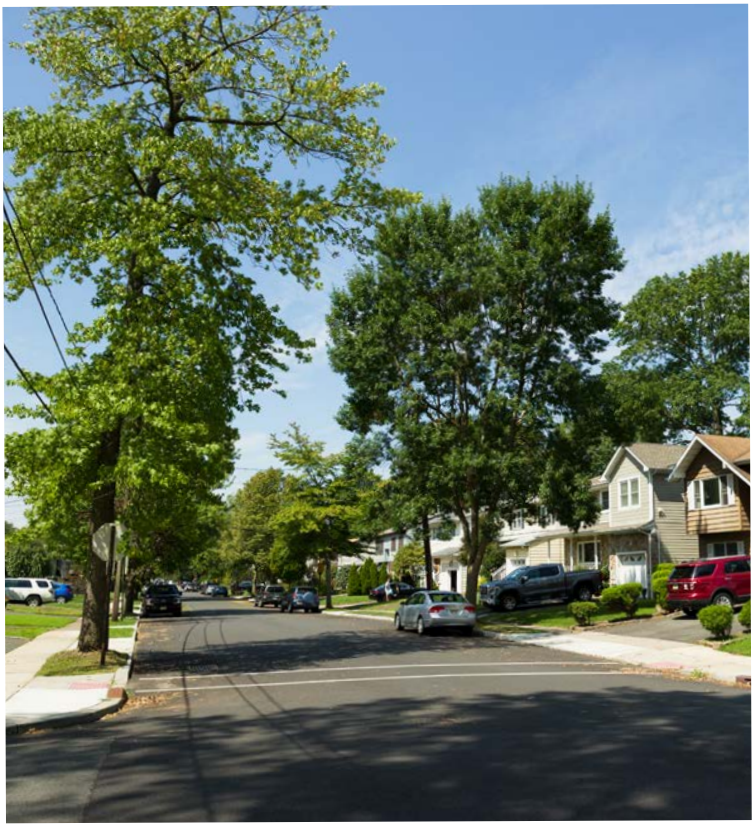
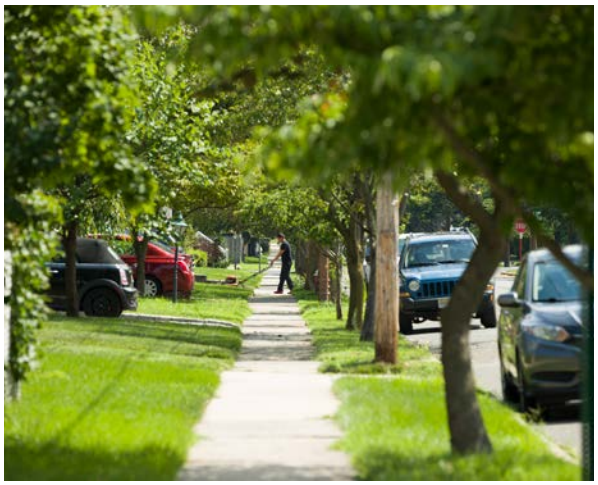


# Bicycle Network Plan

## Borough of Garwood, Union County, NJ

2020

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## About the Report

This report has been prepared as part of the North Jersey Transportation Planning Authority (NJTPA) Complete Streets Technical Assistance Program, with financing by the Federal Transit Administration and the Federal Highway Administration of the U.S. Department of Transportation. This report is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or its use thereof.

The report was authored by Aashna Jain, James Sinclair and Charles T. Brown of the Alan M. Voorhees Transportation Center (VTC) at Rutgers, The State University of New Jersey, and reviewed by Sustainable Jersey and the NJTPA.

## The Alan M. Voorhees Transportation Center

The Alan M. Voorhees Transportation Center (VTC) is a national leader in the research and development of innovative transportation policy. Located within the Edward J. Bloustein School of Planning and Public Policy at Rutgers University, VTC has the full array of resources from a major research university on transportation issues of regional and national significance.

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The North Jersey Transportation Planning Authority (NJTPA) is the federally authorized Metropolitan Planning Organization for 6.7 million people in the 13-county northern New Jersey region. Each year, the NJTPA oversees more than $2 billion in transportation improvement projects and provides a forum for interagency cooperation and public input. It also sponsors and conducts studies, assists county planning agencies, and monitors compliance with national air quality goals.

**North Jersey Transportation Planning Authority**
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## Acknowledgments

The authors of this report would like to extend special thanks to Mayor Sara Todisco; Borough Administrator/ Borough Clerk Christina Ariemma; Police Chief James H. Wright; and Borough Engineer Michael Disko for making this project possible. The team would also like to thank all those who participated in the online webinar and were able to provide their valuable insights into the study area. The team is also thankful to NJTPA for some of the photos used in this report. Lastly, Rutgers graduate students Deja Dennis, Maxim Gladkiy, and Jiajia Jiayu Zhou provided support in the preparation of this report.

# Table of Contents

# Executive Summary

*Complete Streets are streets designed for all users, all modes of transportation, and all ability levels. They balance the needs of drivers, pedestrians, bicyclists, transit riders, emergency responders, and goods movement based on local context.*

**-State of New Jersey Complete Streets Design Guide**

The Borough of Garwood, New Jersey, participated in the North Jersey Transportation Planning Authority (NJTPA) Complete Streets Technical Assistance (CSTA) Program in 2020. The CSTA Program selected eight municipalities to receive up to $10,000 in technical assistance to advance complete streets projects. This report identifies several potential infrastructure improvements to create a safe and attractive bicycle corridor along Center Street, Walnut Street, Second Avenue, Spruce Avenue, Fourth Avenue, and Pine Avenue in Garwood. Center Street is a major thoroughfare that connects to most of the amenities in Garwood, including the Garwood Train Station, Lincoln Public School, Garwood Public Library, Unami County Park, and the downtown. Coupled with Walnut Street (an extension of Center Street) and the rest of the streets, the proposed bicycle corridor connects residential neighborhoods as well as educational, business, and recreational destinations.

The recommendations in this report were developed using a collaborative process with municipal stakeholders to identify existing conditions that pose obstacles to safe bicycle travel and develop practical solutions that enhance safety for all roadway users. They include conceptual plans and reference images that show what a variety of completed projects could look like if installed. Municipal officials may use these plans and images to facilitate discussions with the public and to assist in moving the project from concept to reality. Most of the recommendations can be implemented through a reallocation of roadway space using new striping and signage. As such, the municipality can implement these improvements quickly and at a relatively low cost. Aside from facilitating bicycle travel, many of the recommendations aim to improve overall traffic safety by addressing speeding and improving pedestrian crossings. While the recommendations focus on the selected six streets, the same principals of connectivity apply to other municipal-owned roads in Garwood.

In addition to the CSTA Program, which advises communities on engineering improvements, the NJTPA also has a pedestrian safety education program, Street Smart NJ, which provides resources for communities to improve safety through education and enforcement. Street Smart NJ aims to raise awareness of New Jersey's pedestrian-related laws and change the behaviors that contribute to pedestrian-vehicle crashes. Appendices to the report include additional information on Street Smart NJ and funding opportunities.

*Figure 1. Lincoln Public School on Second Avenue, in Garwood.*

# Background

The NJTPA created the CSTA Program in 2018 to assist municipalities in advancing or implementing complete streets, a need identified by the Together North Jersey (TNJ) consortium. TNJ was created in 2011 to develop the first comprehensive plan for sustainable development for North Jersey. Sustainable Jersey (SJ) and the Alan M. Voorhees Transportation Center (VTC) at Rutgers University were retained to provide technical assistance for this program. In its first year, the program successfully supported nine municipal governments seeking to implement complete streets in their communities. This report is part of year two of the CSTA Program, in which eight additional municipalities were selected to receive technical assistance. Municipalities were chosen for the program based on the following criteria: the need for technical assistance; commitment to project implementation; opportunity for public engagement; the strength of their respective municipal teams; and the project's potential effects on Environmental Justice (EJ) populations.

Garwood is a small town in Union County bisected by the NJ TRANSIT Raritan Valley Line and two major roads – NJ Route 28 (North Avenue) and County Route 610 (South Avenue). Center Street is the only street in the borough that crosses the rail line, North Avenue and South Avenue. It connects to most of the borough's amenities, including Garwood Train Station, Lincoln Public School, Garwood Public Library, and Unami County Park, all of which are attractive bicycle destinations. Additionally, the borough is bordered by Westfield and Cranford townships, and sees a lot of cut-through traffic from these areas on its east-west streets, especially during peak hours when North and South Avenues are congested.

Despite its small size, favorable terrain, and connectivity to attractive bicycle destinations, Garwood does not have any on-road bicycle infrastructure. In late 2019, the municipality applied for assistance under the CSTA Program to identify opportunities to implement complete streets projects aimed at incorporating safe bicycle infrastructure within the borough. During the project kick-off meeting held virtually on April 29, 2020, municipal officials identified six streets—Center Street, Walnut Street (an extension of Center Street north of North Avenue), Second Avenue, Spruce Avenue, Fourth Avenue, and Pine Avenue—that will link the borough's residential neighborhoods to bicycle destinations throughout the municipality. In particular, the borough expressed concern about heavy vehicular traffic and speeding, the absence of safe bicycle infrastructure and an overall need for traffic calming.

The recommendations in this report were developed based on an initial analysis of the traffic conditions along the selected corridor—including street widths, traffic speeds, and surrounding land uses—and feedback from a virtual public meeting with municipal staff and stakeholders that took place on August 10, 2020. The meeting included a presentation on complete streets and bicycle infrastructure followed by an opportunity for the community to comment on initial design concepts. The project team used feedback collected during the meeting to finalize the recommendations compiled in this report.

*Figure 2. A bicyclist on Spruce Avenue, in Garwood.*

## What is a Complete Street?

Complete streets are roads designed for all users, all modes of transportation, and all ability levels (Figure 3). They balance the needs of drivers, pedestrians, bicyclists, transit riders, emergency responders, and goods movement based on the local context. Complete streets should tailor to the specific needs of the surrounding environment. A school zone, for instance, may require reduced speed limits, narrower travel lanes, and wider sidewalks to achieve a safer setting for students. Meanwhile, streets along transit routes will incorporate the needs of bus and rail commuters by installing benches, shelters, and enhanced lighting and signs.

Regardless of the context, complete streets should be designed to improve safety for pedestrians and bicyclists who are the most vulnerable road users. Reduced speed limits, raised medians, and other design elements can help create a safer environment for seniors, children, and people with disabilities.

To put traffic speeds into perspective, a 10 mph reduction in vehicle speed dramatically decreases the chance of pedestrian fatalities in a collision. The U.S. Department of Transportation (USDOT) cites collisions in which pedestrians are struck by a vehicle traveling 40 mph as being fatal 85 percent of the time. Comparatively, at 30 mph, pedestrian fatality rates drop to 45 percent, and down to five percent at 20 mph (Figure 4 and Figure 5). Complete streets recognize that all users of the transportation network, whether traveling by car, bus, train, or taxi, become a pedestrian at some point during their journey. Creating a safer environment benefits everyone.

*Figure 3. A complete street, as seen in New Brunswick, New Jersey. No two complete streets are alike, as they should always reflect the context of the street and the character of the community.*

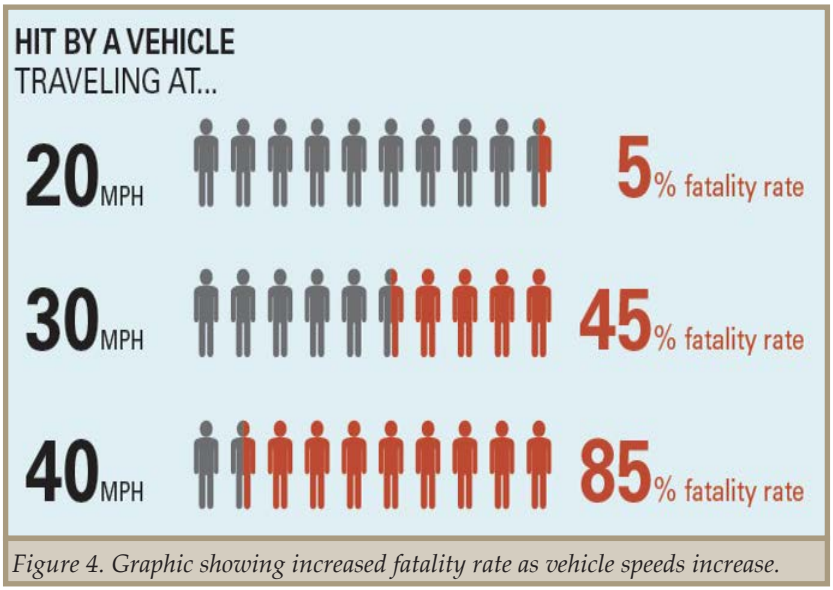



*Figure 4. Graphic showing increased fatality rate as vehicle speeds increase.*

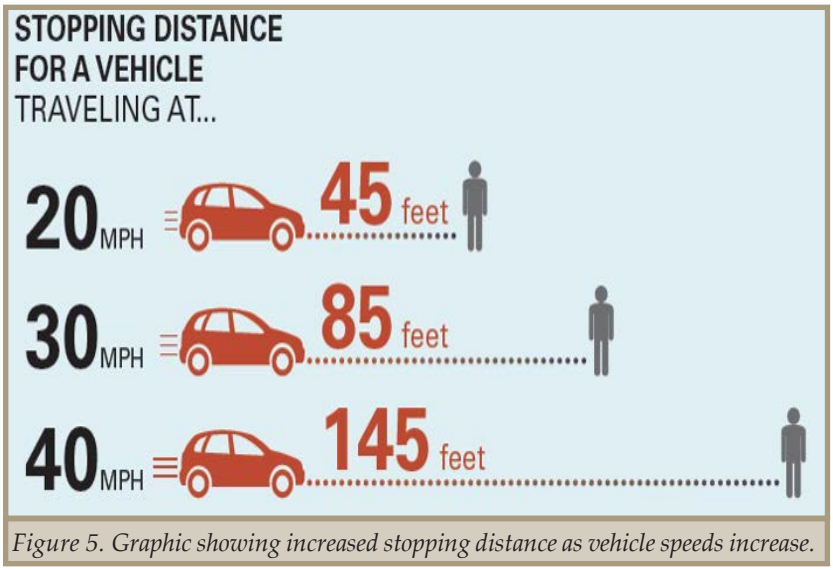



*Figure 5. Graphic showing increased stopping distance as vehicle speeds increase.*

# Benefits of Complete Streets

While the primary benefit of complete streets is improved safety for all roadway users, there are other positive outcomes. Complete streets create better places to live, work, and do business. These benefits include mobility, equity, health, quality of life, economic vitality, and environmental health.

## Mobility

Creating or enhancing multi-modal transportation options expands mobility opportunities for everyone, including nondrivers, youth, and senior citizens (Figure 6). In turn, increased mobility improves access to jobs and services, which is crucial for people who cannot afford or choose not to own a car, as well as those who are unable to drive due to a disability or their age.

*Figure 6. When a street lacks accessible sidewalks and ramps, it is not complete.*

## Equity

Complete streets help decrease the necessity of the automobile for access to opportunity. Transportation costs comprise a significant portion of a household budget, approximately 20 percent in the United States. Much of this is due to the high cost of automobile ownership, including insurance, fuel, maintenance, registration fees, and financing. However, household transportation costs drop to just 9 percent in communities with improved street connectivity and accommodations for other modes.

Connected communities allow residents to use less energy and spend less money to get around, allowing for fewer car trips and the use of other less expensive modes of transportation like bicycling, walking, or public transit. Providing a variety of transportation choices across different price points allows families to free up more money for housing or other needs.

*Figure 7. Trails, such as this one in Monroe, New Jersey, can encourage exercise and lead to improved health.*

## Health

Complete streets enhance opportunities for increased walking and bicycling which in turn leads to the numerous health benefits associated with increased physical activity. The Center for Disease Control (CDC) supports complete streets to combat obesity (Figure 7).

## Quality of Life

Livable, walkable communities diminish the need for automobiles. Walking or bicycling around town creates a sociable environment, fostering interactions between family, friends, or clients and increasing community involvement. These interactions, in turn, entice users to enjoy the surroundings they would otherwise ignore in a car. A reduction in vehicle use can also increase the quality of life thanks to reductions in noise and stress associated with congestion and crashes (Figure 8).

*Figure 8. Complete Streets in Asbury Park help foster a lively social environment.*

## Economic Vitality

Improving streetscapes revitalizes business districts. Complete streets generate more foot traffic when they create great places where people want to be, which can encourage both residents and visitors to spend more money at local shops and restaurants that they may have driven past before. Such is the experience in Somerville, New Jersey, where one block of Division Street was converted to a pedestrian plaza. The area witnessed a sharp decline in vacant commercial properties; vacancy dropped from 50 percent to zero after the plaza was developed (Figure 9).[1]

*Figure 9. Division Street in Somerville was converted into a pedestrian plaza that has become a popular gathering space.*

## Environmental Health

By reducing automobile use, complete streets can contribute to cleaner air. Additional sustainable design elements installed along complete streets can also bring other environmental benefits. For example, landscape improvements (green streets) can reduce impervious cover, reduce or filter stormwater runoff, and contribute to water quality improvement (Figure 10).

*Figure 10. Green infrastructure used to narrow the roadway and provide a shorter crossing distance for pedestrians.*

## Complete Streets in New Jersey and Garwood

New Jersey is a national leader in the complete streets movement. In 2009, NJDOT was among the first state departments of transportation (DOTs) in the nation to adopt an internal complete streets policy. In 2010, the National Complete Streets Coalition ranked that policy first among 210 state, regional, county, and municipal policies nationwide. Since 2009, NJDOT has funded five Complete Streets Summits, and over a dozen local, regional and statewide in-person and online educational workshops intended to disseminate the latest information about complete streets to planners, engineers, elected officials, and advocates. In 2017, NJDOT released the *New Jersey Complete Streets Design Guide* to inform New Jersey communities on how to implement complete streets projects. In 2019, NJDOT released the *Complete & Green Streets for All: Model Complete Streets Policy and Guide* to serve as a new resource for local best practices in policy language. One of the positive outcomes of these efforts is that communities of all sizes throughout the state have joined NJDOT in adopting complete streets policies. Of New Jersey's 21 counties, eight have adopted complete streets policies. Additionally, 167 municipalities have implemented complete streets policies affecting 3.8 million (44 percent) of the state's residents (Figure 11).[2]

However, neither Union County nor Garwood have passed a complete streets policy to date.

1. "Complete Streets Case Study: Somerville, New Jersey," Alan M. Voorhees Transportation Center, 2016.
2. New Jersey Bicycle and Pedestrian Resource Center, "NJ Complete Streets Policy Atlas," 2018. https://njbikeped.org/ complete-streets-2/.

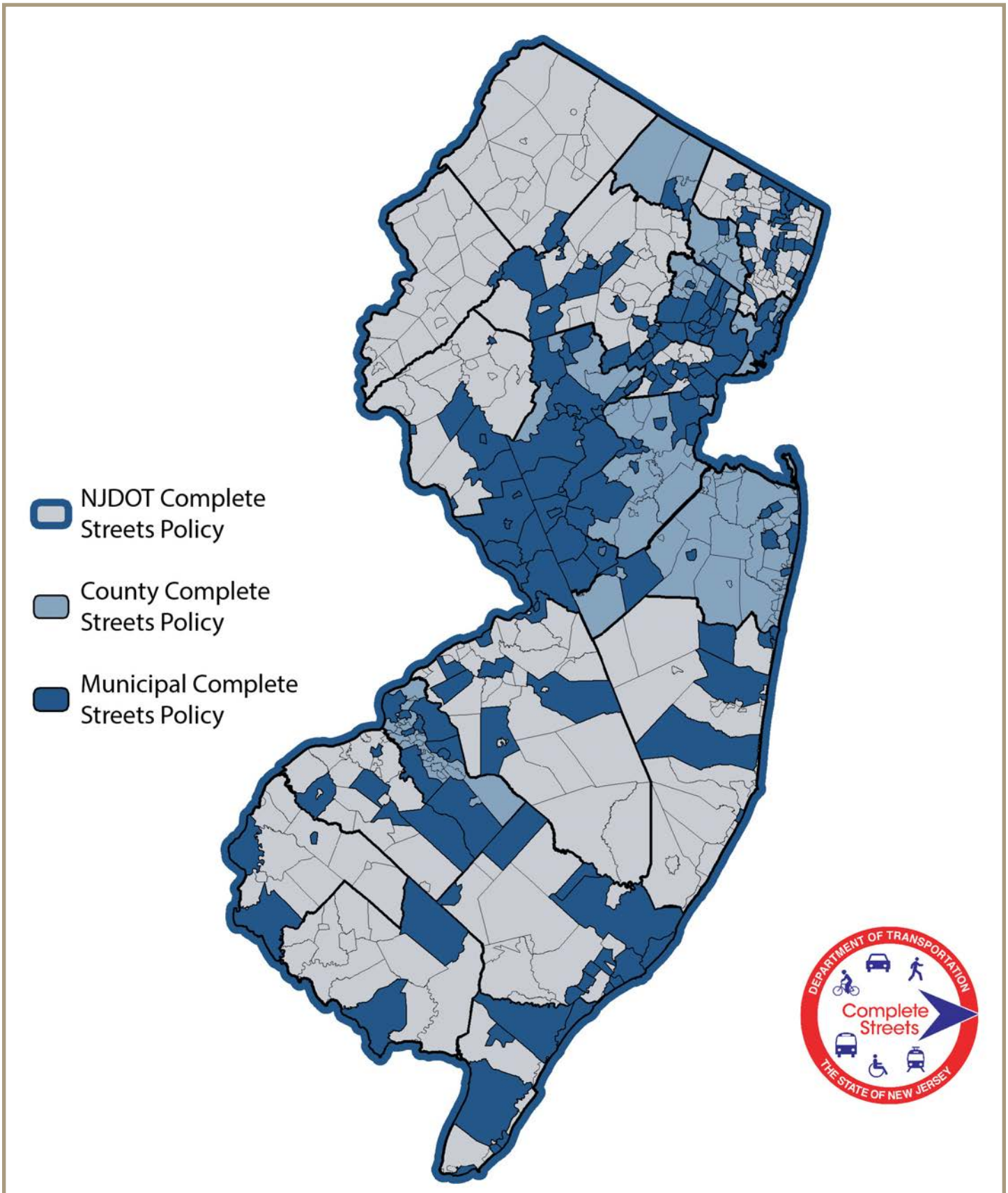



*Figure 11. Complete Streets Policies in New Jersey, as of October 15, 2020. Visit http://njbikeped.org/services/complete-streets-policy-compilation/ for a constantly updated list of policies.*

## Study Area Location

Garwood is the second smallest borough in Union County with an area of 0.66 square miles. It has about 4,334 residents with a population density of 6,567 people per square mile, 22.1 percent higher than the county. The median age of its residents is 39.3, and 41 percent of its population has a college degree. The borough has a 59.8 percent homeownership rate and an estimated median household income of $84,896, which is 10.1 percent higher than the county. Less than 5 percent of its population lives under the poverty line, compared to 9.8 percent in the county. About 80.8 percent of its population identifies as Non-Hispanic White, which is significantly higher than the county where 40.3 percent of the residents identify as Non-Hispanic White (US Census Bureau, 2018).

Few households in Garwood do not have a car: only 5.9 percent compared to 11.6 percent in the county. Nonetheless, a significant share of workers bicycle (1.8 percent) and walk (4.7 percent) to work compared to the county, where only 0.2 percent bicycle and 2.8 percent walk. Additionally, about 73.7 percent of commuters drive alone to work, 4.8 percent carpool, and 10.9 percent use public transit. A significant majority of these workers (95.8 percent, or 2,321 people) are employed outside the borough and work in Union (35.8 percent), Middlesex (11.2 percent), and Essex (11.0 percent) counties. Interestingly, an approximately equal number of people (2,305 people) from outside the borough commute into Garwood for work (US Census Bureau, OnTheMap, 2018).

The NJ TRANSIT Raritan Valley Line serves the Borough of Garwood, providing service to Newark Penn Station with stops in Hunterdon, Somerset, and Essex counties. The rail line runs through the borough in an east-west direction, dividing it into two parts with similar size and land use patterns (Figure 14 and Figure 12). Additionally, two major roads – NJ Route 28 (North Avenue) and County Route 610 (South Avenue) – traverse through the borough alongside the rail line to its north and south, respectively. Garwood's businesses are concentrated in this part of the town around North and South Avenue. The borough has also begun to see new developments focused around transit, walking, and bicycling along these two roads (Figure 13).

*Figure 12. NJ Transit Raritan Valley Rail line that divides Garwood.*

*Figure 13. A new mixed-use development under construction on South Avenue, in Garwood.*

NJ TRANSIT also serves Garwood via bus routes 113 and 59, both of which have several stops along North Avenue and are commonly used by the borough's transit users for service to New York, Newark, and other New Jersey municipalities.

The borough shares its border with Cranford and Westfield Townships and sees a lot of through traffic from these towns on North and South Avenue, especially during peak hours. Municipal officials have noted that the borough's east-west residential streets—particularly Second Avenue, Fourth Avenue, Spruce Avenue, and Pine Avenue—experience high volumes of cut-through traffic during this time.

Center Street is the only street in Garwood that provides access across the railroad tracks, connecting the borough's northern and southern sections. It is one of the most heavily used roadways in the municipality. It extends from the southern end of the borough to North Avenue and provides access to most of its amenities, including the Garwood Train Station, Garwood Municipal Building, Post Office, Unami County Park, and the borough's commercial district. Additionally, Lincoln Public School and Garwood Public Library are located just a block north of North Avenue on Walnut Street.

In its application, the borough identified Center Street and Walnut Street as essential components of the bicycle corridor network plan as they provide connections to most of Garwood's recreational, educational, and institutional amenities (Figure 14). For east-west connectivity, the borough identified Second Avenue, Spruce Avenue, Fourth Avenue, and Pine Avenue. The proposed corridor covers the entire length of these streets within the municipality. The borough identified Second Avenue as the first priority as it provides access to the public school and library, and experiences heavy congestion and gridlock during school opening and closing hours. Spruce Avenue was prioritized second as it links to the Garwood Church and Garwood Sports/Recreation Complex. Overall, the proposed network will provide continuous bicycle facilities that extend throughout the municipality, connecting to both residences and amenities. It will also benefit transit users who take the bus/train from North Avenue or Center Street.

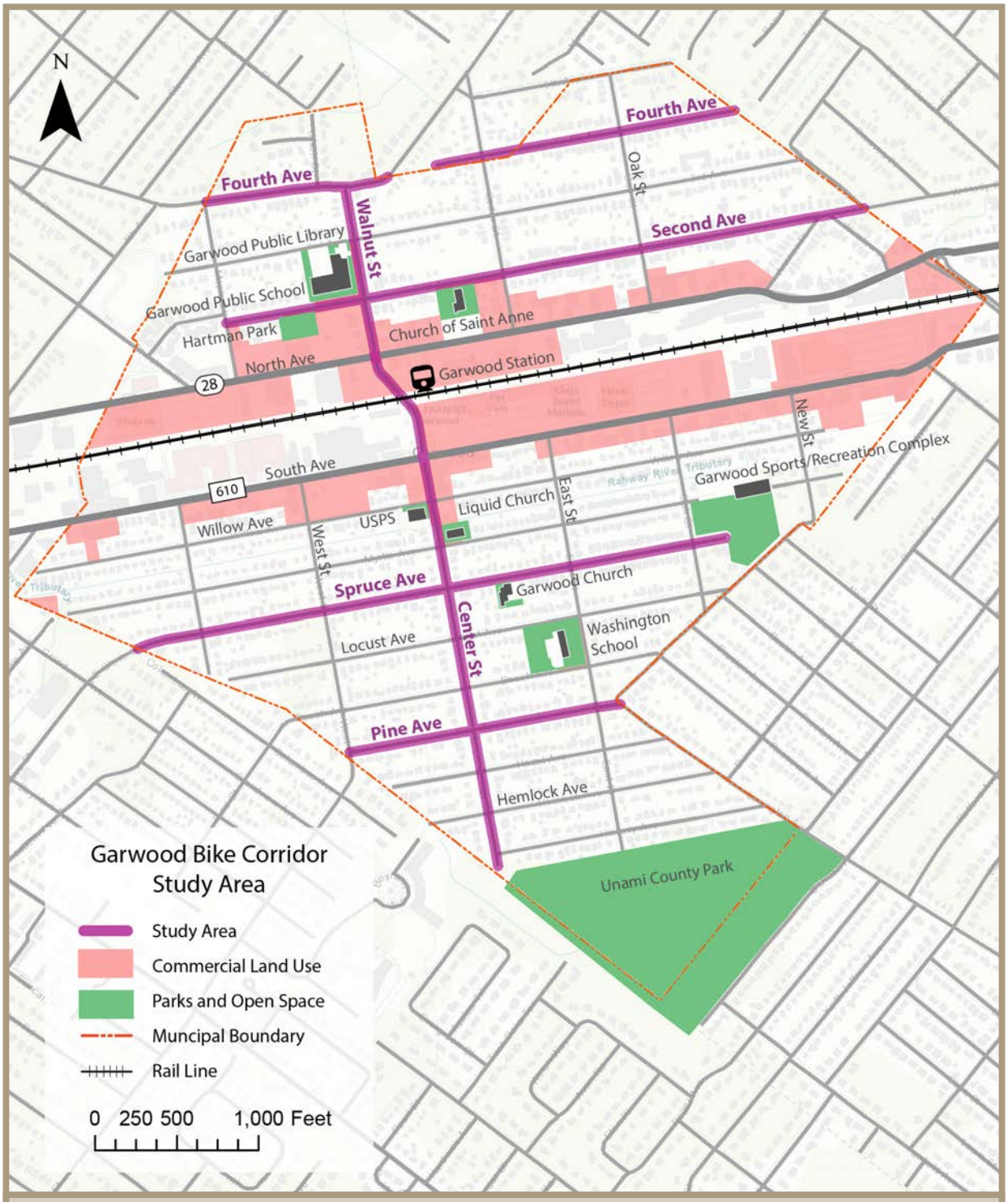



*Figure 14. Garwood Bicycle Corridor Study Area.*

## Assessment of Need

Despite its small size, favorable terrain, and connectivity to attractive bicycle destinations, Garwood does not have any on-road bicycle infrastructure (i.e. signs, signals, and lanes). While sidewalks exist and are generally continuous along the corridor, in most parts, they are too narrow for bicyclists and pedestrians to share (Figure 15). As such, the absence of safe bicycle infrastructure presents a safety challenge for bicyclists due to heavy traffic and speeding along the corridor. Center Street, one of the main streets in the study area, is the most heavily traveled roadway in the borough with two heavily used intersections at North and South Avenues (Figure 16). Garwood's crash data from 2015 to 2019 shows that the study corridor accounted for 11 (55 percent) of the 20 bicycle and pedestrian crashes, with about 7 of these crashes occurring within 100 feet of Center Street.

Garwood officials also noted the need for traffic calming measures to manage speeding and cut-through traffic in the municipality. The speed limit in the study area is 25 mph, but Garwood Police Department's traffic logs show that speeding is a problem along the corridor. Incorporating safe bicycle infrastructure and traffic calming measures would minimize problematic driving and encourage residents to bicycle to potential destinations in the borough.

On April 29, 2020, the project team conducted a virtual meeting with representatives from the municipality. During this meeting, the team examined the existing conditions and discussed the barriers that bicyclists face along the corridor with the assistance of Google Street View and gathered feedback from Garwood officials. Following the meeting, Garwood Police Department shared extensive traffic data for the selected corridor, which helped the project team better understand the study area.

*Figure 15. Pedestrians on a narrow sidewalk, in Garwood.*

*Figure 16. Bicyclists crossing through the Center Street at North Avenue intersection.*

## Data

### Traffic

The Garwood Police Department has compiled extensive information on traffic counts in the study area. The data indicates that Center Street is the most heavily traveled roadway in the area with an average annual daily traffic (AADT) volume of 2,896 to 3,119 vehicles in either direction (Table 1). Fourth Avenue is the second most heavily used roadway in the study area with an AADT volume of 2,097 to 2,269 vehicles in either direction, while the AADT volume for the rest of the roads ranges between 997 and 1,432 vehicles in either direction. These figures can help determine appropriate bicycle improvements for the corridor. For example, the *New Jersey Complete Streets Design Guide* recommends that bicycle boulevard treatments are not appropriate on roads seeing over 2,500 vehicles per day.

### Speed

Garwood Police Department's traffic logs provide detailed information on vehicular speeds in the study area. This includes 85th percentile speeds, which is the design speed at or below which 85 percent of all vehicles

are observed to travel under free-flowing conditions past a monitored point. This value can help to estimate the comfort of bicyclists along the road in the context of different bicycle infrastructure options. For example, the *New Jersey Complete Streets Design Guide* recommends that dedicated bicycle lanes are more appropriate than shared-use lanes (sharrows) on roads whose 85th percentile speed is 30 mph or higher.

In general practice, posted speed limits are expected to be within 5 mph of the 85th percentile speed. According to the data, 85th percentile speed on the northbound side of Center Street ranges between 30.47 mph and 32 mph, which exceeds the posted speed limit by 5.47 mph – 7 mph (Table 2). This shows that vehicles on Center Street travel faster than expected. Additionally, 85th percentile speed on the eastbound side of Spruce Avenue is observed to be 7 mph greater than the speed limit, indicating that speeding is also a problem there.

The 85th percentile speeds for the rest of the roadways are between 25.33 mph and 30 mph, which indicates that 85 percent of the drivers on these roadways travel under 30 mph (Table 2). However, the maximum speeds data illustrates that few drivers exhibit high-risk behavior, traveling over 50 mph causing safety concerns (Table 2). Such incidents of excessive speeding appear to occur between 10 AM and 11 PM. Improvements along the roadways could make it safer for cyclists while also dissuading drivers from dangerously exceeding the posted speed limits.

*Table 1: Average Annual Daily Traffic (AADT) Volume Data for the Study Area*

| Street | Direction | Time Period | AADT Volume |
|---|---|---|---|
| Center Street | Northbound | October 2019 | 3,119 |
| | Northbound | 07/26/2017 - 08/01/2017 | 2,896 |
| | Southbound | 06/08/2017 - 06/19/2017 | 2,981 |
| Second Avenue | Eastbound | 05/11/2017 - 05/22/2017 | 997 |
| | Westbound | 01/04/2017 - 01/18/2017 | 1,181 |
| Spruce Avenue | Eastbound | May 2018 | 1,179 |
| | Eastbound | 11/28/2016 - 12/14/2016 | 1,250 |
| | Eastbound | October 2017 | 1,256 |
| Fourth Avenue | Eastbound | May 2018 | 2,162 |
| | Eastbound | 11/09/2016 - 11/20/2016 | 2,269 |
| | Westbound | 03/20/2016 - 03/25/2016 | 2,098 |
| Pine Avenue | Westbound | 07/06/2016 - 07/25/2016 | 1,432 |

Source – Garwood Police Department

*Table 2: Traffic Speeds in the Study Area*

| Street | Direction | Time Period | Average Speed | 85th Percentile Speed | Max Speed | Speed Feedback |
|---|---|---|---|---|---|---|
| Center Street | Northbound | October 2019 | 27 | 32 | 58 | No |
| | Northbound | 07/26/2017 - 08/01/2017 | 26.34 | 30.47 | 70 | No |
| | Southbound | 06/08/2017 - 06/19/2017 | 20.16 | 23.89 | 66 | Yes* |
| Second Avenue | Eastbound | 05/11/2017 - 05/22/2017 | 25.24 | 28.69 | 70 | No |
| | Westbound | 01/04/2017 - 01/18/2017 | 20.27 | 25.33 | 68 | Yes |
| Spruce Avenue | Eastbound | May 2018 | 28 | 32 | 61 | No |
| | Eastbound | 11/28/2016 - 12/14/2016 | 24.74 | 28.26 | 67 | Yes |
| Fourth Avenue | Eastbound | May 2018 | 25 | 30 | 61 | No |
| | Eastbound | 11/09/2016 - 11/20/2016 | 23.11 | 26.7 | 52 | Yes |
| | Westbound | 03/20/2016 - 03/25/2016 | 24.78 | 28.29 | 57 | Yes |
| Pine Avenue | Westbound | 07/06/2016 - 07/25/2016 | 25.23 | 28.99 | 70 | Yes |

Notes: 1) Posted speed limit in the study area is 25 mph.
2) The table excludes outlier speeds caused by leaf blowers that were identified by the Garwood police officials in the August 10, 2020 public input meeting.
* Speed feedback was displayed for some duration only.

Source – Garwood Police Department

## Crash History

NJDOT crash data from 2015 to 2019 shows that the study corridor accounted for seven (53.8 percent) of the 13 pedestrian crashes and four (57.1 percent) of the seven bicycle crashes in Garwood (Table 3). About seven of these crashes happened within 100 feet of Center Street.

Table 3 details the collisions involving pedestrians and bicyclists within the study area. It is important to note that 90 percent of the crashes along the corridor occurred within 100 feet of an intersection. This suggests that intersections are the main conflict locations that need to be addressed. The crashes appear to cluster on three intersections: Center Street at North and South Avenues, and Second Avenue at Cedar Street (Figure 17).

*Table 3: Bicycle and Pedestrian Crashes in Garwood, 2015-2019*

| Year | Crash Location | Crash Type | Severity Rating | Posted Speed Limit | Intersection | Traffic Control | Light Condition |
|---|---|---|---|---|---|---|---|
| 2019 | Second Ave, 250 feet from Cedar St | Pedestrian | Complaint of Pain | 25 | No | | Daylight |
| 2019 | West St, 50 feet from South Ave | Pedestrian | Complaint of Pain | 25 | No | | Dusk |
| 2019 | Center St, at North Ave | Pedalcyclist | Property Damage Only | 25 | Yes | Signal | Daylight |
| 2019 | Second Ave, 100 feet from Cedar St | Pedalcyclist | Moderate Injury | 25 | No | | Daylight |
| 2018 | South Ave, 215 feet from Center St | Pedestrian | Moderate Injury | 35 | No | | Daylight |
| 2018 | East St, 175 feet from Locust Ave | Pedalcyclist | Moderate Injury | 25 | No | | Daylight |
| 2018 | North Ave, 100 feet from Center St | Pedestrian | Complaint of Pain | 35 | No | | Daylight |
| 2017 | North Ave, 20 feet from Chestnut St | Pedestrian | Complaint of Pain | 35 | No | Signal | Daylight |
| 2017 | South Ave, at Center St | Pedestrian | Complaint of Pain | 35 | Yes | Signal | Daylight |
| 2017 | Walnut St, 10 feet from North Ave | Pedalcyclist | Moderate Injury | 25 | No | Signal | Daylight |
| 2017 | Oak St, at Fourth Ave | Pedestrian | Moderate Injury | 25 | Yes | | Dark (street lights on) |
| 2016 | Third Ave, 420 feet from Oak St | Pedestrian | Moderate Injury | 25 | No | | Dark (street lights on) |
| 2016 | East St, at Willow Ave | Pedalcyclist | Moderate Injury | 25 | Yes | Stop Sign | Daylight |
| 2016 | North Ave | Pedestrian | Complaint of Pain | 35 | No | | Daylight |
| 2016 | North Ave, 100 feet from Center St | Pedestrian | Complaint of Pain | 35 | No | | Daylight |
| 2016 | Spruce Ave, at West St | Pedalcyclist | Moderate Injury | 25 | Yes | Stop Sign | Daylight |
| 2015 | South Ave, 350 feet from Center St | Pedestrian | Moderate Injury | 35 | No | | Daylight |
| 2015 | South Ave, at East St | Pedalcyclist | Moderate Injury | 35 | Yes | | Daylight |
| 2015 | South Ave, at Center St | Pedestrian | Complaint of Pain | 35 | Yes | Signal | Dawn |
| 2015 | North Ave, at Cedar St | Pedestrian | Complaint of Pain | 35 | Yes | Signal | Dark (street lights on) |

Source – Safety Voyager

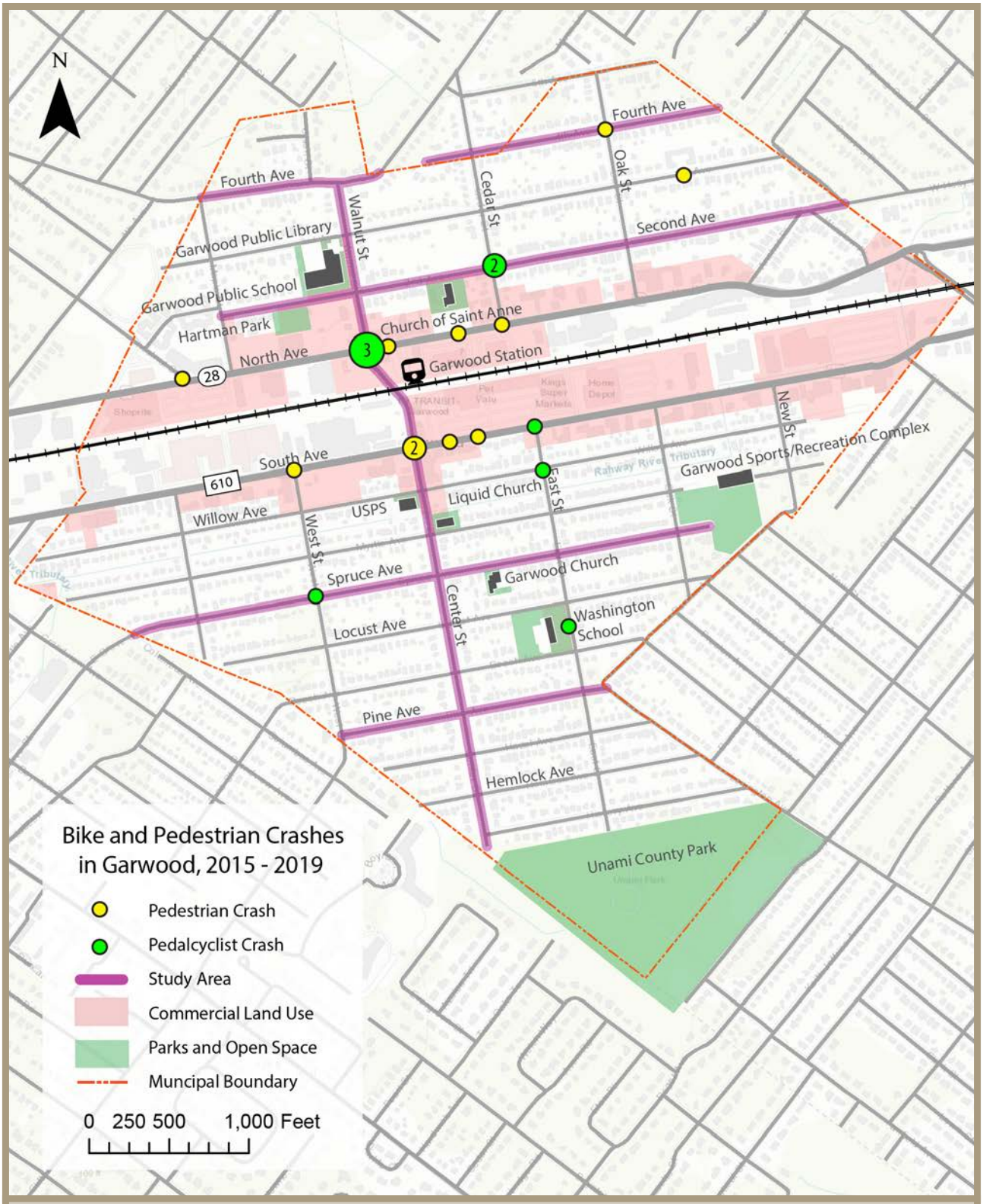



*Figure 17. Bicycle and Pedestrian Crashes in Garwood, 2015 – 2019*

## Safe Routes to School Tallies

The 2008-2009 Safe Routes to School Travel Plan for the Lincoln Public School records that 100 (30 percent) of the 333 students in Grade 1 – 8 walked to school, 20 bicycled, and 5 took a bus. However, borough officials noted that a very small number of Garwood students currently walk or bicycle to the school, so these statistics may be outdated.

# Planned Route and Recommendations

The Garwood Bicycle Network Plan includes bicycle accommodations for six streets in the borough—Center Street, Walnut Street, Second Avenue, Spruce Avenue, Fourth Avenue, and Pine Avenue—which Garwood officials prioritized in this order. Its main purpose is to enable bicycle connectivity along Center Street, link to amenities across the borough, and improve safety on roads where cut-through traffic causes heavy traffic and speeding. Though not directly addressed in this plan, many other Garwood roadways are similar to the selected streets and the recommendations in this report could be applied to those streets to provide safe bicycle accommodations with minimal changes.

## Center Street

Municipal officials identified Center Street as the highest priority street in the Garwood Bicycle Corridor Network Plan. It begins at Unami County Park near the southern border of Garwood and terminates at North Avenue, north of the rail line. As the only route that connects to Garwood's northern and southern parts, and to the train station, Center Street provides an important link for all modes: pedestrians, bicyclists, and cars.

Center Street is a 48- to 50-foot wide roadway with a 25-mph speed limit. According to the *New Jersey Complete Streets Design Guide*, dedicated bicycle lanes or shared-use paths are the most appropriate bicycle treatments for Center Street, given its AADT volume and 85th percentile speed. Between Unami County Park and North Avenue, Center Street is divided into three sections based on its changes in street profile.

*Figure 18. Looking north on Center Street south of Willow Avenue. (Photo Credits: Google Street View)*

### Center Street: South of Willow Avenue

Center Street's first section extends from Unami County Park to Willow Avenue where it is a 48-foot wide two-lane road lined by single-family homes (Figure 18). It has shoulder line markings and parking on both sides. Sidewalks are continuous, but too narrow to be shared by bicyclists and pedestrians.

South of Willow Avenue, Center Street has enough width to accommodate bicycle lanes. The current design may encourage speeding as the roadway has wide driving lanes and priority over intersecting streets.

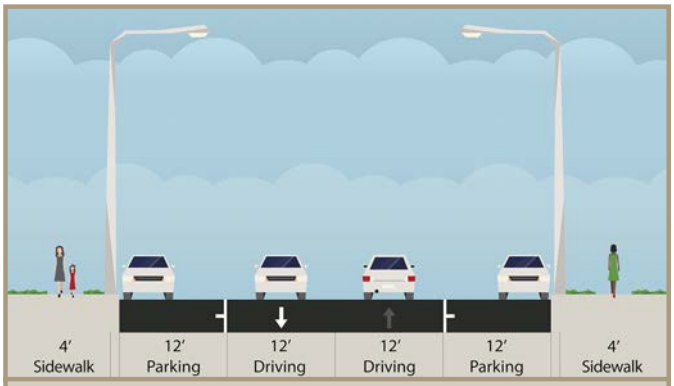



*Figure 19. Looking south on Center Street south of Willow Avenue, existing conditions.*

**Recommendation:** Restripe the roadway to create 6-foot wide bicycle lanes on both sides. While the desirable width of a bicycle lane adjacent to parking is 7 feet, this proposal exceeds the 5 foot minimum. Figure 19 and Figure 20 depict the current and proposed design for this section of Center Street. The design would narrow the existing 12-foot wide driving lanes to 11 feet, which is sufficient for the existing traffic, but will discourage speeding. According to the National Association of City Transportation Official (NACTO) *2013 Urban Street Design Guide*, "lane widths of 10 feet are appropriate in urban areas and have a positive impact on a street's

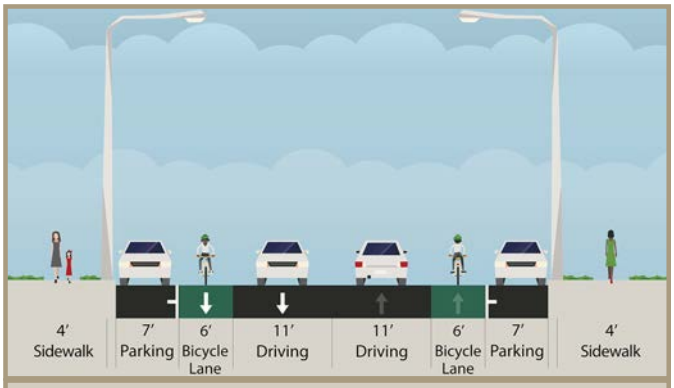



*Figure 20. Looking south on Center Street south of Willow Avenue, proposed conditions.*

safety without impacting traffic operations." Reducing the lane width would discourage speeding, which in turn will reduce the severity of crashes and increase safety.

Appropriate signage and pavement markings should be installed to improve the visibility of bicyclists and remind drivers to look for them, especially at intersections where conflicts are more likely to happen. Additionally, this section of Center Street is lined by single-family homes, many of which have driveways. The design of these driveways should consider the interaction between vehicles entering/exiting the driveways and cars parked on the street to enable clear sightlines that allow drivers to see oncoming bicyclists.

**Also Consider:** Work with Union County to connect the bicycle lanes to Unami County Park at the southern end of Center Street as it is a natural destination.

## Center Street: Willow Avenue to South Avenue

Center Street has businesses and mixed-use buildings with wider sidewalks on both sides from Willow Avenue to South Avenue (Figure 21). This section of Center Street is 50-feet wide and includes a dedicated left-turn lane at the South Avenue intersection.

With two driving lanes and a dedicated left-turn lane, it does not have the width to incorporate dedicated bicycle lanes on both sides without eliminating the parking spaces on one side. During the virtual public input meeting and through public comments, Garwood residents noted that these parking spaces are important for the surrounding businesses. As such, a long-term and short-term alternative are discussed.


*Figure 21. Looking north on Center Street, from Willow Avenue toward South Avenue.*

**Recommendation:** Install a 6-foot wide bicycle lane on the northbound side, as it experiences higher traffic volumes and 85th percentile speeds (Figure 22 and Figure 23). Narrow the two 13-foot driving lanes to 10 feet to make space for the northbound bicycle lane and improve safety by reducing opportunities for speeding.

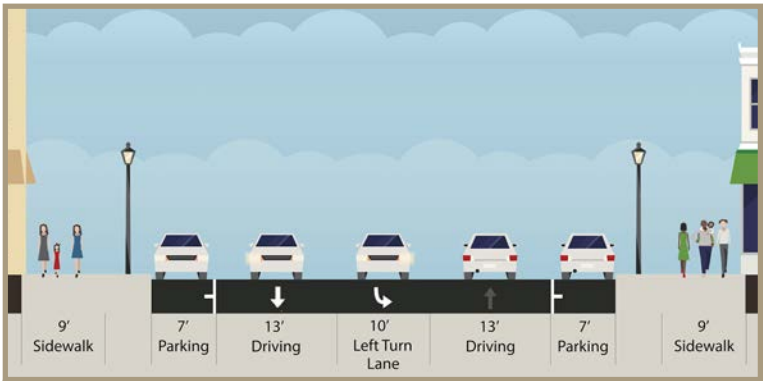



*Figure 22. Looking south on Center Street at South Avenue, existing conditions.*

On the southbound side, determine the feasibility of developing the south sidewalk as a shared-use path for both bicyclists and pedestrians, considering the pedestrian foot traffic in the area. The shared-use path should be designed for two-way movement of pedestrians and southbound bicyclists. Restricting the bicycle movement to the direction of traffic on the sidewalk would prevent the creation of extra conflicts at the adjacent intersections.

Currently, the south sidewalk has a clear width of 7.5 to 9 feet. Its design could be reimagined to obtain a clear width of 8 to 10 feet for a shared-use path. Typically, the minimum width required for a shared-use path is 10 feet; however, the *New Jersey Complete Streets Design Guide* mentions that 8-foot wide shared-use paths are acceptable for short distances when there are physical constraints.

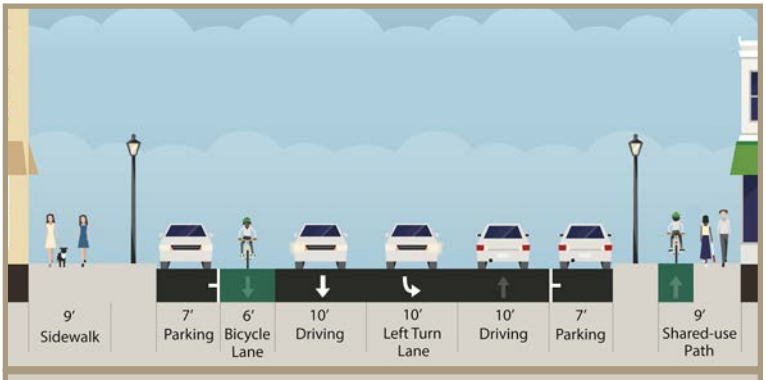



*Figure 23. Looking south on Center Street at South Avenue, proposed conditions.*

*Figure 24. A one-way bicycle lane with a walking lane in Portland. (Photo Credit: Dianne Yee)*

The shared-use path should incorporate sidewalk improvements catering to both bicyclists and pedestrians. Appropriate signage and pavement markings should be implemented to minimize bicycle-pedestrian conflicts and to remind bicyclists to be mindful of pedestrians (Figure 24 to Figure 27). Bicycle-friendly ramps, signage and pavement marking should be installed at intersections to enable bicycle access and make them more visible to drivers (Figure 28 and Figure 29).

As a short-term measure, shared-use lane markings should be installed for southbound bicyclists.

*Figure 25. Shared-use path markings (Photo Credit: Tim Potter at AASHE 2014 Conference, Portland)*


*Figure 26. Shared-use path restriction sign (Photo Credit: MUTCD)*

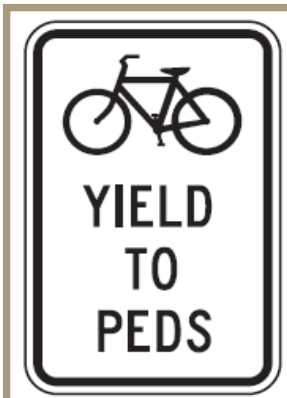



*Figure 27. Yield to Pedestrian sign (Photo Credit: MUTCD)*

*Figure 28. Curb cuts from a shared-use path across a busy road. (Photo Credit: Tim Potter at AASHE 2014 Conference, Portland)*

*Figure 29. Bicycle intersection markings from a shared-use path. (Photo Credit: Tim Potter at AASHE 2014 Conference, Portland)*

## Center Street: South to North Avenue

The third section of Center Street is a 50-foot wide four-lane road with a raised divider that goes under the railway bridge (Figure 30). It has separated sidewalks on both sides, with the north sidewalk providing access to the Garwood Train Station. This is the only section of the corridor that allows heavy vehicles over 4 tons. During the public input meeting, residents noted that the upward hill and road curvature restricts sightlines and creates blind spots under the bridge, particularly on the southbound side.

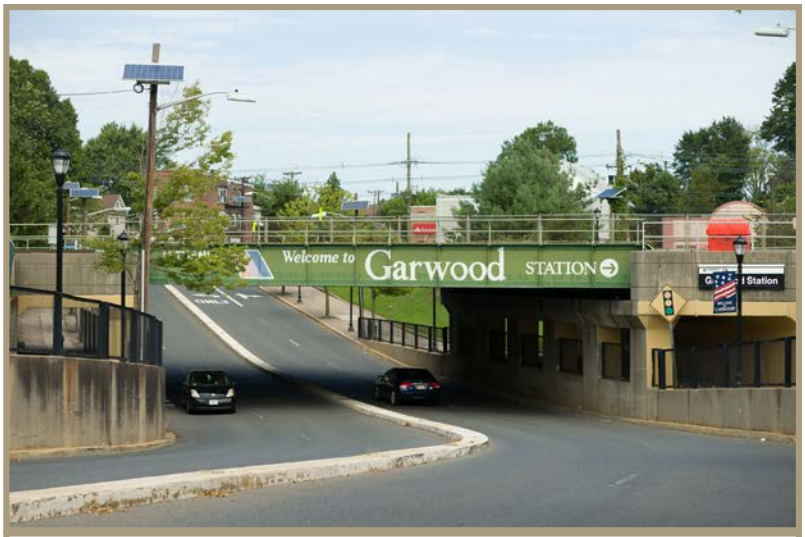



*Figure 30. Looking north towards the railway bridge on Center Street. Note the poorly lit sidewalks under the bridge.*

With two busy intersections, and connectivity to the train station and across the rail line, this section of Center Street offers the most important and challenging connection in Garwood. Improvements along the road could provide a dedicated space for bicyclists, minimize conflicts with other modes, and improve access to the train station and other locations within the borough.

**Recommendation:** Convert the separated sidewalks to shared-use paths designed for both bicycle and pedestrian use. Currently, the sidewalks on each side are about 14- to 16-feet wide with a clear width of 10 to 12 feet, which is sufficient for a shared-use path. This section of Center Street does not have the width to accommodate bicycle lanes in addition to four lanes of traffic. As it is used by over 6,000 vehicles in a day, sharing the road with traffic would be a highly undesirable alternative for bicyclists here. Instead, converting the existing sidewalks for shared-use would provide a separated, safe, and more comfortable passage for bicyclists.

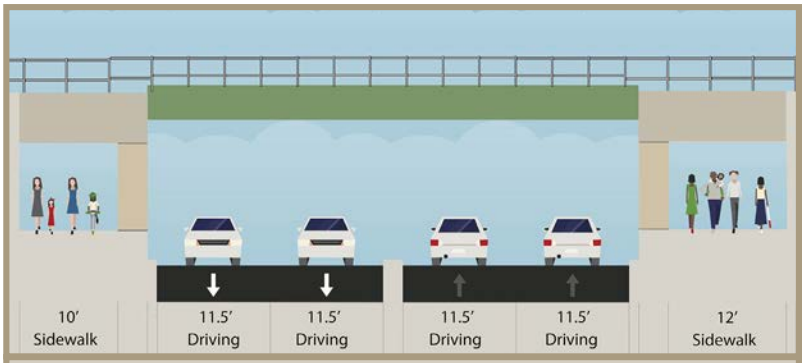



*Figure 31. Looking north on Center Street under the railway bridge, existing conditions.*

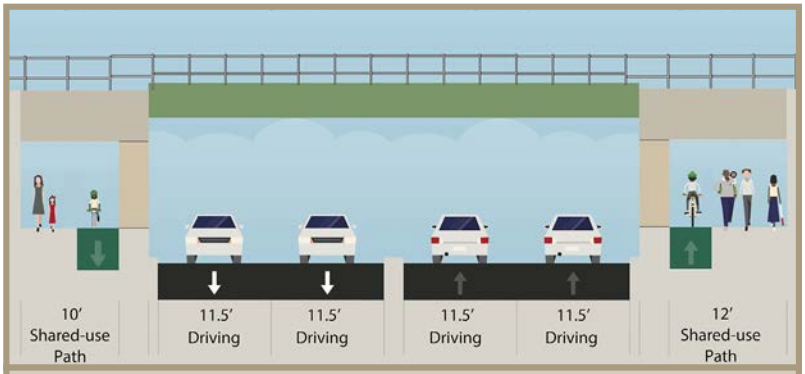



*Figure 32. Looking north on Center Street under the railway bridge, proposed conditions.*

Figure 31 and Figure 32 highlight the existing and proposed allocation of space for this section. In order to avoid creating extra conflicts at South and North Avenue intersections, it is recommended that the bicycle movement on each sidewalk be one-way in the direction of traffic. The Garwood Train Station is accessible from the northbound side of this section. As such, bicyclists heading to the train station in the southbound direction would need to walk their bicycle on the north sidewalk.

The shared-use path should incorporate bicycle and pedestrian zones demarcated by signage and pavement markings to minimize unnecessary conflicts between bicyclists and pedestrians (Figure 24 to Figure 27). As the street curves and goes uphill, appropriate signage should be installed to remind bicyclists to stay in their lane and look for pedestrians, particularly on the southbound side. Garwood should also work with the railroad bridge owner to install adequate lighting under the bridge to improve safety and visibility for everyone. Bicycle parking is also important and should be provided near the train station, and North and South Avenue intersections.


*Figure 33. Proposed improvements to the intersection of Center Street and South Avenue.*

Figure 33 shows the recommended improvements for the South Avenue intersection. Bicycle intersection markings should be installed at the intersection to provide an intuitive path for bicyclists and improve their visibility among drivers (Figure 29). Bicycle-friendly curb ramps must be incorporated to ensure that bicyclists can safely transition to the sidewalks (Figure 28). The design could also include a yield to pedestrian sign at the crossings to encourage deference to pedestrians looking to cross at the intersection (Figure 27).

Similar to the South Avenue intersection, appropriate signage and pavement markings must also be incorporated at the North Avenue intersection to improve the safety and visibility of bicyclists and reduce conflicts with pedestrians and motor vehicles.

Additionally, curb extensions could be installed at these intersections to reduce crossing distances and enhance the sidewalk space. These extensions must be designed in consideration of emergency vehicles and trucks. In the short term, the extensions can be built as a temporary installation at a low-cost using paint and signage (Figure 34).

As a long-term measure, Garwood could look into installing bicycle signals at the South and North Avenue intersections, given the traffic volume and safety needs. A new mixed-use development is underway at the northwest corner of Center Street and South Avenue. Similar projects have been proposed for both South and North Avenue, which would add to the bicycle, pedestrian and motor vehicle traffic volumes at these intersections. Installing a bicycle signal could substantially reduce conflicts between bicyclists and cars, making it safer to cross these intersections.

*Figure 34. An example of a painted curb extension in Seattle, WA.*

## Walnut Street

Walnut Street is a 38–foot wide, two-lane roadway with a 25 mph speed limit (Figure 35). At its southern end, Walnut Street ends at the North Avenue and Center Street intersection where it has a dedicated left-turn lane (Figure 36). At its northern end, Walnut Street terminates at Fourth Avenue.

Walnut Street hosts a variety of land uses, including the Lincoln Public School, Garwood Public Library, downtown businesses and single-family homes. It has parking on both sides, excluding the southbound side between North and Second Avenue, where parking is not allowed.

As an extension of Center Street and a roadway with great connectivity to the Lincoln Public School and Garwood Public Library, Walnut Street provides an important connection for residents willing to bicycle to these destinations.

**Recommendation:** Eliminate parking on the northbound side to create dedicated bicycle lanes on both sides of Walnut Street, except for on the southbound side between North and Second Avenue where it has a dedicated left-turn lane. As such, southbound bicyclists between North and Second Avenue would need to share the road with traffic. The proposed recommendation aims to enhance bicycle access to the school, especially from Center Street.

Figure 37 and Figure 38 shows the proposed design for Walnut Street south and north of Second Avenue. The minimum width for a bicycle lane adjacent to a curb is 5 feet. South of Second Avenue, the design includes changing the current 9- and 12-foot driving lanes at the North Avenue intersection to 11 feet, which will provide a standard lane space for motor vehicles heading in either direction. North of Second Avenue, the driving lanes will narrow down to 10 feet, which still allows for the existing traffic but encourages lower travel speeds.

The intersection between Walnut Street and Second Avenue provides critical access to the school. Improvements at the intersection could include lowering vehicle speeds and increasing visibility of bicyclists and pedestrians. A variety of bicycle boulevard or traffic-calming treatments such as enhanced pavement markings, curb extensions, mini-roundabouts, or raised crosswalks could be considered for this purpose. These treatments are discussed in detail in the section on Second Avenue (see Page 23 and Page 24).

**Also Consider:** Instead of dedicated bicycle lanes, shared-lane markings could also be installed at Walnut Street to preserve the parking. However,

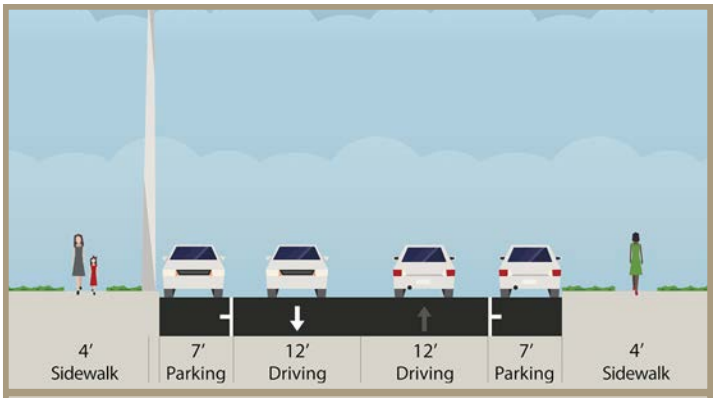



*Figure 35. Looking north on Walnut Street north of Second Avenue, existing conditions.*

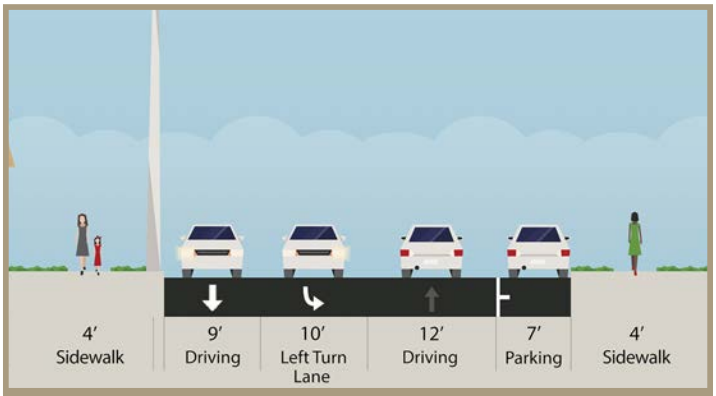



*Figure 36. Looking north on Walnut Street at North Avenue south of Second Avenue, existing conditions.*

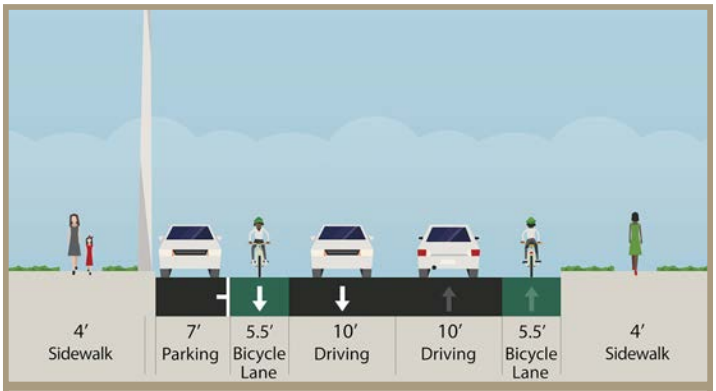



*Figure 37. Looking north on Walnut Street north of Second Avenue, proposed conditions.*

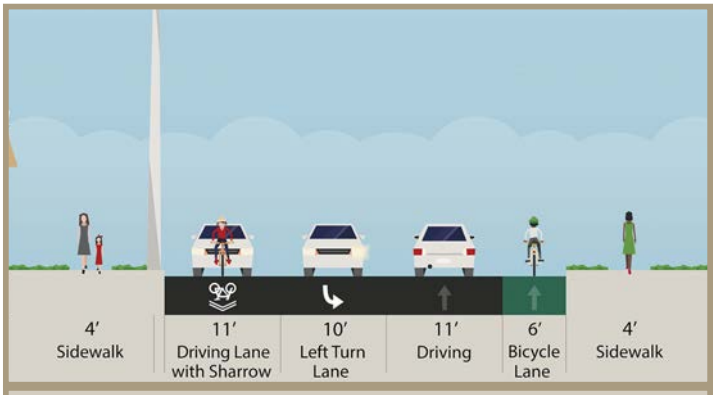



*Figure 38. Looking north on Walnut Street at North Avenue south of Second Avenue, proposed conditions.*

this treatment is less likely to encourage residents to bicycle to the school or library. If considered, shared-lane markings must be supplemented with enhanced pavement and traffic-calming measures to lower vehicle speeds and improve bicyclists' safety and visibility. These treatments are covered in detail in the following sections.

## Second Avenue

Second Avenue is a 38- to 40-foot wide roadway that expands to 54 feet in front of the Lincoln Public School (Figure 39). The speed limit is 25 mph. It begins at Maple Street and ends at West Holly Street and Gallows Hill Road at the Garwood-Cranford border. It is a two-lane road, except for the block between Maple and Walnut Streets where the Lincoln Public School is and it is one way in the westbound direction.

### Second Avenue: Maple to Walnut Street

Between Maple and Walnut Streets, Second Avenue is bordered by the Lincoln Public School, Hartman Park, and single-family homes. It is 38-feet wide, except for in front of the school where it widens to 54 feet to accommodate a drop-off zone. There is a mid-block crossing in front of the school entrance (Figure 40). It has parking on both sides, except for the side in front of the school and park.

During the public meeting, participants expressed concerns related to bicyclist safety due to heavy traffic and speeding in the area, especially during school opening and closing hours. They also identified Walnut Street and Second Avenue as a "dangerous" and "busy" intersection where drivers ran through the stop sign and did not follow instructions from the crossing guard.

Given its width, Second Avenue has the space to accommodate bicycle lanes in both directions. This can improve safety and encourage the community, especially children, to bicycle to the school and park.

**Recommendation:** Install a 6-foot wide protected bicycle lane with a 2-foot buffer in front of the Lincoln Public School (Figure 41 and Figure 42). The preferred and minimum width of a buffered bicycle lane is 5 feet and the preferred width of a buffer is 3 feet, although 1.5 feet is the minimum. The protective buffer should use a physical barrier (such as bollards, traffic cones, or plantings) in order to prevent the pick-up/drop-off traffic from encroaching into the bicycle lane. West of the school, install a 5.5 feet wide bicycle lane in each direction. It is not possible to physically separate the bicycle lane from the traffic here because of on-street parking. Figure 43 and Figure 44 shows the existing and proposed design west of the school.

*Figure 39. Looking at the Lincoln Public School from Second Avenue where it widens to 54 feet.*

*Figure 40. Mid-block crossing in front of the Lincoln Public School on Second Avenue.*

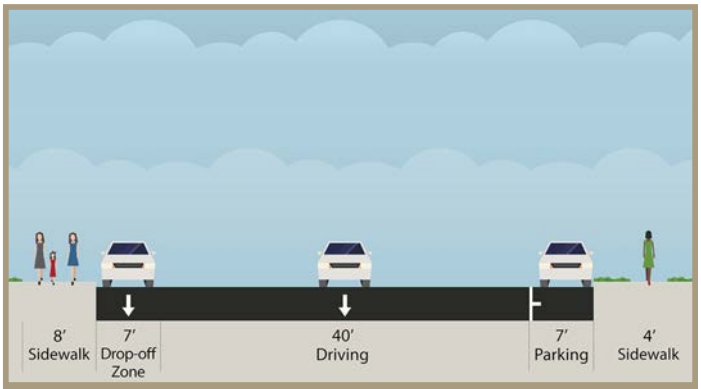



*Figure 41. Looking east on Second Avenue in front of the Lincoln Public School, existing conditions.*

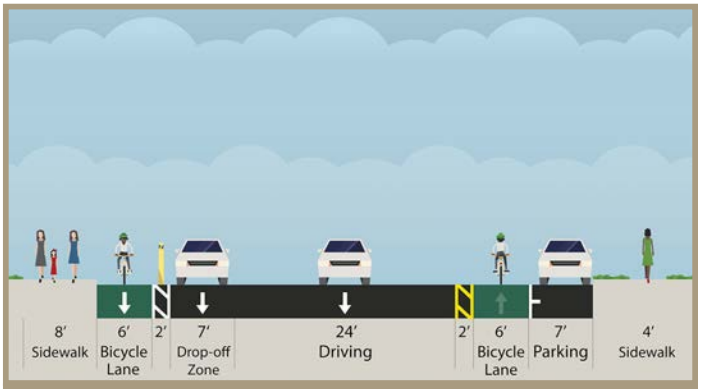



*Figure 42. Looking east on Second Avenue in front of the Lincoln Public School, proposed conditions.*

It will be critical to consider how the pick-up/drop-off traffic and pedestrians will interact with bicyclists riding to the school. The proposed design would narrow the driving space in front of the school to 31 feet, which can accommodate a 7-foot wide drop-off zone and 24 feet of driving space. This is enough space for cars to double park and pass around stopped vehicles, which can create dangerous sightline issues. While the bicycle lane is physically separated in front of the school, it is still necessary to address conflicts at the adjacent intersection and after the drop-off zone ends. Bicyclists would also need to watch for children crossing the bicycle lane to move between the drop-off zone and the school sidewalk, especially at the mid-block crossing. A potential solution to this issue could be to ask bicyclists to walk their bicycles in front of the school during the pick-up/drop-off hours. Overall, coordination with the school is essential to ensuring that the drop-off/pick-up traffic do not conflict with the bicycle lanes. One advantage of adding bicycle infrastructure is that every child who arrives by bicycle is one less car congesting Garwood's streets. Figure 45 shows the plan view of the block in front of the school.

Typically, school drop-off zones are recommended to be one-way in a counterclockwise direction so that the students can directly get to the school sidewalk. However, Second Avenue also provides access to the Hartman Park, which gives the opportunity to strengthen the bicycle connection to the park. To address this, the design includes a contra-flow bicycle lane with a 2-foot buffer (Figure 42 and Figure 44).

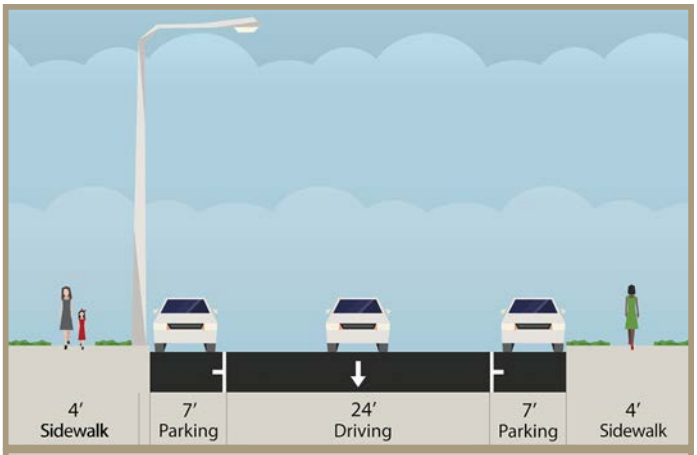



*Figure 43. Looking east on Second Avenue west of the Lincoln Public School, existing conditions.*

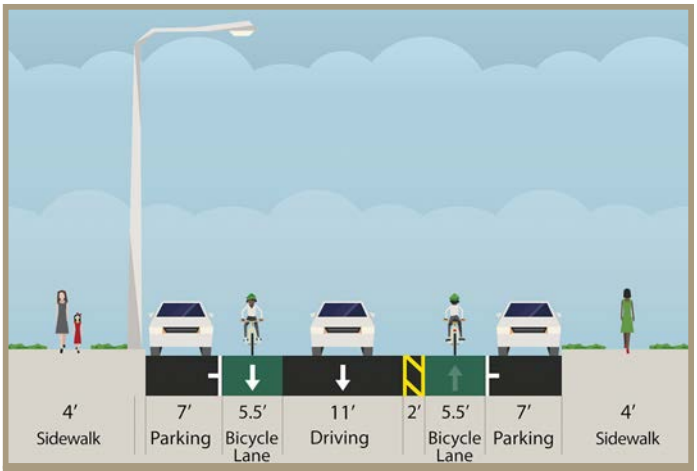



*Figure 44. Looking east on Second Avenue west of the Lincoln Public School, proposed conditions.*

According to the Federal Highway Administration (FHWA) course on Bicycle and Pedestrian Transportation, contra-flow bicycle lanes may be advantageous when: they provide "direct access to high-use destinations;" "there are few intersecting driveways, alleys, or streets on the side of the contra-flow lane;" and bicyclists can safely transition to the traffic at the end points of the lane. The biggest drawback is the potential for additional conflicts with cars as drivers may not expect on-coming bicyclists. Appropriate signage and pavement markings should be installed at driveways and intersections to warn the drivers to look for bicyclists.

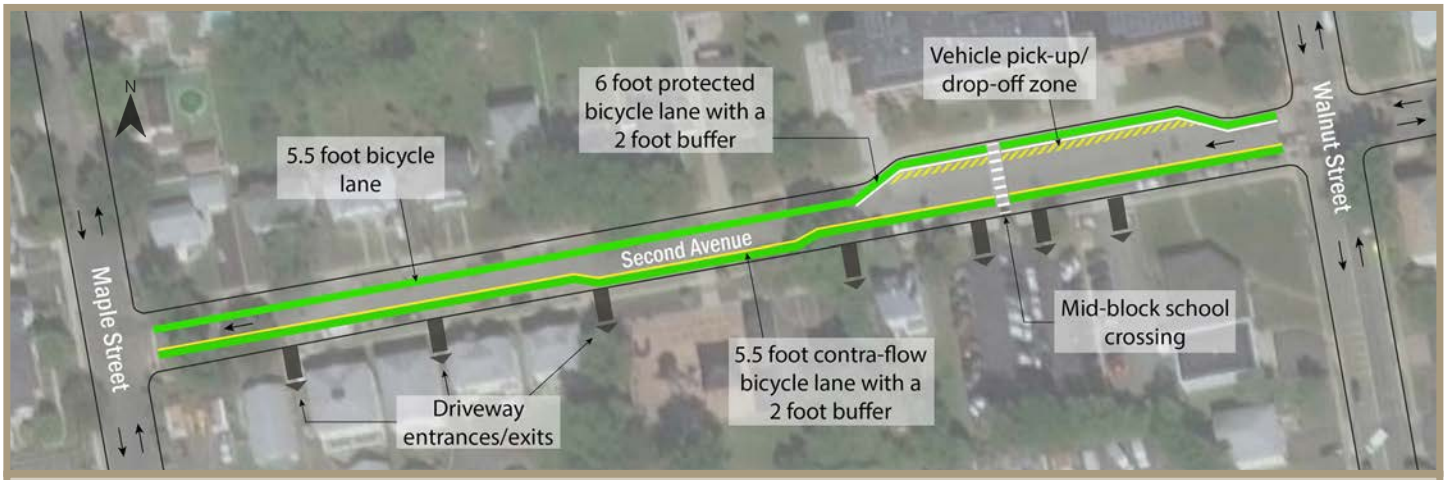



*Figure 45. Plan view of the proposed bicycle lanes on Second Avenue between Maple Street and Walnut Street.*

Garwood could test the contra-flow lane through a temporary installation to evaluate its impact on traffic flow and gather feedback from all road users. This approach, referred to as a demonstration project or Tactical Urbanism, uses short term, low-cost, scalable interventions to affect long-term change related to street safety and public space. This method can draw attention to perceived shortcomings, widen civic engagement, test interventions, and inspire action. Demonstration projects champion flexibility because improvements can be temporary. This allows residents and policymakers to witness the improvement and weigh in on its effects. This also allows for data collection and modifications to the final permanent design based on what was learned during the temporary installation. Evaluating the contra-flow lane through this method can help inform whether it merits a permanent facility upgrade.

Secure and visible bicycle parking is also important and should be added at the school and park entrances to encourage bicycling.

*Figure 46. A contra-flow lane in Chicago, IL. (Photo Credits: NACTO)*

## Second Avenue: Walnut Street to Gallows Hill Road

Between Walnut Street and Gallows Hill Road, Second Avenue is a 38- to 40-foot roadway bordered by St. Anne's Convent, Church of St. Anne, and single-family homes (Figure 47). It has parking on both sides, except for in front of the convent and church where a mid-block crossing is also located.

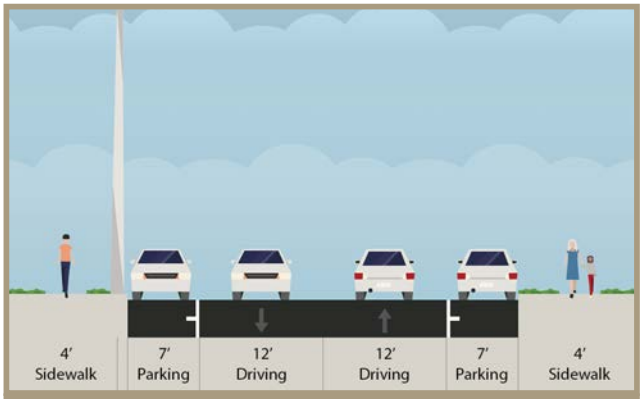



*Figure 47. Looking east on Second Avenue in front of the St. Anne's Convent, existing conditions.*

With two lanes and parking on both sides, this section of Second Avenue does not have the width to accommodate dedicated bicycle lanes without altering the configuration. In public comments, residents indicated that they avoid bicycling on this road due to heavy traffic, speeding, and extra activity from the school and church.

**Recommendation:** A potential option to create bicycle accommodations in this section of Second Avenue could be an advisory shoulder or advisory bicycle lane treatment, which would lower vehicle speeds and provide a prioritized space for bicyclists on the road. An advisory shoulder is a common treatment in Europe that is being tested at over 20 locations in the United States, including Princeton, New Jersey.

Currently, Second Avenue does not have any striping dividing directions of traffic, which means that a driver wishing to pass a bicyclist would move into the opposite lane of travel to pass. An advisory bicycle lane is similar, except that striping on the roadway makes it clear how much space the vehicle needs to give the bicyclist (Figure 48). Drivers may only enter the shoulder when no bicyclists are present and need to be cautious of oncoming traffic when passing bicyclists. It is an ideal spatial treatment for roadways that are otherwise too narrow to have dedicated bicycle lanes.

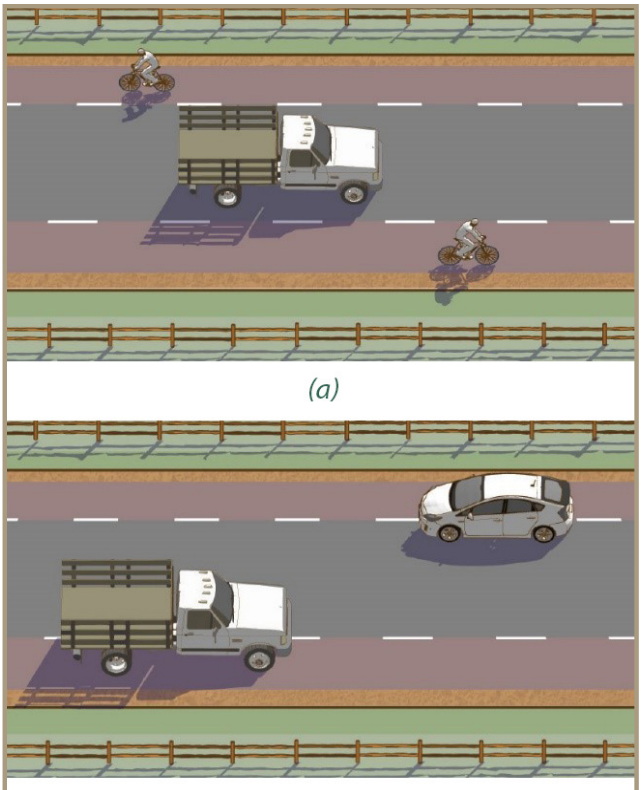



*Figure 48. An advisory shoulder with: a) A motorist traveling in the center two-way lane when passing a bicyclist, and b) A motorist using the advisory shoulder to pass an oncoming vehicle when bicyclists are not present.*

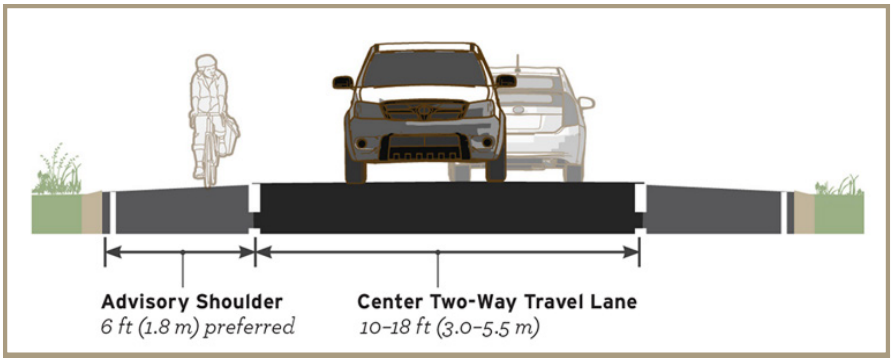



*Figure 49. Design of an advisory shoulder. (Photo Credits: FHWA)*

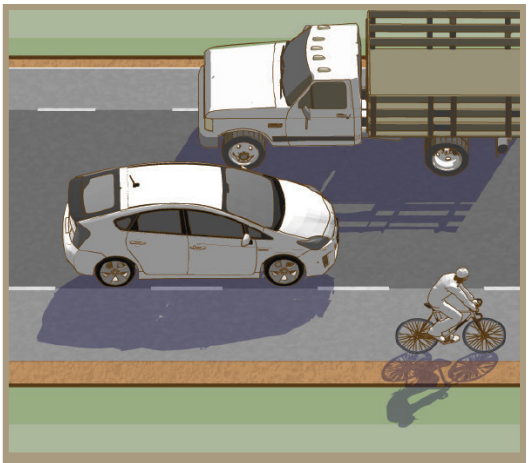


*Figure 50. Interaction between two vehicles and a bicyclist on a 13.5 feet wide center lane with advisory shoulders. (Photo Credits: FHWA)*

In terms of driver behavior, an advisory shoulder is similar to how people typically drive on two-lane residential streets without any striping – that is, they drive towards the middle of the road and yield to the side for oncoming traffic.

According to FHWA's *Small Town and Rural Design Guide*, advisory shoulders are ideal for roadways with less than 2,500 vehicles per day and 25 mph vehicle speeds, which is the case for Second Avenue. Figure 49 shows the geometric design of an advisory shoulder. The preferred width of an advisory bicycle lane is 6 feet. Figure 50 shows an advisory road with a 13.5-foot wide center lane, which can allow two passenger cars to pass each other at modest speeds without encroaching into the advisory shoulder.

The advisory shoulder should be marked with appropriate signage and pavement markings that clarify the unique functioning of the road (Figure 51 and Figure 52). The shoulder should be delineated using a different color paint or pavement material for increased visibility.

Figure 53 depicts how an advisory shoulder treatment would appear on Second Avenue in front of the St. Anne's Convent where the roadway is 38-feet wide. As many roadways in Garwood are similar to Second Avenue, the municipality can likely identify additional corridors where an advisory shoulder treatment may be appropriate.


*Figure 51. Signage installed for an advisory bicycle lane in Burlington, VT. (Photo Credits: Street Plans Collaborative)*

**Also consider:** Look at other roadways in Garwood where an advisory shoulder could be an effective way to promote bicycle riding and safer vehicular travel.

*Figure 52. Advisory shoulder treatment on a two-lane road with parking in Edina, MN (Photo Credits: FHWA)*

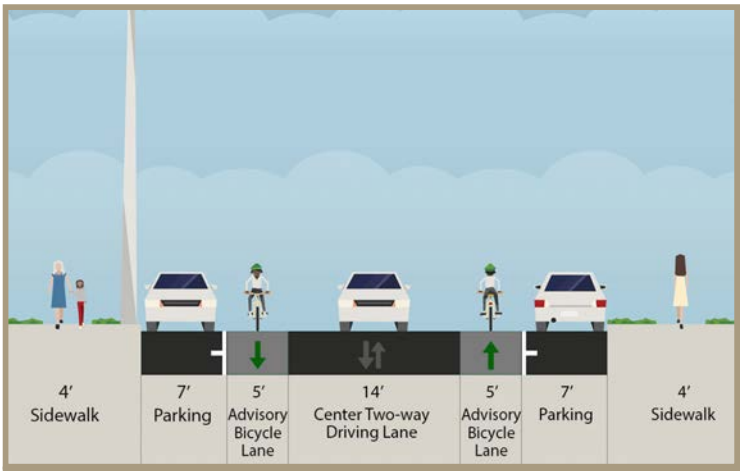



*Figure 53. Looking east on Second Avenue in front of the St. Anne's Convent, proposed conditions.*

## Second Avenue: Bicycle Boulevard

The proposed bicycle improvements for Second Avenue can be combined with bicycle boulevard treatments to further reduce vehicular speeds and improve safety for bicyclists, pedestrians and cars. This concept has many different names, including low-speed multi-modal transportation corridor, neighborhood greenway, and quiet streets. According to NJDOT, bicycle boulevards are "linear corridors of interconnected, traffic-calmed streets where bicyclists are afforded an enhanced level of safety and comfort." Its benefits extend beyond bicyclists, as implementation increases the safety and comfort for pedestrians and drivers as well.

*Figure 54. Pavement markings for a bicycle boulevard in Ocean City, New Jersey.*

Bicycle boulevards use a combination of strategies—including signage, pavement markings, and other traffic-calming measures—to improve the bicycling experience (Figure 54). Some of these strategies, such as diverters, are designed to discourage through-trips by motor vehicles while accommodating local access.

A bicycle boulevard communicates that pedestrians and bicyclists have priority along the corridor and that motorists need to be especially mindful of their presence or select an alternative route. Adopting this model can effectively encourage bicycling and walking by discouraging higher vehicular speeds and volumes.

Due to its prominent residential character and low traffic volume (less than 2,500 vehicles per day), Second Avenue is an ideal candidate to transform into a bicycle boulevard. Such treatments would bolster the residents' connection to the school, library, park and the church, all while discouraging through traffic to the extent desired.

*Figure 55. Signs for a bicycle boulevard in Portland, OR.*

Bicycle boulevards are a new concept to most New Jersey residents. As such, their purpose and importance must be well-communicated to residents and visitors. On the corridor itself, there are two kinds of signage that need to be deployed: regulatory and educational/informational. Regulatory markings include speed limit signs, marked crosswalks, and instructions to drivers, bicyclists, and pedestrians where appropriate (Figure 55). Informational signage may include branding, wayfinding, and explanations of the project purpose. It is important to develop the branding with community input.

*Figure 56. Large shared-lane pavement markings in West Baltimore, MD.*

Pavement markings reinforce the message being delivered by the signs. Large shared-lane pavement markings advise bicyclists on where to position themselves and remind drivers that bicyclists may use the full lane (Figure 56). A low speed limit (15 or 20 mph) is key to a successful bicycle boulevard, but signage is not enough. Additional tools are necessary to help reduce vehicle speeds so that they are closer to the speed of a bicycle. Reducing speeds helps to prevent collisions and makes bicyclists and pedestrians more comfortable when sharing the road with motorists.

*Figure 57. A traffic circle being tested in Denver, Colorado.*

*Figure 58. A permanent traffic circle in Seattle, Washington.*

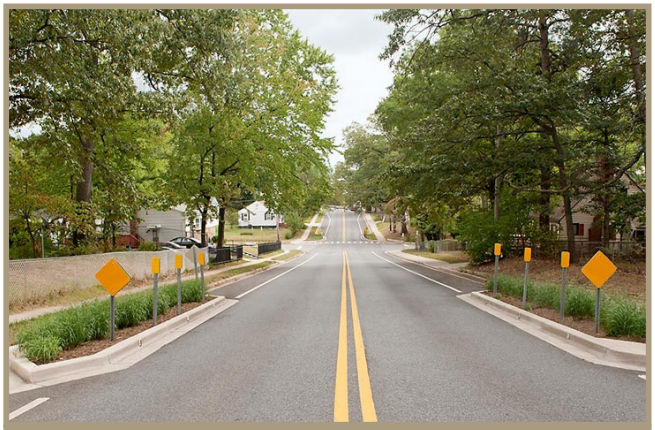


*Figure 59. Traffic calming neckdown and green infrastructure in Prince George's County, MD. (Photo credits: EBA Engineering)*

Traffic calming measures can include vertical deflection (e.g. speed humps or tables at intersections) or horizontal deflection (e.g. chicanes, neckdowns, and traffic circles). Figure 57 shows how a traffic circle can be installed with low cost materials to test the concept in Garwood. Figure 58 shows what a permanent traffic circle can look like, which can help add greenery to the neighborhood. These treatments would be particularly helpful in preventing stop sign violations and speeding at the intersections along Second Avenue.

Traffic calming solutions can be combined with other measures to address other potential community goals, such as the addition of green infrastructure to a chicane (Figure 59). Green infrastructure refers to projects that reduce flooding, add greenery, and address health concerns through the addition of vegetation. For example, a curb extension can be built as a rain garden to collect stormwater and add native plants.

Figure 60 and Figure 61 show an example of how bicycle boulevard treatments such as neckdowns can be applied to Second Avenue. The proposed design could also incorporate a raised crosswalk design if speeding remains a concern.

**Also consider:** Consider a bicycle boulevard treatment for other similar roadways in Garwood where it may be appropriate. Within the scope of this plan, the municipality could consider this treatment for Spruce Avenue in particular.

Extend the bicycle connection on Second Avenue to Third Avenue, which connects to Westfield's Gumbert Park in the west, and an existing bike route in Cranford in the east. Some Garwood residents also expressed interest in implementing a bicycle loop, further extending this connection to Fourth Avenue using the municipality-owned vacant land between Third and Fourth Avenue, and Maple Street (Figure 62). A similar bicycle loop on the south side of Garwood could also be considered.

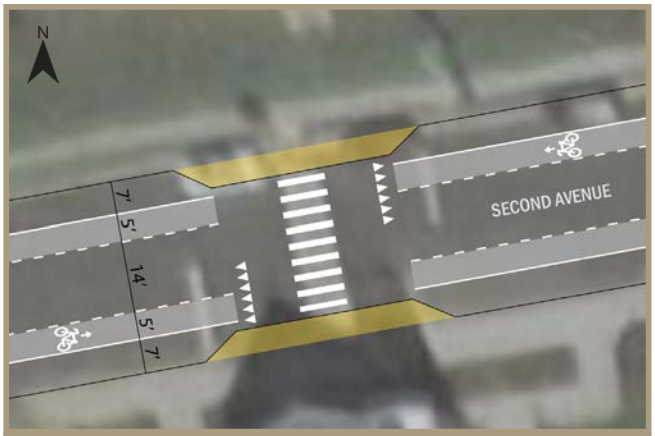



*Figure 60. The mid-block crossing in front of St. Anne's Convent with proposed Bicycle Boulevard improvements.*

*Figure 61. Traffic calming neckdown at a mid-block crossing. (Photo Credits: Deeproot Green Infrastructure)*


*Figure 62. Proposed bicycle loop north of North Avenue.*

## Spruce Avenue: Bicycle Boulevard

Spruce Avenue is a 34- to 36-foot wide roadway with a 25 mph speed limit. It is bordered by single-family homes with the Garwood Church near Center Street and Garwood Sports/Recreation Complex at its eastern terminus. At its western end, Spruce Avenue extends into the Township of Westfield.

Spruce Avenue is a two-lane road with parking on both sides, except for a few feet in front of the Garwood Church. The intersection between Spruce Avenue and Center Street is critical as both streets experience speeding issues. Residents also stated that drivers use Spruce Avenue as a cut-through because it parallels South Avenue and connects to Westfield.

Figure 63 and Figure 64 depict the existing allocation of space on Spruce Avenue, east and west of Center Street. Given its width, it does not have the space to accommodate dedicated bicycle lanes without eliminating parking.

A bicycle boulevard treatment would be ideal for Spruce Avenue to reduce vehicular speeds and prioritize bicyclists, thus making it safer and more comfortable for them to share the road with traffic. As a residential street with an average daily traffic volume of less than 2,500 vehicles, the treatment would fit the character of the road. Incorporating this treatment would help curtail incidents of speeding and reinforce bicyclists' presence on the road, which could encourage more residents to ride to the church, the sports/recreation complex, or other homes.

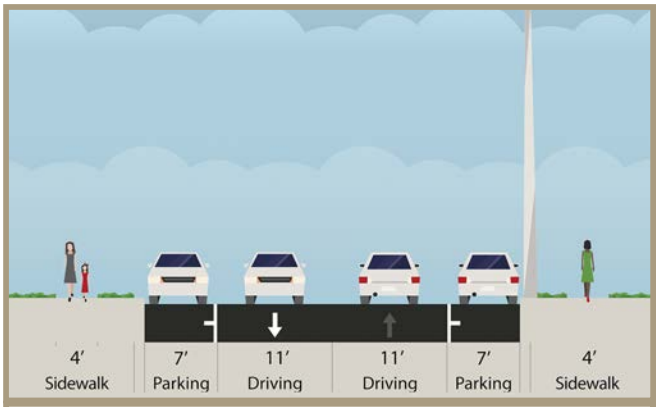



*Figure 63. Looking east on Spruce Avenue east of Center Street, existing conditions.*

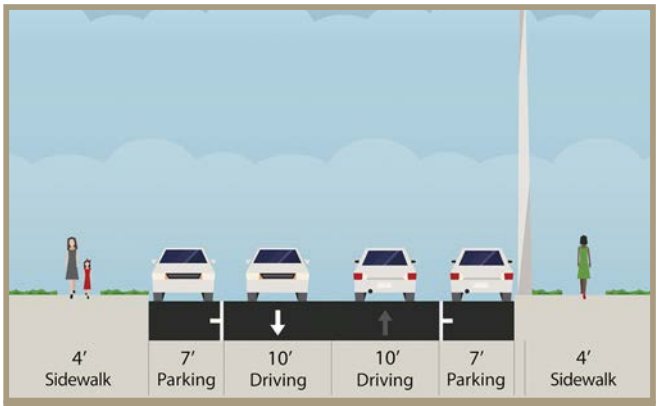



*Figure 64. Looking east on Spruce Avenue west of Center Street, existing conditions.*

Bicycle boulevards use a combination of access management, traffic calming, and crossing treatments to create a shared, slow street for bicyclists. These treatments could include lowered speed limits, enhanced signage and pavement markings, chicanes/neckdowns, and mini traffic circles at intersections. Many of these strategies increase the safety and comfort for both bicyclists and pedestrians. The previous section covers a bicycle boulevard treatment in detail along with a description of strategies that can be deployed under this treatment.

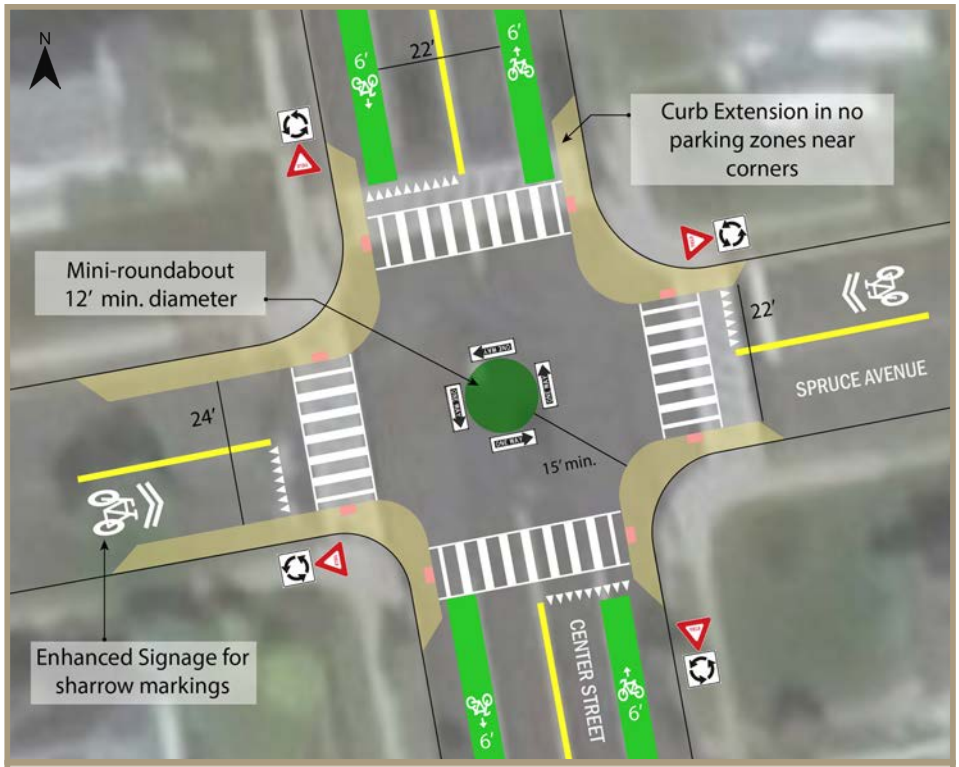



*Figure 65. The intersection of Spruce Avenue and Center Street with proposed bicycle improvements.*

Figure 65 shows how a mini-roundabout, also known as a neighborhood traffic circle, can be incorporated at the Spruce Avenue and Center Street intersection. The roundabout design would channel all intersection traffic to move counterclockwise around a central traffic island. According to NACTO's Urban Street Design Guide, mini-roundabouts reduce vehicular speeds and the number of conflict points at intersections. FHWA's Lessons on Traffic Calming indicate that crashes at mini-roundabouts are "reduced by 50 to 90 percent when compared to two-way and four-way stop signs and other traffic signs." They also have lower crash rates and vehicle delays than signalized intersections with the same speed and equivalent volumes. In terms of traffic capacity, FHWA research indicates that mini-roundabouts can be applied to intersections seeing less than 1,600 vehicles per hour in total, which is likely the case for Spruce Avenue at Center Street.

Mini-roundabouts can be installed using paint or raised islands that incorporate green elements, which enhances the traffic calming effect and also beautifies the street (Figure 57 and Figure 58). These plantings must be maintained properly to keep them from obstructing road visibility.

Mini-roundabouts can be designed with larger vehicles and emergency vehicles in mind, by incorporating a mountable curb (Figure 66).

Garwood should work with an engineer to implement this recommendation and analyze any unwarranted impacts on the traffic movement along Center Street as it is a major thoroughfare. Additionally, the borough could test the effectiveness of these treatments using short-term and low-cost installation methods, such as temporary paint.

The intersection design also adds curb extensions and tightens turn radii to further reduce vehicular speeds and increase bicyclist and pedestrian safety and visibility. Additional anti-speeding strategies such as speed humps and raised crosswalks can also be incorporated into the design as needed. The upcoming section discusses the latter treatments in detail.

*Figure 66. A permanent mini-roundabout with mountable curb in a neighborhood in Austin, TX. (Photo Credits: Global Street Design Guide)*

# Fourth Avenue

Fourth Avenue is a 31- to 34-foot wide roadway with a speed limit of 25 mph. It is split into two sections in Garwood: one begins at Maple Street and ends at Brookside Place at the Garwood-Cranford border, while the other begins west of Cedar Street and is a dead end at the Gallows Hill Road.

## Fourth Avenue: Maple Street to Brookside Place

Between Maple Street and Brookside Place, Fourth Avenue is a 34-foot wide two-lane road that narrows to 31 feet east of the Walnut Street intersection. It has parking on both sides, except for a few hundred feet on its eastbound side near the Walnut Street intersection. Sidewalks exist on at least one side of the street, but they are narrow and unsuitable for bicycling.

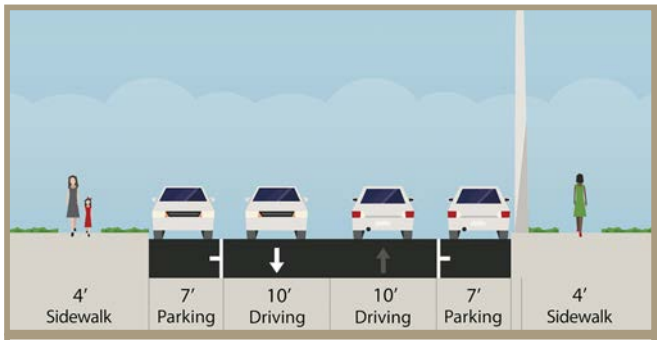



*Figure 67. Looking east on Fourth Avenue between Maple Street and Brookside Place, existing conditions.*

Fourth Avenue extends into the township of Westfield to the west, where it merges with North Avenue, and becomes Brookside Place in Cranford to the east. Residents said the connection to neighboring municipalities causes heavy cut-through traffic, especially during peak hours. They further noted that this traffic funneled to Walnut Street making that intersection unsafe for bicyclists and pedestrians due to speeding and Stop sign violations.

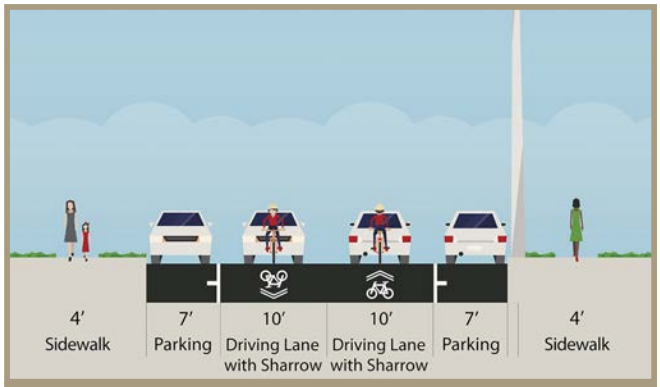



*Figure 68. Looking east on Fourth Avenue between Maple Street and Brookside Place, proposed conditions.*

Figure 67 shows the existing allocation of space on Fourth Avenue. Given its width, it does not have the space to incorporate dedicated bicycle lanes without eliminating parking. Additionally, according to the *New Jersey Complete Streets Design Guide*, prioritizing bicyclists and pedestrians using a bicycle boulevard treatment is also not recommended on Fourth Avenue as it is likely to see more than 4,000 vehicles per day. Instead, traffic calming, which forms one of the main components of bicycle boulevards along with shared-lane markings is recommended.

**Recommendation:** Install shared-lane markings in combination with traffic calming measures to reduce vehicular speeds and achieve safer shared-lane conditions (Figure 68). These measures are designed to literally "calm" the traffic and help drivers be more mindful of bicyclists and pedestrians, thus improving safety.

*Figure 69. Traffic-calming chicanes on a residential street. (Photo Credits: NACTO)*

As previously mentioned, traffic calming measures could include horizontal deflection or vertical deflection. Horizontal deflection treatments (e.g. curb extensions, chicanes, neckdowns, or center islands) visually and physically narrow the roadway to deter high vehicular speeds and expand the sidewalk realm for pedestrians (Figure 69). These treatments could be implemented using both low-cost and temporary, and high-cost and more permanent methods.

Vertical deflection treatments (speed humps, speed cushions, and speed tables) change the height of the roadway which forces a motorist to slow down to maintain an acceptable level of comfort (Figure 70 and Figure 71). These treatments are particularly effective in reducing vehicular speeds, and can be designed to be flatter, bicycle-friendly, and comfortable for emergency vehicles. Note that other treatments such as narrowing the lane width using road diets and employing tighter turn radii at intersections could also produce a traffic-calming effect.


*Figure 70. A 12 feet wide, 3 inches high speed hump installed on a crossing in Bellevue, WA (Photo Credits: City of Bellevue)*

*Figure 71. Bicyclist passing through a speed cushion in Alameda, CA (Photo Credits: NACTO)*

Figure 72 depicts how traffic calming measures can be implemented at the Fourth Avenue and Walnut Street intersection. The design includes both horizontal and vertical deflection measures to reduce vehicular speeds and increase visibility of bicyclists and pedestrians. The improvements include raised crosswalks with speed humps, high-visibility ladder crossings, and curb extensions to reduce turn radii and prevent parking in the no parking zone near the intersection. The speed hump treatment would ensure that vehicles slow down at the intersection, making it safer for both bicyclists and pedestrians to cross through the intersection.

During the public-input meeting, Garwood residents also expressed interest in installing an all-way stop sign or a pedestrian-activated signal at this intersection. The town could investigate adding a rectangular rapid-flashing beacon (RRFB) or a pedestrian hybrid beacon (PHB) into this design if speeding and bicyclist/pedestrian safety concerns persist.

RRFBs are standard crosswalk signs that produce a flashing light pattern when activated. They can be activated passively with a sensor that detects pedestrians, or directly via a button that pedestrians push when they are ready to cross. This flashing light is highly visible to motorists, and more drivers comply with the requirement to stop for pedestrians when it is used. The lights are only activated on demand, and last for just a few seconds, so they are not disruptive to nearby residents. These installations can be powered by solar panels or connected to the electrical grid.

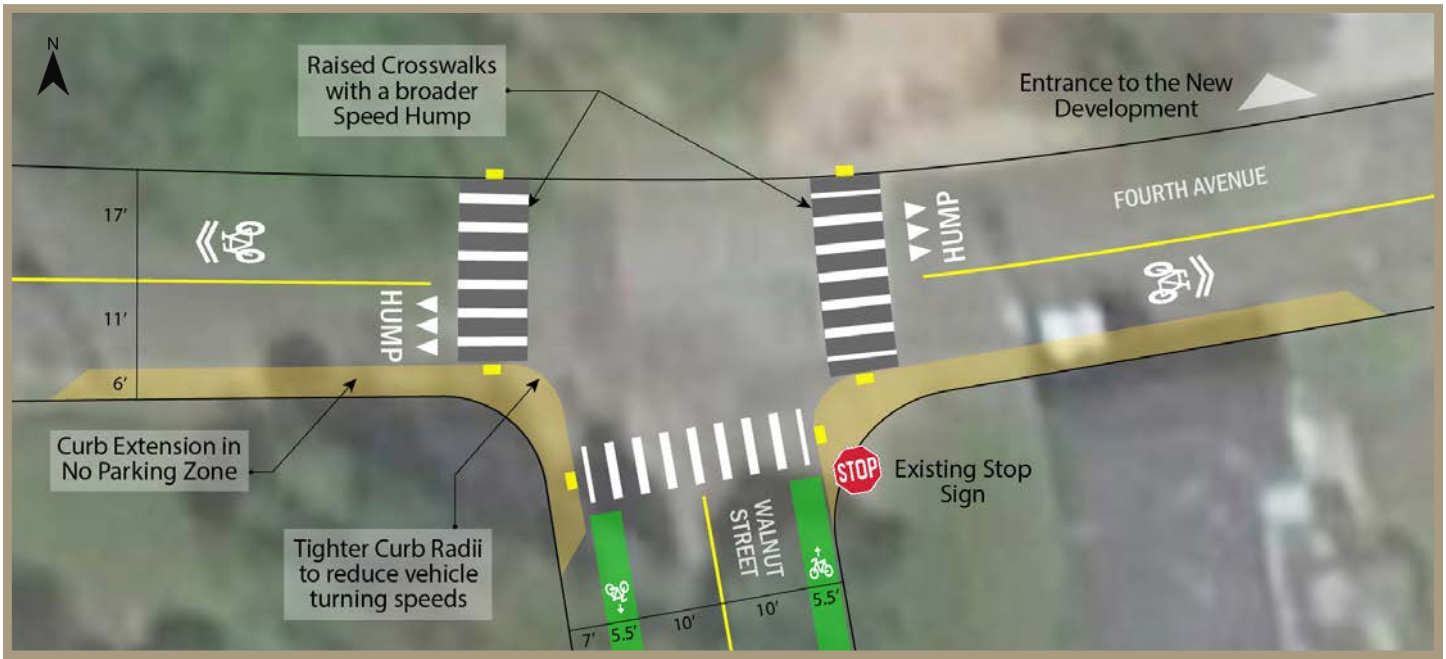



*Figure 72. The intersection of Fourth Avenue and Walnut Street with proposed bicycle improvements.*

PHBs are pedestrian-activated signals with three lights (Figure 73) that go through a sequence of yellow and red light phases when activated. The signal remains dark until activated by a pedestrian using the push-button, or via a sensor that detects pedestrians. PHBs stop traffic to allow pedestrians to safely cross and have high motorist yielding rates as they require a complete stop when the signal has a red light indication. They are a potential solution for unsignalized crossing locations characterized by high pedestrian or traffic volume, high speed, or multiple lanes.


*Figure 73. Pedestrian Hybrid Beacon near Metropark Train Station, NJ. (Photo Credits: NJDOT)*

### Fourth Avenue: West of Cedar Street to Gallows Hill Road

The second section of Fourth Avenue is a quiet residential street with a dead end on both sides, near Cedar Street on the west and Gallows Hill Road in the east. Figure 74 shows the existing design of the street. While it does not have the width to accommodate bicycle lanes without eliminating parking, this section of Fourth Avenue most likely experiences less traffic and barely any through traffic.

**Recommendation:** As a roadway with low speeds and traffic volume that sees only local traffic, this section of Fourth Avenue already has the basic components of a bicycle boulevard. A bicycle boulevard treatment would also fit the residential character of the street, which has plenty of trees on the side and is mostly quiet. See the bicycle boulevard section on Second and Spruce Avenue for detailed information on this treatment.

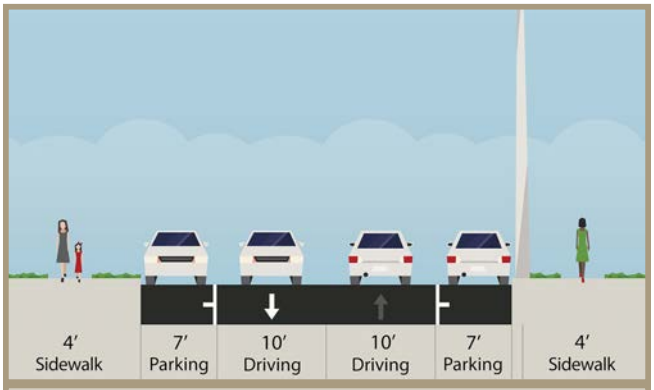



*Figure 74. Looking east on Fourth Avenue between Cedar Street and Gallows Hill Road, existing conditions.*

## Pine Avenue

Pine Avenue is a 36-foot wide roadway with two lanes and parking on both sides. It is bordered by single-family homes and allows a speed limit of 25 mph. It starts at Rankin and Lexington Avenues at the Garwood-Cranford border in the east. At its western end, it terminates at West and Sycamore Street, the latter of which continues to Westfield.

Garwood officials noted that speeding and heavy through traffic can be observed on Pine Avenue because of its easy connectivity to Cranford and Westfield Townships. Additionally, the intersection between Pine, Rankin and Lexington Avenue is a wide-angle intersection that typically allows for high speed turns.

Given its design, Pine Avenue does not have the width to accommodate dedicated bicycle lanes, unless parking on one side is eliminated. Improvements along the corridor could lower vehicle speeds and discourage problematic driving behavior to improve safety for bicyclists. Bicycle boulevards and traffic calming treatments, considered for previous roads in the corridor, could be considered for Pine

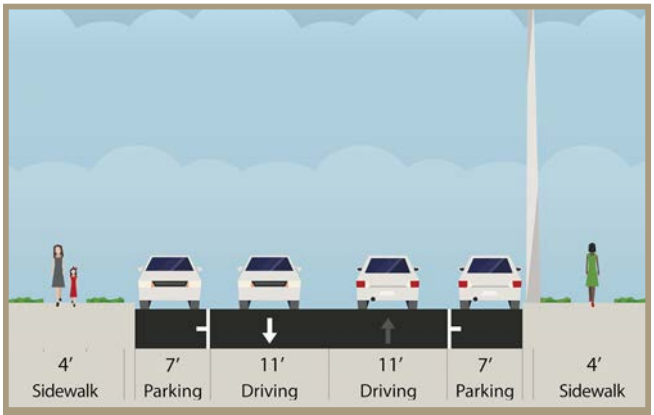



*Figure 75. Looking east on Pine Avenue, existing conditions.*

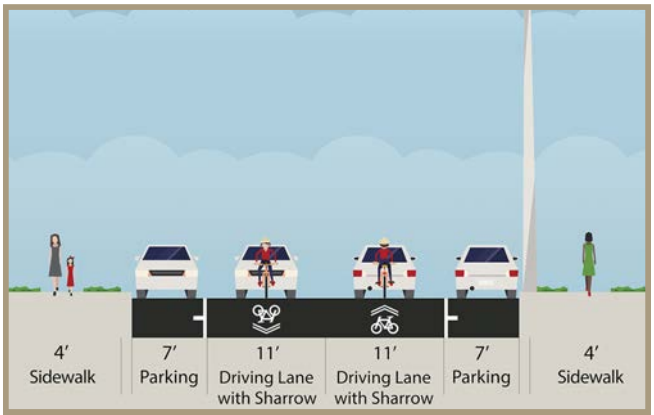



*Figure 76. Looking east on Pine Avenue, proposed conditions.*

Avenue to prioritize bicyclists and pedestrians in shared-lane conditions. Like Spruce and Fourth Avenues, Pine Avenue is also a residential road with plenty of trees on both sides. However, bicycle boulevards are not recommended for Pine Avenue as it likely sees more than 2,500 vehicles per day. As such, traffic calming measures in conjunction with shared-lane marking are recommended.

**Recommendation:** Install shared-lane markings in conjunction with traffic calming measures to reduce vehicle speeds and improve safety for bicyclists in shared-lane conditions (Figure 75 and Figure 76). The previous section covers traffic-calming measures in detail.

# Additional Recommendations

## Adopt a Complete Streets Policy

Garwood should consider adopting a complete streets policy as it is an important first step toward implementing complete streets; it will define the meaning of complete streets, establish goals, and lay out the ways in which the municipality will accomplish the goals. The most successful policies state that complete street practices and principles should be a standard part of regular roadway maintenance, planning, and design. An implementation plan and checklist can also be developed to ensure that the municipality remains on the right path year after year. Additionally, points are available to municipalities who are seeking Sustainable Jersey certification for adopting and instituting a complete streets policy. The New Jersey Department of Transportation offers a guide to policy development and a separate guide on how to create an implementation plan. These resources are among those available at http://njbikeped.org/complete-streets-resources/. The state recently released a new model policy guide, which should be used as a template for a new municipal policy (https://www.state.nj.us/transportation/eng/completestreets/pdf/CS_Model_Policy_2019.pdf).

## Provide Supporting Bicycle Facilities

In addition to roadway infrastructure, some of the common barriers that bicyclists face is access to safe and secure parking, quality shower facilities, changing rooms, and bicycle repair/maintenance equipment. Incorporating these facilities near trip destinations (such as the train station, schools, libraries, offices, and businesses) along the corridor is important to address bicyclist needs and encourage bicycling as a travel mode.

*Figure 77. Bicycle parking at Somerville School in Ridgewood, NJ. (Photo Credits: The RBA Group, New Jersey School Zone Design Guide)*

Providing safe and secure bicycle parking is critical to prevent theft and protect bicycles from vandalism and inclement weather (Figure 77). Adequate bicycle parking at appropriate locations can encourage people to ride to work, school, or recreational destinations without parking concerns in mind. The *New Jersey Complete Streets Design Guide* and the *New Jersey School Zone Design Guide* recommend several bicycle parking rack designs from the Association of Pedestrian and Bicycle Professionals that allow bicycles to be attached to the rack at two points. Bicycle racks can also be installed in the roadway instead of the sidewalk as bicycle corrals. Doing so can be particularly useful where there is limited sidewalk space (Figure 78).

*Figure 78. Bicycle corral at an intersection in New York City, NY. (Photo Credits: NACTO)*

Garwood should also encourage or require employers, schools, other organizations, and new developments to provide secure bicycle parking, lockers, shower facilities, and repair/maintenance equipment to encourage people to ride longer distances to these destinations. As a significant number of commuters travel to Garwood for work, incorporating

these facilities can help accommodate bicycling as a travel mode for nearby residents, which can then help ease some of the parking demand and traffic congestion in the area. Encouraging bicycling among employees will also help organizations be more productive and healthier, while also extending their support to the environment. Additionally, Garwood could investigate incorporating bicycle amenity requirements or incentives into its zoning code.

*Figure 79. Bicyclists on Center Street at North Avenue, in Garwood.*

# Conclusions

The Borough of Garwood is a compact community where getting to schools, parks, residences and downtown businesses by bicycle can be safe and convenient. However, the borough sees heavy traffic and speeding on its major roadways and some of its residential streets that discourages residents from bicycling, partly due to the lack of supporting bicycle infrastructure. This report identified several recommendations that could improve bicycle access to amenities and discourage unsafe driving behaviors.

Many of these improvements can begin as demonstration projects or as part of regular municipal road maintenance. By making the changes quickly and with low-cost materials, the municipality can receive meaningful feedback from residents based on their real-world experience. If the improvements are ineffective, or have unintended consequences, they can be easily removed.

While the focus of this report is on infrastructure, successful implementation will also require education and community support. The study team encourages Garwood to work with EZ Ride and the New Jersey Safe Routes to School Resource Center to develop programs that can help make bicycle riding an easy choice for residents. Programs can include bicycle rodeos, which teach children safe riding techniques, and the existing bicycle school buses, which make riding to school a social event. While North and South Avenue are not covered in this report, residents may be more likely to shop locally if they can do so on a bicycle. As such, the borough should engage the business community to encourage locals to arrive that way.

Garwood should also identify other roadways that could better accommodate bicyclists and extend their network to Westfield and Cranford's bicycle trails. These improvements could provide a safe network that connects resident homes to destinations across and outside the borough. The Borough has a strong transportation network, and expanding it to be more bicyclist- and pedestrian- friendly will be a great benefit to community accessibility and the local economy.

# Appendix

## A. Workshop Flyer

## B. Street Smart NJ Campaign Resources

## C. Potential Funding Resources

## D. Design Resources

## A. Workshop Flyer

# Garwood Bicycle Network Plan Public Input Meeting

ONLINE MEETING MONDAY, AUGUST 10, 2020 5:00PM TO 6:30PM

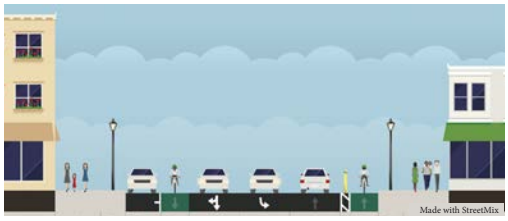
GARWOOD IS INTERESTED in improving bicycle connections to destinations across the Borough, including the Garwood Train Station, Lincoln Public School, Recreation Complex, and Unami Park. The final product, a **Bicycle Network Plan,** will recommend a variety of changes to make bicycling a safer and more attractive option for residents of all ages and abilities.

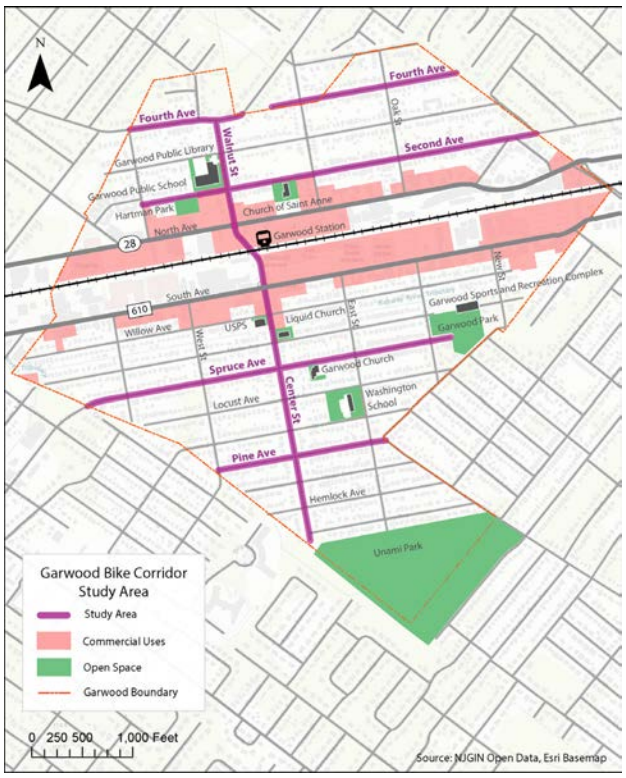
**Please join us in a virtual meeting to learn about the plan, view the initial design concepts, and provide your feedback! The meeting is open to all, but pre-registration is required.**

**Register here**: https://go.rutgers.edu/garwood

For more information, email: heaslya@tcnj.edu






The Complete Streets Technical Assistance Program is a collaboration between Sustainable Jersey, the Voorhees Transportation Center at Rutgers University, and the North Jersey Transportation Planning Authority (NJTPA). Funded by the NJTPA, the program is designed to support municipal government efforts to advance complete streets initiatives.

NJTPA NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

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# B. Street Smart NJ Campaign Resources

STREET SMART

## STREET SMART NJ FACT SHEET

**What is Street Smart NJ?**


Street Smart NJ is a public education, awareness and behavioral change pedes- trian safety campaign created by the North Jersey Transportation Planning Authority (NJTPA). The campaign combines grassroots public awareness efforts with social media, public outreach efforts and law enforcement to address pedestrian safety.

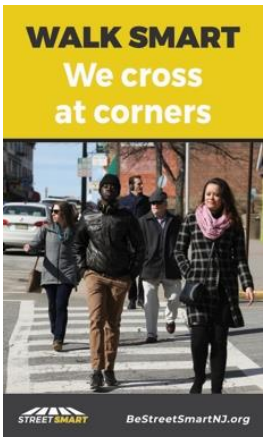
There are a number of different ways communities can participate. Nearly all campaigns enlist the involvement of community leaders, businesses and organizations and ask police to step up enforcement of pedestrian safety laws. Some campaigns have an evaluation component, including pre- and post-campaign surveys and observations at crash prone locations. Smaller campaigns may be limited to handing out information at community events and dis- playing signage around town.

More than 140 communities have participated in Street Smart in some way since the program's inception in 2013. NJTPA's goal is to continue growing the program across the state. Communities everywhere are invited to use the strategies and materials on the Street Smart website, bestreetsmartnj.org, to create their own campaigns. The website includes a 'How To' guide, printable materials, social media posts and a sample press release among other resources.

NJTPA staff are available to sit down with interested towns to discuss how to bring Street Smart NJ to their community.

**BeStreetSmartNJ.org**

**StreetSmartNJ** **NJStreetSmart**




**Why do we need Street Smart?**

Part of the impetus behind Street Smart NJ was that the Federal Highway Administration identified New Jersey as a pedestrian "focus" state due to the high incidence of pedestrian injuries and fatalities. In 2019, 179 pedestrians died as a result of pedestrian-vehicle crashes in New Jersey. From 2015 to 2019, 876 pedestrians were killed and thousands were injured on New Jersey's roadways. That translates to one death every two days and 12 injuries daily.

**Campaign Messages**

The Street Smart NJ campaign urges pedestrians and motorists to keep safety in mind when traveling New Jersey's roads. The program's core message is "Walk Smart – Drive Smart – Be Street Smart" with specific messages including We look before crossing; Heads up, phones down; We slow down for safety; We stop for people – it's the law; We use crosswalks; We cross at corners; We cross at the light; and We wait for the walk. The NJTPA has developed pedestrian safety tip cards, in English and Spanish, for public distribution built around the messages. The messages are also printed on posters, banners, street signs, coasters, tent cards and coffee sleeves.

**Police Enforcement**

One of the keys to Street Smart NJ's success is law enforcement participation. Police officers engage and educate, rather than simply issue citations. In many communities that participate in Street Smart NJ police have issued warnings rather than citations and even rewarded good behavior with coupons, gift cards and free t-shirts. Street Smart NJ public awareness efforts are often conducted in conjunction with this increased enforcement.

**Results**

Evaluations of previous Street Smart NJ campaigns have shown positive results. There was a 60 percent improvement in drivers stopping for people crossing before turning right at a red light or stop sign and 45 percent reduction in drivers running a red light or stop sign, based on an analysis of eight campaigns conducted in 2018 and 2019. There was also a 40 percent improvement in drivers stopping for pedestrians before turning at a green light and a 21 percent reduction in the number of people crossing unsafely against a signal or outside a crosswalk. The full report can be viewed at **BeStreetSmartNJ.org**.

# C. Potential Funding Resources

This appendix provides a list of common grant programs available to New Jersey communities for the advancement of complete streets initiatives, including both infrastructure and non-infrastructure projects, and programs to increase walking and bicycling. A table has been included that lists the most common grant sources for complete street related projects. Links to two online databases with additional funding sources has also been included. Grants listed are highly competitive and grant application requirements should be carefully reviewed before making the decision to apply. From the reviewers' perspective, application review is time-consuming and often applications will not be reviewed if all the required elements are not received by the published deadline. The most successful applications tell the story of the populations most in need of the proposed improvements, especially disadvantaged communities or vulnerable groups such as seniors. Applications should use compelling pictures, data and other documentation, and indicate how and why improvements are prioritized.

## New Jersey Department of Transportation

The Division of Local Aid and Economic Development at the New Jersey Department of Transportation (NJDOT) provides funds to local public agencies such as municipal governments for construction projects to improve the state's transportation system. The state's Transportation Trust Fund and the federal Safe, Accountable, Flexible, Efficient Transportation Equity Act — A Legacy for Users (SAFETEA-LU) legislation provides the opportunity for funding assistance to local governments for road, bridge and other transportation projects. NJDOT and the three metropolitan planning organizations that cover the state administer federal aid programs. NJDOT administers state aid programs. Below are some options for funding infrastructure projects through NJDOT.

### *State Aid Infrastructure Grant Programs*

**Municipal Aid**: This program assists municipalities in funding local transportation projects, and all municipalities in New Jersey are eligible to apply. NJDOT encourages applications for pedestrian safety improvements, bikeways, and streetscapes. Additionally, a common strategy to implement on-street bike lanes is to include bike lane striping within repaving projects that are funded through this program. Learn more here: https://www.state.nj.us/transportation/business/localaid/municaid.shtm

**County Aid**: County Aid funds are available for the improvement of public roads and bridges under county jurisdiction. Public transportation and other transportation projects are also included. Learn more here: https://www.state.nj.us/transportation/business/localaid/countyaid.shtm

**Bikeways:** This program funds bicycle projects that create new bike path mileage, working towards NJDOTs goal of 1,000 miles of dedicated bikeways in New Jersey. Special consideration will be given to bikeways physically separated from vehicle traffic, but on-road bike lanes or other bike routes are also eligible for funding. Learn more here: https://www.state.nj.us/transportation/business/localaid/bikewaysf.shtm

**Safe Streets to Transit:** This program encourages counties and municipalities to construct safe and accessible pedestrian linkages to all types of transit facilities and stations, in order to promote increased usage of transit by all segments of the population and decrease private vehicle use. Learn more here: https://www.state.nj.us/transportation/business/localaid/safe.shtm

**Transit Village:** This program awards grants for transportation projects that enhance walking, biking, and/or transit ridership within a ½ mile of the transit facility. Municipalities must already be designated as a Transit Village by the Commissioner of Transportation and the inter-agency Transit Village Task Force in order to be eligible to apply. Learn more here: https://www.state.nj.us/transportation/business/localaid/transitvillagef.shtm

### *Other NJDOT Assistance*

**Bicycle and Pedestrian Planning Assistance:** NJDOT offers Local Technical Assistance (LTA) funding through the Office of Bicycle and Pedestrian Programs. Under this program, on-call consultants are paired with communities to complete a variety of projects including bicycle and pedestrian circulation and master plan studies, safety assessments, trail feasibility studies, bikeway plans, and improvement plans for traffic calming projects. For more information, please contact the state bicycle and pedestrian program coordinator at bikeped@dot.nj.gov

## Federal Aid Infrastructure Grant Programs

**Safe Routes to School:** The Safe Routes to School Program provides federal funds for infrastructure projects that enable and encourage children in grades K-8, including those with disabilities, to safely walk and bicycle to school. Applicants can receive bonus points on the grant if they have School Travel Plans, a Complete Street Policy and Transit Village designation. Learn more here: https://njdotlocalaidrc.com/federally-funded-programs/safe-routes-to-school

**Transportation Alternatives Program:** The Transportation Alternatives Program provides federal funds for community based "non-traditional" transportation projects designed to strengthen the cultural, aesthetic and environmental aspects of the nation's intermodal system. Municipalities can receive bonus points on the grant if they have an adopted Complete Street Policy and are a designated Transit Village. Learn more here: https://njdotlocalaidrc.com/federally-funded-programs/transportation-alternatives

**New Jersey Department of Environmental Protection:** The Recreational Trails Program administered by the NJDEP Green Acres Program provides federal funds for developing new trails and maintaining and restoring existing trails and trail facilities including trails for non-motorized, multi-use (including land and water) and motorized purposes. Learn more here: https://www.nj.gov/dep/greenacres/trails/grants.html

## Health and Environment Funding

**Sustainable Jersey**: The Sustainable Jersey Small Grants program provides capacity building awards to municipalities to support local green teams and their programs, and is not project specific. Learn more here: http://www.sustainablejersey.com/

**Sustainable Jersey for Schools**: Sustainable Jersey for Schools grants are intended to help districts and schools make progress toward Sustainable Jersey for Schools certification. Learn more here: http://www.sustainablejerseyschools.com

**New Jersey Healthy Communities Network:** The New Jersey Healthy Communities Network is a partnership of grantees, funders and advocate organizations who seek to have collective impact on community well-being to support healthy eating and active living. The Community Grant Program provides opportunities to develop healthy environments for people to live, work, learn and play by funding policies, projects and programs that support walking and bicycling. Learn more here: https://www.njhcn.org/

## Funding from Other Sources

Various other funding sources exist that may help municipalities further complete streets projects. Both Sustainable Jersey and Together North Jersey have developed comprehensive online databases that catalog the many funding sources available. They can be found at the following locations:

**Sustainable Jersey Grants Portal**: https://www.sustainablejersey.com/grants/

**Together North Jersey Funding and Resources Database**: https://togethernorthjersey.com/funding-tools-database/

## Federal Funding

**1. US Department of Transportation (USDOT)**

a. Better Utilizing Investments to Leverage Development (BUILD, replaced TIGER)

**2. Federal Highway Administration (FHWA) Programs**

a. Congestion Mitigation and Air Quality Improvement (CMAQ)

b. Surface Transportation Program (STP)

c. Highway Safety Improvement Program (HSIP)

d. National Highway Performance Program (NHPP)

e. Transportation Alternatives Program (TAP)

f. Safe Routes to School (SRTS)

g. Local Safety / High Risk Rural Roads Program (HRRR)

h. National Highway System (NHS)

i. Recreational Trails Program - Including hiking, bicycling, in-line skating, equestrian use, cross-country skiing, snowmobiling, off-road motorcycling, all-terrain vehicle riding, four-wheel driving, or using other off-road motorized vehicles.

j. Federal Lands Access Program (FLAP) - The Access Program supplements State and local resources for public roads, transit systems, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators.

k. Emergency Relief - Repair or reconstruction after national disaster, can include bicycle and pedestrian facilities

**3. National Highway Traffic Safety Association**

a. NHTSA Section 402 State Highway Safety Program

b. NHTSA Section 405 Non-Motorized Safety Grants

**4. Federal Transit Administration Programs**

a. Urbanized Area Formula Program (UZA) - Public transit and bike routes to transit

b. Fixed Guideway Capital Investment Grants - Transit systems and bike parking

c. Bus and Bus Facilities Formula Grants - Includes bike parking facilities

d. Enhanced Mobility of Seniors and Individuals with Disabilities - Access to transit facilities for seniors

## State Funding

**5. Municipal Aid ($140m)**

**6. County Aid ($150m)**

**7. Local Bridges ($44m)**

**8. Safe Streets to Transit ($1m)**

**9. Transit Village ($1m)**

**10. Bikeways ($1m)**

**11. Local Aid Infrastructure Fund ($7.5m)**

**12. Safe Corridors Highway Safety Funds**

**13. Urban Aid ($10m)**

**14. New Jersey Trails Program (Department of Environmental Protection)**

**15. Other Funding Sources**

**16. Regional/Local CMAQ Initiatives Program (NJTPA)**

**17. NJ Division of Highway Traffic Safety**

**18. Open Space &Farmland Preservation**

**19. Homeland Security Transit Security Grant Program (TSGP)**

## Other Sources

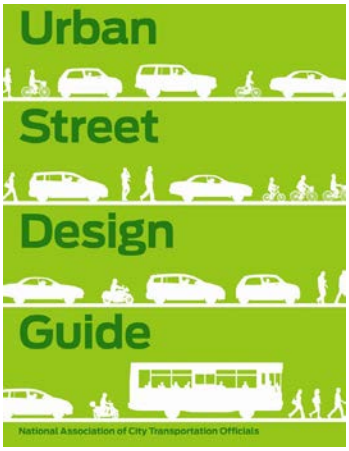
**20. County Capital Program**

**21. Municipal Capital Programs**

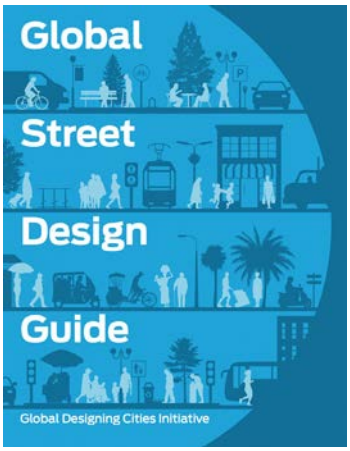
**22. Foundations**

# D. Design Resources

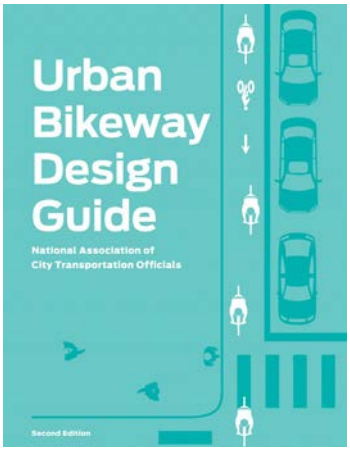
## NACTO Guides




[Urban Street Design Guide]

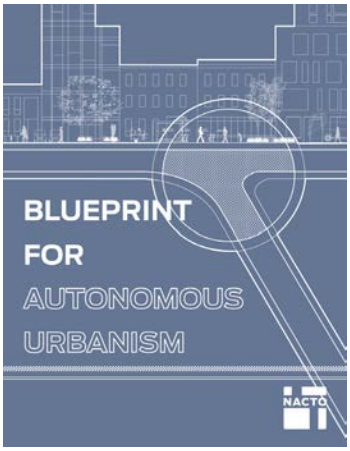



[Global Street Design Guide]




[Urban Bikeway Design Guide]


[Transit Street Design Guide]

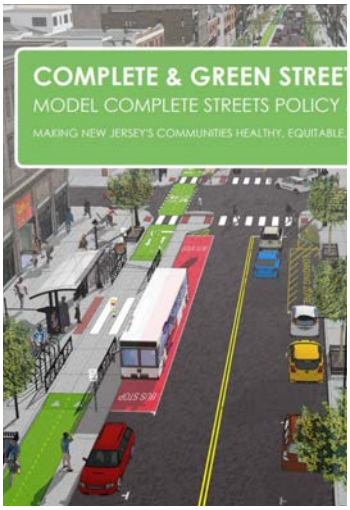



[Blueprint for Autonomous Urbanism]

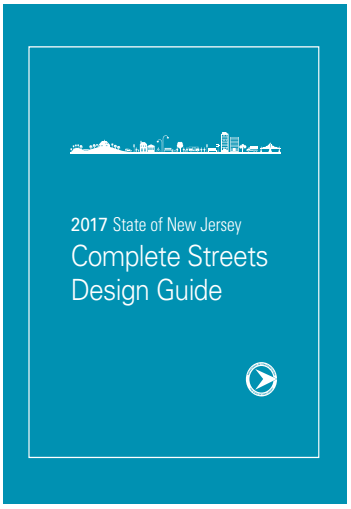

[Urban Street Stormwater Guide]


[Bike Share Station Siting Guide]

## NJDOT Guides

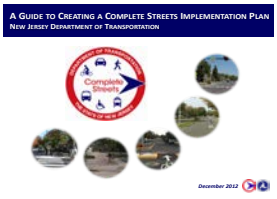



[Complete & Green Streets for All: Model Policy and Guide]



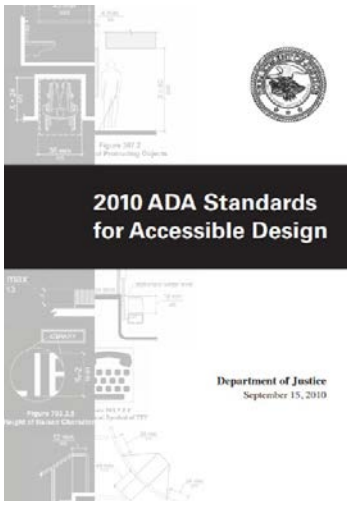

[2017 State of New Jersey Complete Streets Design Guide]


[A Guide to Policy Development]




[A Guide to Creating A Complete Streets Implementation Plan]

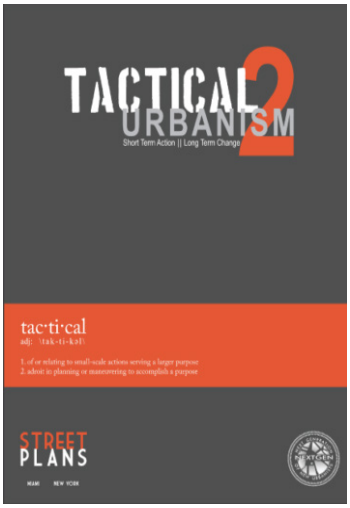
## ADA Guidelines




[ADA Standards for Accessible Design]

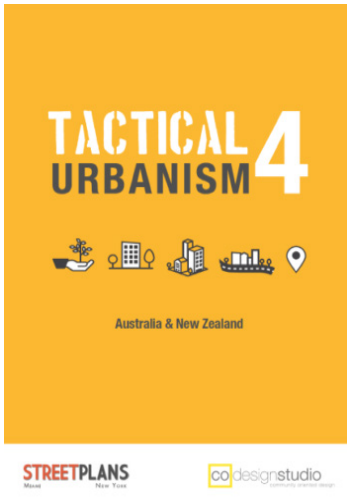
## Tactical Urbanism Guides


**Tactical Urbanism 1**




Tactical Urbanism 2


**Tactical Urbanism 3**




Tactical Urbanism 4


Tactical Urbanism 5


**Tactical Urbanism**


**Tactical Urbanist's Guide to Materials and Design Version 1.0**


**The Open Streets Guide**


Mercado: Lessons from 20 Markets Across South America


Public Space Stewardship Guide