

DRAFT

# Downtown Trenton BICYCLE & PEDESTRIAN PLAN



April  
2015





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The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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## CHAPTER 1:

# introduction

This introductory chapter will highlight the plan's purpose and goals. It will also discuss the outreach process, including the plan's stakeholders. The chapter concludes with a summary of previous studies.



# Chapter 1: Introduction

## Purpose

The purpose of this document is to develop a bicycle and pedestrian plan for Trenton's Downtown District that enhances local mobility.



*This plan will be integrated into the Trenton 250 Master Plan as one of its transportation sections.  
Source: Trenton 250*

The Delaware Valley Regional Planning Commission (DVRPC), with input from a variety of local, county and regional stakeholders and the public, has developed the *Trenton Downtown Bicycle and Pedestrian Plan*.

The plan recommends connecting bicyclists and pedestrians to options within the downtown street network as well as extending connections to a larger network of regional infrastructure. The bicycle and pedestrian improvements must be part of a comprehensive network to ensure all users safety, access, and convenience when traveling by all modes. The facilities recommended in this plan will help to create and integrate Trenton's bicycle and pedestrian network by implementing safer roads, trails, and intersections.

**These recommendations seek to enhance pedestrian safety, facilitate access to transit, and to clarify an appropriate route for bicyclists.**

## This plan...

- **Recommends actions** that will enhance safety when accessing and traveling within downtown Trenton.
- Aims to **increase cycling and protect pedestrians** in downtown Trenton.
- **Will build upon, and include, the work of related plans** such as the 2004 *Trenton Transportation Master Plan* and the 2006 *Trenton Station Linkage Plan*.
- Will be **incorporated into the upcoming Trenton 250 Master Plan as a part of the Transportation Circulation Element**.

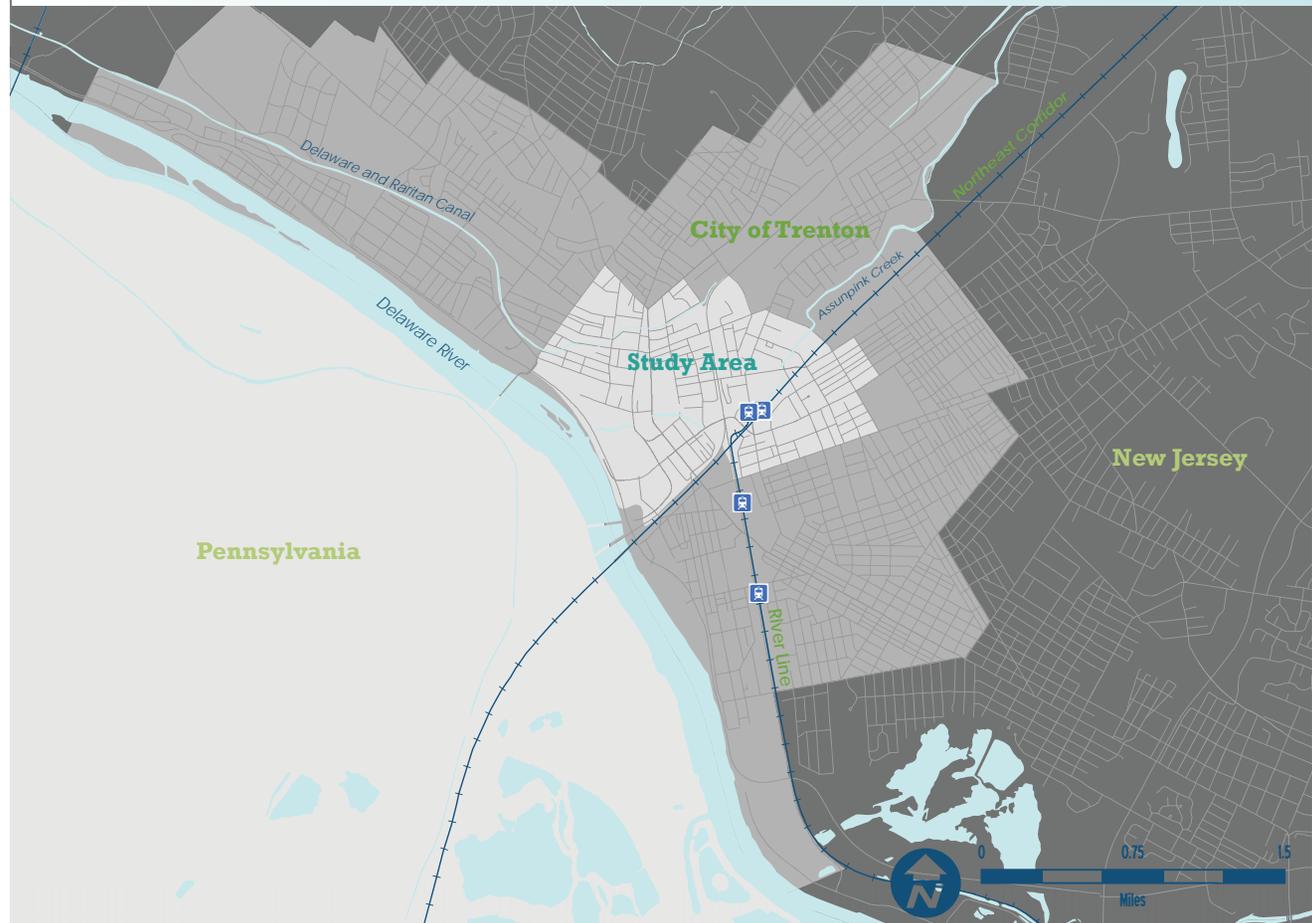
## Study Area

The Trenton Downtown Bicycle and Pedestrian Plan examines **downtown Trenton** for its bicycle and pedestrian recommendations. The downtown is defined using the “Downtown Capital District” boundaries from the 2008 Living Trenton Downtown Capital District Master Plan.

### DOWNTOWN BOUNDARIES

This study area borders the Delaware River on its west side from Calhoun Street in the North to the Northeast Corridor Rail lines in the south, east of 129. East of 129, the lower boundaries of downtown end at Hamilton Avenue. Lincoln and Chambers are the primary borders to the east, while Pennington, Brunswick, and the Delaware and Raritan Canal make up the northeast portion. Features within the study area include downtown state, county, and city government buildings and the Trenton Transportation Center. Additionally, the Assumpink Creek and Delaware and Raritan Canal both cut horizontally across downtown Trenton.

FIGURE 01: Study Area



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

## Outreach and Stakeholders

A steering committee was formed in order to assist and guide the plan. The steering committee created a space for sharing local knowledge and a deeper understanding of particular issues within downtown Trenton.

This steering committee consisted of a variety of stakeholders including government and transportation partners such as the **City of Trenton, New Jersey Department of Transportation, Greater Mercer Transportation Management Association, Mercer County, and New Jersey Transit**. Additionally, other local partners participated such as the **Trenton Health Team, Trenton Healthy Kids, Trenton Downtown Association, Capital City Redevelopment Corporation, and Trenton Cycling Revolution**.



Stakeholders were invited to attend two meetings in 2014: The first meeting in February introduced the project and showed stakeholders the existing conditions as well as previous plans. The second stakeholder meeting in September presented the results of the bicycle and pedestrian counts as well as preliminary recommendations.

In October 2014, a public outreach meeting was held that included both stakeholders and members of the general public. This presented the majority of the plan's recommendations and provided an opportunity for the public to comment on the plan.

The steering committee helped shaped the recommendations in this plan by providing feedback throughout the process.

Collaboration with stakeholders helped prioritize specific recommendations in the plan.

A major collaboration was partnering with the Trenton Partnership for Healthy Kids to design the Wellness Loop, a dedicated bicycle facility discussed later in the document.

## Steering Committee Members <sup>DRAFT</sup>

- City of Trenton
- New Jersey Department of Transportation
- Greater Mercer Transportation Management Association
- Mercer County
- New Jersey Transit
- Trenton Health Team
- Trenton Partnership for Healthy Kids
- Trenton Downtown Association
- Capital City Redevelopment Corporation
- Trenton Cycling Revolution

## Meeting Timeline



## Project Goals

As a result of stakeholder meetings, a list of guiding principles was created to focus the plan on specific overarching goals.

Four main themes emerged from stakeholder input (See “Guiding Principles” on the right):

- Focus on safety
- Develop a network
- Make it “not just about bikes”
- Make the plan intuitive

Although this plan does not measure specific project-level metrics, a guide to taking a project-level approach can be found within the Implementation section of this plan (Chapter 4).

Measuring outcomes is an essential part of an effective project, and the City of Trenton must decide more specific measures of success on a case by case basis.

## GUIDING PRINCIPLES

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### FOCUS ON SAFETY



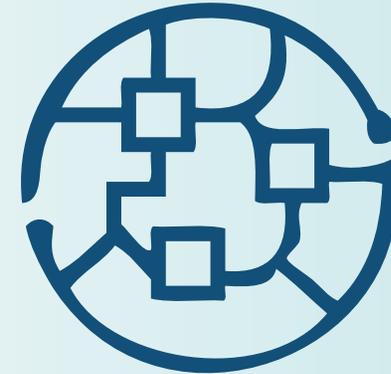
Safety is an essential part of what makes people feel comfortable walking and biking in Trenton. If the streets can be made safer for people walking and biking, more people are likely to use these modes.

### MAKE IT “NOT JUST ABOUT BIKES”



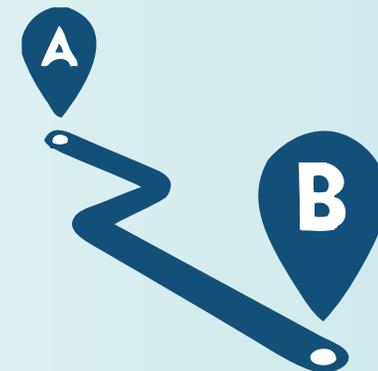
Pedestrians also have to be a major part of the plan, as there are many more people walking around Trenton than biking the city.

### DEVELOP A NETWORK



This plan needs to connect places in a network rather than discrete parts.

### MAKE IT INTUITIVE



Trenton's bicycle and pedestrian system should be easy to navigate.

## Previous Studies

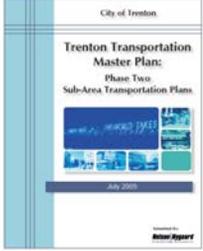
Many previous studies have examined bicycle and pedestrian transportation within downtown Trenton.

A few of these plans include the *Trenton Transportation Master Plan* (2004/2005), *Trenton Station Linkage Plan* (2006), the *New Jersey's Long-Range Transportation Plan: Urban Supplement Report, City of Trenton* (2008), and the *Living Trenton Downtown Capital District Master Plan* (2008).

Each section of the report also draws ideas and inspiration from prior <sup>DRAFT</sup> documents. These will be referenced throughout the plan in each respective section.

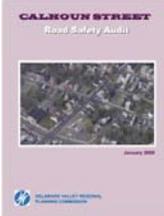
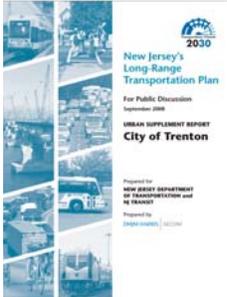
See Table 1 for a summary of a few selected plans:

**TABLE 01:** Previous Studies

<p><b>TRENTON TRANSPORTATION MASTER PLAN (2004/2005)</b></p>	<p>The <i>Trenton Transportation Master Plan</i> was a two-phased report that documented the existing transportation network as well as recommending a strategic plan for both short and long term improvements. This plan integrates as Trenton's master plan transportation element.</p>	
<p><b>TRENTON STATION LINKAGE PLAN (2006)</b></p>	<p>This plan addresses linking all modes of transportation to the Trenton Transportation Center. The plan addresses reconfiguring traffic flow, introducing new wayfinding, examining sidewalk and bicycling conditions, and optimizing signal timing, particularly in the area around the station.</p>	

**TABLE 01: Previous Studies Continued**

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<p><b>LIVING TRENTON DOWNTOWN CAPITAL DISTRICT MASTER PLAN (2008)</b></p>	<p>This plan suggested a multitude of different transit improvements for different sections of the city. The Route 29 Boulevard and Transit Villages within walking distance of the Trenton Transportation Center and the River Line are two of the plan's recommendations.</p>	 <p><small>Opportunities sites are identified in orange. Key sites and projects are listed in the list that follows.</small></p>
<p><b>ROUTE 29 BOULEVARD PROJECT (2009)</b></p>	<p>NJ DOT conducted a feasibility study on the southern section of Route 29 from Richey Place/ Calhoun Street interchange and the intersection at Cass Street to replace the existing freeway with an urban boulevard to connect the waterfront with Trenton's downtown neighborhoods.</p>	
<p><b>CALHOUN STREET ROAD SAFETY AUDIT (2008)</b></p>	<p>This DVRPC Safety audit examines Calhoun Street within downtown Trenton and suggests a variety of improvements for user safety such as upgrading curb ramps, installing pedestrian crossing signs, and replacing street lighting.</p>	
<p><b>NEW JERSEY'S LONG- RANGE TRANSPORTATION PLAN: URBAN SUPPLEMENT REPORT, CITY OF TRENTON (2008)</b></p>	<p>This supplement report is a requirement of the state's seven largest cities as well as New Brunswick. This report reviews the existing conditions, examines current projects, previous reports, and interviews key agencies to provide a list of recommendations that provide insight into the planning and capital programming processes. The goals of this report help to align transportation with supporting local economic development and land use objectives.</p>	

# Plan Structure

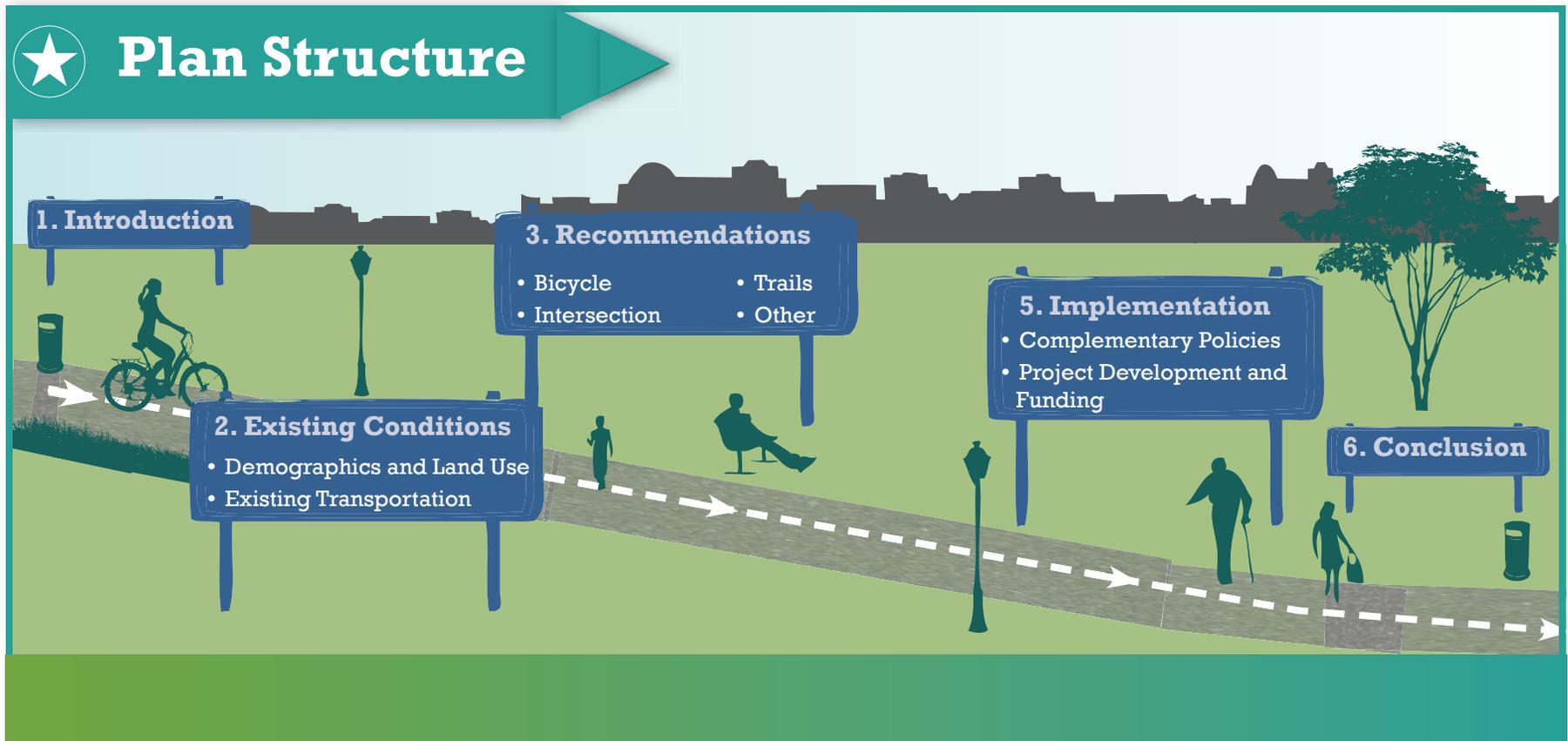
The Downtown Trenton Bicycle and Pedestrian Plan covers a large range of multi-modal infrastructure and policy interventions.

Following the **introduction**, this plan is divided into three main sections: existing conditions, recommendations, and implementation.

**Existing conditions** is divided into an overview of demographics and land use, followed by an overview of existing transportation conditions.

The **recommendations section** is divided into four sub-sections: bicycle improvements, pedestrian and intersections improvements, trail improvements and other improvements.

The **implementation section** explores complementary policies, including the recently enacted Trenton Complete Streets ordinance. Furthermore, funding and financing strategies are explored for options on how to find resources for the interventions recommended in this document.



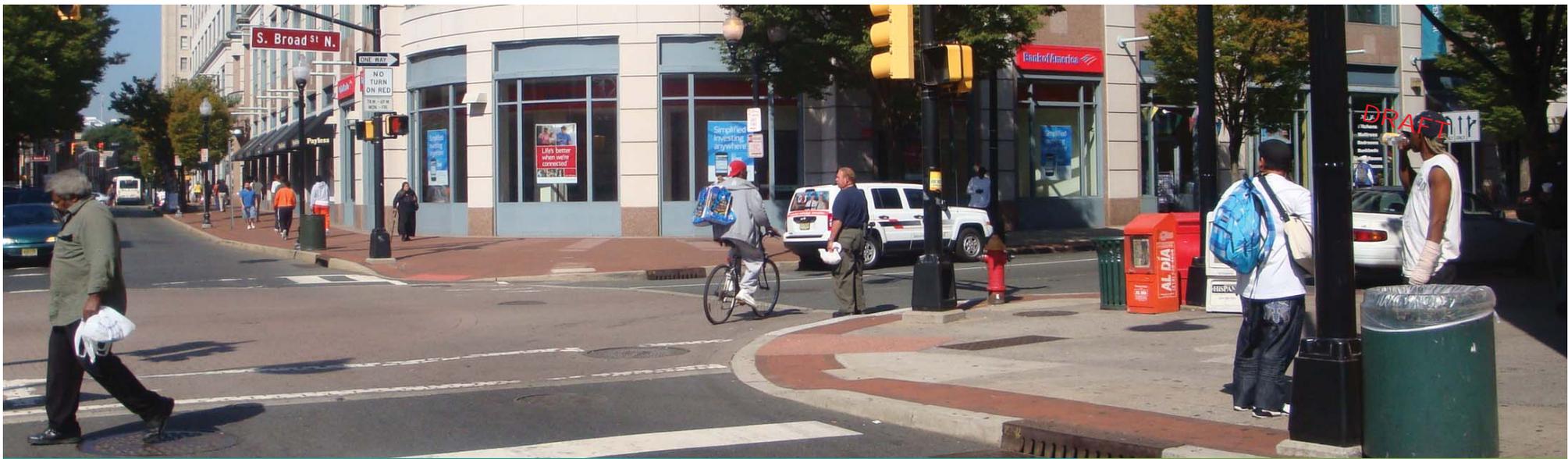


PHOTO CREDIT: DELAWARE VALLEY REGIONAL PLANNING COMMISSION

# CHAPTER 2: existing conditions



This chapter provides an overview of downtown Trenton's demographics, land use, and existing transportation conditions.



## Chapter 2: Existing Conditions

### Introduction

Downtown Trenton, New Jersey is the state capital and home to many government jobs. The downtown district also contains a diverse set of socioeconomic backgrounds which add to Trenton's unique character.

The downtown district also has a variety of transportation options, including rail, bus, trails, and bicycle lanes, already in existence.

This chapter will discuss Trenton's current conditions, with the first section focused on the city's demographics and land use, and the second portion focusing on existing transportation.

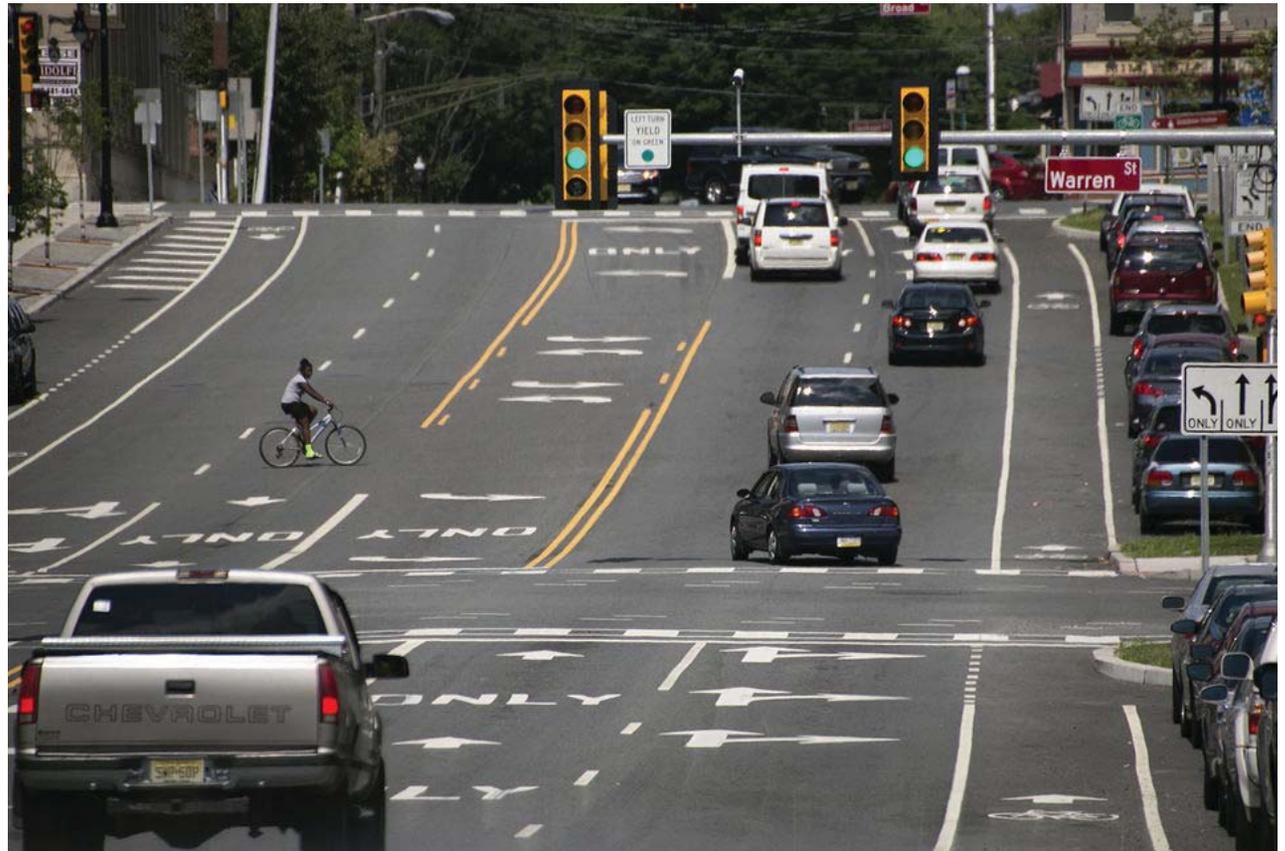


PHOTO CREDIT: MICHAEL MANCUSO, THE TIMES

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EXISTING

# demographics and land use



# Demographics and Land Use

Trenton, home to the state and county governments, has experienced change since its late 19th/early 20th century industrial period. Downtown Trenton, like many cities, experienced a large drop in population in the second half of the 20th century and faces challenges with poverty, health conditions, and unemployment. However, population decline has slowed and the city is home to an ethnically diverse and relatively young populace.

## Demographics

### POPULATION

Trenton is located within Mercer County, New Jersey. The city has an estimated population of 84,899 in an area of 7.65 square miles as of 2010. The city's population boomed rapidly during the first half of the 20th century due to manufacturing jobs, with its peak of 129,781 residents around 1950. Since then, Trenton has experienced large population decline: In 2010, Trenton was at its lowest population since 1900 at 84,899 residents.

### AGE

The median age is much <sup>DRAFT</sup> younger in Trenton than both the state and the country: The median age is 33 compared to 37 in the United States and 39 in New Jersey. However, the age difference is not due to a higher percentage of children, as the city has similar rates to the state and nation (28% Trenton, 26% New Jersey, 27% United States). Additionally, despite population decline, there is a growing number of 15-34 year olds (consisting of a third of the population in 2010 from 29% in 2000).

FIGURE 02: Trenton Population 1900-2010

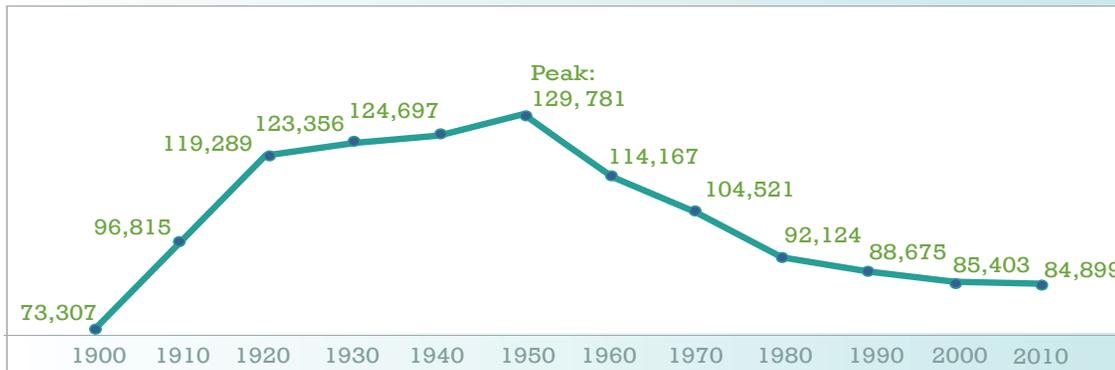
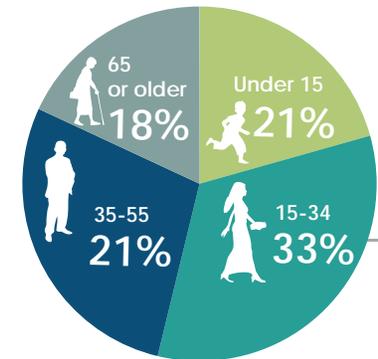


Image D7: Population decline since 1950. Source: Trenton 250

## TRENTON'S AGE DISTRIBUTION



2000 TO 2010..

↑ 4%  
1,383

RISE IN THE PERCENTAGE OF THE POPULATION BETWEEN 15 AND 34 RESULTING IN ADDITIONAL 15-34 YR. OLDS

## UNEMPLOYMENT AND INCOME

Trenton is a relatively low income city facing issues with poverty and unemployment: Trenton has a high poverty rate at 26.5% of all residents (10.4% New Jersey, 15.4% United States). For families with children under 18, this rate rises to 33%. Additionally, there is an 18% unemployment rate in Trenton City, compared to 10.1% in New Jersey and 9.7% nationally.

Furthermore, there are low median household incomes with the median household income at \$36,662 in Trenton City, \$71,629 in New Jersey, and \$53,046 nationally. Trenton's downtown districts have some of the lowest median incomes in the city.

## POVERTY AND UNEMPLOYMENT RATES

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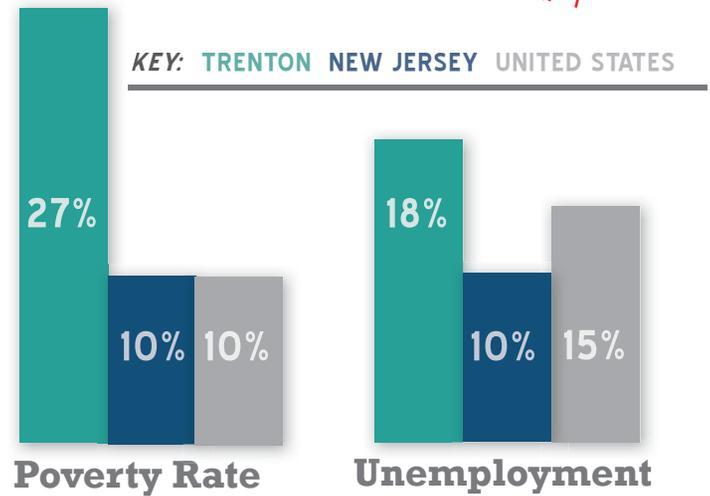
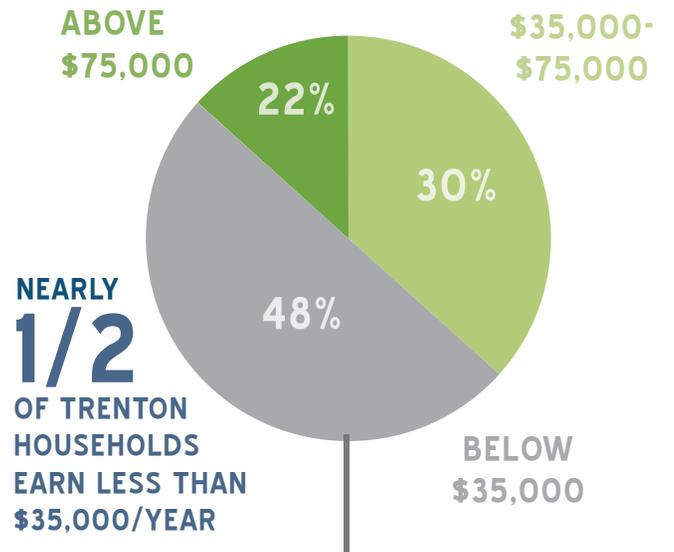


FIGURE 03: Household Income Levels in Trenton



## INCOME DISTRIBUTION



**RACE**

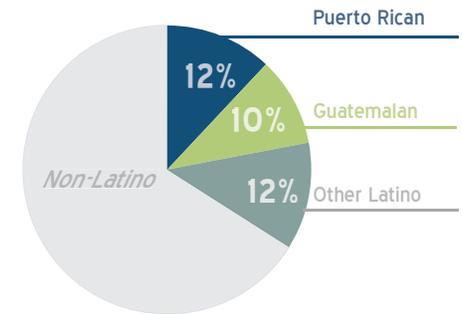
A little more than a quarter (27%) of Trenton residents identify as White alone on the 2010 Census, much lower than the New Jersey (69%) and national (72%) averages.

Conversely, around half (52%) of Trenton residents identify as Black alone on the 2010 Census, much higher than state (14%) and national (13%) averages.

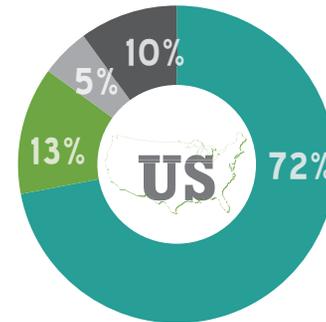
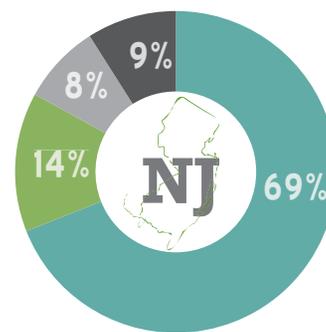
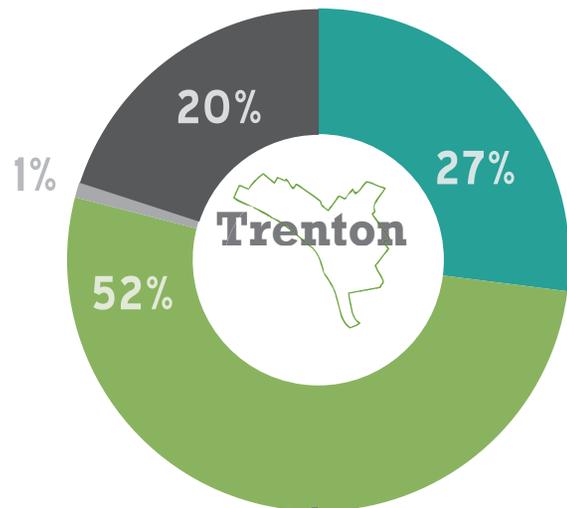
Latinos are also a large group in Trenton: About a third of the population (34%) identifies as Latino. Unlike the state and nation, the majority of the Latino population is Puerto Rican (12% of all residents) or Guatemalan (10% of all residents).

Trenton also has a much smaller Asian population (1%) compared to New Jersey (8%) or nationally (5%). Additionally, 4% of residents identify with two or more races, and 16% did not identify with any of the categories.

**1 OUT OF 3 RESIDENTS ARE LATINO**



**RACIAL COMPOSITION: TRENTON, NEW JERSEY, AND UNITED STATES**



**KEY:** WHITE BLACK ASIAN OTHER/2+ RACES

**OVER 1/2 THE CITY IS AFRICAN AMERICAN**

**HEALTH**

Obesity and overweight residents is a major health concern in Trenton. In 2011, around 39% of residents were classified as obese compared to 20% in Mercer County and 24% in the state. Furthermore, new 2013 Mercer County Health rankings show that this number has increased for the county and state.

The effects of less physical lifestyles include an increase in diseases such as diabetes. In the United States, diabetes is the leading cause of kidney failure, non-traumatic lower limb amputations, and new cases of blindness. Diabetes can be prevented or delay the onset with weight loss and increased physical activity. In the City of Trenton this is a major health concern since 16% of adults have diabetes.

Weight concerns and lack of physical activity have become a major problem for the city's children. Nearly half (47%) of the city's children 3-19 classify as obese or overweight, much higher than the state average at 32%.

When looking at individual primary and secondary schools, obesity and overweight children are more prominent at some schools at higher rates than others. Robbins Elementary School, within downtown Trenton, has the city's second highest rate of overweight/obese children at 55%. Sedentary lifestyles are a major concern for overweight and obese children. In Trenton, around 47% of children are not active for even 30 minutes daily.



Source: Trenton 250, City of Trenton



Source: Trenton Health Team

**Percentage of Residents With....**

	<b>Diabetes</b>	<b>Obesity</b>	<b>Hypertension</b>
<b>Trenton</b>	<b>16%</b>	<b>39%</b>	<b>31%</b>
<b>Mercer County Average</b>	<b>7%</b>	<b>20%</b>	<b>27%</b>

Adapted From Trenton 250, City of Trenton

## Land Use

Downtown Trenton has a mix of government, residential, and commercial land uses that offer a large number of jobs to support the regional economy.

Additionally, Trenton's community assets, recreational places, and transportation options, are essential elements to the city's landscape.



New Jersey State House



Capital Health  
Regional Medical Center  
Photo Credit: EDI, Ltd.

## EMPLOYMENT

As home to state and county government, 2/3 of jobs available in Trenton are in the public sector. The downtown district is home to many government buildings such as the New Jersey State House and Mercer County Superior Court.

The largest private employers are Capital Health Systems and St. Francis medical center employing 2500 and 1250 employees respectively in 2011.

Regionally, Trenton is a major employment center, with only a small portion of workers living and working within the city (See "Regional Job Patterns" on the right).

ABOUT

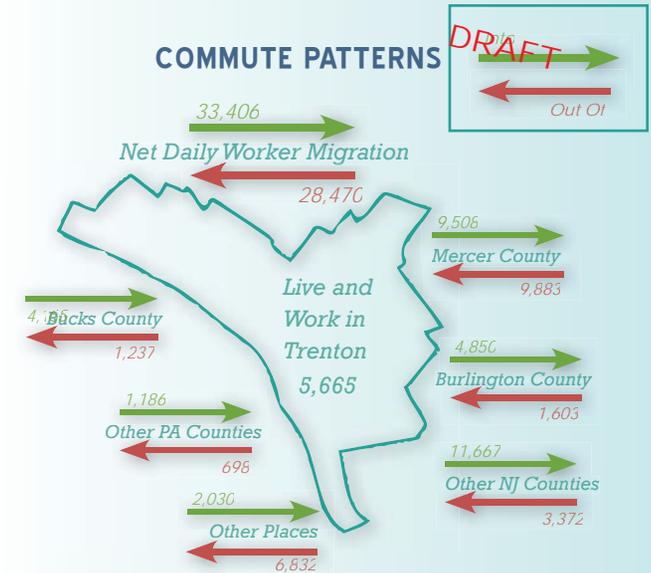
**2/3**

**OF TRENTON'S JOBS  
ARE IN THE  
PUBLIC SECTOR**

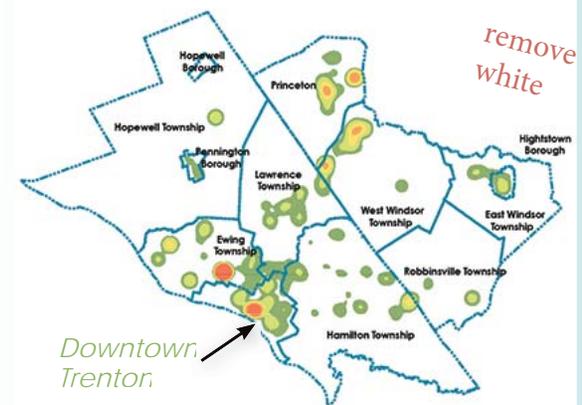
## HEALTH CARE

**IS TRENTON'S LARGEST  
PRIVATE SECTOR EMPLOYING  
OVER 4,000 COMBINED WORKERS**

## Regional Job Patterns



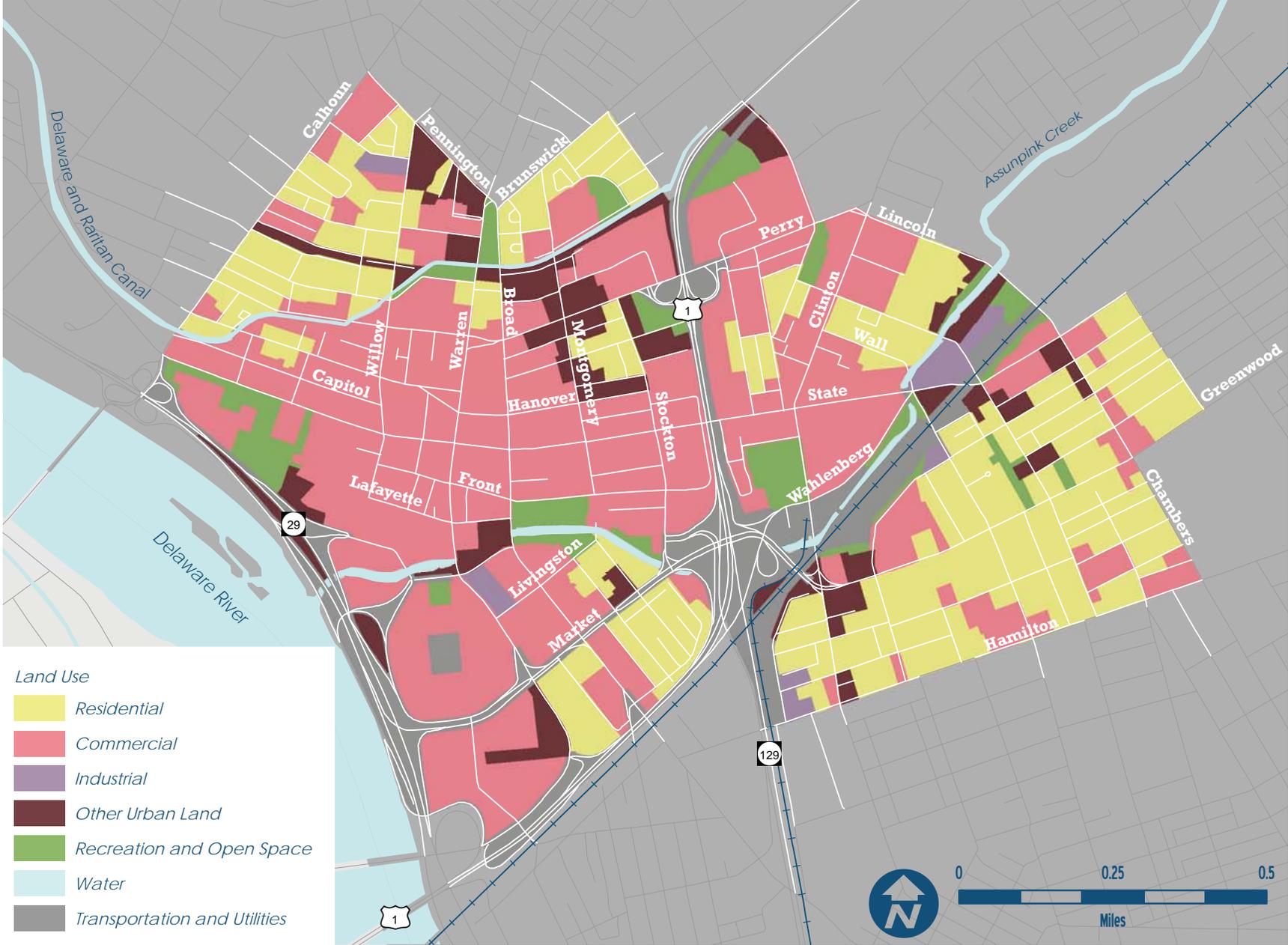
## JOB DENSITY (JOBS PER SQUARE MILE)



Adapted from Trenton 25C

FIGURE 04: Land Use

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ources: NJDOT, NJ DEP, DVRPC, Mercer County, City of Trenton.

# Community Resources and Attractors

To determine where people want to bicycle and walk, a number of attractions in downtown Trenton were mapped. Locations included schools (elementary and secondary), colleges and universities, parks and open spaces, bodies of water (rivers and creeks), sports venues, the public library, and transportation stations and lines.

## SCHOOLS

Downtown Trenton has five elementary, two middle, one high school, and one alternative high school, all of which are public. Although there are no private schools within the downtown, there are a handful of private schools that lie right beyond the downtown border. Additionally, there are two state colleges and a vocational school within downtown.

## DOWNTOWN LANDMARKS AND RECREATION

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*Downtown Trenton has a variety of historic and recreational attractions. A few points of interest are shown below:*

**MILL HILL PARK**



**TRENTON BATTLE MONUMENT**



**SUN NATIONAL BANK CENTER**



**TRENT HOUSE**



**TRENTON FREE PUBLIC LIBRARY**



**RIVERWALK PARK AND ARM & HAMMER STADIUM**

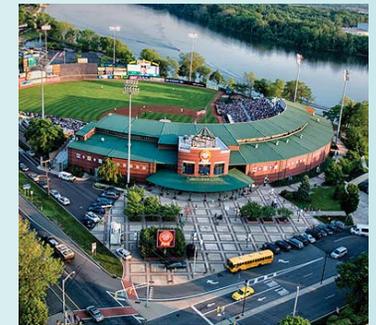


FIGURE 05: Community Attractors Map

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Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

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PHOTO CREDIT: TRENTON CYCLING REVOLUTION

EXISTING



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transportation

## Existing Transportation

This section is an overview of commuting patterns, bicycle and pedestrian counts, Trenton roads and bridges, and public transportation access. The specifics of the multi-use trails, street intersections, and on-road bicycle network will be discussed in the recommendations section.

Downtown Trenton is in a unique regional transportation location, with three bridge crossings into Pennsylvania, a major transportation center with connections to the Northeast Corridor and Camden via the River Line, and an interconnection of major state and national highways.

However, there are still large numbers of residents who use non-motorized transportation and public transportation, particularly buses, to commute to work.

## COMMUTE

Although commuting patterns are not a perfect means for analyzing transportation mode choice, they do indicate that generally Trenton uses automobile modes less than the state and national average: (77% Trenton, 80% New Jersey, 86% United States).

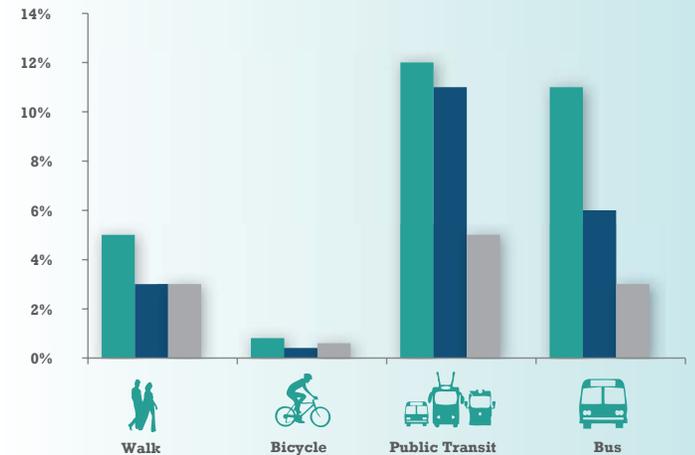
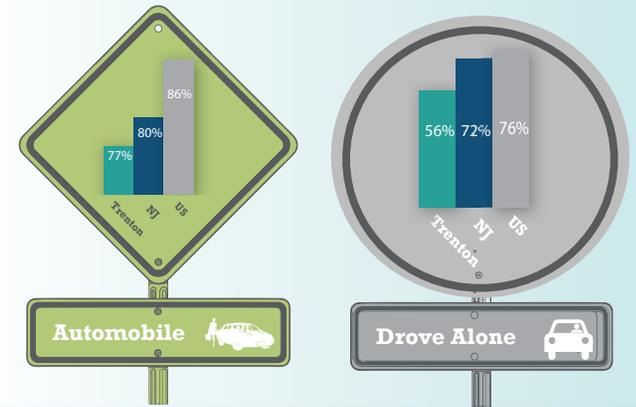
Furthermore, there are a substantially lower number of people driving alone to work (56% Trenton, 72% New Jersey, 76% United States) meaning that of those who commute to work by automobile, a larger percentage are carpooling.

In the City of Trenton, of workers over 16 years old, 12% rode public transportation to work (11% commuting by bus) 5% walked, and .8% biked.

## Mode to Work: Trenton, New Jersey, and United States DRAFT

KEY: TRENTON NEW JERSEY UNITED STATES

### AUTOMOBILE MODES



Source: 2009-2013 American Community Survey 5-Year Estimates

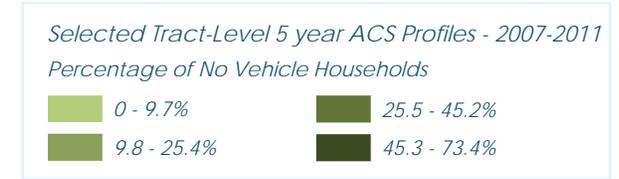
FIGURE 06: Journey to Work

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**WALK TO WORK**

**BICYCLE TO WORK**

**NO VEHICLE HOUSEHOLDS**



These maps show by Census tract, where people are walking and bicycling to work in the City of Trenton. Walking to work is especially prevalent in the downtown districts. Biking to work is most common in the area directly northeast of the downtown district.

**18% OF TRENTON WORKERS HAVE NO ACCESS TO A HOUSEHOLD VEHICLE**

Additionally, there are large portions of downtown with non-vehicle households: 18% of workers over 16 have no vehicle available, and 32% have only one vehicle available in their household.

## ROAD OWNERSHIP

New Jersey has four tiers of road ownership: national, state, county, and local roads. Road ownership determines maintenance and decision making about each roadway segment.

### *Local Trenton City Roads:*

The majority of the roads in downtown Trenton are local roads (shown in gray) such as Montgomery Street and Clinton Street.

### *Mercer County Roads:*

Chambers, Hamilton, State Street (east of Clinton Avenue) and Calhoun Street (shown in red) are owned by Mercer County.

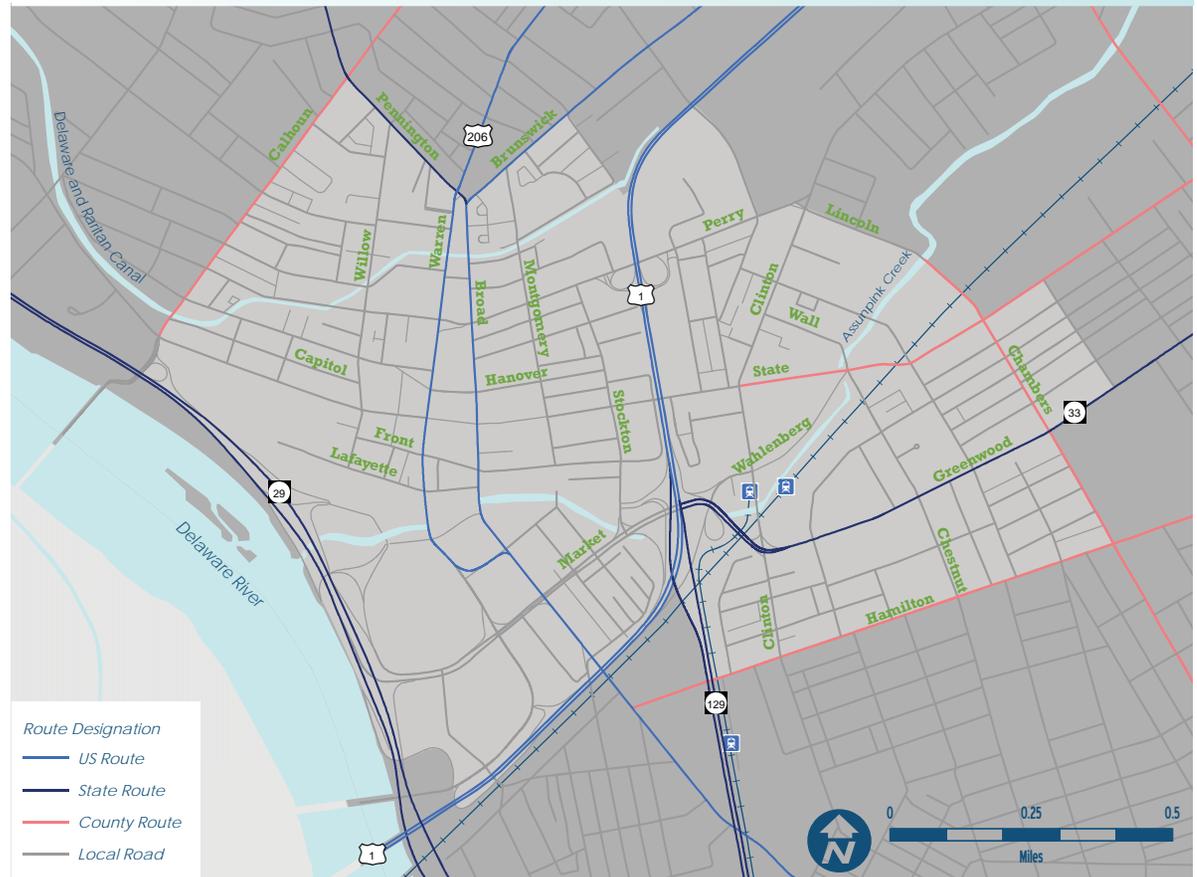
### *New Jersey State Roads:*

Greenwood Avenue that runs northeast through the downtown is a New Jersey owned road (shown in black). State Route 129 travels along the same route as the River Line Realignment, south of the Northeast Corridor. State Route 29 runs along the shoreline with the Delaware River for the entirety of downtown.

### *National United State Roads:*

The major US Route 1 reaches downtown Trenton from the US Route 1 toll bridge from Pennsylvania in the east. From this point, US 1 runs northeast through downtown Trenton. Additionally, Warren Street and Broad Street are portions of US Route 206 running north-south through downtown Trenton. These national roads are shown in blue.

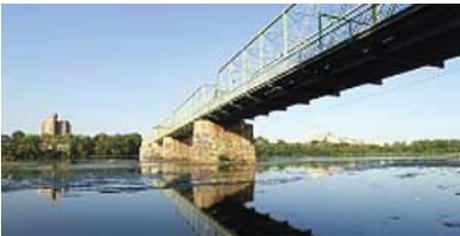
FIGURE 07: Road Ownership



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.



*Lower Trenton (Trenton Makes) Bridge*



*Calhoun Bridge*



*Trenton-Morrisville Route 1 Toll Bridge*

*Photo credit: Delaware River Joint Toll Bridge Commission.*

## BRIDGES

Trenton connects to Morrisville, Pennsylvania across the Delaware River at three different bridge crossings controlled by the Delaware River Joint Toll Bridge Commission: The Lower Trenton Bridge (also known as the “Trenton Makes” bridge), the parallel Trenton-Morrisville Route 1 Toll Bridge, and the Calhoun Street Bridge.

- The Lower Trenton Bridge was built in 1928 and features the iconic “Trenton Makes The World Takes” signage.
- The US 1 bridge was built in 1952 and has a toll when entering Pennsylvania.
- The Calhoun Bridge was constructed in 1884 and recently renovated in 2010.

Additionally, other smaller Trenton bridges cross US 1, the Northeast Corridor rail line, the Assunpink Creek, and the former Delaware & Raritan Canal.

## PUBLIC TRANSPORTATION

Trenton Transportation Center, <sup>DRAFT</sup> located on Wallenberg Avenue between Clinton Avenue and East State Street, is a major hub for bus and train connections. The transportation center was originally built in 1891 and was renovated in both 1972 and 2009. The transportation center has train connections to New York, Philadelphia, Washington DC and other cities in New Jersey through New Jersey Transit, SEPTA, and Amtrak. The station serves approximately 60 trains daily. The River Line, a light rail (opened in 2004) between Camden and Trenton, also serves the Trenton Transportation Center.

Twelve New Jersey Transit buses serve Trenton, ten of which serve the transportation center. The 409 is a bus that connects Trenton to Philadelphia and Camden, while the other routes are more local ones. Additionally, one SEPTA bus serves Trenton and travels to Oxford Valley Mall.



*Trenton Transportation Center  
Photo Credit: Ron Reiring*

FIGURE 08: Existing Transportation

DRAFT



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

## TRAFFIC VOLUMES

The highest traffic in downtown Trenton is along US 1 and New Jersey 29 along the river. The connection along Market Street between these two streets is also very high.

The second highest level traffic volumes are along the east-west bridges that connect to the bridge crossings: Calhoun Street and US 1. Other streets with high traffic include NJ 129, Perry Street, State Street, and South Broad Street.

Local urban arterial roads include State Street, Broad and Warren Streets, Hamilton and Clinton Street, and Pennington Avenue.

The recommendations in this plan reflect the existing traffic patterns. On roadways with high traffic, additional safety measures are added to make these roadways safer for bicycles and pedestrians (buffered or protected bicycle lanes, pedestrian islands, etc.) Conversely, areas with lower traffic are more suitable for less physical pedestrian traffic interventions because these streets tend to already be safer. Standard bicycle lanes, sharrows or neighborhood bicycle routes, and standard sidewalks and crosswalks are more appropriate for this traffic level.

FIGURE 09: Downtown Trenton Traffic Volumes



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

DRAFT

## Existing Bicycle Network

Trenton's current bicycle network only includes a few high traffic streets within southwest downtown near the US 1 Bridge and the downtown government district. (See Figure 9 on previous page)

These streets include **New Warren Street, Market Street, Lafayette Street, and Broad Street.**

Despite new bicycle lanes, these streets can be uncomfortable for bicyclists due to high speeds and traffic volumes. The city currently does not have any other types of on-road bicycle infrastructure, such as sharrows.

## Definitions

### Mixed Traffic Route

Mixed traffic routes are low traffic, typically narrower streets, where bicycle traffic mixes in the same lane as automobile traffic. There are no striped bicycle lanes, but rather streets are marked with sharrows.

Sharrow, short for "shared lane arrow", is a pavement marking that typically includes a bicycle symbol and two white chevrons. (See right). This treatment is used to remind motorists that bicyclists are permitted to use the full lane.

Mixed traffic routes can also include advisory lanes, which look like dedicated bicycle lanes but have a dashed line on the traffic side.



Top: Standard bicycle sharrow marking. Bottom: A set of sharrows in Princeton, New Jersey  
Photo Credit: Princeton Joint Pedestrian and Bicycle Advisory Committee

### Dedicated Bicycle Facilities

A dedicated bicycle facility is a portion of the roadway designated by striping, signing, and pavement markings for the preferential and exclusive use of bicyclists.

A standard bicycle lane is one with two lines of white paint to indicate the lane, while buffered or physically separated lanes have additional lane markings, such as extra paint, bollards, or a raised surface.



Warren Street Bicycle Lane in downtown Trenton  
Photo Credit: Trenton Cycling Revolution

FIGURE 10: Existing On-Street Bicycle Network



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

## BICYCLE AND PEDESTRIAN COUNTS

To measure existing levels of bicycling and walking in downtown Trenton, DVRPC conducted bicycle and pedestrian counts at ten locations in the study area. DVRPC chose these locations based on the presence of trip generators, as well as input from the stakeholder group. In each case both sides of the street and both directions of travel were counted.

Pedestrians were counted at each location for a seven-day period by infrared sensors that detect the presence of a pedestrian based on their body heat signature. Bicycle counts were taken in two ways based on the particular behaviors that staff observed during field work. Across the study area, but especially in the core of downtown, most bicycling was being done on the sidewalk. DVRPC's standard procedure for counting bicyclists is to use pneumatic tubes placed in the cartway. It is agency practice not to place these tubes on the sidewalk, due to issues of safety and liability. So to effectively measure levels of bicycling, a two-pronged count strategy was used. Pneumatic tubes were laid in the roadway at each location. These tubes gathered data for a seven-day period. Video cameras were also set up to

capture all bicycle activity at each count location. The video was then manually transcribed to arrive at a one-day bicycle count at each location. This ended up being an important data point since **video revealed that at some locations, as much as 60-70 percent of bicycle traffic was using the sidewalk.**

This behavior is also important to consider when selecting facilities for each route. A new in-street facility must provide a similar level of protection and perception of safety, and be clearly dedicated to bicycle traffic in order to change existing behavior and have bicyclists use new facilities.

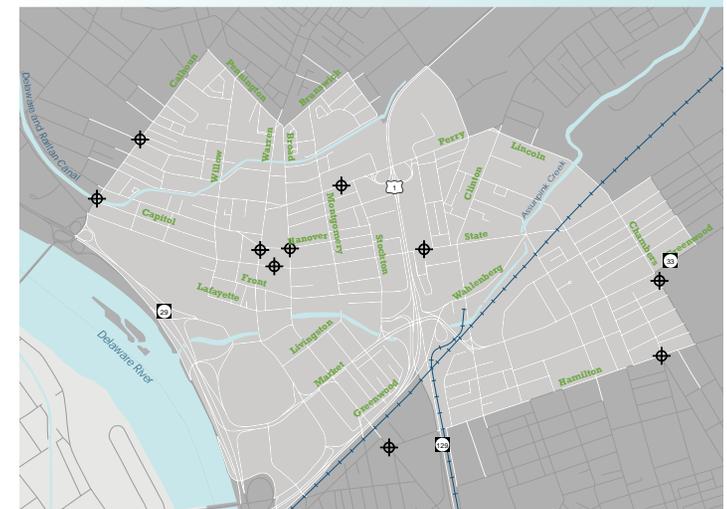
The counts also inform the treatments recommended in plan. The clearest example being that the large number of pedestrians crossing at Hamilton and Anderson, partially as a result of students traveling to and from Trenton Central High School, necessitates large-scale interventions at this intersection to accommodate demand and improve pedestrian safety.

Count locations and totals are shown in Figure 11. More detailed count information can also be found at: [www.dvrpc.org/webmaps/pedbikecounts](http://www.dvrpc.org/webmaps/pedbikecounts).



*Video count location at Hamilton and Anderson. Photo Credit: DVRPC*

**FIGURE 11: Bicycle and Pedestrian Counts**



# Average Bicycle and Pedestrian Counts

HIGH
MEDIUM
LOW

DRAFT

LOCATION	BICYCLE	PEDESTRIAN*
1. WARREN BETWEEN HANOVER+STATE	38`	1407
2. BROAD BETWEEN HANOVER+STATE	99`	5618
3. STATE BETWEEN WARREN+BROAD	38	5449
4. PERRY NEAR MONTGOMERY+STOCKTON	36	860
5. HAMILTON BETWEEN ANDERSON+CHAMBERS	63	2109
6. GREENWOOD AND CHAMBERS	30	1749
8. HAMILTON AND ROUTE 206	59	1832

*\*Both sides of the street  
 `Indicates 1 way street*

## Existing Trail Network

An inventory of Trenton’s existing trail network was one of the first steps in examining trail connections. Downtown Trenton has many trails that converge within its limits including the Assunpink Greenway, D&R Canal, and Delaware River Heritage Trail.

The D&R Canal is a completed historic towpath that follows the D&R Canal from Trenton to New Brunswick. This trail has a connected extension trail. The D&R Canal also currently has different extension proposals.

The Assunpink Greenway is a partially completed linear park maintained by the City of Trenton along the Assunpink Creek. The Delaware River Heritage Trail is a partially completed 60 mile loop that circles the Delaware River. This trail intends to connect 24 communities such as Trenton, Palmyra, Burlington, and Levittown.

Trenton also has additional proposed trails, such as the Delaware & Brook Bound Trail and the Trenton to Princeton Rail Trail. The Trenton to Princeton Rail Trail is a proposal to connect the two cities through a vacant rail right of way.

The Delaware and Bound Brook Trail is yet another proposal within a vacant rail right of way that aims to create a 3.5 mile greenway.



*D&R Canal Towpath; Photo Credit: DVRPC*

## Definition: DRAFT Multi-Use Trails

Multi-use trails are off-road facilities which often accommodate multiple types of non-motorized users. Multi-use paths can be paved or unpaved and are typically ten feet in width. Multi-use paths are most frequently used for recreation, but can also provide valuable links to transit stations. Costs can vary substantially based on construction materials, right-of-way acquisition, and other considerations.

**TABLE 2:** Existing and Proposed Trails

Existing Trails	
<b>D &amp; R CANAL TOWPATH AND EXTENSION</b>	The D&R Canal is a historic towpath that runs along the canal from Trenton to New Brunswick. Maintained by the Delaware & Raritan Canal Commission.
<b>ASSUNPINK GREENWAY</b>	The greenway runs along the Assunpink Creek through downtown Trenton. Plans for expansion further east in the future. Maintained by the City of Trenton..
<b>DELAWARE RIVER HERITAGE TRAIL</b>	Upon completion, this 60 mile loop will connect 24 communities along the Delaware River in New Jersey and Pennsylvania such as Trenton, Palmyra, Burlington, and Levittown. Maintained by the Delaware & Raritan Canal Commission Delaware River Greenway Partnership
Proposed Trails	
<b>TRENTON TO PRINCETON RAIL</b>	This trail proposal envisions a trail two connect the to cities, partially within an unused rail right of way.
<b>DELAWARE &amp; BOUND BROOK TRAIL</b>	This proposal aims to create a 3.5 mile greenway in an abandoned rail right of way.

FIGURE 11: Existing Trail Network

DRAFT



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

### NON-MOTORIZED CRASH LOCATIONS

From 2008-2012, there were 79 pedestrian and 28 bicycle crashes in downtown Trenton constituting 3.6% and 1.3% of total downtown crashes respectively.

Three pedestrian fatalities occurred during this time period, all occurring in dark conditions. There were no fatal bicycle crashes. In the city of Trenton, there were 218 pedestrian crashes and 68 bike crashes, 36% of which occurred in the downtown boundaries.

In the state of New Jersey, 4.4% of crashes were pedestrian crashes and 0.8% bicycle crashes. **Approximately 10% of all New Jersey pedestrian crashes occurred in the City of Trenton.**

FIGURE 12: Bicycle and Pedestrian Crashes in Downtown Trenton 2008-2012



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

## Existing Pedestrian and Crosswalk Conditions

As a historic urban center, downtown Trenton has a mostly complete sidewalk network. However, there are many intersections that do not have crosswalks and ADA-compliant curb ramps. This is particularly important in high volume pedestrian corridors, intersections near schools, and intersections near recreation areas.

Additionally, Trenton must make all curb ramps ADA-compliant by 2016. This requires locating intersections that are not currently in compliance. Figure 2 shows the results from the crosswalk and curb ramp survey conducted for this plan. Conditions were evaluated in the following ways:

### CROSSWALKS

If a crosswalk was degraded (in yellow) or not present (in red) it is indicated by "X" in Figure 13. Crosswalks were evaluated by intersection, therefore if a crosswalk was missing or faded on any leg of the intersection, the entire intersection is labeled accordingly. Crosswalks composed of brick are also shown on the map. During discussions with stakeholders, issues related to brick



*(Left) Hamilton and Anderson, a non-ADA compliant curb ramp. (Right) Degraded crosswalk on Walnut Avenue. Photo Credit: DVRPC*



*Problems with brick sidewalks and crosswalks include uneven surfaces and frequent maintenance. Photo Credit: DVRPC*

crosswalk maintenance and conditions were brought up several times. Moving forward the city should clarify its policy and design standards for crosswalk materials.

### CURB RAMPS

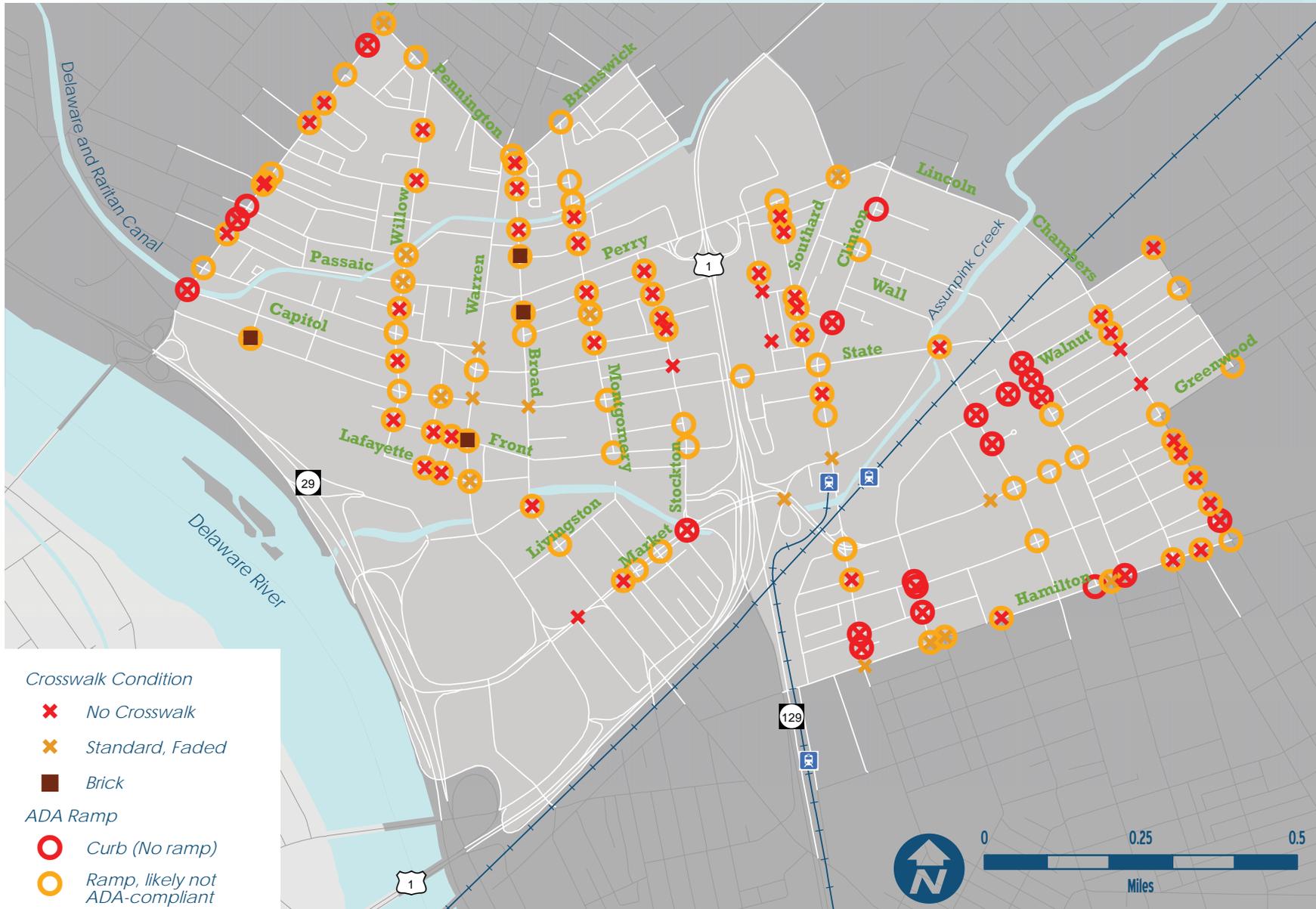
As with crosswalks, curb ramps were evaluated by intersection. If one corner of the intersection was missing a ramp or the ramp was likely not ADA-compliant, the whole intersection is marked as such. Figure 13 displays intersections in red if any ramp was missing and displays intersections with a yellow "O" if one or more ramps was likely not ADA-compliant.

It is important to note that with assistance from NJDOT, the city of Trenton has been aggressively constructing and replacing curb ramps. The survey for this plan was completed in October of 2013 and does not reflect this more recent work. Updated data was not made available for use in this plan.

Additionally, it is Trenton's policy not to paint a crosswalk unless it is connecting two ADA-compliant curb ramps. Therefore, for many intersections, ramps would need to be constructed prior to crosswalks being painted.

FIGURE 13: Crosswalk Conditions

DRAFT



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.



PHOTO CREDIT: DELAWARE VALLEY REGIONAL PLANNING COMMISSION



# CHAPTER 3: recommendations

This section proposes a set of recommendations that will enhance bicycle and pedestrian mobility in downtown Trenton.



## Chapter 3: Recommendations

### Recommendations

Building on the existing land use, demographics, and transportation networks, a set of bicycle and pedestrian recommendations is discussed in this section of the plan.

This plan breaks recommendations into four categories:

#### BICYCLE RECOMMENDATIONS

On-road bicycle facilities are highlighted in this plan for different types of streets within downtown Trenton. Recommendations include both dedicated bicycle facilities and mixed traffic routes.

#### TRAIL RECOMMENDATIONS

The trail recommendations introduce expansion of the existing multi-use, off road trail network, as well as discussing places where gateways can be added to link the trail network to the on-road bicycle network.

#### INTERSECTION RECOMMENDATIONS

In this section, five different types of intersections are examined to give sample recommendations on what kinds of bicycle and pedestrian improvements can be implemented at intersections.

#### OTHER RECOMMENDATIONS

These recommendations include bicycle parking, wayfinding signage, and areas for further study.

These recommendations flow into one another to enforce the entirety of the bicycle and pedestrian network. This network also connects to public transportation and integrates with automobiles on the road.

#### PLAN PRIORITY RECOMMENDATIONS

In this plan, priority recommendations are noted with the symbol shown below. These priority recommendations are first action steps that will be the most effective. These priorities are based on steering committee and public feedback.



# Design Guidelines

## DESIGN MANUALS

The past decade has established updated standards and guidelines for bicycle and pedestrian facilities. These standards will be used throughout the various sections of the bicycle and pedestrian plan.

Each manual gives a list of standard treatments, that can be used as guidance for individual scenarios. These manuals are updated every few years and offer different standards with each update. For example, new treatments become more popular and are added, while others are found less desirable.

The manuals work together to offer bicycle and pedestrian improvements in different environments and scales.

The **American Association of State Highway and Transportation Officials (AASHTO)** created the *Guide for Development of Bicycle Facilities*, with the most recent edition updated in 2012. This is the principle reference for our design standards.

Additionally, the *Manual on Uniform Traffic Control Devices (MUTCD)*, issued by the Federal Highway Administration, is another guideline when designing bicycle and pedestrian facilities. This manual details standards for signage and pavement markings.

The **NJ DOT** also published the *Bicycle Compatible Roadways and Bikeways Planning and Design Guidance* in 1996 with guidance from previous versions of the two aforementioned manuals.

Many of our recommendations encourage more urban treatments **DRAFT** those found within AASHTO or MUTCD manuals:

The **NACTO** (National Association of City Transportation Officials) created two manuals that pertain to urban environments: *The Urban Bikeway Design Guide* and the *Urban Street Design Guide*.

Another guide is the Dutch **CROW Design Manual for Bicycle Traffic** that looks at more urban settings, *some of which are* compatible with US standards, and some of which would need FHWA experimental approval.

## Design Manuals by Agency



FHWA



AASHTO



NJ DOT



NACTO



NACTO



CROW

## FHWA Experimental Standards

Although many of the design treatments in the NACTO or AASHTO guides are not currently included in the MUTCD, FHWA has encouraged municipalities and road owners to be flexible when designing bicycle and pedestrian facilities and go beyond the minimum requirements in order to provide “convenient, safe,

and context-sensitive facilities that foster increased use by bicyclists and pedestrian of all ages and abilities, and utilize universal design characteristics when appropriate.”

In a memo with the subject Guidance: Bicycle and Pedestrian Facility Design Flexibility, dated August 20, 2013, FHWA states its support for the use of these other manuals and a general flexibility in designing for active transportation,

especially in dense urban environments. And in fact, the vast majority of treatments presented in the NACTO guides are either allowed or not precluded by the MUTCD.

Many other treatments are being considered in the current rule making cycle for new edition of the MUTCD. For traffic control devices that are presently non-compliant, FHWA encourages the piloting of treatments through the MUTCD experimentation process. This process is outlined in Section 1A.10 of the MUTCD.

## Design for 8-80

One initiative to design safer streets is the 8-80 Cities project. The 8-80 Cities is a non-profit based on the goal that cities should be designed for people, whether 8 years old or 80 years old.

Priorities of 8-80 include creating safe places to walk and sustaining healthy lifestyles. A large part of their vision includes social equality in that streets should be for all users. 8-80 projects not only focus on streets, but also include creating safe park lands, trails, and open spaces.

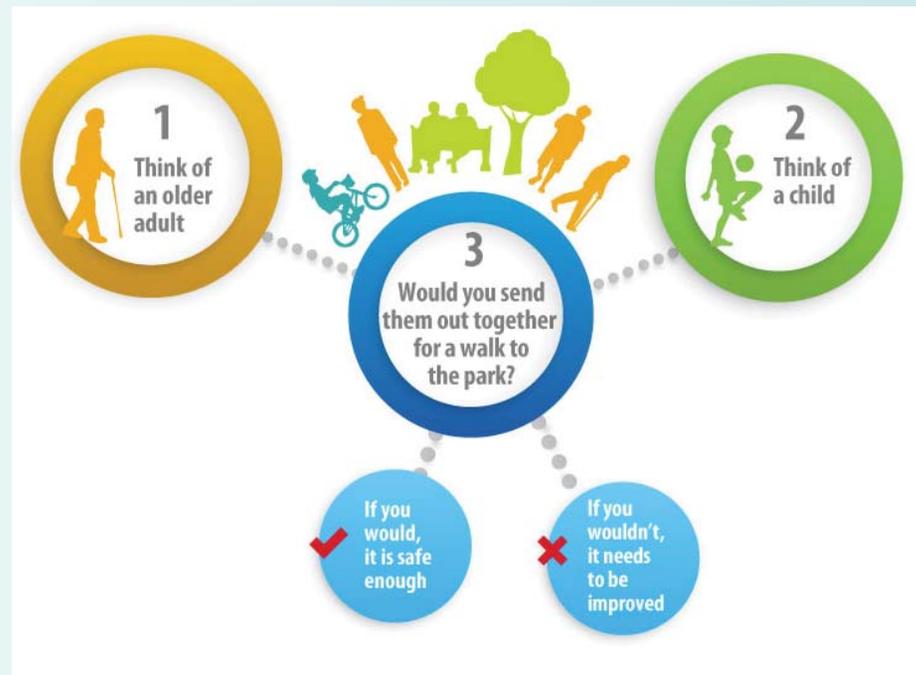


Photo Credit: 8-80 Cities

# Bicycle and Pedestrian Design Standards

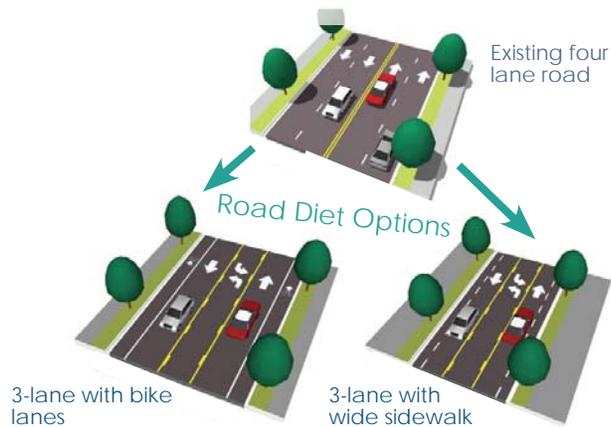
## ROAD DIETS

A road diet is when the number of travel lanes and/or width of the road is reduced in order to achieve improvements within the entire road network.

Road diet projects, other than reducing lanes, can also add features such as bicycle lanes, widening sidewalks, adding turn lanes, or landscaping boulevards.

Road diets come in a variety of different forms and can be used for streets of all widths. Two different examples are shown in the "Road Diets Examples" box on the right.

Sample Four Lane Road Diet



Sample ways to road diet a four lane road;  
Adapted From: <https://www.pinterest.com/pin/295689531755839821/>

# Road Diets Examples

## PHILADELPHIA'S SPRUCE AND PINE ST

In 2009, Philadelphia implemented its first buffered bicycle lanes on a two mile segment of Pine and Spruce Streets. The narrow 26' cartway formerly with two automobile lanes and one parking lane was converted into one automobile lane, a six foot bike lane, and a three foot buffer. The parking remained the same at seven feet. These two one-way streets provided an integral east-west connection in downtown Center City for bicyclists. The speed limit was also reduced from 25 to 20 miles an hour. Despite a reduction of a vehicle lane, there was still the same amount of annual daily traffic at 6,000 vehicles.



Before



After

Photo Credit: (Top) Google; (Bottom) Lyle Gradinger

## HAMBURG, NY'S MAIN STREET

This wide 44' urban arterial received a road diet. The project added bicycle lanes and reduced travel lane and parking lane widths. Additionally, pedestrian improvements were added such as mid-block crossings, landscaping, and sidewalk extensions. The project also added roundabouts for additional traffic calming.

As a result, car accidents dropped 66% and injuries 60% two years after changes were implemented. These improvements also increased the area's property values and investment in the area.



Before



After

Photo Credit: Laura Hackathorn

FIGURE 14: Road Diet Cross Sections

DRAFT

## Spruce and Pine Streets

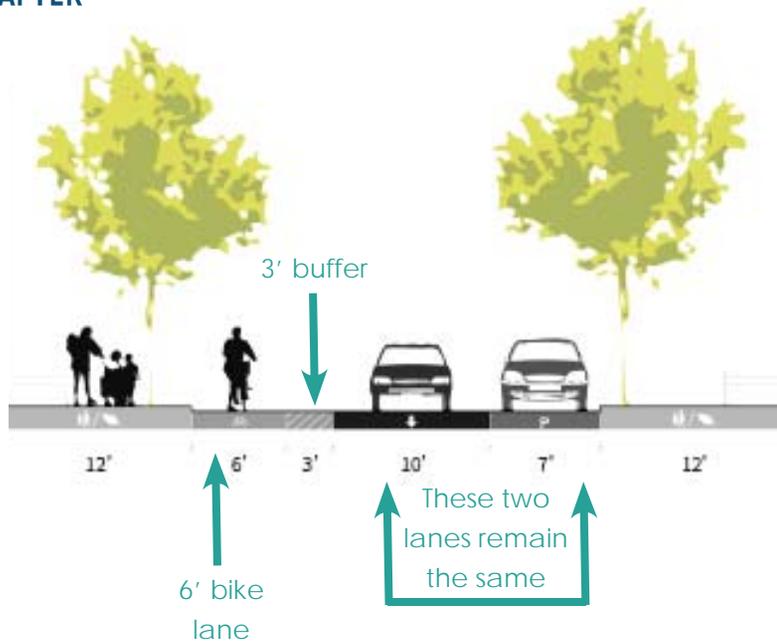
Philadelphia, PA

### 26 FOOT CARTWAY

BEFORE



AFTER



## Main Street

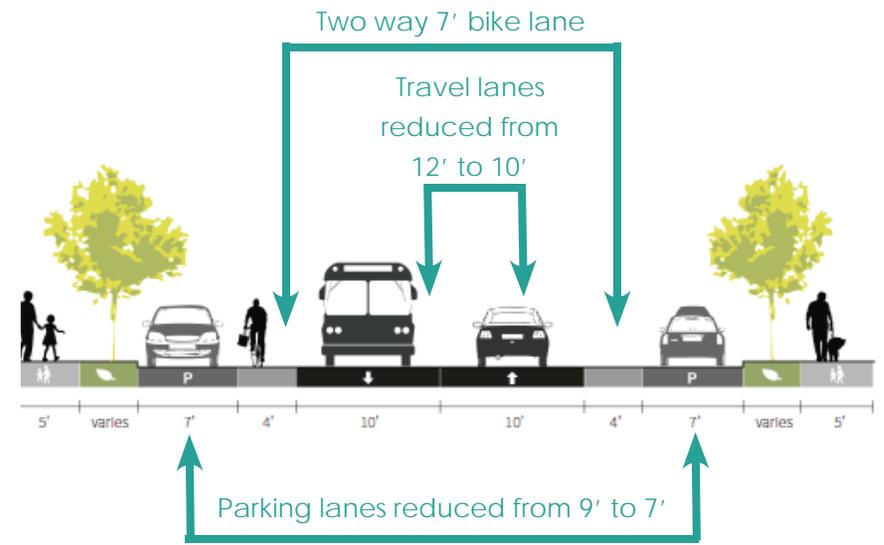
Hamburg, NY

### 44 FOOT CARTWAY

BEFORE



AFTER



Adapted from: Marc Schlossberg, John Rowell, Dave Amos, and Kelly Sanford Rethinking Streets



PHOTO CREDIT: TRENTON CYCLING REVOLUTION



# bicycle

## RECOMMENDATIONS

## Bicycle Recommendations

When downtown Trenton’s streets were constructed, it did not consider the needs of cyclists because they were generally not regarded as a concern until the past few decades.

Bicycles are becoming an increasingly used mode of transportation within cities across the United States and the world. Today, as cities become increasingly multi-modal, creating safe environments for all users may include retrofitting streets, especially in older cities.

### BICYCLE TRAFFIC LAWS

Bicycles are treated as vehicles under New Jersey’s vehicle code with several exceptions. Bicycles must operate on the right side of the road, stop, yield, maintain a safe passing distance, and remain within the roadway. Bicyclists should also follow the rules of the road such as stopping at traffic lights and riding with the directional flow of traffic.

Motorists also are required to treat bicyclists the same as other motorists when yielding, and all road users must yield to pedestrians.

However, bicycles have different needs than those of automobiles. This is why creating facilities to accommodate bicycles is essential to increasing safety for all users. Bicycle facilities should lead bicyclists to follow rules for the greatest protection against legal liability or physical injury. Additionally, creating dedicated bicycle facilities has decreased illegal sidewalk riding in many cities including Philadelphia.

### EXISTING PLANS

Recent plans have suggested bicycle and pedestrian improvements, such as the Trenton Transportation Master Plan (2004/2005). This plan suggest a list of improvements such as bicycle parking, wayfinding, traffic calming, and landscaping. The Trenton Station Linkage plan also discusses bicycle and pedestrian connections to the train station (For more information, see page 59).

## GOALS OF THE PROPOSED BICYCLE NETWORK

*DRAFT*

A list of factors determined the placement of the bicycle network in Downtown Trenton:

### Provide North/South and East/West Connections



Trenton’s downtown network needs a way to move along both axes.

### Balance the needs of all road users



While making streets safe for bicycles, other users also must be considered. Many recommendations can also improve traffic flow and safety for other users. Balancing negative consequences is also essential.

### High quality facilities with more separation attract new people to riding



People feel more comfortable with separated facilities. This plan aims to recommend as many as possible with the road widths and traffic volume capacity of downtown Trenton.

### Provide access to attractions and services



Ensuring that the network can bring people to recreation as well as work and education is important. The network should safely bring people connections to places where they desire to travel.

## Four Types of Cyclists

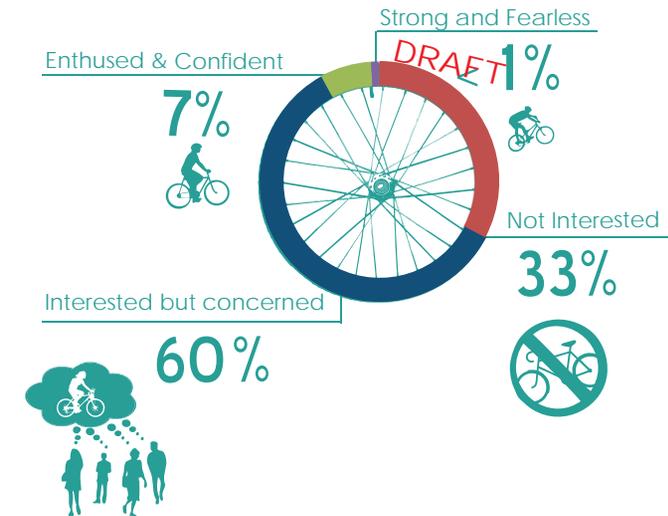
Bicyclists are often treated as one user type, however, there are many different purposes and confidence levels of those who ride bicycles.

A common way to classify bicyclists is to discuss four different typologies of the population in its attitudes towards bicycles. This methodology, established by Robert Geller, has four predominant attitudes:

- Strong and Fearless:** These riders will ride in any condition, but only are a small percentage of the population.
- Enthusied & Confident:** These are more casual cyclists that will ride in conditions that are perceived as safe. These riders usually feel comfortable on the roads, but will not travel more dangerous roads.
- Interested but Concerned:** This portion of the population is considering riding a bicycle, and perhaps ride occasionally, but are concerned about everyday safety. This is the largest typology and converting some of these people to become confident cyclists is key to increasing bicycle users.
- Not Interested (Also called “No Way, No How”)** For a variety of reasons, around a third of the population is not interested in bicycling.

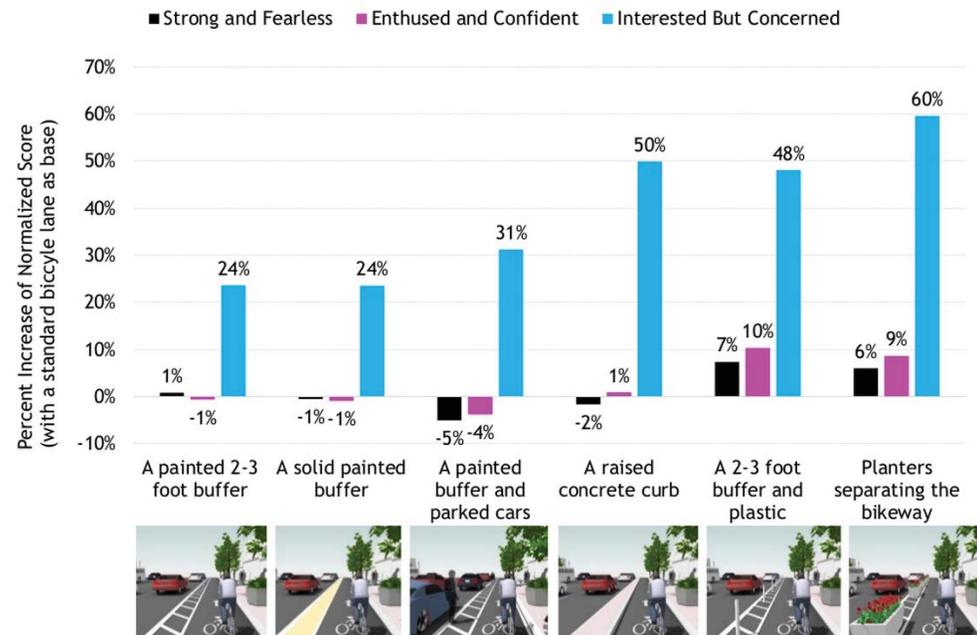
When examining the four types of cyclists, the comfort level raises significantly among interested but concerned cyclists with a bicycle lane. Furthermore, it raises even higher with a protected bicycle lane (See right).

Due to these different comfort levels, creating as many protected or buffered facilities is important. While some people may feel comfortable with riding in no-bike lane or standard bicycle lane conditions, the majority of people who are willing to cycle feel more confident within protected lanes.



Source: Robert Geller

### CHANGE IN STATED COMFORT (FROM A BIKE LANE), BY BICYCLIST TYPE



Source: Christopher Monsere

DRAFT

## Proposed Facilities

Two types of bicycle facilities are recommended in this plan: dedicated bicycle facilities and mixed traffic routes.

This plan offers general guidelines for the entire downtown area. However, there are some smaller pinch points (such as bridge crossings) that have specific concerns that need to be addressed separately.

Due to the nature of generalizing streets sections together, recommendations for street widths in this plan vary. However, two general rules emerge:

- *Large cartways of greater than 12 feet should be narrowed to allow for other improvements such as bicycle lanes, landscaping, or new turn lanes. Many streets in Trenton have travel lanes as wide as 14 feet.*
- *Additionally, if there is width available in the cartway, buffered bicycle lanes are usually preferred over standard bicycle lane treatments.* Bicycle lanes should be at least four feet wide, but should preferably be five to seven feet. Bike buffers should be at least two feet wide, but can also be much larger.

### DEDICATED FACILITIES

Dedicated bicycle facilities are intended for higher traffic streets that have room for a separate bicycle lane. These lanes may be standard lanes or protected (buffered) lanes. The proposed on road network has different facilities based on road width, traffic volume, and connections to other roads.

Dedicated facilities are proposed on many streets including Broad Street, Warren Street, Calhoun Street, State Street, and Greenwood Avenue. Within this section this plan separates recommendations by *standard* and buffered or *protected bicycle lanes* on streets with either one or two way directional traffic.



*Protected one way bike lane in Chicago, IL; Photo Credit: John Greenfield*

### MIXED TRAFFIC ROUTES

Mixed traffic routes are a type of treatment that is intended for lower traffic, narrower streets. Different treatments such as single sharrows or "bicycle boulevards" (aligned sharrows to indicate a bicycle path in mixed traffic) or advisory lanes (lanes with a dotted line to indicate a bicycle path but can also be used by automobiles) may be used.

This plan also recommends a few streets, such as Clinton Avenue and Chestnut Street, to include mixed traffic routes. These low traffic, mixed mode streets can use sharrows or other low cost improvements that do not require entire traffic lanes.

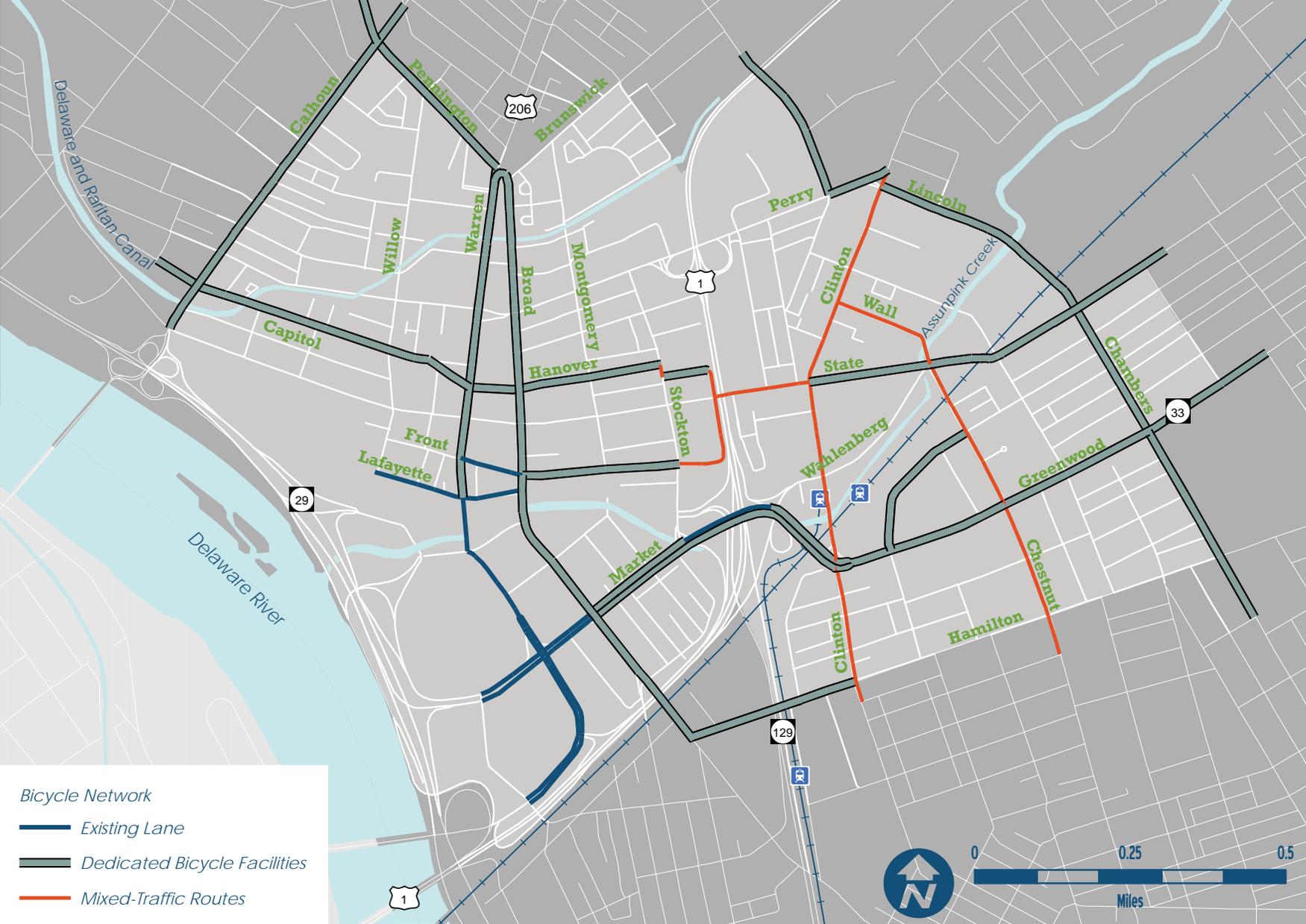


*Advisory bicycle lanes in Minneapolis, MN. Photo Credit: Tom Bertulis*

DRAFT

FIGURE 15: Proposed Bicycle Network

DRAFT



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

# Two Way Standard Bike Lane With Parking

PLAN  
**PRIORITY**

HANOVER STREET AND STATE STREET CONNECTION  
**DRAFT**

## Description

**WIDTH: 36-40 FEET**

The first type of bicycle recommendation is for two way streets with parking between 32 and 40 feet. These portions include State Street (Armory Dr.- Hampton Ave.) , Hanover Street (Calhoun St.- Broad St.), and Front Street (Montgomery St. to Stockton St.).

Two way standard bicycle lanes use solidly striped lanes and can use a combination of bicycle symbols, directional arrows and words. Lanes can range from four to seven feet in width and located between the vehicular travel lane and parking moving in the direction of traffic. Green paint in the lanes can be used to visually remind drivers that bicycles have a right to the street and create more space and comfort for cyclists using the infrastructure. Standard Lanes are most useful on streets with less than 3000 daily motor vehicles and speed limits that are 25 miles per hour or less.

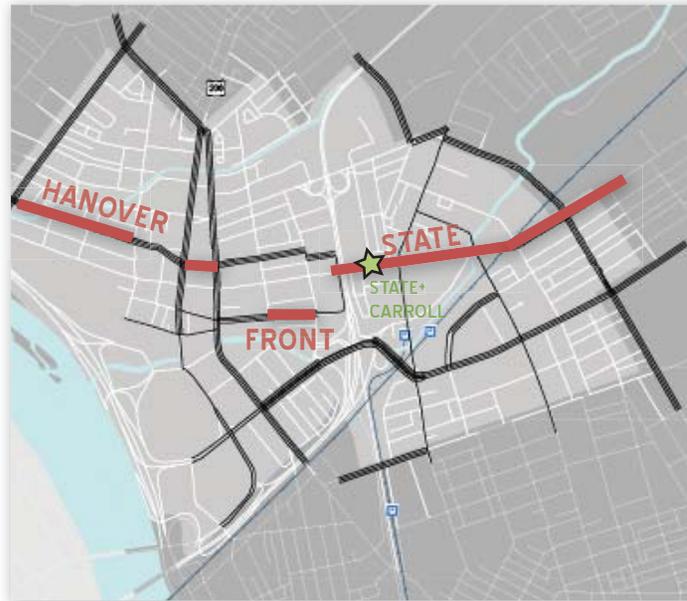
### EXISTING FACTORS



### KEY RECOMMENDATION



## Location



## Recommendations

### STATE STREET

- Armory Dr. - Hampton Ave.

### HANOVER STREET

- Calhoun St. to Willow St.
- Warren St. Broad St.

### FRONT STREET

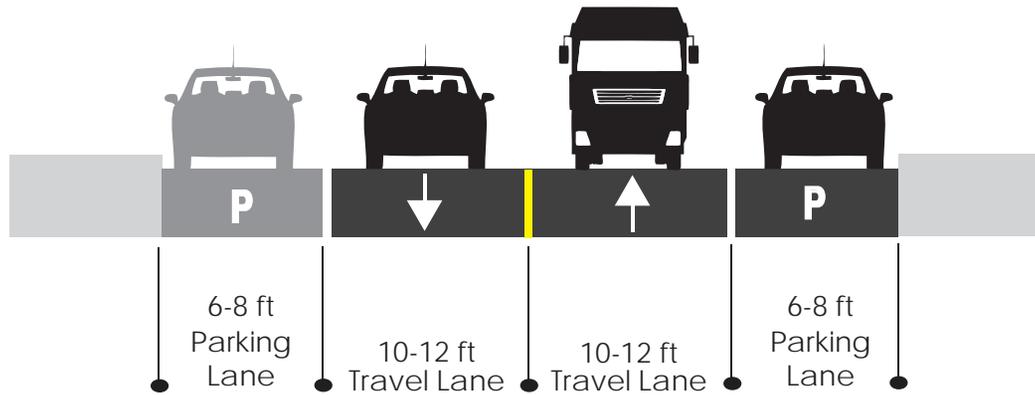
- Montgomery St. to Stockton St.



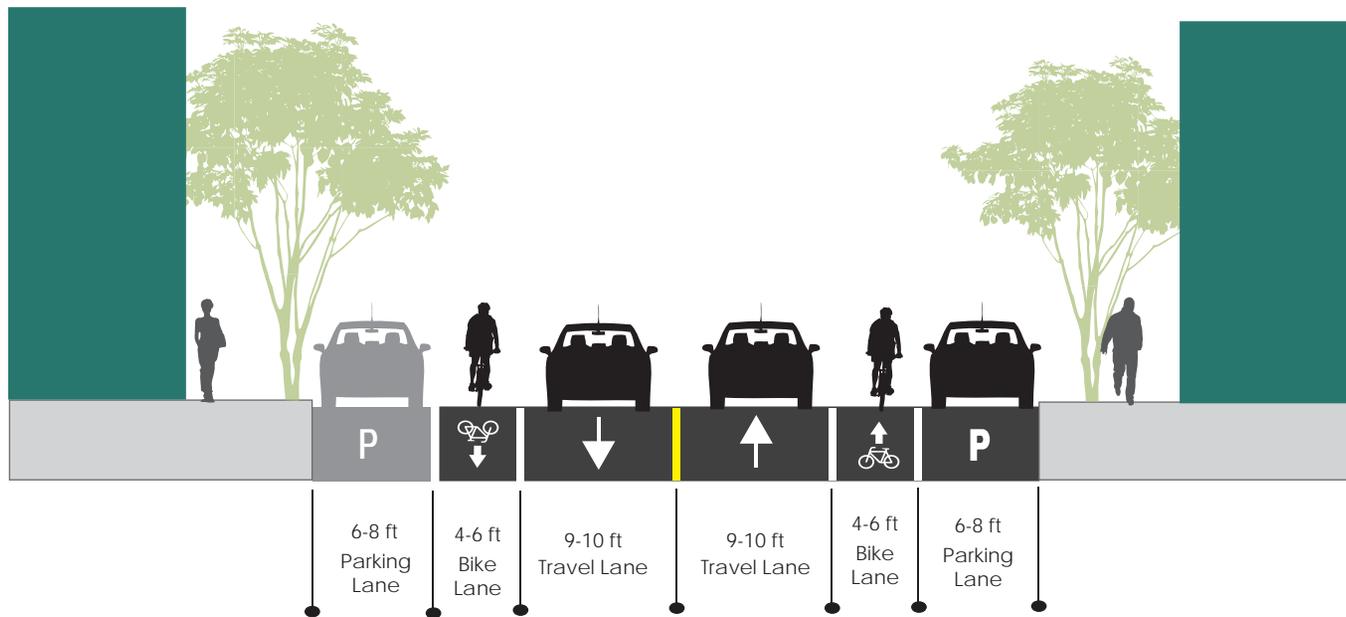
Photo Credit: DVRPC

# Two Way Standard Bike Lane Cross Sections <sup>DRAFT</sup>

## Existing Conditions



## Recommendations



# Two Way Protected Bike Lane

DRAFT

## Description

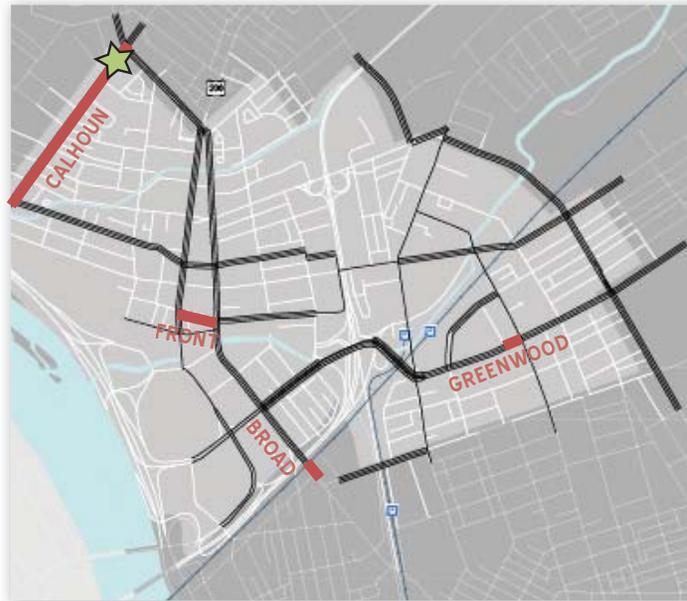
WIDTH: 36-40 FEET

This type of treatment is suitable for the entirety of Calhoun Street in the downtown study area, along with smaller portions when Broad Street crosses the Northeast Corridor, Greenwood Avenue, and Front Street between Broad Street and Warren Street.

These streets have no parking and currently feature either three or four lanes of traffic.

Five or six foot protected bicycle lanes are recommended on these streets. On streets with travel lanes greater than 10 feet, travel lane widths are reduced as well.

## Location



## Recommendations

### FRONT STREET

- Broad St. to Montgomery St.

### BROAD STREET

- Northeast Corridor Bridge to Bridge St.

### GREENWOOD STREET

- Hollywood Ave. to Monmouth St.

### CALHOUN STREET

- Hanover St. to Pennington Av.



### EXISTING FACTORS

### KEY RECOMMENDATION

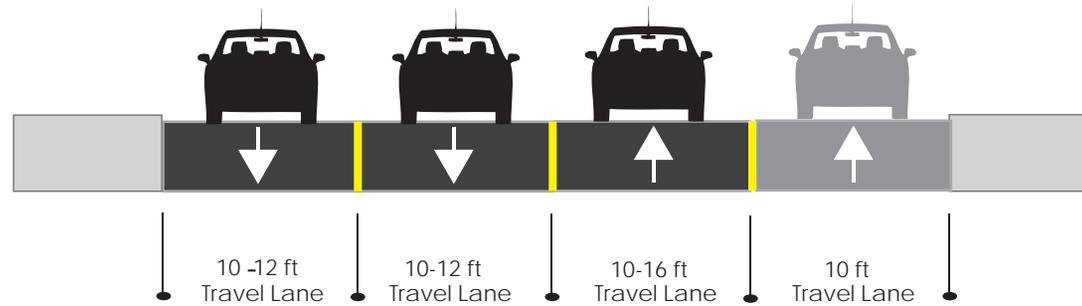
2 Way Traffic	0 Parking Lanes	3-4 Travel Lanes

Buffered or Protected Bike Lane

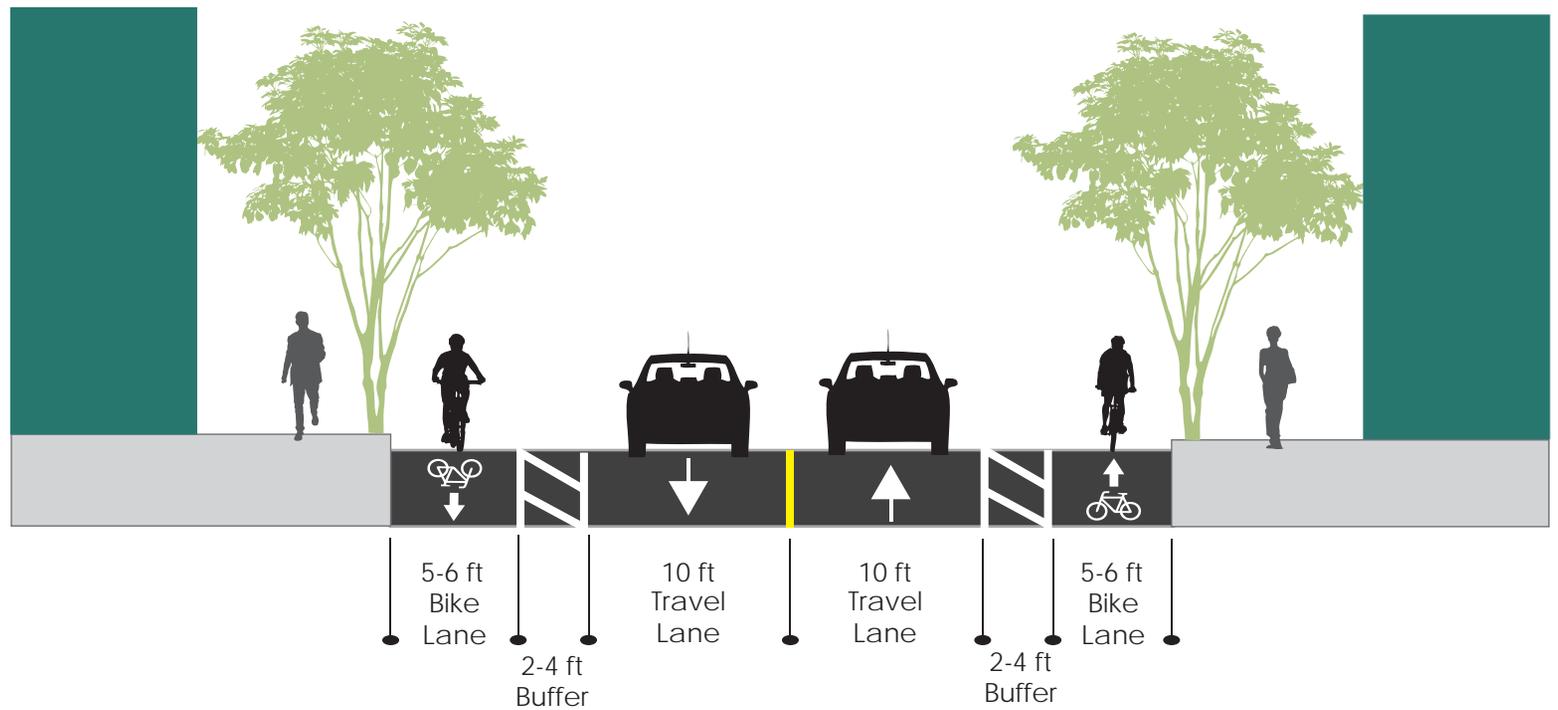


Photo Credit: DVRPC

### Existing Conditions



### Recommendations



# One Way Buffered or Protected Bicycle Lane



BROAD STREET AND WARREN STREET CONNECTION  
DRAFT

## Description

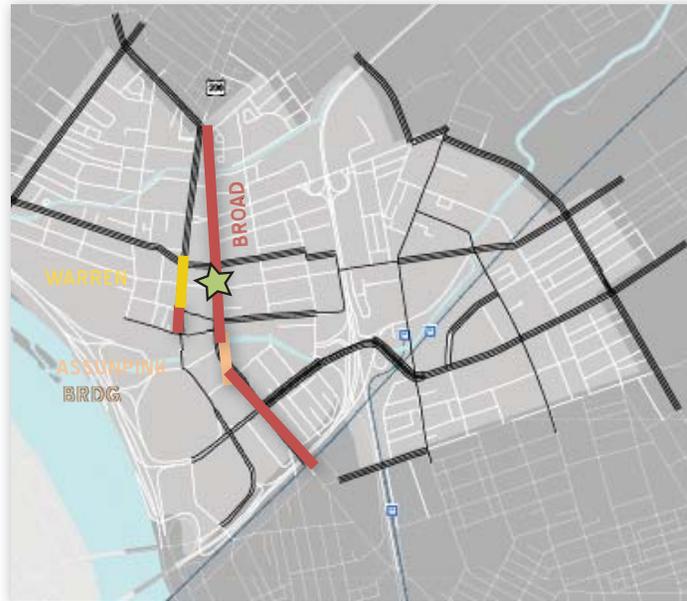
WIDTH: 28 FEET

This type of treatment is recommended for the entire stretch of Broad Street, as well as the lower part of Warren Street between Front and Lafayette Streets.

The buffered or protected travel lane is recommended because of the high automobile and bus traffic on the streets. Additionally, the streets do not include parking lanes which create room for the buffered lane.

At key intersections and conflict points, green bicycle lane areas should be painted to make bicyclists more visible.

## Location



## Recommendations

At Assunpink Bridge No Parking 🚫

### BROAD STREET:

- Livingston St. - Assunpink Dr.

One Existing One Parking Lane 🚗

### BROAD STREET

- Front St. - Pennington Ave.
- Livingston St - Greenwood Ave.
- Assunpink Dr. - Lafayette Ave.

### WARREN STREET

- Front St. - Lafayette Ave.

Two Existing Two Parking Lanes 🚗🚗

### WARREN STREET

- Hanover St. - Front St.

### EXISTING FACTORS

### KEY RECOMMENDATIONS

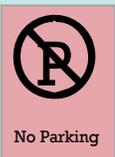
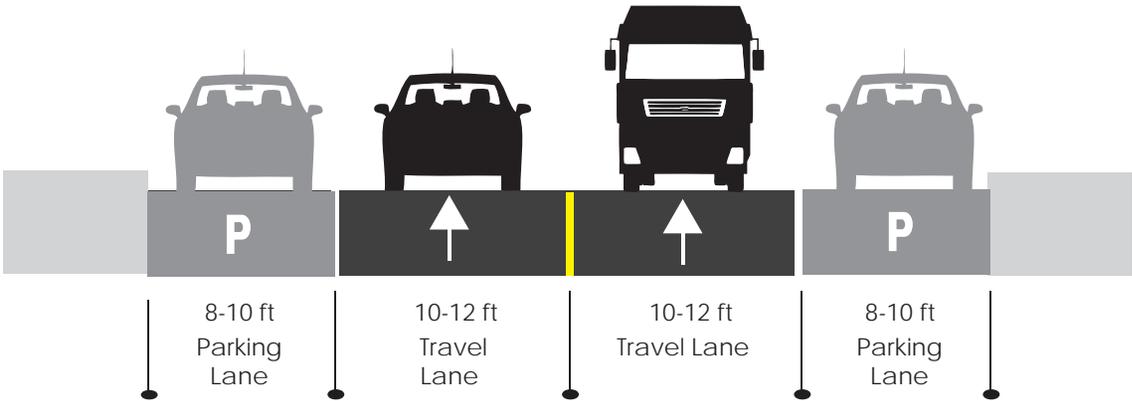
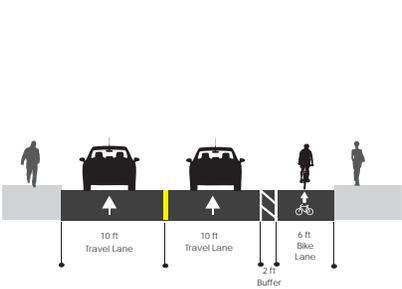


Photo credit: Google

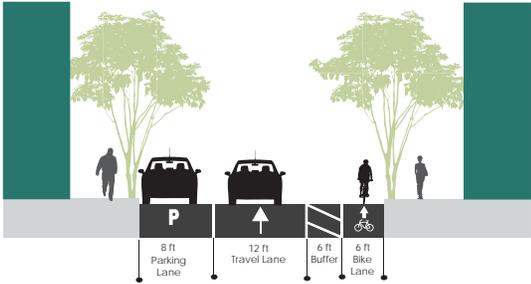
**Existing Conditions**



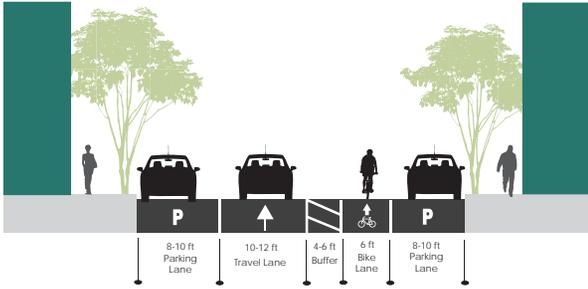
**Recommendations**



At Assunpink Bridge  
(No Existing Parking)



One Existing Parking Lane



Two Existing Parking Lanes



# Advisory Lanes

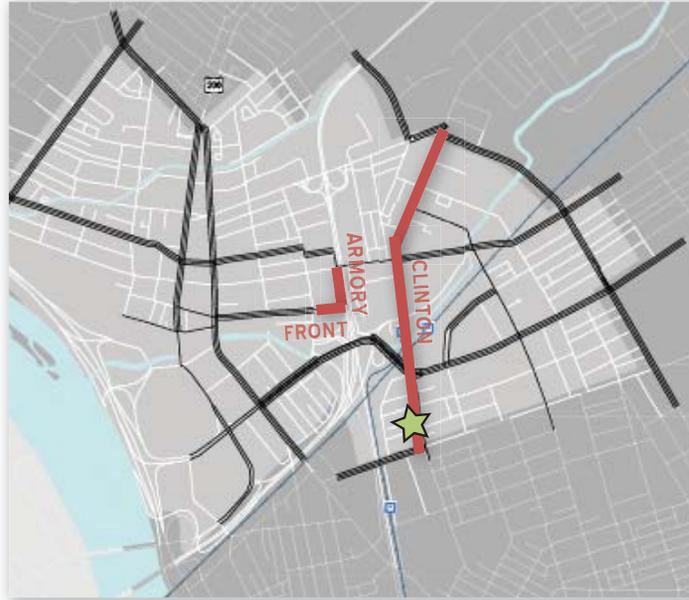
DRAFT

## Description

Width: 28 feet

Advisory bike lanes look similar to standard bike lanes in width and placement, but tend to be used along low-volume streets that are too narrow to fit a standard vehicle lane alongside a bike lane. Advisory lanes are unique in that they feature a dashed marking on the traffic side of the lane and solid one on the parking side. This configuration pushes vehicles into one large lane in the middle of the street and requires them to yield to cyclists and oncoming cars before parking, passing, or turning. Advisory lanes can create a safer environment for pedestrians and cyclists by forcing vehicles to share the road and yield to more vulnerable transportation modes.

## Location



## Recommendations

At Assunpink Bridge No Parking Ⓡ

### CLINTON AVENUE

- Lincoln Ave. - Hamilton Ave.

### FRONT STREET

- Stockton St. - Armory Dr.

### ARMORY DRIVE

- Merchant St. - Front St.



Photo credit: Google

### EXISTING FACTORS



No Parking



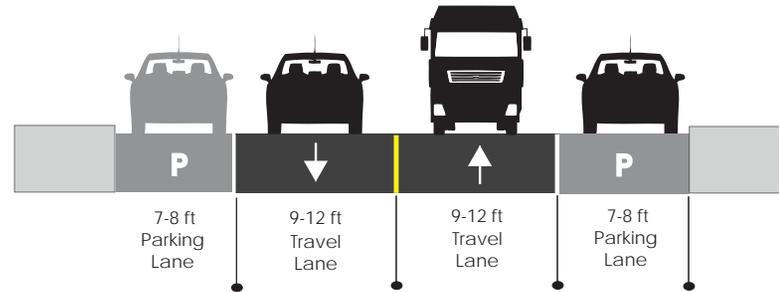
2 Way Traffic

### KEY RECOMMENDATIONS

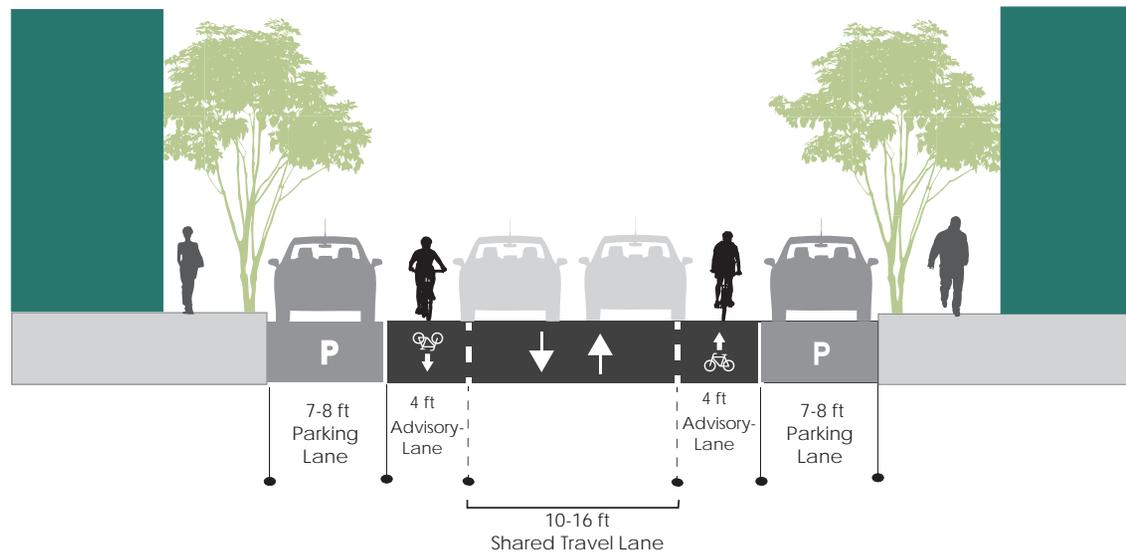


Advisory Bike Lane

## Existing Conditions



## Recommendations



# Bicycle Boulevards

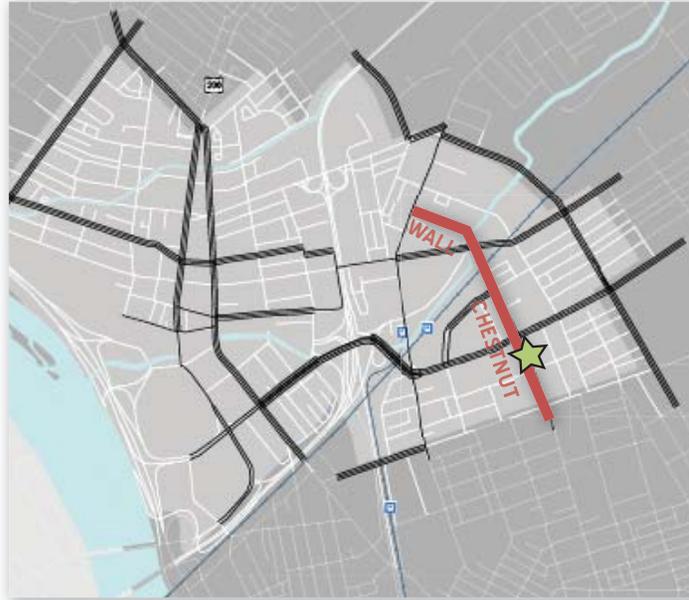
DRAFT

## Description

WIDTH: 28 FEET

NACTO defines Bicycle Boulevards as “streets with low motorized traffic volumes and speeds, designated and designed to give bicycle travel priority. Bicycle Boulevards use signs, pavement markings, and speed and volume management measures to discourage through trips by motor vehicles and create safe, convenient bicycle crossings of busy arterial streets.”

## Location



## Recommendations

### WALL STREET

- Clinton Ave. - State St.

### CHESTNUT STREET

- State St. - Bayard St.



### EXISTING FACTORS

### KEY RECOMMENDATIONS



No Parking



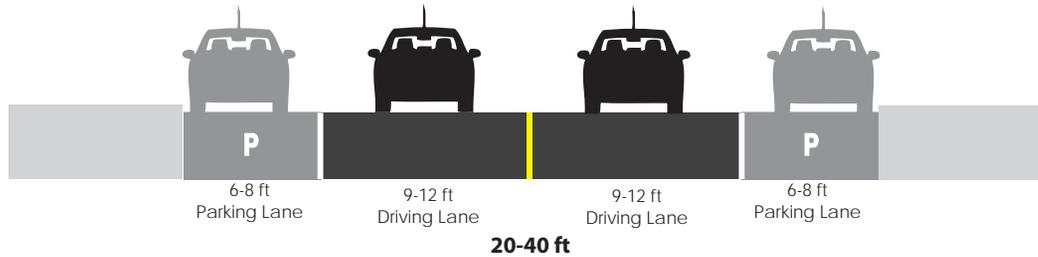
1 Way Traffic



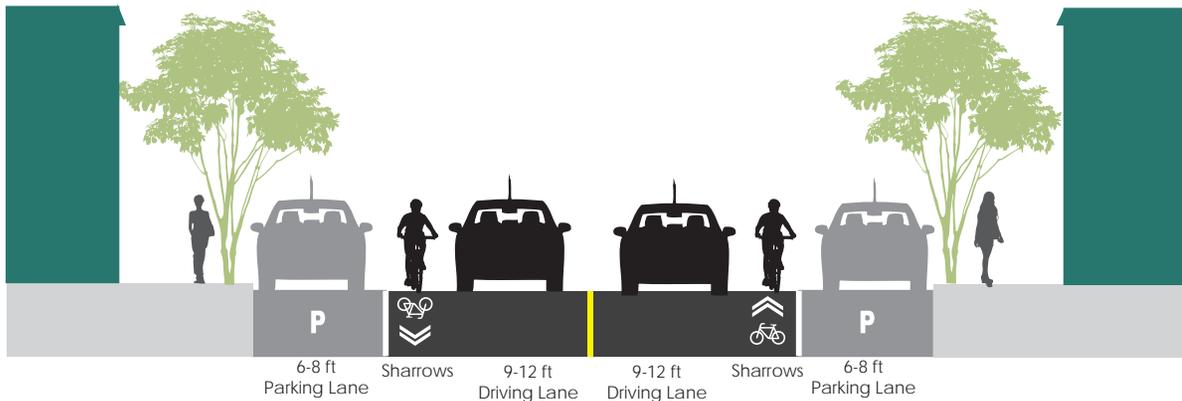
Bicycle Boulevard

Photo Credit: DVRPC

## Existing Conditions



## Recommendations



### CHESTNUT AVENUE AT THOMPSON STREET

Chestnut Avenue becomes a one way street heading north beginning at the south end of the bridge that traverses rail right of way near Thompson Street. This abrupt directional change forces north bound cyclists to turn right onto Thompson and travel out of the way to reach State Street. Chestnut possesses more than enough width for one way vehicular traffic it is recommended that two way cycling be allowed along this segment using a bollard-protected contraflow lane going north from Thompson Street to East State Street. This segment should also feature “one way except bikes” signage.



*Photo Credit: DVRPC*

# Other Configurations

DRAFT

## Walnut Street - Trenton Transportation Center

### Location



**WIDTH: 28 FEET**

Walnut Street is a two way street that runs along the back side of the Trenton Transportation Center. The existing layout features one side of parking.

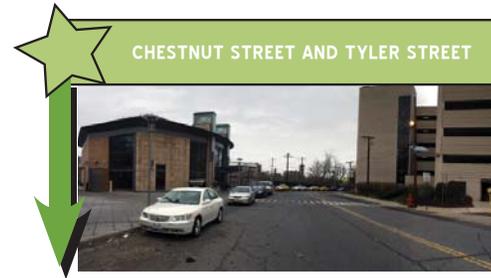
Walnut Street should create an advisory lane from Chestnut to the Transportation Center, and a buffered or protected bicycle lane from the Transportation Center to Greenwood Avenue.

For further station recommendations, refer to the existing Trenton Station Linkage plan (see next page).

### AERIAL VIEW



EXISTING FACTORS		KEY RECOMMENDATION		



### CHESTNUT STREET AND TYLER STREET

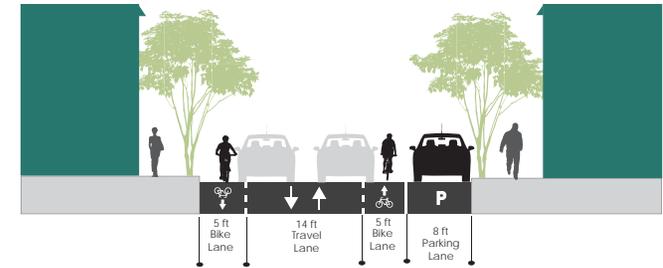
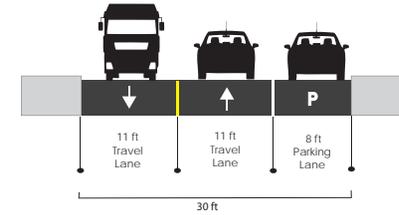


### VISUALIZATION OF BICYCLE LANE

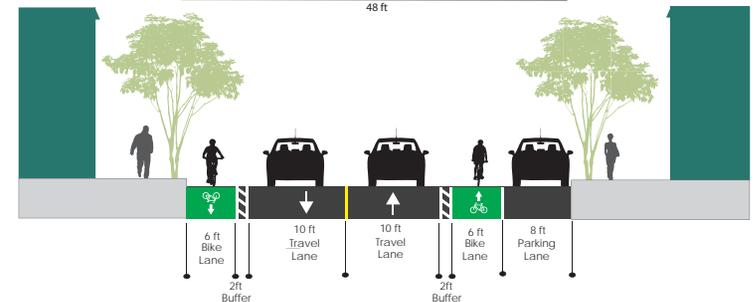
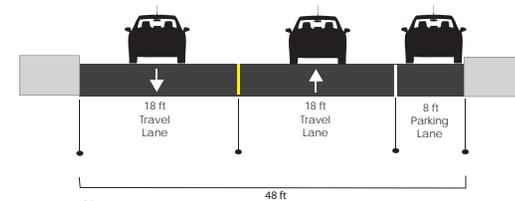


Photo Credit: DVRPC

### CHESTNUT STREET TO TRANSPORTATION CENTER



### TRANSPORTATION CENTER TO GREENWOOD AVENUE



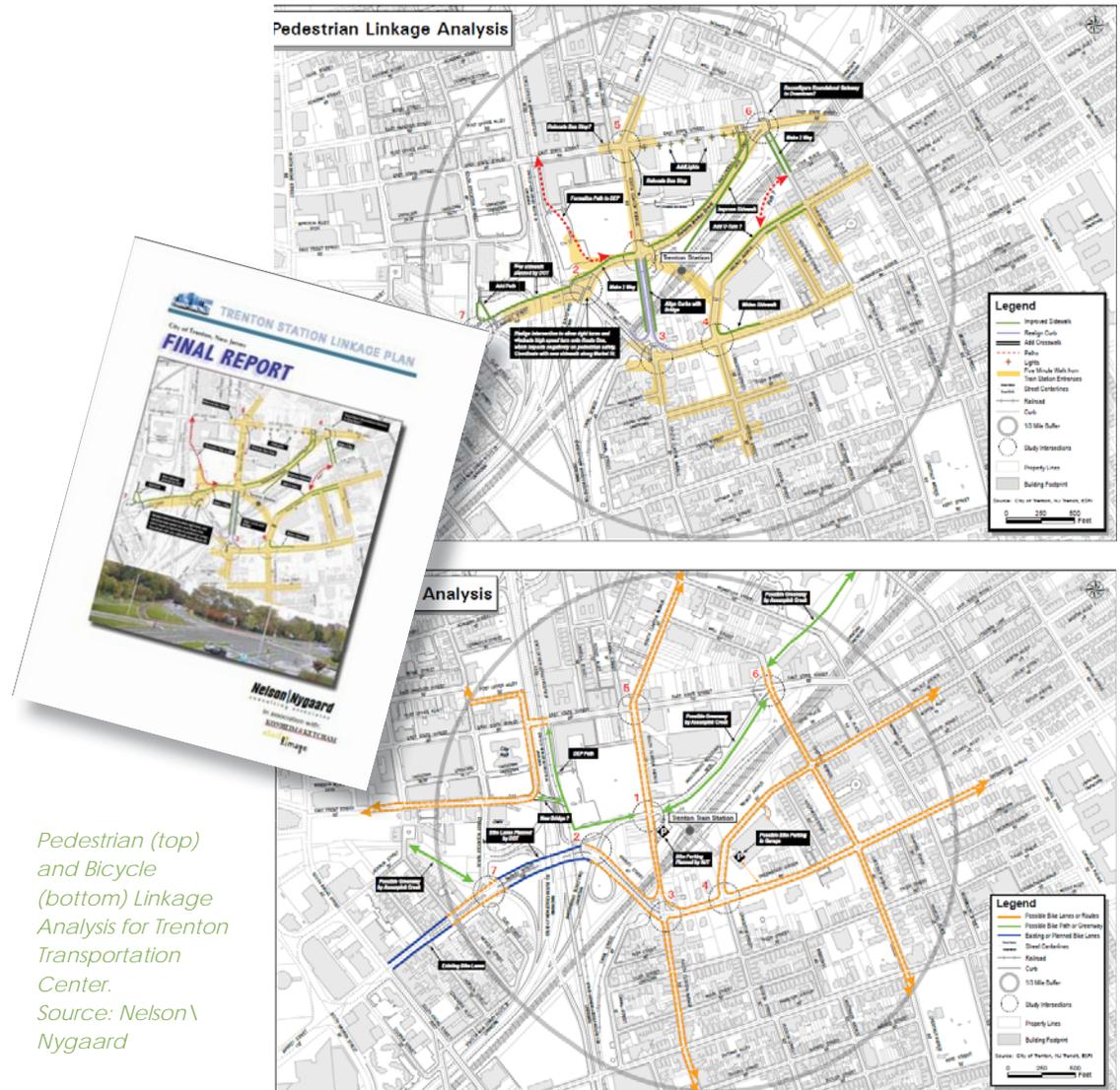
## TRENTON STATION LINKAGE PLAN

Nelson Nygaard’s 2006 Trenton Station Linkage Plan for the city of Trenton, which looked at pedestrian and bicycle connections within the Downtown District, was consulted in developing this plan. DVRPC’s plan has developed bicycle routes with infrastructure for all of the streets recommended in Trenton’s linkage plan while offering more specific treatments. This plan also extends beyond the study area of the Linkage Plan to include areas outside of the scope of the analysis as means of serving a broader community and a greater mix of land uses. This project does not include some of the greenway recommendations from the linkage plan due mostly to other less costly standard bike lane configurations that serve similar routes.

The linkage plan suggests that Chestnut Street be reopened as a two way street between Walnut and State Street. While we find this to be a reasonable solution, we have also offered that this segment be made a two way street for bikes (and remain one way for vehicular traffic) as a reasonable way to keep traffic at low volumes while allowing safe and improved northbound connections for bicycles.

This plan is in support of the linkage plan’s pedestrian and signage analysis’, which show areas in need of sidewalks / sidewalk improvements, path formalization, bridge replacement, bus stops / locations,

wayfinding, lighting, and intersection alignments. These changes **DRAFT** contribute to an improved built environment that encourages safety, greater walkability, and supports multi-modal transportation.



*Pedestrian (top) and Bicycle (bottom) Linkage Analysis for Trenton Transportation Center. Source: Nelson\Nygaard*

## Hanover Street- Warren Street Plaza

## Other Configurations <sup>DRAFT</sup>

For Hanover Street, this plan proposes two different designs that are less commonly used but are becoming more popular, cycle tracks and contraflow lanes:

### TWO WAY CYCLE TRACKS

Two way cycle tracks are a physically separated set of bike lanes that allow movement in both directions on the same side of a street. Two way cycle tracks tend to be good for cyclists of all experience levels due to their complete separation from traffic, their ability to avoid the risk of being 'doored' by a parked vehicle, as well as reducing out of direction travel by allowing movement against the direction of one way streets. Two way cycle tracks require a bike symbol and / or an arrow in each lane, a "one way" sign with an "except bikes" plaque and intersection traffic controls (i.e. traffic lights) oriented for cyclists.

### CONTRAFLOWS

Contraflows are a type of lane that allow bicyclists to ride in the direction opposite of traffic and are used on

streets with one way vehicular traffic to allow bicycles to travel both ways. Contraflows are usually best suited to low volume, low speed corridors, and can be effective in reducing wrong way or sidewalk riding on one way streets. In the case of Hanover, it is recommended that the contraflow running east from Willow Street to Barnes Street use bollards to be physically separated from traffic at which it is recommended to become a protected two way cycle track to North Warren Street.

According to NACTO, Contraflows require a bike symbol with an arrow in the lane, a "one way" sign with an "except bikes" plaque and intersection traffic controls (i.e. traffic lights) oriented for cyclists using the contra-flow lane. Colored pavement and "Two Way" bicycle signs can also be used to draw attention to the lane's different function.



Source: NACTO



Source: NACTO

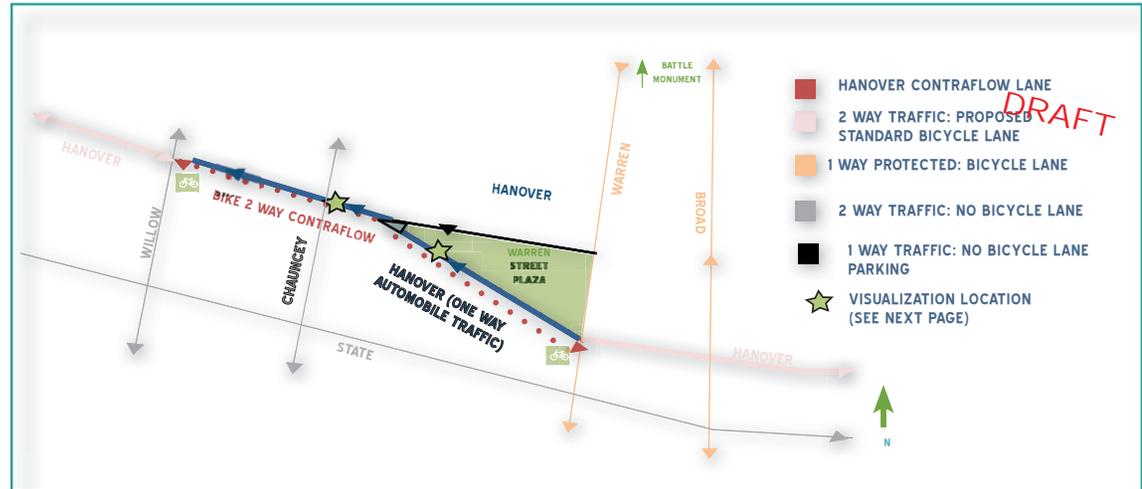


Polk Street Separated Contraflow, San Francisco, CA  
Source: SF Streetsblog



The Kent Avenue two way cycle track in Brooklyn, New York is approximately two miles long and is physically separated from vehicular traffic using parking, painted buffers, and soft-hit bollards to create a comfortable thoroughfare for both commuters and recreational cyclists.  
Source: NYC DOT

## Location



Hanover Street near Warren Plaza presents a unique condition due to the section running one way westbound after Warren Street for a span of two blocks before returning to a two way configuration at Willow Street. Hanover represents an important eastbound connection into downtown due to its comparatively wide streets and relatively low traffic volumes. To bridge this gap in eastbound bicycle service, the following is recommended:

- Starting from Warren headed westward on the southern leg of West Hanover to Barnes Street, implement a two way cycle track along the left hand (south) curb, separated from vehicular traffic by a painted buffer and soft bollards. At the intersection of Chauncey Lane, use

dashed lines, green paint, signage, and bike symbols with arrows to symbolize that bikes are moving in both directions through this intersection.

- Moving westward from Barnes Street, west and eastbound lanes will separate. Westbound lanes will turn into a sharrow marking with paint blocks that lead to a green bike box at the intersection of Hanover and Willow. This path will be able to continue straight to meet the westbound bike lane on the other side of Hanover.
- The eastbound bike lane will continue as a protected lane along the south side of Hanover and line up to meet the standard lane on the opposite side of

Willow. The three vehicular lanes will be narrowed from twelve feet to ten to allow proper space for the single track lane along the south curb.

- Excess space along the southern curb lane should be considered for bioswales, which use plants to capture and slowly release excess runoff from storms.

Overall:

- Repaint crosswalks at each intersection
- “Two Way Bicycle” and “No Entry except Bicycle signage”, as well as Bicycle traffic lights should be used as needed at each intersection.

# Hanover Contraflow Warren Street to Chauncey Avenue

DRAFT

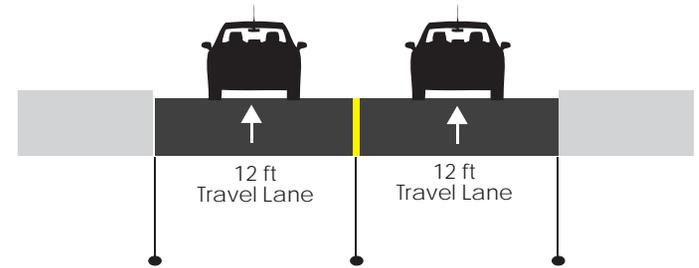
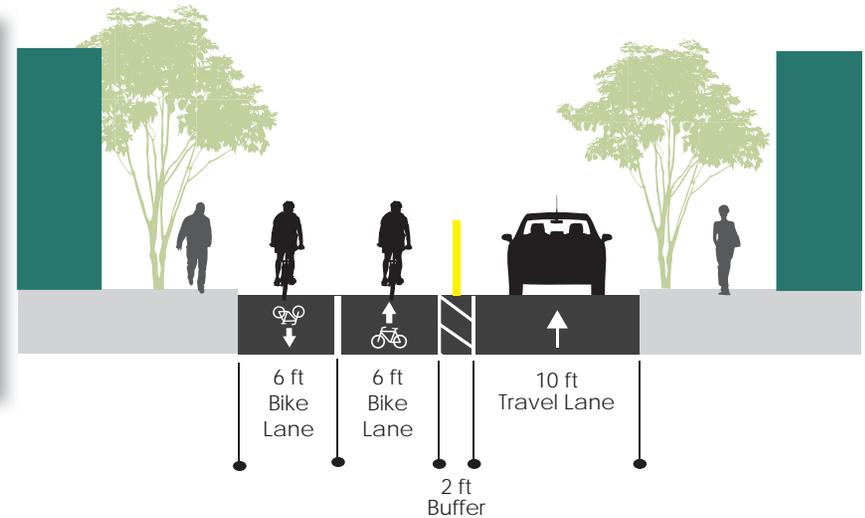


Photo Credit: Google



# Hanover Contraflow 2 Chauncey Avenue to Willow

DRAFT

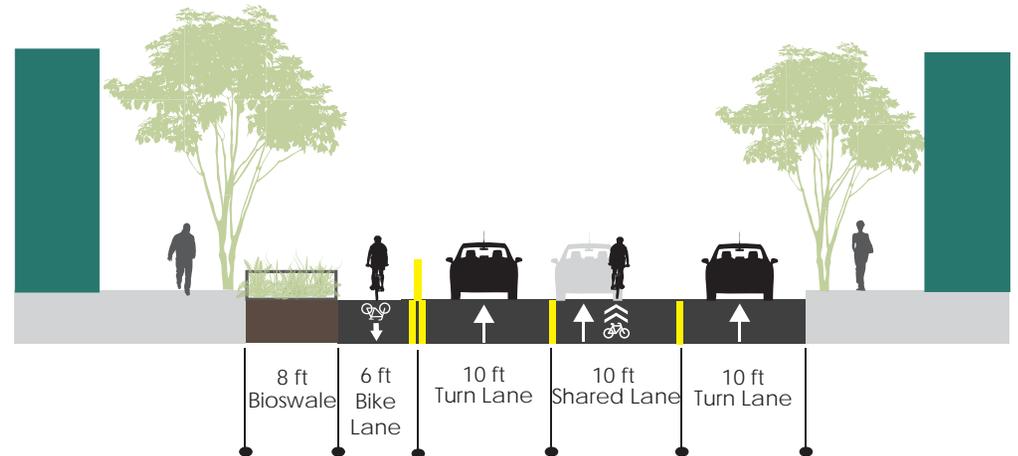
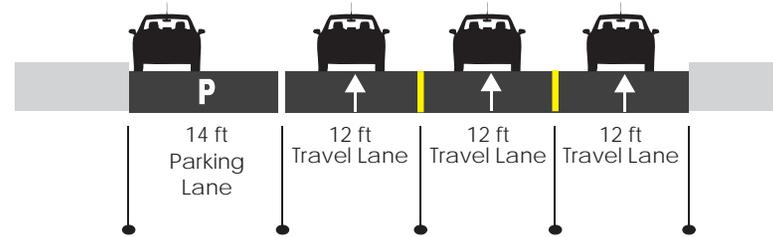


Photo Credit: Google

## Other Design Strategies

With the basic street typologies explained in the previous pages, each can incorporate additional techniques to improve the safety and comfort of the bicycle lane. Below are a list of strategies:

### PHYSICAL SEPARATION

Physical separation is an important element in creating safer bicycle facilities in higher volume or wider streets, allowing greater comfort for a range of cyclists. A common form of physical separation is achieved using buffers, which use ground-based lines and hatching to create space between bicycle lanes and vehicular traffic. Greater physical separation can also be achieved using bollards, medians, or planters adjacent to curbside lanes in areas without driveways or parking. Bollards, in particular, can be placed with minimal buffered space (18 inches) between bike and vehicular lanes. Lastly, parking can be moved from curbside areas to the vehicular side of bicycle lanes to create physically separated bicycle tracks or standard lanes, and is helpful in reducing incidents of 'dooring', while retaining parking and creating calmer cycling conditions.

### BIKE BOXES

The NACTO Urban Bikeway Design Guide defines bike boxes as designated areas located at the head of a traffic lane at a signalized intersection that provide bicyclists with a safe and visible way to get ahead of queuing traffic during a signal phase. Boxes are usually painted green, and sometimes features a short curbside lane that helps create space for cyclists to move to the front of the vehicle queue. Bike Boxes are beneficial in that they provide increased visibility for cyclists, reduce signal delay, help to facilitate turning and turn related conflicts, and reduce encroachment on pedestrian crosswalks by vehicles and cyclists.

### INTERSECTIONAL CROSSING MARKINGS

Intersectional Crossing Markings help to guide cyclists through intersections by providing clear and direct paths using arrows and dashes. These markings are also helpful in that they make cyclists' paths more predictable for drivers, reinforcing that they have priority over turning vehicles and bringing attention to their presence.

### STREET SWALES

Although not commonly associated with bicycle infrastructure, street swales, a depressed vegetated area running alongside a road that collects stormwater runoff, can be used as part of a road diet for oversized streets. Eliminating excess street width can help to reduce speeding, while the capture of stormwater can reduce stress on sewers and help to prevent streets from flooding.

### GREEN PAINT

Painted pavement within a bike facility can help to increase the visibility of cycle tracks, bike lanes, bike boxes, and intersection crossings. It more generally helps to identify conflict areas and reinforce a cyclist's right to the road. Consistency in use of color across a corridor is vital to promoting a clear understanding of its meaning.

DRAFT

# Examples of Other Design Strategies

DRAFT

## BOLLARDS



*New protected bicycle lane in downtown Pittsburgh.  
Photo Credit: Bike Pittsburgh*

## BIKE BOXES



*Bicycle box connected to a green bicycle lane in  
Portland, OR.  
Photo Credit: Jonathan Maus*

## INTERSECTIONAL MARKINGS



*Intersectional crossing markings in Brooklyn, NY.  
Photo Credit: NACTO*

## PHYSICAL SEPARATION WITH PARKING



*Kent Avenue, Brooklyn, NY.  
Photo Credit: NACTO*

## GREEN PAINT



*Green bicycle lane on the South Street  
Bridge; Photo Credit: DVRPC*

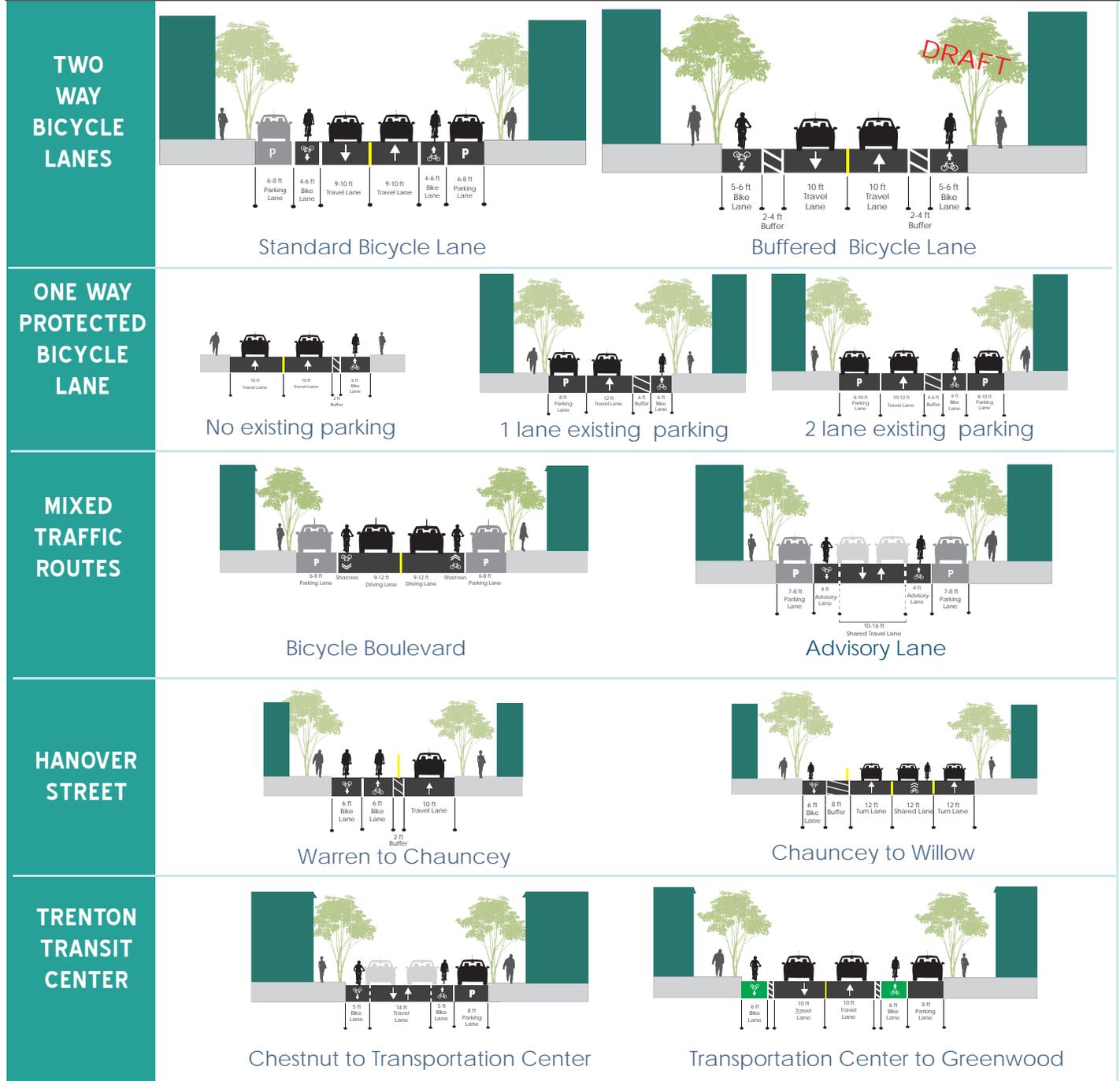
# Summary of On-Road Bicycle Cross Sections

## On-Road Bicycle Recommendations Summary

This section recommends a variety of different on-road bicycle treatments for different conditions in Downtown Trenton.

The diversity of streets widths and traffic patterns in downtown Trenton requires different design interventions. Each section can also have even further features based on special characteristics.

Furthermore, design characteristics should remain as consistent as possible *throughout* an entire street section to limit bicycle and automobile confusion. For example, one portion of Broad Street should not switch between buffered and standard bicycle lanes too often so that there is a level of predictability.



DRAFT



PHOTO CREDIT: DELAWARE VALLEY REGIONAL PLANNING COMMISSION

# trail

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# RECOMMENDATIONS



## Trail Recommendations

Off-road trails complement the on-road bicycle network and pedestrian street grid. Trails can serve different users for both recreational uses as well as connecting users to work, school, and other transportation.

Trenton is a place where many existing and proposed trails merge, in a downtown, urban setting. Ensuring access to existing trails with improved gateways is essential to making people feel safe navigating the trail system. Additionally, bridging the gaps and creating additional connections between trails within the regional trail system is also essential for moving past the downtown into the larger regional recreational area.

The D&R Canal Trail is generally the highest priority, due to the fact that the other trails do not have as strong connections. Optimizing gateways and expanding access to the D&R Canal is crucial to the Circuit Regional Trail system, as well as the trail network within downtown Trenton.



Trailhead for Bordentown New Jersey on the Delaware River Heritage Trail. Photo Credit: John Boyle



Existing Trail conditions; Photo Credit: DVRPC

This plan recommends updating and extending the regional Circuit Trail network by filling trail gaps in the system. The gateways identified are places where the on-road bicycle routes intersect with the trail network and offer gateways into the Trenton street network. The trail obstacles are places where it is difficult to enter the trail network from the street and would benefit from the connection.



Example of clear trail signage. Photo Credit: DVRPC

## Updated Trail Network Connections

The planned trail network considers the existing and proposed trails to create a series of connections between the trails.

These connections help extend and create a more integrated trail network. Our major recommendations to expand the trail network are as follows:

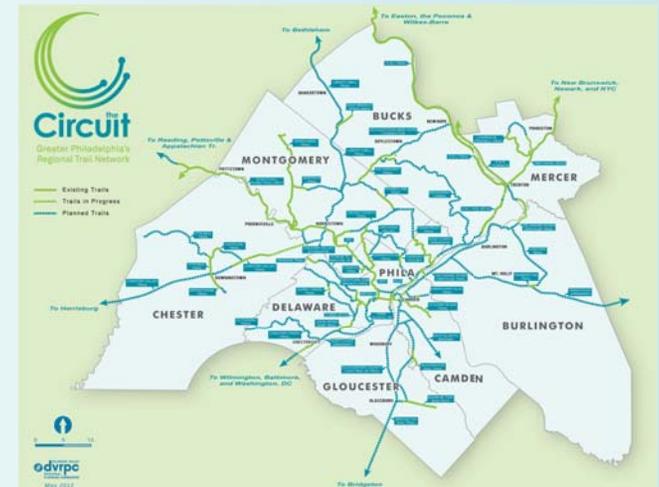
- Extending the D&R Canal Extension to Market Street
- Delaware River Heritage Trail connections to allow access to the Delaware River
- Assunkpink Greenway Connections to create a better east-west connection through downtown Trenton

## Trail Coordination Initiatives

DRAFT

### THE CIRCUIT

Many of Trenton's existing and proposed trails are part of a larger prioritized regional trail network called The Circuit. The grant received by DVRPC in 2010 from the William Penn Foundation helped accelerate regional trail construction and also provided funding to create a regional trails advisory committee. The Circuit is a coalition of partners including DVRPC and other regional partners to create an integrated trail system. The system has a proposed 750 miles with over 300 already existing.



The Circuit trail network map in the Philadelphia region. Source: Delaware Valley Regional Planning Commission

### NEW JERSEY TRAIL ASSOCIATION

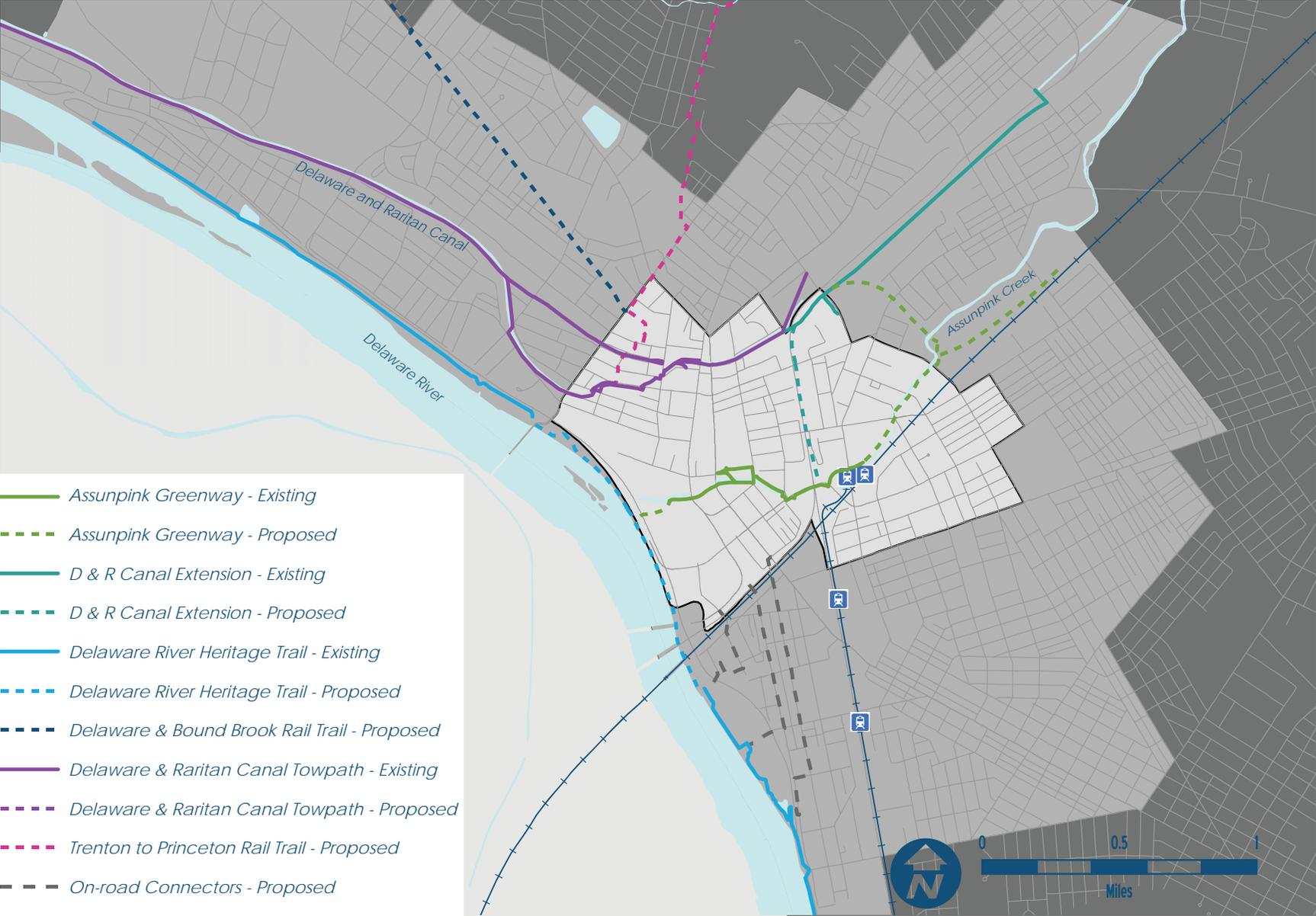
The New Jersey Trail Association is a group led by the D&R Greenway Land Trust to coordinate trail projects in the area around Trenton, New Jersey. This group convened a coordination meeting in winter 2014 with Trenton City and Mercer County officials, as well as those from the Partnership for Healthy Kids, the Bicycle Coalition of Greater Philadelphia, the East Coast Greenway, and other stakeholders. Other efforts include enlisting volunteers to maintain the trails, and offering educational materials, maps, and trail information for all users.



New Jersey Trail Association volunteers building trails in central New Jersey. Source: D&R Greenway Land Trust

FIGURE 16: Existing and Proposed Trenton Trail Network

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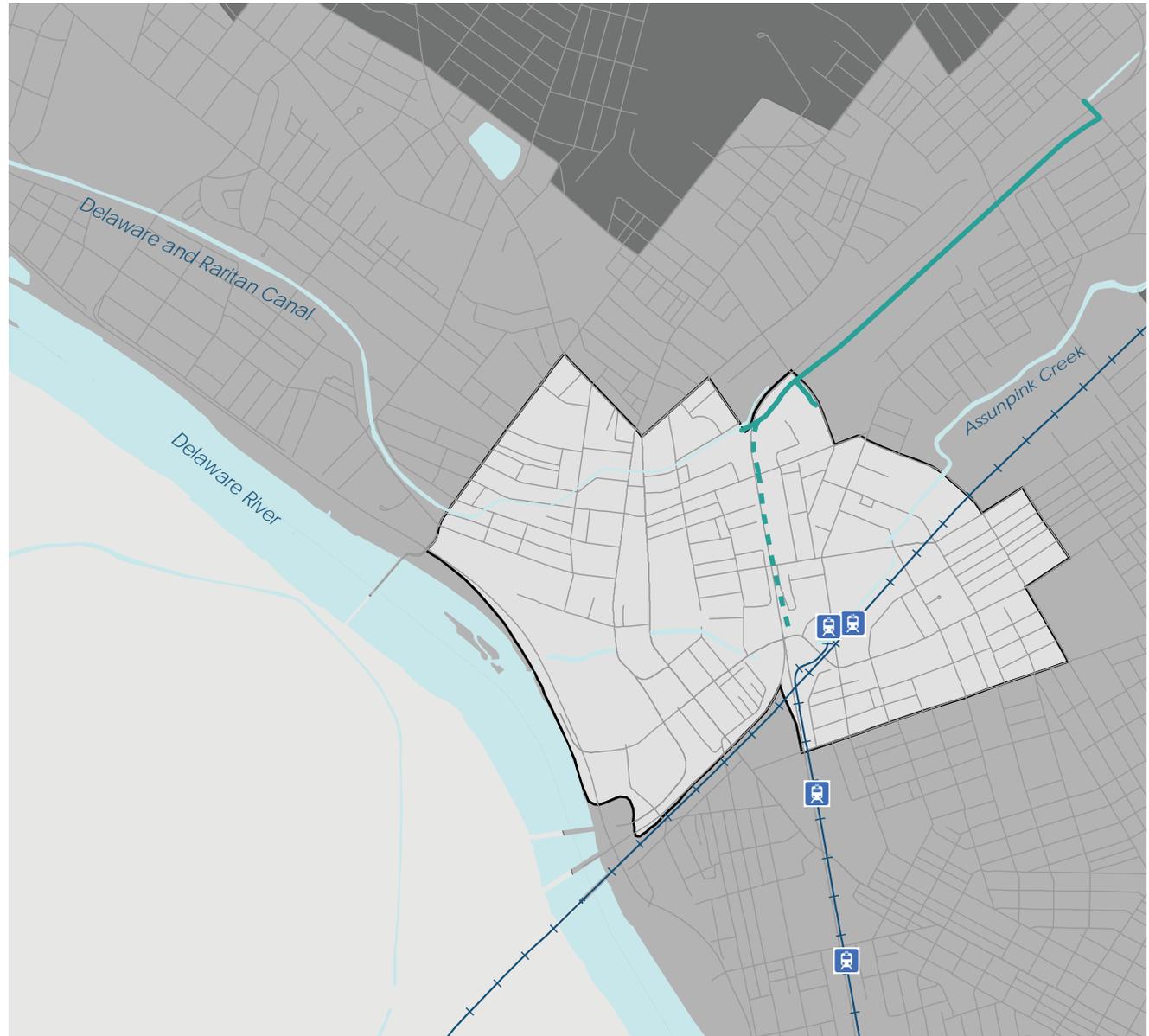
Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

## Trail Connections



### D&R CANAL EXTENSION STATE OR MARKET STREET

The D&R Canal Towpath Trail runs along the D&R Canal with an extension west after Route 1. The trail could be connected on an abandoned rail line running adjacent to Route 1 to Market Street. At State Street the rail line is approximately at grade with the street and would allow a user to make an easier connection when heading south. A ramp or sloped segment would be necessary to make the connection with the road due to the different heights of the road and the rail right of way trail segment. This would provide off-road access to the Trenton Transportation Center.

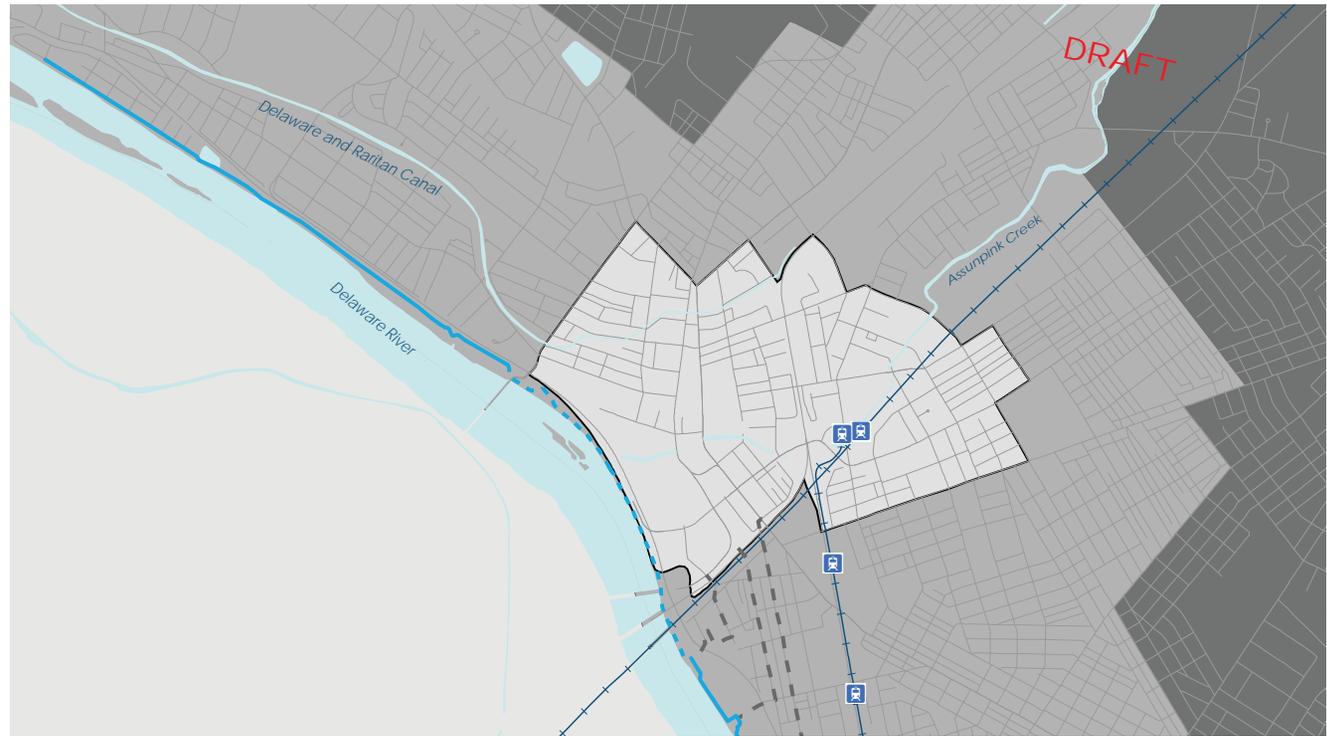


## DELAWARE RIVER HERITAGE TRAIL

### CONNECTIONS

The Delaware River Heritage trail hopes to expand south and provide added access to Stacy Park. Additionally, creating the connection between the Delaware River Heritage Trail around Calhoun Street Bridge would provide mostly off-road access to the Pennsylvania side of the Delaware Canal Towpath and several proposed on-road connectors.

This trail could link to southern portions with Broad Street and Warren Street to on-road bicycle facilities to provide access to Battle Monument Park.



### ASSUNPINK GREENWAY CONNECTIONS

The Assunpink Greenway is still in its planning process for the majority of the trail. The existing trail is a network of sidewalks and a walkway through Mill Hill Park. Connections to the D&R Canal Extension and the Delaware River Heritage Trail would connect the trail network east-west through the downtown district. The greenway could connect to

the Delaware River Heritage Trail on the west end of downtown by connecting the trail slightly south of the Assunpink Creek on Market Street to the existing on-road routes on Market Street. To connect to the D&R Canal Extension near the east end just past downtown, the trail could cross across the Assunpink Creek near the Freight Yards park and connect around near Southard Street before Route 1.



## Trail Gateways

Although downtown Trenton has a rich trail network, many of the access points are either minimally marked or have a barrier of some kind. This makes the trail network an underutilized resource for residents and visitors. Below are a number of places where improvements to these entrances could highlight these rich assets, as well as increase usage and visibility.

### **THE CALHOUN STREET BRIDGE AND NEW JERSEY 29 INTERCHANGE**

The entrance and exit ramps to NJ 29 at Calhoun Street create a barrier between the Calhoun Street Bridge, the proposed on-road network, and the East Coast Greenway, which uses Calhoun Street and Bridge to cross into Pennsylvania. Clear signage and separated on-road facilities would improve access between these routes. Improvements to the intersection of State Street and Calhoun Street, just north of NJ 29 could also improve access to the bridge for pedestrians and bicyclists.

### **LOWER D&R CANAL GATEWAYS**

The D & R Canal Towpath crosses Calhoun Street at two points between State Street and Bellevue Avenue. The signage that does mark these entrances is minimal and in disrepair. The midblock crosswalk connecting one side of the trail to the other is not highly visible. No human-scale lighting is present. At the entrance between Summer and Bellevue, guardrails pose additional barriers and an uninviting entrance. Installing additional signage, trail maps and lighting could be initial improvements.

### **TRENTON BATTLE MONUMENT**

The Trenton Battle Monument sits between Broad Street and Warren Street in a triangle configuration. The D&R Canal Trail runs horizontally across the park with trail entrances currently on Broad Street and Warren Street. Although there are trail entrances, they are not welcoming. Poor signage and a closed gate give poor visibility to the trail and do not encourage usage. This gateway will connect to the new on-road bicycle lanes facilities on Broad and Warren Street, as well as the historic Trenton Battle Monument.

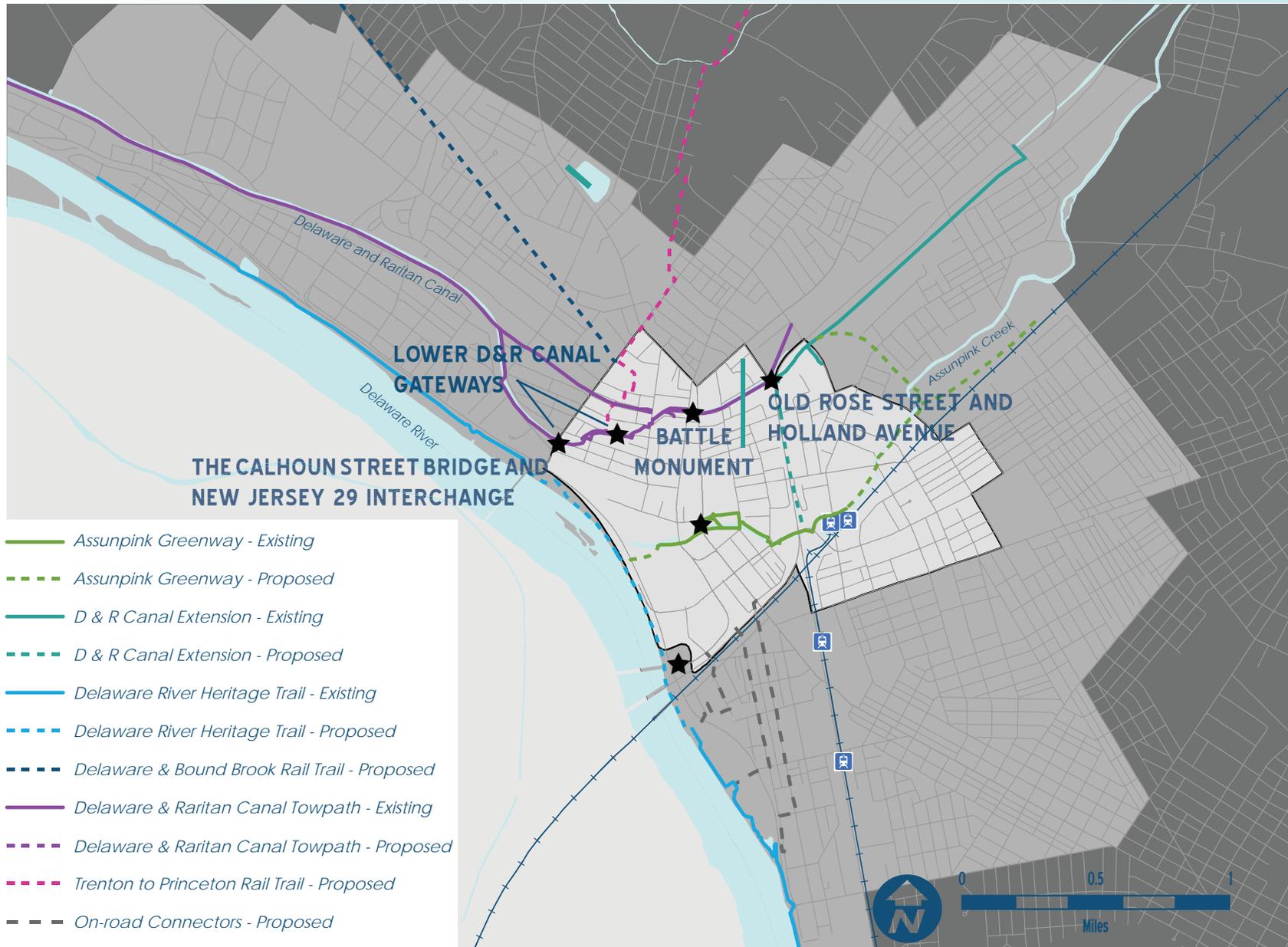
DRAFT  
Simple improvements such as opening the gates to the trail as well as creating a midblock crossing between one side of the trail to the other would help to mark the canal trail at this location. Other signage like a trail map and environmental or historical signs could highlight the trail and help residents and visitors learn about this resource and asset.

### **OLD ROSE STREET AND HOLLAND AVENUE**

This entrance on the northeastern end of downtown Trenton is at the intersection of the D&R Canal Towpath and the Canal extension. The gateway is at the end of a road in a primarily residential area and less than a block away from Rivera Middle School. This entrance features a wooden bridge across the canal. There is little lighting and vandalized trail signage at the entrance. Additional lighting, landscaping, signage and amenities like benches and picnic tables could make the trail more inviting in this area, as well as increasing use and safety.

FIGURE 17: Trail Gateways

DRAFT



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

## Existing Trail Gateways

NEAR THE CALHOUN STREET BRIDGE AND NEW JERSEY 29 INTERCHANGE



OLD ROSE STREET AND HOLLAND AVENUE

DRAFT



NEAR THE TRENTON BATTLE MONUMENT



Photo Credit: DVRPC



PHOTO CREDIT: DVRPC

# intersection

## RECOMMENDATIONS

# Intersection Treatments

The intersection recommendation section suggests interventions that can improve safety and access across all transportation modes.

The pedestrian and intersection section of the plan focuses on finding priority locations for improvements, integrating the best design practices, creating performance measures, and approximating construction and maintenance costs. Performance measures and costs can be found in the “implementation” section of the document.

## DESIGN CONSIDERATIONS

Intersections are some of the hardest and the most critical areas to design for safe bicycle movements, since the safest and most appropriate path may not be entirely clear. At the same time the cross section and roadway width may also change at intersections.

Proper intersection design should make it clear to bicyclists, pedestrians and motorists how they traverse the intersection. A bicyclist’s route through the intersection should be direct and logical, and generally follow the path of vehicle traffic. Bicycle and pedestrian facilities should reduce conflict between users and vehicles. Lighting and signal timing that does not require bicyclists to wait an excessive amount of time are also important.

Acknowledging both the importance and difficulty of designing intersections to be safe nodes of the active transportation network, five key intersections were analyzed and a set of design recommendations were developed for each. These intersections were chosen based

on the presence of a cluster of crashes or based on high volumes of pedestrians and bicyclists. While each has a unique arrangement, many of the recommended design treatments can be applied to other intersections within downtown Trenton.

## INTERSECTION TREATMENTS

Five key intersections are examined in this analysis: State and Barrack/Willow, Perry/Lincoln and Clinton, Greenwood and Chambers, Hamilton and Anderson, and Route 129 and Hamilton.

## Intersection Design

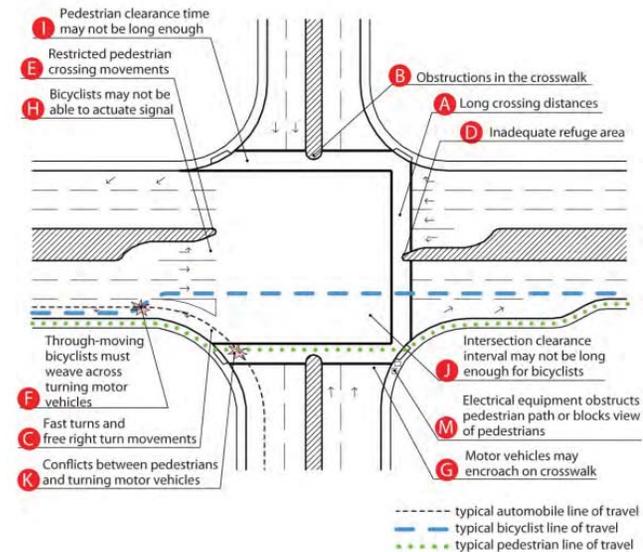
Generally, good intersection design heightens the visibility of bicycles and pedestrians and reduces conflicts between modes. Listed below are several design and infrastructure treatments to improve intersection safety, especially for pedestrians:

- Leading Pedestrian Interval
- Pedestrian countdown times
- Curb extensions
- Right Turn on Red Restrictions
- Daylighting intersections
- Marking crosswalks

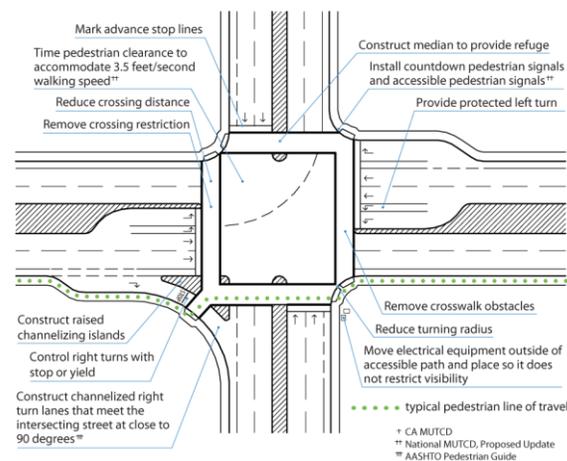
The figure at right illustrates many of the issues and additional strategies for improving bicyclist and pedestrian safety at intersection. Many of these strategies are employed in the intersection recommendations that follow.

## SIGNALIZED INTERSECTION DESIGN GUIDELINES FROM THE CALIFORNIA DEPARTMENT OF TRANSPORTATION DRAFT

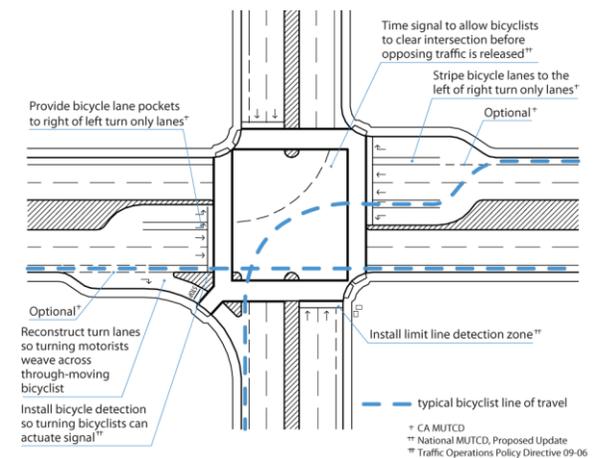
### ISSUES ASSOCIATED WITH SIGNALIZED INTERSECTIONS



### PEDESTRIAN TREATMENTS



### BICYCLE TREATMENTS



Source: California Department of Transportation

FIGURE 18: Map of Focus Intersections

DRAFT



Sources: NJDOT, DVRPC, Mercer County, City of Trenton.



## Hamilton Street and Anderson Street

### ACTIVE COMMERCIAL CORRIDOR

This busy intersection is on a commercial corridor (Hamilton Avenue) near Trenton Central High School. It has high pedestrian volumes, especially in the afternoon, when school lets out and peak commute times occur. In the crash data, this is reflected in a higher-than-average number of bicycle and pedestrian crashes.

In spite of these factors, the intersection is unsignalized. During periods of peak activity, this forces pedestrians to either wait for long periods of time before crossing, to cross the street mid-block, or to otherwise cross unsafely.

A traffic signal is recommended for this intersection. DVRPC traffic counts for <sup>DRAFT</sup> this block of Hamilton Avenue indicate an AADT of 13,933 vehicles, while DVRPC's pedestrian counts show an AADT of 2,560 pedestrians. This strongly suggests that pedestrian volume is high enough to meet the traffic signal warrant for school crossings as described in the Manual on Uniform Traffic Control Devices for Streets and Highways (2009 ed), Section 4C.06, Warrant 5, School Crossing.



**FACING SOUTH TO POINT AT WHICH WASHINGTON AND ANDERSON STREETS MERGE**



**EASTERN SIDE OF INTERSECTION ON HAMILTON AVENUE**

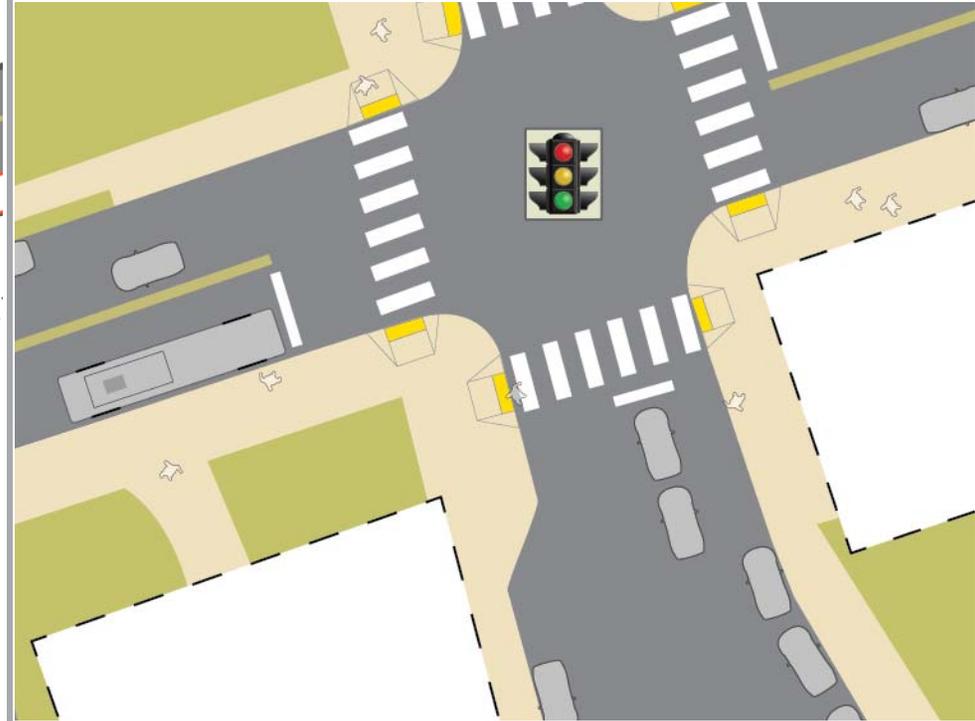
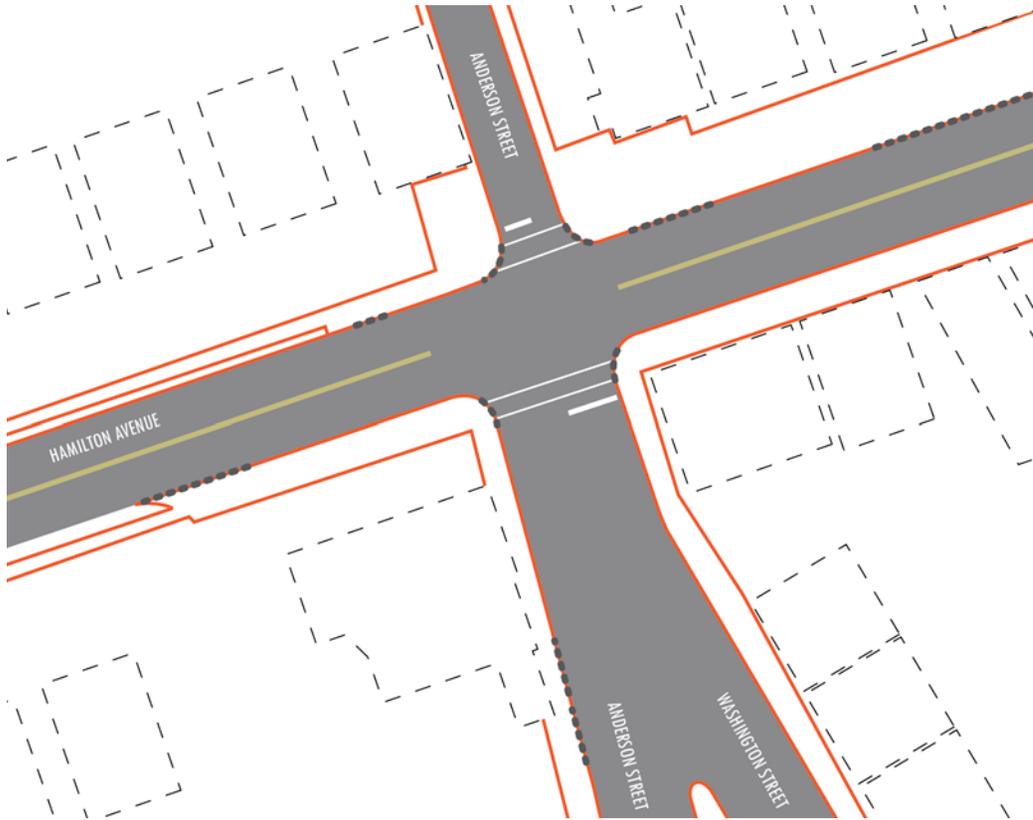
*Photo Credit: DVRPC*

# Hamilton Street and Anderson Street

DRAFT

## Existing Conditions

## Recommended Improvements



### FACTORS

- High pedestrian volumes
- No pedestrian crossing over Hamilton Ave
- Difficult sight lines for vehicles

### RECOMMENDATIONS

- A traffic signal is recommended for this intersection due to high AADT and pedestrian counts
- Fully striped crosswalks with walk signals
- A curb extension on the southwest corner of the intersection to shorten the crossing distance across Anderson Street

# State Street & Willow Street/Barrack Street

## BUSY DOWNTOWN INTERSECTION

This intersection is in the heart of Downtown Trenton's business district. Several public- and private-sector office buildings, along with Thomas Edison State College, are nearby, helping to generate high volumes of pedestrians. Likewise, this portion of State Street is one of the busiest transit corridors in Downtown Trenton, with five NJ Transit bus routes (Routes 601, 606, 608, 609, and 619) stopping at far-side stops in each direction at this intersection.

Crash data showed a high number of pedestrian-involved vehicle crashes (see <sup>DRAFT</sup> Figure 12 on page 33). This number of pedestrian-involved crashes was high even when compared to other nearby intersections with high pedestrian volumes. As a result, these recommendations focus on promoting pedestrian safety.



ON STATE STREET FACING EAST



ON STATE STREET FACING WEST

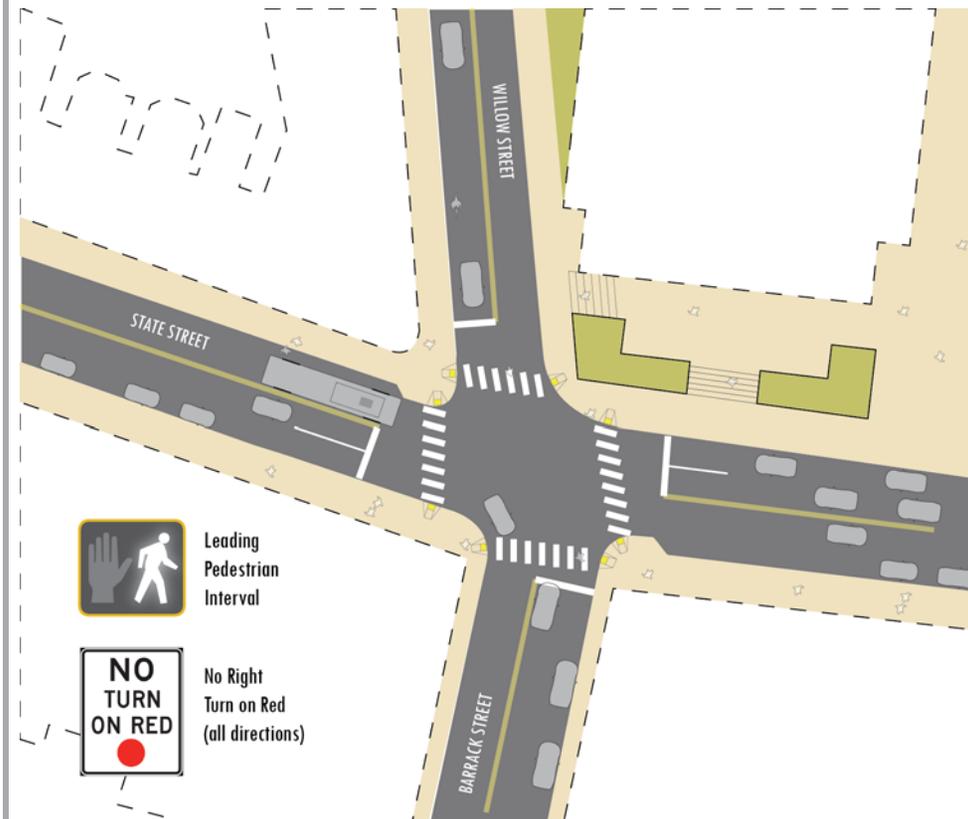
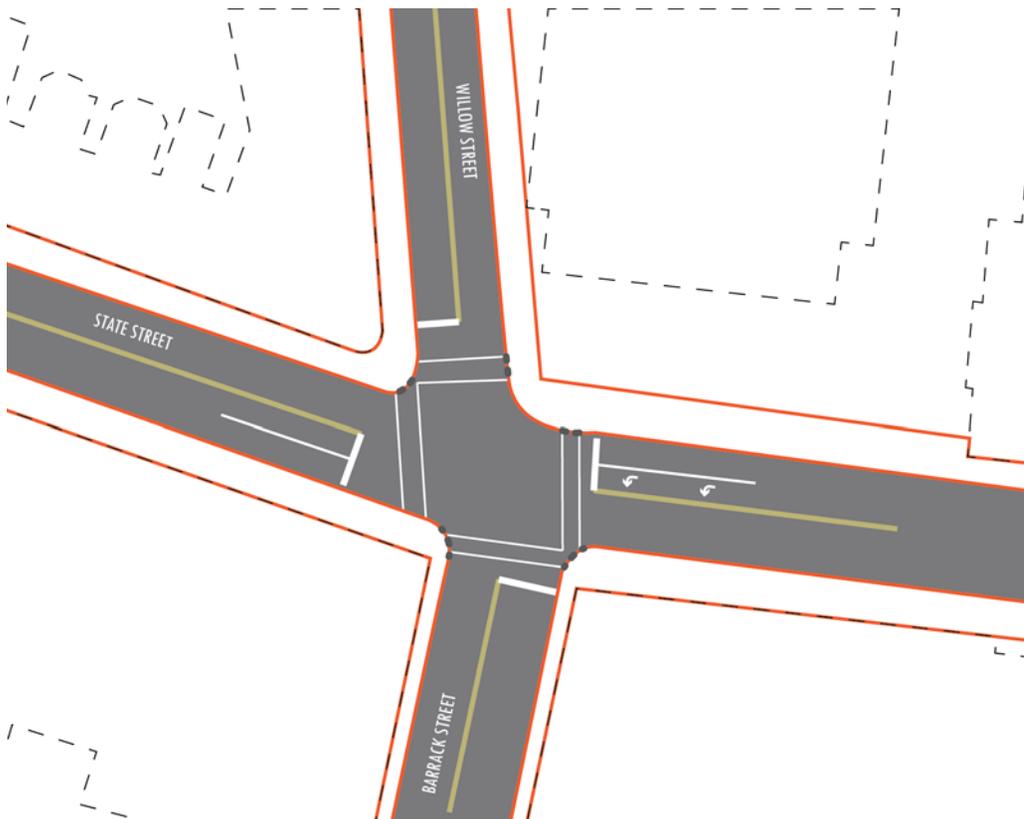
Photo Credit: DVRPC

# State Street & Willow Street/Barrack Street

DRAFT

## Existing Conditions

## Recommended Improvements



### FACTORS

- High bus volumes
- High pedestrian volumes
- Relatively high quality existing infrastructure

### RECOMMENDATIONS

- Two curb extensions (at the northwest and southeast corners) to shorten crossing distances across State Street
- A leading pedestrian interval for all crosswalks, allowing pedestrians extra time and added visibility in the intersection
- Right turns on red (currently allowed in all directions except southbound on Willow Street) are not recommended in any direction at this intersection

## Perry Street/Lincoln Avenue and Clinton Avenue

### AUTO-CENTRIC INTERSECTION

This busy intersection suffers from an aggressively auto-centric design, despite its location near potential bicycle and pedestrian destinations including a school, a church, municipal buildings, and a corner store. Perry Street and Lincoln Avenue fan out into four lanes at the

intersection, while Clinton Avenue expands to three <sup>DRAFT</sup> lanes, forcing pedestrians to cross long distances. This intersection is also a key link between a north-south bicycle facility on Clinton Avenue, and an east-west bicycle facility on Lincoln Avenue.



CLINTON AVENUE FACING SOUTH



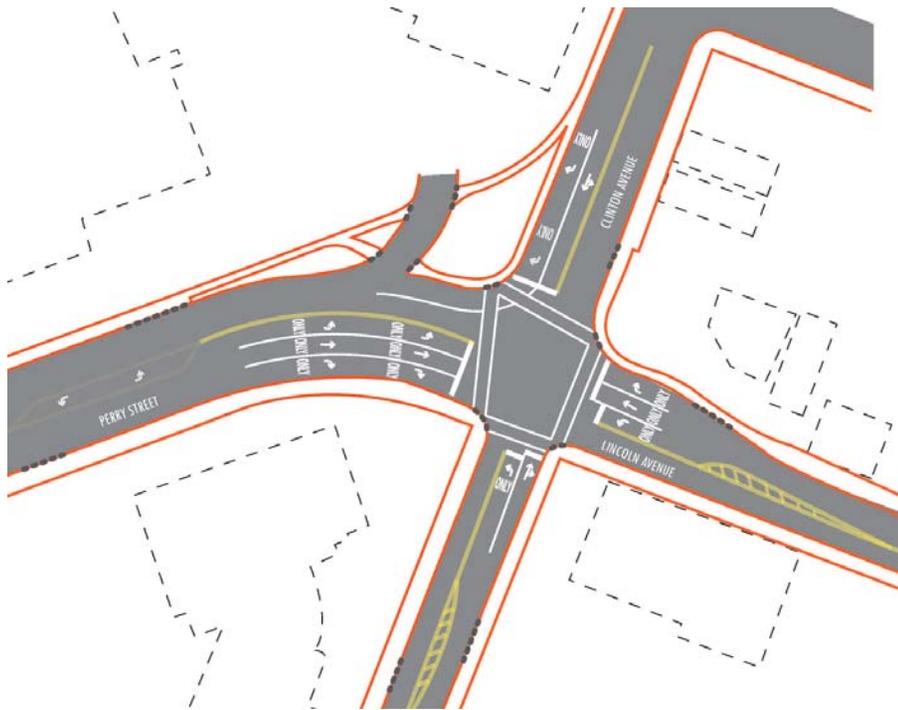
PERRY STREET AT CLINTON FACING WEST

*Photo Credit: DVRPC*

# Perry Street/Lincoln Avenue and Clinton Avenue

DRAFT

## Existing Conditions



## Recommended Improvements



### FACTORS

- Auto-centric lane design
- Difficult pedestrian access

### RECOMMENDATIONS

- Painted bike boxes in each direction to provide cyclists with appropriate visibility before entering the intersection
- Protected bike lanes in each direction on Perry Street and on Clinton Avenue north of the intersection
- Standard bike lanes on Lincoln Avenue and on Clinton Avenue south of the intersection
- Bicycle parking on the southwest corner of the intersection to serve Grant Elementary School
- The turning/through lanes on Perry Street and Lincoln Avenue should be reduced to one left turn only lane and one through/right turn lane

## Route 129 and Hamilton Avenue

### WIDE ARTERIAL CROSSING

This intersection was selected for several reasons. This portion of Hamilton Avenue is an important connector in this plan's proposed on-street bicycle network. State Route 129 is an auto-oriented arterial boulevard with long crossing

distances and high vehicle speeds. Additionally, the nearby Hamilton Avenue River Line station makes this intersection critical for bike-to-transit and walk-to-transit considerations.

DRAFT



ROUTE 129 FACING NORTH

*Photo Credit: Google*



HAMILTON FACING EAST TOWARDS 129

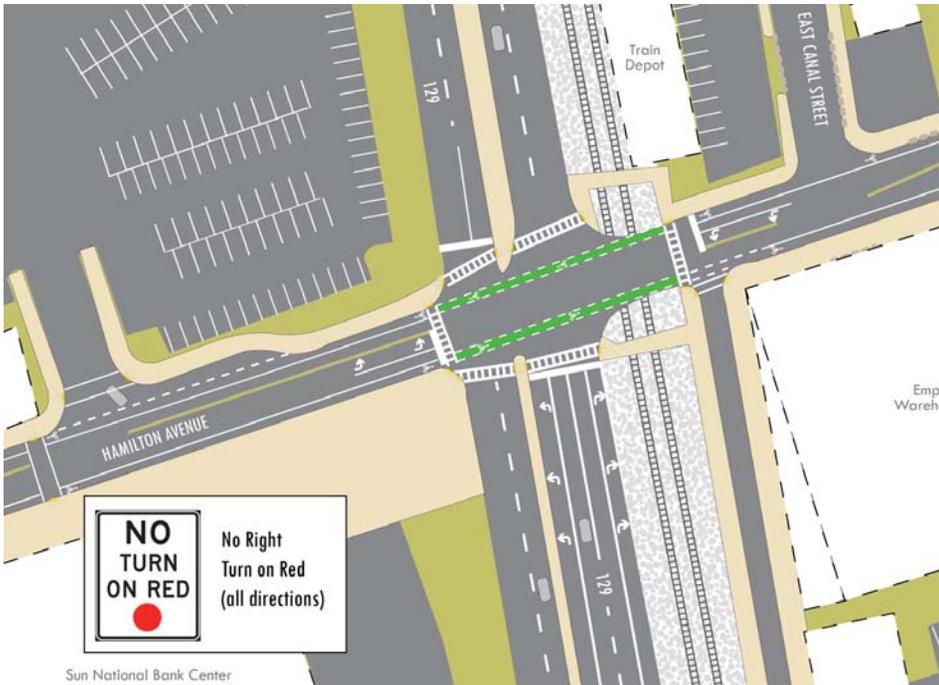
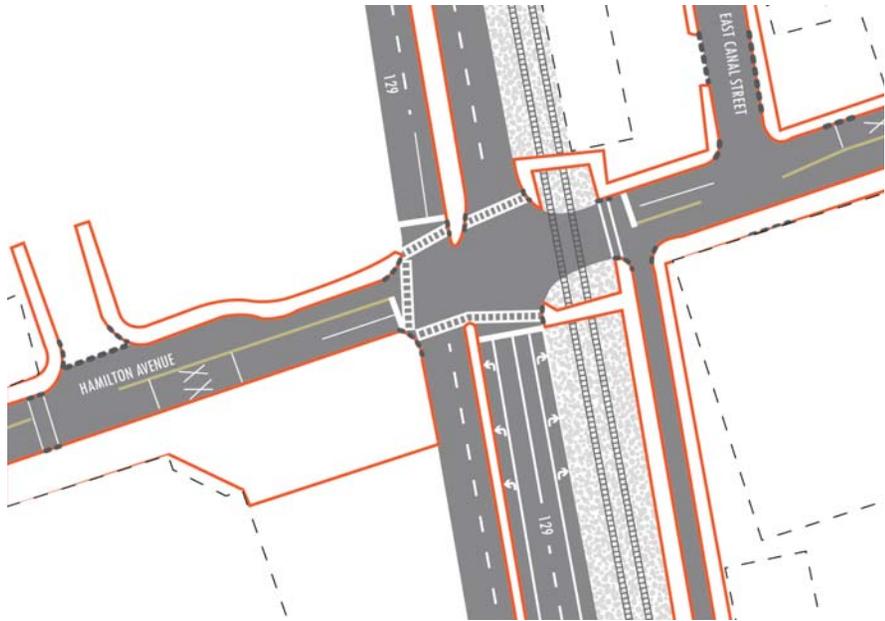
*Photo Credit: DVRPC*

# Route 129 and Hamilton Avenue

DRAFT

## Existing Conditions

## Recommended Improvements



### FACTORS

- High speed vehicular traffic
- Long crossing distances for cyclists and pedestrians
- Adjacent to the River Line station

### RECOMMENDATIONS

- Intersection crossing markings for bicycle lanes crossing Route 129. These markings are intended both to guide cyclists and to alert motorists to the potential presence of cyclists
- A pedestrian refuge island consisting of a widened median is recommended for the south side of the intersection
- “No Turn On Red” signs are recommended in every direction (Right turns on red are already disallowed when crossing the River Line tracks)

# Greenwood Avenue and Chambers Street

## MAJOR ROAD NETWORK CROSSING

This intersection is the site of a crossing of a major east-west route and a major north-south route in this plan's proposed on-street bicycle network. It is also immediately adjacent to Trenton Central High School's Chambers Street campus (currently under renovation), making safety a critical issue. Additionally, the two gas stations on the north side of the intersection have multiple wide curb cuts, causing a chaotic situation on the sidewalk.

Each street separates into either two or three lanes at this intersection, and DVRPC's video count observations show that the right-most lanes are often used for queue-jumping for through traffic—a dangerous situation for pedestrians and cyclists. These recommendations aim to mitigate unsafe motorist behavior while providing safer, more predictable spaces for pedestrians and cyclists.



GREENWOOD AVENUE FACING WEST



CHAMBERS STREET FACING NORTH



GREENWOOD AVENUE FACING EAST



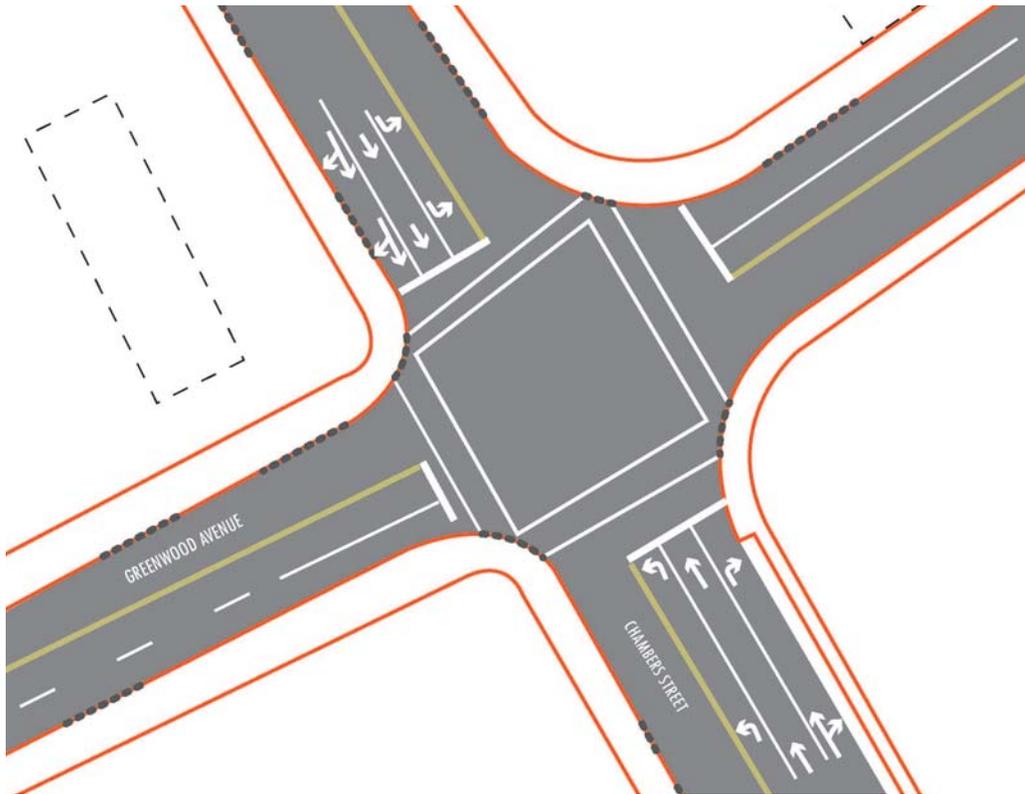
CHAMBERS STREET FACING SOUTH

*Photo Credit: DVRPC*

# Greenwood Avenue and Chambers Street

DRAFT

## Existing Conditions



## Recommended Improvements



### FACTORS

- Long curb cuts and driveways
- Trenton Central High School-Chambers Campus nearby
- Key intersection in proposed bike network

### RECOMMENDATIONS

- Buffered bicycle lane on each street, with painted sections within 200 feet of the intersection to alert motorists to the presence of cyclists
- Painted bike boxes in each direction
- Bicycle racks on the Trenton Central High School property at the southeast corner of the intersection

# Greenwood Avenue and Chambers Street Experimental

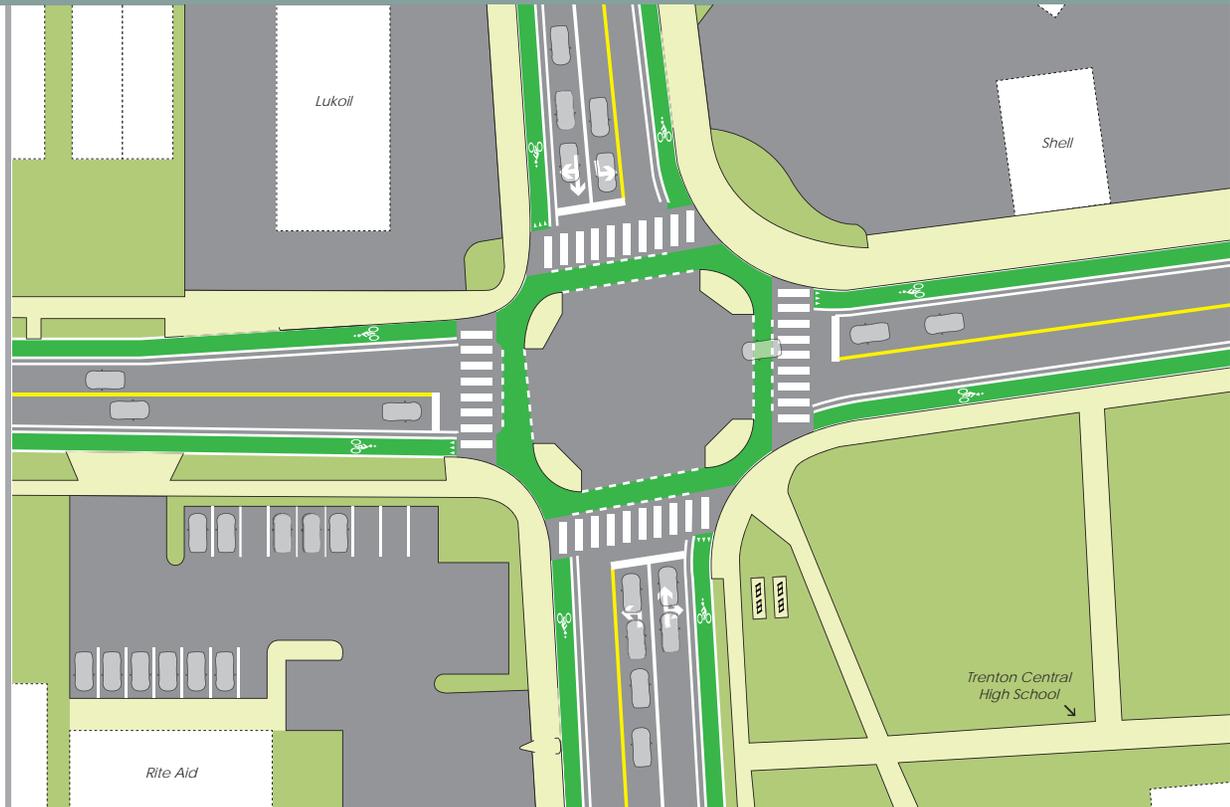
DRAFT

## Experimental Treatment: Dutch Intersection Treatments

In addition to the recommended treatment, this plan also recommends considering a more experimental treatment. This intersection design has been used in the Netherlands. Since this treatment is not in the MUTCD, implementation would require a Federal Highway Administration experimental approval.

A major feature of this design is creating raised curbs inside of the intersection surrounded by a bicycle lane. This decreases the curb radius for vehicles, allowing slower speeds. In turn, pedestrians and cyclists can more easily travel across intersections.

This treatment would likely reduce traffic speeds at Greenwood Avenue and Chambers Street, creating a safer design for all users.



### DUTCH INSPIRATION



Photo Credits: NL Cycling

## Intersections Summary

The intersection recommendation section suggests interventions that can improve safety and access across all transportation modes.

Intersection conditions vary and require different types of treatment based on automobile, bicycle, and pedestrian traffic. New designs are also being tested and are becoming more standard practice as transportation safety focuses on multi-modal needs.

While these recommendations feature single intersections, portions <sup>DRAFT</sup> of these designs can be used throughout the city.

## Summary of On-Road Bicycle Cross Sections



Hamilton & Anderson



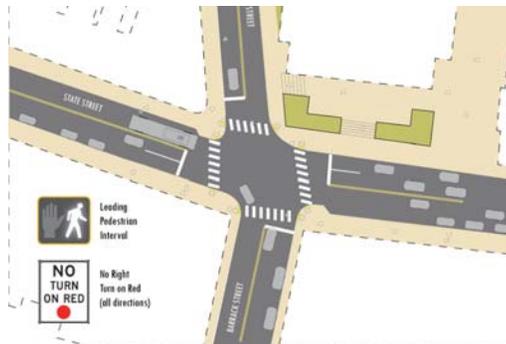
Perry & Lincoln/Clinton



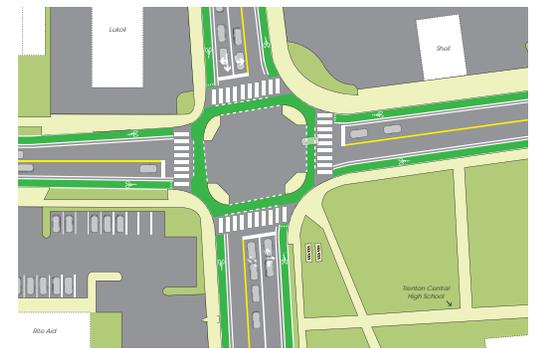
Greenwood & Chambers Recommended



Route 129 & Hamilton



State & Willow/Barrack



Greenwood/Chambers Experimental

DRAFT



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TRENTON TRANSPORTATION CENTER; PHOTO CREDIT: DVRPC

# other

## RECOMMENDATIONS

## Bicycle Parking

Providing bicycle parking is an important piece in supporting and sustaining Trenton’s cycling community. Cyclists will feel more secure in riding bikes for a variety of activities if they feel there will be a safe place to lock or stow their bike. The following section provides a series of considerations and recommendations when purchasing, siting, and installing bike racks.

### SITING

The placement of bicycle racks is an important aspect of developing bike parking that is secure and well used. The following are a few general rules of thumb for siting the location of bicycle racks:

- For racks used by shoppers, customers, or other visitors is that bicycle parking be easily accessible and sited within 50 feet of the building entrance that cyclists use.
- Only locate bicycle racks on sidewalks and spaces where there is adequate space for pedestrian traffic. To minimize these types of conflicts, align the rack with other types of street furnishings such as light poles near the curb of the street.
- Make sure racks are in well lit areas if possible.
- Locate parking where cyclists are aware it exists. If it is not placed in sight of a building or trafficked area, it is unlikely to be used.

### ARRANGEMENT

When arranging bike racks for installation, it is important to remember that bikes require space for maneuverability.

Remember to:

- Consider the space that a full rack of bicycles will take up- allow 2 feet by 6 feet for each parking space, and an aisle at least 5 feet wide behind the rack for maneuverability when exiting.
- If installing more than one rack, stagger them by a minimum of 17 inches to allow for more parking.
- Do not install racks too close to walls or car parking. Insufficient room can greatly cut capacity and reduce usage.
- Create a sufficient pathway to and from the parking area.
- When a location lacks adequate sidewalk space, but has a high demand for bike parking, Bike Corrals can be used by removing a parking space and filling it with bicycle racks. Standard corrals can fit at least ten bicycles.

### DESIGN

The design of a bike rack should provide durability, ease of access, and vandal-resistant anchoring to attract users and provide long term utility. When considering rack types, it is important to note that the rack should hold bikes upright by providing two points of contact along the horizontal plane, allowing for both frame and wheels to be locked using U-Locks or Chain Locks. Racks that only allow for

cyclist to lock their wheels tend to be more vulnerable to vandalism and instability. DRAFT

### BIKE PARKING ORDINANCE

It is recommended that Mercer County consider an ordinance that requires some amount of bicycle parking for both existing and new developments. This code can be customized to fit different types of regional destinations. The ordinance should also make clear that bicycle parking should be located near building entrances, for increased security and convenience for cyclists.



(Top) Bike parking near the Philadelphia Zoo. Photo Credit: DVRPC (Bottom) Bike Corral in Philadelphia; Photo Credit: Plan Philly

## Wayfinding Signage Improvements

Signage for bicyclists, pedestrians, and motorists to alert of bicycle facilities also helps promote the presence of bicyclists and help guide bicyclists safely along the routes. Signage for pedestrians can also alert users, especially in high pedestrian streets or intersections.

### TRAIL SIGNAGE

In addition to gateways signage, frequent trail signage, maps, and markers should be clearly visible and easy to read along the trail. The amount of signage and markings will depend on the amount of trail users.

Additionally, markers that lead users to a trail are also important. An example of this is the Delaware River Heritage Trail Signs within the City of Bordentown, which lead people to the trail gateway.



*Delaware River Heritage Trail On-Road Trail Signage Photo Credit: John Boyle*

### PEDESTRIAN WAYFINDING

Many places are overhauling signage for pedestrians to be more user friendly. Downtown Philadelphia's Walk!Philadelphia program created directional signage and diskmaps to locate pedestrians through Center City. These are extremely useful for tourist destinations and areas that have visitors unfamiliar with the area. Additionally, at high traffic places, larger standing signs can be installed.



*Walk!Philadelphia pedestrian signage. Photo Credit: LH Signs*

### ON-ROAD SIGNAGE FOR BICYCLISTS

Clear on-road signage that corresponds to bicycle routes or mixed traffic routes can lead bicyclists to key destinations. These signs can also include distance and/or approximate trip time. These signs can also alert drivers of potentially higher bicycle traffic along these routes.



*Directional Bicycle Route Signs in Portland, Oregon. Photo Credit: Richard Drdul*



*400 directional wayfinding signs have been installed within Sydney, Australia along the city's cycleways to lead bicyclists to key destinations; Photo Credit: Sydney Cycleways*

## Areas Needing Further Study

This study recommends examining bridge crossings and approaches for further study. These are important links for non-motorized users as well as automobiles. Safe, easily accessible connections could increase access to the bridges.

Three recommended places are the following:

### CALHOUN BRIDGE AND APPROACHES

This bridge area offers access from the on-road network to the D&R Canal trail.

### MARKET STREET AND APPROACHES

This bridge near the heart of downtown is well-used. The long sidewalk underneath and underpass is unfriendly to pedestrians.

### ROUTE 1 INTERCHANGE AREA

This area is another area that is recommended for further study. This interchange is unfriendly for bicyclists and pedestrians, despite its location near the train station and downtown Trenton.



### CALHOUN BRIDGE AND APPROACHES



Photo Credit: Wikimedia Commons User Famartin

### MARKET STREET AND APPROACHES



Photo Credit: DVRPC



Photo Credit: DVRPC



PHOTO CREDIT: WEST WINDSOR BICYCLE AND PEDESTRIAN ALLIANCE



## CHAPTER 4:

# implementation

Effective implementation requires examining where bicycle and pedestrian projects can integrate with complementary policies, in addition to finding the appropriate projects and funding streams.



## Chapter 4: Implementation

### Introduction

Implementing a project involves coordination with other policies, as well as searching for project funding. The right timing, resources, and knowledge can turn conceptual project ideas into reality.

This section is divided between complementary policies and processes, followed by project development strategies and funding programs.



*Ribbon cutting for a portion of the Lawrence Hopewell Trail.  
Photo Credit: Bristol-Myers Squibb*



*Pedestrian improvements under construction on Bala Avenue in Lower Merion Township, Pennsylvania  
Photo Credit: DVRPC*



DRAFT

TRENTON CYCLING 2012 TOUR. PHOTO CREDIT: TRENTON CYCLING REVOLUTION

# complementary

## POLICIES

## Introduction

In addition to direct physical improvements to improve bicycle and pedestrian quality, other projects and programs are closely related. These may include safer general roadway projects, such as Vision Zero, Complete Streets, or education and enforcement programs that expand how many people use non-motorized transportation. Routine maintenance of both on-road infrastructure and off-road trails is also important to ensure adequate and safe facilities.



South Warren Street  
Photo Credit: Dan Fatton.

## VISION ZERO

Vision Zero challenges conventional thinking on traffic accidents and injuries from focusing on accidents to improving the physical environment in order for fewer problems to occur. Vision Zero is an imitative that started in Sweden in 1997 and has since spread to countries around the world.

Examples of Vision Zero improvements may include physical improvements, as well as taking actions such as reducing the speed limit. DRAFT

Vision Zero has recently become more popular in the United States, with recent Vision Zero plans passed in San Francisco, New York City, Portland, and Boston.



(Left) Vision Zero initiatives are gaining momentum around the country. Photo Credit: Bike NYC  
(Right) Photo Credit: Strong Towns

### Traditional Thinking



- Focus on accidents
- Perfect human behavior
- Individual responsibility
- Industry must be forced
- Saving lives is expensive

### Vision Zero



- Focus on the facilities and serious injuries
- Integrate the failing human in design
- Shared responsibility between system and design
- Industry can be stimulated
- Saving lives is cheap

*Adapted from Vision Zero Initiative*

# Complete Streets

Complete street policy is intended to create a safe environment for all users. These policies often include a community vision, connect street networks, performance standards and implementable next steps, and uses design best practices from other communities. Complete streets policies include both new and retrofitted projects into their policies.

Trenton passed Resolution No. 12-121 Resolution Establishing a "Complete Streets" Policy for the City of Trenton in March 2012. This policy was highly ranked by Smart Growth America for features such as mentioning all users and modes, a network, having design flexibility. However, the resolution weakness is that does not list specific performance measures.

Learning from counties with successful complete streets metrics, such as Essex County, New Jersey (see right), will help Trenton operationalize its complete streets policy.

## ESSEX COUNTY'S COMPLETE STREETS ACTION PLAN

In 2014, Together North Jersey created a Complete Streets Action Plan for Essex County, New Jersey.

This document consists of a series of complete streets implementation tools such as an implementation matrix, project procedures, and a series of checklists (see below).

- Separate Complete Streets Checklists:**
- Concept Development
  - Design Engineering
  - Construction
  - Resurfacing
  - Maintenance and Operations



Essex County has created a complete streets implementation plan; Photo Credit: Together North Jersey

Essex County Complete Streets Implementation Action Plan			
Action Item	Action Required	Responsibility	Timeframe
Municipal Coordination	Review municipal plans and codes to develop and adopt changes that incorporate language that supports and promotes bicycling and walking, especially local master plans, zoning ordinances, and bicycle riding ordinances.	Municipalities	Short Term
Municipal Coordination	Encourage all municipalities within the County to amend existing policies and ordinances as per the recommendations noted in the Essex County Complete Streets Implementation Action Plan.	Essex County	Short Term
Transparency	Create a webpage, on the Essex County website, dedicated to the Complete Streets Program	Essex County	Long Term
Exemptions Process	Provide a link or description of the decision-making process for each exemption made under the CS	Essex County	Long Term
Complete Streets Marketing/Outreach	Host a logo contest for residents to create a Complete Streets logo unique to Essex County	Essex County	Long Term
Action Plan Implementation	Adopt a policy to install bicycle racks or other bicycle storage at all existing and future community facilities and appropriate funding to assist with retrofitting existing facilities with bicycle racks or other bicycle storage.	Essex County/ Municipalities	Short Term
Action Plan Implementation	Establish targets for increasing the number, mileage or percentage of roads in the County that are bicycle friendly and the number and mileage of designated bicycle facilities in the County by a pre-determined forecast year.	Essex County/ Municipalities	Short Term
Action Plan Implementation	Establish a target goal to decrease the number of bicycling and pedestrian injuries and fatalities within the County by a pre-determined forecast year.	Essex County	Short Term

Item to be Addressed	Design Engineering Checklist Consideration	YES	NO	N/A	Comments/Explanation of How the Item will be Addressed
Proposed Bicyclist, Pedestrian, and Transit Accommodations	What is the proposed typical cross section?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Does the proposed project design include accommodations for bicyclists?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Does the proposed project design include accommodations for pedestrians to safely travel along and across the facility at appropriate intervals, including ADA compliance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Has there been coordination with the relevant transit agency and have transit users been accommodated in the project design?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Does the proposed design include landscaping, street trees, planters, buffer strips, or other environmental enhancements such as drainage swales?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Does the proposed project design remove, reduce or relocate an existing bicycle or pedestrian accommodation? If yes, list reasons why the design is as proposed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

(Left) A portion of the implementation matrix; (Right) A portion of the Design Engineering Checklist. Photo Credit: Together North Jersey

## MAINTAINING FACILITIES

Bicycle and pedestrian facilities must also be properly maintained (for example, cleaning debris along the side of the road or clearing sidewalks) so that these facilities are best experienced by users.

## EDUCATION AND ENFORCEMENT

Creating and supporting programs that teach bicycle education are critical in developing a strong support system for cyclists of all ages in Trenton. Bike education can take many forms ranging from basic riding and safety lessons to bike maintenance, mechanic classes, and advocacy roles. Bicycle riding and safety lessons for individuals of all ages are vital to assuring that bike infrastructure is properly used, and that new and experienced bike riders alike know the rules of the road. With new bicycle infrastructure, it is also important that motorists understand laws and best practices when sharing the road with cyclists. As always, proper enforcement by local police will aid in assuring that cyclists and motorists are abiding laws and sharing the road. Aside from safety and enforcement, the support of local advocacy groups such as Trenton Cycling Revolution as well as access to affordable bicycles and repair resources like the New Jersey Bicycle Exchange

at the Boys and Girls Club are excellent ways to further develop a strong culture of bicycle riding and education in Trenton.

**To further engage cyclists in the planning process, it is recommended that Trenton form a bicycle and pedestrian technical advisory committee.** Led by the city's Planning Division, this group can provide important input on plan and facility implementation priorities or provide technical expertise about active transportation's incorporation into projects and can ensure that the county's Complete Streets policy is being followed. Members should have bicycle and trails knowledge and experience related to pedestrian, bicycle, health, recreation and open space, and Americans with Disabilities Act (ADA) issues.



*Neighborhood Bike Works' Earn-A-Ride program in Philadelphia works with children ages 8-18 teaching them about bicycle safety, repairing bicycles, and going on bike rides. At the end of the program each of the participants receives their own bicycle. Neighborhood Bike Works also has adult repair classes available.*



*Free Ride Co-op. Bicycle Co-ops like Free Ride in Pittsburgh "It is a non-profit, do-it-yourself recycled bike shop that enables people of all ages to obtain, recycle, and maintain bicycles. Through educating people on how to recondition used bicycles, they are putting forgotten bikes back on the streets in a reliable, safe condition. They aim to enhance the health of our community and environment by promoting active living and encouraging bicycle transportation."*



PHOTO CREDIT: DELAWARE VALLEY REGIONAL PLANNING COMMISSION

# project development

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## STRATEGIES AND FUNDING PROGRAMS

# Project Development

Although finding transportation funding has become much more difficult in recent years, finding creative ways to make your project valuable in multiple ways can increase its likelihood of implementation. This section discusses different funding streams that area available for bicycle and pedestrian projects.

## PROJECT DEVELOPMENT CHECKLIST

The Center for Planning Excellence in Louisiana has created a checklist to guide bicycle and pedestrian projects through the funding process (see right). This checklist is a tool to aid with strategies that open the project to the greatest amount of stakeholders while maintaining feasibility.

**TABLE 1A:** Project Development Checklist

**DRAFT**

<p>To ensure that public transportation dollars have the greatest impact and stakeholders' energies are directed towards feasible projects that effectively address community need, the following checklist offers some guidance to keep efforts on track.</p>	
<p><b>ASSESSMENT</b></p>	<p><b>PROPOSAL</b></p>
<p>Develop a problem statement that describes the issue that you are attempting to solve                  Determine who owns and operates the property in question                  Develop a physical inventory of the problem area                  Obtain historical crash and demand data (i.e. vehicular, bicycle, and pedestrian volumes)                  Determine who is most vulnerable to being impacted by problem and conduct user surveys.                  For example, children may be unable to bike or walk safely to school; elderly people may be unable to cross roads because of short traffic light cycles; people reliant on transit, walking, or bicycling unable to access jobs, schools, retail, or civic amenities                  Observe and document travel behaviors in the travel area</p>	<p>Develop possible solutions to address the problem that maximize positive impacts for vulnerable users. For example, installation of a bike lane along a busy commercial corridor with a history of bicycle crashes can increase safety for bicyclists.                  Determine feasibility (including costs and time frame) of possible solutions.                  Document anticipated environmental and social impacts. For example, solutions may improve air quality and make access to transit stops safer for a neighborhood with high asthma rates and low households automobile ownership                  Obtain permission and assistance of owner and operator to seek funding and implement solution                  Contact funding program manager(s) to learn about program requirements, eligibility, etc.                  Designate local sponsor who is eligible to apply for funding (see individual program requirements)                  Secure local cash and/or in-kind match</p>
<p><b>COLLABORATION</b></p>	<p><b>IMPLEMENTATION</b></p>
<p>Conduct a site walk with others who can support or provide input on the problem                  Determine if problem is already identified in local, regional, or state plans                  Reach out to civic associations, advocacy groups, and non-profit organizations who might be able to support a solution                  Involve the owner and operator of the property in developing a solution                  Determine if philanthropic organizations, business community, or others have an interest in supporting a solution</p>	<p>Host a community meeting to provide information on the project                  Track the project's progress by periodically checking in with the local sponsor                  Continue to grow support for the project and/or subsequent phases of the project                  Celebrate the completion of the project with local sponsor and community stakeholders                  Assess effectiveness of the solution by conducting user satisfaction surveys and reviewing crash and travel mode data. For example, a survey of pedestrians and motorists after a pedestrian safety media campaign might gauge level of awareness for safe travel behaviors and crash data may show a reduction in pedestrian crashes along a roadway                  Incorporate lessons learned into future projects</p>

Adapted from Walk and Ride: A Resource Guide to Funding Pedestrian, Bicycle +Complete Streets in Louisiana by Center for Planning Excellence

## Finding Other Related Projects

Every year, Trenton experiences construction that results in miles of local, state, and federal roads being resurfaced. During this repaving process, lines are restriped, signs are replaced, and lights are recalibrated. Using this bike plan, it is recommended that the Mercer County and City of Trenton’s transportation planners and engineers provide oversight of these construction processes and use the resurfacing of these road segments as an opportunity to implement or a reminder to replace existing or proposed bicycle and pedestrian infrastructure as part of its Complete Streets policy. The costs associated with this implementation can often



Repaving of Market Street in Trenton by NJ DOT aided the installment of its bike lane. Photo Credit: Trenton Cycling Revolution

be absorbed by the agency doing the resurfacing and provides an optimal (as opposed to pot holed) surface for the new infrastructure. In return, ribbon cutting ceremonies and letters of acknowledgment can be written to the resurfacing agency to commend and ensure continued support.

Additionally, utilities and construction work (fiber optic cable installation, gas mains, etc) often also must repair pavement. By arranging as a condition of approval that these companies stripe these repaved streets with new planned infrastructure, the city saves time and money in the implementation of the bicycle and pedestrian network.



Walnut Street, Philadelphia, PA; Photo Credit: Bicycle Coalition of Greater Philadelphia

## PHILADELPHIA’S WALNUT STREET LEFT-SIDE BICYCLE LANE *DRAFT*

In 2012, the Bicycle Coalition of Greater Philadelphia requested to the Philadelphia Streets Department to consider left hand buffered bicycle lanes on Walnut Street (a state road). With the lane due to be resurfaced, the City asked PENNDOT to consider striping the lanes, which were subsequently approved and implemented in fall of 2012 from 22nd to 63rd Street.

The existing right hand bicycle lanes, some of the first lanes in the city, were experiencing increased traffic. These lanes extend through University City, which has high numbers of riders due to the student population. Additionally, moving the bicycle lane to the left side also is a practice that reduces bicycle conflicts with buses. Furthermore, since most vehicles are single occupancy, left hand lanes can reduce the number of bicyclists getting hit by automobile doors in the bicycle lane.

# Project Costs

## ESTIMATED COSTS

Costs for bicycle and pedestrian infrastructure projects tend to vary between city and city and state and state. Further, exact project costs can only be determined once the project completes final design. However, as more and more projects are completed across the country, better resources have become available to estimate costs.

In 2013, the UNC Highway Safety Research Center published Costs for Pedestrian and Bicyclist Infrastructure Improvements, as a resource guide for planners and municipalities as they develop plans and projects. This guide, which was the source for the table at the right, summarizes a nationwide survey of over 1,700 cost observations to provide better information to use to estimate infrastructure costs.

The table presents the minimum, maximum and median costs from this survey. Other projects in the Trenton region have generally been in line with

TABLE 1A: Estimated Implementation Costs

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	Per?	Minimum	Median	Maximum	Additional Notes
<b>On-Road Dedicated Facility</b>					
Bicycle Lane	mile	5,360	\$89,470	\$536,680	
Excavation	foot		\$55		
Grading	acre		\$2,000		
Curb/gutter removal	linear foot		\$5		
<i>Roadway Preparation costs for bicycle lane</i>					Varies by project
<b>Mixed Traffic Routes</b>					
Shared Lane Marking/Sharrow	Each	\$22	\$160	\$600	Every 50 to 100 feet, lower traffic volumes every 250 ft.
Pavement Markings	mile		\$3,360		250 feet, or 21 markings/mile
Signage	per mile		\$640		Every 1/4 mile
Recommended Routes	per mile		\$4,000		
<b>Multi-Use Trails</b>					
Paved Multi-Use Trail	per mile	\$64,710	\$481,140	\$4,288,520	Does not include routine maintenance
Source: Costs for Pedestrian and Bicyclists Infrastructure Improvements					

the median costs presented. The document and this table can be used by city planners as they begin to pursue implementing discreet projects from this plan. For example, to construct the bicycle boulevard proposed for Chestnut/Wall Street, which is approximately 3500 feet or 7/10th of a mile, 14 sharrow markings and three signs would be necessary. Based on the estimated implementation costs, that facility would cost about \$2720. Similar calculations can be done for the other facilities as implementation progresses.

## Funding Programs

Pursuing local, regional, state and federal funding will be one of the most critical steps for the success of this plan. The following information highlights a number of existing programs that that can be pursued. The types of activities that are eligible under each funding program are identified in the adjacent table. Beyond those included here, there are a number of other programs and funding sources available that are not bicycle and pedestrian specific. These opportunities should also be gone after. Often partnering with other agencies can be a successful strategy for securing funding and developing projects. For most programs, an adopted plan and implementation approach is the first step towards a successful application.

TABLE 3: Bicycle and Pedestrian Funding Programs

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Eligible Bicycle and Pedestrian Projects	Funding Sources						
	TCDI	CMAQ	TAP	SRTS	RTP	B/P Assistance	Bikeway
<b>Safety</b>							
Safety Education							
Police Patrol							
Helmet Promotion							
Safety Brochure/Book							
Training							
Safety Campaign							
<b>Trails and Greenways</b>							
Shared Use Path							
Trail/Highway Intersections							
<b>Complete Streets</b>							
Bicycle lanes on Roadway							
Paved Shoulders							
Signing and Striping							
Bike racks on Buses							
Bicycle Parking Facilities							
Bicycle Storage/Services							
Sidewalks- New or retrofit							
Crosswalks- New or reterofit							
Traffic/Pedestrian Signal Improvement							
Curbcuts and Ramps							
Traffic Calming							
<b>Maps and Plans</b>							
Pedestrian bicycle plans							
Maps							
<b>Eligible Project Categories</b>							
Construction							
Planning							
Other							

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<b>Safe Routes to School (SRTS)</b>	<b>Program Administrator</b>		<b>Funding Type</b>	<b>Deadline</b>
	New Jersey Department of Transportation		Federal	May
	<b>Summary</b>		<b>Types of Projects</b>	
	This program provides funds to improve the ability of elementary and middle school students to safely walk and bike to school.		<ul style="list-style-type: none"> <li>Projects involving educate and encourage school children about bicycle and pedestrian safety</li> <li>Infrastructure projects that improve the built environment around schools</li> </ul>	
	<b>Application Process</b>			
	<b>Who can apply?</b>	<ul style="list-style-type: none"> <li>Any organization can apply</li> <li>Typically public agency sponsorship</li> </ul>		
	<b>Process</b>	<ol style="list-style-type: none"> <li>Contact a SRTS Coordinator and visit the website for requirements</li> <li>Form a SRTS Team that might include a school administrator, school staff person, parent, police officer, and community representative</li> <li>Conduct a parent survey to assess attitudes towards and current status of walking, bicycling, driving, and riding to school</li> <li>Obtain letters of support from DVRPC</li> </ol>		
	<b>Amounts</b>			
<b>Annual Total</b>	\$5.69 M (FY 2012)	<b>Typical Allotments</b>	\$30,000 - \$450,000	
<b>Website</b>	<a href="http://state.nj.us/transportation/business/localaid/srts">http://state.nj.us/transportation/business/localaid/srts</a>			



Photo Credit: New Jersey Safe Routes to School

<b>Transportation Alternatives Program (TAP)</b>	<b>Program Administrator</b>		<b>Funding Type</b>	<b>Deadline</b>
	New Jersey Department of Transportation		Federal	May
	<b>Summary</b>		<b>Types of Projects</b>	
	Funds programs and projects that are defined as transportation alternatives, including planning, design, and construction of bicycle lanes, recreational trails, and Safe Routes to School		<ul style="list-style-type: none"> <li>Off and on road trails and bicycle infrastructure</li> <li>Conversion of abandoned railroad corridors as trails</li> <li>Community improvements and environmental mitigation activity</li> <li>Other non-motorized transportation infrastructure enhancements</li> </ul>	
	<b>Application Process</b>			
	<b>Who can apply?</b>	<ul style="list-style-type: none"> <li>Public entities authorized to received Transportation Alternative funding</li> <li>Non-profits cannot receive direct grants, but may partner with public agencies to apply</li> </ul>		
	<b>Process</b>	<ol style="list-style-type: none"> <li>Contact the TAP program Manager and visit website for more program information</li> <li>Consult with DVRPC on how the proposed project relates to and supports the DVRPC 2040 Plan and the Transportation Improvement Program (TIP)</li> </ol>		
	<b>Amounts</b>			
<b>Annual Total</b>	\$15.5 M (FY 2014)	<b>Typical Allotments</b>	NA	
<b>Website</b>	<a href="http://www.state.nj.us/transportation/business/localaid/alternatives.shtm">http://www.state.nj.us/transportation/business/localaid/alternatives.shtm</a>			



The Benjamin Franklin Bridge will be using TAP funding, along with other sources, for a new pedestrian and bicycle ramp into Camden, New Jersey; Photo Credit: Thom Carroll

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<b>Congestion, Mitigation, and Air Quality Program (CMAQ)</b>	<b>Program Administrator</b>		<b>Funding Type</b>	<b>Deadline</b>
	Delaware Valley Regional Planning Commission		Federal	May
	<b>Summary</b>		<b>Types of Projects</b>	
	Projects that demonstrably reduce air pollution emissions or reduce traffic congestion		Bicycle and pedestrian projects, transit improvement programs, congestion reduction and traffic flow improvements, diesel retrofit and repower projects, freight projects, and funding of transportation demand management programs, among other eligible project types.	
	<b>Application Process</b>			
	<b>Who can apply?</b>	Public agencies; Non-profits and public-private partnerships with a public agency sponsor		
	<b>Process</b>	1. Attend a mandatory information session held at DVRPC 2. Fill out the project application form on the DVRPC website.		
	<b>Amounts</b>			
	<b>Annual Total</b>	\$2.6 M	<b>Typical Allotments</b>	Up to \$160,000 - \$1 M
	<b>Website</b>	<a href="http://www.dvrpc.org/cmaq">http://www.dvrpc.org/cmaq</a>		



CMAQ funds were awarded to Lawrence Township to connect portions of Providence Line Road to the Lawrence Hopewell Trail (pictured above)  
Photo Credit: West Windsor Bicycle and Pedestrian Alliance

<b>Transportation and Community Development Initiative (TCDI)</b>	<b>Program Administrator</b>		<b>Funding Type</b>	<b>Deadline</b>
	Delaware Valley Regional Planning Commission		Federal	May
	<b>Summary</b>		<b>Types of Projects</b>	
	This effort is to ensure greater quality of life choices by providing and maintaining essential infrastructure, supporting local and regional economic development, and linking land use and transportation planning. <b>20% match is required</b>		Planning, analysis or design initiatives for projects or programs that enhance development or redevelopment and improve the efficiency of the regional transportation system.	
	<b>Application Process</b>			
	<b>Who can apply?</b>	Municipal and County Governments		
	<b>Process</b>	Submit to DVRPC: -Grant Application and Budget Form, -Study area map -Description of the project -Description how the project will affect the area and population -Proposed approach to achieve public and private sector cooperation -Summary how the project fits the TCDI goals, and other supporting materials.		
	<b>Amounts</b>			
	<b>Annual Total</b>	\$1 M	<b>Typical Allotments</b>	Up to \$100,000
	<b>Website</b>	<a href="http://www.dvrpc.org/TCDI">http://www.dvrpc.org/TCDI</a>		



TCDI funds will be used by the City of Trenton to develop an updated Parking Plan (as part of Trenton 250) to make Downtown Trenton more attractive for developers.  
Photo Credit: Emile Wamsteker

<b>Bicycle &amp; Pedestrian Local Technical Assistance Program</b>	Program Administrator		Funding Type	Deadline
	New Jersey Department of Transportation		Federal	February
	Summary		Types of Projects	
	Funds a consultant of NJDOT's choice to undertake local bicycle and pedestrian planning efforts.		Includes development of bicycle master plans, circulation elements, and corridor studies.	
	Application Process			
	Who can apply?	· ???		
	Process	1. FILL IN		
	Amounts			
	Annual Total	NA	Typical Allotments	NA
	Website	No Website		



Local bicycle and pedestrian plans, such as those in Hoboken, NJ, and Atlantic City, NJ, have benefited from this program; Source: City of Hoboken; NJ Casinos Reinvestment Development Authority

<b>Recreational Trails Program (RTP)</b>	Program Administrator		Funding Type	Deadline
	New Jersey Department of Environmental Protection		Federal	February
	Summary		Types of Projects	
	Funds to improve access to open space and provide additional biking and hiking opportunities. 20% match is required		<ul style="list-style-type: none"> <li>-Maintenance and restoration of existing recreational trails</li> <li>-Development and rehabilitation of trailside and trailhead facilities and trail linkages for recreational trails</li> <li>-Purchase and lease of recreational trail construction and maintenance equipment</li> <li>-Construction of new recreational trails in existing parks or in new rights-of-way</li> <li>-For motorized use only, acquisition of easement and fee simple title to property for recreational trails.</li> </ul>	
	Application Process			
	Who can apply?	Government Agencies and Nonprofit Organizations		
	Process	Obtain and submit the application from the NJ DOT website		
	Amounts			
	Annual Total	\$2.2 M	Typical Allotments	Up to \$24,000
	Website	<a href="http://www.state.nj.us/dep/parksandforests/natural/trail_grants.htm">http://www.state.nj.us/dep/parksandforests/natural/trail_grants.htm</a>		



Delaware and Raritan Canal State Park received RTP funding for trail equipment and access improvements for Port Mercer. Photo Credit: DVRPC

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<b>Bikeway Grant Program</b>	<b>Program Administrator</b>		<b>Funding Type</b>	<b>Deadline</b>
	New Jersey Department of Environmental Protection		Federal	February
	<b>Summary</b>		<b>Types of Projects</b>	
	Funds projects that promote bicycling as an alternative mode of transportation. <b>20% match is required</b>		Priority is given to construction of new bike paths, however, the proposed construction or delineation of any new bicycle facility will be considered.	
	<b>Application Process</b>			
	<b>Who can apply?</b>		Federal, state, county, and local governments; Nonprofit organizations	
	<b>Process</b>		Apply to the program via New Jersey's SAGE website	
	<b>Amounts</b>			
<b>Annual Total</b>	<b>\$2.2 M</b>	<b>Typical Allotments</b>	<b>Up to \$24,000</b>	
<b>Website</b>		<a href="http://www.state.nj.us/transportation/business/localaid/bikewaysf.shtm">http://www.state.nj.us/transportation/business/localaid/bikewaysf.shtm</a>		



The Middle Township Bike Path in New Jersey's phases 4 and 5 used Bikeway Grant Program funding. Photo Credit: Kevin Marriner

Program	Funding	Program Administrator	Deadline	Annual Total	Typical Allotments	Eligibility					
						Construction	Planning	Other	Municipalities	Counties	Other
TIGER	Federal	USDOT	May	\$600 M	\$1 M - \$20 M						
Municipal Aid	State	NJDOT	Sep	\$78.75 M	\$150,000- \$1 M						
County Aid	State	NJDOT	Feb	\$78.75 M	1.6 M - 6.6 M						
Local Aid (LAIF)	State	NJDOT	Rolling	\$5.3 M	\$43,000 - \$450,000						
Local Bridges, Future Needs	State	NJDOT	Feb	\$21 M	\$250,000 - \$1 M						
Transit Village	State	NJDOT	Sep	\$1 M	\$45,000 - \$295,000						
Green Acres Program	State	NJDEP	Feb	\$57 M	\$300,000 - \$975,000						
Municipal Park Development	County	County	Jun	\$5 M	250,000						
Sustainable Jersey	Other *	Sust. Jersey	Jan	400,000	\$2,000 - \$20,000						
National Highway System											
Surface Transportation Program	Federal			10.1 B							
Hazard Elimination Program											
Private Foundation Funding	Other *	Varies	Varies	Varies	Varies						
Other Sources	Other *	Varies	Varies	Varies	Varies						

**OTHER PROGRAMS**

In addition to the programs discussed on the previous pages, a variety of other sources can be used to fund pedestrian, bicycle, and trail projects. For more information, visit the websites of the respective programs.

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PHOTO CREDIT: DVRPC



# CHAPTER 5: conclusion

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## Chapter 4: Conclusion

### Conclusion

The creation of an expanded bicycle and pedestrian network in downtown Trenton has the potential to provide an abundant and diverse range of new possibilities for the city and its residents. As mentioned in the plan, this network can provide above all else, continuity. Creating a safe and dense network of bicycle and pedestrian linkages to transportation hubs and places of interest, this plan seeks to help provide Trenton with a truly multi modal transportation system that can serve as a backbone for a reinvigoration of downtown. The plan also serves as a piece that other city-wide bike, pedestrian, and transit plans can build from in order to further expand and enhance the network. In supporting a density of infrastructure, Trenton is making walking and cycling a both practical and convenient means of transportation

in Trenton that shows a commitment to improving the city's overall quality of life. When examining the existing conditions of this report, issues of mobility, health, and employment are of critical concern to the city of Trenton. High levels of obesity, for example, show a need for improved access to healthy food options and exercise, while low levels of personal car ownership and high unemployment suggest that affordable and connected means of gaining access to transportation, such as biking and walking, could be vital to improving the life chances of a large segment of the city's population.

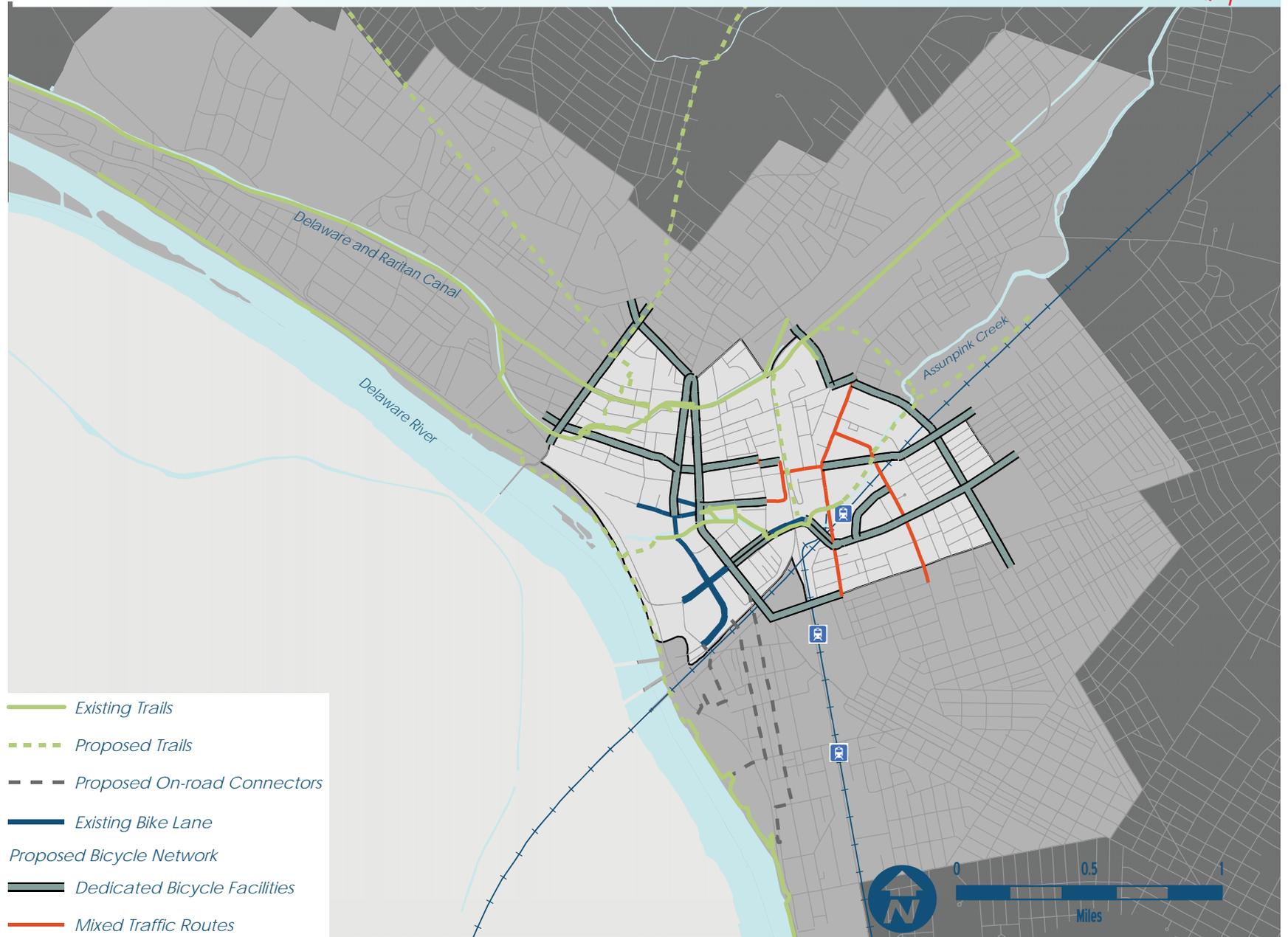
This plan also highly recommends the development and unearthing of several trail systems to enhance bicycle and pedestrian connectivity. The Delaware and Raritan trail, for example, represents a right of way with great potential, yet its lack of a formalized path, locked gates, and unlit segments,

leave it often overlooked or deemed unsafe by passersby. Developing these trails (as well as other infrastructure throughout the city) with fully realized bike and pedestrian infrastructure can provide more foot and bike traffic, putting more eyes on the street and an enhanced feeling of safety in places that previously might not have been.

This plan, overall, will support an enhancement of safety, greater connectivity and sense of place in Downtown Trenton. Road diets will slim down oversized and unsafe intersections, while bike lanes and pedestrian infrastructure will reemphasize to motorists that bicyclists and pedestrians have a right to the road. This infrastructure has the potential to create new transportation connections, shorten commutes, and open up job opportunities. More foot and bicycle traffic throughout the day and week can improve health and enhance a feeling of safety, while providing better outcomes for local businesses and real estate. Lastly, a more involved community planning process can help Trenton's bicycle community continue to blossom and hold greater stake in its development and expansion.

FIGURE 19: Complete Existing and Proposed Active Transportation Network

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Sources: NJDOT, DVRPC, Mercer County, City of Trenton.

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