuire Boulevard near the Joint Bast MDL. Source: DVRPC, 2018

BURLINGTON COUNTY

Board of Chosen Freeholders

Board of Chosen Freeholders is the official name of the governing body for the County of Burlington. Consisting of five members, one or two are elected each year from the county at-large for a three-year term. The freeholder director is elected annually by the board (Burlington County, 2018). The current members are:

Tom Pullion, Freeholder Director

Balvir Singh, Freeholder Deputy Director

Felicia Hopson, Freeholder

Daniel J. O'Connor, Freeholder

Latham Tiver, Freeholder

Planning Board

The county *Planning Board* reviews land development applications and adopts planning documents. The current members are:

James H. Williams, Chairperson

Kevin Brown, Deputy Chairperson

Joseph Brickley, County Engineer

Joseph LoRicco, Assistant County Engineer

David Gelman, Alternate Member

Freeholders

Tom Pullion, Freeholder Director

Felicia Hopson, Freeholder

Balvir Singh, Freeholder, Alternate Freeholder

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

EXECUTIVE SUMMARY

The *Burlington County Highway Master Plan* is the 2018 update to the county's 1989 Highway Master Plan. The Delaware Valley Regional Planning Commission (DVRPC) was commissioned by Burlington County to update the 1989 plan to supply a vision and implementation framework for the county highway network that can sustainably complement long-term county growth patterns.

The plan is the product of a technical, collaborative three-year-long planning process. DVRPC worked closely with Burlington County on this update to ensure the plan's utility and encourage the successful implementation of its strategies. The foundation of the *Burlington County Highway Master Plan* is based on the goals to maintain existing county highway infrastructure and modernize it to meet current and future demands and to have adequate rights-of-way provided for future road widening and intersection improvements.
The following objectives are outlined in the plan as means to achieve this goal:

- Promote traffic safety for all road users.
- Maintain existing transportation facilities.
- Deliver acceptable levels of service.
- Integrate best practices in highway design by implementing improvements.
- Improve routes and connections to intermodal facilities for freight traffic and mass transit.
- Link transportation objectives to land uses.
- Identify and collaborate with planning partners (stakeholders and co-sponsors) to implement the county highway plan.

Burlington County owns and maintains a robust highway system. The 529-mile-long County Route (CR) network is vital to everyday movement in the county, and it plays an important role in interconnecting with the NJ Turnpike and Interstate highway system. Because of Burlington County's strategic location within the bi-state region and its high degree of inter- and intrastate connectivity, the County experiences significant amounts of "pass-through" traffic on its state, county, and municipal roadways. The CR network carries NJ Transit and BurLINK bus routes, provides access to rail stations along the NJ Transit RiverLINE, and serves as a scenic route network in the Pinelands. For this project, performance indicators for the CR network, as well as land use conditions, were assembled for current and forecasted future conditions. The conditions were assessed using a Traffic Management Process (TMP) to identify candidate improvement strategies for the county road network.

DVRPC and Burlington County worked together to inventory current projects, programs, plans, and proposals that have been advanced to address transportation needs. DVRPC collected data and conducted a transportation modeling assessment of system characteristics. Supply, demand, and performance data were assessed to measure current conditions, identify deficiencies, and serve as a baseline for future travel demand modeling.

DVRPC performed technical work using the regional travel demand model (TIM 2.2) and the TMP evaluation methodology. The 2040 Long-Range Plan (LRP) Scenario was modeled to reflect the land use assumptions and transportation recommendations of *Connections 2040*, DVRPC's LRP for Greater Philadelphia. This model was utilized to assess future conditions and compare them to current conditions.

DVRPC developed a second future scenario, the 2040 Master Plan (MP) Scenario, which contained the LRP recommendations, as well as the county's revised future-year population and land use estimates. The Geographic Information System (GIS) database developed for this project contains the final Year 2040 MP Scenario model outputs and other measurable data used to assess conditions and changes along the CR network.

This GIS database includes TMP strategies that identify candidate solutions for transportation deficiencies along specific CRs sequentially. The five categories below summarize the range of strategies:

- Operational Strategies;
- Transportation Demand Management Strategies;
- Strategies to Increase Existing Transportation System Capacity;
- Strategies to Add New Transportation System Capacity; and
- Goods Movement Strategies.

A Web Map containing the majority of the data in the GIS database, including the TMP strategies, is available online at: www.dvrpc.org/webmaps/BCHMP. This online tool was created as a public, user-friendly application.

The Burlington County Highway Master Plan is a published summary and companion to the Web Map that explains the motives, methods, observations, and applications of the project. Similar to the Web Map, the plan's analytical content is organized into four parts: (1) Conditions, (2) Resources, (3) Strategies, and (4) Right-of-Way. This plan serves as the basis for implementing sound growth strategies for improvements to the county highway network in Burlington County, New Jersey. County and municipal staff have the ability to utilize this document, and its associated tools, to assess land development applications and plan future initiatives. This Master Plan shall be used as a planning tool that provides ultimate rights-of-way and desired roadway cross-sections and guidance in the design of land development projects submitted by applicants and roadway improvements undertaken by land development applicants, utilities, and governmental agencies. The final determination of rights-of-way and roadway cross-sections shall occur on a case-by-case basis in consideration of local factors and constraints.

CHAPTER 1
INTRODUCTION

Purpose and Need

The *Burlington County Highway Master Plan* is an update to the county's 1989 Highway Master Plan. Burlington County has grown by more than 50,000 residents and 25,000 jobs since 1989. By 2040, the county is expected to experience an almost equal increase in residents and employment opportunities. The resulting growth in travel within and through the county warrants reconsideration of the 1989 plan. This plan was developed for Burlington County by DVRPC with the avid participation of county representatives and stakeholders. It serves as the basis for implementing sound growth strategies for improvements to the county highway network in Burlington County, New Jersey. The main objective of this Master Plan is to have adequate rights-of-way provided for future road widening and intersection improvements. It shall be used as a planning tool that provides ultimate rights-of-way and desired roadway cross-sections and guidance in the design of land development projects submitted by applicants and roadway improvements undertaken by land development applicants, utilities, and governmental agencies.

Elizabeth Street (CR 687) in Pemberton. Source: DVRPC, 2017

Work Program

Phase I (Fiscal Year 2016)

The first phase involved research on four areas of emphasis:

- Joint base area mobility and security;
- logistics/freight movement around NJ Turnpike Interchanges 6A and 7 and US Route 130;
- mass transit route connections along US Route 130 and the NJ Transit RiverLINE; and
- hospitality and visitor orientation around NJ Turnpike Interchanges 4, 5, and 7.

Transportation projects, programs, plans, and proposals were inventoried. In addition, the regional travel demand model was prepared for current base-year transportation conditions in the county. Data collection and transportation modeling assessment of current land use conditions and transportation system characteristics were used to assess current conditions, identify deficiencies, and serve as a baseline for future travel demand modeling.

Phase II (Fiscal Year 2017)

The second phase included the modeling and assessment of the Region's 2040 LRP to judge its transportation components for adequacy in serving growth and travel along the county's highway network. Performance results for the future year were compared with existing conditions. Final modeling was performed in this phase for all county-endorsed recommendations as part of the 2040 MP Scenario, which contains the LRP recommendations and the additional recommendations endorsed by the county.

Phase III (Fiscal Year 2018)

The third and final phase involved the creation of a GIS transportation database, the design of a Web map, and the preparation of this summary document.

Products

GIS Database

The GIS database is a digital file containing the Master Plan travel demand modeling outputs and other measurable data for use in judging conditions and changes along the CR network. The GIS database includes existing attributes and performance data available from the county, the New Jersey Department of Transportation (NJDOT), and DVRPC. The database includes a traffic management strategy generator that identifies candidate solutions for transportation deficiencies along specific CRs sequentially by first suggesting strategies that eliminate or reduce single-occupant vehicle (SOV) travel at its source. Strategies to manage travel or accommodate travel are also identified to be employed if necessary.

The framework of the GIS network matches that of the county, so the project database can be joined with other inventories of physical items or structural conditions for ongoing planning and engineering by the county staff. Selected data from the GIS database represents the content of the Web Map.

Web Map

The Web Map is an online, map-viewing application that displays key content of the project's GIS database in a flexible and portable format for widespread use.

The Highway Master Plan Document

This Highway Master Plan is a published summary and companion to the Web Map that explains the motives, methods, observations, and applications of the project. Similar to the Web Map, the plan's analytical content is organized into four parts: (1) Conditions, (2) Resources, (3) Strategies, and (4) Right-of-Way. County and municipal staff have the ability to utilize this document, and its associated tools, to assess land development applications and plan future initiatives.

N Pavilion Avenue (CR 543) just south of Rancocas Creek in Riverside Township. Source: DVRPC, 2017

Planning Process

The *Burlington County Highway Master Plan* is the product of a technical, collaborative, three-year-long planning process. Burlington County and DVRPC worked closely on this update to ensure the plan's utility. The close collaboration was also intended to encourage the future successful implementation of the traffic management strategies recommended in this report. Burlington County provided important information for the development of deliverables, as well as regular feedback on the technical tools created as part of this project.

The guiding principles of the project were defined by Burlington County representatives. The foundation of the *Burlington County Highway Master Plan* is the county's goal to maintain existing county highway infrastructure and modernize it to meet current and future demands, while having adequate rights-of-way provided for future road widening and intersection improvements. The objectives and strategies to achieve this goal are outlined in **Table 1**. The Highway Master Plan is a toolbox to help the county achieve the outlined objectives and implement the relevant strategies.

Performance indicators for the highway system were assembled for current (2013) and future (2040) conditions, and these were assessed to identify candidate TMP improvement strategies for the CR network. DVRPC staff used regional travel demand modeling, database management techniques, and GIS evaluations to correlate the performance data with the improvement strategies. The evaluation framework contains conditions, resources, and strategies for the CR network. The identified strategies are most effective when:

- implemented in combinations; and
- consistent with regional practices and federal and state mandates.

Meeting these conditions improves chances for more effective investments, energy and environmental sustainability, and funding assistance.

Table 1: Goal, Objectives, and Strategies

GOAL: Maintain existing county highway infrastructure and modernize it to meet current and future demands	
Objective	**Strategies**
Maintain existing transportation facilities.	Develop and apply standards-based strategies
	Monitor system performance versus standards
Deliver acceptable levels of service.	Utilize a TMP to evaluate transportation options and reduce traffic congestion • Maintain, optimize, and modernize • Manage demand • Increase multimodal system capacity • Add new capacity where necessary, limiting the addition of new through-travel lanes
	Reduce travel/promote options through land use, community planning, and development design and approval process
	Develop access management codes to preserve highway capacity
	Improve mobility among regional destinations
	Have adequate rights-of-way provided for future road widening and intersection improvements
Promote traffic safety for all travelers.	Analyze crash and traffic operations data to identify locations for safety improvements
	Prioritize improvements upon critical safety needs in the highway network
Integrate best practices in highway design whenever implementing improvements.	Incorporate Complete Streets design principles in improvement project evaluation
	Consider the surrounding environment and incorporate context-sensitive solutions in improvement project design
	Consider designation of historic and scenic byways to promote conservation of historic and natural resources
Improve routes and connections to intermodal facilities for freight traffic, mass transit, and agricultural vehicles.	Develop standard routes to destinations and through the county with municipalities, business owners, and freight operators
	Improve mass transit service connections with destinations in the county with municipalities, land owners, and transit operators
	Develop standard routes for agricultural vehicles to destinations and through the county with municipalities and farm owners and operators
Link transportation objectives to sustainable economic development, community development, and environmental protection.	Promote sustainable economic development and efficient goods movement and convenient access to jobs and services, without adversely impacting livability and quality of life
	Promote sustainable communities and vibrant downtowns, thriving business corridors, livable neighborhoods, and welcoming tourist attractions and hospitality areas
	Protect air quality, the natural environment, open spaces, farmland, and rural quality of life
Identify and collaborate with equitable partners (stakeholders and co-sponsors) to help implement the county highway plan.	Continue interagency coordination with DVRPC, NJDOT, NJ Transit, Joint Base McGuire-Dix-Lakehurst (JB-MDL), Cross County Connection Transportation Management Association (CCCTMA), etc.
	Continue to use the County Planning Board's Land Development Review Resolution to implement the County Highway Master Plan's criteria, standards, and proposals through the land development review process
	Publish the County Planning Board's Land Development Review Resolution and County Highway Master Plan online to better inform the public about the latter's criteria, standards, and proposals

Sources: Burlington County, 2017; DVRPC, 2017

Regional Setting

Burlington County is located in southern New Jersey within the Greater Philadelphia metropolitan area (**Figure 1**). There are 40 municipalities in Burlington County. As the largest county by area in New Jersey, it boasts a diverse range of land uses. The Burlington Township/Haines Industrial Freight Center, a DVRPC Mega Freight Center, is located along Burlington County's northern border with the Delaware River by the NJ Turnpike 6A Interchange. The southern part of the county hosts a portion of the Pinelands National Reserve, the largest body of open space on the Mid-Atlantic seaboard between Boston, Massachusetts, and Richmond, Virginia. County roads provide vital connections to these and other destinations in Burlington County.

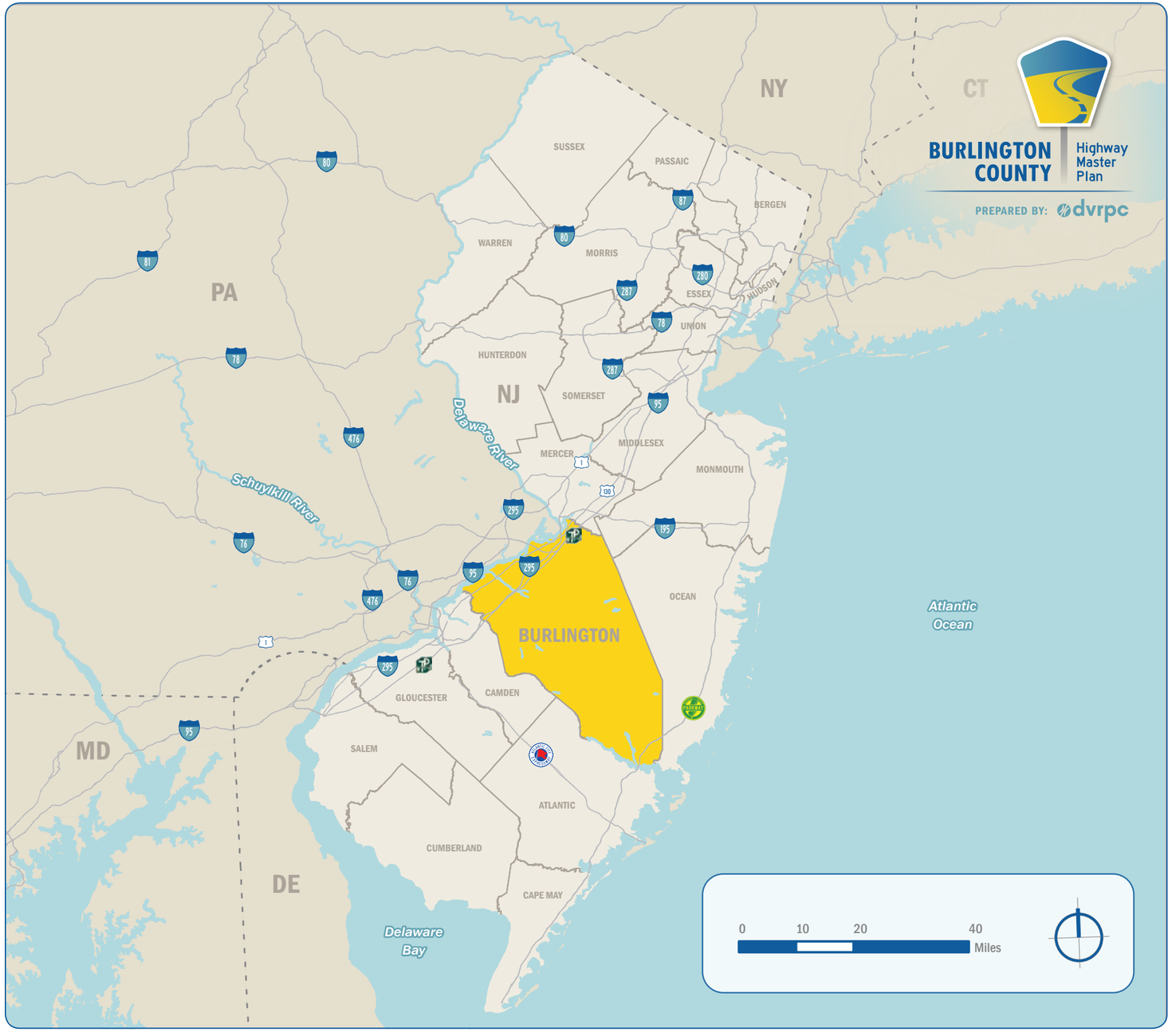
Land Use

At 820 square-miles in area, Burlington County is the largest county in the State of New Jersey. Its land uses are extremely diverse. While more intensive land uses are concentrated in the northern third of the county, the majority of the county's land area is dedicated to recreational, agricultural, and preserved lands. Furthermore, Burlington County has direct access to the Delaware River and the Mullica River, which extends into the Atlantic Ocean from the Pinelands.

Since its opening in 2004, the NJ Transit RiverLINE, a light rail passenger line, has spurred the revitalization of northern Delaware River waterfront towns. The NJ Turnpike Interchange 6A (between the NJ Turnpike and US 130) is another important component of the transportation infrastructure in this part of the county. The RiverLINE and new industrial development near Interchange 6A have helped expand and modernize the freight, manufacturing, and industrial uses that historically characterized the riverfront in Florence and Burlington townships.

South of US Route 130, residential communities and commercial centers define the county's active suburban zone. Agricultural preservation areas and Joint Base McGuire-Dix-Lakehurst form a partial buffer between the suburbs and the Pinelands in the southeast. The Pinelands—a 1.1-million-acre, natural and cultural preserve—extend eastward to the Great Bay near the Atlantic Coast.

Figure 1: Regional Setting with Major Highways



Source: DVRPC, 2018

Population and Employment Data

Burlington County comprises 40 municipalities. In 2013, the county was home to over 450,000 residents and approximately 240,000 jobs. By 2040, the county is expected to be home to almost 490,000 residents (9 percent change) and approximately 261,000 jobs (7 percent change). The number of job opportunities is forecasted to grow by approximately the same rate as the population. Evesham and Mount Laurel townships will continue to have the most residents and jobs through 2040, although these two established municipalities will experience comparatively little growth. On the other hand, strong growth is forecasted for municipalities in the suburban band between the River Corridor and the protected areas by 2040. For example, the population of Mansfield Township is expected to increase by 34 percent, and the number of jobs will almost double. Florence Township, which is where most of the new warehouses and distribution centers are located, will boast the largest increase in employment; the number of jobs is expected to increase by approximately 6,000 by 2040 (see **Table 2**). The 2040 projections were provided by Burlington County as an update to previously adopted DVRPC Long-Range Plan projections. The county's estimates were prepared using a parcel-based zoning build-out analysis for each traffic analysis zone (TAZ) in each municipality, accounting for environmental restrictions, future sewer service area connections, redevelopment opportunities, and local government farmland and open space preservation objectives.

Travel Patterns and Transportation Facilities

In 2010, 54 percent of the county's employed residents worked within Burlington County, and 34 percent worked in the adjacent counties. Because of Burlington County's strategic location within the bi-state region and its high degree of inter- and intrastate connectivity, the County experiences significant amounts of "pass-through" traffic on its state, county, and municipal roadways.

Public transportation options include the NJ Transit RiverLINE service between Camden and Trenton—accessible via 11 stations in Burlington County. Ten scheduled NJ Transit bus routes operate within the county. Service is primarily focused on access to Philadelphia and Camden, but Trenton and Asbury Park are also route destinations. Three BurLINK bus routes (community shuttles operated for the county by the South Jersey Transportation Authority [SJTA]) extend the reach of the RiverLINE to communities and business centers near the Beverly and Florence stations.

Despite the availability of these services, in 2010, only 3 percent of the county's employed residents used public transit to reach work. Ninety-one percent of the workers commuted by private motorized vehicle. With regard to inbound commuter trips from outside the county, just 2 percent were completed by public transit, and 97 percent of workers drove into Burlington County by private vehicles.

A little over 3,500 miles of roads, streets, and highways traverse the county. The interconnected system is owned and maintained by the State of New Jersey, Burlington County, the 40 municipalities in the county, the NJ Turnpike Authority, the federal government (in the case of roads inside the Joint Base Area) and, to a smaller extent, private entities. Every road, street, or highway serves a function. Freeways serve long-distance trips at high speeds, and they carry the highest traffic volumes. Local roads and streets provide access to properties and serve low traffic volumes at low speeds. Arterial and collector highways serve both functions—providing greater mobility and land access—and serve a wide range of traffic demands.

The county is responsible for operating conditions along, and the structural integrity of, its system of roads. Because of Burlington County's strategic location within the bi-state region and its high degree of inter- and intrastate connectivity, the County experiences significant amounts of "pass-through" traffic on its state, county, and municipal roadways. The CR network is part of an interconnected transportation system; therefore, the evaluations and base mapping include state routes and other elements of the transportation system.

Potential sources for federal and state funding assistance for highway improvements are based on functional classification. In terms of function, the three highway networks (state, county, and municipal) fit together and complement one another. With assistance from the federal and state departments of transportation, Burlington County has strategically implemented an interconnected and coordinated traffic signal system to monitor and regulate traffic flow along the CRs. The signal system is used to address recurring rush hour traffic congestion and to manage traffic diversions due to incidents on the freeway system. It can also be employed during evacuations due to natural or national emergencies.

American Asphalt Company manufacturing plant on River Road in Burlington Township. Source: DVRPC, 2016

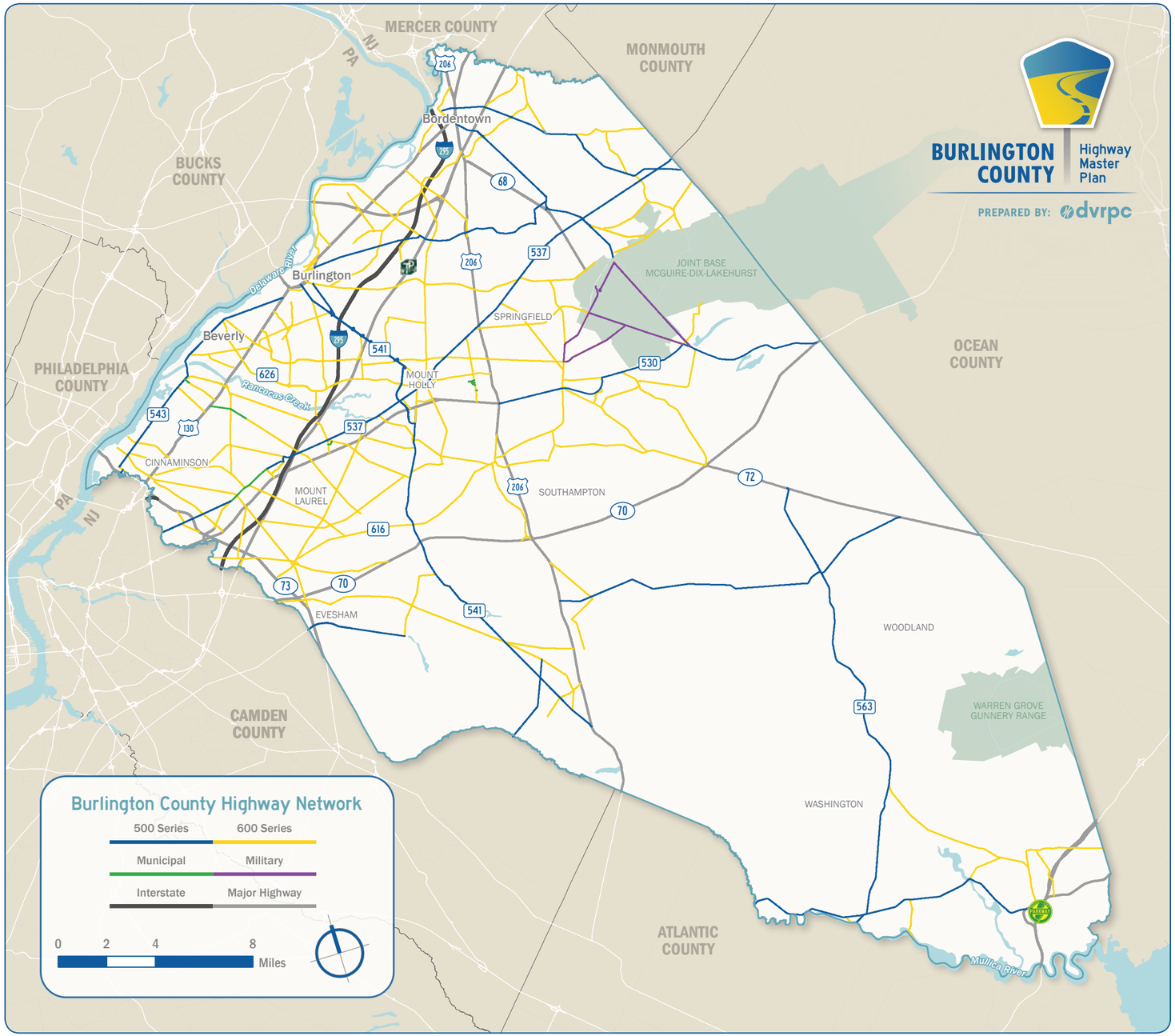
Pedestrian facilities at the intersection of Chester Avenue (CR 603) and Second Street in Moorestown. Source: DVRPC, 2017

Table 2: Estimated Population and Employment for 2013 (Base–Year) and 2040 (Future–Year)

	Population				Employment			
Municipality	2013 Estimate	2040 Estimate	Absolute Change	Percent Change	2013 Estimate	2040 Estimate	Absolute Change	Percent Change
Bass River Township	1,444	1,458	14	1%	1,519	1,534	15	1%
Beverly City	2,594	3,121	527	20%	454	465	11	2%
Bordentown City	3,927	4,313	386	10%	1,335	1,343	8	1%
Bordentown Township	11,395	12,332	937	8%	5,499	5,664	165	3%
Burlington City	9,929	11,319	1,390	14%	4,704	6,161	1,457	31%
Burlington Township	22,636	24,300	1,664	7%	14,855	18,397	3,542	24%
Chesterfield Township	7,728	8,182	454	6%	811	813	2	0%
Cinnaminson Township	15,580	16,259	679	4%	9,396	9,599	203	2%
Delanco Township	4,311	4,676	365	8%	1,071	1,737	666	62%
Delran Township	16,906	17,360	454	3%	6,216	6,361	145	2%
Eastampton Township	6,102	7,764	1,662	27%	999	1,021	22	2%
Edgewater Park Township	8,909	10,042	1,133	13%	2,438	3,770	1,332	55%
Evesham Township	45,608	47,560	1,952	4%	26,067	26,623	556	2%
Fieldsboro Borough	541	541	-	0%	82	83	1	1%
Florence Township	12,203	13,387	1,184	10%	3,297	9,325	6,028	183%
Hainesport Township	6,174	7,066	892	14%	2,952	3,099	147	5%
Lumberton Township	12,684	13,150	466	4%	6,163	6,444	281	5%
Mansfield Township	8,639	11,538	2,899	34%	2,429	4,419	1,990	82%
Maple Shade Township	19,145	19,389	244	1%	6,147	6,304	157	3%
Medford Lakes Borough	4,148	4,151	3	0%	704	711	7	1%
Medford Township	23,154	26,004	2,850	12%	11,569	11,860	291	3%
Moorestown Township	20,795	22,199	1,404	7%	28,118	29,040	922	3%
Mount Holly Township	9,545	10,704	1,159	12%	6,622	4,881	–1,741	–26%
Mount Laurel Township	41,997	44,526	2,529	6%	31,746	32,635	889	3%
New Hanover Township	7,387	7,452	65	1%	26,101	26,104	3	0%
North Hanover Township	7,749	8,084	335	4%	1,457	1,469	12	1%
Palmyra Borough	7,392	7,839	447	6%	1,901	1,910	9	0%
Pemberton Borough	1,410	1,480	70	5%	496	501	5	1%
Pemberton Township	28,012	31,687	3,675	13%	6,339	4,984	–1,355	–21%
Riverside Township	8,099	9,031	932	12%	1,576	1,615	39	2%
Riverton Borough	2,780	2,798	18	1%	738	745	7	1%
Shamong Township	6,493	6,945	452	7%	1,428	1,439	11	1%
Southampton Township	10,468	12,730	2,262	22%	3,506	3,531	25	1%
Springfield Township	3,449	4,173	724	21%	1,158	1,164	6	1%
Tabernacle Township	6,952	8,366	1,414	20%	1,924	1,940	16	1%
Washington Township	687	693	6	1%	265	268	3	1%
Westampton Township	8,888	10,659	1,771	20%	8,980	13,402	4,422	49%
Willingboro Township	31,737	32,781	1,044	3%	8,776	8,871	95	1%
Woodland Township	1,788	1,804	16	1%	387	390	3	1%
Wrightstown Borough	806	1,006	200	25%	1,384	1,393	9	1%
Burlington County	**450,191**	**488,869**	**38,678**	**9%**	**244,843**	**261,136**	**16,293**	**7%**

Sources: Burlington County, 2017; DVRPC, 2017

Figure 2: CR Network



Sources: Burlington County 2018; DVRPC 2018

The County Route (CR) Network

The 529-mile-long CR network, shown in **Figure 2**, is vital to everyday movement in the county. It carries NJ Transit and BurLINK bus routes, provides access to rail stations along the NJ Transit RiverLINE, and serves as a scenic route network in the Pinelands. For this project, performance indicators for the CR network, as well as land use conditions, were assembled for current and forecasted future conditions.

Burlington County owns and maintains 99 CRs (see **Table 3**). The County's 529-mile-long highway system has its own functional hierarchy, denoted by the CR series. Burlington County has 500-series, 600-series, and 700-series CRs.

The 500-series routes are the CRs of the highest order. These routes are the longest, traverse multiple counties in some cases, and serve the highest traffic volumes. While more numerous in mileage, as shown in **Table 3**, the 600-series routes are secondary county roads that serve shorter trips. Therefore, these routes do not have as significant an impact on mobility. The only 700-series CR in Burlington County is CR 782, Matthews Lane.

Table 3: CR Mileage by Functional Class and Series

Highway Functional Classification	500-Series (11 routes)	600-Series (87 routes)	700-Series (1 route)
Principal Arterial	39 miles	13 miles	-
Minor Arterial	53 miles	137 miles	-
Major Collector	79 miles	140 miles	-
Minor Collector	-	9 miles	-
Local	1 mile	57 miles	1 mile
Total	**172 miles**	**356 miles**	**1 mile**

Source: Burlington County, 2016

Highway Functional Classification

NJDOT uses the federal functional classification system for roadways in New Jersey. The federal functional classification system is a framework for identifying the role of a roadway in moving vehicles through a highway network. Highway functional classes set expectations about roadway design, speed, capacity, and surrounding land uses. All functional classification categories exist in both rural and urban areas. Federal legislation uses functional classification in determining eligibility for funding under the Federal-aid program. Roads in Burlington County fall under all seven federal functional classes (**Figure 3**), which are defined below.

Interstate

» These highways are designed for long-distance travel and designated as Interstates by the Secretary of Transportation. I-295 is the only Interstate in Burlington County.

Freeway/Expressway

» These highways are very similar in design to Interstates; they are limited access highways designed for long-distance travel. The NJ Turnpike is the only Freeway/Expressway in Burlington County.

Other Principal Arterial

» These roadways provide a high degree of mobility to and through major centers and may serve abutting land uses. The two US routes in the county (US 130 and US 206), CR 70, and CR 543 are Other Principal Arterials.

Minor Arterial

» Minor Arterials are designed for trips of moderate length, and they serve smaller geographic areas. Many of the CRs are Minor Arterials, such as CR 607 and CR 537.

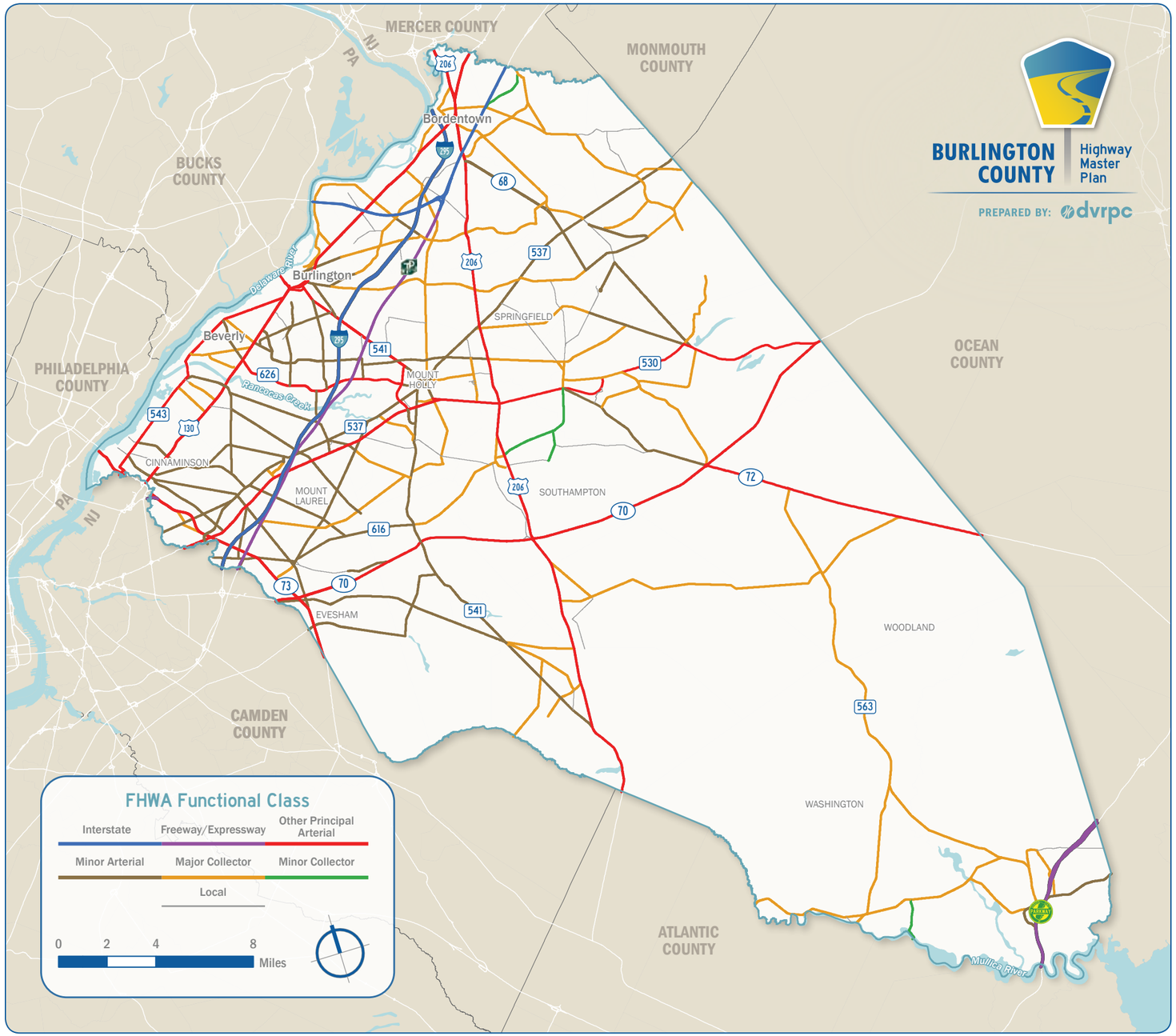
Major Collector/Minor Collector

» Collectors channel traffic from Local Roads onto Arterials. In Burlington County, Minor Arterials and Major Collectors have similar design characteristics. There are many Major Collectors, particularly throughout the New Jersey Pinelands Area. Minor Collectors serve the same purpose as Major Collectors, but are characterized by lower speeds and higher connecting driveway densities, such as CR 616.

Local

» Local roads are primarily residential streets and are not intended for long-distance travel.

Figure 3: FHWA Highway Functional Class



Source: FHWA, 2018; NJDOT, 2018

CHAPTER 2
EVALUATION METHODOLOGY

The TMP

The TMP is rooted in the DVRPC Congestion Management Process (CMP), which provides medium-term planning to strengthen the connection between the LRP and the regional Transportation Improvement Program (TIP). Federal regulations require that alternatives to building new single occupancy vehicle (SOV) road capacity be explored. Even where new capacity is found to be appropriate and necessary, multimodal supplemental strategies must be included to get the most long-term value from the investment. The TMP identifies these multimodal strategies for specific corridors, and projects that add SOV capacity must be consistent with the TMP in order to be eligible for federal funding.

Regional Travel Demand Model

The first step in evaluating segments to identify appropriate TMP strategies was to estimate current and forecasted future travel patterns using DVRPC's regional travel demand model. Travel demand modeling was performed for the county to estimate vehicular travel demands and consequences for a 2013 base-year and 2040 future-year scenario.

The 2040 Master Plan (MP) Scenario was based on DVRPC's 2040 LRP. The scenario estimated travel conditions assuming the implementation of the mobility-enhancing projects listed in **Table 4**. The county planning office modified the DVRPC Board-adopted population and employment forecasts based on their knowledge of upcoming development projects that were initiated, changed, or finalized after the LRP demographic forecasts were developed. The county-modified demographics estimated an 8.6 percent increase in population and 6.7 percent increase in employment.

Travel modeling results were used in conjunction with crash data and other transportation, land use, and community planning criteria as inputs to the TMP evaluation methodology. The results of the evaluation identify segments or areas of the highway system that warrant attention. The methodology supplies candidate improvement strategies for County decision making. Strategies are delivered in priority order to maintain and modernize the existing transportation system (first), manage or reduce travel demands (second), or accommodate (last) SOVs with new travel lanes or new roads.

Table 4: Mobility-Enhancing Projects Included in the 2040 MP Scenarios

LRP Mobility Enhancing Projects in the 2040 Model	
Year	**Description**
2015	NJ Turnpike, Interchange 6 to Interchange 8A; widen to 12 lanes
2015	Widen Garden State Parkway to 6 lanes from MP 48 to MP 80
2017	Widen Garden State Parkway to 6 lanes from MP 35 to MP 48
2020	South Pemberton Road, US Route 206 to CR 644; install center-turn lane; relocate intersection, new ramp
2020	Widen Garden State Parkway from MP 30 to MP 35
Planned/Committed County-Approved Mobility-Enhancing Projects Added to the 2040 Model	
Improvement	**Location**
Dultys Lane at CR 658	Burlington Township
Church Road and NJ 73 Interchange	Mount Laurel Township
Fellowship Road and NJ 73 Interchange	Mount Laurel Township
Rising Sun Road and Dunns Mill Road Connector	Bordentown Township
US Route 130 and Florence-Columbus Road	Florence Township
Burr Road Connector	Westampton Township
Pennypacker Drive/Delanco Road/US Route 130	Edgewater Park Township, Willingboro Township
Hartford Road and Marne Highway	Mount Laurel Township
South Pemberton Road	Pemberton Borough
4 Roundabouts	Throughout the county
Removal of Centerton Road Bridge over Rancocas Creek	Mount Laurel, Westampton, Willingboro

Sources: Burlington County 2017; DVRPC 2017

Preparing Model Results for TMP Evaluation

This TMP evaluation method was applied at the county level to assign strategies to CR segments. For this analysis, segments within the modeled network were aggregated in the GIS database to reduce data requirements and processing while maintaining transportation system characteristics (traffic volumes, highway cross sections, functional classification, etc.) as refined as possible. The county reviewed segmentation, and changes were made where deemed necessary. In most cases, segments became shorter, allowing for a more refined analysis. The 2,341 detailed CR segments used in the model were aggregated and reduced to 576 CR study segments with an average segment length of 1.49 miles. Segments were formed by combining adjacent links with common attributes (cross section, functional classification, etc.) between intersecting CRs or other key intersections.

Composite Score Calculation

The TMP evaluation method was used to determine the types of appropriate strategies. Scores were assigned to roadway segments based on criteria for the seven TMP scoring groups listed below. The TMP composite score is the sum of the measured values for each segment.

Reduce Congestion

- Travel Time Index (TTI) | Base-Year volume-to-capacity ratio (V/C) | V/C Growth of 30 percent or more to 2040

Increase Mobility and Accessibility

- Transit Score | Rail Stations within 1 mile | Planning Time Index

Infrastructure

- NHS | Transit Routes | Freight Rail and Centers

Safety

- Crash Rate 2 or more times the rate for the functional class in NJ counties, where links have V/C greater than 0.50.

Security

- Density of Households or Employment 2x regional average | Heavily used transit stations, nuclear plants, stadiums, bridges

Land Use/Support Plan Principles

- LRP Centers | Infill and Redevelopment Areas

Environment

- Environmental Index – Low Impact

CHAPTER 3
CONDITIONS, RESOURCES, AND FUNDING

Application of the Evaluation Methodology

The evaluation methodology described in **Chapter 2** was applied uniformly to the entire highway system, regardless of route ownership, in order to facilitate comprehensive decision making. Results for the CR network are separated from results for the state and authority highway systems in the GIS database and the Web Map.

Segment records are described (CR/state route number, name, and limits), contain modeled traffic volumes (current, 2040 LRP, and 2040 MP), and are assigned conditional values computed through the official regional TMP method, or attributed characteristics depending upon the nature of the lands they traverse. The combined fields provide a comprehensive inventory for measuring and evaluating conditions, constraints, and opportunities, and for judging strategies.

Framework of Project Deliverables

The GIS database and Web Map include layers related to roadway conditions, countywide resources, and improvement strategies for Burlington County. Conditions criteria provide important information regarding the CR network's current performance. Resources include factors that affect travel and transportation in the county, such as environmental and cultural assets. Finally, strategies include planned infrastructure projects and the county-specific TMP strategies that resulted from the analysis of all criteria. A description of these fields precedes the cartographic representation of the relevant criteria.

Cartographic Representation

The conditions, resources, and strategies are all represented cartographically in this chapter. The full Web Map framework of project deliverables is summarized in **Table 5** on the following pages. This table describes each GIS layer that contains spatially referenced data for each evaluation criterion. In the GIS database and on the Web Map, each criteria is a unique layer, and layers can be viewed simultaneously or individually. However, in this report, related layers are combined to synthesize the information and provide a more comprehensive view of particular topics.

Marne Highway (CR 537) between Masonville Centerton Road and Creek Road is a Minor Arterial within the Urban Area. Source: DVRPC, 2017

Table 5: Web Map Framework of Project Deliverables

CONDITIONS

Category	Parameter	Parameter Description	Mapping Code
Technical Analysis Results	2015 Traffic Safety	Average Crash Rate by Highway Functional Classification	0.00x to 0.99x 1.00x to 1.99x 2.00 and greater
Technical Analysis Results	2013 Traffic Congestion	Base-year rush hour traffic volume to roadway capacity (V/C) ratio	0.00 to 0.84 0.85 to 0.99 1.00 and greater
Technical Analysis Results	2040 Long-Range Plan Traffic Congestion	Forecasted traffic volume to roadway capacity (V/C) ratio	0.00 to 0.84 0.85 to 0.99 1.00 and greater
Technical Analysis Results	2040 Highway Master Plan Traffic Congestion	Forecasted traffic volume to roadway capacity (V/C) ratio	0.00 to 0.84 0.85 to 0.99 1.00 and greater
Technical Analysis Results	2010 Transit Score	DVRPC's assessment of an area's population and employment to indicate appropriateness of transit service and level of transit investment	Low (0.00 to 0.59) Marginal (0.60 to 1.00) Medium (1.01 to 2.50) Medium-High (2.51 to 7.50) High (greater than 7.50)
Technical Analysis Results	Traffic Management Process Composite Score	DVRPC's evaluation of a highway segment's transportation and land use characteristics for needs	Satisfactory (0.00 to 4.99) Warrants Attention (5.00 and greater)
Technical Analysis Results	2010 Roadway Connectivity Index	3+ legged intersections per square mile within traffic analysis zone (TAZ)	Low (0.00 to 19.99) Marginal (20.00 to 49.99) Medium (50.00 to 99.99) Medium-High (100.00 to 179.99) High (180.00 and greater)
Technical Analysis Results	Candidate County Road Addition	County Road Addition Candidate	Y

RESOURCES

Category	Parameter	Parameter Description	Mapping Code
TMP	2015 TMP Planning Corridors	2015 New Jersey TMP Corridors	Corridor ID and Name
Highway Planning Structures	National Highway System	Roadways important to the nation's economy, defense, and mobility; includes Interstates, Other Principal Arterials, Strategic Highway Network (STRAHNET), Major Strategic Highway Network Connectors, and Intermodal Connectors.	Y N
Highway Planning Structures	Incident Management Network	Hurricane evacuation routes	Y N

Category	Parameter	Parameter Description	Mapping Code
Highway Planning Structures	Incident Management Network	Expressway detour routes	Y N
Alternate Modes	Train Station Within 1 Mile	Rail service within one mile of CR segment.	Y N
Alternate Modes	New Jersey Transit Bus Service	Number of Weekday Bus Routes	0 1 2 2 or more
Alternate Modes	BurLINK Shuttle Bus Service	One-quarter-mile buffer	N/A
Alternate Modes	Park-and-Ride Lots	Existing park-and-ride lots and locations identified for potential new park-and-ride lots	Existing Identified Opportunity
Alternate Modes	On-Road Bicycle Network	CCCTMA (2015)	Existing Facility Proposed Facility
Activity Centers	Land Use Centers	Land Use Plan Type	County-Defined Center
Activity Centers	Business Centers	DVRPC Business Centers	N/A
Activity Centers	Freight Centers	DVRPC Freight Centers	N/A
Community Planning Elements	2040 Planning Area Type	2040 Long-Range Planning Areas	Developed Community Growing Suburb Rural Area
Community Planning Elements	Designated Scenic Byway	Roads that are of archaeological, cultural, historic, natural, recreational, or scenic significance.	Y N
Community Planning Elements	Cultural, Historical, and Community Resources	Historic sites, municipal services, or schools.	Historic Sites Municipal Services School
Community Planning Elements	NJ Pinelands Area	Boundaries of the NJ Pinelands National Reserve (U.S. National Park Service)	N/A

STRATEGIES: 2040 LRP AND 2040 HIGHWAY

Category	Parameter	Parameter Description	Mapping Code
Existing Plans, Programs, and Projects	2015 Highway Safety Improvement Program—Eligible Roadway	Roadways eligible for HSIP improvements	Pedestrian Corridor High Risk Rural Road
Existing Plans, Programs, and Projects	2015 Highway Safety Improvement Program—Eligible Intersection	Intersections eligible for HSIP improvements	Intersections Pedestrian Intersections
Existing Plans, Programs, and Projects	New Jersey Transportation Improvement Program (TIP) (FY 2016 to 2019)—Bridges/Intersection	Bridges and intersections included in the NJ TIP	TIP No./Project Description
Existing Plans, Programs, and Projects	New Jersey Transportation Improvement Program (TIP) (FY 2016 to 2019)—Roadway	Roadways included in the NJ TIP	TIP No./Project Description

Category	Parameter	Parameter Description	Mapping Code
Existing Plans, Programs, and Projects	Burlington County Public Works Improvement Project		Project Description
Candidate 2040 Long-Range Plan Improvement Strategies	Traffic Management Strategies for 2040 Long-Range Plan	TMP strategy options are the result of the 2013 and 2040 LRP Scenario modeling	Operational Strategies
			Transportation Demand Management Strategies
			Strategies to Increase Existing Transportation System Capacity
			Strategies to Add New Transportation System Capacity
			Goods Movement Strategies
Candidate 2040 Highway Master Plan Improvement Strategies	Traffic Management Process Inventory of Appropriate Strategies	TMP strategy options are the result of the 2013 and 2040 MP Scenario modeling	Operational Strategies
			Transportation Demand Management Strategies
			Strategies to Increase Existing Transportation System Capacity
			Strategies to Add New Transportation System Capacity
			Goods Movement Strategies

RIGHT-OF-WAY

Category	Parameter	Parameter Description	Mapping Code
Planning and Development Review Tools	Ultimate Right-of-Way (ROW)	Defines width of individual roadway design elements in feet for each CR segment based on assigned functional classification and urban/rural area boundaries (U.S. Department of Transportation Federal Highway Administration's [FHWA's] Highway Functional Classification System [HFCS]). This layer should be used as a reference for CR segments with a V/C ratio of 0.85 or greater.	62
			80
			100
			125
			150
Planning and Development Review Tools	Capacity Assessment	Potential need to increase roadway capacity, based on a base and/or future-year V/C ratio of 0.85 or greater	Y
			N
Planning and Development Review Tools	Desired Typical Cross Section	Desired typical cross sections for CRs within NJDOT Urban area. Design element characteristics are based on assigned functional classification, urban/rural area boundaries, and the potential need to increase roadway capacity. This layer should be used as a reference for roadways with a V/C ratio less than 0.85.	**Same as Existing**
			All Functional Classes (Rural Area)
			Maintain
			Local Road (Urban Area)
			Major Collector (Urban Area)
			Minor Arterial (Urban Area)
			Minor Collector (Urban Area)
			Principal Arterial (Urban Area)
			Widen
			Major Collector (Urban Area)
			Minor Arterial (Urban Area)
			Principal Arterial (Urban Area)
Planning and Development Review Tools	NJDOT Urban Area	Urban Area boundaries as determined by the HFCS.	

Source: DVRPC, 2018

Conditions

The conditions analysis includes snapshots of measurable information about the county's road network. This information was used as part of the evaluation method to help identify location-appropriate improvement strategies. These measurable elements include traffic safety and congestion values. Some of the conditions presented are inputs of the official TMP evaluation method and composite score calculation, while others were used to provide context for decision making.

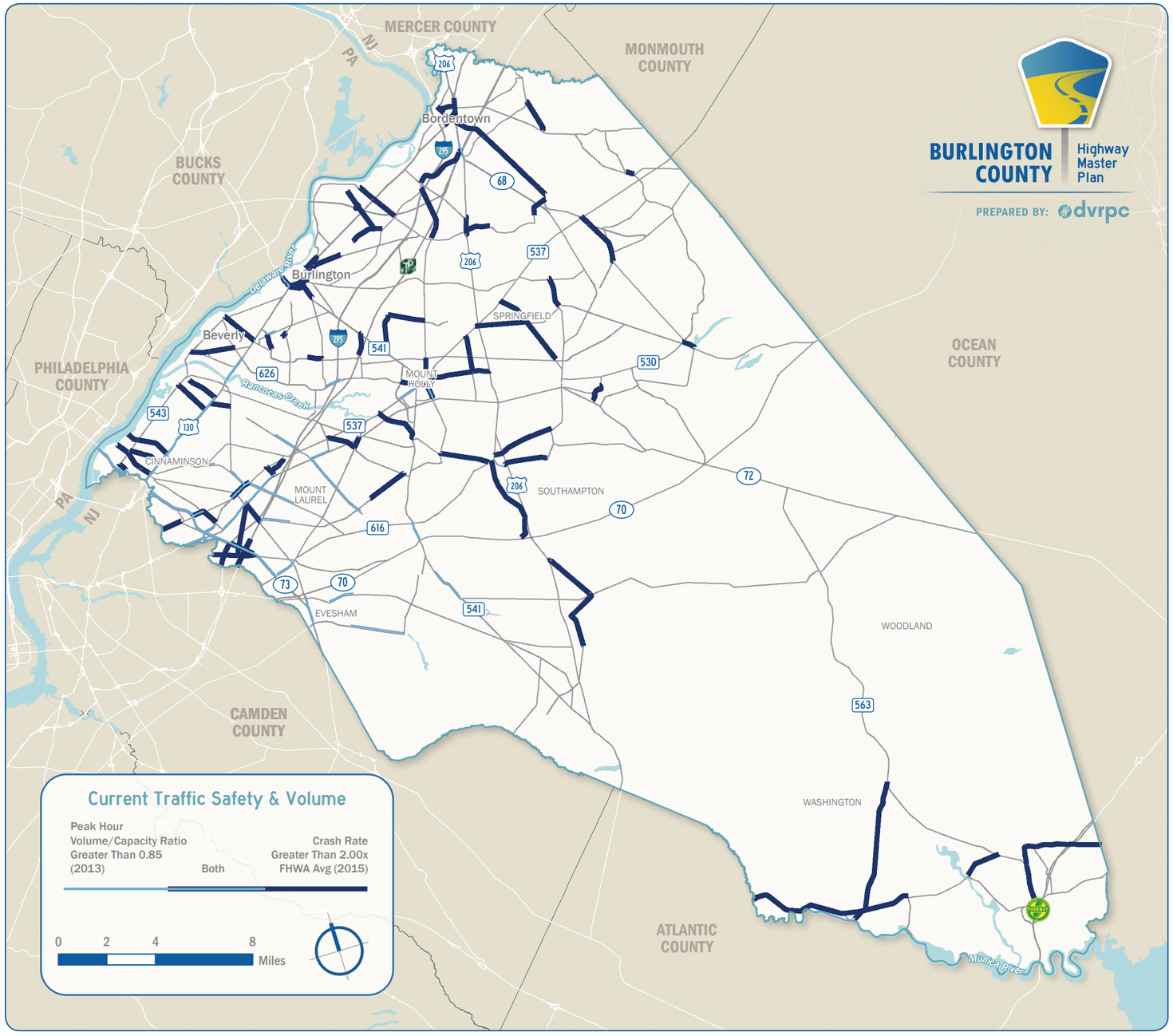
2015 Traffic Safety

Figure 4 shows those CR segments with a crash rate greater than or equal to two times the FHWA average for the specific functional class in New Jersey. The crash rate is equal to number of crashes per 100 million vehicle miles of travel (VMT). This traffic score is based on 2015 crash statistics from NJDOT. Highway segment crash rates exceeding twice the regional average for similar highways are of particular safety concern.

2013 Rush Hour V/C

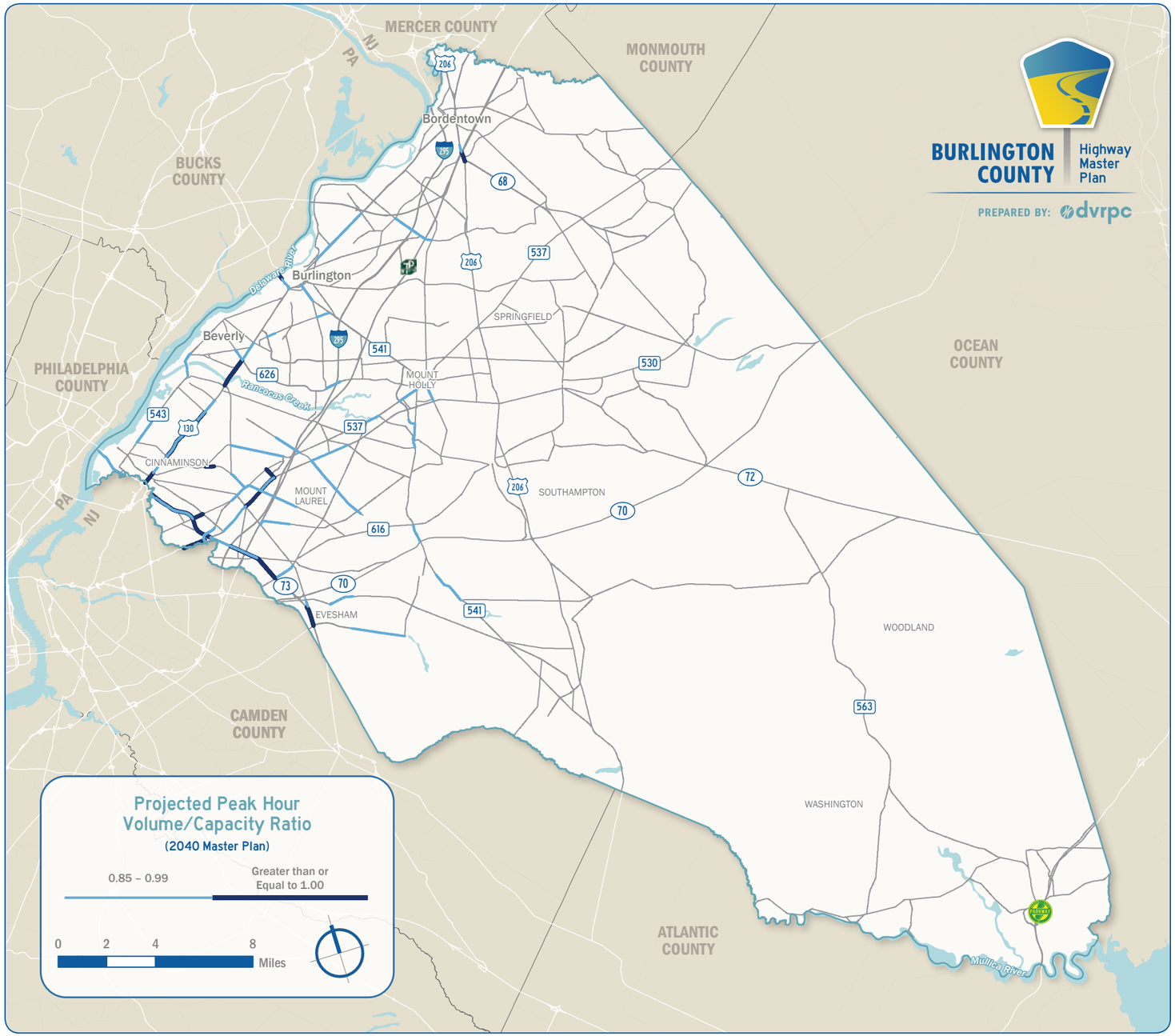
Figure 4 also shows those CR segments with a V/C ratio greater than or equal to 0.85. V/C stands for volume-to-capacity ratio and is used to represent how much of a roadway's capacity is used by the rush hour traffic volume. V/C ratios are a measure of traffic congestion, given prevailing traffic volume and roadway conditions. In theory, V/C ratios cannot exceed 1.00, but, in practice, they do. The threshold value of 0.85 indicates that the roadway is reaching its maximum vehicular capacity. The data shown in the map is the model-based V/C ratio for the current (2013 base-year) PM peak traffic hour. Highlighted roadways identify areas where some part of the segment is close to capacity during rush hour.

Figure 4: Existing Traffic Safety (2015) and V/C (2013)



Source: DVRPC, 2017

Figure 5: Forecasted 2040 Rush Hour V/C Ratio



Source: DVRPC, 2017

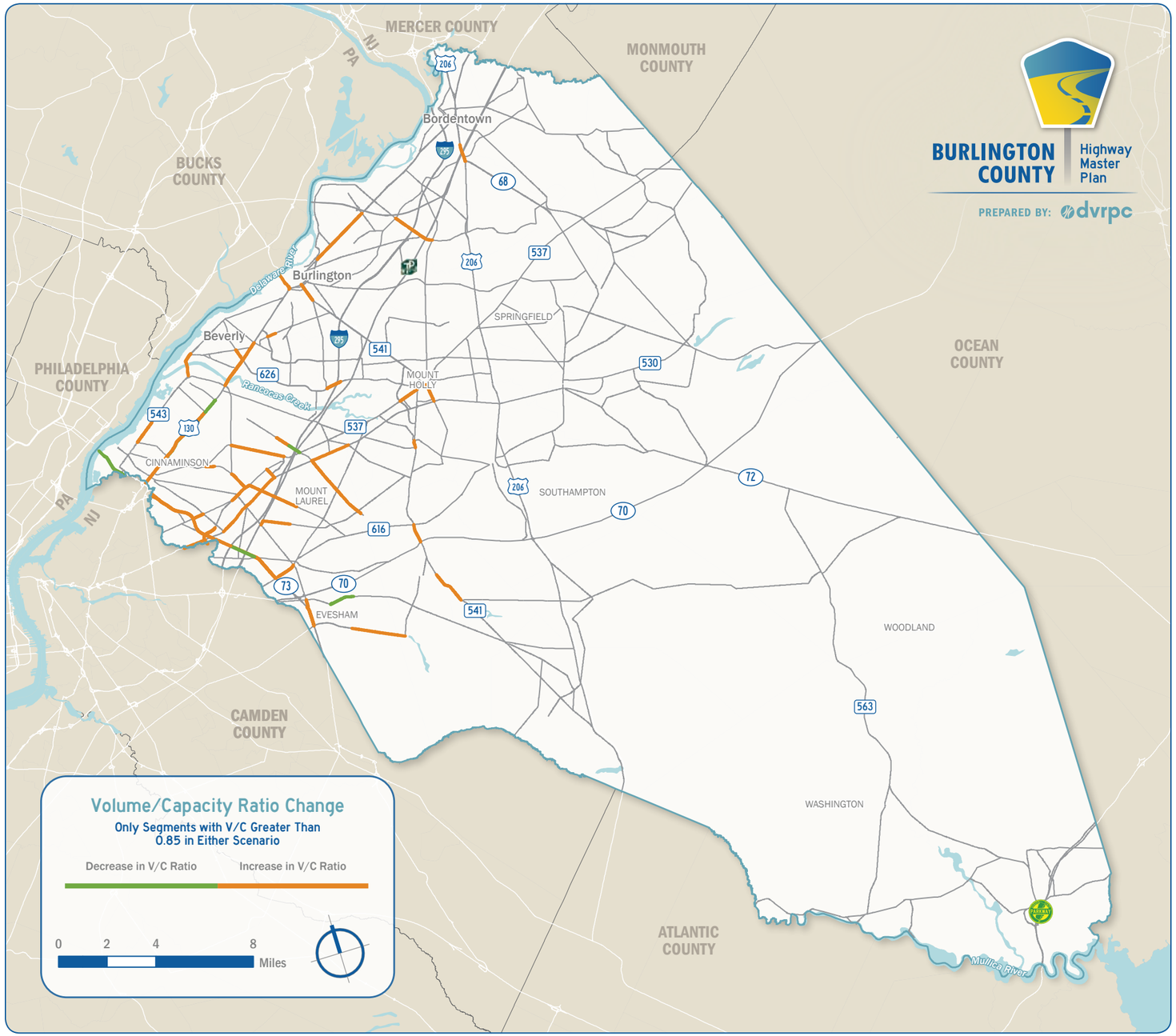
Forecasted 2040 Rush Hour V/C Ratio

Similar to the 2013 V/C Ratio map, **Figure 5** shows the V/C ratio for the PM peak traffic hour assuming the revised demographic forecasts and transportation improvements crafted by DVRPC and the county for the Year 2040 MP Scenario. Once again, a threshold value equaling or exceeding 0.85 is used to indicate forecasted volume's approach to the theoretical maximum capacity.

Base-Year (2013) and Forecast-Year (2040) Comparison

Figure 6 shows expected change in V/C ratio between the base-year (2013) and the forecast-year (2040). Roads shown in orange represent roadway segments where traffic is expected to increase, while roads shown in green show roadway segments where congestion is forecasted to be relieved.

Figure 6: 2013 to 2040 V/C Ratio Comparison



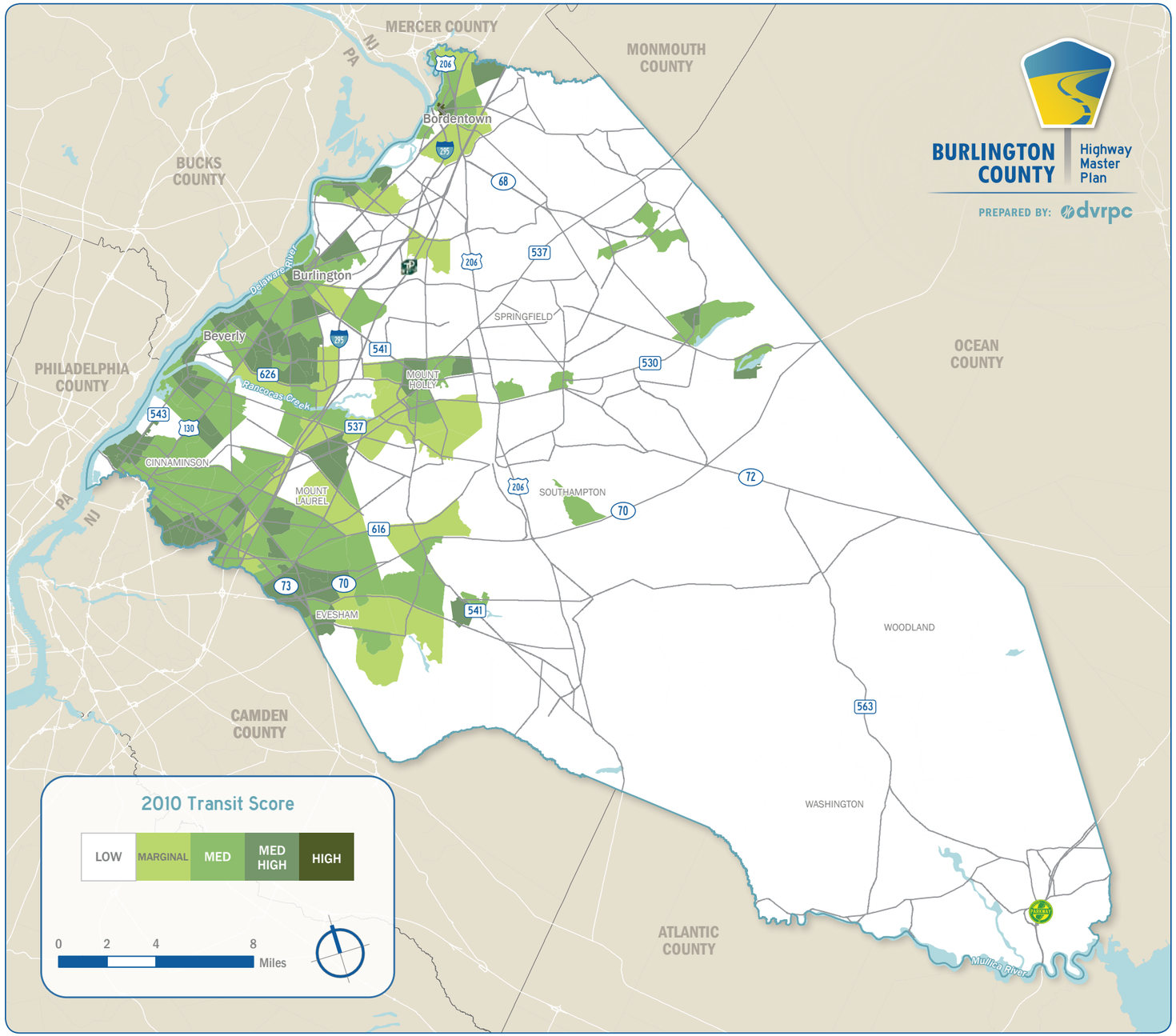
Source: DVRPC, 2018

Transit Score

The DVRPC transit score was used as an input for the TMP composite score calculation, which is described further in **Chapter 4**. The score indicates the appropriateness of transit service and transit investment based on the relationship between the following specific attributes: population density, employment density, and zero-car household density. Generally, denser areas are more transit-supportive environments; therefore, they are given higher transit scores. The higher the transit score, the greater the potential for that area to successfully support transit service. For more information about the transit score calculation, view the full report on the transit score calculation methodology here: www.dvrpc.org/Products/07005.

Figure 7 shows the 2010 transit score for Burlington County TAZs. The darker green indicates increased transit potential near highway links in Burlington County. Increased transit use can help alleviate traffic congestion, particularly during peak hours. When considered jointly with transit providers, such as NJ Transit, Burlington County, Joint Base MDL, private sector employers, and other operators, this indicator can help identify areas with potential for new bus service.

Figure 7: Transit Score (2010)



Sources: U.S. Census Bureau 2010 Census; NETS, 2010; NJ Transit Score Method; DVRPC, 2017

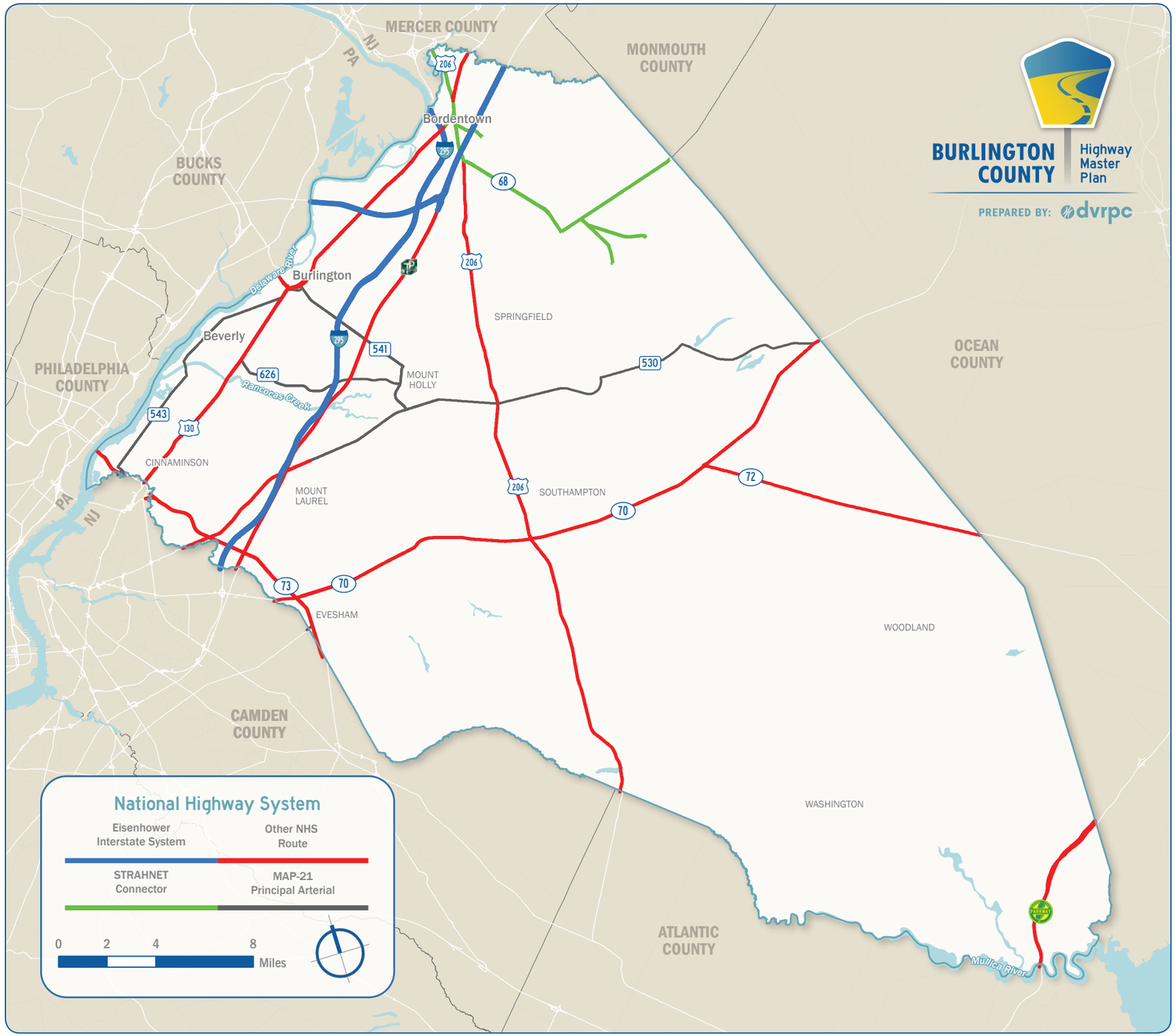
Resources

Resources include transportation, land use, and community planning attributes associated with the roadway segment or adjacent lands that may offer opportunities or pose constraints along a highway segment. This information can be used to help identify strategies for improvements and inform highway planning decisions. Some of the factors are embedded in the TMP evaluation method and composite score calculation.

National Highway System routes are important for interconnected travel and long-distance mobility, national security, and the nation's economy and competitiveness. They are approved by the United States Congress. A few are Burlington County CRs, as shown in **Figure 8**. Some NHS routes are part of the Strategic Highway Network (STRAHNET), critical for military mobilization for Joint Base MDL.

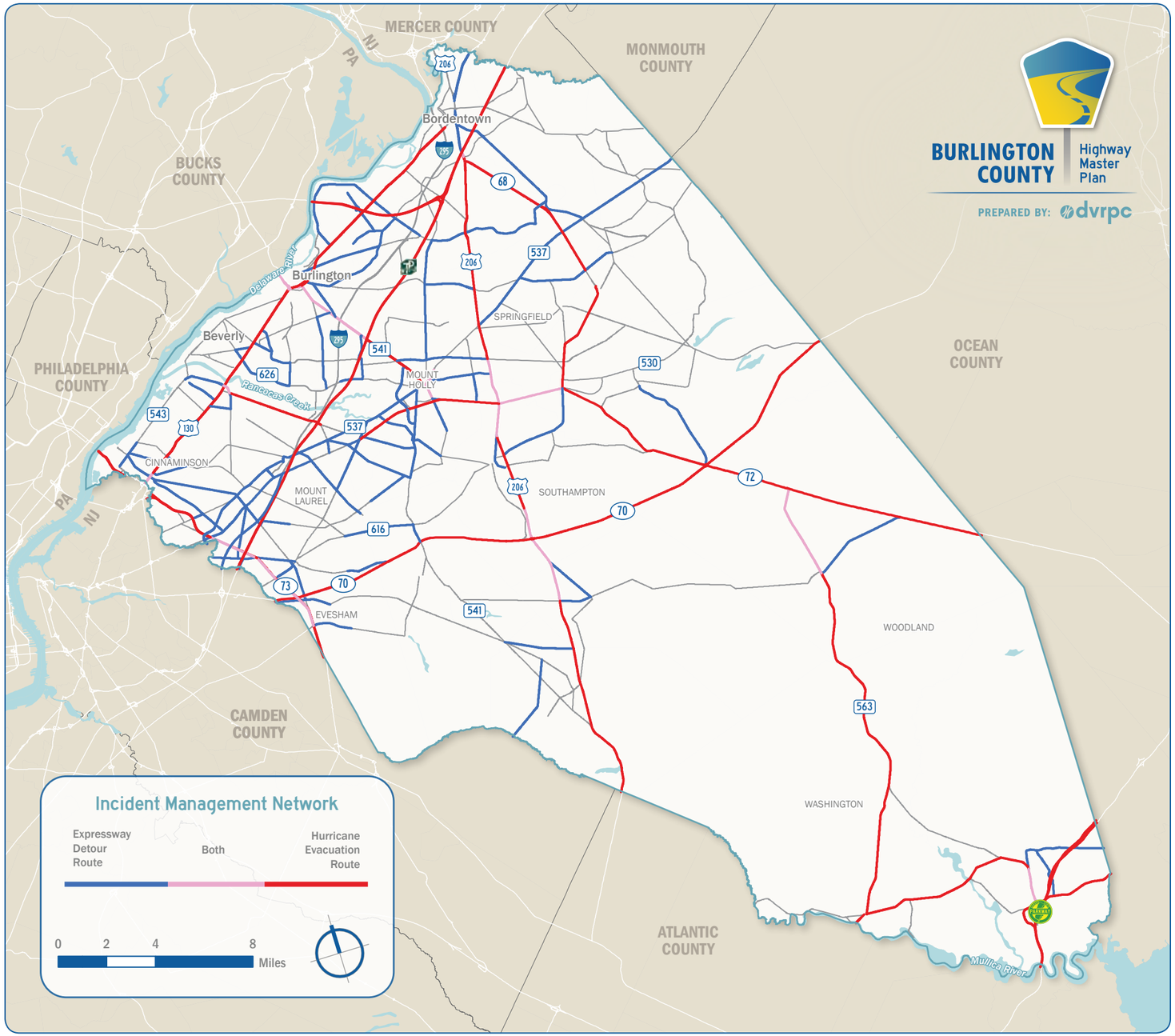
Discrepancies exist between agencies (FHWA and NJDOT) about the NHS and STRAHNET route designations in Burlington County. The agencies should work together to resolve these differences.

Figure 8: National Highway System (NHS)



Source: FHWA, 2018

Figure 9: Incident Management Network



Sources: DVRPC, 2017; NJDOT, 2017

Incident Management Network

The Incident Management Highway Network comprises regional highways and designated parallel or intersecting routes that are used to detour traffic during incidents (NJDOT) and weather emergencies (Homeland Security). Surveillance and communication equipment (Dynamic Message Signs), and electronic control systems are the backbone to detecting and managing traffic flow.

A number of CRs are part of the network (**Figure 9**). Traffic is directed to expressway detour routes in the event of an incident on the expressway. Hurricane evacuation routes are those roads that have been identified as evacuation routes in the event of a hurricane or tropical storm.

Train Station within One Mile

Northern Burlington County is served by the NJ Transit RiverLINE, a light rail line that runs parallel to US Route 130. The RiverLINE service encompasses 21 stations and serves local communities in central and southern New Jersey. The stations provide connections to Amtrak, NJ Transit, and Southeastern Pennsylvania Transportation Authority (SEPTA) Regional Rail lines, the Port Authority Transit Corporation (PATCO) High Speed Line, NJ Transit buses, community and paratransit local bus services, and private corporate shuttles. As a result, proximity to one of the 11 RiverLINE stations in Burlington County provides access to jobs throughout the region.

Figure 10 highlights the area within a one-mile buffer of the RiverLINE stations, as well as road segments that intersect this buffer. On average, it takes an individual 20 minutes to walk 1 mile, and a bicyclist can traverse this distance even faster. Therefore, providing multimodal access to the stations on the highlighted segments would be strategic.

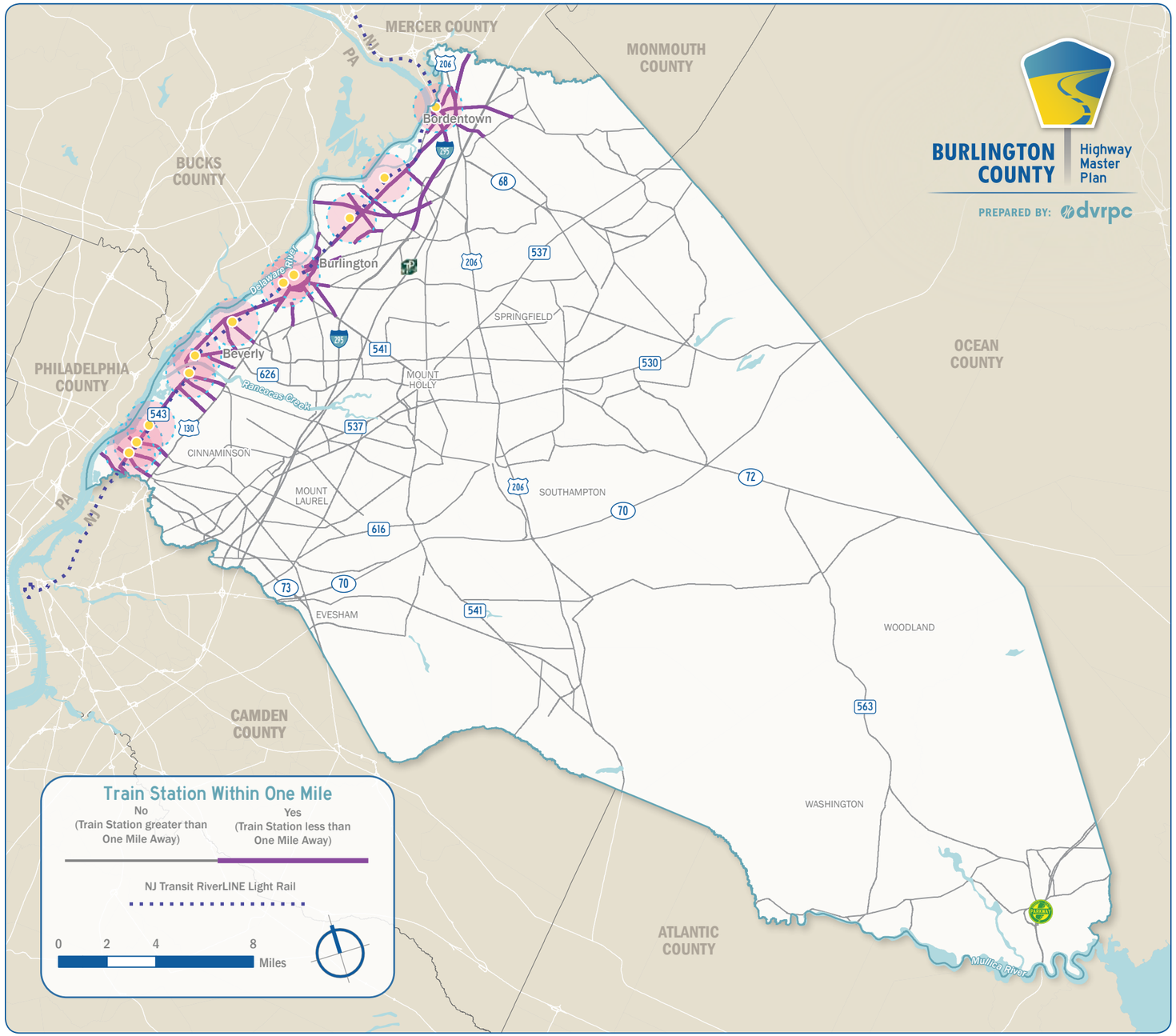
RiverLINE ridership doubled in Burlington County between 2004 (1,945 passengers) and 2013 (3,918 passengers). **Table 6** shows the most recent available data for weekday passenger boardings and parking in the county. Thirty-seven percent of parking was occupied during the day.

Table 6: 2013 RiverLINE Weekday Boardings and Parking

Station	Passenger Boardings	Parking Capacity	Parking Used	Parking % Occupancy
Bordentown	336	183	142	78%
Roebling	225	215	41	19%
Florence	304	589	82	14%
Burlington Towne Centre	634	No parking	N/A	N/A
Burlington South	341	356	159	45%
Beverly/ Edgewater Park	648	201	114	57%
Delanco	183	103	71	69%
Riverside	469	315	74	23%
Cinnaminson	200	253	81	32%
Riverton	172	64	62	97%
Palmyra	406	35	20	57%
All Burlington County Stations	**3,918**	**2,314**	**846**	**37%**

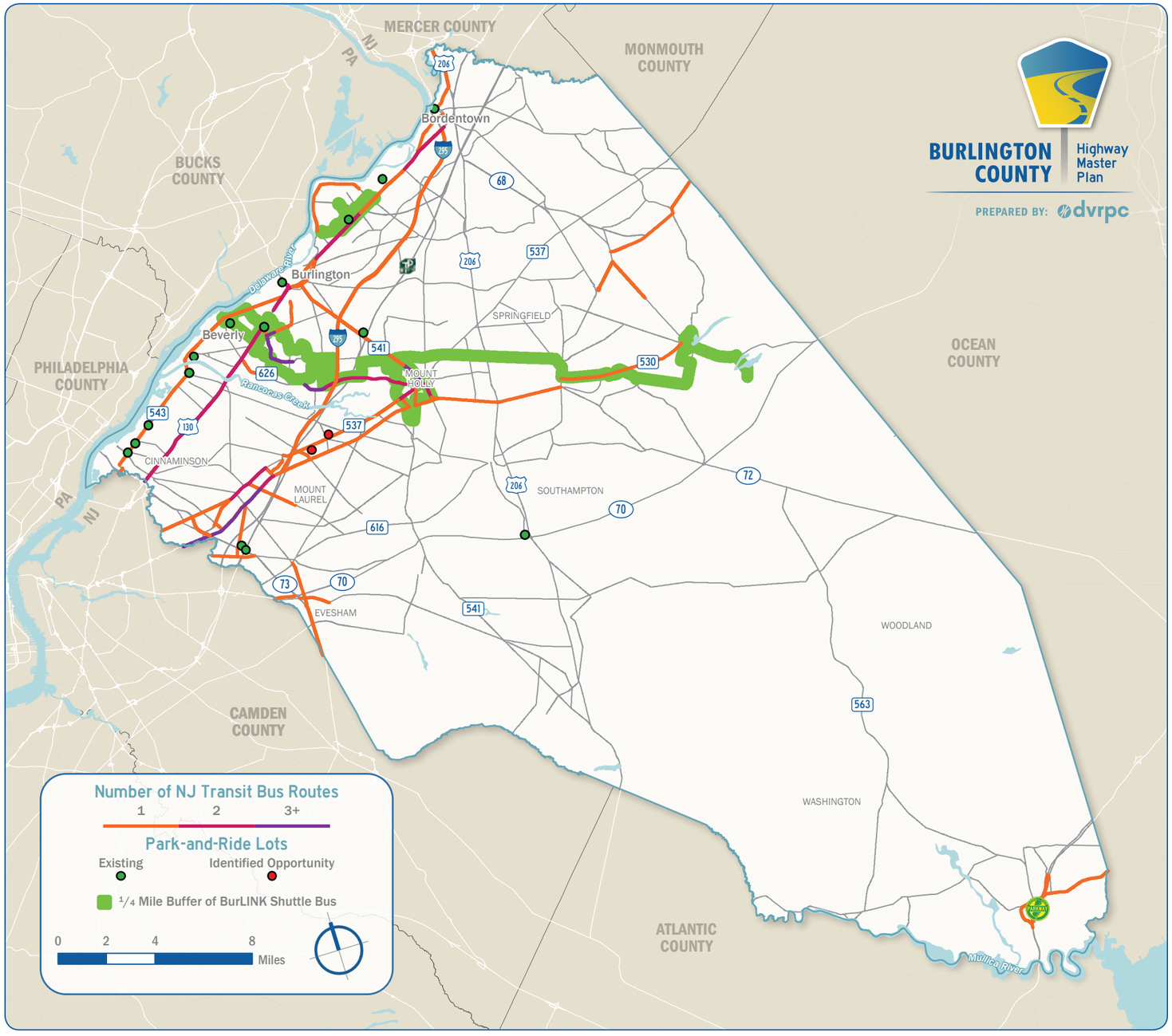
Source: NJ Transit, 2013

Figure 10: Train Station within One Mile



Source: NJ Transit, 2017; DVRPC, 2017

Figure 11: NJ Transit Bus Service, BurLINK Shuttle Bus Service, and Park-and-Ride Lots



Source: NJ Transit, 2017; DVRPC, 2018

NJ Transit Bus Service

The map in **Figure 11** shows the number of scheduled bus routes operating on the CR network on weekdays. For fixed routes like these, areas within one-quarter of a mile (or a five-minute walk to the bus stop) are considered served.

BurLINK Shuttle Bus Service

SJTA operates BurLINK shuttle service in Burlington County. The BurLINK bus routes connect with numerous NJ Transit bus routes, as well as the RiverLINE at different light rail stations. The routes are permitted to deviate one-eighth of a mile per trip to serve a customer's specific needs. A footprint of one-quarter of a mile centered on the route is therefore used in the GIS methodology to represent the BurLINK service area.

Park-and-Ride Lots

Figure 11 also shows an inventory of public lots in the county that are served by public transit vehicles or are available for carpool formation. Two candidate lot locations (identified in separate work by DVRPC) adjacent to Marne Highway (CR 573), in Mount Laurel Township, are also included in the inventory.

Land Use Centers

Land Use Centers (**Figure 12**) represent nodes of concentrated land use activity, identified in DVRPC's LRP. Land use centers are significant traffic generators and destinations for transit service. Long-term revitalization of these areas should seek to introduce interconnected and complementary land uses (office and residential), in close proximity, to internalize trip making, promote two-way transit travel, and reduce SOV travel. They are defined as follows:

Metro Subcenters: Key regional areas with many jobs and substantial commercial activity. There are no identified Metro Subcenters in Burlington County.

Planned Town Centers: Planned or new developments that incorporate a mix of uses at higher density that support transit and walkability.

Rural Centers: Mix of land uses and higher density than surrounding areas; often a small scale downtown or main street.

Suburban Centers: Large geographic areas primarily defined by single-use districts, such as office or retail.

Town Center: Mix of high density residential and commercial uses with a unique history and sense of place.

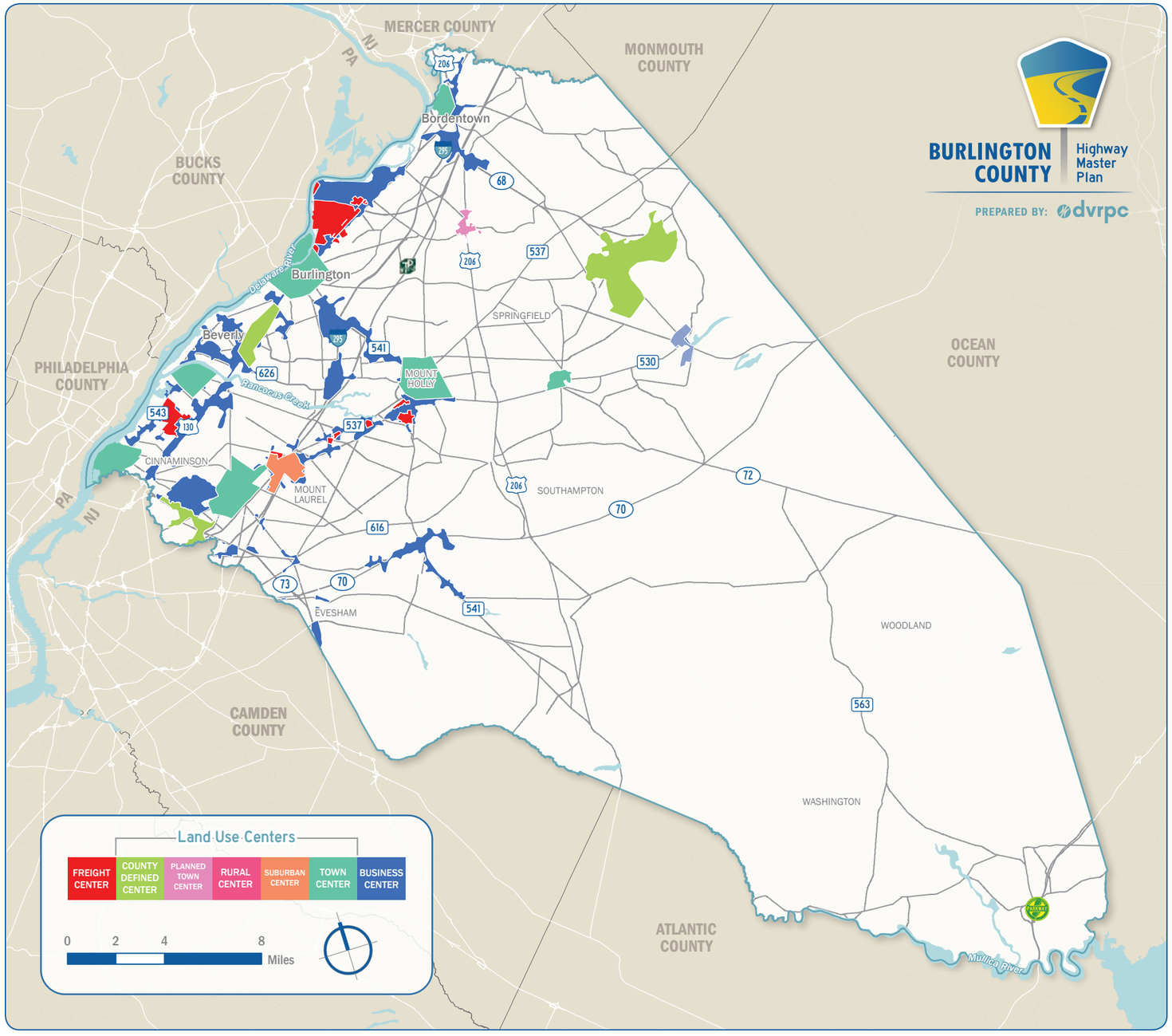
County-defined Centers: Additional activity centers identified by the county.

Business Centers and Freight Centers

Business Centers (**Figure 12**) are business parks dominated by office space. They are significant traffic generators during the rush hours and are usually complemented by transit routes near the site. Short-term strategies include employee ridesharing. Depending on the type of business, long-term strategies could aim to increase the density of the center with retail and residential uses. Furthermore, the interconnection of internal roadways would contain trip-making and reduce SOV travel.

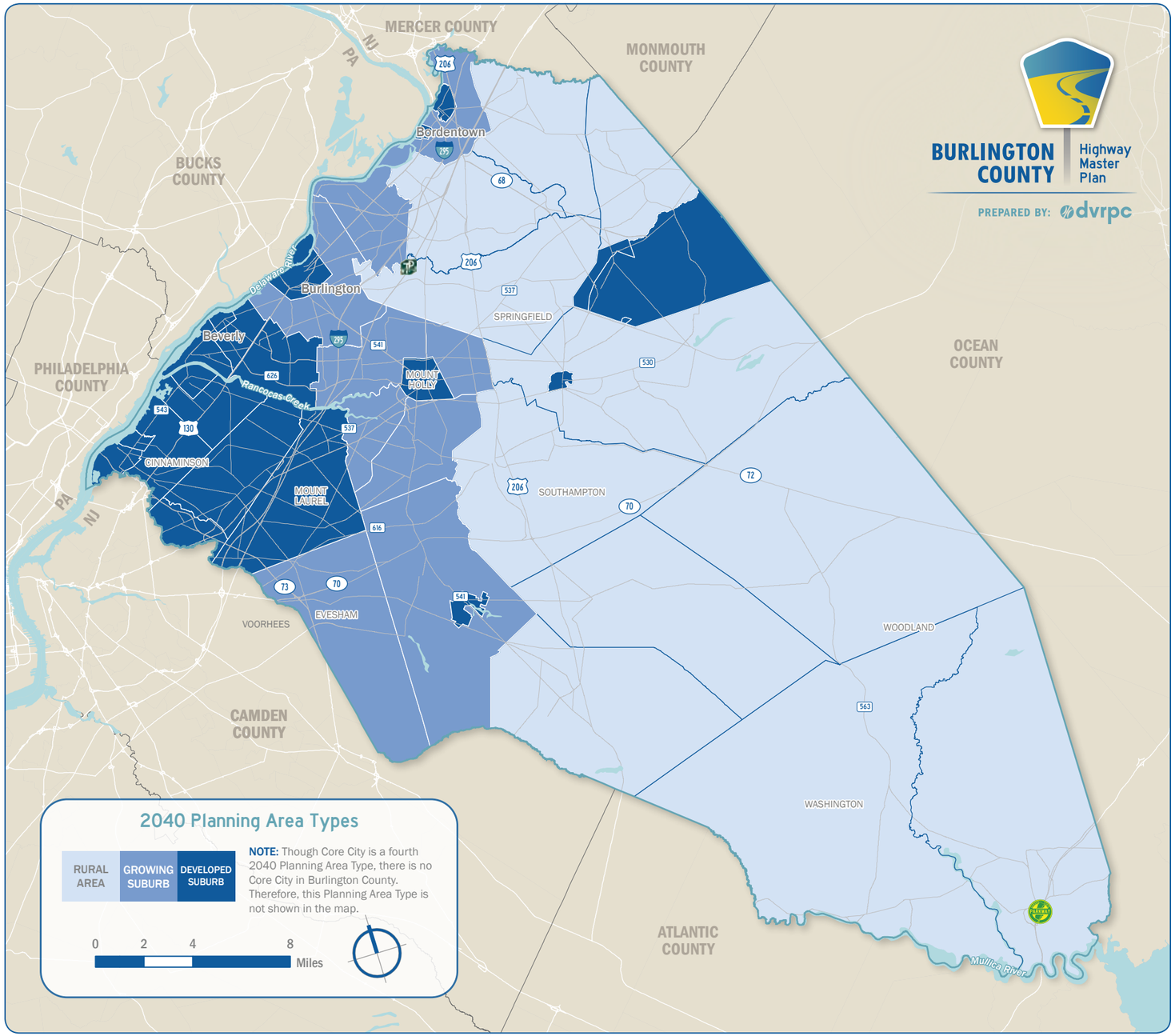
Freight Centers (**Figure 12**) are business or industrial parks that contain manufacturing, industrial, and warehousing and distribution uses. These centers generate peak and off-peak traffic. Large trucks can be expected to constitute a higher proportion of vehicles making trips when compared with other land use centers. Ridesharing strategies that reduce employee travel demand and provide access to these employment centers are the most appropriate early strategies. Site design of new freight centers should accommodate appropriate vehicle classes.

Figure 12: Land Use Centers, Business Centers, and Freight Centers



Source: DVRPC, 2013

Figure 13: 2040 Long-Range Planning Area Type



Source: DVRPC, 2013

2040 Long-Range Planning Area Type

The 2040 Long-Range Planning Area Types shown in **Figure 13** are long-term indications for the degree of urbanization of particular areas. The planning area types highlight the need to consider the degree of current roadway connectivity and consistency with municipal plans, ordinances, and design criteria when evaluating plans for new development. Planning Area Types from *Connections 2040* include:

- Core City;
- Developed Community;
- Growing Suburb; and
- Rural Area.

Only three of these Planning Area Types—Developed Community, Growing Suburb, and Rural Area—are found in Burlington County. The county does not have any designated Core Cities.

New Hanover Township and Wrightstown Borough were designated as developed communities due to the significant development associated with the Joint Base McGuire-Dix-Lakehurst (MDL). However, this area is predominantly rural, and the Joint Base MDL is surrounded by agricultural uses.

Bicycle Network

Bicycles are an increasingly popular transportation mode, and they serve as a viable alternative to shorter, SOV trips. In 2014, the Burlington County Planning Board adopted the Burlington County Bicycle Master Plan, a document prepared for the county by the CCCTMA. The document is a comprehensive plan for bicycling facilities throughout Burlington County. **Figure 14** shows the alignments of existing and proposed facilities, many of which are on CRs. For more information about the Burlington County Bicycle Master Plan, visit: www2.driveless.com/pdfs/BC%20Bike%20Report1.pdf.

Designated Scenic Byways

Scenic byways are routes that are unique for their scenic, recreational, cultural, natural, historic, or archaeological significance (NJDOT). Inclusion in the system requires formulating a corridor management plan that inventories scenic qualities and specifies long-term management and maintenance responsibilities for preserving the asset.

Two of Burlington County's CRs (CR 542 and CR 653, in Bass River Township) are part of the Pine Barrens Scenic Byway system. A state- and federally designated byway, the Pine Barrens Byway, traverses the southern portion of Burlington County. Some of the byway is not on county routes; it includes portions of US 9, CR 542, and CR 653 through Atlantic, Burlington, Cape May, Cumberland, and Ocean counties.

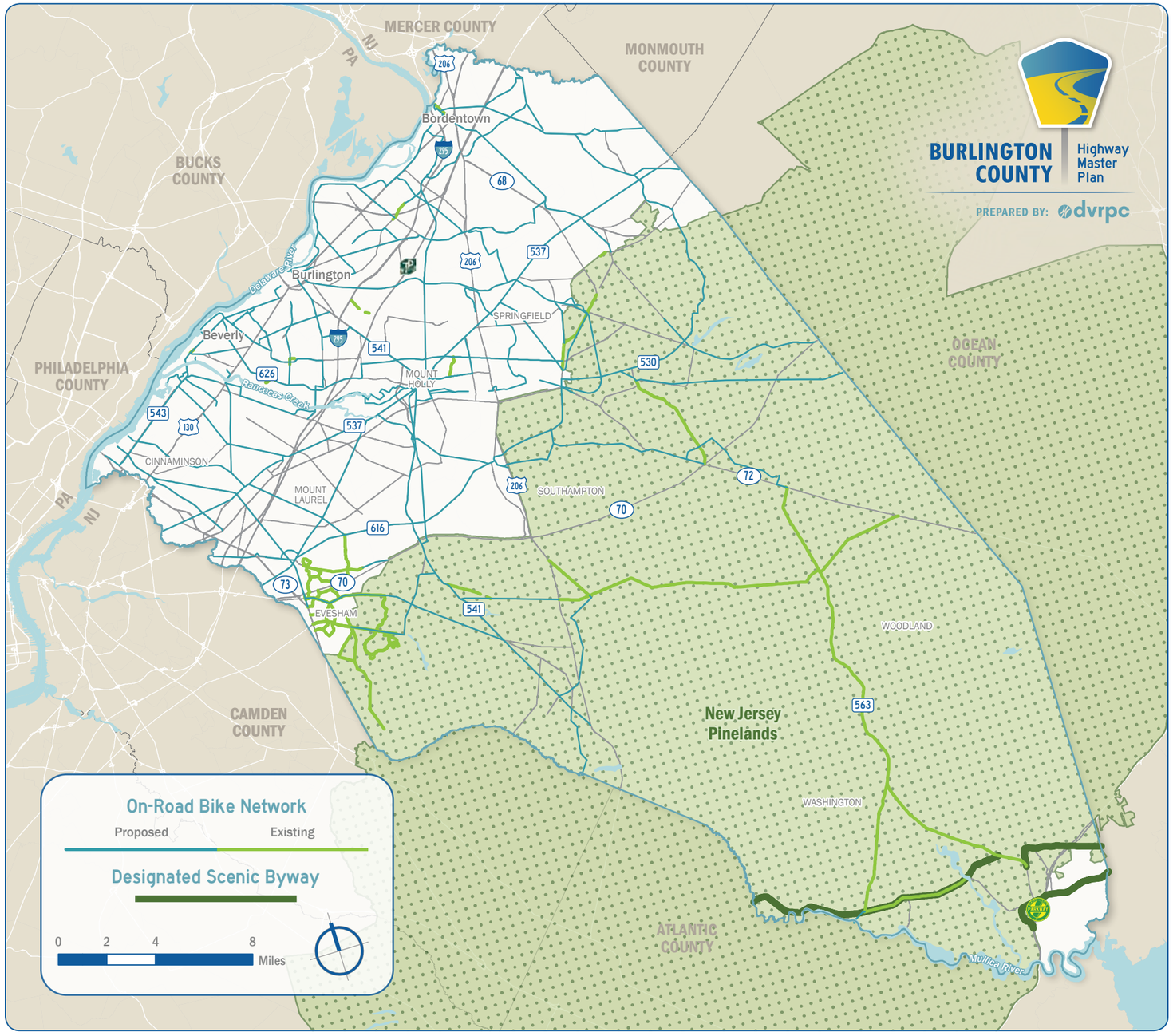
The Pinelands Commission adopted a corridor management plan for the byway in 2009, which outlines specific recommendations to accomplish goals. The plan includes recommended signage and encourages the conservation of lands surrounding the Pine Barrens Scenic Byway, and the employment of smart growth policies.

The Pinelands

Figure 14 highlights the New Jersey Pinelands Area. Pinelands National Reserve is a United Nations Biosphere Reserve; it became the nation's first National Reserve in 1978. The Reserve encompasses the New Jersey Pinelands Area.

The Pinelands are a tremendous natural asset in Burlington County. The total area of the Pinelands is almost 2,000 square-miles, 522.67 square-miles of which are in Burlington County. Any transportation enhancements proposed in this area must consider environmental regulations in the New Jersey Pinelands Area Comprehensive Management Plan.

Figure 14: Bicycle Network; Designated Scenic Byways; Cultural, Historical, and Community Resources; and the Pinelands



Sources: NJDOT, 2017; Burlington County, 2017; DVRPC, 2017; NJ Pinelands Commission, 2017

Funding

The funding sources identified in this section may be useful to implement some of the multimodal improvement strategies identified in the *Burlington County Highway Master Plan*. For additional local funding resources, please see DVRPC's Municipal Funding Resource: www.dvrpc.org/asp/MCDResource.

FAST Act Federal Funding Sources

Most roads in Burlington County are eligible for Federal-aid highway funding assistance. Fixing America's Surface Transportation (FAST), the current federal surface transportation assistance act, extends Federal-aid for road and bridge improvements. It is a multimodal program that encompasses the following core highway formula programs.

NJ FY 2018–FY 2021 Transportation Improvement Program (TIP)

The TIP is the regionally agreed-upon list of priority transportation projects, as required by federal law. The TIP is included in the New Jersey Statewide Transportation Program (STP) and has been approved by the federal review agencies (FHWA, FTA, and EPA). It became the official DVRPC TIP for NJ on January 23, 2018. For more information and the list of highway, transit, and other TIP-funded programs, visit: www.dvrpc.org/TIP/NJ.

NJDOT Transportation Alternatives Set-Aside

The TA Set-Aside are Federal highway and transit funds under the Surface Transportation Program (STP) for community-based, "non-traditional" projects designed to strengthen the cultural, aesthetic, and environmental aspects of the nation's intermodal transportation system. The program is administered by NJDOT. This program provides funds to build pedestrian and bicycle facilities, improve access to public transit, create safe routes to school, preserve historic structures, provide environmental mitigation, and create trail projects that serve a transportation purpose. Projects must be authorized for construction within two years of the grant notification, and they must have formal community support. For more information about the New Jersey Transportation Alternatives Set-Aside program, visit: www.dvrpc.org/TAP/NJ and www.state.nj.us/transportation/business/localaid/alternatives.shtm.

National Highway Performance Program (NHPP)

The NHPP provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in New Jersey's asset management plan for the NHS. Eligible projects include reconstruction, restoration, rehabilitation, or preservation of bridges on non-NHS Federal-aid highways and projects to reduce the risk of failure of critical NHS infrastructure.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

The DVRPC Competitive CMAQ Program funds transportation projects that will improve air quality and reduce traffic congestion in the DVRPC region. CMAQ-eligible projects demonstrably reduce air pollution emissions and help the region meet the federal health-based air quality standards. Congestion reduction and traffic flow improvement projects are eligible for CMAQ funding.

Highway Safety Improvement Program (HSIP)

HSIP is a Federal-aid program to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-state-owned roads. HSIP funds must be used for safety projects that are consistent with New Jersey's strategic highway safety plan (SHSP) (www.state.nj.us/transportation/about/safety/pdf/2015strategichighwaysafetyplan.pdf). Some eligible projects include the installation of vehicle-to-infrastructure communication equipment and roadway improvements that provide separation between pedestrians and motor vehicles.

Other Funding Sources

DVRPC Regional Trails Program

The DVRPC Regional Trails Program provides planning assistance and financial support to trail developers, counties, municipalities, and nonprofit organizations to complete the Circuit, Greater Philadelphia's 750-mile network of multi-use trails. For more information about this program and the Circuit Trails, visit: www.dvrpc.org/Trails/RegionalTrailsProgram.

Safe Routes to Schools

NJDOT funds the SRTS program separately. The objectives of this program are to enable and encourage children, including those with disabilities to walk and bicycle to school. The program also aims to make bicycling and walking to school safer and more appealing, encouraging a healthy and active lifestyle, and it aims to facilitate the development and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of New Jersey's primary and middle schools (Grades K–8). For more information regarding this program, visit: www.dvrpc.org/SafeRoutes.

DVRPC Transportation and Community Development Initiative (TCDI)

The TCDI is an opportunity for DVRPC to support growth in individual municipalities of the Delaware Valley through planning initiatives that implement the region's Long-Range Plan. TCDI grants support early stage planning, design, and feasibility studies. Eligible projects reinforce and implement improvements in designated centers and improve the overall character and quality of life within the region. Among the eligible activities are wayfinding plans and mobility elements of master plans.

Capital Improvement Program (CIP)

CIPs outline plans for future capital improvements, such as roads and other public facilities. The New Jersey Capital Budget Law requires municipalities and counties to adopt annually a CIP for the upcoming year and the following five years, as part of their annual budget. The range and scope of these vary, but most cover a six-year period and can be scoped for up to 20 years. A successful CIP should include a schedule of implementation with a projected budget. If a municipality or county CIP is consistent with the master plan and zoning ordinance, they can be useful tools, allowing the county or municipality to plan for future growth and improvements and lowering costs by anticipating the future demands of the municipal infrastructure system. The CIP can also provide developers and the public with more certainty concerning future public improvements, thereby improving opportunities for participation and increasing accountability. The adoption and updating of the CIP is no small task, but should be considered an immediate priority for municipalities and counties.

Pro-Rata Share of Off-Tract Improvements

New Jersey municipalities (under the Municipal Land Use Law) and counties (under the County Planning Act) may require, as a condition of subdivision or site plan approval, developers to pay their pro-rata share of off-tract improvements to the local water, sewer, drainage, and street infrastructure necessitated by a proposed development. This type of revenue provides a better quality of life for residents by financing the infrastructure needed to support additional population, employment, and development. It ultimately reduces the need to impose higher taxes on existing residents to finance additional facilities. An off-tract improvement ordinance requires modification to the master plan and subdivision and zoning codes.

Redevelopment Area Bond Financing (RAB)

This type of financing provides tax-exempt bonds to fund the infrastructure and remediation components of redevelopment projects for New Jersey municipalities with designated redevelopment areas. This option may not be appropriate in the study area because many of the completed and approved redevelopment projects have redevelopment agreements that have already accounted for the distribution of the project's special assessment of payment-in-lieu-of-taxes (PILOT), which otherwise could have been used for RAB payments.

CHAPTER 4
STRATEGIES

TMP Evaluation Method and Composite Score Calculation

The TMP evaluation method is the foundation of the strategies recommended in this plan. As mentioned previously, the data-driven approach used to assign multimodal strategies to particular corridors was applied at the county level to assign strategies to all roadways within the county.

A scoring system was used to determine the types of appropriate strategies. Points were assigned to segments using the TMP evaluation method. The scores were based on individual segment criteria, such as TTI, for seven TMP scoring groups. The TMP composite score is the sum of the measured values, calculated for each segment (refer to description on **page 11**).

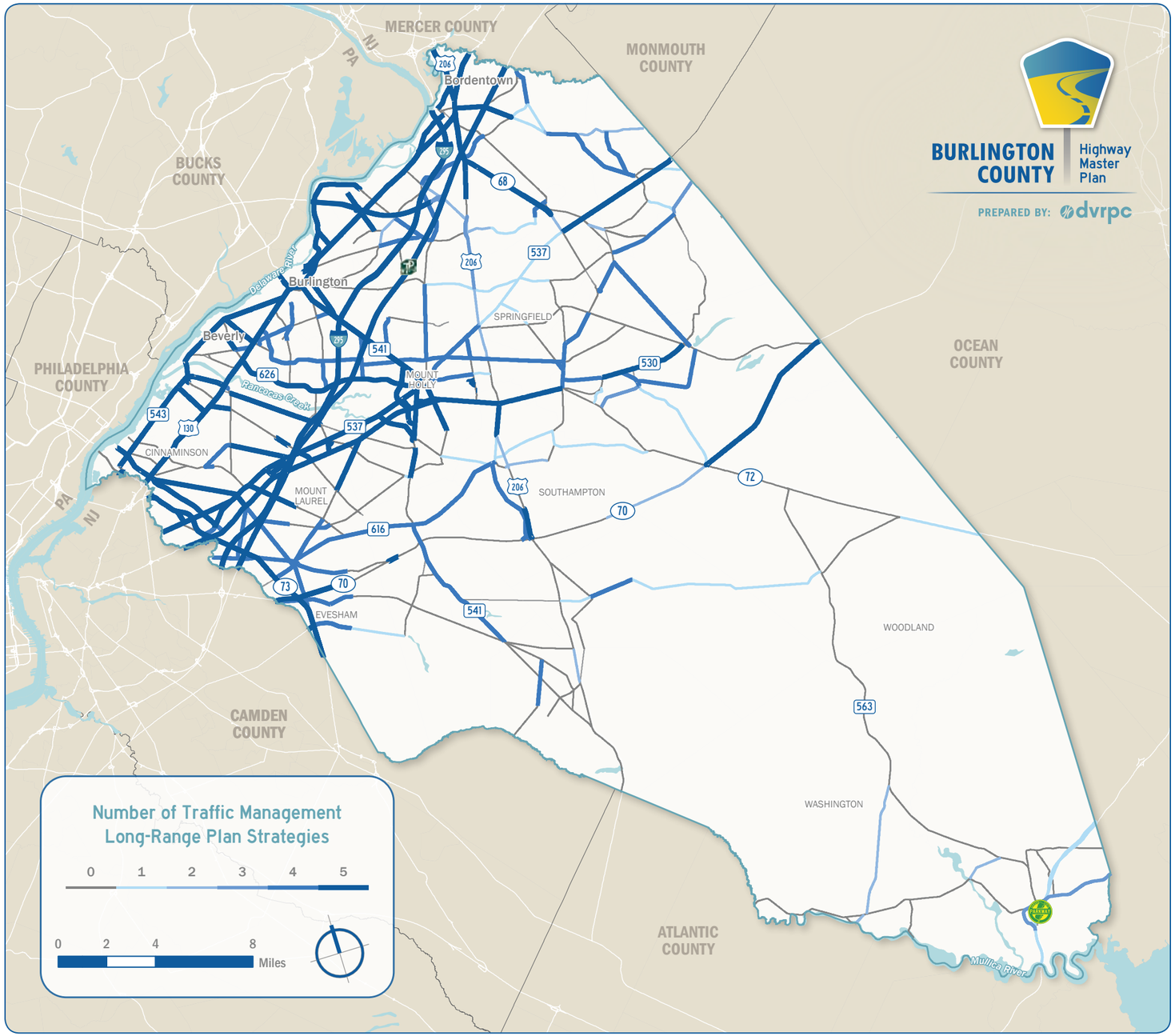
Segment conditions in the GIS database were screened to generate candidate strategies across five categories, which are explained in further detail on the following pages:

- Operational Strategies;
- Transportation Demand Management Strategies;
- Strategies to Increase Capacity of Existing Transportation Systems;
- Strategies to Add New Transportation System Capacity; and
- Goods Movement Strategies.

This assignment was based on the strategies by performance measure for the 2015 TMP (see **Appendix A**). The full list of strategies can be found in **Appendix B**.

The intersection of Chester Avenue and Second Street in Moorestown boasts marked crosswalks and pedestrian signals. CMP strategies that support the use of alternative transportation modes can help mitigate traffic congestion in Town Centers, such as Moorestown, that are characterized by higher density surrounding land uses. Source: DVRPC, 2017

Figure 15: Number of Traffic Management Long-Range Plan Strategies per Roadway Segment



Source: DVRPC, 2017

Operational Strategies

Operational strategies are projects that maintain, optimize, and modernize existing transportation assets. Operational strategies can maintain and improve safety. These strategies include signal timing changes, Transportation System Management (TSM), and Intelligent Transportation Systems (ITS). They address traffic congestion without altering the physical or functional footprint of the transportation facility. An example is the interconnected and managed traffic signal system regulating portions of the CR system in Burlington County. Another example is the implementation of traffic engineering improvements at bottleneck intersections. Roundabouts, a recognized alternative to signalized intersection control, have been implemented throughout the CR network. Access management codes and practices can regulate the number and location of driveway access points to manage traffic flow and improve traffic safety.

Transportation Demand Management Strategies

Transportation demand management strategies promote land use policies and smart transportation approaches that can reduce motorized travel and encourage the use of alternate transportation modes. They discourage SOV trips and manage existing travel and reduce future demands for travel by implementing combinations of transportation, land use, and community planning strategies. These strategies focus on managing congestion from the demand side. They reduce the need for travel and motor vehicular trip length, while often advancing quality of life, environmental, and economic development goals. Some transportation demand management strategies include zoning changes and master planning for high-density, interconnected, mixed-use centers that contain complementary uses. Placing complementary land uses in close proximity encourages multimodal trips.

Complete Streets policies are included in this category. Complete Streets policies require streets to be designed for all users. The design standards require that such streets serve bicyclists, pedestrians, disabled people, transit users, and drivers. Local governments may adopt such standards for future roads and roads under rehabilitation. NJDOT approved its Complete Streets policy on December 3, 2009. More information about New Jersey Complete Streets can be found here: www.state.nj.us/transportation/eng/completestreets.

Strategies to Increase Capacity of Existing Transportation Systems

This category includes programs and projects to increase the capacity of existing transportation services and facilities. Strategies include boosting the service frequency of public transit and increasing parking capacity at train stations and park-and-ride lots. Highway-focused strategies include widening short distances of a roadway for additional through travel and allowing hard shoulder running.

Strategies to Add New Transportation System Capacity

This category includes projects that increase the capacity of existing roads, such as widening an extended roadway length (one mile or more), as well as projects that build new capacity on new right-of-way. These strategies address SOV congestion directly by accommodating and encouraging more SOV travel. If federal or state transportation funding is needed for such transportation improvement projects, system capacity expansion must be accompanied by strategies and projects that help offset and manage SOV travel. Combined strategies enhance the effectiveness and extend the useful life of the SOV improvement. Therefore, implementation costs of the companion actions and programs are generally accepted by funding agencies.

Goods Movement Strategies

Goods movement strategies are policies and projects intended to maintain and optimize the safe and efficient movement of freight. The optimization of trips that travel through an intermodal network crossing land (via railroads and highways), water, and air is essential to efficient goods movement. These strategies are best applied in Freight Centers and Business Centers and along the National Highway System. Goods movement strategies are defined separately because goods movement operations affect traffic patterns differently from the movement of people. **Figure 15** shows the number of the five aforementioned strategies assigned to each highway segment.

Traffic personnel in the Burlington County Traffic Operations Center, in Mount Laurel, New Jersey, are able to monitor 282 intersections and adjust signal timing at 112 intersections to respond to or regulate traffic flow along their CR system. Source: DVRPC, 2016

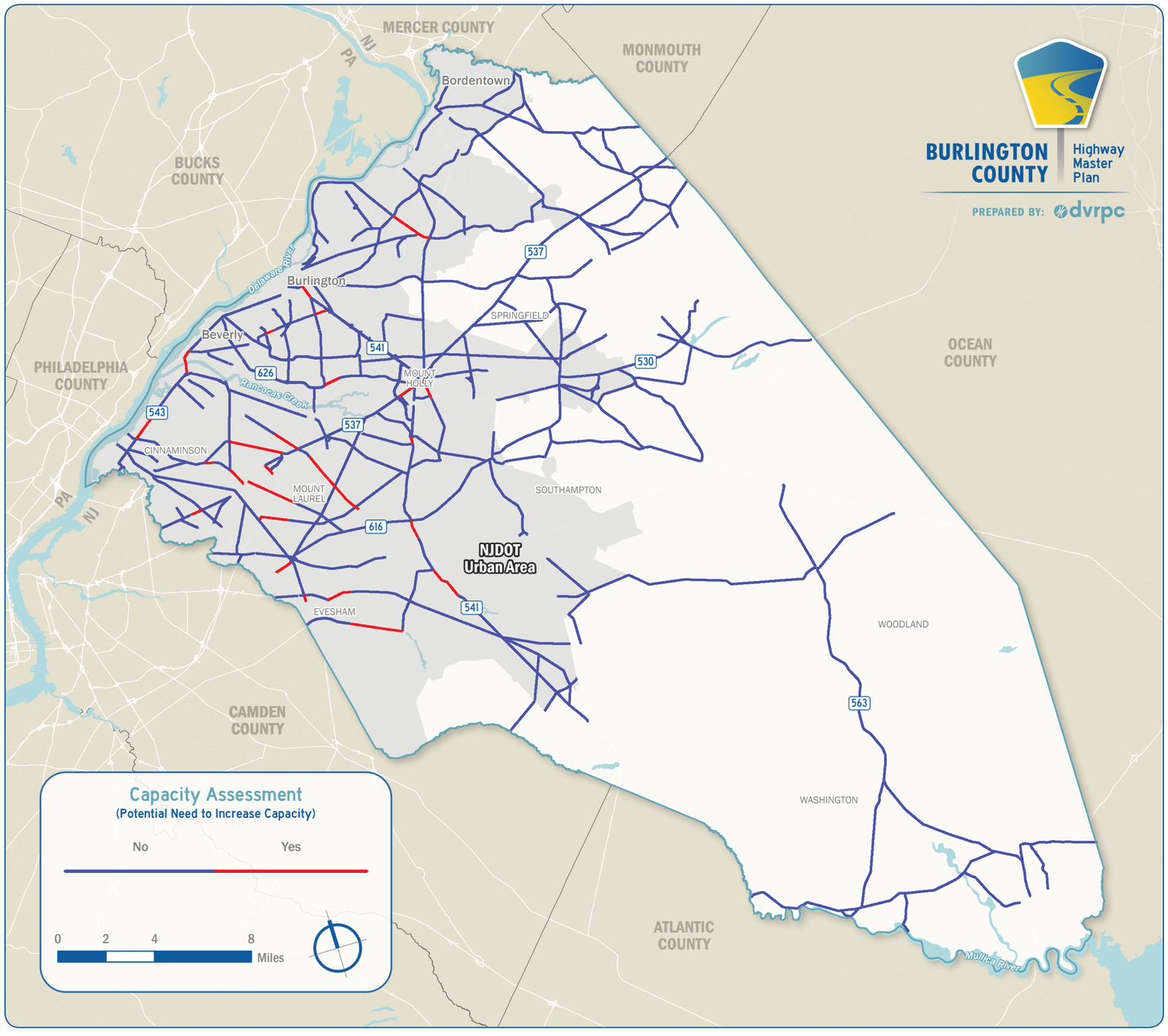
CHAPTER 5
RIGHT-OF-WAY

The right-of-way map is the paramount planning tool contained within the *Burlington County Highway Master Plan*. This tool provides ultimate rights-of-way and desired roadway cross-sections for Burlington County engineers and planners to assess land development applications. It provides guidance in the design of land development projects submitted by applicants and roadway improvements undertaken by land development applicants, utilities, and governmental agencies. The ultimate right-of-way shall be used to assess CR segments with a V/C ratio of 0.85 or greater, while the desired typical cross section shall be the reference for CR segments with a V/C ratio below 0.85.

Land development projects have an impact on future traffic volumes on county roads. Given the rapid population growth and rate of new development, the right-of-way map allows engineers to ensure that new construction does not impinge on the ability to have adequate rights-of-way provided for future road widening, intersection improvements, and multimodal facilities. Reserving additional right-of-way for these improvements is important, particularly for CR segments with a V/C ratio greater than 0.85. The final determination of rights-of-way and roadway cross-sections shall occur on a case-by-case basis in consideration of local factors and constraints.

Church Street (CR 607) between Arianas Court and Country Club Parkway is a Minor Arterial in the Urban Area. Based on the estimated existing and future V/C ratio for this segment, the Highway Master Plan recommends current roadway capacity be maintained. Source: DVRPC, 2017

Figure 16: Estimated V/C Ratio



Source: Burlington County, 2018; NJDOT, 2018; DVRPC, 2018

Estimated V/C Ratio

The estimated V/C ratio from the travel demand model was used to identify CR segments with the potential need for increased capacity, or widening, in the future. This assessment is shown in **Figure 16**. The volume in the V/C ratio represents the number of vehicles estimated to pass through a given segment in one hour. The capacity is the number of vehicles the road segment is designed to handle in one hour, given its lane configuration, travel speed, and other attributes. If either the base-year (2013) or future-year (2040 MP Scenario) V/C ratio was greater than or equal to 0.85, the segment is considered to be approaching capacity and would therefore have the potential need for increased capacity in the future. Current and future capacity needs were considered when assigning ultimate right-of-way widths and desired typical cross sections to the CRs.

Ultimate Right-of-Way

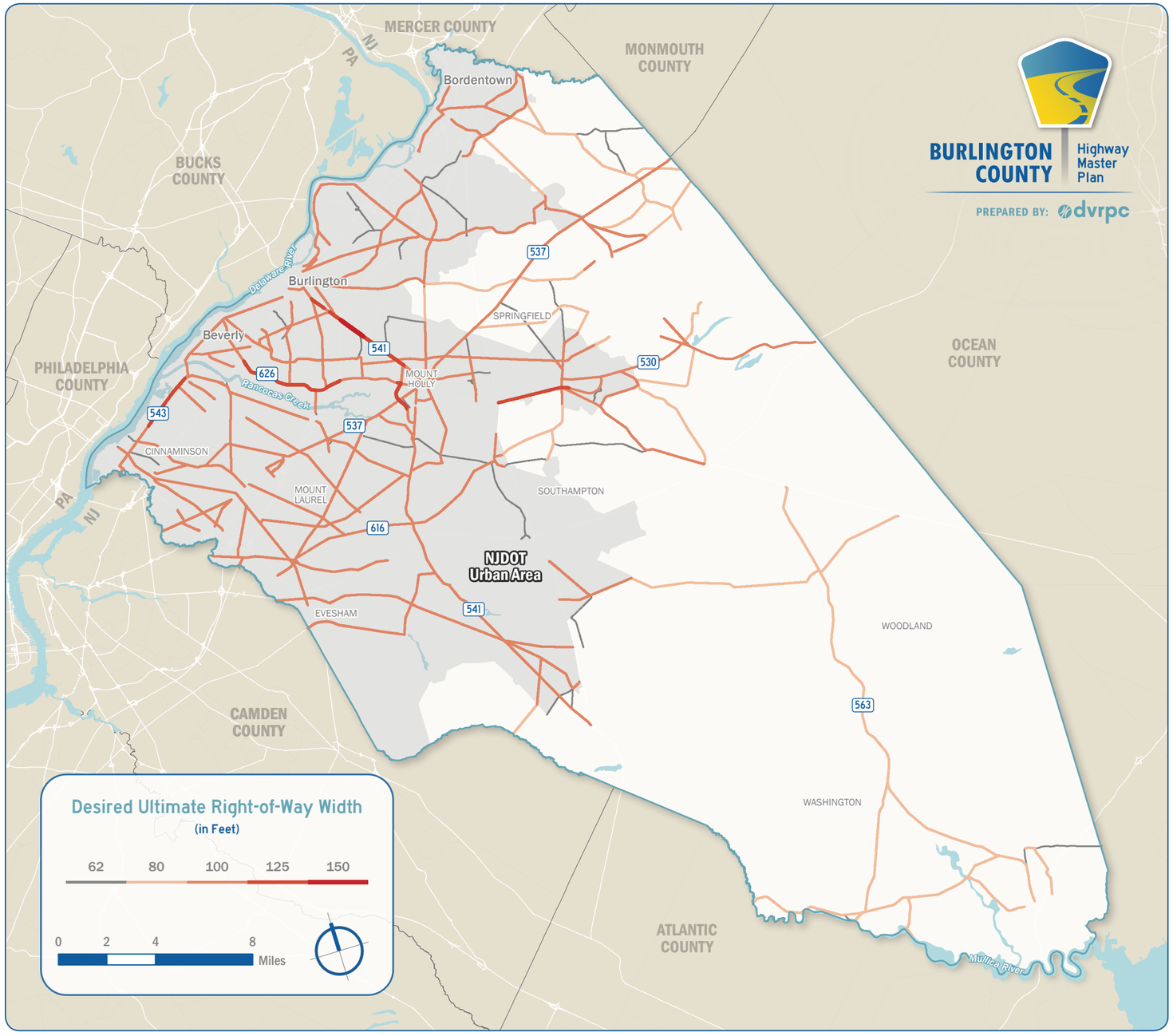
The updated right-of-way map identifies ultimate right-of-way widths for each county road segment. The ultimate right-of-way widths should be used when assessing CR segments with a V/C ratio of 0.85 or greater. These widths were determined based on the roadway functional classification, land use area, and NJDOT and federal standards. They are wider than the desired typical cross sections because they incorporate the ideal width of all multimodal facilities and, in most cases, on-street parking. The appropriateness of specific facilities should be determined on a case-by-case basis. **Figure 17** shows the ultimate right-of-way width for each CR segment in Burlington County. The NJDOT Urban Area designation (shaded in gray in **Figure 17)** was used to provide the land use context for these right-of-way width determinations. Urban and rural areas are defined by the Census Bureau, and they are based on population and density. NJDOT has the authority to adjust census-defined boundaries so that they are consistent with transportation needs and maintain graphic continuity for planning purposes. The right-of-way width for CR segments with the same functional classification differs based on this land use designation (see **Table 7**).

Table 7: Proposed Right-of-Way Width Assignment

NJDOT Classification	Land Use Type	Number of Travel Lanes	Right-of-Way (Feet)
Principal Arterial	Urban	6	150
Principal Arterial	Urban	4	125
Principal Arterial	Urban	2	100
Principal Arterial	Rural	2	100
Minor Arterial	Urban	2	100
Minor Arterial	Rural	2	100
Major Collector	Urban	2	100
Major Collector	Rural	2	80
Minor Collector	Urban	2	100
Minor Collector	Rural	2	80
Local Road	All	2	62

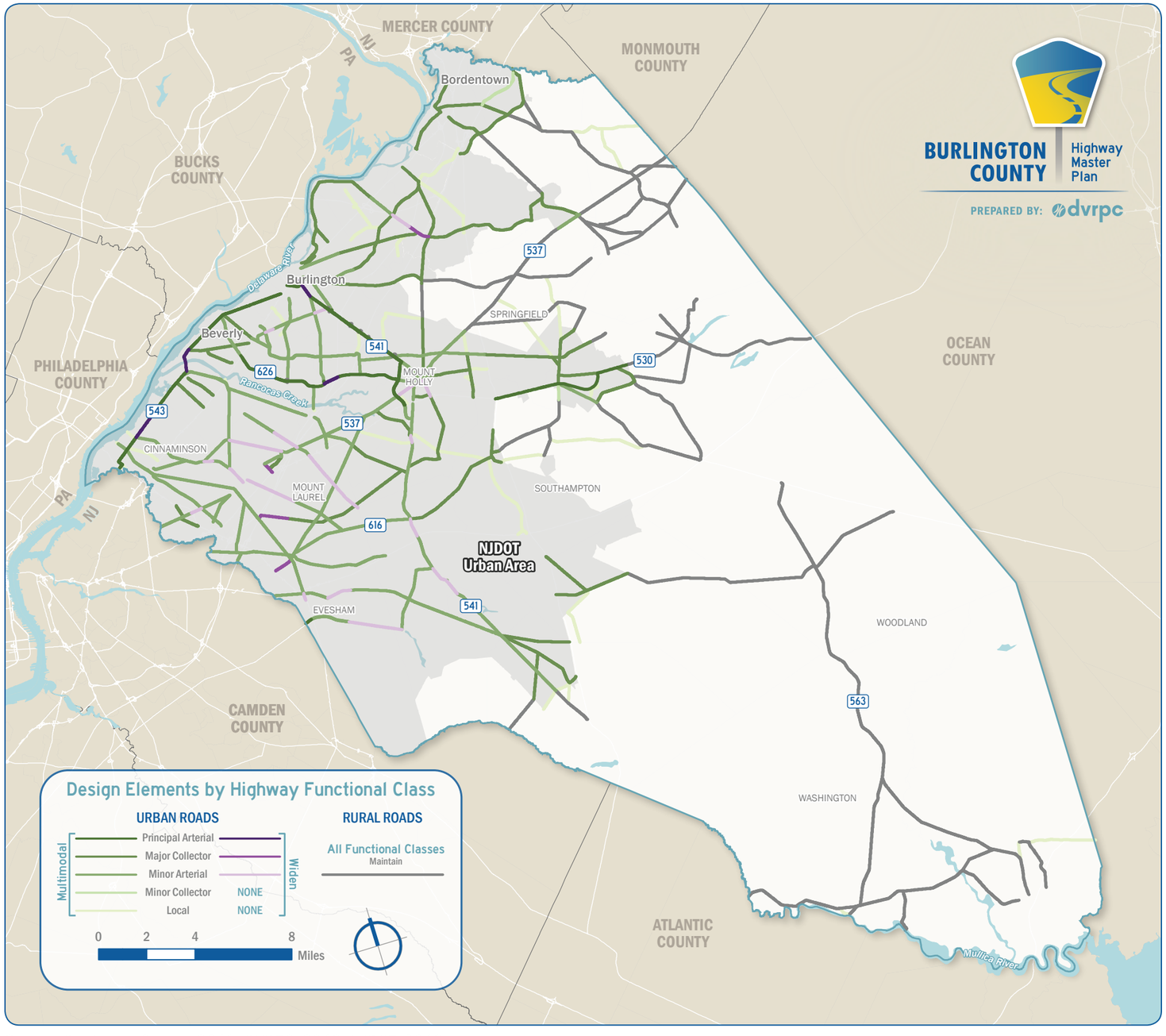
Sources: Burlington County, 2018; NJDOT, 2018; DVRPC, 2018

Figure 17: Ultimate Right-of-Way



Source: DVRPC, 2017

Figure 18: Desired Typical Cross Sections



Source: Burlington County, 2018; DVRPC, 2018; NJDOT, 2018

Desired Typical Cross Sections

Because standards are often context-based, the local experience and knowledge of the county traffic engineer and the county planning board engineer were critical in developing desired typical cross sections. The desired typical cross sections should be used when assessing land developments or roadway improvements on CR segments with a V/C ratio less than 0.85. In these cases, conservative capacity enhancements coupled with multimodal improvements are appropriate.

The desired typical cross sections are more closely tied to existing conditions than the ultimate right-of-way widths, and they serve as a guide for implementing multimodal facilities. It is important to note that they do not identify the exact facilities that should be implemented on every CR segment of a specific functional class. The final design would need to be determined on a case-by-case basis depending on context and available right-of-way.

Unique cross sections were developed only for the five roadway functional classes found in the Burlington County Urban Area; this plan recommends maintaining the existing features of CRs in rural areas. The V/C ratio was used to distinguish between two categories of cross sections for urban areas: Multimodal (V/C ratio < 0.85) and Widen (V/C ratio ≥ 0.85). A Multimodal cross section was developed for each functional class, and a Widen cross section was developed for three of the five functional classes. Though a Widen cross section is identified as a guide for roadways with a V/C ratio of 0.85 or greater, the ultimate right-of-way should be the primary tool for assessing these segments.

A total of seven desired typical cross sections were designed and assigned to CR segments (**Figure 18**). The desired typical cross sections are intended to show multimodal and/or capacity enhancements to existing roadway conditions. The Widen cross sections represent conservative applications of roadway widening (e.g., the addition of only one lane), and they incorporate multimodal features that reflect the TMP strategies identified in this plan. The desired typical cross sections shown on the following page include all of the elements that are desirable and appropriate on a particular roadway based on functional class and land use area. Some roadways have similar characteristics and surrounding land uses; therefore, the same desired typical cross section may be recommended for multiple functional classes (see **Figure 19**–**Figure 25**).

Figure 19: Local Road (Maintain)

Figure 20: Principal Arterial: Two Lanes (Maintain), Major Collector (Maintain), Minor Arterial (Maintain)

Figure 21: Minor Collector (Maintain)

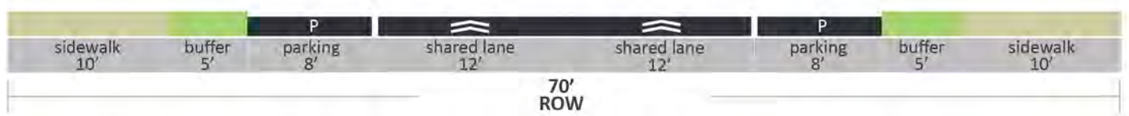


Figure 22: Major Collector (Widen), Minor Arterial (Widen), Principal Arterial: Three Lanes (Maintain)

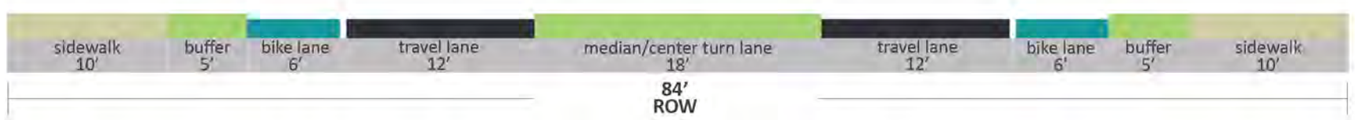


Figure 23: Principal Arterial: Two Lanes (Widen), Principal Arterial: Three Lanes (Widen)

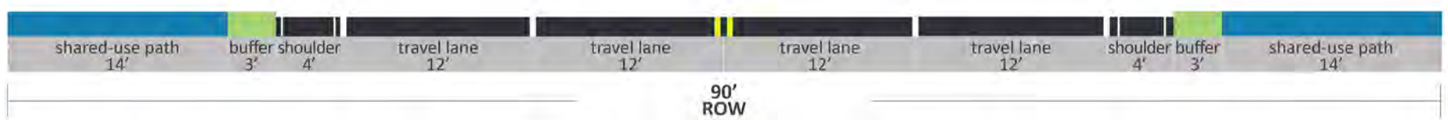


Figure 24: Principal Arterial: Four Lanes (Maintain)

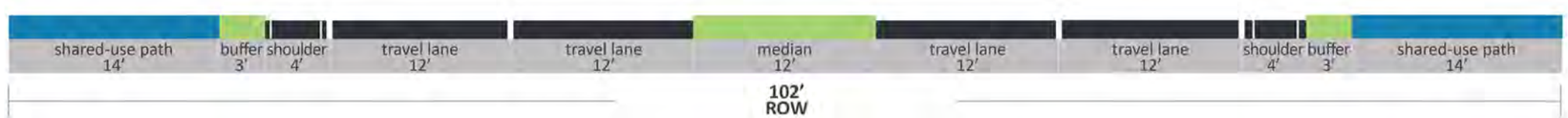
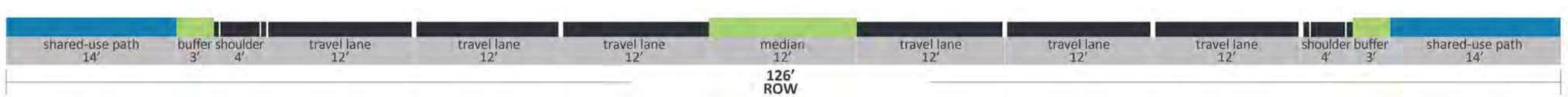


Figure 25: Principal Arterial: Four Lanes (Widen), Principal Arterial: Six Lanes (Maintain)



Sources: Burlington County, 2018; DVRPC, 2018

BURLINGTON COUNTY Highway Master Plan

APPENDICES:

A: Strategies by Performance Measure for the 2015 TMP

B: Complete List of TMP Strategies

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

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APPENDIX A
STRATEGIES BY PERFORMANCE MEASURE FOR THE 2015 TMP

Table A-1: TMP Strategies by Performance Measure

REDUCE CONGESTION

Criteria	Strategies
High TTI or High V/C	Transit Signal Priority (TSP)
	ITS Improvements for Transit
	Transit Infrastructure Improvements
	Modifications to Existing Transit Routes or Services
	ITS
High Growth in V/C	Improve Circulation
	Access Management Projects
	Comprehensive Policy Approaches
	Growth Management and Smart Growth
	Complete Streets
	Revisions to Existing Land Use/Transportation Regulations
High TTI and High V/C	All strategies above, plus:
	Integrated Corridor Management (ICM)
	Interregional Transportation Coordination
	Major Reconstruction with Minor Capacity Additions
	Frontage or Service Roads
	New Bus Services
High TTI and High V/C and High PTI	All strategies above, plus:
	General Purpose Lanes
	Hard Shoulder Running
	Bus Rapid Transit or Exclusive Bus Lanes
	New Passenger Rail Investments
	Interchange with Related Road Segments

CREATE A SAFER TRANSPORTATION SYSTEM

Criteria	Strategies
High Crashes	Safety Improvements and Programs
	Incident Management (On Highways)

INCREASE ACCESSIBILITY AND MOBILITY

Criteria	Strategies
High Transit Score	Walking and Bicycling Improvements
	Modifications to Existing Transit Routes or Services
	New Bus Services
	Shuttle Service to Stations
	Transportation Services for Specific Populations
	Economic Development Oriented Transportation Strategies
	Environmental Justice (EJ) Outreach for Decision Making
High PTI	Incident Management
	ITS (Freeways)
	Traveler Information Services (Freeways)
	Signal Improvements (Arterials)
	Closed Loop Computerized Traffic Signals (Arterials)

REBUILD AND MAINTAIN THE REGION'S TRANSPORTATION INFRASTRUCTURE

Criteria	Strategies
National Highway System Freight Connectors and Freight Facilities	Goods Movement Strategies
Roads with Substantial Transit Service or Train Stations with 500 or More Daily Boardings	Transit Infrastructure Improvements
	TSP
	ITS Improvements for Transit
	Shuttle Service to Stations
	Transit-Oriented Development (TOD)
	Modifications to Existing Transit Routes or Services
Substantial Transit Service and Highly Congested	Passenger Intermodal Center or Garage for Transit Riders
	Express Transit Routes
	Bus Rapid Transit

CREATE A MORE SECURE TRANSPORTATION SYSTEM

Criteria	Strategies
High Densities	Evacuation Planning
Most Heavily Used Transit Stations	Transit Station Security
Nuclear Power Plant Emergency Evacuation Zone	Coordinate with Nuclear Emergency Evacuation Zone (EMZ) Planning
Most Heavily Used Bridges	Bridge Security
Military Facilities	Coordinate with Military Bases

ENSURE TRANSPORTATION INVESTMENTS SUPPORT LRP PRINCIPLES

Criteria	Strategies
Environmental Impact High	Environmentally Friendly Transportation Strategies
	Context-Sensitive Design
	Growth Management and Smart Growth
LRP Centers	Improve Circulation
	Planning and Design for Non-Motorized Transportation
	Context-Sensitive Design
LRP Center with Transit	Shuttle Service to Stations
	TOD
	TSP
	Transit Infrastructure Improvements
Infill and Redevelopment/Emerging Growth Areas and High PTI	Signal Improvements
	Basic Upgrading of Traffic Signals
	Improve Circulation
	Access Management Projects
	County and Local Road Connectivity
	Intersection Improvements of a Limited Scale
	Transit-First Policy
	Modifications to Existing Transit Routes or Services
	New Bus Services
	New Passenger Rail Investments
	Major Reconstruction with Minor Capacity Additions
	Frontage or Service Roads
Infill/Redevelopment with Transit	TSP
	ITS Improvements for Transit
	Modifications to Existing Transit Routes or Services
	Transit Infrastructure Improvements

APPENDIX B
COMPLETE LIST OF TMP STRATEGIES

Table B-1: List of TMP Strategies by Category

OPERATIONAL STRATEGIES

Candidate Strategy	Description
Signage	Improvements to clearly communicate location and direction information, including adding or removing signs (to reduce clutter), redesigned signs, “trailblazing” to key locations, maintenance of signs and line of sight to them, and pavement markers to provide information.
Signal Improvements	The range of strategies, from basic to sophisticated, that improve the efficiency of signals individually and in systems. This includes specific applications, such as preemption for emergency vehicles or buses.
Basic Upgrading of Traffic Signals	Adjustments and maintenance of signal timing and phasing, including installation of new signals as warranted, to improve flow and reduce congestion. This also includes equipment update, traffic signal removal, and pretimed signal plans. See also Closed Loop Computerized Traffic Signals.
Closed Loop Computerized Traffic Signals	Linked traffic signal coordination that uses detectors to be responsive to traffic conditions. This may be employed for corridors or interconnected areas.
Signal Prioritization for Emergency Vehicles	Use of technology onboard vehicles and within signal infrastructure to preempt the signal timing to create green signals for ambulances and other high-priority response vehicles through the existing road system.
Transit Signal Priority (TSP)	Use of technology onboard vehicles and/or at signalized intersections to temporarily extend green time or otherwise expedite buses, light rail, or trolleys through the existing road system.
Intelligent Transportation Systems	Encompasses a broad range of technologies that can relieve congestion, improve safety, and disseminate real-time travel information to the public when integrated into the transportation system’s infrastructure.
Traveler Information Services	Provision of pre-trip and en-route information to travelers on current traffic and other conditions and real-time guidance on route information. This includes advisory services to warn of traffic or transit delays. It is especially relevant to special-event generators and roadways with significant concentrations of travelers unfamiliar with the transportation system.
Ramp Metering	Time-differentiated metering that acts as a traffic signal for vehicles entering freeways in order to control access to the highway and assist in maintaining vehicle flow.
Automated Toll Collection Improvements	This includes various existing and developing strategies that reduce congestion and delays at tollbooths, including by shifting to all-electronic tolls.
Commercial Vehicle Operations	Utilization of ITS technologies to improve efficiency and effectiveness of commercial vehicles. This includes weigh station preclearance, automated safety inspections, and onboard safety monitoring.
Integrated Corridor Management	Building upon ITS technologies, ICM is the coordination of the individual network operations between parallel facilities that creates an interconnected system. A corridor is defined as a combination of parallel surface transportation networks (e.g., freeway, arterial, transit networks) that link the same major origins and destinations. A coordinated effort between networks along a corridor can effectively manage the total capacity in a way that will result in reduced congestion. ICM uses many other strategies in this list, such as Closed Loop Computerized Traffic Signals, TSP, Incident Management, and Traveler Information Services. Often, these efforts are done from a Transportation Management Center.
Street Circulation Patterns	Changing and/or restricting the direction of travel or separating two-way traffic on roadways. This can involve changing the designation of roadways from two-way travel to one-way, or vice versa.
Vehicle Use Limitations and Restrictions	The outright or time-of-day restrictions of vehicles, usually limited to trucks, to increase roadway capacity. This also includes turn restrictions during peak hours to eliminate conflicting movements. Scheduling truck deliveries can result in more efficient use of loading facilities and can be used to reduce congestion impacts where trucks park on the street.
Parking Operations	Changes to parking intended to improve the operation of roadways, such as relocating parking spaces nearest to dangerous intersections if line of sight is a problem, incentives to keep short-term parking used as such, and time-of-day limitations on parking.
Safety Improvements and Programs	A significant component of frustration with congestion is from unexpected delays, such as those caused by crashes. This item’s strategies cover the range of generally low-cost improvements to improve safety in areas with high rates of crashes by evaluating deficiencies and addressing them by use of improved guard or guide rails, lane dividers, signage, line-of-sight clearances, lighting, and if necessary, minor engineering projects, enhanced enforcement of speed limits, and educational programs.
Incident Management	These are programs to effectively manage incidents by reducing the time for incident detection/verification, response, and clearance. They usually include improved institutional coordination.
Transportation Security	Improvements and programs specifically designed to reduce negative transportation impacts of major events of all types. An all-hazards approach prepares the transportation system for events, including severe weather, major crashes, terrorist or criminal activities, or very large-scale events; any of these can create massive congestion.

Candidate Strategy	Description
Coordinate with Military Bases	Coordinate transportation planning in the vicinity of military bases with their security and access needs.
Coordinate with Nuclear Emergency Evacuation Zone Planning	Coordinate transportation planning in Emergency Evacuation Zones with nuclear plant plans.
Freight Rail Bridge Security	Enhance security on and around the limited number of key freight rail bridges, in particular the three crossing the Schuylkill or Delaware rivers.
Passenger Rail Bridge Security	Enhance security on and around the limited number of key bridges that carry passengers by rail. There are four major rail river crossings, two of which are part of the Northeast Corridor Amtrak Line.
Road System Bridge Security	Enhance security on and around road system bridges. This is especially important for the eight Interstate system bridges in the region that each carry over 100,000 vehicles per average day.
Transit Station Security	Enhance security at and around transit stations, with particular attention to the most heavily used ones in each county that could become a focus in an evacuation situation.
Evacuation Planning	Coordinate with and enhance how transportation would serve dense and at-risk populations if they needed to leave the area, such as people without access to a private vehicle.
Making Intermodal Transfers Easier for Freight	Improvements to make it more possible and convenient to fully use all available modes of transportation for their best purposes. Examples might include minor improvements to roads needed for truck access to rail sidings or improved communications/ITS approaches. See also Freight Intermodal Center/Yard or Freight Village in the Goods Movement Strategies section and Making Transfers Easier for Passengers in the Transit Improvements section.
Maintenance Management (Maintenance and Work Zones)	Employment of strategies to minimize the congestion caused by maintenance and construction activities. ITS is often used to alert drivers or to manage the work area. This is already part of the planning done by the implementing agency for all Federal-aid highway projects as part of their Traffic Management Plan.
Adaptive Signal Control	By receiving and processing data from traffic sensors to optimize and update signal timing settings every few minutes, adaptive signal control systems can adjust when green lights start and end to accommodate current traffic patterns, promote smooth flow, and ease congestion.
Dynamic Lane Assignment (DLA)	The use of lane control signals to provide advance notice that a lane is closed ahead and to start the merge process into the available lanes well in advance of the actual closure. DLA is often installed in conjunction with variable speed displays and also supports the Active Traffic Management (ATM) strategies of hard shoulder running, queue warning, and junction control.
Junction Control	A strategy that dynamically changes lane allocation at interchanges based on mainline and entering or exiting ramp volumes. Junction control is useful for situations with a varying relationship between mainline demand and ramp demand. This strategy allows a ramp to have one or two lanes depending on the demand on the ramp and the mainline volume. Through use of signs (and possibly lighted pavement markers), junction control can close a mainline lane and create a second lane on the ramp for entering or exiting traffic. For entrance ramps, the right lane at the entrance would become an add lane by closing this lane to mainline traffic upstream of the ramp. For exit ramps, the right mainline lane approaching the ramp would become a drop lane. At other times of the day, when ramp demand is not as high or when mainline volumes are such that a mainline lane cannot be closed, the ramp would operate as a single lane and the right mainline lane would operate as a through lane through the interchange.
Queue Warning	The use of technologies such as warning signs, flashing lights, or in-vehicle devices to alert motorists of downstream queues. Goals include effectively utilizing available roadway capacity and reducing the likelihood of collisions related to queuing. In some applications, the cause of the queue (crash, maintenance activities, congestion) is also displayed on dynamic message signs.
Variable Speed Displays	The intent of variable speed systems, often used in conjunction with DLA, is to regulate the speeds or advise motorists of downstream conditions, incidents, or congestion, providing advance warning to motorists and the need to reduce speeds prior to an incident or congestion, and the ability to merge out of lanes that are closed downstream in an orderly manner. Additionally, by stabilizing traffic speeds, variable speed displays and lane control systems work to reduce flow breakdown and the onset of stop-and-go driving behavior. This results in more uniform traffic flow and safer driving conditions and reduces both primary and secondary incidents and their severity. Variable speed displays may be advisory or regulatory. If they are regulatory (i.e., variable speed limits), they are legal speed limits for which a motorist can receive a citation if they exceed the posted limit. If they are advisory, a motorist cannot be cited for a speed limit violation unless in the officer's judgment they are driving too fast for the prevailing conditions. Also called "Speed Harmonization."
Dynamic Rerouting	The use of variable destination signing to make better use of available roadway capacity by directing motorists to less-congested facilities. Dynamic rerouting signs are often intended for the non-local traveler wishing to travel through a metropolitan area. As a result, dynamic routing is often used to divert traffic around central business districts or other activity centers and most effectively applied to Interstate corridors.
Intersection Improvements of a Limited Scale	Minor isolated intersection widening and lane restriping to increase intersection capacity and safety. This may include auxiliary turn lanes (right or left) and widened shoulders. Intersection design should be context sensitive. Truck routes may need special geometries.
Turning Movement Enhancements	Strategies to make turning movements cause less congestion and fewer crashes.
Channelization	Strategy used in optimizing the flow of traffic for making right turns, usually using concrete islands or pavement markings.

Candidate Strategy	Description
Left-Turn Lanes	This strategy installs left-turn lanes to decrease left-turning traffic causing friction with through traffic.
Center-Turn Lanes	This strategy is used in conditions where there are many vehicles turning left midblock to reduce the amount that through traffic is slowed.
Jug Handles	These are at-grade ramps provided at or between intersections to permit motorists to make indirect left turns and/or U-turns.
Improve Circulation	The range of strategies designed to move more vehicles through the existing road system, often using engineering approaches.
Access Management Projects	This refers to the engineering side of controlling access to and from mainly arterial roadways. Access is controlled through the number and design of driveways, medians, and median lanes. See also Access Management Policies.
County and Local Road Connectivity	This is a range of ways to encourage local traffic to use the more local road network in order to maximize use of highways for through traffic. It can be encouraged through enhanced signage, additional connections within the local road network, and state policies, such as those being used by NJDOT.
Bottleneck Removal of a Limited Scale for Cars and Trucks	Removal or correction of short isolated and temporary lane reductions, substandard design elements, and other physical limitations that form a capacity constraint. See also Bottleneck Removals for Passenger Rail and for Freight Rail, Making Transfers Easier for Passengers (Bottleneck Improvements), and Improvements for Bicycling and Walking.
Roundabouts	These are circular intersections with specific design and traffic-control features. Key features include yield control of entering traffic, channelized approaches, and appropriate geometric curvature to slow speeds. Roundabouts provide substantially better operational and safety characteristics than older traffic circles and rotaries and are safer than comparable signalized intersections.
ATM and Active Transportation and Demand Management (ATDM)	ATM is the ability to dynamically manage recurrent and non-recurrent congestion on the mainline based on prevailing traffic conditions. Focusing on trip reliability, it maximizes the effectiveness and efficiency of the facility and increases throughput and safety through the use of integrated systems. ATM strategies include variable speed displays, DLA, hard shoulder running, junction control, and queue warning. ATM can be combined with travel demand management and other operational strategies to create ATDM, which refers to the collective approach for dynamically managing travel and traffic demand and available capacity of transportation facilities, based on prevailing traffic conditions, using one or a combination of operational strategies that are tailored to real time and predicted conditions in an integrated fashion. This strategy includes traditional traffic management and ITS technologies, as well as new technologies and non-traditional traffic management technologies, including ATM, managed lanes, ramp management, travel demand management, and ICM among others.

TRAVEL DEMAND MANAGEMENT STRATEGIES

Candidate Strategy	Description
EJ Outreach for Decision Making	While general outreach includes the range of groups that have a history and/or likelihood of being adversely affected or not adequately involved in decisions about transportation services, it has tended not to be effective with these populations. Focused outreach may include meetings in different locations, times, or formats than are often used in the process of preparing recommendations or making decisions, and offering translated materials or translators as needed for people to participate.
Multilingual Communication	As part of EJ approaches, provide basic information in language-neutral signs where reasonable or in the languages used in communities with significant populations that speak English as a second language. This includes bus schedules and wayfinding signs. In addition to increasing access, this reduces the number of travelers confused for a range of reasons, including speed of reading and vision.
Road Diets	Road diets involve a reduction in the number of through lanes, typically reducing a four-lane undivided road to three lanes, to encourage alternate modes of transportation, calm traffic, reduce crashes for all road users, and, in some cases, increase on-street parking. Studies indicate that in conditions where the average daily traffic is under 20,000 vehicles, there is minimal effect on road capacity or travel time.
Traffic Calming	Specific actions intended to slow vehicular traffic to improve safety or meet other community goals. These goals can include improving pedestrian safety, making roads and streets more hospitable for bicycling and walking, and enhancing the livability of a neighborhood. In a commercial setting, traffic calming can be part of a set of strategies to encourage a more walkable commercial district and to encourage investment. In a residential area, traffic calming strategies such as speed tables are sometimes used to reduce the speed and amount of through traffic cutting across local streets. This can be paired with improvements on larger roads to better manage the flow of traffic.
Planning and Design for Non-Motorized Transportation	This covers the general work to make an area more conducive overall for consideration of any mode other than driving alone. This includes landscaping, streetscaping, and development of regional bicycling and walking plans and maps.
Encourage Use of Fewer Cars	This group of strategies encourages fewer cars on the road by reducing the number of SOVs, providing options for commuters, and promoting the use of transit and other modes rather than driving alone. Outreach and marketing are important to the success of these strategies and are included in the strategy by that name.

Candidate Strategy	Description
Carpool/Vanpool Programs	Carpooling is sharing a ride with one or more other people for at least most of a trip on a regular basis. Vanpooling is sharing a ride with a larger group of riders going to the same destination. These alternative forms of transportation save time and money, and are beneficial for the environment.
Carsharing and Bikesharing	This is an organized program that facilitates sharing vehicles among multiple users without each incurring the fixed cost and maintenance obligations of ownership. A charge is associated with each trip, or on a subscription basis. Examples include the Enterprise Car Share and Zipcar programs, and the new Indego bikeshare system in Philadelphia, which could expand regionally in the future. Some communities are also experimenting with shared Neighborhood Electric Vehicles or fleets of informally shared bicycles.
Emergency Ride Home	Serves as a safety net for employees who car/vanpool or use transit service by providing a reliable backup ride to get them to their destination if they have to work unusual hours or if an emergency arises.
Ride Matching	Any of a range of ways to help match people willing to coordinate their trip making. This is most often done with regard to work commutes. There are both public services available and services provided by specific employers. DVRPC has a program called Share-A-Ride. It is a free service that matches commuters with transit services, carpools, vanpools, and walking/bicycling opportunities in the five-county southeastern Pennsylvania region. The Share-A-Ride program also partners with local employers to provide these services for employees. Transportation Management Associations (TMAs) also provide related programs.
Local Delivery Service	Encouraging businesses to deliver their products to customers can reduce SOV trips and provide goods, especially in communities where car ownership is low.
Bicycle to Work	Programs to encourage employees to commute to work by bicycle. For example, the Greater Valley Forge TMA's annual Bike to Work Challenge recorded 40,000 miles by bicycle commuters in 2010, resulting in fewer VMT on the road network. Supportive strategies may also include the provision of bicycle amenities by employers, such as bike racks (especially weather protected), bike maintenance stations (e.g., air pumps), and shower access.
Shift Peak Travel	Strategies that encourage employers to allow employees to work from home or shift their schedules to reduce the number of travelers during peak hours.
Telecommute	This involves the elimination of a commute, either partially or completely, to a conventional office through the use of computers and telecommunication technologies (phone, personal computer, modem, fax, e-mail, etc.). It can involve either working at home or at a satellite work center that is closer to an employee's home than the conventional office.
Alternative Work Hours	These are strategies that reduce vehicle trip demand on highway facilities by shifting it to less congested time periods. This may include work schedules that spread the hours in which trips to and from the workplace occur or the complete elimination of trips to the workplace on some days, such as through compressed work weeks.
Outreach and Marketing	These strategies promote existing services to encourage increased participation and/or use generally of transit and transportation demand management strategies. These strategies include carpool, vanpool, and ridesharing programs, alternate work hours, telecommuting, emergency ride home, promotion of a regional commuter benefit, and carsharing and bikesharing programs. Also included are strategies for effectively communicating with transportation-disadvantaged populations.
Marketing/Outreach for Transit and Travel Demand Management Services	This covers outreach, education, planning, and other ways of encouraging use of transit services and transportation demand management programs. This is applicable to employers, public entities, and the general public. This includes carpool, vanpool, and ridesharing programs; alternate work hours, emergency ride home, promotion of a regional commuter benefit, carsharing, bikesharing, and other transportation demand management strategies.
Promotion of a Regional Commuter Benefit	DVRPC's commuter benefit program allows employers to offer their employees a cost-saving way to help pay for commuting on transit or vanpools. It saves employers and commuters money because the program takes advantage of federal legislation that allows tax-free dollars to pay for transit fares.
Comprehensive Policy Approaches	There is a wide range of policy approaches that reduce congestion and help get people and goods where they need to go.
Growth Management and Smart Growth	These are ways to encourage the use of land in a manner that reduces overall congestion and transportation costs. These approaches recognize that transportation and land use decisions form a cycle, with many implications for communities. Managed and balanced development can reduce trip length by creating a greater job/housing balance and by making it more feasible to get to places by means other than driving alone. This range of ideas includes locating neighborhood schools where students can walk to them and regional schools on transit lines to reduce the duplicative need for buses and congestion from drivers turning into the driveway.
Complete Streets	Development and implementation of policies that require streets to be designed for all users. The design standards for such streets would serve bicyclists, pedestrians, disabled people, transit users, and drivers. A municipality may be able to adopt such standards for future roads and roads under rehabilitation. Note that this is an adopted policy of NJDOT but is not appropriate everywhere in Pennsylvania.
Financial Incentives	These are market-based solutions to reduce congestion, often targeting a specific time and location known to experience severe congestion. They can also help raise funds for transportation improvement projects.
Pricing Policies	Various policies that use pricing to shape transportation include gas taxes, insurance structures, VMT taxes, or other approaches. These approaches may be used to shape transportation behavior or raise funds. The funds may be used for transportation in general, or for paying for a specific project. See also the specific application, as Tolls/Congestion Pricing, and Parking Supply-and-Demand Management.

Candidate Strategy	Description
Tolls/Congestion Pricing	This is a method of reducing congestion by charging for roadway use based on time and/or location of travel. This strategy may encourage travelers to shift to alternative times, routes, or modes during peak-traffic periods, or may help offset costs of maintaining the roadway. Higher fees apply during the periods of greatest demand. This also covers changes to the toll structure for different types of trucks and how this compares to tolls for cars.
Parking Supply-and-Demand Management	These are actions taken to alter the supply and/or demand of a parking system to further the attainment of transportation objectives. They can include parking cash-out/transportation allowances, preferred parking areas for carpools or for people who only drive a few times a week, or changes in pricing.
Land Use/Transportation Policies	These strategies reduce congestion by changing land use and development patterns to encourage mobility options and limit new trip generation.
Revisions to Existing Land Use/ Transportation Regulations	Revise and better coordinate existing regulations, such as zoning, to reduce future traffic congestion. This can be done by using GIS or travel simulation modeling, programs, such as UPlan, or buildout analysis. It is desirable that zoning ordinances, subdivision regulations, and other rules reflect master plans and other community goals, such as maintaining reasonable accessibility and quality of life. They can also incorporate access management (see Access Management Projects in the Operational Improvements section and Access Management Policies in the Transportation Demand Management section).
Trip Reduction Ordinances	These are ordinances that use a municipality's regulatory authority to limit trip generation from development sites. They usually cover an entire local political subdivision rather than just an individual project; they spread the burden more equitably between existing and future development; and they may be less vulnerable to legal challenges than conditions imposed on development approvals. Also known as Employee Trip Reduction, such approaches may be voluntary or mandatory.
Engineering for Smart Growth	Strategies to promote and enable smart growth using engineering solutions.
Access Management Policies	Adoption of the right to share access, provide cross access, regulate driveways, or other regulatory authority. This can also include the development of model ordinances and adoption of an access code by itself or as part of other regulations. Access management codes may cover corner-lot requirements, continuity of sidewalk/bike networks and pedestrian/transit rider access, and land use (trip making) intensity controls in specific areas. Refer to Access Management Projects in the Operational Improvements section.
Context-Sensitive Design	Engaging local stakeholders early in the process to ensure that projects reflect community goals. Context-sensitive design also encourages designers to consider non-traditional approaches to designing projects for the community context, while maintaining basic design standards. This is also known as *context-sensitive solutions*.
Railroad/Linear Right-of-Way Preservation	Preservation of abandoned railroad rights-of-way for potential future rail service or other transportation uses before other development occurs. In addition, other linear rights-of-way should be preserved, such as those for utilities.
Economic-Development-Oriented Transportation Policies	These are transportation strategies that serve the goals of redevelopment, revitalization, renewal, and recentralization of the region in keeping with adopted plans and programs. Such approaches are generally more efficient ways for a region to manage congestion, while retaining or increasing employment, than developing new rural areas. Examples may include actively redeveloping brownfields in TMP subcorridors as appropriate for investment of federal transportation funds. Brownfields are often sited near rail or other major transportation facilities and may be ideal for mixed-use, TOD, or freight intermodal centers.
Environmentally Friendly Transportation Policies	These are transportation strategies that seek to minimize the impacts of transportation on the natural environment in keeping with adopted plans and programs. Included are approaches to minimize stormwater run-off, conserve fuel; improve air quality; and preserve farmland, natural features, and open spaces. These strategies often shorten trip lengths, which helps manage congestion. They may include "Green Streets" programs or projects that help reduce flooding to prevent roads from closing or becoming unsafe during rain storms or other weather events.
Interregional Transportation Coordination	While part of many other strategies, this is explicit recognition that people and goods travel across regional boundaries, and congestion management is made more effective by addressing the need to coordinate and communicate beyond strict geographic lines. This includes coordination of metropolitan planning organizations (MPOs), transit authorities, and departments of transportation, as well as outreach to key stakeholders, such as the freight community. The strategies include continued strengthening of the transportation planning process.
Park-and-Ride Lots	These are facilities that serve as a transfer terminal between modes. They may be served by public transportation or can be used for transferring to carpools and vanpools. This strategy may cover agreements for use of existing spaces, adding additional spaces to existing facilities, or building new lots that do not primarily serve transit (see also Expanded Parking for Existing Transit Stations [all modes] and Improvements to Pedestrian and Bicycle Access to Transit Stations and Bus Stops in the Transit Improvements section).
Transit First Policy	Implementation and enforcement of policies that give preferential treatment to transit, thereby increasing its attractiveness in comparison to SOV travel and effectiveness as a mobility option. See also Transit-Oriented Development and other Planning and Policy Approaches, and Transit Signal Priority in Operations.
Transit-Oriented Development (TOD)	This includes pedestrian-friendly, mixed-use development focused around transit stations. TOD encourages residents and workers to rely on modes other than the automobile. See also Transit First Policy.
Walking and Bicycling Improvements	These strategies reduce congestion and promote livability by making it safer and more convenient to travel by walking and bicycling.
Improvements for Walking	Improve safety and convenience for pedestrians of all types (such as able-bodied or disabled, young, or old people), but especially for people who need to walk to get places. These improvements should be selected to fit the level of development and population. Examples include sidewalk improvements, crosswalk improvements, signals, and markings giving pedestrians the right-of-way. This can include pedestrian-countdown-type signals.

Candidate Strategy	Description
Improvements for Bicyclists	Improve safety and convenience for bicyclists, especially for people using bicycles for transportation. Examples include provision of sharrows, bike lanes, cycletracks, multi-use trails, and bicycle storage facilities to promote bicycles as an alternative to automobiles.
Creating New Connections to Help Complete The Circuit Regional Trail Network	The Circuit trail system takes advantage of opportunities to build and connect trails across the region. In addition to providing access to the region's rivers, creeks, and streams, the Circuit will also serve as the backbone for a network of "bicycling highways" that will allow safe and efficient travel by bicycle between homes, businesses, parks, schools, and institutions, free from motorized traffic. This strategy includes identifying connections that will help complete the Circuit or improve access to existing or planned segments of the regional trail network.

STRATEGIES TO INCREASE EXISTING TRANSPORTATION SYSTEM CAPACITY

Candidate Strategy	Description
ITS Improvements for Transit	These strategies make existing transit services more convenient and reliable through implementation of ITS technologies.
Electronic Fare Payment Improvements	This involves automatic trip payment through the use of non-cash media, such as magnetically encoded or radio-frequency-identification enabled fare cards. Increasingly, this method is coordinated with other systems so that one media works across various transit systems, or even for both transit and toll roads.
Advanced Transit System Management	Use of Automatic Vehicle Locator systems on buses to communicate with people riding transit (such as information about transfers) or considering riding it (such as when the next vehicle is expected at a stop). This is sometimes called *Intelligent Transit Stops*. Advanced Transit System Management may be coordinated through transit centers able to make real-time adjustments to schedules. Additionally, it may include the use of ITS technologies for bus, train, and coordinated transit management, including train signals and power grids. See also Transit Signal Priority.
Making Transfers Easier for Passengers (Bottleneck Improvements)	Focused improvements to make it more possible and convenient to fully use all available modes of transportation for their best purposes. Examples might include minor changes in schedules to better mesh bus and train schedules, or improved information and amenities at intermodal centers. These improvements may also be between two providers of one mode, such as convenient walking connections between different train lines or coordination of schedules. For new intermodal centers, see Passenger Intermodal Center or Garage for Transit Riders.
Transit Infrastructure Improvements	Strategies that make it more convenient, safe, and desirable to use transit services.
Enhanced Transit Amenities and Safety	This is the broad range of ways to make it more comfortable, safe, and convenient to use transit. It includes, but is not limited to, onboard features and improvements at transit stops. Improvements at transit stops may include lighting, bus pull-off areas, shelters for passengers, and making it safer for passengers walking to and from stops. Safety may be addressed for the people traveling, and also for the vehicles and bicycles left at stations. See also Advanced Transit System Management.
At-Grade Rail Crossing Safety Improvements	Improvements to the rail system and/or the crossing road or trail system to increase safety and acceptable speeds, while reducing delays and other impacts. This may include improved coordination and warning systems. A related strategy is to equip a priority set of vehicles (such as school buses, hazardous material haulers, and emergency vehicles) with in-vehicle devices warning of approaching trains, potentially with real-time information on train position.
Expanded Parking for Existing Transit Stations (all modes)	Access to stations can be a limiting factor for use of the services that stop at them. There is a range of ways that access can be improved (see also TOD, Shuttle Service to Stations, Passenger Intermodal Center or Garage for Transit Riders, and Improvements to Pedestrian and Bicycle Access to Transit Stations and Bus Stops). Within the category of increasing parking capacity to existing facilities, this may be done through added surface lot capacity or agreements with nearby sources of parking. An inexpensive example is assessing whether existing parking lots can be restriped in part or whole with smaller stalls to fit more vehicles in the same space. This could also be assessed in parking requirement regulations.
Bottleneck Removal for Passenger Rail	Investing in new bridges, tunnels, switch, or other communication systems significantly increases the capacity of the rail system with limited need for right-of-way. This is also related to Bottleneck Removal for Freight Rail and Making Transfers Easier for Passengers (Bottleneck Improvements).
Passenger Intermodal Center or Garage for Transit Riders	This can range from extensive new facilities, such as a landmark building, with a range of services and structured parking, to parking decks for transit stations, to major new surface lots. For a smaller scale, see Park-and-Ride Lots and Expanded Parking for Existing Transit Stations (all modes).
Improvements to Pedestrian and Bicycle Access to Transit Stations and Bus Stops	There is a mutually supportive relationship between biking, walking, and public transit in helping residents and workers reduce SOV trips. Enabling safer bicycle/pedestrian connections between transit stations and neighborhoods/employers and improving bicycle accommodations at transit facilities can expand a rail station's catchment area at a lower cost than parking expansion, or alternatively help ensure that station parking capacity is used by riders traveling from further distances. DVRPC's RideScore tool (www.dvrpc.org/webmaps/ridescore) can help prioritize rail stations for bike improvements. In addition, SEPTA's Bus Stop Design Guidelines (DVRPC Publication #12025) illustrate how a bus stop can be effectively connected with the development it is intended to serve.
Modifications to Existing Transit Routes or Services	Making the existing transit system serve people better is often a more efficient and cost-effective approach than new projects.
Express Transit Routes	This involves having some or all service on a route stop only at major stops in order to transport people more rapidly. It can be done by dropping less heavily used stops from peak-hour scheduled runs or by adding additional express service.

Candidate Strategy	Description
Extensions or Changes in Bus Routes	This includes a review of where bus service is provided, seeking ways to provide better or more efficient service using existing resources. For bus or other services, it may include minor extensions in existing routes to provide service to a broader area.
More Frequent Transit or More Hours of Service	This involves providing additional service on an existing transit route. It can be done for increased peak service, increased service throughout the day, or to provide earlier or later service.
Flexible Routing/Route Deviation Service	This is an approach that increases passenger convenience for fixed-route bus riders by building in ability for buses to deviate within a defined distance, such as a quarter-mile from a fixed route. This may require advance arrangement and is generally used more in rural areas.
New Bus Services	These are strategies that provide new bus or shuttle routes or services.
Bus Route	New regular bus service in an area not served by existing routes.
Demand Response Transit Services	Transit set up by appointment, available to the general public using smaller vehicles (e.g., vans, 30-foot buses, or sometimes taxis). This may be most applicable in areas where transit demand is low or development is very dispersed.
Shuttle Service to Stations	Shuttle services may be added to make existing services more accessible or to efficiently expand their reach in less dense areas. Smaller vehicles can provide loops or demand-responsive services to train stations, bus stops, or other multimodal transportation transfer centers. This is sometimes referred to as *shuttle bus to line-haul transit* or *last-mile service*.
Transportation Services for Special Events	Shuttle services and other approaches can be provided to get people to and from sporting events, concerts, or other major gatherings. This can be an efficient way to reduce what is generally referred to as *non-recurring congestion*, as well as reducing need for expensive investments in infrastructure. These services usually serve outlying parking lots and/or transit stops.
Transportation Services for Specific Populations	This is the provision of services that address specific needs or specific populations. This includes employer-supported shuttles for employees. It also includes services oriented toward senior citizens, handicapped people, and Job Access and Reverse Commute target populations.
Bus Rapid Transit or Exclusive Right-of-Way Bus Lanes	At the heart of such strategies is making bus service more competitive with private automobiles. Both of these approaches allow buses to bypass road congestion so they can reach destinations faster. Bus Rapid Transit systems may also include enhanced use of ITS and traveler communication services, high-end vehicles, and distinctive marketing. Exclusive bus lanes may be part of existing roads or on new rights-of-way.
New Passenger Rail Investments	These are strategies that provide new passenger rail routes, stops, stations, or services.
Intercity Rail Service	This is longer-distance new rail service connecting to cities outside the region on new track or track previously not used for this specific service. Such service may be fueled and operated in a variety of ways, including electric or diesel power.
Fixed-Rail Service (new, extensions, or added stations)	This is generally, although not always, oriented to commuter rail movement within one region, often with linkages to intercity transportation. It can be provided in many ways, including trolley, subway, elevated rail, light rail, or other approaches. This may mean enhancements of existing services or new services.
Ferry Services	Passenger or passenger/vehicle services conveying people across major water bodies. Water taxis are closely related.

STRATEGIES TO ADD NEW TRANSPORTATION SYSTEM CAPACITY

Candidate Strategy	Description
High-Occupancy Vehicle (HOV) Treatments	Improvements that reduce congestion by increasing the person throughput capacity of critically congested corridors. This also includes supporting policies and constructing facilities to encourage the use of HOV. An assumption is that such a project will inherently include a range of transportation demand management and safety improvements and be coordinated with community needs.
Frontage or Service Roads	Road strategies that maintain access to local land uses, while generally increasing the throughput of regional roads. This relates to and would be done with other access management strategies included in this document.
Major Reconstruction with Minor Capacity Additions	Major reconstruction focuses on the basic use of a roadway, but may increase capacity, safety, and access for other modes. For example, reconstructing a facility so that it meets current design standards may include wider lanes and shoulders, which result in higher actual safe operating speeds. Major new bridge or bridge replacement projects and interchange reconfigurations may fit into this category.
General Purpose Lanes	The addition of one or more through lanes to an existing road.
Hard Shoulder Running	Temporary use of the shoulder as an additional traffic lane during peak and congested periods. This is implemented in conjunction with complementary ITS strategies to indicate when the shoulder may legally be used for travel. In some instances, only transit buses are allowed to use the shoulder lane.

Candidate Strategy	Description
Interchange with Related Road Segments	These are projects at a scale that is expected to change regional transportation patterns. They increase the capacity of the existing road network by increasing interconnection opportunities, capacity, and safety. Large intersection projects with related roads that will add major capacity would be included in this strategy.
Arterial or Collector Road	New road or substantial extension of an existing road (usually over a mile), generally built with many access points and designed to fit with local conditions.
Bypass	A bypass of a downtown or city adds new capacity on a new alignment. Such roads may tend to be short to medium in length and address a variety of transportation and other issues.
Limited Access Highway	The addition of a new facility or extension of existing facilities with accompanying ramps, tolls if included, signage, and other related improvements.

GOODS MOVEMENT STRATEGIES

Candidate Strategy	Description
Freight Operations Improvements	Strategies to make the truck, freight rail, and other means of moving goods function more efficiently by themselves or in combination with each other.
Truck Parking (short-term)	The provision of short-term truck parking for various types of deliveries is essential in active locations, such as central business districts or urban areas. Having adequate, designated parking locations prevents unwanted violations and contributes to improved general traffic flows.
Truck Parking (overnight)	With trucking remaining the predominant mode of domestic freight transportation, the supply of overnight truck parking has emerged as an important consideration in the supply chain. Recent changes to driver hours-of-service regulations have highlighted the need for full-service truck-parking facilities.
Freight Rail (rehabilitation or reconstruction)	Existing rail infrastructure requires routine maintenance and periodic upgrades. Both Pennsylvania and New Jersey have statewide, competitive programs that fund rail freight maintenance projects, with short line railroads often being the beneficiaries.
Bottleneck Removal for Freight Rail	Investing in needed new bridges, tunnels, switches, or other communication systems significantly increases the capacity of the rail system with limited need for new right-of-way. See also Bottleneck Removal for Passenger Rail and Freight Intermodal Center/Yard or Freight Village.
Grade-Crossing Separations	Highway-railroad crossings that are at-grade create delay for both freight rail operations and the driving public. In instances of high usage, it may be desirable to grade separate the crossing and to create free-flow conditions for both the rail and vehicular traffic.
Freight Intermodal Center/Yard or Freight Village	This can range from major reinvestment making an existing intermodal center more functional to new facilities. It can focus on transfer between modes, such as rail to truck, or transfer within a mode, such as from truckload to less-than-truckload/local delivery vehicles. A freight village is a cluster of freight-related activities within a specific area that may be served by multiple modes. Benefits include improved traffic management, lower transport costs, value-added activities, and increased reliability.
Freight Capacity Investments	These are strategies that add capacity to goods movement systems through significant investment in infrastructure.
Port Facility Expansion	The expansion of existing marine terminals and the creation of new ones helps maximize the use of the region's waterways for freight transportation purposes. At present, there are several major proposed expansions of port facilities along the Delaware and Schuylkill rivers.
Short Sea Shipping	Now also referred to as the *Marine Highway*, Short Sea Shipping connotes the use of inland and coastal waterways to move commercial freight from major domestic ports to its destination. With container ships growing larger and calling on fewer ports, Short Sea Shipping is an emerging strategy that makes further use of water transportation.
Freight Rail (new or expanded)	New rail lines or extensions of existing facilities built to meet the needs of moving freight, including in terms of weight, clearance, and access.

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Burlington County, New Jersey

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Highway Master Plan, Regional Travel Demand Model, Burlington County, New Jersey, Congestion Management Process (CMP), Highway Functional Classification, Operational Strategies, Transportation Demand Management Strategies, Increase Capacity of Existing Transportation Systems, New Capacity, Goods Movement Strategies, Geographic Information System (GIS), Web Map

Abstract:
The *Burlington County Highway Master Plan* is the 2019 update to the county's 1989 Highway Master Plan. Burlington County commissioned the Delaware Valley Regional Planning Commission (DVRPC) to update the 1989 plan to supply a vision and implementation framework for the county highway network that can sustainably complement long-term county growth patterns.

The plan is the product of a technical, collaborative three-year-long planning process. DVRPC performed the technical work using the regional travel demand model (TIM 2.2) and the Traffic Management Process (TMP) evaluation methodology. The 2040 Long-Range Plan (LRP) Scenario was modeled to reflect the land use assumptions and transportation recommendations of *Connections 2040*, DVRPC's LRP for Greater Philadelphia. This model was utilized to assess future conditions and compare them to current conditions.

DVRPC developed a second future scenario, the 2040 Master Plan (MP) Scenario, which contained the LRP recommendations, as well as the county's revised estimate regarding population and land uses. The geographic information system (GIS) database developed for this project contains the final 2040 MP Scenario model outputs and other measurable data used to assess conditions and changes along the County Route (CR) network.

This GIS database includes TMP strategies that identify candidate solutions for transportation deficiencies along specific CRs sequentially. The five categories below summarize the range of strategies:

- Operational Strategies;
- Transportation Demand Management Strategies;
- Strategies to Increase Existing Transportation System Capacity;
- Strategies to Add New Transportation System Capacity; and
- Goods Movement Strategies.

A Web Map containing the majority of the data in the GIS database, including the TMP strategies, is available online: www.dvrpc.org/Webmaps/BCHMP. This online tool was created as a public, user-friendly application.

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BURLINGTON COUNTY Highway Master Plan

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