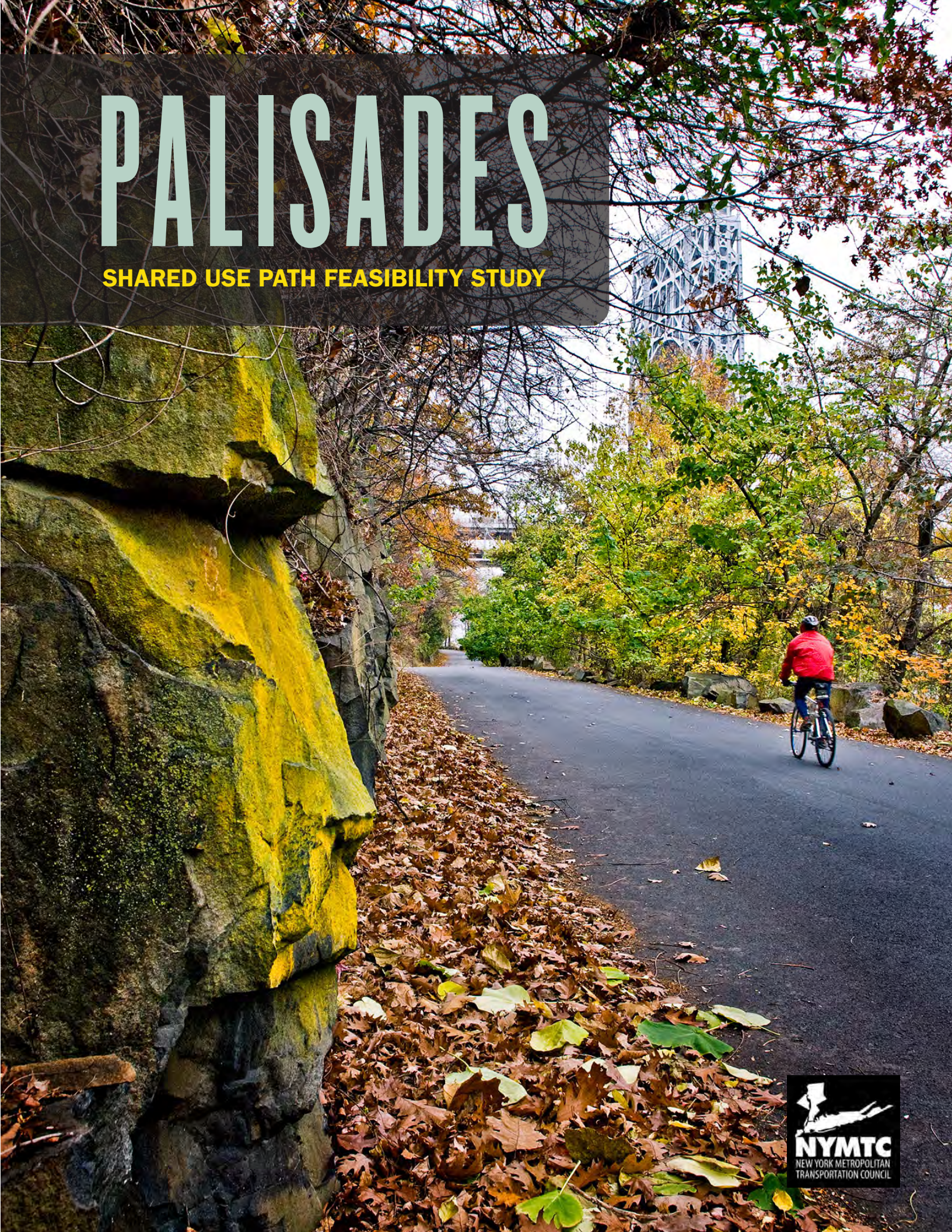

PALISADES

SHARED USE PATH FEASIBILITY STUDY

NYMTC
NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

Disclaimer

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Cover photo by Anthony Taranto, courtesy of the Palisades Interstate Park Commission

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1 Executive Summary

The Palisades study area is located along the west bank of the Hudson River in northern Bergen County, New Jersey and southern Rockland County, New York, and is characterized by steep cliffs rising high above the river. Much of the study area is preserved as open space due to its scenic beauty. Today, the Palisades study area is primarily composed of suburban neighborhoods and large swaths of green space. Because of this unique composition, the Palisades is a local treasure that is beloved for walking, cycling, and spending time in nature. Despite the area's popularity, there is currently limited infrastructure to allow for people walking and biking to move intuitively and safely throughout the Palisades. As the popularity of the study area grows with improved access from the new shared-use path on the Gov. Mario M. Cuomo Bridge and upgrades to the George Washington Bridge path, there is growing interest to develop adequate infrastructure to allow bicyclists and pedestrians to safely connect and move through the Palisades.

Report Overview

This plan documents the process to evaluate the feasibility of creating bicycle and pedestrian connections through the Palisades between the George Washington Bridge and the Gov. Mario M. Cuomo Bridge and the resulting recommendations. Existing conditions are assessed to understand the social, geographic, and infrastructure landscape of the study area. Through this assessment, demographic analysis serves to inform what communities will be served and impacted by the project, while topographic mapping lends an understanding to the physical terrain the connections will traverse, and crash analysis grants insight into existing safety concerns. Outreach was conducted through online visioning sessions, in-person workshops, an interactive webmap and survey, and regular contact through the project website and email. From these inputs, a set of route profiles are identified and then evaluated based on criteria reflective of the project objectives. Based on the results of the outreach and technical analysis, recommendations are made for north-south connections, east-west connections, connections to the George Washington Bridge, facility design and amenities, and programmatic support.

Figure 1: Cyclist along Henry Hudson Drive (Source: Anthony Taranto, courtesy of the Palisades Interstate Park Commission)

Existing Conditions

The study area encompasses the roughly 16-mile stretch between the George Washington Bridge and the Gov. Mario M. Cuomo Bridge through northern Bergen County and southern Rockland County. The study area, approximately two-thirds of which is in New Jersey, is characterized by large swathes of open space, suburban development, and commercial centers in Fort Lee and Piermont. A prominent feature of the study area is the highly dynamic topography with a dramatic change in elevation between the top and bottom of the Palisades cliffs. The steep changes in grade across the study area is limiting factor in the types of facilities that can be provided and who is able to use them.

The study area has urban centers such as Fort Lee, small villages such as Piermont, and suburban areas such as Tenafly. Residents of the study area primarily drive to work, with the vast majority of households having access to a vehicle, with slightly lower rates of vehicle ownership in Fort Lee and Nyack.

The study area has a diverse road network, from busy interstate highways to scenic parkways and local roads. The area is served by several bus routes, including both daily service bus lines and additional commuter service bus lines. Existing bicycle routes are classified as having moderate to high bicycle stress. There have been many severe and fatal crashes involving bicycle and pedestrians in recent years, indicating a need for safety enhancements.

Public Engagement

Engaging meaningfully with local communities, stakeholders, and municipalities is a key component of the study. Feedback from members of the community was gathered through three virtual visioning sessions held in March and four in-person pop-up events held across the study area in August. Additionally, input was gathered online through the website and an interactive map. From these events, the project team heard about safety requests and concerns, desired amenities, and suggestions to improve connectivity. Through these efforts, over 280 members of the public were engaged. As a direct result of these engagement efforts, the study's focus was broadened to a network approach that accommodates a range of users on different routes.

Approach

Based on the analysis and community input, the project team identifies five areas of assessment for the study: north-south connections, east-west connection, first-last mile connections to the George Washington Bridge, amenities, and programmatic support. Over 20 potential routes were identified in the area, however some routes were not evaluated because they are fully built (Long Path), are advocacy projects (Northern Valley Greenway), or are in parallel studies that are beyond the feasibility phase (NJDOT 9W, Rockland Riverway Trail). These related routes help to fill out the recommended network but are not included in this study's analysis of alternatives.

North-south, east-west, and first-last mile connections are evaluated based on five criteria: safety, available right of way, cost, community input, and topography. Each criterion is evaluated and preferred alternatives are identified to improve connectivity in the region.

The study identifies four main user groups of the recommended network:

- Fast Cyclists,
- Slow Cyclists,
- Walkers, Runners, and Rollers
- Interested Members of the Public

Each of these groups has different needs to make the Palisades study area more accessible. The study matches the recommended routes with different user groups and proposes design treatments where necessary for the routes to safely accommodate those users.

Evaluation

A total of 19 routes are evaluated: 10 north-south connections, six east-west connections, and three first-last mile connections. Based on the evaluation conducted as described in the Approach section, six north-south connections, five east-west connections, and one first-last mile connection are recommended to be included in the network.

Recommendations

The recommended corridors, with the addition of the related routes (Long Path, Northern Valley Greenway, NJDOT 9W, Rockland Riverway Trail), will help to build the foundation for a network that connects across the study area. Design treatments are further explored through the facility toolkit, which offers an overview of different improvements that can be applied to make active transportation safer, more accessible, and more comfortable in the region.

2 Introduction

Context

The longstanding popularity of recreation in the Palisades combined with recent improvements to the Gov. Mario M. Cuomo and George Washington Bridges creates a prime opportunity to study the feasibility of a creating a shared use network through the Palisades.

In 2017, the new Gov. Mario M. Cuomo Bridge was opened, replacing the aging Tappan Zee Bridge to carry Interstate 87 and 287 across the Hudson River between Nyack, NY and Tarrytown, NY. The new bridge includes a separated shared use path, which opened in 2020, creating for the first time a crossing for active modes (walking, bicycling, and rolling) between the George Washington Bridge and Bear Mountain Bridge. The new bridge also includes six overlooks across the bridge as well as a landing on either side of the bridge, including amenities such as a welcome center, public art, and restrooms to position the bridge as a recreational experience.

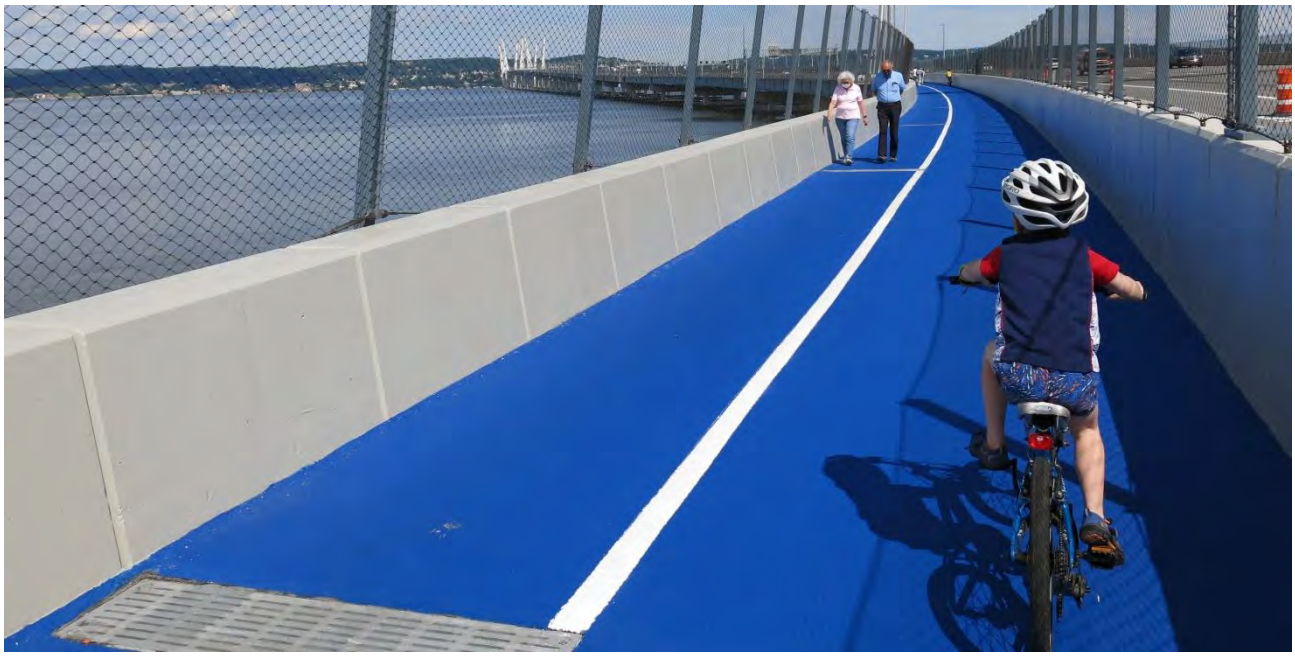


Figure 2: Walkers and Slow Cyclist crossing the Mario M. Cuomo Bridge (Source: STREETSBLOG NYC)

In 2023, the renovated North Walk pedestrian and bicycle path opened as part of restoration efforts on the George Washington Bridge. The new path replaces steps with an accessible ramp, allowing for greater access for those with bicycles, strollers, and mobility devices. The updated path redesigned chokepoints around bridge towers and has additional safety and wayfinding enhancements. Two viewing platforms have been added to the path as part of the renovation.

The east side of the Hudson River has a well-developed trail system that connects these two bridges, including the Old Croton Aqueduct Trail and the South Country Trailway (Empire State Trail). The west side of the Hudson River, despite being a popular area for walking, rolling, and biking, has a more limited set of easily navigable trails. US Route 9W, a designated bicycle route, and Henry Hudson Drive through Palisades Interstate Park, offer some connectivity but lack fully separated facilities and cohesive wayfinding. The Long Path offers a connected and navigable route through the region for walkers and hikers but is not accessible by all users, as it is unpaved and steep in some sections making it unsuitable for bicycling or rolling.

Figure 3: Cyclists traveling along North Walk of the George Washington Bridge (Source: Buro Happold)

Government agencies and advocacy organizations are working to improve walking and biking infrastructure through the Palisades. The Metropolitan Planning Organizations (MPOs) for the study area, New York Metropolitan Transportation Commission (NYMTC) and North Jersey Transportation Planning Authority (NJTPA), work on a range of multimodal studies across their respective regions. Rockland County is in the process of designing the Rockland Riverway Trail to create a pedestrian and bicycle path along the Hudson River. The New Jersey Department of Transportation (NJDOT) is designing pedestrian and bicycling improvements to 9W in Bergen County (from E Palisade Avenue to the state border). In addition to these ongoing projects, the Northern Valley Greenway (NVG) is an advocacy project for a proposed 7.4-mile shared use path using an abandoned railroad right-of-way through Tenafly, Cresskill, Demarest, Closter, Norwood, and Northvale in Bergen County. These projects will help to expand the active transportation network through the Palisades but do not address east-west connectivity or provide a direct connection to the George Washington Bridge.

Study Purpose

The purpose of this study is to determine the feasibility of creating a shared use path between the George Washington Bridge and the Gov. Mario M. Cuomo Bridge through the Palisades to build upon recent pedestrian and bicycle upgrades to the two bridges. This would increase walking and biking accessibility in the Palisades and help to complete a roughly 35-mile lower Hudson Valley loop for walkers and bicyclists. By incorporating feedback gained during engagement efforts and incorporating with other on-going initiatives (Rockland Riverway Trail, NJDOT design for 9W, NGV), the study moved forward with a network approach for pedestrian and bicycle infrastructure throughout the study area to serve different user groups.

The study is working towards a vision where people walking, hiking, biking, and rolling are able to safely and intuitively move through the Palisades study area to access recreational opportunities and local communities.

3 Existing Conditions

The current conditions of the Palisades study area with regards to the environment, community, and transportation infrastructure sets the stage for exploring the feasibility of a shared-use path. The physical landscape is examined to understand points of interest, land use, and topography of the area. A demographic analysis is conducted to better understand the communities a potential path would serve. Transportation factors are analyzed to understand what infrastructure exists and how people move through the study corridor.

Place

Study Area

The study area extends for approximately 16 miles surrounding the Palisades Interstate Parkway and US 9W corridor from Fort Lee to South Nyack. About two-thirds of the study area is in Bergen County with the southernmost portion being the most commercial and populous. The rest of the corridor is primarily parkland and single-family homes. For the existing conditions analysis, the corridor was divided into five segments based on their character, land use, and political boundaries:

Segment 1 - Fort Lee: The Fort Lee segment is defined by the George Washington Bridge, an area with a lot of traffic and businesses, perched high above the Hudson River. People coming over the bridge can access the Palisades by turning directly north on Hudson Terrace at the top of the cliff or turning south to enter the park along Henry Hudson Drive, which travels along the bottom of the cliff.

Segment 2 - Englewood Cliffs: Along this segment, from E Palisade Avenue (Englewood Cliffs, NJ) to E Clinton Ave (Tenafly, NJ), US 9W is a 4 to 5 lane arterial with large office parks along the west side of the roadway. For much of this segment there are no shoulders along US 9W and cyclists must take the lane.

Segment 3 - Tenafly: In this segment, from E Clinton Avenue (Tenafly, NJ) to Timberline Drive (Closter, NJ), US 9W widens to include a generous shoulder used by cyclists. The area is mainly parkland and single-family homes, with few intersections or crossing traffic. At the top of this segment, people on Henry Hudson Drive climb the hill up to US 9W to continue north.

Segment 4 - Alpine: This segment goes from Timberline Drive (Closter, NJ) to the state border and is almost entirely through parkland.

Segment 5 - Rockland County - The final segment is the stretch within Rockland County, NY, including Piermont, Grandview, and South Nyack. There are several popular destinations in this area such as Tallman Mountain State Park and downtown Piermont as well a network of paths to get to Nyack including US 9W, River Road, and rail trails.

Figure 4: Study area

Land Use

The study corridor is comprised mainly of open space and residential neighborhoods, with some commercial corridors along US 9W. The commercial areas are concentrated in the southern portion of the study corridor in Fort Lee and Englewood Cliffs. The middle of the corridor is largely open space and low density residential. The northern portion of the corridor is primarily residential, including high density residential, with large parks and a commercial center in Piermont.

Segment 1 - Fort Lee is characterized by open space along the river in Palisades Interstate Park and Fort Lee Historic Park, with a commercial corridor along US 9W and high- and low-density residential areas throughout the corridor.

Segment 2 - Englewood Cliffs is characterized by open space along the Hudson River in Palisades Interstate Park, with commercial uses and large office parks concentrated along US 9W. East of US 9W is primarily residential.

Segment 3 - Tenafly is composed of open space with Palisade Interstate Park, Greenbrook Sanctuary, and the Tenafly Nature Preserve. The rest of the segment is residential.

Segment 4 - Alpine is predominantly open space of the Palisades Interstate State Park and Camp Alpine with a small amount of residential development.

Segment 5 - Rockland County is comprised of a commercial center in downtown Piermont with high- and low-density residential development and large areas of open space in Tallman Mountain State Park and Blauvelt State Park

Topography

The corridor follows the western bank of the Hudson River and showcases a terrain characterized by rolling hills and steep cliffs. Elevation changes are a prominent feature of the corridor. This dynamic landscape offers numerous overlooks that provide stunning views of the river and the surrounding area as well as challenging hill climbs. This dynamic topography is an important consideration in designating routes accessible to pedestrians and bicyclists of a wide range of abilities. A full analysis of topographical changes along popular north-south routes in the study area is available in the Existing Conditions report found in the Appendix.

Figure 5: The Palisades cliffs rise dramatically from the Hudson River (Source: Anthony Taranto, courtesy of Palisades Interstate Park Commission)

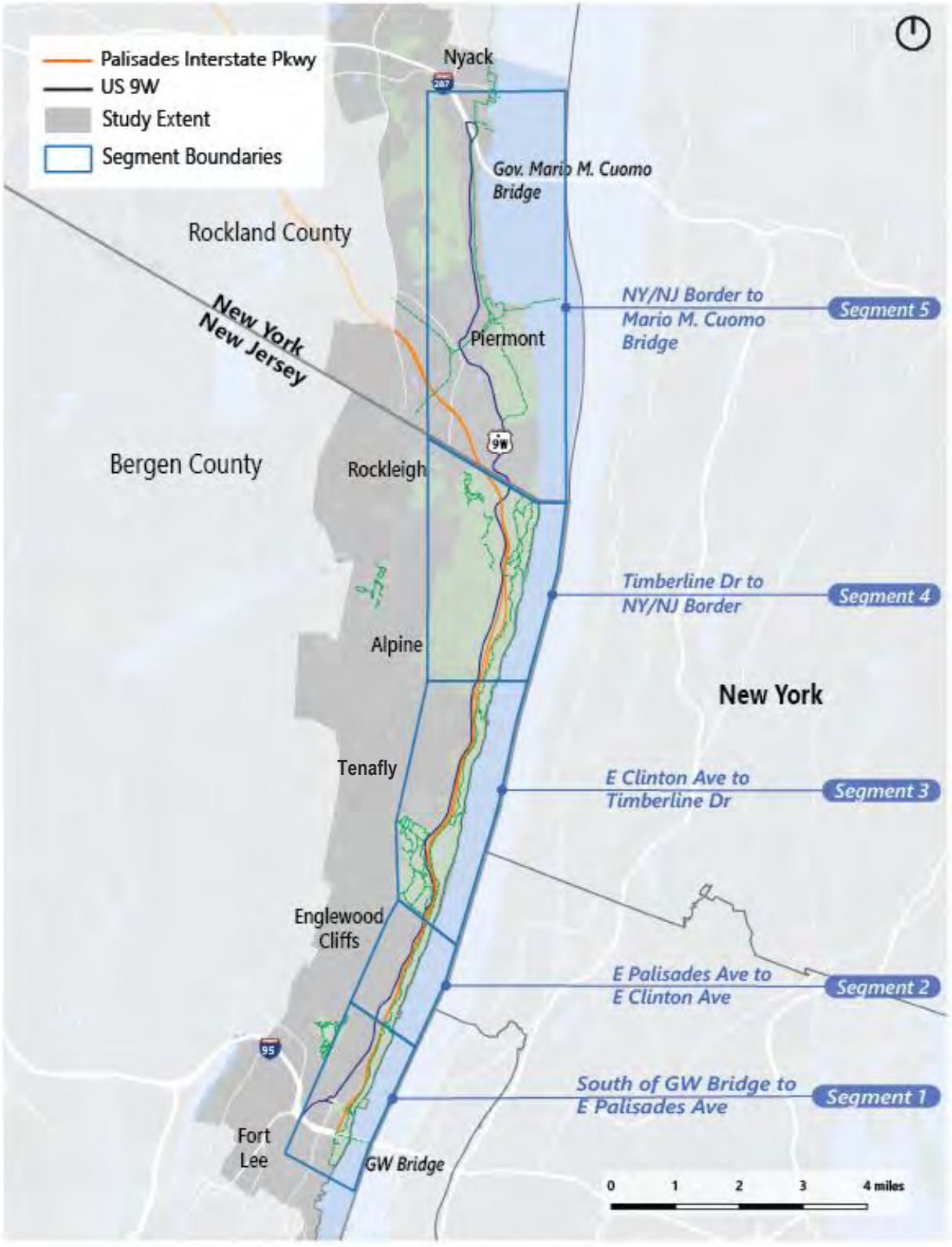


Figure 6: The study area is broken into five segments based on character, land use, and political boundaries

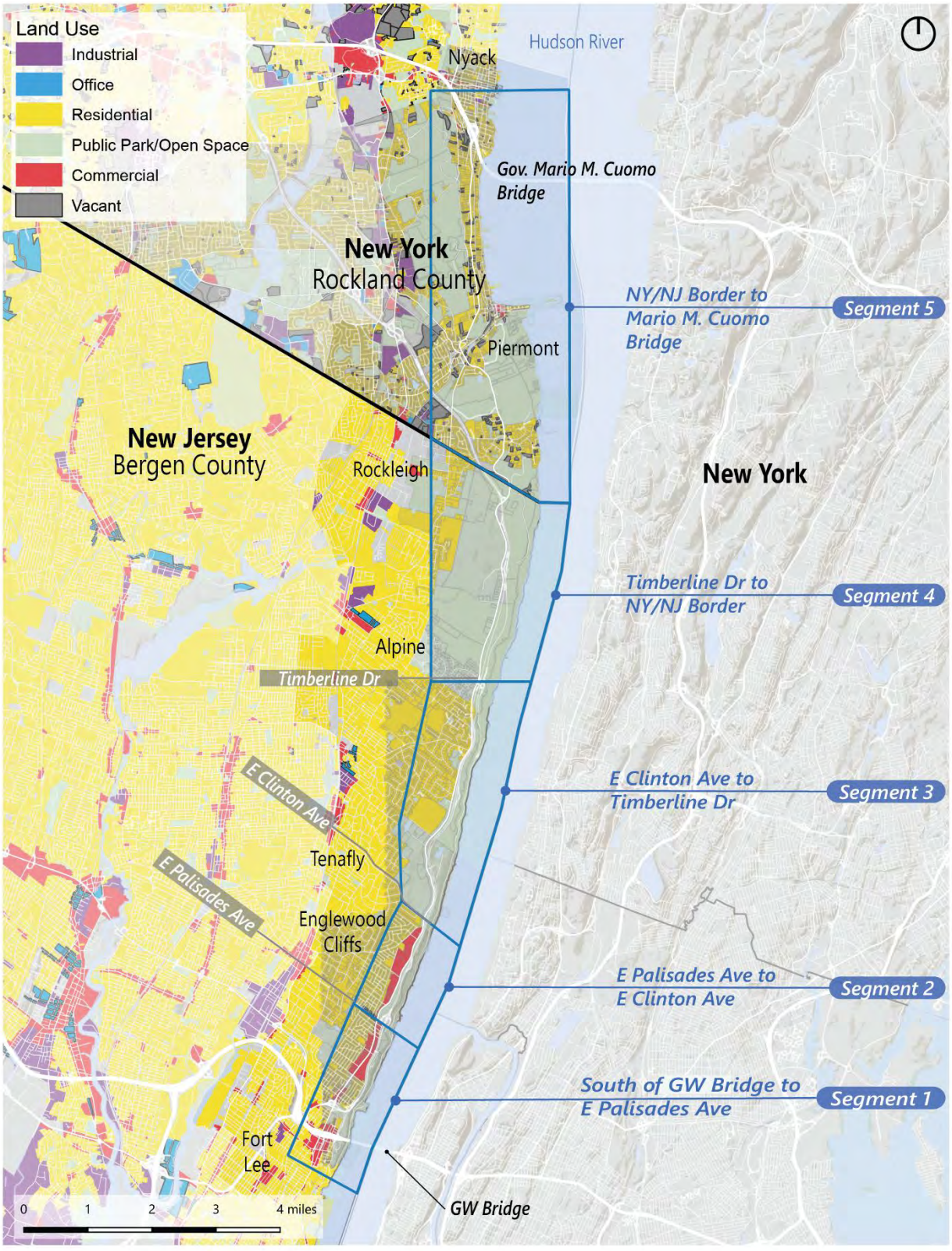


Figure 7: Land use varies across each segment of the study area including residential, commercial, and open space.

People

The study area is defined by more than just the physical landscape, but also the communities that live, work, and play in and around it. The project will intersect with lives of neighboring residents, so it is important to understand the communities within the study area. The demographics of the study area are explored to understand how it compares to the broader region, identify community trends, and populations of equity concern. This analysis explores demographics related to population characteristics, equity indicators, and commuting characteristics. These metrics are explored to inform who will be using the path and how the path can be made accessible to the surrounding community.

Population

The total population of the study area as of 2023 is about 78,000 residents. Population is expected to grow in the future, with projected population growth of 15% between 2023 and 2050. This is faster than growth in the New York-New Jersey Metropolitan area in general, which is projected to grow 14% between 2023 and 2050.

Population density across census tracts in the study area is highly varied. Population density ranges from 200 people per square mile in Alpine at the lowest density to 18,158 people per square mile in Fort Lee at the densest. Half of census tracts have a population density greater than the New York- Metropolitan area average of 2,940 people per square mile.

Carless Households

Most households in the study area have access to a vehicle. The areas with the highest concentration of households without access to a vehicle are Nyack, South Nyack and Fort Lee. However, even in these areas, 80% or more of households do have a vehicle.

Journey to Work Time

Mean journey to work times of workers in the study area varies by census block between 26 and 42 minutes. There is no apparent trend in length of journey to work across the study area. Residents of census blocks in the Fort Lee area have both the longest and the shortest journey to work times. Likewise, residents of the census blocks around Nyack have both high and low journey to work times.

Journey to work times depend on multiple variables, including distance to work, mode of transportation, congestion, and transit frequencies. Residents of census tracts in the middle of the study area are further from job centers and more likely to drive to work. Similarly, households around Fort Lee and Nyack are less likely journey to work by driving, and are likely more dependent on transit, and therefore journey to work time may depend more on the availability of transit infrastructure.

Journey to Work Mode

A majority of workers in the study area journey to work by driving (either alone or as part of a carpool). Residents of census tracts in the middle of the study area have the highest rates of driving to work, while residents of census tracts in the southern portion of the study area, around Fort Lee, have the lowest rate of driving to work. This follows the land use patterns: more mixed-use areas have a higher concentration of destinations and greater access to transit. Less than 5% of the study area population journeys to work by active transportation methods of biking or walking.

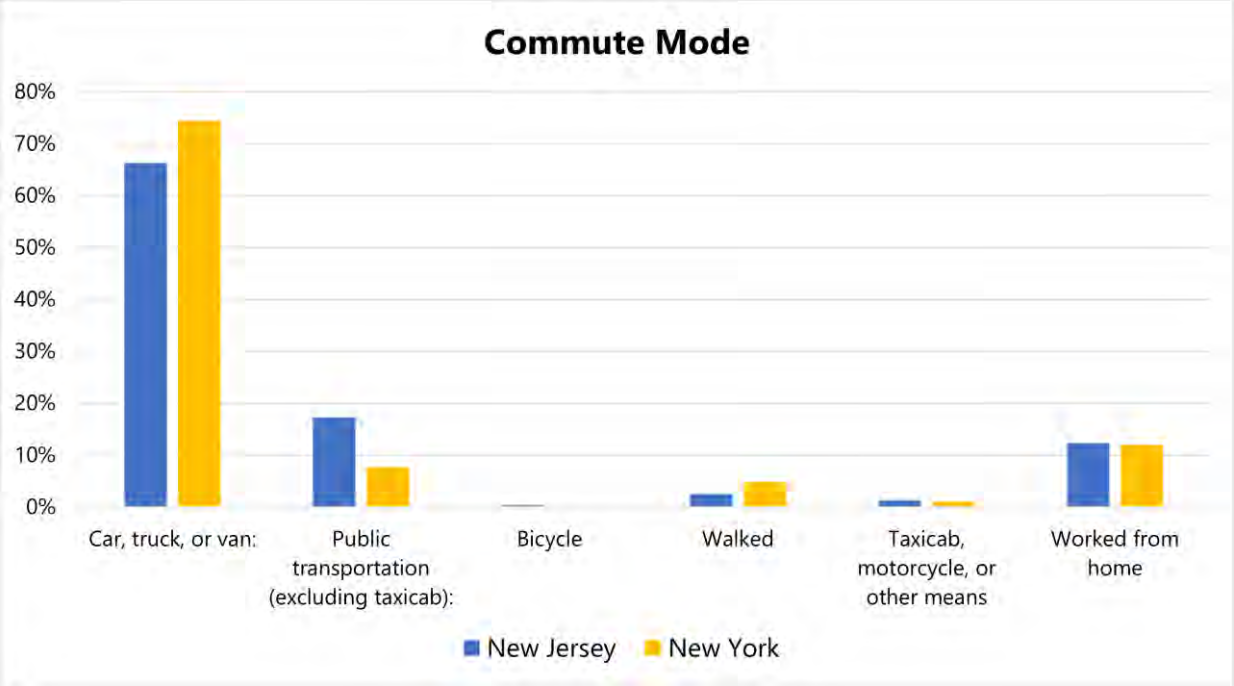


Figure 8: Modes of commuting in the study area (Data Source: ACS 2017 – 2021)

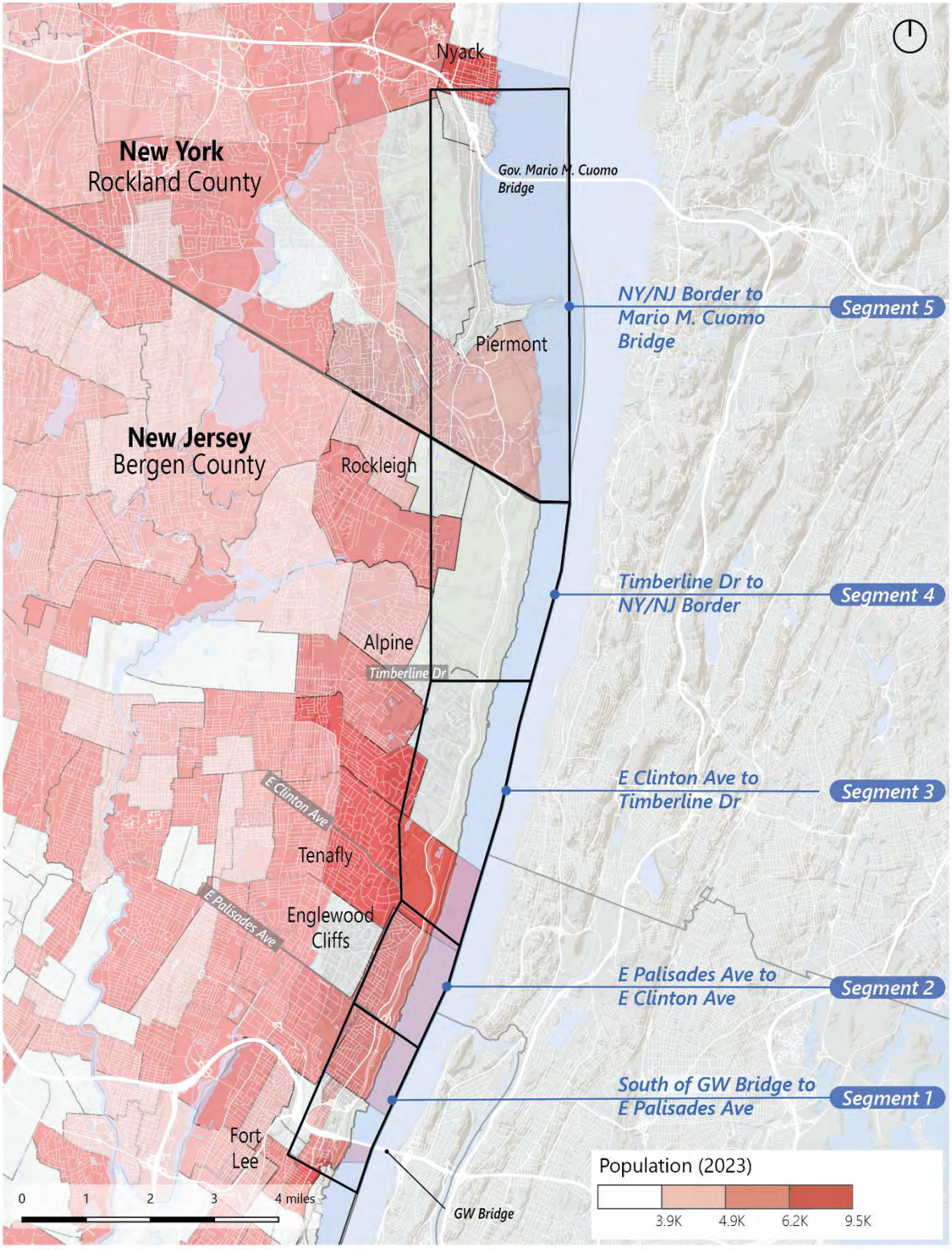


Figure 9: Total projected population by census tract in 2023 (Data Source: NJTPA Travel Demand Model)

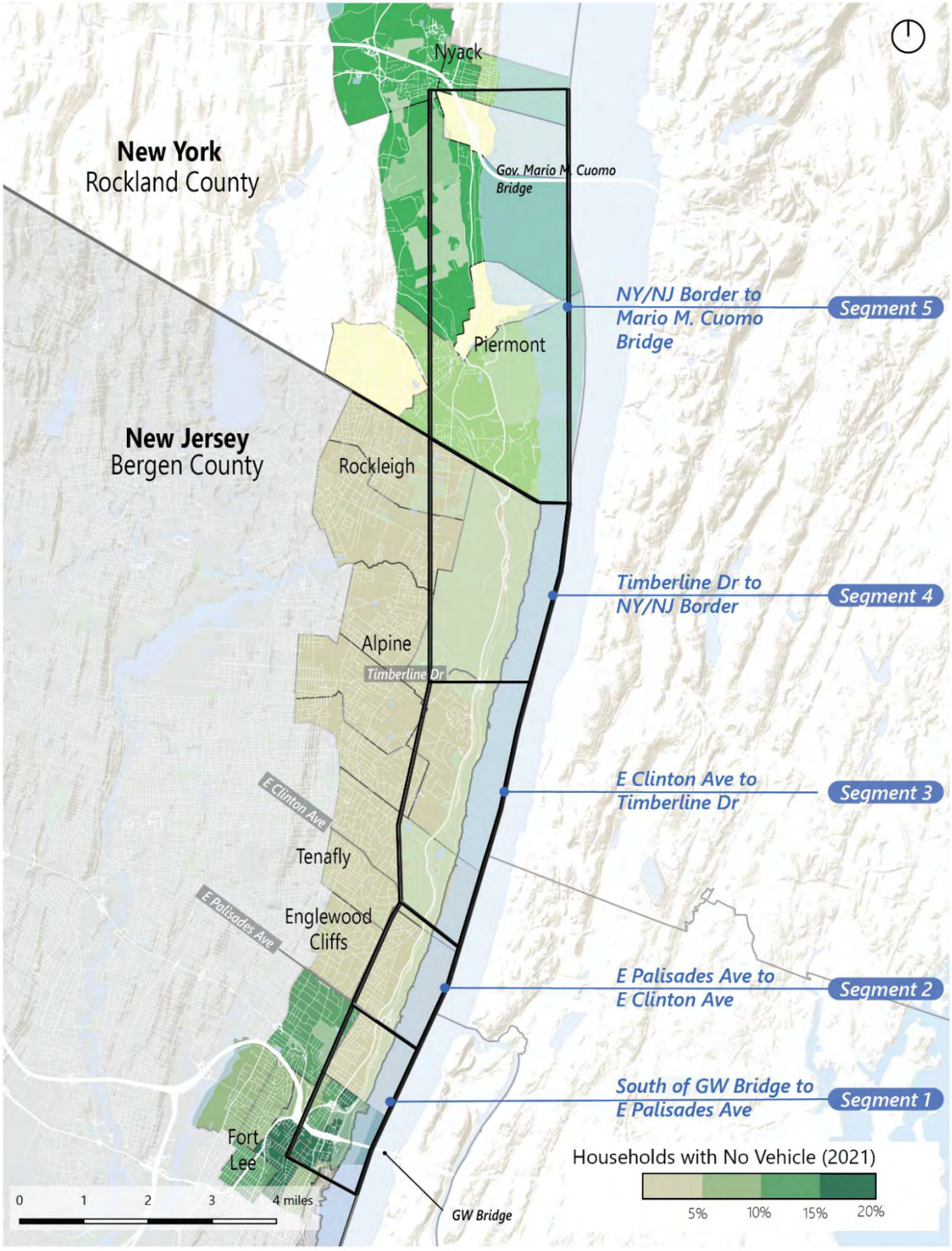


Figure 10: Proportion of residents with no access to a vehicle. (Data Source: ACS 2017-2021)

Transportation

Several transportation factors impact the functionality, accessibility, and safety of the study area. The level of bicycle compatibility (LBC), defined by the North Jersey Transportation Planning Authority (NJTPA), is a key determinant of biking comfort for cyclists. Other considerations include functional classifications of adjacent highways, transit accessibility, street widths, and traffic flow. These considerations play a fundamental role in how people move through the study area and shapes the user experience across all modes.

Functional Classifications

Functional classification is a system of classifying groups of highways according to the mix of access and mobility functions they provide.

- **Principal Arterials:** Highest-capacity roads in the network and serve as major transportation corridors, often connecting major cities and regions.
- **Minor Arterials:** Lower capacity than principal arterials but still serve as important connectors between cities, towns, and regions. They typically have fewer lanes and lower travel speeds than principal arterials.
- **Major Collector Roads**: Collect traffic from local streets and funnel it onto arterial roads.
- **Local Streets:** Serve primarily neighborhood, communities, and provide access to individual properties.

Table 1: Functional classifications of major roadways through the study area

Roadway	Functional Classification	Travel Way (ft)	Shoulder (ft) [per side]	Total (ft)
Segment 1-2 (From George Washington Bridge to E Clinton Ave)				
Henry Hudson Drive	N/A	18- 20	0	18-20
Palisades Interstate Parkway	Principal Arterial	22-24	4	30-32
US 9W	Principal Arterial	56	0-4	56-64
Segment 3 (From Clinton Ave to Timberline Dr)				
Henry Hudson Drive	N/A	18- 20	0	18-20
Palisades Interstate Parkway	Principal Arterial	22-24	4	30-32
US 9W	Principal Arterial	24	0-12	24-48
Segment 4 (From Timberline Dr to NY/NJ Border)				
Palisades Interstate Parkway	Principal Arterial	22-24	4	30-32
US 9W	Principal Arterial	24	0-8 (SB) 0-4 (NB)	40-48
Segment 5 (From NY/NJ Border to Gov. Mario M. Cuomo Bridge)				
US 9W	Principal Arterial	22-24	0-6	22-30

Bicycle Compatibility

The level of bicycle compatibility (LBC) is an indicator used by NJTPA to describe the level of comfort or discomfort experienced by cyclists when navigating a road or pathway. The LBC value of a path is based on an aggregation of transportation related attributes including traffic volume, vehicle speed, the presence of biking infrastructure, and overall road conditions. These range from LBC 1, offering low stress and safety for most individuals, to Level 5, characterized by high traffic stress and prohibit cyclists. This analysis, conducted by NJTPA, only applies to the roadways within the New Jersey portion of the study area.

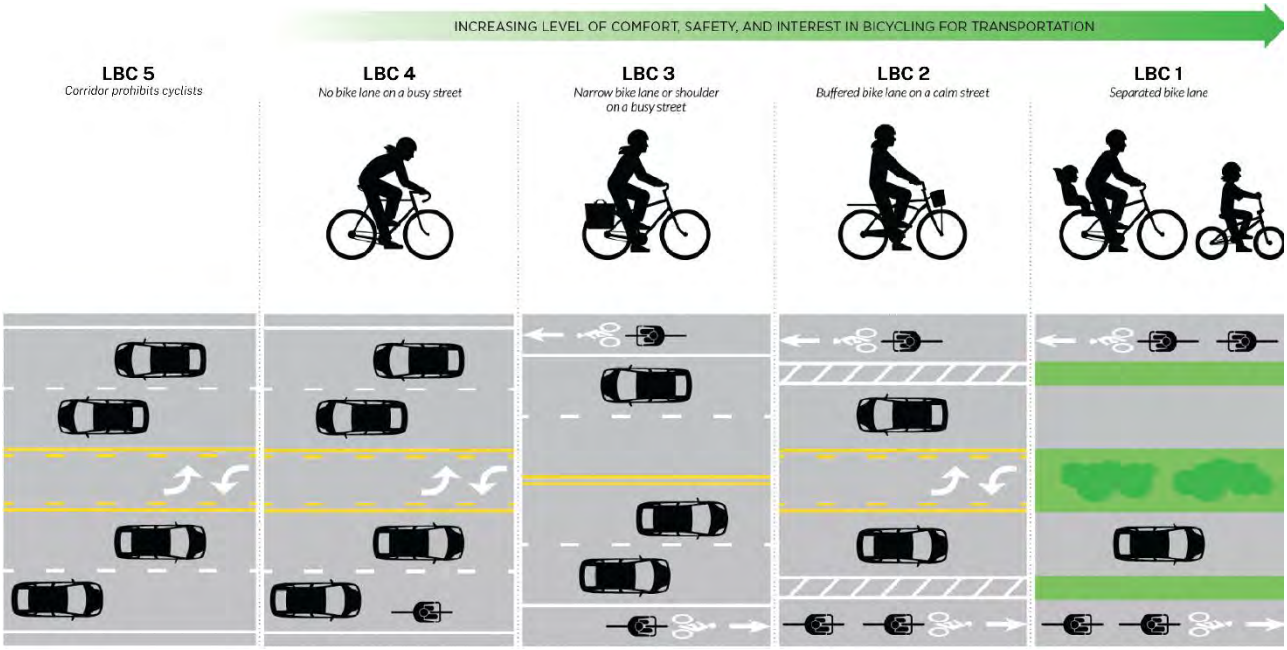


Figure 11: Level of Bike Comfort (Credit: Alta Planning + Design)

US 9W: NJTPA generally classifies US 9W as LBC 4. Further examination of the highway reveals more in-depth differentiations of biking conditions along the roadway. US 9W is a four-lane undivided road up until Segment 3 (Clinton Avenue, Tenafly). In Segment 3, US 9W turns into a two-lane undivided road with approximately 12-ft shoulders widths in each direction. The shoulders terminate at the intersection of Orbach Way in Section 4 but re-emerge with an 8-ft shoulder in the southbound direction and a 4-ft shoulder in the northbound direction. US 9W continues in Section 5 with two-way undivided lanes and shoulders that range from 0 to 6-ft in each direction.

Palisades Interstate Parkway: NJTPA generally classifies Palisades Interstate Parkway as LBC 5. Palisades Interstate Parkway is a four-lane divided road with 4-ft shoulders. This roadway is prohibited to cyclists.

Henry Hudson Drive: NJTPA generally classifies Henry Hudson Drive as LBC 3. Henry Hudson Drive is a 30-ft wide, scenic roadway with low car volume. The roadway begins at the Edgewater park entrance in Fort Lee and follows the Hudson River to the Alpine Park entrance in Segment 3, where it merges with US 9W.

Transit

The study area can be accessed by car or bicycle, as well as public transit services. The study area is serviced by New Jersey Transit (NJT), Transport of Rockland (TOR), Hudson Link, and Rockland Coaches bus routes.

Table 2: Bus lines servicing the study area

Bus Service	Segments Served	Frequency (buses per hour at AM peak)
Rockland Coaches 9A (Nyack– Stony Point, New York)	1, 2, 3, 4, 5	2.5
New Jersey Transit Bus Route 156 (Englewood Cliffs- Fort Lee- NY)	1	2
New Jersey Transit Bus Route 186 (Dumont – New York (GWB))	1, 2	3
Transport of Rockland Bus Routes 59 (Nyack – Suffern)	5	3
Transport of Rockland Bus Roue 91 (Nyack – Spring Valley)	5	1
Transport of Rockland Bus Route 92 (Spring Valley – Nyack)	5	2
Hudson Link Routes H03, H05, H07, H07X	5	3

Annual Average Daily Traffic

Annual Average Daily Traffic (AADT) measures the number of vehicles that travel a given road segment in a year, divided by 365 to find the average number of daily trips. It is a useful metric in gauging traffic congestion, road safety, and infrastructure design. Table 3: shows the most recently available AADT for the selected study area roadways.

Table 3: Average Annual Daily Traffic (AADT) levels along major roadways through the service area (Sources: NJDOT Traffic Counts 2012-2022 and NYSDOT 2023)

Roadway	Average Annual Daily Traffic	Source (Year)
Segment 1-2 (From George Washington Bridge to E Clinton Ave)		
Henry Hudson Drive	2,239	NJDOT (2020)
Palisades Interstate Parkway	48,821	NJDOT (2021)
US 9W	21,293	NJDOT (2022)
Segment 3-4 (From E Clinton Ave to NY/NJ Border)		
Henry Hudson Drive	2,239	NJDOT (2020)
Palisades Interstate Parkway	37,327	NJDOT (2021)
US 9W	7,667	NJDOT (2020)
Segment 5 (From NY/NJ Border to Gov. Mario M. Cuomo Bridge)		
Palisades Interstate Parkway	44,957	NYSDOT (2023)
US 9W	9,613	NYSDOT (2023)

Crash Analysis

Every year, the study area has had several bicycle and pedestrian crashes, including Killed or Severely Injured (KSI) crashes. Crash hot spots occurred most often at intersections and areas around on/off ramps. Detailed information (when available) suggest that intersections are more common sites for crashes than mid-block locations. This pattern of crash locations suggests that intersections in the study corridor warrant further study for safety improvements.

Bicycle crashes occurred most often on weekends during daylight hours. This suggests that the corridor is used mostly for recreational bicycling as opposed to commuting or other transportation uses. Available data indicates that men between the ages of 30 and 59 were the most common demographic for bicycle and pedestrian crash victims. The prevalence of this demographic in the crash data suggests that this group may also make up the majority of bicyclists and pedestrians currently using the study corridor. Notably, not all bicycle and pedestrian crashes are reported, so the data may represent only a subset of actual crashes occurring in the study area. For the full analysis, please reference Appendix 3: Crash Analysis Memo.

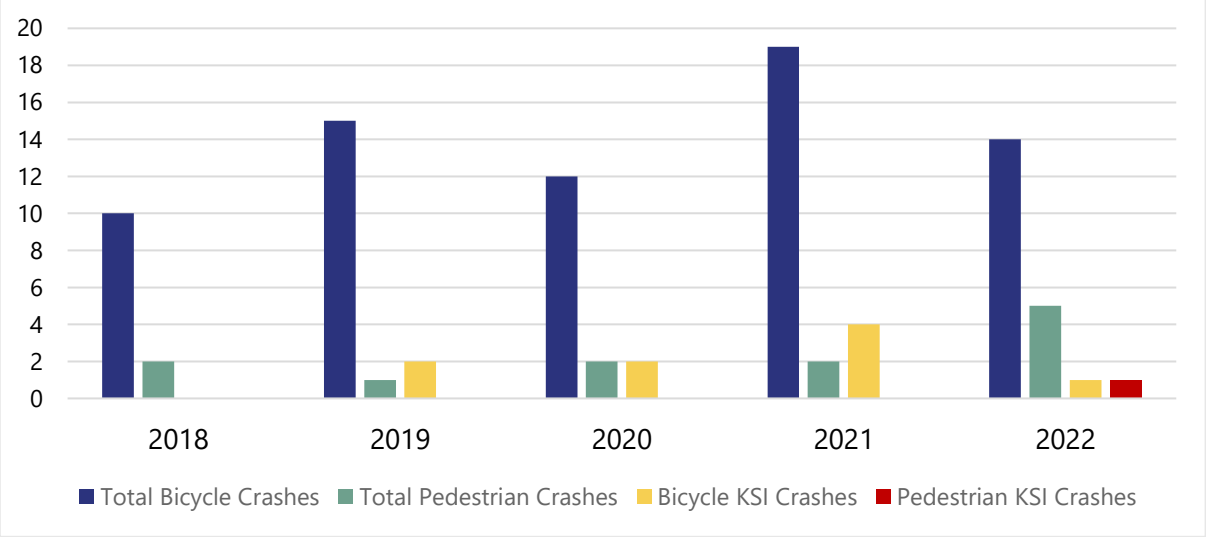


Figure 12: Pedestrian and bicycle crash data from the NJ portion of the study area between 2018 and 2022 (Source: NJDOT)

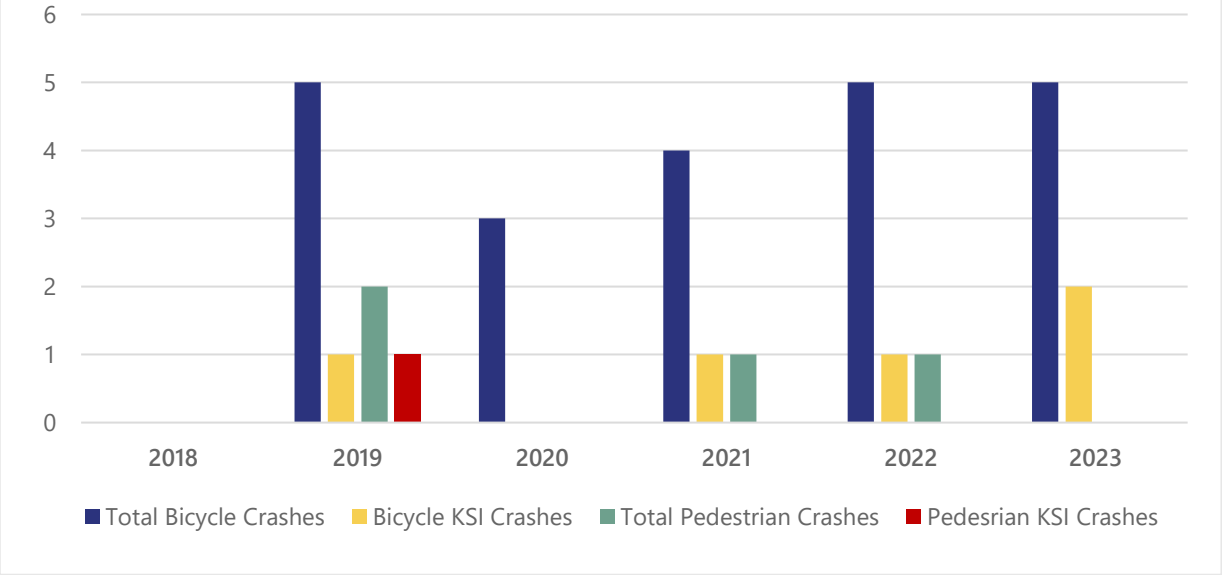


Figure 13: Pedestrian and bicycle crash data from the NY portion of the study area between October 2018 and September 2023 (Source: NYSDOT)

Title VI Non-Discrimination

In keeping with NYMTC's Title VI Non-Discrimination Program, Communities of Concern (COCs) were identified in the New York portion of the Palisades study area. NYMTC defines COCs based on census tracts that meet both of the following two conditions related to minority and lower income populations:

- Minority population greater than the NYMTC planning area average; and
- More than the NYMTC planning area average of the tract population living in low-income households at or below the poverty level.

For the portion of the study area in New Jersey, NJTPA's methodology was used to assess census tracts, which is based on 11 factors including race, income, English proficiency, disability, age, and national origin. The New York COCs and the New Jersey equity score locations are mapped in the figures below.

Based on this assessment, COCs and equity locations were identified in Fort Lee, New Jersey and Nyack, New York, according to the criteria of the respective organizations. These designations were useful in seeking meaningful participation from these communities in the development of this plan and the investments that may follow as a result of this planning process.

With regard to this plan, meaningful participation in its development and potential outcomes should result in adequate access to resulting improvements. It also should ensure that negative impacts of this plan, foreseen or otherwise, do not disproportionately fall on these communities. In this context, meaningful participation means adequate access to planning and decision-making processes. In the context of this plan, that included:

- Promoting accessibility to meetings;
- Fostering two-way communication including feedback loops through which the community can continue to provide input throughout the project;
- Working with local organizations already engaging with communities; and
- Responding to community concerns.

Promoting Accessibility to Meetings

1. **Offered multilingual materials**: Outreach materials such as flyers promoting the public meetings, popup events, and visioning workshops, as well as the map survey and questions, were available in English, Spanish, and Korean to increase accessibility.
2. **Website with information and access to the project survey and interactive map**: The project website contained project information, the ability to contact the project team, and was also where one could access the project survey and interactive online map.
3. **Had a variety of event times and locations**: Meetings, workshops, and pop-up events were scheduled at different times of the day and held in-person and virtually to increase accessibility.

Fostering Two-Way Communication and Feedback Loops

1. **Engaged a technical advisory committee**: Gathered specific feedback from subject-specific professionals about the study's progression at key intervals.
2. **Gathered feedback at in-person pop-ups:** The project team engaged with people across the study area at four pop-ups, collecting feedback using physical and digital maps, surveys, and via conversation.
3. **Accepted comments via website and project email**: Enabled the community to stay informed and provide comments at any time through a comment form or the project email.
4. **Used live polls during workshops**: Gauged participants' preferences and collected input in real time using polling software during meetings.

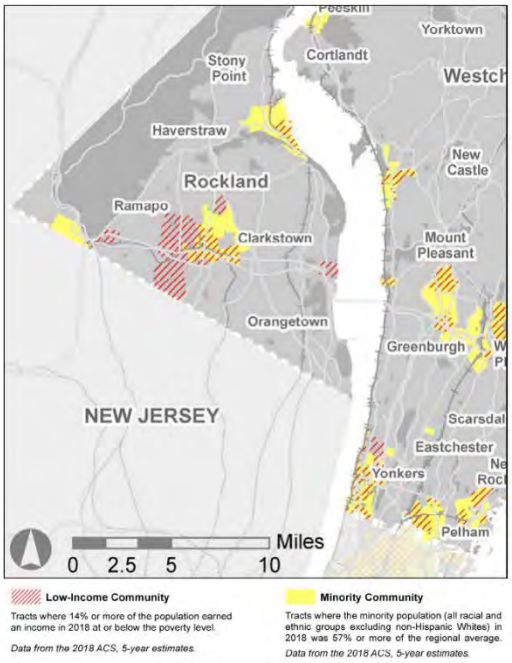
5. **Facilitated breakout room discussions**: Ensured attendees could voice their input during online visioning workshops by breaking out into facilitated, smaller group discussions.
6. **Conducted continuous engagement**: Scheduled additional in-person and online public meetings for spring 2025 to review the draft plan and recommendations.

Working with Local Organizations and Engaging with Communities

1. **Engaged Chambers of Commerce and local businesses**: Encouraged attendance to project related events by reaching out directly to local businesses and Chambers of Commerce. The project team also delivered event flyers to local businesses.
2. **Invited government agencies and elected officials**: Encouraged municipalities, public agencies, and schools to participate in project events.
3. **Held events in high-traffic community locations**: Hosted pop-ups at popular places around the study area where locals naturally gather.
4. **Engaged cyclist groups**: Reached out to biking groups and held events at places popular with people biking.

Responding to Community Concerns

1. **Documented public feedback thoroughly**: Recorded and categorized comments and input in comment logs, meeting recordings, engagement summaries, and detailed reports.
2. **Adjusted study based on input**: Evolved the study from a shared-use path to a broader network approach due to community feedback. Public input continued shaping final recommendations.
3. **Highlighted key input in reports**: Noted issues such as traffic conflicts, poor lighting, and lack of amenities and shared them at subsequent workshops and meetings to ensure transparency about how feedback was gathered and incorporated.
4. **Encouraged direct follow-up and questions**: Invited participants to visit the project website or email the team with input and questions. Maintained a project email list to provide regular updates to people who had engaged with the project.



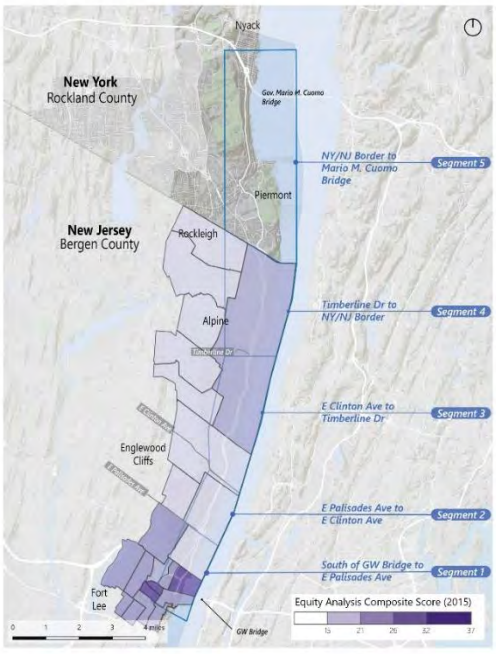


Figure 14: New York Communities of Concern (Source: NYMTC Regional Transportation Plan) (left)
Figure 15: New Jersey Equity Composite Score used to identify Communities of Concern (Data Source: NJTPA Equity Analysis Tool) (right)

4 Public Engagement

Public engagement was a critical part of the study process, helping to shape the focus and recommendations of the study. Engagement was split into three phases:

1. Visioning workshops in the spring of 2024 held online to hear from interested parties about how they use the corridor and what they would like to see as part of this study.
2. In person pop-up events in the summer of 2024 to meet people out in the community, identify current and potential routes, safety concerns, desired amenities, how people use the area today, and how they would like to use it in the future. During this phase an online map and survey was available through the project website for anyone to provide feedback.
3. In-person and online sessions to get feedback on the draft plan and recommendations in the spring of 2025.

In addition to these events and the online webmap, people could contact the project team at anytime through the project website or email. A contact list of interested parties was also maintained to provide email updates throughout the course of the study.

Through these efforts, over 280 members of the public were engaged. As a direct result of these engagement efforts, the study's focus was broadened to a network approach that accommodates a range of users on different routes.

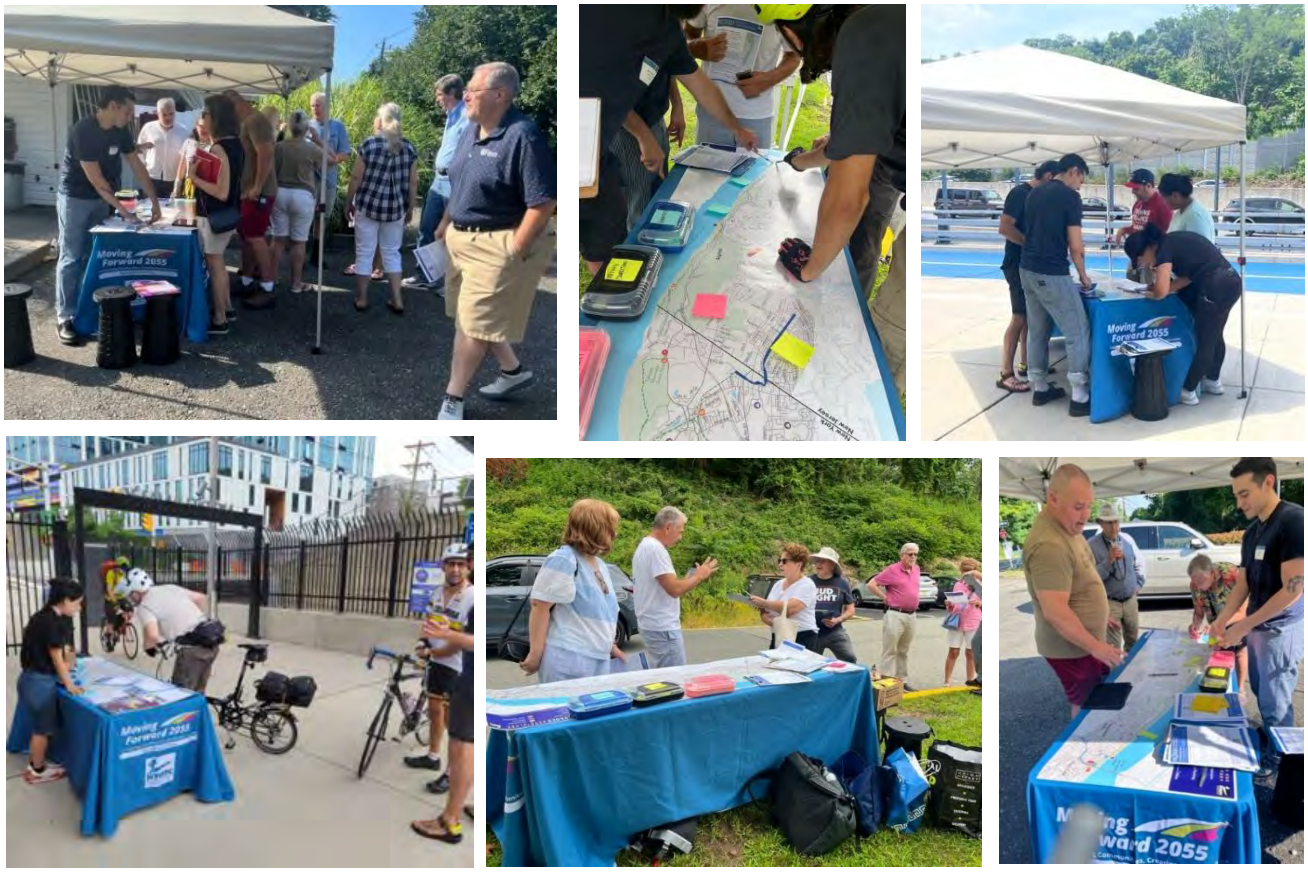


Figure 16: People were able to engage directly with study at pop-up events, and provide mapped, written, and oral comments.

Visioning Workshops

Three virtual workshops were held online in March of 2024. The purpose of the visioning workshops was to provide stakeholders and the public with information about the study process and goals, and to gather feedback from all interested and impacted members of the public. The project team gathered feedback to help understand how people currently use and experience the corridor with respect to active transportation and how improvements could enhance amenities, safety, and connectivity. All virtual visioning workshops were open to the public.

Workshop participants provided input on path features, users of the path, need for the project, methodology for the study, environmental considerations, flooding concerns, safety, path route, and connectivity. In particular, participants expressed concerns over safety of the existing bicycle route along route 9W, concern over road cyclists sharing a path with pedestrians, and using existing walking paths (Old Erie Path) as a through route for large groups of people biking. Participants also noted the need for better bicycle infrastructure, especially in New Jersey and the benefits of connecting the study area through a shared-use path. These comments were used to adjust the study methodology to incorporate a network approach and informed the community input criterion of the evaluation of proposed routes.

Pop-Up Workshops and Webmap

Four pop-up events were held in August of 2024, two in New York and two in New Jersey, to gather insights and ideas about the Palisades study area. Anyone interested in learning about the study or sharing their thoughts was welcome to attend. In total, the project team spoke with over 90 members of the public.

The pop-up events provided an opportunity to gather insights from current and potential users, as well as those interested in the study corridor. Input received will contribute to the development of comprehensive recommendations tailored to the diverse needs of all corridor users. All materials and input methods were available in English, Spanish, and Korean. Three types of input were gathered:

1. **Background information**: a short survey consisting of five questions, designed to better understand how the public uses the corridor (walking/biking/rolling/etc.) and how often, as well as to gather demographic information.
2. **Online and in-person mapping exercise**: members of the public were invited to provide feedback about amenities, missing connections, and safety improvements, via a digital map or a physical map. At the physical map, members of the public were invited to place sticky notes or speak informally with a member of the project team about their suggestions related to amenities, missing connections, and safety improvements. The digital map involved dropping points onto an interactive map of the study area and identifying locations where the route could be improved. The public was invited to complete the digital map via an iPad, or to scan a QR code to complete it on their phone or computer after the event. The digital map was available for public input until August 20, 2024.
3. **General feedback and conversation**: through conversations with members of the public, the project team wrote down and noted general feedback and thoughts about the corridor.

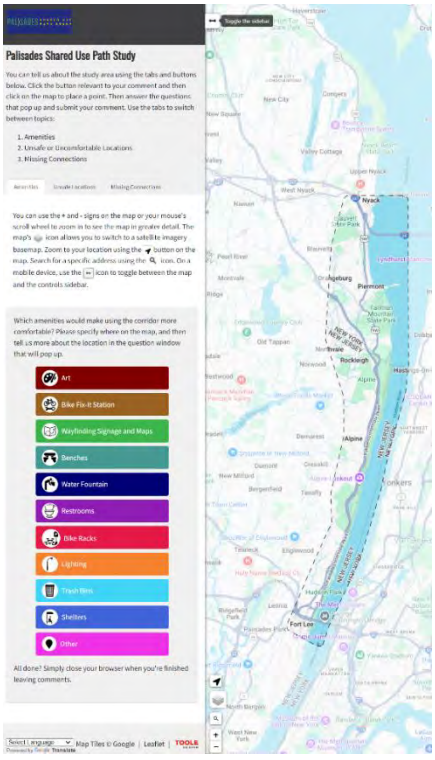


Figure 17: The online map was used to gather community input on desired amenities and route connections

Potential amenities suggested on the map

- Art
- Bicycle Fix-It Station
- Wayfinding Signage and Maps
- Benches
- Water Fountain
- Restrooms
- Bicycle Racks
- Lighting
- Trash Bins
- Shelter

Potential safety concerns indicated on the map

- Poor Lighting
- Traffic Conflicts
- Inadequate Signage
- Poor Path Conditions
- Lack of Crosswalks
- Crime or Other Security Issues

Community members also left feedback through the online maps regarding facility characteristics, amenities, safety, and connectivity. There was a desire for a separation of users between cyclists, pedestrians, and vehicles. Along the route, community members expressed a need for restrooms and water fountains. Particularly regarding Henry Hudson drive, community members requested wayfinding infrastructure and for the route to be open all year. Respondents also noted many safety concerns along the existing 9W route along areas where there is high-risk of conflict with vehicles. There was also a desire to connect the route with other trails to extend off-street travel options. These comments were used to evaluate community support for the proposed routes as well as inform proposed amenities for the routes.

5 Approach to Evaluation

Based on the existing conditions analysis, initial technical analysis of the study area, and feedback garnered through the public engagement, a systematic approach to evaluating alternatives to the area was developed. As the focus of the study broadened to a network approach, and considering the other ongoing efforts in the area, three geographic areas emerged as in-need of improved connectivity: north-south connections, east-west connections, and last-mile connections to the George Washington Bridge. In addition, the study looks at potential amenities and facility types and a framework to help unify the area.

Areas for Assessment

North-South Connections

North-south connections between the George Washington Bridge and the Gov. Mario M. Cuomo Bridge are explored. Eleven potential route segments are identified for evaluation including portions of US 9W, a new trail adjacent to Palisades Interstate Parkway, Henry Hudson Drive, existing rail trails, and local roads.

East-West Connections

There are currently no formalized east-west connections for bicyclists connecting the Palisades to communities farther east. This study identifies five potential routes connecting the Palisades with the communities of Closter, Cresskill, Tenafly, and Englewood. These routes would serve to better connect Bergen County communities with the Palisades study area, as well as connecting visitors to local downtowns.

George Washington Bridge Last Mile Connections

The study identifies a need for greater pedestrian and bicycle connections to and from the George Washington Bridge in Fort Lee, allowing access from the study area to New York City and vice versa. Three routes are identified as potential paths for accessing the bridge.

Amenities

In addition to identifying routes for bicycle and pedestrian routing and infrastructure, the study explores options for adding amenities to facilitate bicycle and pedestrian recreation in the Palisades. The study proposes seating, bicycle parking and repair tools, public art, and comfort stations as ways to improve the experience for those exploring the Palisades study area.

Polices

Policies and programs to facilitate pedestrian and bicycle connectivity through the study area are also explored. The focus of these policies is to create a unified recreational experience with a single point of information for trails, points of interest, and amenities, as well as an organization responsible for coordinating implementation and maintenance of the trail network.

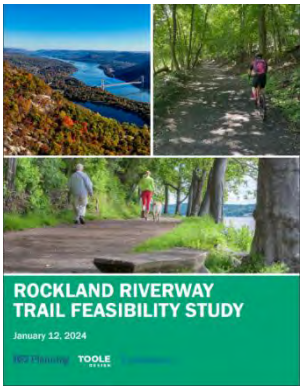
Related routes in the area

Four related routes were identified that contribute to the study area network but were not evaluated as part of this study. The US 9W in New Jersey and the Rockland Riverway Trail were excluded because they are being studied as part of other studies that are further along than this feasibility study. The Long Path was excluded from evaluation because it already exists but is a key component of the local hiking trail system. And the Northern Valley Greenway was excluded from evaluation because it faces significant hurdles to implementation.

NJDOT US 9W Study (currently in design)

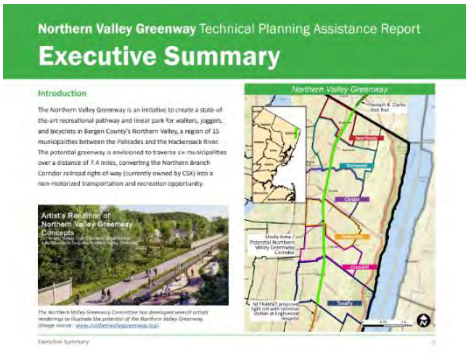
NJDOT is conducting a study to make bicycle and pedestrian improvements to US Route 9W. The study encompasses the portion of US 9W from E Palisade Avenue in Englewood Cliffs to the New York State Border. The study is in response to the significant number of bicyclists along the corridor and the higher-than-average bicycle crash rate as well insufficient pedestrian facilities. In general, the study seeks to widen the shoulder of US 9W to accommodate separated cycling facilities. The study has completed the concept development phase and is moving to the preliminary engineering phase at time of writing.

Rockland Riverway Trail (study)



In 2024, Rockland County finalized a study for a 21-mile trail running along the Hudson River through the county. The study aims to increase access to recreation for Rockland County residents, improve connectivity between Rockland County communities and other Hudson Valley communities, promote county economic development and tourism, and enhance the public realm. This proposed trail compliments the efforts of the Palisades Shared Use Path Study and helps to continue north-south connectivity along the west side of the Hudson River.

Northern Valley Greenway (advocacy)



The Northern Valley Greenway (NVG) is a proposed 7.4-mile recreational pathway and linear park through Bergen County along the unused Northern Branch Corridor railroad right-of-way. The proposed path would begin at border between Englewood and Tenafly, south of which the right-of-way is reserved for the proposed extension of the Hudson-Bergen Light Rail. Running north from there, the path would connect the communities of Tenafly, Cresskill, Demarest, Closter, Norwood, and Northvale. The north end of the trail could connect with the Joseph B. Clarke existing rail trail in Rockland County, though a small portion of right-of-way would need to be acquired on the New York side of the border. A major impediment to the project is that the corridor is still owned by the CSX railroad company. Acquisition will be expensive, however, as of the writing of this report, CSX has indicated that they may be interested in selling.

The Long Path (existing trail)

The Long Path is a 358-mile walking trail stretching from the 175th Street station in Manhattan to the Adirondack Mountains. The trail traverses through the Palisades along the top of the cliffs through Bergen County, NJ and Rockland County, NY. This trail is not evaluated as part of this study, as it is an established route that is maintained and advocated for by the New York - New Jersey Trail Conference; however, it is an important hiking trail through the region that connects with some of the routes in the proposed network.

Joseph B. Clarke Trail (existing trail)

The Joseph B. Clarke Trail is a paved, nearly 4-mile rail trail that connects Blauvelt to Tappan in Rockland County. It intersects the Olde Erie Path in Sparkill and ends at Oak Tree Road, about 1,000 ft from the state border and the proposed Northern Valley Greenway.

User Groups

Diverse users have different needs with respect to the type of infrastructure required. Four primary user groups were identified as part of this study, as outlined below. Not every route is best suited for each group. As part of the evaluation, a user group or groups are designated for each route. The recommendations from the evaluation are based on the ability of the route to serve these user groups specified; however, the recommendation does not preclude other user groups from using that route.

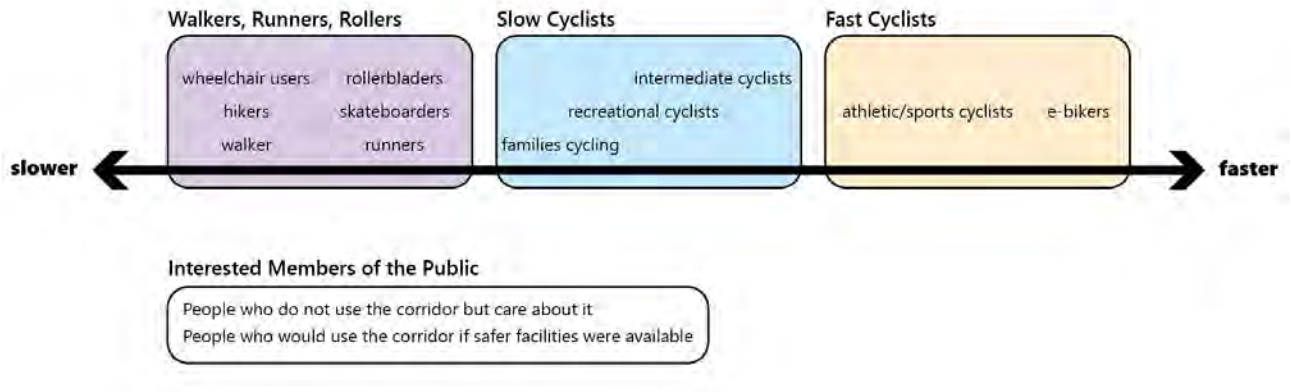


Figure 18: User groups

Walkers, Runners, Rollers

Walkers, hikers, and wheelchair users, as well as roller bladers, skateboarders, and runners generally travel at slower speeds. These users will travel over shorter routes and require separation from vehicle traffic. Additionally, these users tend to prefer separation from fast cyclists. Some users in this group require a paved path, while others can use or may prefer an unpaved path.

Slow Cyclists

The study area is popular with slow cyclists, including small groups and families cycling together who travel at slower speeds and over shorter distances as compared with fast cyclists, but still outpace other forms of active transportation. These users desire moderately long routes but may be more tolerant of interruptions and path congestion. These users seek separation from vehicle traffic. Clarity in wayfinding, access points, and information about steep grade changes would increase accessibility of a route to these users.

Fast Cyclists

The study area, especially US 9W, is popular with fast cyclists who travel long distances at relatively high speeds, sometimes in large groups. This group is best served by long, high-speed routes with minimal interruptions. Speed is generally more important than separation from traffic for these users, though separation from vehicles would provide significant safety benefits. For the purposes of this study, e-bikes are also included in this group.

Interested Members of the Public

The final group of users are those that do not use the corridor, but care about it, such as those that live in the area or advocates as well as those who do not use the corridor but would if safer facilities were available and the network was easier to navigate. While Group 4 is not specified as a user for any of the paths, members of this group may become part of another user group, if facilities promoting safe and convenient active transportation are provided.

Route Selection Criteria

Five feasibility criteria were developed to evaluate the identified corridors:

- Available right-of-way
- Topography
- Cost
- Community support
- Safety

Routes that directly overlap with the Riverway Study, NJDOT 9W Study, or the Northern Valley Greenway, were discontinued from consideration in this study, due to the dedicated consideration they are receiving in parallel initiatives. This also allowed for the focus of the study to broaden to a network approach by looking beyond these studied corridors. As a result, portions of US 9W in New Jersey and a number of routes through Rockland County were excluded from evaluation.

Feasibility Criteria

Right-of-Way

Routes were evaluated to see if there is sufficient right-of-way width for the appropriate facility. The appropriate facility depends on intended user groups as well as roadway characteristics such as speed, volumes, width, and frequency of intersections. The less safe a street, the more protection/separation the recommended intervention requires. For example, shared lane markings are considered appropriate for bicyclists on low-volume, low-speed streets but not high-traffic roads. Routes with little available right-of-way, where significant widening would be required to implement the safe treatment for the road type, are ranked low priority, while corridors with readily available right-of-way space for the appropriate road treatment are considered highest priority.

Topography

Topography impacts the usability of the path, as steep hills are more challenging to traverse than flat ground. Routes with grades above 10% would be challenging for many users and are considered lowest priority, while routes with less than 5% grades are more accessible and considered highest priority. Topology is also considered in assigning user groups, with steep hills considered a deterrent for Rollers (people using wheelchairs, skateboards, rollerblades, etc.).

Cost

An estimated order-of-magnitude opinion of probable cost is presented for each segment route based on facility type. This opinion of probable construction cost was developed by identifying pay items and establishing quantities based on the proposed segments. Additional pay items have been assigned approximate lump sum prices based on a percentage of the anticipated construction cost. Preliminary cost opinions include a 5-20% contingency to cover items that are undefined or are typically unknown prior to final design. Routes that are estimated to incur high costs, defined as greater than $10.5 million, to develop the recommended infrastructure, are considered low priority. Routes with low costs to complete, defined as less than $5 million, are considered highest priority.

As this study is a preliminary planning study, costs have been developed based on current understanding of each recommendation and should provide a baseline for planning-level, capital improvement decision-making. Costs were estimated based on professional judgment and experience with similar projects. It is expected that costs would become more accurate as planning and design advances.

Community Input

The study considers online and in-person input received from the public about different proposed routes, as described in the public engagement section of this study. The outreach efforts sought to capture the diverse perspectives and needs of the communities along the corridor. Public feedback was categorized by the key themes identified during public outreach such as: safety, connectivity, and user needs. This approach allowed for a systematic evaluation that addressed various community concerns and desires. Each segment was then qualitatively evaluated based on positive and negative comments received with respect to these themes. Segments with predominantly positive feedback and strong alignment with community desires received a high grade. Those with mixed feedback, balancing both support and concerns, were graded as medium. Segments with significant opposition or concerns were graded as low.

Safety

The study considered the safety of the routes based on an analysis of available crash data. Crash frequency and severity were used to evaluate each segment: one exclamation mark (!) for a low number of crashes, two exclamation marks (!!) for a medium number of crashes, and three exclamation marks (!!!) for a high number of crashes or any killed or severely injured (KSI) crashes. Safety is evaluated in conjunction with the other criteria to determine if the route should be prioritized.

The safety evaluation is not ranked based on priority, as the interpretation of the crash data depends on context. A high number of crashes may point to areas that are a high priority for safety improvements. However, if a high number of crashes occurs where it is not possible to make the necessary safety improvement, the route may be low priority, where instead the safest option is to direct travelers to a different route.

The crash analysis was completed before initial public outreach and the scope of the study expanded to a network approach. Therefore, not all segments were evaluated using crash data. In some of those cases, safety was evaluated based on roadway characteristics that are known to contribute to safety, including speed limit and frequency of intersections.

Table 4: Evaluation criteria and rating methodology

Metric	Low Priority	Medium Priority	High Priority
Right of Way	Minimal available right-of-way. Significant engineering and widening are required.	Moderate amount of right-of-way. Some widening may be necessary	Available right of way for the recommended treatment.
Steep Grade	Steep grades, greater than 10%	Moderate grades between 5% and 10%	Shallow grades less than 5%.
Cost	High cost, greater than $10.5 million	Moderate cost, between $5 million and $10.5 million.	Low cost, less than $5 million
Community Input	Primarily opposing community input	Mixed community input	Primarily supportive community input
Safety	No crashes along the corridor	Moderate rate of crashes, no KSI crashes	High rate of crashes and/or KSI crashes

Disqualifying Criteria

Vocal community opposition
Routes that received significant opposition from the communities during public engagement were removed from consideration. This includes the Old Erie Path, for which many residents of Grandview and Piermont objected to any changes that would direct through bicyclists to this trail, including paving.

Very steep grades
Steep grades make routes challenging for bicyclists and pedestrians to use. Routes with grades greater than 10% for long stretches that could not be addressed through design were removed from consideration due to being inaccessible to many potential users of the path.

Inadequate right-of-way
Routes where the right-of-way is too narrow and constrained from being widened for the appropriate intervention to facilitate safe travel were removed from consideration. Determining whether the right-of-way is too narrow depends on the type of roadway and intended user. On a high-speed, high-traffic routes, separating bicycle and pedestrian users from vehicle traffic is the safest road design and requires a wider right-of-way to accommodate. However, on low-traffic and slower speed roads bicycles and vehicles sharing the right-of-way may be appropriate. Sidewalks or other path separated from traffic is necessary for walkers and rollers.

Very high costs
Routes where constructing the appropriate design to facilitate safe bicycle and pedestrian movement would have prohibitively high costs were discontinued from consideration. Very high costs can arise from the need to acquire land, such as for the CSX route, or construction of entirely new infrastructure such as a path adjacent to Palisades Interstate Parkway.

Lacks opportunities for regional connectivity
Given the purpose of the study to create a connected network of bicycle and pedestrian routes through the Palisades study area, routes that offered limited connection to other trails or recreational opportunities were discontinued for consideration. This applied to two of the proposed last mile connections to the George Washington Bridge, which did not connect to any existing or proposed bicycle or pedestrian routes, in addition to other challenges.

6 Route Evaluation

The study assessed 19 routes across the three types of connection: ten north-south connections, six east-west connections, and three George Washington Bridge connections. The routes were evaluated on each of the five criteria described in the preceding section in the following route profiles. Based on the evaluation, each route is either recommended for further study or recommended to be excluded. Following the route profiles, the results of the analysis are summarized in tables for each type of connection. Five additional Related Routes in various stages of implementation are included but were not evaluated as part of the study.

Table 5: All studied connections and related routes

ID	Route Name
1	Henry Hudson Drive / Main Street
2	Adjacent to Palisades Interstate Parkway
3	Rockland Road / Ferdon Avenue
4	Piermont Avenue / River Road
5	Tallman Mountain State Park Path
6	Joseph B. Clarke Trail / Old Erie Path
7	Highland Ave / Valentine Ave
8	Lamont Observatory Route
9	CSX / Bradley Parkway / Waldron Ave
10	US 9W in Rockland County: Bicycle Route
11	Oak Tree Road
12	Closter Dock Road
13	Hillside Avenue
14	Hudson Avenue
15	East Clinton Avenue
16	East Palisade Avenue
17	Hudson Terrace
18	Sylvan Street
19	Main Street
20	US 9W in Bergen County
21	Rockland Riverway Trail
22	Northern Valley Greenway
23	The Long Path
24	Joseph B. Clarke Trail

Figure 19: All studied connections and related routes

How to read the Segment Profile

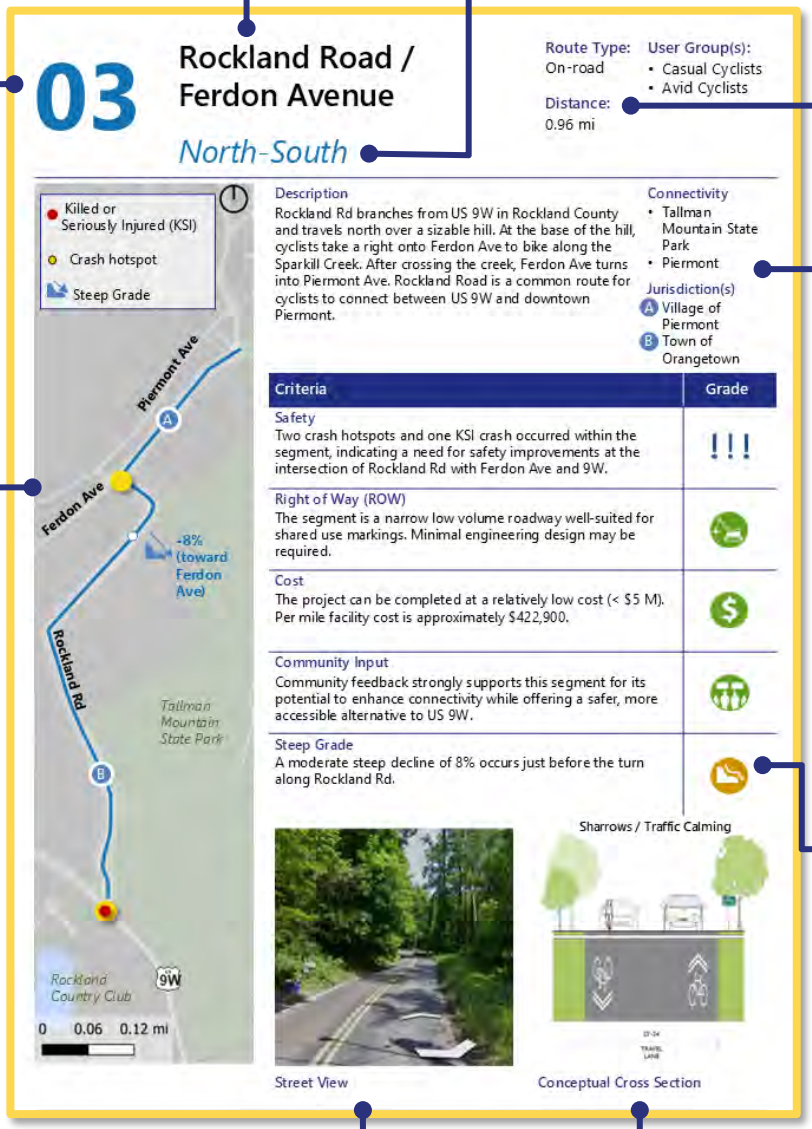
Segment Name and Descriptor
Lists the corridors or existing trails served by the proposed segment.

Connectivity Type
Indicates whether the proposed segment will provide: North-South, East-West, or Last Mile to GWB connection.

Route Type, Distance, and User Group
Displays the route type, distance, and user group:
- Route type indicates whether the connection will be on-road, off-road, trail, or a mix of options.
- Distance indicates the length of travel (in miles) along the segment.
- User group indicates who would likely feel comfortable using this route.

Map ID
Unique identifier used to locate the segment on Overview Maps.

Segment Map
Displays the segment extents, and if applicable:
- Location of crash hotspots identified by the Crash Analysis. A crash hotspot is defined as an area where three or more crashes occurred during the most recent five-year period.
- Location of killed or seriously injured (KSI) crashes.
- Location of steep grade changes along the segment.
- Boundary limit of roadway jurisdiction. It is common for a roadway's ownership to change along its length.



Connectivity and Jurisdiction
Summary of locations linked by the proposed segment, in addition to road ownership for each segment.

Criteria and Grade
Evaluation of the five criteria and an explanation of the assigned grade.

Street View
Google Street View of existing conditions.

Conceptual Cross Section
Illustrative example of the proposed treatment.

01 Henry Hudson Drive / Main Street

North-South

Route Type:
Trail & On-road

Distance:
9.2 mi

User Group(s):
- Slow Cyclists
- Walkers, Runners, and Rollers

Description

This route takes users from the George Washington Bridge south on Hudson Terrace/Main St before turning left onto Henry Hudson Drive (HHD) and continuing north. The route ends in Alpine where it connects with US 9W. This route covers variable terrain, including a long steep hill over the last mile in Alpine. PIPC considers this route to be appropriate for slower speeds as it is a mix of users on a narrow and sometimes steep roadway. HHD closes seasonally for cold weather.

Connectivity

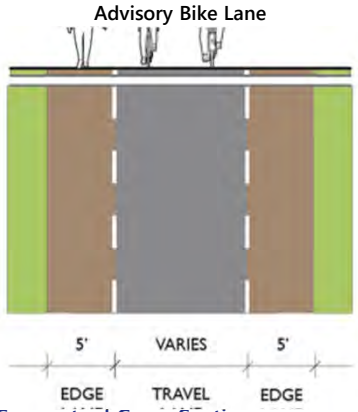
- GWB
- Fort Lee
- Englewood Cliffs
- Alpine

Jurisdiction(s)

- Palisades Interstate Park Commission

Criteria	Grade
Safety A crash hotspot occurred along Main St and River Rd. This is an area of concern due to the high car, bike, and pedestrian traffic. No crashes were reported on HHD itself.	! ! !
Right of Way (ROW) An advisory bike lane is recommended because HHD is narrow, sometimes less than 20 ft. Some engineering design may be required.	
Cost The project can be completed at a relatively high cost (greater than $10.5 M) due to its length. Per mile facility cost is approximately $205,500.	
Community Input Community feedback strongly supports this segment, as it connects directly to the GWB and is a popular, low-traffic street through Palisades Park.	
Steep Grade This route is hilly throughout, with a significant climb out of the park at Alpine (9%) that is around a mile long.	

Street View



Conceptual Cross Section

02 Path adjacent to Palisades Interstate Pkwy

North-South

Route Type:
Trail

Distance:
11.02 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers, Runners, and Rollers

Description

This is envisioned as a dedicated shared-use path in the right-of-way (ROW) of the Palisades Interstate Parkway, adjacent to but distinct from the highway, utilizing the wooded area between the PIP and 9W. The path would traverse relatively even terrain at the top of the Palisades and be separated from vehicle traffic.

Connectivity

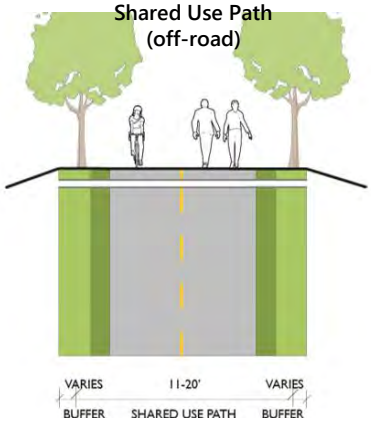
- GWB
- Fort Lee
- Englewood Cliffs
- Alpine

Jurisdiction(s)

- Palisades Interstate Park Commission

Criteria	Grade
Safety This path does not currently exist and has no crash history. It would be fully separated from vehicle traffic and not at risk of those types of crashes except at crossings.	! ! ! *(not evaluated)*
Right of Way (ROW) There is generally enough space for proposed treatment, but some engineering design is required to connect to the GWB.	
Cost The project can be completed at a relatively high cost (>$10.5 M). Significant expenses for construction and materials. Per mile facility cost is approximately $2,571,800.	
Community Input There is strong support for safety improvements and new facilities that protect people from car traffic across the full extent of the segment.	
Steep Grade The proposed trail would maintain an even terrain maintaining an average 1-2% slope.	

Street View



Conceptual Cross Section

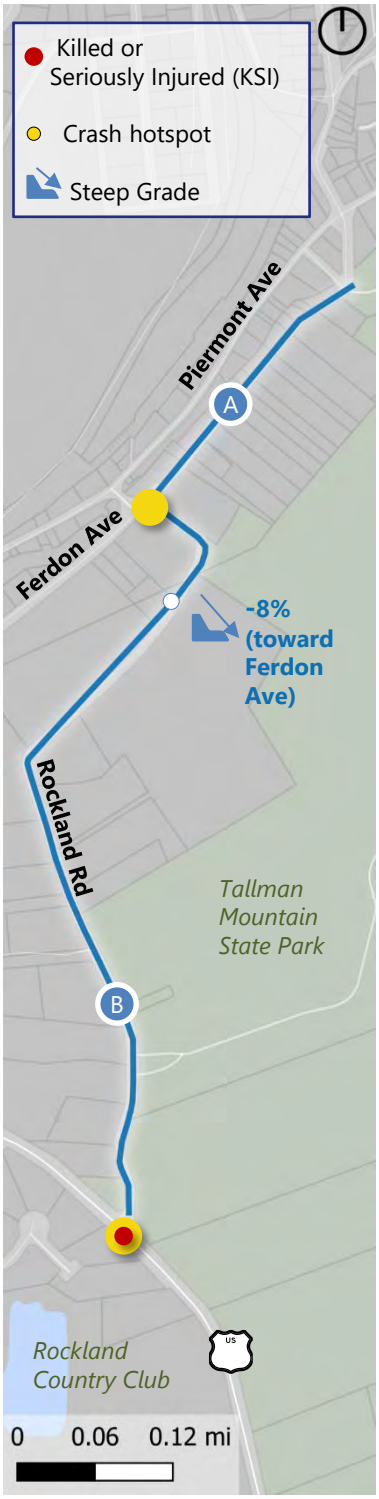
03 Rockland Road / Ferdon Avenue

North-South

Route Type:
On-road

User Group(s):
- Slow Cyclists
- Fast Cyclists

Distance:
0.96 mi



Description

Rockland Rd branches from US 9W in Rockland County and travels north over a sizable hill. At the base of the hill, cyclists take a right onto Ferdon Ave to bike along the Sparkill Creek. After crossing the creek, Ferdon Ave turns into Piermont Ave. Rockland Road is a common route for cyclists to connect between US 9W and downtown Piermont.

Connectivity

- Tallman Mountain State Park
- Piermont

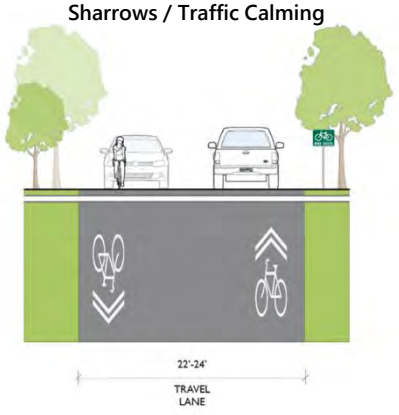
Jurisdiction(s)

A Village of Piermont
B Town of Orangetown

Criteria	Grade
Safety Two crash hotspots and one KSI crash occurred within the segment, indicating a need for safety improvements at the intersection of Rockland Rd with Ferdon Ave and 9W.	! ! !
Right of Way (ROW) The segment is a narrow low volume roadway well-suited for shared use markings. Minimal engineering design may be required.	
Cost The project can be completed at a relatively low cost (< $5 M). Per mile facility cost is approximately $422,900.	
Community Input Community feedback strongly supports this segment for its potential to enhance connectivity while offering a safer, more accessible alternative to US 9W.	
Steep Grade A moderate steep decline of 8% occurs just before the turn along Rockland Rd.	

Street View

Sharrows / Traffic Calming



Conceptual Cross Section

04 Piermont Avenue / River Road

North-South

Route Type:
On-road

Distance:
3.40 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers, Runners, and Rollers

Description

Piermont Ave travels through the commercial center of the Village of Piermont, turning into River Rd as it enters Grand View-on-Hudson. The road is a paved local road, carrying one lane of vehicle traffic in each direction. The road is constrained by houses on both sides and a narrow sidewalk. The route turns left onto Clinton Ave in South Nyack to connect to the Gov Mario M. Cuomo Bridge.

Connectivity

- Piermont
- Grand-View-On-Hudson
- South Nyack

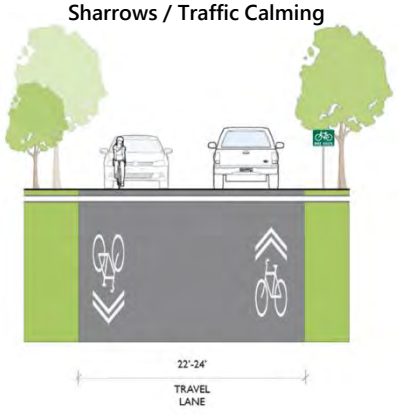
Jurisdiction(s)

A Town of Orangetown
B Rockland County
C Village of Piermont

Criteria	Grade
Safety The segment experiences a moderate crash rate with no reported KSI incidents.	! ! !
Right of Way (ROW) The segment is a narrow low volume roadway well-suited for shared use markings. Minimal engineering design may be required.	
Cost The project can be completed at a relatively low cost (less than $5 M). Per mile facility cost is approximately $422,900.	
Community Input Community feedback indicated mixed support, balancing the need for improved connectivity with concerns about the impact on local community with groups of long-distance cyclists.	
Steep Grade Minimal steep grades (less than 5%) make it accessible for most users.	

Street View

Sharrows / Traffic Calming



Conceptual Cross Section

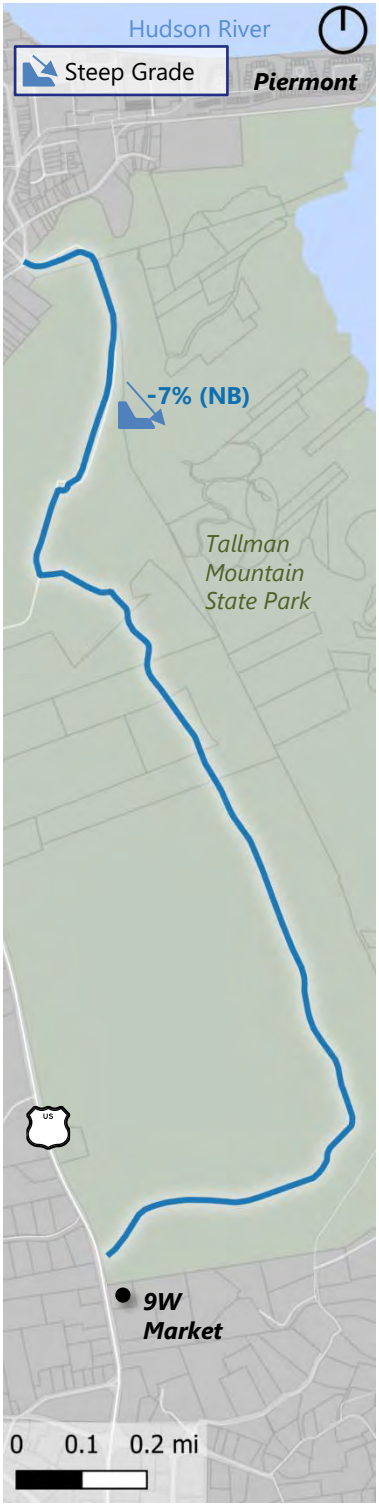
05 Tallman Mountain State Park Path

North-South

Route Type:
Trail

Distance:
2.40 mi

User Group(s):
- Walkers and Runners
- Slow Cyclists
- Paved section suitable for Rollers



Description
The Tallman Mountain State Park bicycle path branches from US 9W to the east in Rockland County. The route travels north through Tallman Mountain State Park until it connects to Ferdon Ave shortly before it turns into Piermont Ave. The path has no vehicle traffic and is partially paved and predominantly crushed gravel. The Long Path also passes through this park.

Connectivity
- 9W Market
- Piermont

Jurisdiction(s)
- Palisades Interstate Park Commission
- New York State Parks, Recreation, and Historic Preservation

Criteria	Grade
Safety Not covered in the crash analysis.	! ! ! *(not evaluated)*
Right of Way (ROW) There is no recommended treatment and therefore no recommended changes to the right-of-way. The existing right-of-way is sufficient for the recommended users.	
Cost There is no recommended treatment and therefore no associated costs.	
Community Input Community feedback shows significant support for this segment, highlighting its potential to enhance connectivity along a scenic route separated from vehicles.	
Steep Grade A moderate steep grade of 7% occurs at the Tallman Mountain State Park decline, where it meets Ferdon Ave. This is the conclusion of the State Park Bike Path.	

Street View

No Recommended Treatment

Conceptual Cross Section

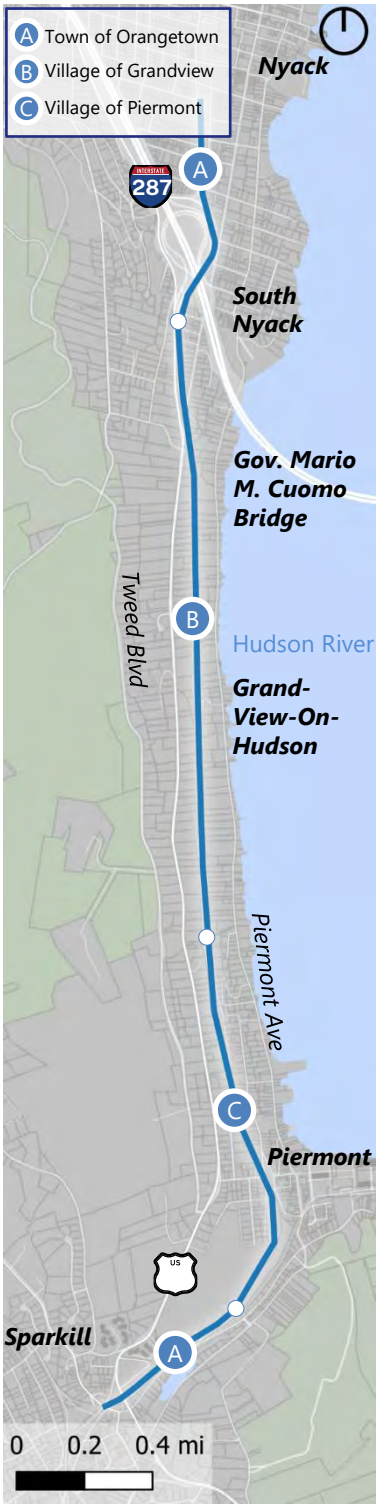
06 Joseph B. Clarke Trail / Old Erie Path

North-South

Route Type:
Trail

Distance:
4.31 mi

User Group(s):
- Slow Cyclists
- Walkers, Runners, Rollers



Description

The Joseph B. Clarke (JBC) Trail turns into the Old Erie Path shortly after crossing US 9W traveling north. The Old Erie Path is an unpaved trail following a historic rail right-of way. The trail travels through the Villages of Piermont and Grand-View-on-Hudson and is a popular walking and biking trail for locals.

Connectivity

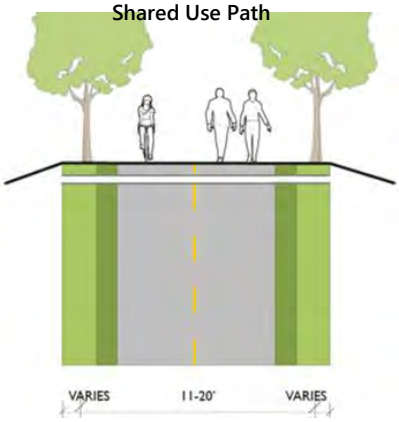
- Piermont
- Grand-View-On Hudson
- South Nyack

Jurisdiction(s)

- See legend items A, B, and C

Criteria	Grade
Safety Not covered in the crash analysis.	! ! ! *(not evaluated)*
Right of Way (ROW) The segment has adequate ROW and could be paved, however there is no local support for such an upgrade.	
Cost To pave and upgrade the current trail would cost more than $10.5 M. Significant expenses for construction and materials. Per mile facility cost is approximately $2,571,800.	
Community Input Community feedback indicated opposition to changes to the Old Erie Path, expressing concerns about drainage, wildlife impacts, and impacts on private property.	
Steep Grade This old railroad right-of-way has minimal hills and is appropriate for most users. The grade change is below 5%.	

Street View



Conceptual Cross Section

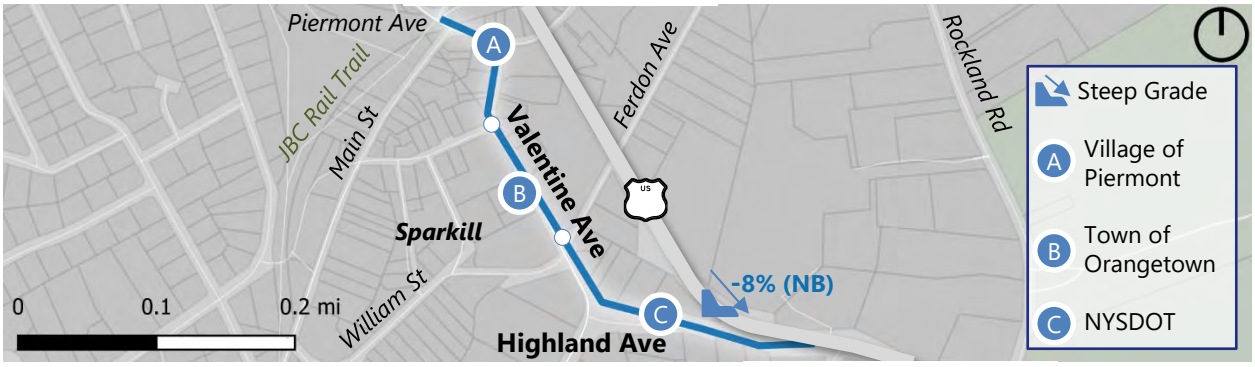
07 Highland Avenue / Valentine Avenue

North-South

Route Type:
On-road

Distance:
0.48 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists



Description
Highland Ave branches off US 9W to the east, descending a hill and connecting into the relatively flat Valentine Ave, both of which have one lane of vehicle traffic in each direction. This segment connects to both Ferdon Ave into the Village of Piermont and to the Old Erie Path / Joseph B. Clarke Trail. The existing section of sidewalk located on the southside of Highland Ave is mostly intact with some portions requiring maintenance.

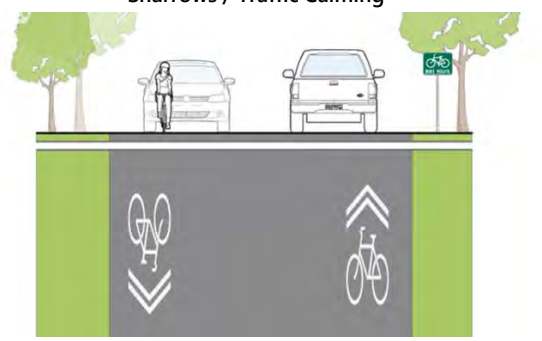
Connectivity
- Sparkill

Jurisdiction(s)
- See legend items A, B, and C above

Criteria		Grade
Safety	Poor visibility and lack of signage at the five-legged intersection of Main St, Piermont Ave, Highland Ave, and the Joseph B. Clarke Trail make visibility and crossing challenging.	! ! !
Right of Way (ROW)	The segment is a narrow low volume roadway well-suited for shared use markings. Minimal engineering design may be required.	
Cost	The project can be completed at a relatively low cost (<$5 M). Per mile facility cost is approximately $422,900.	
Community Input	Community feedback indicated mixed support, balancing the benefits of improved connectivity for cyclists bypassing 9W with safety concerns related to steep grades and poor visibility near intersections.	
Steep Grade	Moderate steep decline of 8% along Highland Ave traveling towards Valentine Ave.	

Street View

Sharrows / Traffic Calming



Conceptual Cross Section

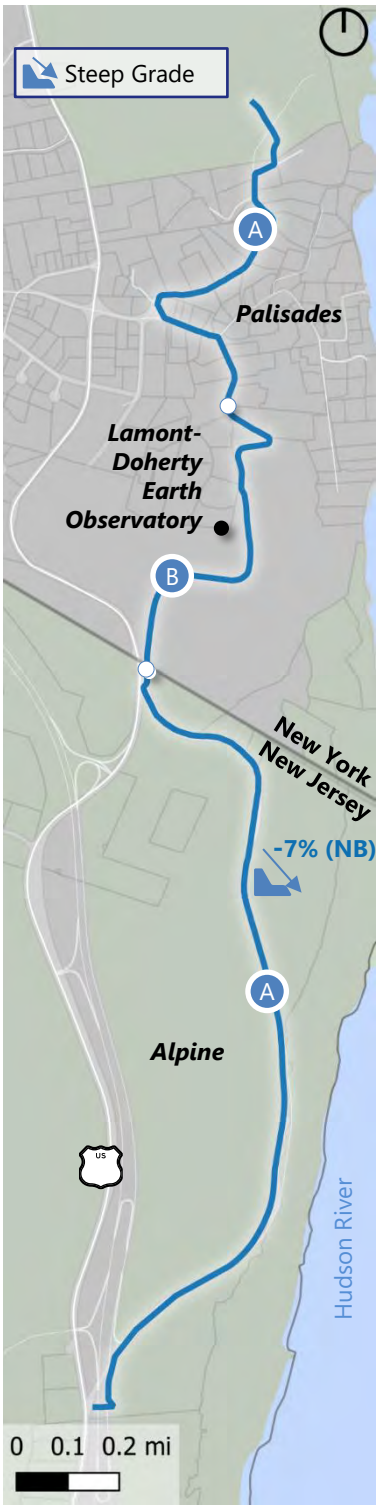
08 Lamont Observatory Route: Forest View Trail / Stateline Lookout / Ludlow Lane / Woods Road

North-South

Route Type: Trail & On-road

Distance: 3.81 mi

User Group(s):
- Walkers and Runners
- Paved section is suitable for fast cyclists and some slow cyclists



Description

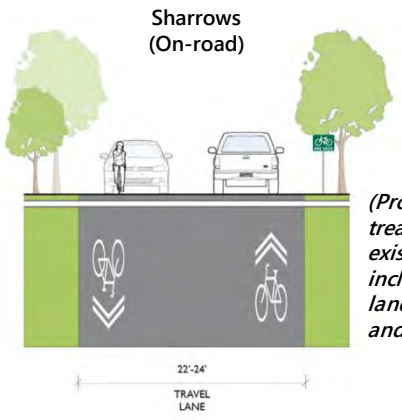
The route branches off US 9W to the east onto the Forest View Trail, an unpaved, no-vehicle path that descends steeply down the Palisades. The route turns right onto Stateline Lookout, a paved road with two-way vehicle traffic. Traveling north, Stateline Lookout meets Old Rte 9W, a paved path closed to vehicles. Old Rte 9W meets Ludlow Ln, a small road through the Lamont campus. The route continues onto the single-track Wood Rd until connecting with Tallman Mountain State Park bicycle path.

Connectivity
- Alpine
- Palisades

Jurisdiction(s)
- A Palisades Interstate Park Commission
- B Gated and private but available to walk/bike

Criteria	Grade
Safety Not covered in the safety analysis.	! ! ! *(not evaluated)*
Right of Way (ROW) The segment is a narrow low volume roadway well-suited for shared use markings. Minimal engineering design may be required.	
Cost The project can be completed at a relatively low cost (<$5 M). Per mile facility cost is approximately $422,900.	
Community Input Community feedback showed mixed support, balancing the benefits of vehicle-free paths along the trail with concerns of paving the current trail for cyclists.	
Steep Grade Moderate steep decline of 7% just before Stateline.	

Street View



Conceptual Cross Section

(Proposed treatment for existing trails include shared lane markings and signage)

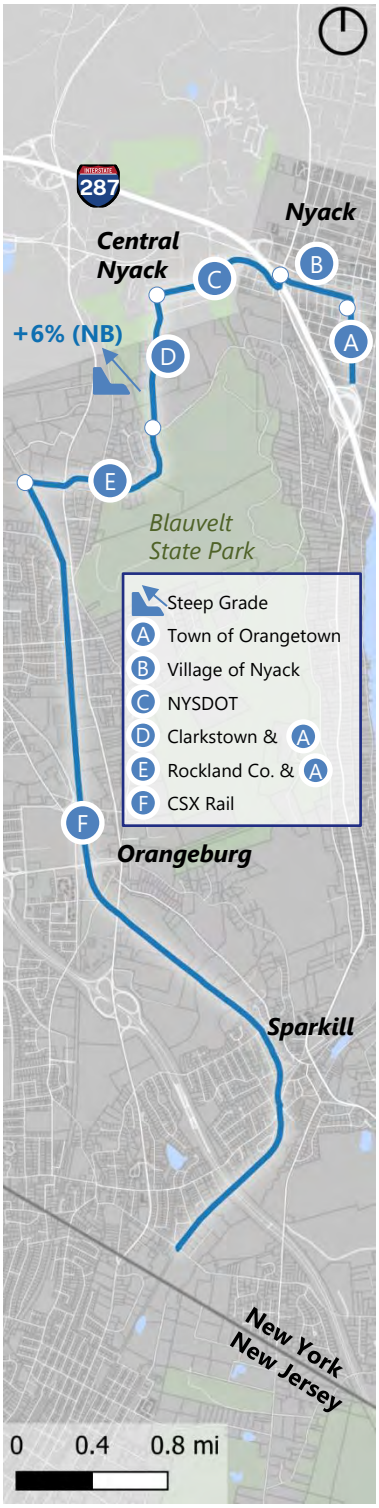
09 CSX/ Bradley Parkway / Waldron Ave

North-South

Route Type: Trail & On-road

Distance: 9.12 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers, Runners, and Rollers



Description

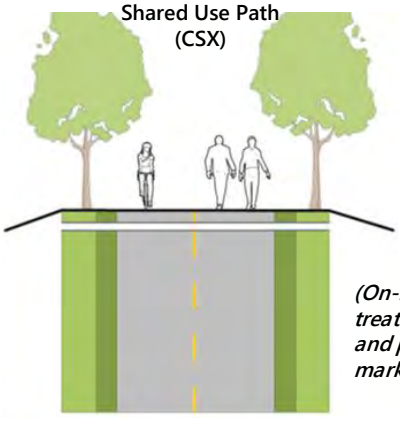
The route follows the Joseph B. Clarke trail, a paved rail trail, northwest out of Sparkill. At Mountain View Ave, the route follows the CSX rail right-of-way (ROW) north. There is currently no bicycle or pedestrian infrastructure along this path. The route turns west onto Bradley Parkway and then through Blauvelt State Park and Schuyler Town Park before traversing local roads in Central Nyack and Nyack to connect with the Gov Mario M. Cuomo Bridge.

Connectivity
- Sparkill
- Orangeburg
- Central Nyack
- South Nyack

Jurisdiction(s)
- See legend items A-F

Criteria	Grade
Safety Not covered in the safety analysis.	! ! ! *(not evaluated)*
Right of Way (ROW) The segment has a variable ROW width but is suited as a future shared use path (SUP) and on-street pavement markings and signage. Moderate engineering design may be required.	
Cost The project can be completed at low cost (<$5 M). Facility cost per mile is approximately $422,900 for signage/pavement markings and $2,571,800 for SUP. Costs exclude land acquisition and the likelihood of CSX selling the ROW or allowing use as a trail is low.	
Community Input Community feedback indicates support for the segment, highlighting improved connectivity along existing green spaces via the Joseph B. Clarke Trail.	
Steep Grade Moderate steep incline of 6% at the crossover from Bradley Pkwy into Schuyler Rd near Blauvelt State Park.	

Street View



(On-road would be treated with signing and pavement markings)

Conceptual Cross Section

10 US 9W in Rockland County: Bicycle Route

North-South

Route Type: State Bike Route
Distance: 6.55 mi

User Group(s):
- Fast Cyclists

Description

US 9W through Rockland County is designated as a New York State Bicycle Route. Cyclist use the shoulder (where present) or the travel lane in the narrower sections. After crossing over the Sparkill Creek, the road is very narrow, often with no shoulder, and lined with private homes. US 9W from the state border to Valentine Ave is wider and is part of the planned Rockland Riverway Trail.

Connectivity

- Alpine
- Piermont
- Grand View
- South Nyack

Jurisdiction(s)

- NYSDOT

Criteria	Grade
Safety Six KSI crashes and three crash spots occurred along US 9W in Rockland County. The segment is an area of concern due to the high volumes of car and bike traffic, steep grades, and narrow shoulders.	! ! !
Right of Way (ROW) US 9W, particularly through Grand View-on-Hudson, does not have enough width to provide safer biking facilities. The southern portion is part of the planned Rockland Riverway Trail.	
Cost There is no recommended treatment and therefore no associated costs.	
Community Input Community support was mixed. Some athletic cyclists prefer this route because it is direct and relatively flat, however it is challenging for less confident riders due to vehicle traffic.	
Steep Grade A moderate steep decline of 7% occurs north of the State Line. Another moderate grade change occurs when traveling from Sparkill to Piermont.	

Street View

No Recommended Treatment

Conceptual Cross Section

11 Oak Tree Road

East-West

Route Type:
On-road

Distance:
1.91 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers, Runners, and Rollers

Description
Oak Tree Rd travels west from US 9W in Palisades, NY before connecting with the beginning of the Joseph B. Clarke Rail Trail. The route is relatively flat along a road with one lane of vehicle travel in each direction. There is a sidewalk on one side for much of its length.

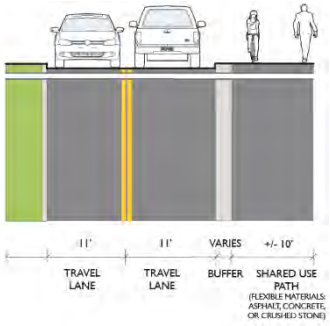
Connectivity
- Tappan
- Palisades

Jurisdiction(s)
- Town of Orangetown

Criteria		Grade
Safety	While the segment itself was not covered in the crash analysis, one crash cluster and one KSI occurred at the intersection of Oak Tree Road and US 9W.	! ! !
Right of Way (ROW)	The segment has a variable ROW width ranging 40-ft to 70-ft and is well-suited as a future sidepath. Moderate engineering design is likely required.	
Cost	The project can be completed at a relatively moderate cost ($5 to 10 M). Per mile facility cost is approximately $3,846,900.	
Community Input	Community feedback indicated mixed support. People expressed a desire for better connection to the Joseph B. Clarke Trail.	
Steep Grade	Minimal steep grades (less than 5%) make it accessible for most users.	

Street View

Shared Use Path (Grade Separated)



Conceptual Cross Section

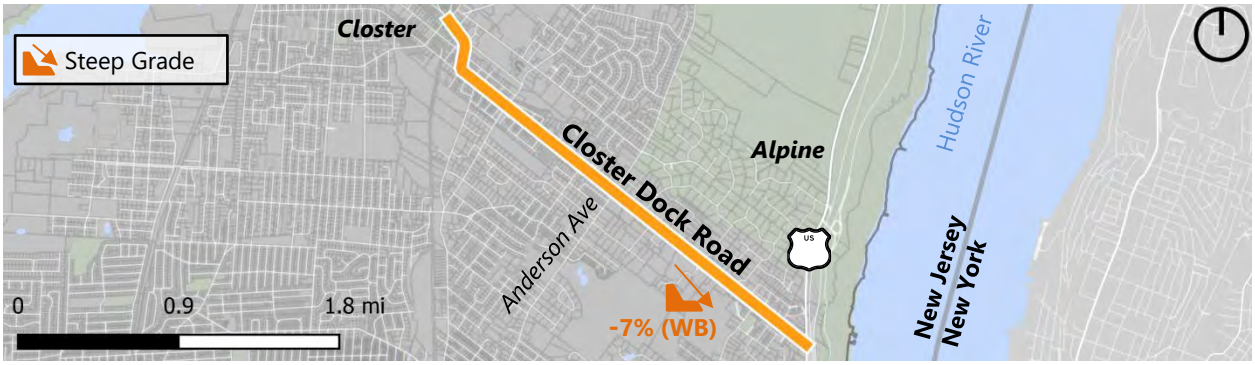
12 Closter Dock Road

East-West

Route Type:
On-road

Distance:
2.78 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers and Runners



Description

Closter Dock Rd connects US 9W to the center of the borough of Closter, NJ. The road has one lane of vehicle traffic in each direction. This route would connect 9W to the proposed Northern Valley Greenway.

Connectivity

- Alpine
- Closter

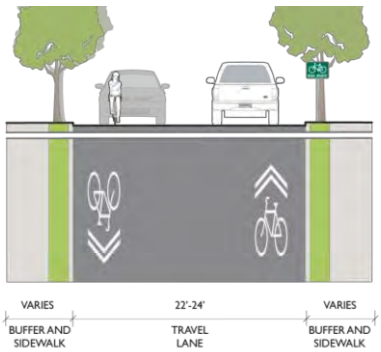
Jurisdiction(s)

- Bergen County

Criteria		Grade
Safety	The safety evaluation scoring is based on roadway factors including the speed limit and frequency of intersections.	! ! !
Right of Way (ROW)	The segment is a narrow low volume roadway well-suited for shared use markings and sidewalk connectivity. Minimal engineering design may be required.	
Cost	The project can be completed at a relatively low cost (<$5 M). Per mile bike facility cost is approximately $422,900 and per mile pedestrian facility cost is approximately $524,500.	
Community Input	This segment garnered mixed community support. While feedback highlights its potential to enhance downtown connectivity and avoid high-traffic areas, there are also concerns about its feasibility as a primary route.	
Steep Grade	A moderate steep decline of 7% present between Anderson Ave and Frick Dr heading westbound.	

Street View

Sharrows and Sidewalks



Conceptual Cross Section

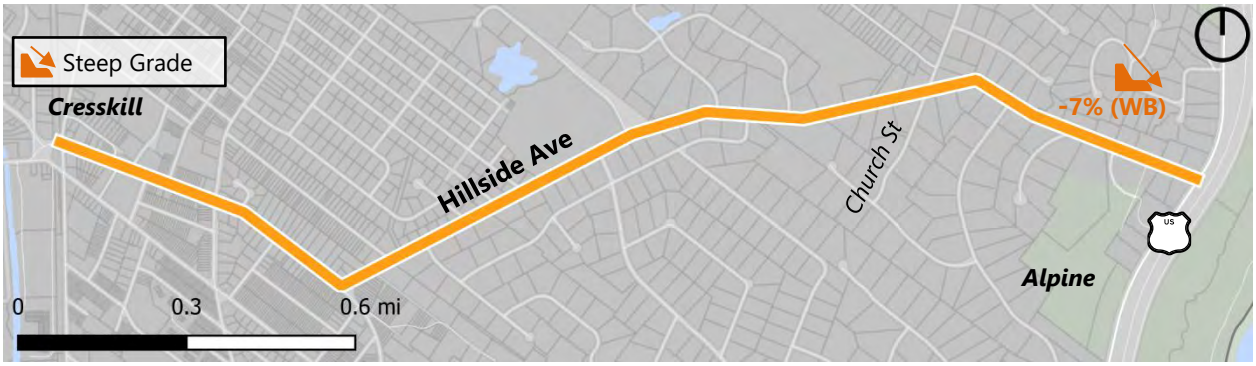
13 Hillside Avenue

East-West

Route Type:
On-road

Distance:
2.21 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers and Runners



Description

Hillside Avenue runs east-west from US 9W to the borough of Cresskill, NJ. Hillside Avenue has one lane of vehicle traffic in each direction. This route would connect 9W to the proposed Northern Valley Greenway.

Connectivity

- Alpine
- Cresskill

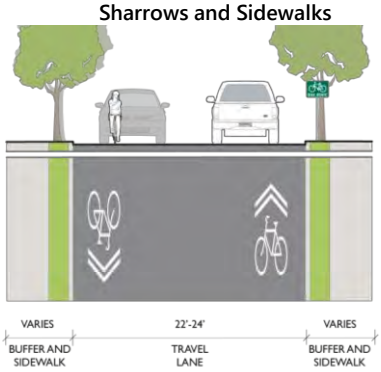
Jurisdiction(s)

- Bergen County

Criteria		Grade
Safety	The safety evaluation scoring is based on roadway factors including the speed limit and frequency of intersections.	!!!
Right of Way (ROW)	The segment is a narrow low volume roadway well-suited for shared use markings and sidewalk connectivity. Minimal engineering design may be required.	
Cost	The project can be completed at a relatively low cost (< $5 M). Per mile bike facility cost is approximately $422,900 and per mile pedestrian facility cost is approximately $524,500.	
Community Input	This segment garnered mixed community support. While feedback highlights its potential to enhance downtown connectivity and avoid high-traffic areas, there are also concerns about its feasibility as a primary route.	
Steep Grade	A moderate steep decline of 7% between US 9W and Church St heading westbound.	

Street View

Sharrows and Sidewalks



Conceptual Cross Section

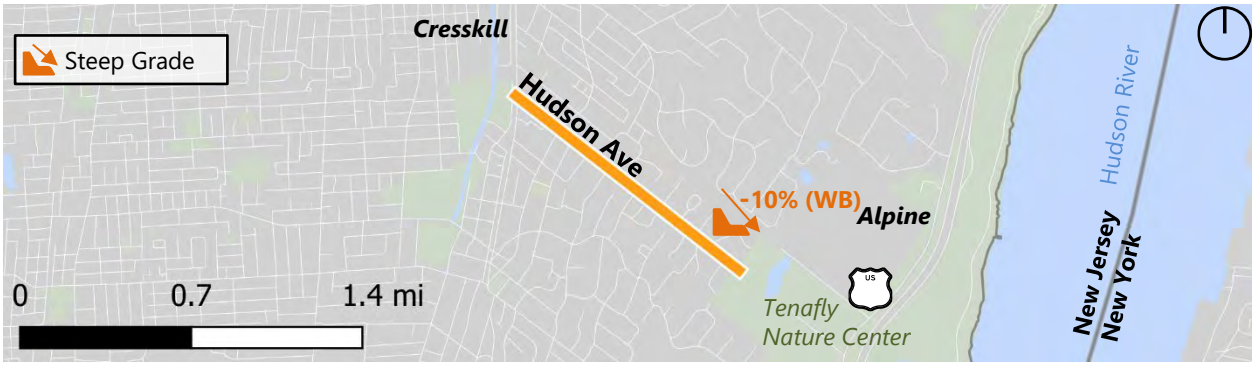
14 Hudson Avenue

East-West

Route Type:
On-road

Distance:
1.71 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers and Runners



Description

Hudson Avenue is primarily a residential street that connects the Tenafly Nature Center to the commercial street of Piermont Road. Hudson Ave has a speed limit of 25 mph, is relatively narrow, and allows street parking for much of its length. This route would connect the Tenafly Nature Center to the proposed Northern Valley Greenway.

Connectivity

- Alpine
- Cresskill

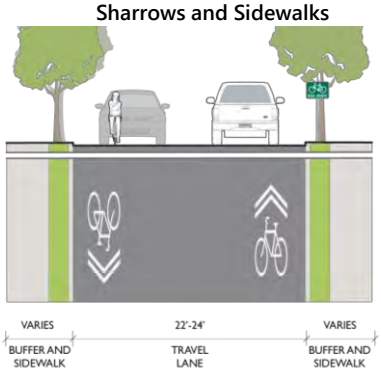
Jurisdiction(s)

- Municipal

Criteria		Grade
Safety	The safety evaluation scoring is based on roadway factors including the speed limit and frequency of intersections.	
Right of Way (ROW)	The segment is a narrow low volume roadway well-suited for shared use markings and sidewalk connectivity. Minimal engineering design may be required.	
Cost	The project can be completed at a relatively low cost (< $5 M). Per mile bike facility cost is approximately $422,900 and per mile pedestrian facility cost is approximately $524,500.	
Community Input	This segment garnered mixed community support. While feedback highlights its potential to enhance downtown connectivity and avoid high-traffic areas, there are also concerns about its feasibility as a primary route.	
Steep Grade	A steep decline of 10% present between Tenafly Nature Center and Piermont Road heading westbound.	

Street View

Sharrows and Sidewalks



Conceptual Cross Section

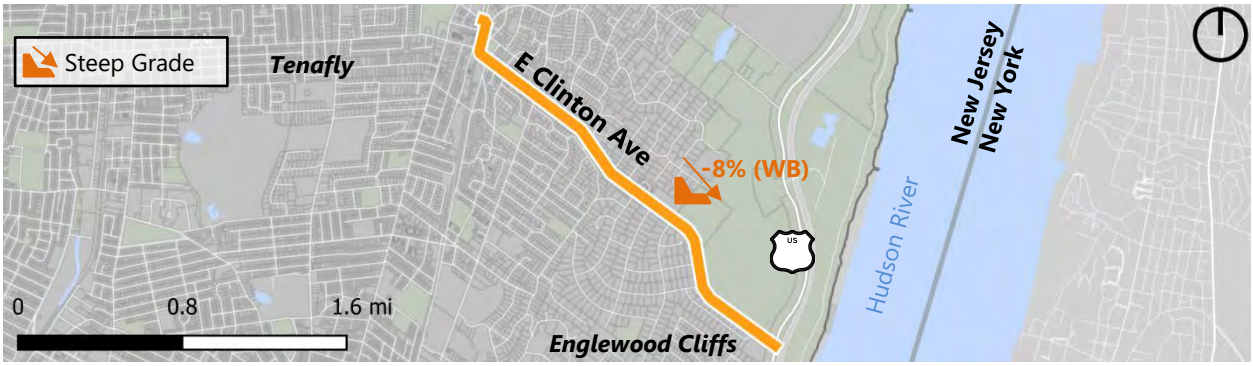
15 East Clinton Avenue

East-West

Route Type:
On-road

Distance:
2.26 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers and Runners



Description
East Clinton Ave runs northwest from US 9W to the borough of Tenafly, NJ. East Clinton Avenue has one lane of vehicle traffic in each direction. This route would connect 9W to the proposed Northern Valley Greenway.

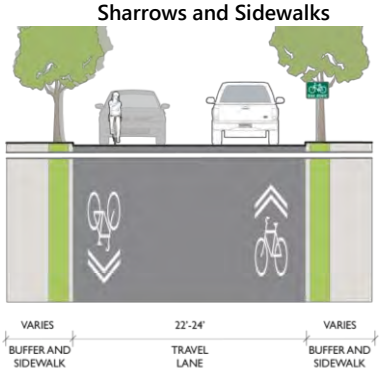
Connectivity
- Englewood Cliffs
- Tenafly

Jurisdiction(s)
- Bergen County

Criteria		Grade
Safety	The safety evaluation scoring is based on roadway factors including the speed limit and frequency of intersections.	! ! !
Right of Way (ROW)	The segment is a narrow low volume roadway well-suited for shared use markings and sidewalk connectivity. Minimal engineering design may be required.	
Cost	The project can be completed at a relatively low cost (< $5 M). Per mile bike facility cost is approximately $422,900 and per mile pedestrian facility cost is approximately $524,500.	
Community Input	This segment garnered mixed community support. While feedback highlights its potential to enhance downtown connectivity and avoid high-traffic areas, there are also concerns about its feasibility as a primary route.	
Steep Grade	A moderate steep decline of 8% present midway along the segment heading westbound.	

Street View

Sharrows and Sidewalks



Conceptual Cross Section

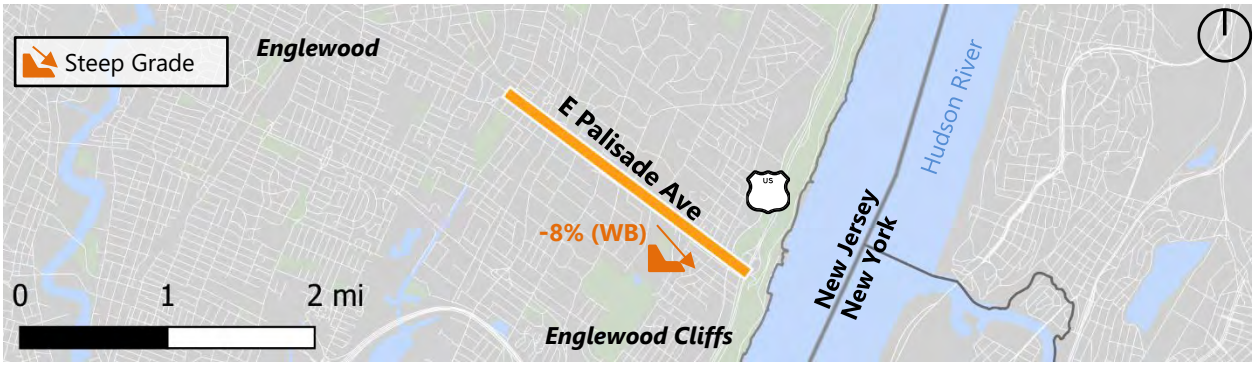
16 East Palisade Avenue

East-West

Route Type:
On-road

Distance:
2.48 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers and Runners



Description
East Palisade Ave travels northwest from Palisades Interstate Parkway, intersecting Hudson Terrace, and crossing US 9W to the city of Englewood. East Palisade Avenue varies between one lane of traffic in each direction to two lanes of traffic in each direction and a left turn lane.

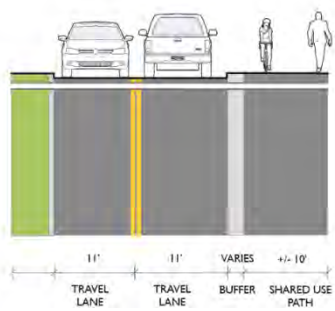
Connectivity
- Englewood Cliffs
- Englewood

Jurisdiction(s)
- Bergen County

Criteria		Grade
Safety	The safety evaluation scoring is based on roadway factors including the speed limit and frequency of intersections.	!!!
Right of Way (ROW)	50 foot ROW with wide shoulders. Possible lane width reduction required for protected bike lanes or shared used path.	
Cost	The project can be completed at a relatively moderate cost ($5 to 10 M). Per mile facility cost is approximately $3,846,900.	
Community Input	This segment garnered mixed community support. While feedback highlights its potential to enhance downtown connectivity and avoid high-traffic areas, there are also concerns about its feasibility as a primary route.	
Steep Grade	Moderate steep decline of 8% along the segment heading westbound.	

Street View

Shared Use Path
(Grade Separated)



Conceptual Cross Section

17 Hudson Terrace

Last Mile Connection to GWB

Route Type:
On-road

Distance:
2.00 mi

User Group(s):
- Slow Cyclists
- Fast Cyclists
- Walkers, Runners, and Rollers

Description

Hudson Terrace north of the George Washington Bridge connects directly from the bridge to 9W and is a common bicycling route. In Fort Lee, it is lined with local businesses including two bike shops and provides direct access to the Palisades Parkway and Allison Park. The western sidewalk is not continuous and there is parking on both sides for much of its length.

Connectivity

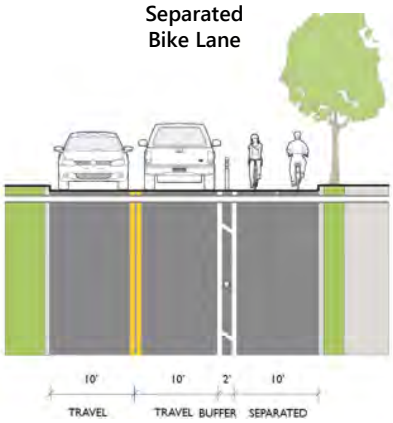
- GWB
- Fort Lee
- Englewood Cliffs

Jurisdiction(s)

- Bergen County

Criteria	Grade
Safety Three KSI crashes occurred along Hudson Terrace. The segment is an area of concern due to the high volumes of car and bike traffic.	! ! !
Right of Way (ROW) Moderate amount of ROW. Widening and relocation of on-street parking may be necessary the minimum recommended 14-feet wide path.	
Cost The project can be completed at a relatively low cost (< $5 M). Per mile facility cost is approximately $438,300.	
Community Input Significant support from the community. Cited as the most feasible and logical route for a connection to the GWB and is already a very common biking route.	
Steep Grade Hudson Terrace has an average grade of 0.6%, with the steepest decline of 5% just before the junction with the Palisades Interstate Parkway.	

Street View



Conceptual Cross Section

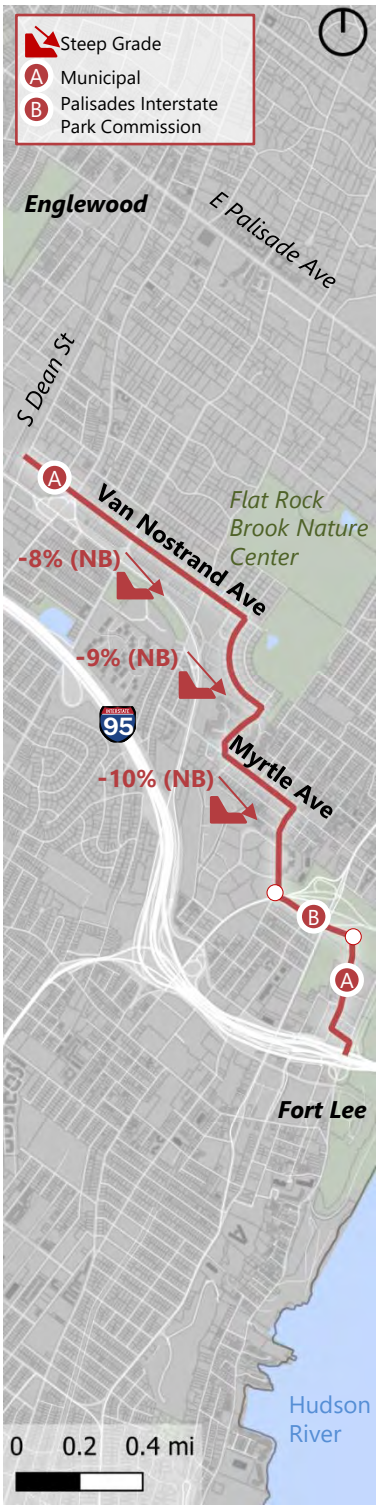
18 North Central Road / Linwood Park

Last Mile Connection to GWB

Route Type:
On-road and Trail

Distance:
3.09 mi

User Group(s):
- Fast Cyclists
- Walkers and Runners



Description
The route uses local roads north of I-95 connecting to a trail through Linwood Park to Linwood Ave, then through the Oak Trail development, and along Van Nostrand Ave to Dean Street.

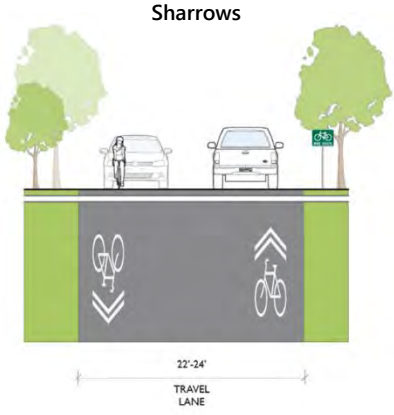
Connectivity
- Fort Lee
- Englewood

Jurisdiction(s)
- See legend items A and B

Criteria	Grade
Safety The safety evaluation scoring is based on roadway factors including the speed limit and frequency of intersections.	! ! !
Right of Way (ROW) For the most part, the segment has enough available ROW for proposed treatment, but some engineering design may be required.	
Cost The project can be completed at a relatively low cost (< $5 M). Per mile facility cost is approximately $422,900.	
Community Input Community support is mixed. While there's strong backing for connecting local roads to regional trails, feedback emphasizes the need for connections along less congested roadways.	
Steep Grade Steep grades present throughout the segment.	

Street View

Sharrows



Conceptual Cross Section

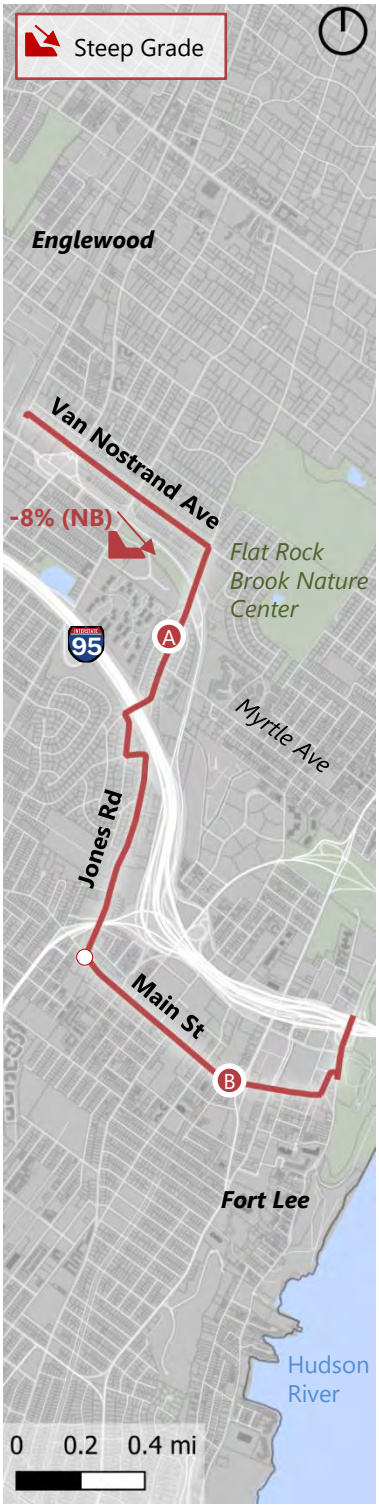
19 Main Street / Jones Road

Last Mile Connection to GWB

Route Type:
On-road

Distance:
3.98 mi

User Group(s):
- Fast Cyclists
- Walkers and Runners



Description
The route travels south on Hudson Terrace after the George Washington Bridge, connecting to Main St to travel east. The route then travels north along Jones Rd, crossing I-95 and then northwest along Van Nostrand Ave before turning right onto Dean St.

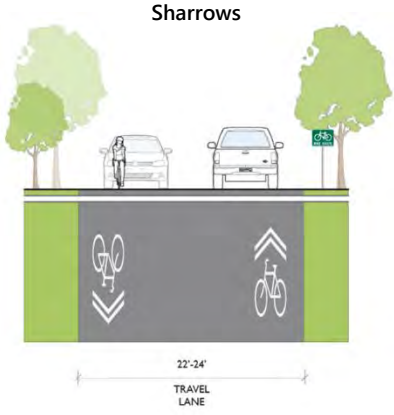
Connectivity
- Fort Lee
- Englewood

Jurisdiction(s)
A Municipal
B Bergen County

Criteria	Grade
Safety The safety evaluation scoring is based on roadway factors including the speed limit and frequency of intersections.	! ! !
Right of Way (ROW) For the most part, the segment has enough available ROW for proposed treatment, but some engineering design may be required.	
Cost The project can be completed at a relatively low cost (< $5 M). Per mile facility cost is approximately $422,900.	
Community Input Community support is mixed. While there's strong backing for connecting local roads to regional trails, feedback emphasizes the need for connections along less congested roadways.	
Steep Grade A moderate steep grade of 8% present along Van Nostrand Ave.	

Street View

Sharrows



Conceptual Cross Section

Table 6: Criteria evaluation of proposed north-south connections

North-South Connections							
ID	**Route**	**Safety**	**Right of Way**	**Cost**	**Community Input**	**Steep Grade**	**Recommendation**
1	Henry Hudson Drive / Main Street	! ! !					Recommend based on favorable community input in addition to scenic beauty and access to nature.
2	Adjacent to Palisades Interstate Parkway	Not evaluated					Exclude due to the significant cost of building a new shared-use path, access would be difficult.
3	Rockland Road / Ferdon Avenue	! ! !					Recommend due to suitable road design, low-cost, and strong community input for the connection between US 9W and River Rd.
4	Piermont Avenue / River Road	! ! !					Recommend due to suitable road design, low-cost, and gentle grade in addition to access to local businesses in Piermont.
5	Tallman Mountain State Park Path	Not evaluated					Recommend based on low-cost, community input, and access to nature.
6	Joseph B. Clarke Trail / Old Erie Path	Not evaluated					Exclude due to strong community opposition to paving and other impacts and significant upgrade costs
7	Highland Ave / Valentine Ave	! ! !					Recommend based on low-cost and sufficient right of way.
8	Lamont Observatory Route	Not evaluated					Exclude due to community opposition to paving Forest View Trail and a section of steep grade.
9	CSX / Bradley Parkway / Waldron Ave	Not evaluated					Exclude due to cost and challenges associated with acquiring the CSX rail right of way and lack of access to the Palisades.
10	US 9W in Rockland County: Bicycle Route	! ! !					Recommend due to designation as a New York State Bicycle Route.

Figure 20: North-south connections included in analysis

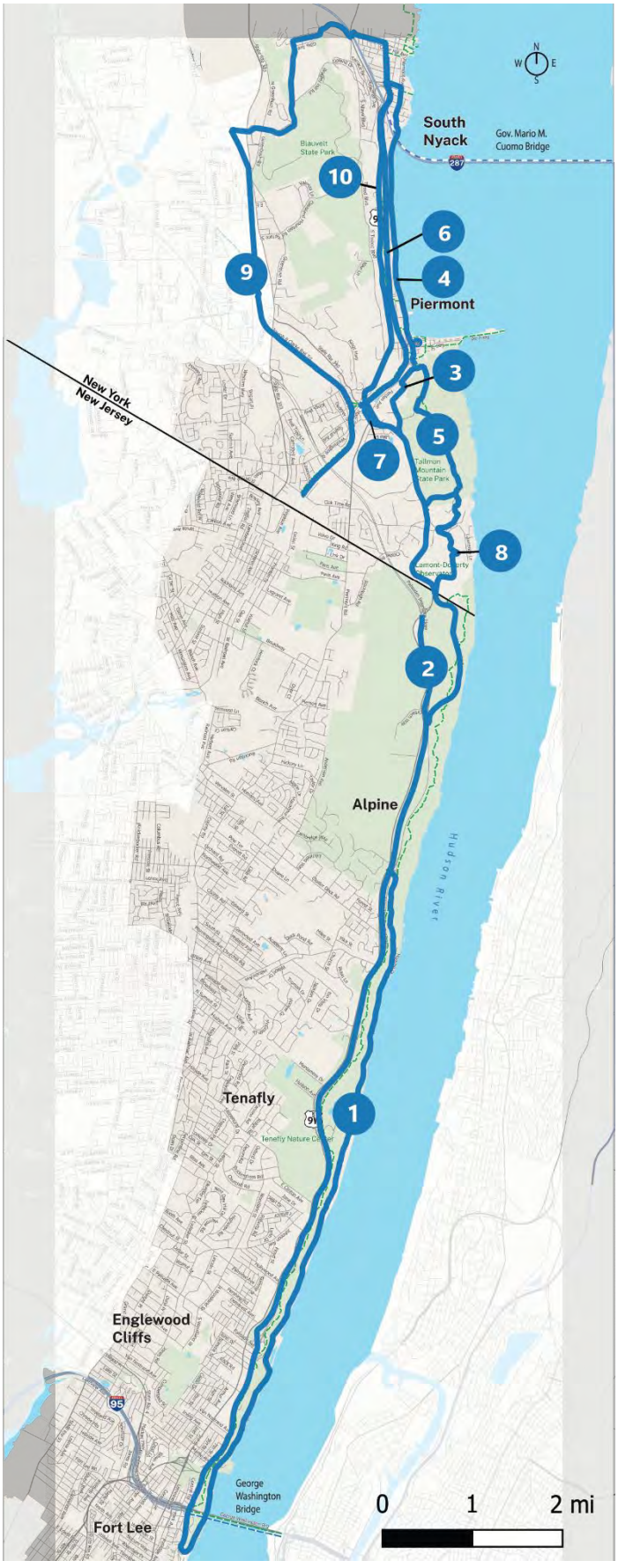


Table 7: Criteria evaluation of proposed east-west connections

East-West Connections							
ID	**Route**	**Safety**	**Right of Way**	**Cost**	**Community Input**	**Steep Grade**	**Recommendation**
11	Oak Tree Road	! ! !					Exclude due to limited right of way, mixed community input, and cost.
12	Closter Dock Road	! ! !					Recommend
13	Hillside Avenue	! ! !					Recommend
14	Hudson Avenue	! ! !					Recommend
15	East Clinton Avenue	! ! !					Recommend
16	East Palisade Avenue	! ! !					Recommend

Figure 21: East-west routes included in analysis

Table 8: Criteria evaluation of proposed first-last mile GWB connections

First-Last Mile GWB Connections							
ID	**Route**	**Safety**	**Right of Way**	**Cost**	**Community Input**	**Steep Grade**	**Recommendation**
17	Hudson Terrace	! ! !			!		Recommended
18	Sylvan Street	! ! !					Exclude due to lack of connectivity to other routes, steep grades, and high-volume streets
19	Main Street	! ! !					Exclude due to lack of connectivity to other routes and high-volume streets

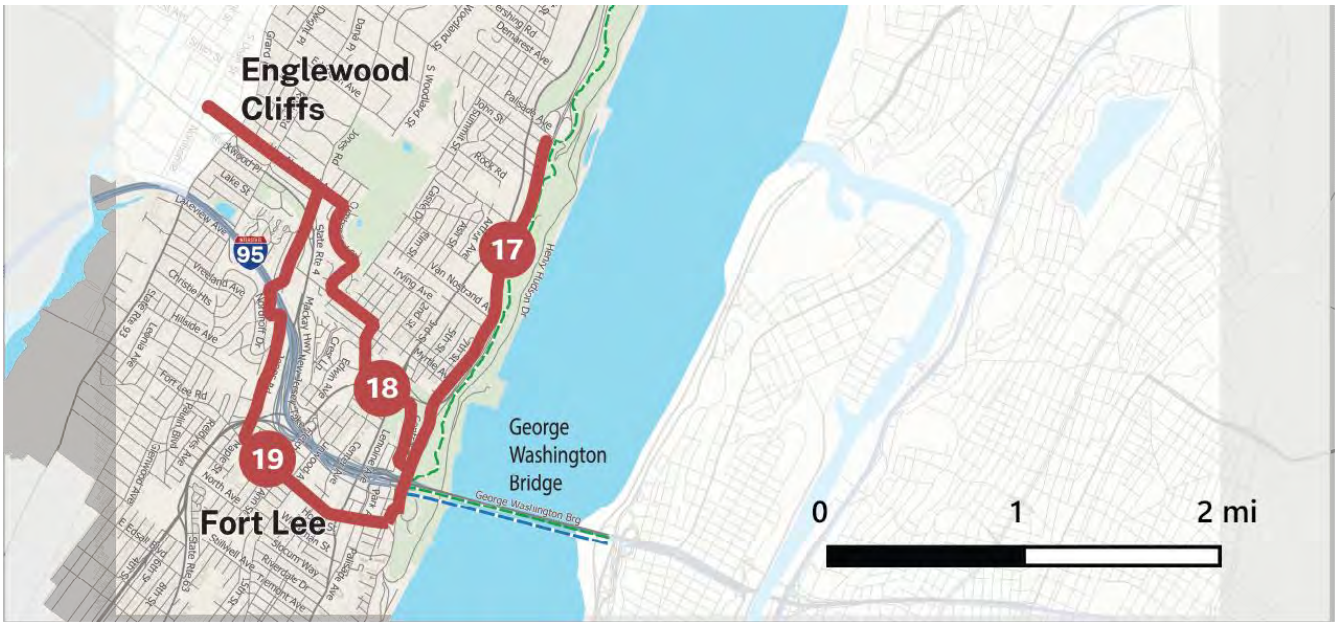


Figure 22: First-last mile GWB connections included in analysis

7 Recommendations

Based on the results of the evaluation, a selection of routes is chosen as recommendations to be included in the network. These routes cover different geographies of the study region and serve different user groups based on their design. The types of recommended design treatments are explored further in the Facilities Toolkit. In addition to route design, amenities and program changes are recommended to unify the area and make it more accessible to navigate by pedestrians and bicyclists. The related routes are also included in the recommended network.

Recommended Connections

Route Recommendations

Henry Hudson Drive / Main Street (ID 1)

Henry Hudson Drive is the recommended north-south route for Slow Cyclists as well as Walkers, Runners, and Rollers from the GWB north through Bergen County. The route is not recommended for Fast Cyclists due to challenging vehicle, pedestrian, and bicycle interactions; however Fast Cyclists are not excluded from using this route. The recommended design is an advisory bicycle lane where bicycles, pedestrians, and vehicles share the road. Improved information and signage about steep grades, dead ends, debris on the roadway and awareness of sharing the road will help the route be more accessible to the recommended user groups.

Rockland Road / Ferdon Avenue (ID 3)

The Rockland Road and Ferdon Avenue route is recommended for Fast Cyclists and Slow Cyclists to connect from US 9W to downtown Piermont. The recommended design is for shared lane markings and signage. Rockland Rd and part of Ferdon Ave do not have a sidewalk, making them unsuited for Walkers, Runners, and Rollers.

Piermont Avenue / River Road (ID 4)

The Piermont Avenue and River Road route is recommended for all user groups. The route is mainly flat and carries low volumes of traffic at low speeds. A narrow sidewalk runs along the east side of the route. The recommended design is shared lane markings and signage. The route also provides access to local businesses in downtown Piermont as well as the Piermont Pier. Piermont Avenue also offers easy access to and from the Gov. Mario M. Cuomo Bridge. Traffic calming such as speed humps would enhance safety.

Figure 23: Recommended routes

Tallman Mountain State Park Path (ID 5)

Tallman Mountain State Park has a network of trails suitable for different users. The bicycle path is a partially paved, predominantly crushed gravel route through the park suitable for Slow Cyclists as well as Walkers, Runners, and Rollers. Additionally, a portion of the Long Path, a 357-mile hiking trail from New York to Albany, passes through the park and is suitable for walkers and hikers. There are no recommended design changes for these paths.

Highland Avenue / Valentine Avenue (ID 7)

The Highland Avenue and Valentine Avenue route is recommended for Fast Cyclists and Slow Cyclists to connect from US 9W to downtown Piermont. It offers an alternative to Rockland Road and Ferdon Avenue which allows users traveling south to avoid a left turn onto US 9W. The recommended design is shared lane markings and signage. While there is a mostly intact sidewalk along this route, some portions of the sidewalk along Highland Avenue may require maintenance.

US 9W in Rockland County: Bicycle Route (ID 10)

The portion of US 9W through Rockland County is recommended only for Fast Cyclists. The route is part of the officially designated New York State Bicycle Route; however, the road is narrow and carries high volumes of high-speed traffic, which may be unsafe for less experienced cyclists. The route does allow cyclists to travel at high speeds for long uninterrupted sections. Nearby routes of the Rockland Riverway Trail and the NJDOT 9W Bicycle and Pedestrian Improvement study were not evaluated in this study due to their dedicated consideration in parallel initiatives.

Closter Dock Road: from Herbert Ave to 9W (ID 12)

Closter Dock Road is recommended as a connection between US 9W and the borough of Closter for Fast Cyclists and Slow Cyclists. The recommended near-term design is shared-use markings. Adding a sidewalk would make the route accessible to Walkers, Runners, and Rollers.

Hillside Avenue: from Piermont Rd to 9W (ID 13)

Hillside Avenue is recommended for Fast Cyclists and Slow Cyclists as a connection between US 9W and the borough of Cresskill. The recommended near-term design is shared use marking and signage with the potential for bicycle boulevard traffic calming in the long-term. There is a narrow sidewalk along parts of Hillside Avenue that can be used with discretion by Walkers, Runners, and Rollers with the knowledge that the sidewalk is not continuous nor entirely paved. The Borough of Cresskill should investigate the feasibility of improving the sidewalk along Hillside Avenue to make the route accessible to Walkers, Runners, and Rollers.

Hudson Avenue: from Piermont Rd to Tenafly Nature Center (ID 14)

Hudson Avenue is a recommended as connection to the Tenafly Nature Center. This route does not connect bicyclists to US 9W as bicycles are not allowed to be ridden through the Nature Center, however there is a walking path through the park that connects to US 9W. The recommended design for this route is shared lane making and signage, which would make the route accessible for Fast Cyclists and Slow Cyclists. There is currently no sidewalk along Hudson Avenue. The Borough of Tenafly should investigate the feasibility of adding sidewalks along this route to improve accessibility for Walkers, Runners and Rollers.

East Clinton Avenue: from Piermont Rd to 9W (ID 15)

East Clinton Avenue is the recommended connection between US 9W and the Tenafly. The road currently carries one lane of vehicle traffic in each direction and there is no sidewalk. The proposed design is for shared lane markings and signage and the Borough of Tenafly should investigate the feasibility of adding sidewalks to the route. With these improvements, the route could serve all user groups.

East Palisade Avenue (ID 16)

East Palisade\ Avenue is the recommended connection between Hudson Terrace and US 9W to the City of Englewood. The recommended design is for a shared use path along the right-of-way. With these upgrades, the route can serve all user groups.

Hudson Terrace (ID 17)

Hudson Terrace is the recommended connection to the George Washington Bridge for all user groups. The proposed design for the route is a two-way bicycle lane at least 14-feet wide and separated from traffic. This lane may require the use of the planted area, sidewalk, and/or parking lane. The route connects to other bicycle and pedestrian networks including US 9W, East Palisade Avenue (as recommended by this study) and walking routes through Palisades Interstate Park.

US 9W in Bergen County (ID 20)

The portion of US 9W through Bergen County is recommended for Fast Cyclists and Slow Cyclists. The route is part of the officially designated New York State Bicycle Route, despite being in New Jersey, as it serves as a key connection between New York City and the portion of US 9W in Rockland County. The road carries high-speed, high-volume traffic, and has widened shoulders along many sections to accommodate bicyclists. Some points along the route have historically experience a high rate of bicycle crashes. NJDOT is currently in the design phase for pedestrian and bicycle improvements to increase safety along this route.

Rockland Riverway Trail (ID 21)

The Rockland Riverway Trail is currently in the design phase and would upgrade many existing paths and fill in gaps to create a shared use route from the state border across Rockland County to the Orange County line. If constructed, this trail will be a recommended route for all user groups through the Rockland County portion of the study area, though Fast Cyclists may prefer to stay on road for a faster ride.

Northern Valley Greenway (ID 22)

The Northern Valley Greenway is a proposed shared use path. While the project does not currently have the funding or access to implement the vision, if achieved the route would complement the rest of the network proposed by this study, further improving active transportation connections through the region.

Long Path (ID 23)

The Long Path is an existing trail running north-south from the George Washington Bridge to Nyack and beyond. The trail crosses a mix of roads and unpaved path, making it suitable for walkers and hikers. The Long Path provides a connected hiking trail along the entire study area.

Joseph B. Clarke Trail (ID 24)

The Joseph B. Clarke Trail is an existing rail-trail, running northwest from just above the New York / New Jersey state line through Sparkill towards Orangeburg and ending at the Blauvelt Free Library. The 4-mile trail runs along historic rail corridors is and paved for the entire segment. At Sparkill, a spur of the path travels northeast and connects to the Old Erie Path. The trail accommodates all user groups.

Table 9: Summary of recommended routes

ID	Route Name	Connectivity Type	Location Description	Jurisdiction	User Group	Treatment	Cost
1	Henry Hudson Drive / Main Street	North - South	Paved, low-volume road between the GWB and Alpine Borough	• Palisades Interstate Park Commission	• Slow Cyclists • Walkers, Runners, Rollers	Advisory Bicycle Lane	High
3	Rockland Road / Ferdon Avenue	North - South	Local roads connecting US 9W to downtown Piermont in Rockland County	• Village of Piermont • Town of Orange	• Fast Cyclists • Slow Cyclists	Sharrows and Traffic Calming	Low
4	Piermont Avenue / River Road	North - South	Local / County road along the Hudson River between Piermont and Nyack	• Town of Orange • Rockland County • Village of Piermont	• Fast Cyclists • Slow Cyclists • Walkers, Runners, Rollers	Sharrows and Traffic Calming	Low
5	Tallman Mountain State Park Bicycle Path	North - South	Partially paved path through Tallman Mountain State Park connecting US 9W and Piermont	• Palisades Interstate Park Commission • New York State Parks, Recreation, and Historic Preservation	• Slow Cyclists • Walkers, Runners, Rollers	No Recommended Treatment	No cost
7	Highland Avenue / Valentine Avenue	North - South	Road connecting US 9W with Piermont Ave	• Village of Piermont • Town of Orangetown • NYSDOT	• Fast Cyclists • Slow Cyclists	Sharrows and Traffic Calming	Low
10	US 9W in Rockland County: Bicycle Route	North - South	Portion of the highway from the NJ- NY state line to Nyack	• NYSDOT	• Fast Cyclists	No Recommended Treatment	No cost
12	Closter Dock Avenue	East - West	County road connecting US 9W to the center of Closter, NJ.	• Borough of Alpine • Borough of Closter • Bergen County	• Fast Cyclists • Slow Cyclists • Walkers, Runners	Sharrows and Sidewalks	Low
13	Hillside Avenue: from Piermont Rd to 9W	East - West	County road connecting US 9W to Cresskill, NJ.	• Borough of Cresskill • Alpine • Bergen county	• Fast Cyclists • Slow Cyclists • Walkers, Runners	Sharrows and Sidewalks	Low
14	Hudson Avenue from Piermont Rd to Tenafly Nature Center	East - West	County road connecting to the Tenafly Nature Center	• Borough of Alpine • Borough of Cresskill	• Fast Cyclists • Slow Cyclists • Walkers, Runners	Sharrows and Sidewalks	Low
15	East Clinton Avenue: From Piermont Rd to 9W	East - West	County road connecting US 9W to Tenafly, NJ.	• Borough of Tenafly • Bergen County	• Fast Cyclists • Slow Cyclists • Walkers, Runners	Sharrow and Sidewalks	Low
16	East Palisade Avenue: from Tenafly Rd to Hudson Terrace	East - West	County road connecting US 9W to Englewood Cliffs, NJ and Englewood, NJ.	• Bergen County	• Fast Cyclists • Slow Cyclists • Walkers, Runners	Grade Separated Shared Use Path	Medium
17	Hudson Terrace from GWB to Kahn Terrace	Last Mile Connection to George Washington Bridge	County road connecting Fort Lee and Englewood Cliffs from the GWB to E. Palisade Ave.	• Bergen County	• Fast Cyclists • Slow Cyclists • Walkers, Runners	Separated Bike Lane	Low

Table 10: Related Routes

ID	Route Name	Connection Type	Status	User Groups
20	US 9W in Bergen County	North - South	In design phase	• Fast Cyclists • Slow Cyclists
21	Rockland Riverway Trail	North - South	In design phase	• Fast Cyclists • Slow Cyclists • Walkers, Runners, Rollers
22	Northern Valley Greenway	North – South	Advocacy project with no designated resources for implementation	• Fast Cyclists • Slow Cyclists • Walkers, Runners, Rollers
23	The Long Path	North – South	Existing path	• Walkers, Runners
24	Joseph B. Clarke Trail	North-South	Existing Path	• Fast Cyclists • Slow Cyclists • Walkers, Runners, Rollers

Table 11: Recommended Routes for Fast Cyclists

ID	Route Name	User Group
3	Rockland Road / Ferdon Avenue	Fast Cyclists Slow Cyclists
4	Piermont Avenue / River Road	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
7	Highland Avenue / Valentine Avenue	Fast Cyclists Slow Cyclists
10	US 9W in Rockland County: Bicycle Route	Fast Cyclists
12	Closter Dock Avenue	Fast Cyclists Slow Cyclists Walkers, Runners
13	Hillside Avenue: from Piermont Rd to 9W	Fast Cyclists Slow Cyclists Walkers, Runners
14	Hudson Avenue from Piermont Rd to Tenafly Nature Center	Fast Cyclists Slow Cyclists Walkers, Runners
15	East Clinton Avenue: From Piermont Rd to 9W	Fast Cyclists Slow Cyclists Walkers, Runners
16	East Palisade Avenue: from Tenafly Rd to Hudson Terrace	Fast Cyclists Slow Cyclists Walkers, Runners
17	Hudson Terrace from GWB to Kahn Terrace	Fast Cyclists Slow Cyclists Walkers, Runners
20	US 9W in Bergen County	Fast Cyclists Slow Cyclists
21	Rockland Riverway Trail	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
22	Northern Valley Greenway	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
24	Joseph B. Clarke Trail	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers

Figure 24: Recommended routes for Fast Cyclists

Table 12: Recommended Routes for Slow Cyclists

ID	Route Name	User Group
1	Henry Hudson Drive / Main Street	Slow Cyclists Walkers, Runners, Rollers
3	Rockland Road / Ferdon Avenue	Fast Cyclists Slow Cyclists
4	Piermont Avenue / River Road	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
5	Tallman Mountain State Park Bicycle Path	Slow Cyclists Walkers, Runners, Rollers
7	Highland Avenue / Valentine Avenue	Fast Cyclists Slow Cyclists
12	Closter Dock Avenue	Fast Cyclists Slow Cyclists Walkers, Runners
13	Hillside Avenue: from Piermont Rd to 9W	Fast Cyclists Slow Cyclists Walkers, Runners
14	Hudson Avenue from Piermont Rd to Tenafly Nature Center	Fast Cyclists Slow Cyclists Walkers, Runners
15	East Clinton Avenue: From Piermont Rd to 9W	Fast Cyclists Slow Cyclists Walkers, Runners
16	East Palisade Avenue: from Tenafly Rd to Hudson Terrace	Fast Cyclists Slow Cyclists Walkers, Runners
17	Hudson Terrace from GWB to Kahn Terrace	Fast Cyclists Slow Cyclists Walkers, Runners
20	US 9W in Bergen County	Fast Cyclists Slow Cyclists
21	Rockland Riverway Trail	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
22	Northern Valley Greenway	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
24	Joseph B. Clarke Trail	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers

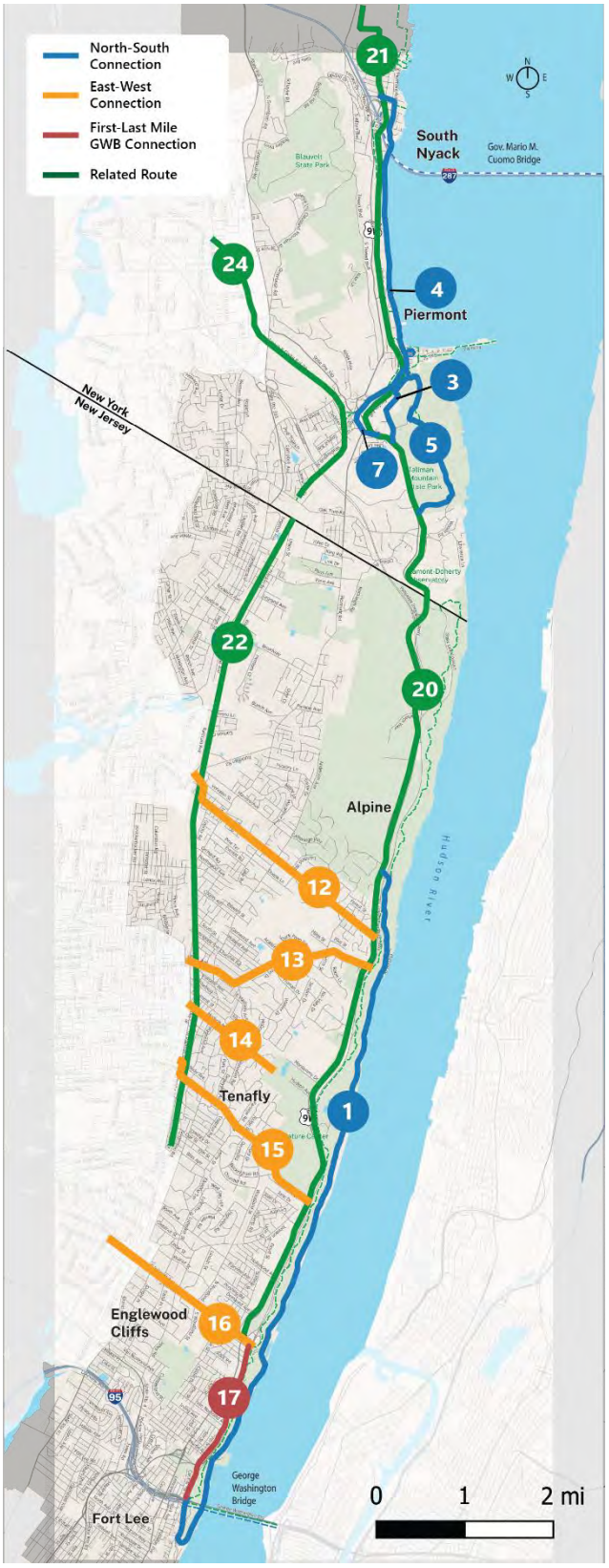


Figure 25: Recommended routes for Slow Cyclists

Table 13: Recommended routes for Walkers, Runners, and/or Rollers

ID	Route Name	User Group
1	Henry Hudson Drive / Main Street	Slow Cyclists Walkers, Runners, Rollers
4	Piermont Avenue / River Road	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
5	Tallman Mountain State Park Bicycle Path	Slow Cyclists Walkers, Runners, Rollers
12	Closter Dock Avenue	Fast Cyclists Slow Cyclists Walkers, Runners
13	Hillside Avenue: from Piermont Rd to 9W	Fast Cyclists Slow Cyclists Walkers, Runners
14	Hudson Avenue from Piermont Rd to Tenafly Nature Center	Fast Cyclists Slow Cyclists Walkers, Runners
15	East Clinton Avenue: From Piermont Rd to 9W	Fast Cyclists Slow Cyclists Walkers, Runners
16	East Palisade Avenue: from Tenafly Rd to Hudson Terrace	Fast Cyclists Slow Cyclists Walkers, Runners
17	Hudson Terrace from GWB to Kahn Terrace	Fast Cyclists Slow Cyclists Walkers, Runners
21	Rockland Riverway Trail	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
22	Northern Valley Greenway	Walkers, Runners
23	The Long Path	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers
24	Joseph B. Clarke Trail	Fast Cyclists Slow Cyclists Walkers, Runners, Rollers

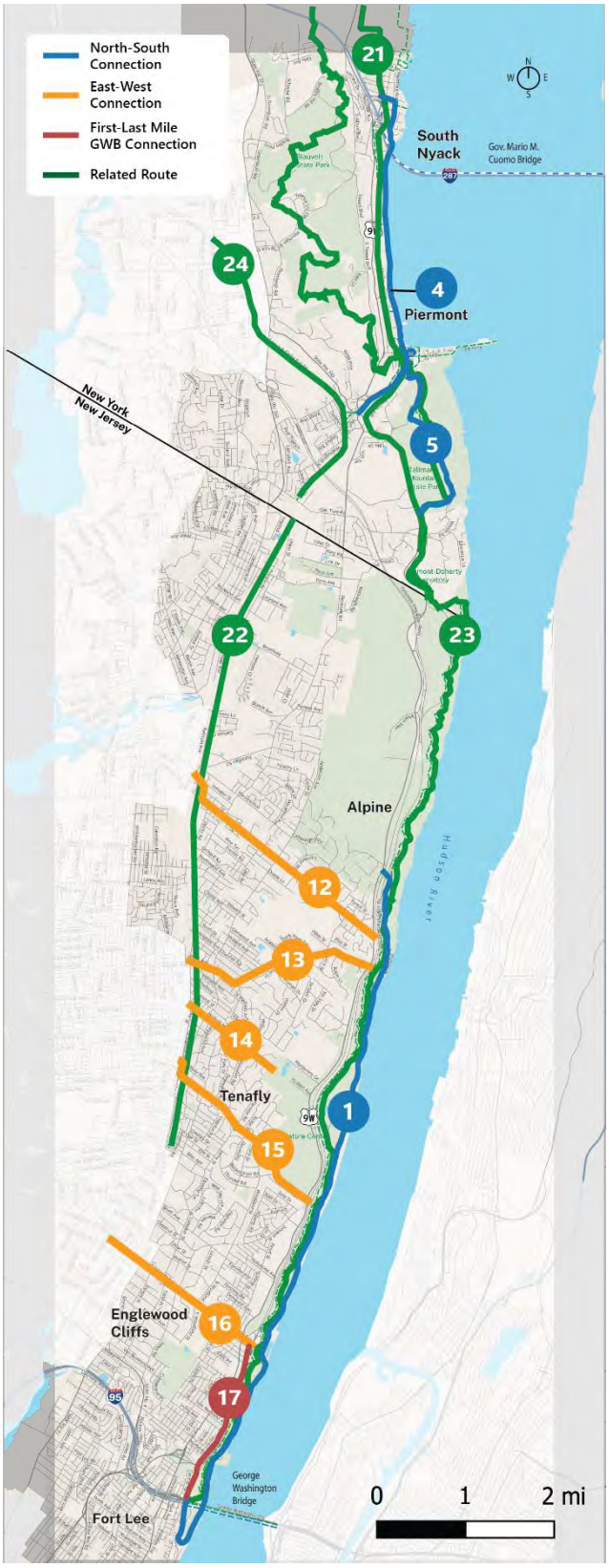


Figure 26: Recommended routes for Walkers, Runners and/or Rollers

Facility Toolkit

This toolkit was developed as a companion to the Palisades Shared Use Path Study. The toolkit provides information and treatments that make active transportation more accessible, increase comfort, and increase safety. The facilities and treatments featured here are not an extensive list of every design option but rather a tailored list of design considerations for the specific network segments included as part of the Palisades Shared Use Path Study. All of the tools featured here are already in use in New York, New Jersey, and throughout the US. The toolkit also presents the treatments in a phased approach identified as near-term, mid-term, and long-term scenarios.

Bicycle Routing & Wayfinding / Near-term

Wayfinding is a highly visible way to improve bicycling in an area because it helps identify the best routes to destinations, helps people overcome a barrier of not knowing where to ride, and reminds motorists to anticipate the presence of bicyclists. A wayfinding system typically combines signage and pavement markings to guide bicyclists along preferred routes to destinations across the community, county, or region. The routes may or may not be numbered, named, or color-coded. Signs may also indicate distances or travel time to destinations. Sign design can be customized to add community branding, but the clarity and accuracy of information must be prioritized.

Figure 27: Types of wayfinding

Considerations

Bicycle wayfinding protocol should coordinate with bicycle route maps and provide three (3) general forms of guidance:

- Decision assemblies, which consist of Bicycle Route identification and optional destination fingerboards, placed at decision points where routes intersect or on the approaches to a designated bicycle route.
- Decision signs, which consist of Bicycle Route panels and arrow plaques, placed where a designated bicycle route turns from one street to another.
- Confirmation assemblies, which consist of Bicycle Route panels and optional destination fingerboards, placed on the far side of intersections to confirm route choice and the distance (and optionally, time) to destinations.

Design Criteria

- Basic bicycle route signs consist of a MUTCD-style “Bicycle Route” sign (shown above) placed every half mile on a major bicycle route and on the approach to major bicycle routes at decision points. Unique numbered routes can be designated and can incorporate a route name or agency logos.

- Bicycle route signs can be supplemented with "fingerboard" panels showing destinations, directions, and distances (MUTCD D1 series).
- Place directional signs on the near side of intersections and confirmation signs on the far side of intersections.

Shared Lane Markings / Near-term

Shared lane markings (sharrows) are pavement markings that denote shared bicycle and motor vehicle travel lanes. The markings are two chevrons positioned above a bicycle symbol, placed where the bicyclist is anticipated to operate. In general, this is a design solution that should only be used in locations with low traffic speeds and volumes as part of a signed route or bicycle boulevard. Shared lane markings are sometimes used as a temporary solution on constrained, higher-traffic streets (up to 10,000 vehicles per day) until additional right-of-way can be acquired, but should not be considered a permanent solution in these contexts.

Figure 28: Shared-lane marking precedent

Considerations

- Typically used on local, collector, or minor arterial streets with low traffic volumes. Commonly used on bicycle boulevards to reinforce the priority for bicyclists.
- Typically feasible within existing right-of-way and pavement width even in constrained situations that preclude dedicated facilities.
- May be used as interim treatments to fill gaps between bicycle lanes or other dedicated facilities for short segments where there are space constraints.
- May be used for downhill bicycle travel in conjunction with climbing lanes intended for uphill travel.
- Typically supplemented by signs, especially Bikes May Use Full Lane sign (R4-11).

Design Criteria

- Intended for use only on streets with posted speed limits of up to 25 MPH and traffic volumes of less than 4,000 vehicles per day.
- May be used as a temporary solution on constrained streets with up to 10,000 vehicles per day (and with speed limits up to 35 MPH).

- Intended for use on lanes up to 14 feet wide (up to 13 feet preferred). For lanes 14 feet wide or greater, stripe a 4-foot bicycle lane instead of using shared lane markings.
- The marking's centerline must be at least 4 feet from curb or edge of pavement where parking is prohibited.
- On streets with parking, the marking's centerline must be at least 11 feet from curb so that it is outside the door zone.

Proposed Palisades Examples

- Rockland Avenue / Ferdon Avenue
- Piermont Avenue / River Road
- Highland Avenue / Valentine Avenue
- Closter Dock Road (near term)
- Hillside Avenue (near term)
- Hudson Avenue (near term)
- East Clinton Avenue (near term)

Bicycle Boulevard Crossing Treatments / Mid-term

While the street segments of a bicycle boulevard or other traffic-calmed street may be generally comfortable for bicyclists without significant improvement, major street crossings should be addressed to provide safe, convenient and comfortable travel along the entire route. Treatments provide waiting space for bicyclists, control cross traffic, or ease bicyclist use by removing traffic control for travel along the bicycle boulevard route.

Figure 29: Bicycle boulevard intersection precedent

Considerations

- Adjustments to traffic control such as implementation of a pedestrian hybrid beacon or adjustments to stop signs may require a traffic study.
- Median islands may be constructed to require right-in/ right-out turns by motor vehicles while still allowing left turns by bicyclists at offset intersections.
- Numerous treatments exist to accommodate offset intersection crossings for bicyclists, and the full range of design treatments should be considered in these situations. These treatments include turn queue boxes,

two-way center left-turn lanes (optionally designed solely for bicyclists), median left-turn pockets and short sidepath segments.

Design Criteria

- Medians should be a minimum of 6 feet in width, though 8 feet is desirable to allow adequate space for a bicycle.

Intersections along a bicycle boulevard route may need treatment in the following situations:

- Unsignalized crossings of arterial or collector streets with high traffic volumes and speeds.
- Offset intersections where the bicycle boulevard route makes two turns in short succession

Proposed Palisades Examples

- Closter Dock Road (mid-term)
- Hillside Avenue (mid-term)
- Hudson Avenue (mid-term)
- E. Clinton Avenue (mid-term)

Yield Street / Mid-term

Slow or yield streets are similar to local streets except that they feature reduced travel lane width that requires oncoming vehicles to yield to one another in order to pass. Yield streets are inviting places for users of all ages and abilities to walk, bicycle, and roll, making them an important connection to parks, schools, and other community destinations.

Figure 30: Yield street precedent

Considerations

- Minimize on-street vehicle parking.

- Consider using planters and other street furniture to create vertical fiction to calm traffic.
- Changes in surface pavement color and texture can be used in interesting and visually attractive ways. The paving treatments also delineate and create awareness among users, make a corridor appear narrower than it is to deter speeding, and define a corridor.

Design Criteria

- Total traveled way width may vary from 12 feet to 20 feet for two-way travel.
- No traffic control markings are necessary to implement a yield street. Do not mark a center line within the travel area. The single two-way lane introduces travel friction and ambiguity for users.
- Trees may be planted along the roadside to visually and physically narrow the corridor, add to the aesthetic environment, and encourage slow speeds.

Paved Shoulders / Mid-term

Paved shoulders provide a range of benefits: they reduce motor vehicle crashes, reduce long-term roadway maintenance, ease short-term maintenance such as snow plowing, and provide space for bicyclists and pedestrians (although paved shoulders typically do not meet accessibility requirements for pedestrians). Paved shoulders are typically reserved for rural road cross-sections.

Figure 31: Paved shoulder precedent

Considerations

- Where 4-foot or wider paved shoulders exist already, it is acceptable or even desirable to mark them as bicycle lanes in various circumstances, such as to provide continuity between other bikeways. If paved shoulders are marked as bicycle lanes, they need to also be designed as bicycle lanes at intersections. Where a roadway does not have paved shoulders already, paved shoulders can be retrofitted to the existing shoulder when the road is resurfaced or reconstructed. In some instances, adequate shoulder width can be provided by narrowing travel lanes to 11 feet.

- Reducing travel lane width on existing roads—also known as a "lane diet"—is one way to increase paved shoulder width.
- There are several situations in which additional shoulder width should be provided, including motor vehicle speeds exceeding 50 mph, moderate to heavy volumes of traffic, and above-average bicycle or pedestrian use.
- The placement of rumble strips may significantly degrade the functionality of paved shoulders for bicyclists. Rumble strips should be placed as close to the lane edge line as practicable and four feet of usable space should be provided for bicyclists. Where rumble strips are present, gaps of at least 12 feet should be provided every 40 to 60 feet.

Design Criteria

Benefits

- Provide separated space for bicyclists (can be used by pedestrians).
- Reduce run-off-road motor vehicle crashes.
- Reduce pavement edge deterioration and accommodate maintenance vehicles.
- Provide emergency refuge for public safety vehicles and disabled vehicles.

Challenges

- May not provide a comfortable experience for all bicyclists when used on high-speed roads.
- May not facilitate through-intersection bicycle movement unless designed as bicycle lanes through intersections.
- Do not meet accessibility requirements for pedestrians.

Design Criteria

- Minimum width: 4 feet (5 feet if adjacent to curb / guardrail)
- For reconstruction, retrofit, or in locations with constraints, use the paved shoulder width necessary to maintain a bicycle LOS score of "C".
- Sidepaths can also be used with higher speeds and volumes (especially for people who are less comfortable biking).

Proposed Palisades Examples

- US 9W in Bergen County

Separated Bicycle Lanes / Mid-term

Separated bicycle lanes can be one-directional (provided on both sides of a street) or two-directional (provided on one side of a street). One-way separated bicycle lanes in the direction of motorized travel can provide intuitive and simplified transitions to existing bicycle lanes and shared travel lanes.

Figure 32: Separated bicycle lane precedent

Considerations

- Separated bicycle lanes can be useful on streets that provide connections to off-street paths, since bicyclists on these streets may be more accustomed to riding in an area separated from traffic.
- Intersection design for protected bicycle lanes is complex and requires careful attention to conflicts with turning vehicles.
- Adjacent to on-street parking a 4 ft buffer is preferred (2 ft minimum) should be provided between the parking lane and separated bicycle lane. The buffer serves as a pedestrian loading and unloading zone which also helps keep bicyclists out of the door zone of parked vehicles.
- Vertical curb separation should be considered where on-street parking is not present. Snow clearance and stormwater drainage will need to be considered with this option. Street-level protected bicycle lanes may be combined with islands at corners and crossings.
- At transit stops, protected bicycle lanes should be routed between the passenger waiting area and the sidewalk to reduce conflicts while passengers are boarding and alighting. Signage and/or markings may be added to alert transit riders and bicyclists conflict zone as pedestrians cross the bicycle lane from the sidewalk to the transit stop.

Proposed Palisades Examples

- Hudson Terrace

Sidepaths / Long-term

A shared-use path constructed parallel to and within the right-of-way of a roadway is referred to as a sidepath. Sidepaths may be desirable along high-volume or high-speed roadways, where accommodating bicyclists within the roadway in a safe and comfortable way is impractical. Since sidepaths are shared by bicyclists and pedestrians, they are most appropriate where pedestrian volumes are relatively low. Sidepaths may present increased conflicts between path users and motor vehicles at intersections and driveway crossings. The design of sidepaths closely resembles the design of shared use paths between intersections. However, sidepaths should be designed similarly to separated bicycle lanes at intersections.

Figure 33: Side path precedent

Considerations

- Sidepaths are most appropriate where driveways and intersections are limited. Where necessary, intersection conflicts can be reduced with high-visibility crossing treatments.
- In areas with high concentrations of driveways and intersections, on-street accommodations (including bicycle lanes, buffered bicycle lanes, and separated bicycle lanes) are preferred because they are proven to be safer.
- For intersections between arterial roads and collector/ local roads, there should be 15 to 25 feet of sidepath setback from the curb line of the parallel road. The setback creates a larger yielding zone for motorists and increases visibility.
- For intersections between two arterial roads, the crossings should be closer to the intersection and bicycle-specific signal heads should be used. Grade-separated crossings of arterial roadways should be considered where feasible.
- Signage for paths along roadways should follow the same regulatory controls as the parallel roadway. For example, a stop sign should not be placed along the path at an intersection or driveway unless the parallel roadway also has a stop sign at the same location. Instead, the perpendicular street should include a stop bar behind the path crossing and warning signage for both the motorists and the path users. Warning signs for motorists turning across sidepaths may be appropriate at high-traffic areas.

Design Criteria

- The minimum width of a sidepath is 8 feet (in constrained areas, and with warning signs). Widths exceeding 10 feet are recommended in areas with higher sidepath traffic volumes or with a higher proportion of pedestrians. A minimum of 11 feet is required for users to pass with a user traveling in the other direction.
- In locations with heavy volumes or a high proportion of pedestrians, it may be beneficial to separate bicyclists from pedestrians by constructing separate sidewalks and separated bicycle lanes instead of a sidepath.
- Paths must be designed according to state and national standards. This includes establishing a design speed (typically 15 MPH) and designing path geometry accordingly. Consult the AASHTO Guide for the Development of Bicycle Facilities for guidance on geometry, clearances, traffic control, railings, drainage, and pavement design.

Proposed Palisades Examples

- Closter Dock Road (long-term)

Shared Use Path (Trails) / Long-term

A shared use path is a two-way facility that is physically separated from motor vehicle traffic and used by bicyclists, pedestrians, and other non-motorized users. Shared use paths, also referred to as trails, are often located in an independent alignment, such as a greenbelt or abandoned railroad right-of-way.

Figure 34: Shared use path precedent

Considerations

- Shared use paths make up a network or system of routes designed specifically for off-street travel.
- According to the AASHTO, "Shared use paths should not be used to preclude on-road bicycle facilities, but rather to supplement a network of on-road bicycle lanes, shared roadways, bicycle boulevards, and paved shoulders."
- Shared use paths are used for recreation, leisure activity, and commuting.

- These paths are located along waterways, within parks and open spaces, along roadways (known as sidepaths), and through easements and utility corridors.
- Shared use paths are appropriate when an on-street route is too dangerous due to the speed of the road, the majority of users are recreational or leisure users, and to provide a direct route between points of interest.

Design Criteria

- A separate unpaved path may be constructed adjacent to a hard surface shared use path to allow for users on foot to select the path material that suits their needs.
- If there is frequent conflict between bicyclists and other users, separate bicyclists from pedestrians by using paint or by constructing separate facilities for each mode. The separate facilities may include two hard surface paths, or one hard surface path and one soft surface path.
- All shared use paths must conform to the current editions of both the AASHTO and ADA guidelines.
- Shared use paths should generally be at least 10 feet wide, although 8 feet is acceptable in limited areas. Recommended widths rise with projected use.
- Shared use paths in a public right-of-way must also conform to Public Rights-of-way Accessibility Guidelines (PROWAG).

Proposed Palisades Examples

- E. Palisade Avenue

User Experience

Expanding pedestrian and bicycle facilities in the Palisades is also an opportunity to infuse site amenities to complement the user experience. Providing critical touch points throughout the environment can draw users and boost the overall experience.

Amenity Facilities

Site amenities complement the user experience. They include benches, overlooks, trash receptacles, bicycle parking, gathering spaces, and even children's play equipment. Signage is also considered a site amenity, especially when it adds an architectural element to the facility setting. The extent to which amenities are provided depends on the site. In an urban setting where a social atmosphere is being created, it is common to provide numerous benches and gathering areas. Along a state trail in a rural area, a few benches and an occasional overlook are sufficient.

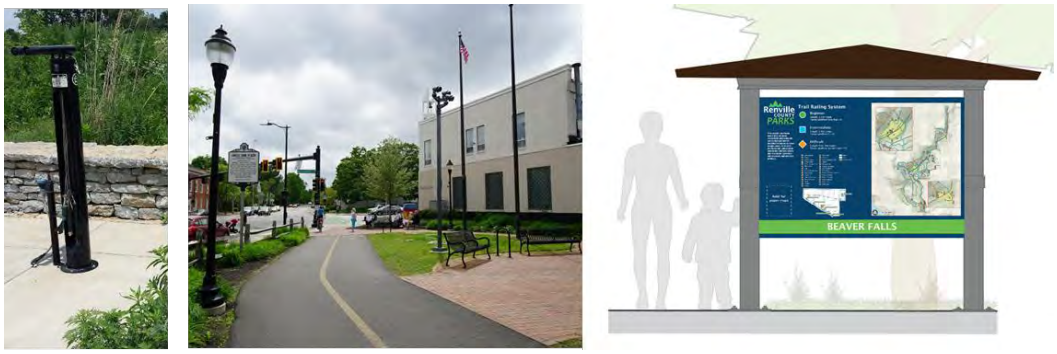


Figure 35: Path amenities precedents

Unifying the Area

A key component to increasing pedestrian and bicycle access to the Palisades is creating a unified identity, supported by a home organization responsible for information about the corridor and maintaining a cohesive feel to the study area through consistent wayfinding and information (online and through signage). Such responsibility could be housed within a government agency, an existing organization in the study area related to transportation or recreation or could be a new organization in the model of a 'friends-of' group commonly involved in supporting green spaces and trails. The organization would be responsible for providing consistent and branded maps, wayfinding, and outreach materials to spread the word about pedestrian and bicycle opportunities in the Palisades. Additionally, the group could create and disseminate educational material on pedestrian and bicyclist traffic safety, including relevant local traffic rules. On an operational side, the organization would also coordinate with the multiple municipalities within the Palisades study area to coordinate on implementation and maintenance of pedestrian and bicycle infrastructure through the study area.

One potential model of this is the Empire State Trail, traverses New York State from Manhattan north to the Canadian border, and east-west from Albany to Buffalo. When the trail was created it connected many pre-existing trails through a single brand identity and wayfinding, as well as large investments in filling gaps. The trail is promoted through a website that includes an interactive map, points of interest, trip planning tools, and trail closure updates. On the ground, the trail is also supported by consistent signage along the 750 miles of trail. The New York State Office of Parks, Recreation and Historic Preservation coordinates the trail and hosts the central repository of information.

Figure 36: The Palisades cliffs extending north of the George Washington Bridge (Source: The Cultural Landscape Foundation)

Next Steps

Based on the criteria and analysis of this study, a single shared-use path connecting the two bridges is not feasible due to topographic, technical, and community constraints. However, it is feasible to improve bicycle and pedestrian connections in the Palisades study area through designating a network of corridors traveling north-south, east-west, and to and from the George Washington Bridge. Enhanced amenities along the routes in the form of restrooms, benches, bicycle parking, and water fountains would make the routes more attractive and friendlier to use. Unified branding and wayfinding for the routes would help to improve access and navigation through the study area for pedestrians and bicyclists.

The recommendations in the study can be used by local governments to identify potential projects for local plans, inform funding applications, and advance projects for design and construction. As a feasibility study, the next steps are for more detailed implementation and design studies, which would then be contracted out for construction. This level of design and implementation falls to the local municipalities, counties, or State DOTs. These entities, with the help of NYMTC, would have to identify funding sources, apply for funding opportunities, prepare and release requests for proposals, and bid out the work. Local jurisdictions will also be responsible for enforcing traffic laws so that streets are safe for all users.

The establishment of a unifying organization is an important early step to advocate for and coordinate efforts to implement the recommendations of the study. NYMTC, NJTPA, and the Palisades Interstate Park Commission should work together to identify a host agency or coalition of groups that can begin this needed work. Alternatively, a "friends of" group (or similar) could be formed to advance this work and apply for funding opportunities.

8 Appendices

Appendix 1: Public Engagement Detailed Summary

Appendix 2: Existing Conditions Report

Appendix 3: Crash Analysis Memo

Appendix 1: Public Engagement Detailed Summary

Workshop 1

On March 5th, from 6:30 pm – 8 pm, 61 members of the public and 10 members of the consultant team attended the first workshop. The workshop began with an overview of the study and project area. Participants responded to three poll questions regarding their relationship to the study area, frequency of biking in the study area, and priorities for a shared use path. The project team then described the existing conditions, including land use, topography, demographics, and crash data analysis. The project team proceeded to describe potential alignments and their characteristics, emphasizing that there is no preferred alignment.

Participants were split into three Zoom breakout rooms for approximately 30 minutes. Breakout room discussions included concerns about safety, support for separate bicycle infrastructure away from car traffic, and varying preferences regarding connectivity. Some preferred amenities like a paved wider path, while others favored minimal impacts on the environment and minimizing overall usage of the corridor. The workshop closed with a discussion of next steps for the project: there will be two more visioning workshops coming up in March, as well as four in-person workshops.

Workshop 1: Reflection

Participants in Workshop 1 voiced concern that non-cyclists were underrepresented and that the proposed path was being designed without sufficient consultation with the community. Members of the public also expressed that a shared-use path would cater to through cyclists and detract from the character of the community surrounding the corridor. The presentation, poll questions, and workshop format were adjusted based on this feedback.

Presentation and workshop format adjustments:

1. Content focused more equally between cyclists, walkers, and hikers.
2. Content focused more on gathering feedback about preferences and improvements along the corridor, rather than providing comments on alignment options.
3. The team included additional background on the aim of a visioning workshop, as well as NYMTC's purpose, responsibility, and membership.
4. The team removed breakout rooms and added poll questions.
5. Question added: What improvements to walking and biking are needed in the study area?
6. Question added: What benefits from improved walking or biking in the study area would you like to see for your community?

Workshop 2

On March 13th, from 6:30 pm – 8 pm, 70 members of the public and 7 members of the consultant team attended the second workshop. The team strongly encouraged the attendance of the Chamber of Commerce, local businesses, and bicycle shops. The workshop began with an explanation of the purpose of a community visioning workshop including contextual information such as study funding sources, the study purpose, and the responsibilities of the New York Metropolitan Transportation Council (NYMTC) and the NYMTC members present. The project team then described the study scope and timeline and introduced the first set of poll questions which included questions about the participants' relationship to the study area, their usage of the corridor, and their priorities for the study area.

The project team then described study area existing conditions and introduced the second round of poll questions, with open-ended responses. Questions were designed to better understand participants' desired improvements to walking or biking in the study area, their safety concerns, desired outcomes, and potential ways to enhance connectivity.

The project team reviewed next steps for the project: there one more virtual visioning workshop in March, plus in-person workshops over the summer in New Jersey and New York. There will also be a draft report available for public comment.

Workshop 2: Reflection

Since Workshop 3 encouraged attendance from elected officials, municipalities, public agencies, parks, community boards, and school districts, questions and presentation adjustments were made. Changes aimed to tailor the content and focus on aspects that are particularly relevant or important to the elected officials, considering their specific roles, responsibilities, and interests.

Slides about the planning process and NJTPA were added to ensure the group had a clear understanding of the decision-making and planning processes, study framework, and stakeholders involved.

The question about unsafe areas for walking or biking was removed, to focus on broader improvements rather than specific safety concerns. The question about connectivity was also removed to focus the discussion on broader strategies rather than specific locations. Additionally, the team amended the question to include *hiking* and *rolling*, ensuring inclusivity and addressing a wider range of mobility needs. Additionally, a question about measuring the success and impact of improvements was added to better understand how elected officials perceive the effectiveness of initiatives. A question about barriers or challenges was added to understand the concerns or obstacles elected officials may face in the implementation process and to identify possible barriers within the scope of this study.

Presentation and workshop format adjustments:

1. Slides added on Metropolitan Transportation Planning Process
2. Slides added on NJTPA region, board, and committees

Poll questions adjustments:

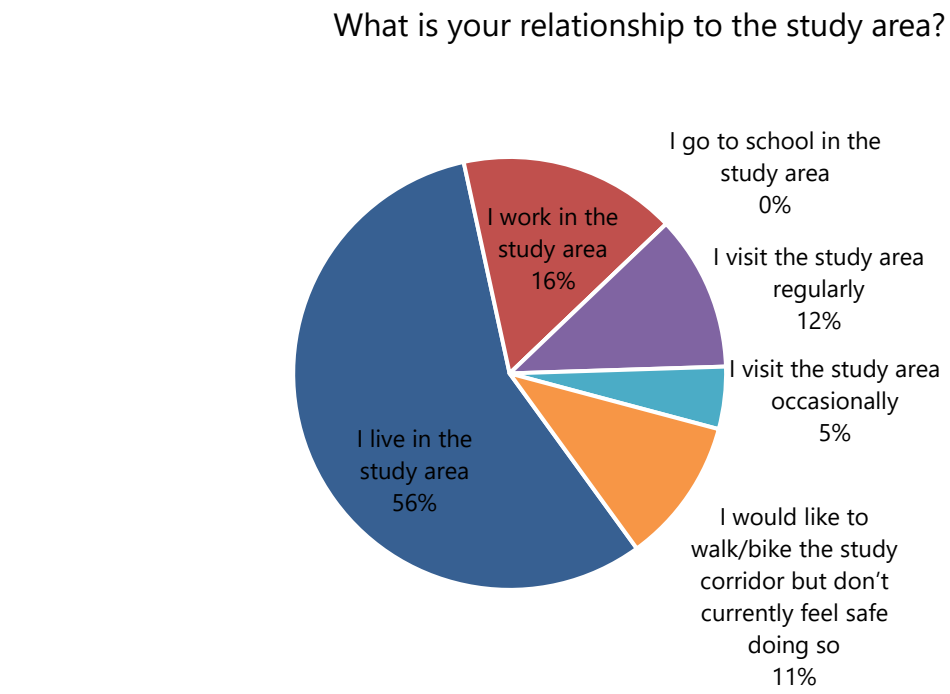
1. Question removed: *What areas do you find unsafe for walking or biking in the study area?*
2. Question removed: *What walking or biking destinations in the study area would you like to see better connected?*
3. Question amended: *What improvements to walking, hiking, biking and/or rolling are needed in the study area?* (added *hiking* and *rolling*)
4. Question added: *How would you measure the success and impact of walking and biking improvements in your community?*
5. Question added*: In your view, what are the barriers or challenges to implementing walking and biking improvements in the study area?*

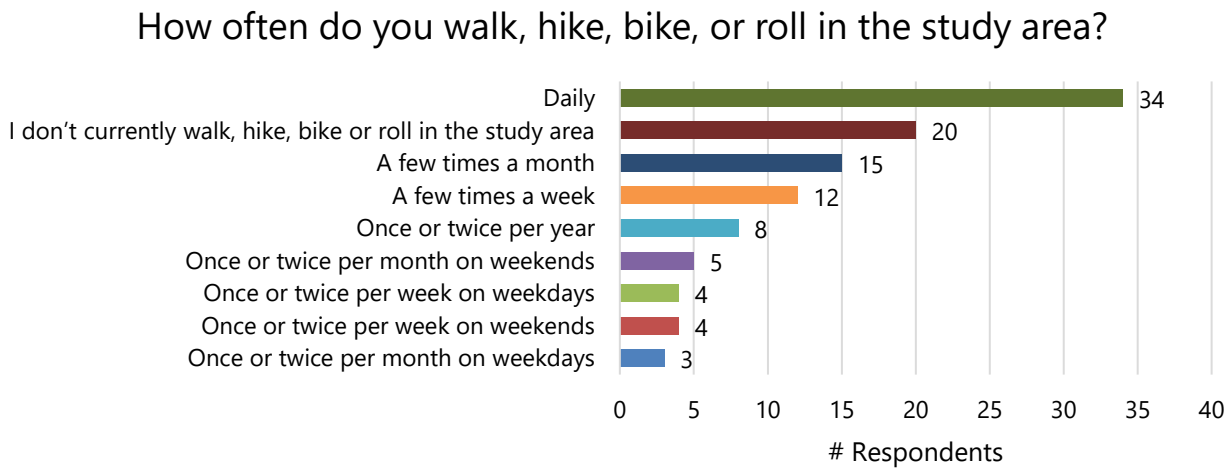
Workshop 3

On March 20th, from 12pm-1:30 pm, 66 members of the public and 10 members of the consultant team attended the third workshop. The team encouraged the attendance of elected officials, municipalities, public agencies, parks, community boards, and school districts. The workshop began with an explanation of the purpose of a community visioning workshop, NYMTC's role and membership, and the Metropolitan Transportation Planning process. The workshop continued with a description the study scope and timeline and introduced the poll questions. Following the polls, the project team described the study area conditions and introduced the second round of poll questions, with open-ended responses.

The workshop concluded with a review of the next steps for the project: in-person workshops over the summer in New York and New Jersey. The project team encouraged the group to find out more about the project on the website or email us with questions or comments and thanked everyone for attending.

Workshop Intro Questions





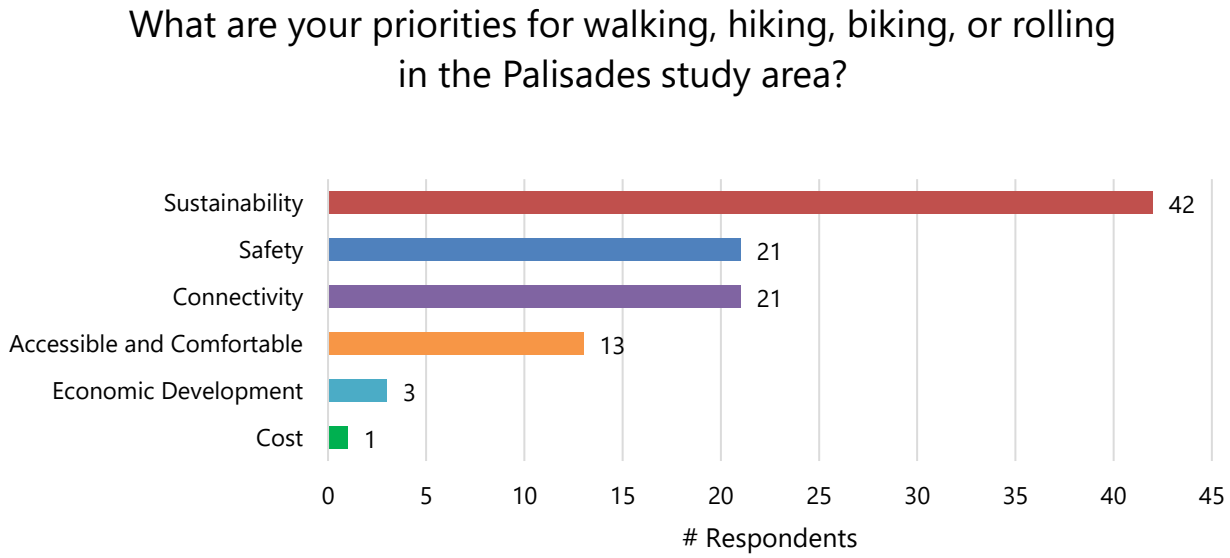
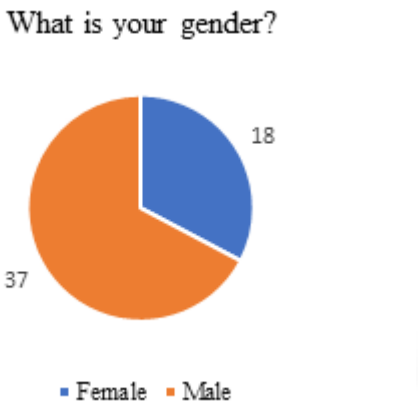
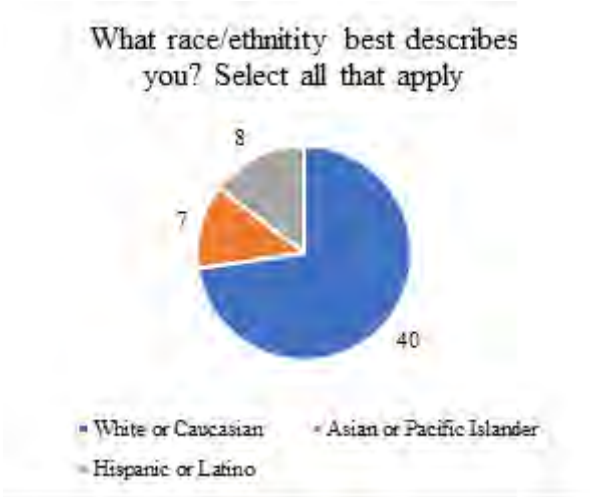


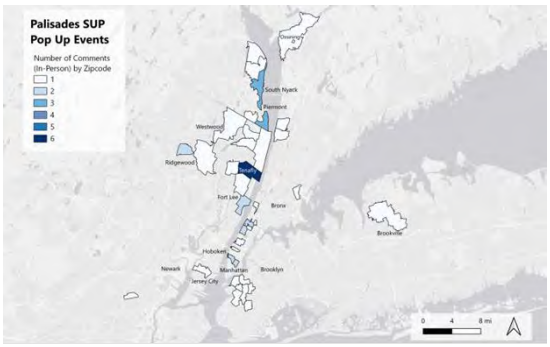
Figure 37: Introduction question responses for all workshops

Pop Up Background Question Responses

Survey questionnaires were distributed at the pop-up events in order to understand whose inputs was being collected through the events. Survey respondents were primarily male, primarily white, and primarily between 25 and 44 years old. A high proportion of respondents were from the Tenafly area, followed by South Nyack and Piermont







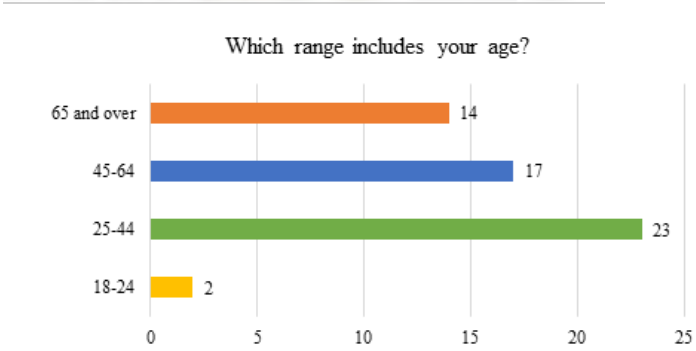
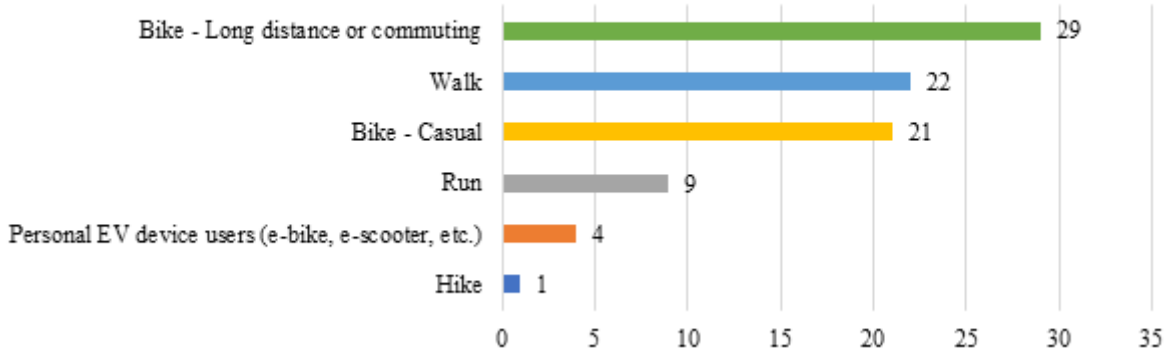
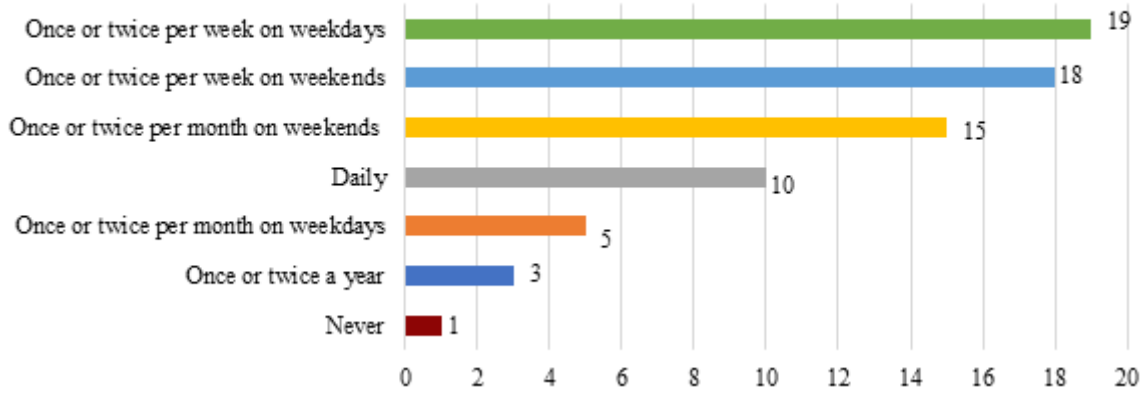


Figure 38: Demographic responses from all pop-ups

Which activites do you do in the study corridor? Select all that apply



How often do you walk, run, bike, or roll in the Palisades study area?



Appendix 2: Existing Conditions Report

PALISADES

SHARED USE PATH FEASIBILITY STUDY

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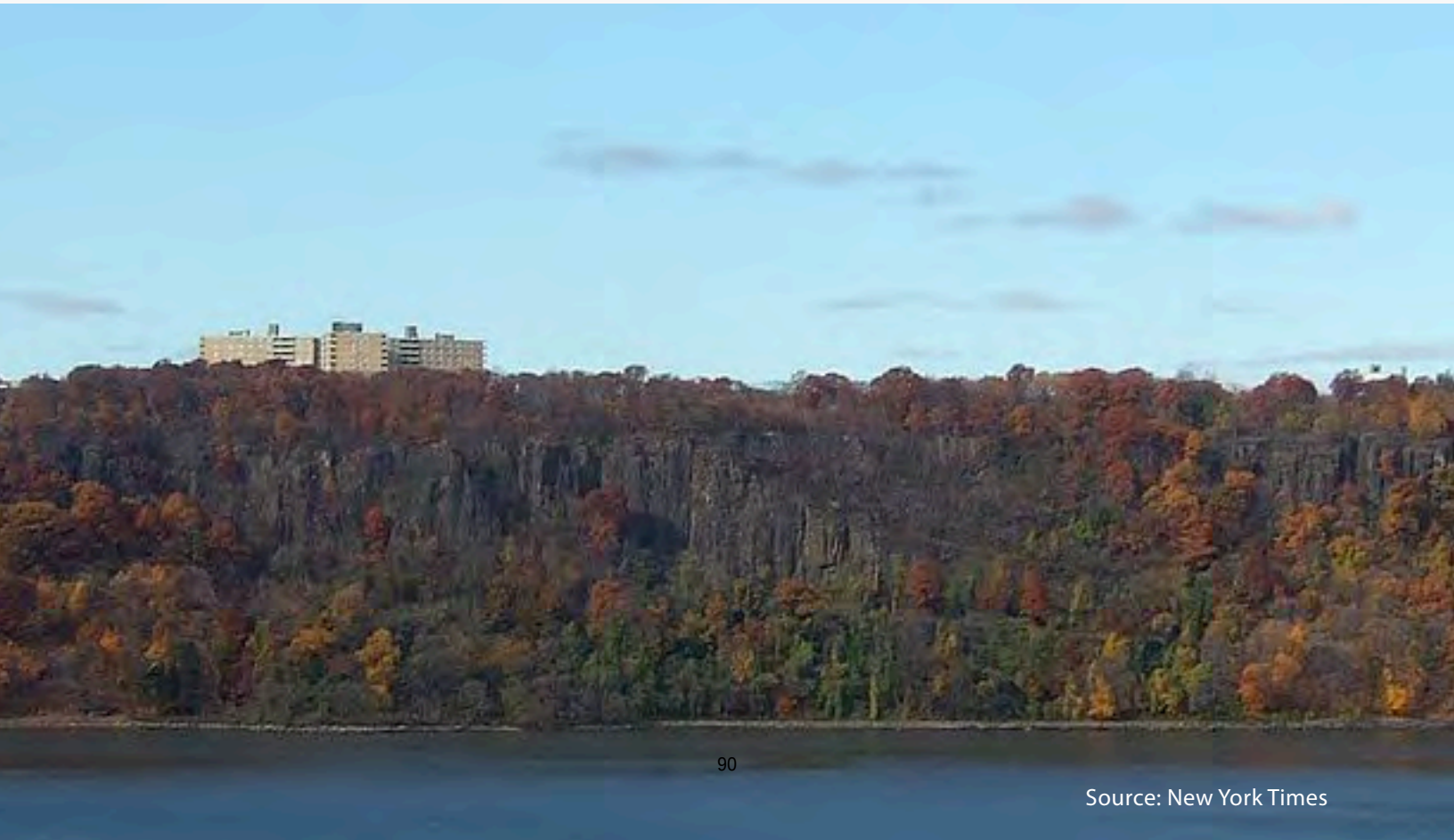
The Palisades landscape boasts a unique blend of urban, suburban, and natural environments, offering a striking contrast between a dramatic riverside cliff and the adjacent development. The preservation of this land from development was driven by a desire to maintain sweeping views of New York City and the scenic beauty of the region. These landscapes have long made this area a magnet for recreation, attracting enthusiasts seeking the surroundings and the challenge of navigating its dramatic terrain. However, this same natural beauty and challenging topography make the introduction of a universally usable shared-use path a complex endeavor, as it must accommodate both experienced cyclists and casual walkers alike with the physical limitations . This study aims to carefully navigate these complexities by breaking down the 19 mile corridor into five distinct segments: Fort Lee, Englewood Cliffs, Alpine Lookout, Camp Alpine, and Rockland County. This segmentation enables the study effort to meet the specific needs, land uses, and recreational preferences of each area, ensuring a holistic approach of the feasibility of a shared-use path.

The study corridor is divided into five segment based on an analysis of adjacent land uses, topography, political boundaries, and potential shared use path rights of way. This division allows for a more detailed analysis of each segment.

This report is organized into four chapters. First is an outline of the physical landscape of the study area. Next is an exploration the demographics of the communities within the study area. Then social characteristics are analyzed through an equity lens to identify where and how equity should be given extra consideration. Finally, transportation factors are analyzed to understand what infrastructure exists and how people move through the study corridor. Together, these analyses establish the existing conditions of the study area and set a foundation upon which to study the feasibility of a shared use path through the Palisades.



Source: New York Times

01
PLACE

The 16 mile corridor spans from the George Washington Bridge in Fort Lee, NJ to the Gov. Mario M. Cuomo Bridge in South Nyack, NY. The corridor has been divided into five distinct segments based on land uses, topography, political boundaries, and potential shared use path rights of way.

PLACE

Study Area

The study area extends for approximately 16 miles surrounding the Palisades Interstate Parkway and U.S. 9W corridor from Fort Lee to South Nyack. About two-thirds of the study area is in Bergen County, NJ, with the southernmost portion representing the more commercial and populous part of the corridor. The rest of the corridor is defined by parkland, single-family homes, downtown Piermont and other river villages in Rockland County, NY.

The corridor was divided into five segments based on their character, land use, and

Segment 1 "Fort Lee"

The Fort Lee segment is defined by the George Washington Bridge, an area with a lot of traffic and businesses, perched high above the Hudson River. Cyclists coming over the bridge can continue directly north on Hudson Terrace, a two lane road with access to the Parkway, or turn south to enter the park along Henry Hudson Drive. This segment contains two popular bike shops, Strictly Bicycles and Hudson Bikes, where cyclists often stop to resupply and use the restroom. The northern limit of this segment is E Palisade Avenue, where there is a full interchange with the Parkway. Cyclists using Hudson Terrace at this point must continue on U.S. 9W / Sylvan Avenue. This is a dangerous transition to make, particularly in the southbound direction when turning left from Sylvan Avenue onto E Palisade Avenue.

Within the park, cyclists on Henry Hudson Drive descend below the bridge and can bike with little or no vehicular traffic.

Segment 2 "Englewood Cliffs"

This segment, from E Palisade Avenue to E Clinton Ave along U.S. 9W, is a 4 to 5 lane arterial with large office parks along the west side of the roadway. For much of this segment there is no shoulders and cyclists must take the lane.

Segment 3 "Alpine Lookout"

This segment, from E Clinton Avenue to Timberline Drive, is where U.S. 9W widens to include a generous shoulder that is used by cyclists. The area parkland and single-family homes, with few intersections or crossing traffic. The northern end of this segment is where cyclists on Henry Hudson Drive climb the hill up to U.S. 9W to continue north.

Segment 4 "Borough of Alpine"

This segment goes from Timberline Drive to the state border and is almost entirely through parkland, with almost no intersections. There are two interchanges with the Parkway.

Segment 5 "Rockland County "

The final segment is the stretch within Rockland County, including Piermont, Grandview, and South Nyack. There are several popular destinations in this area for cyclists (9W Market, downtown Piermont) and a few parallel routes (River Road, U.S. 9W, Joseph B. Clarke Rail Trail/Old Erie Path) to get to Nyack.

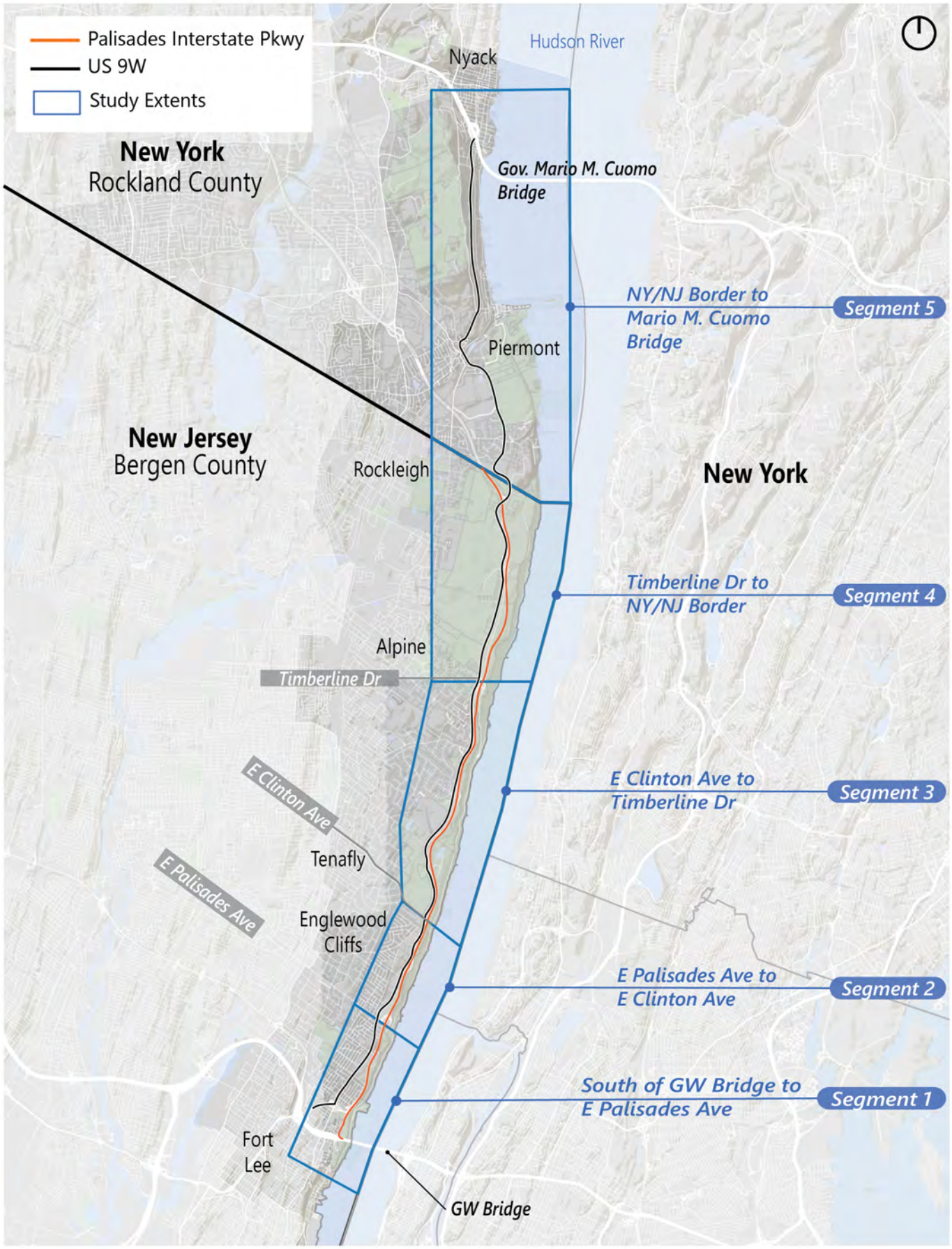
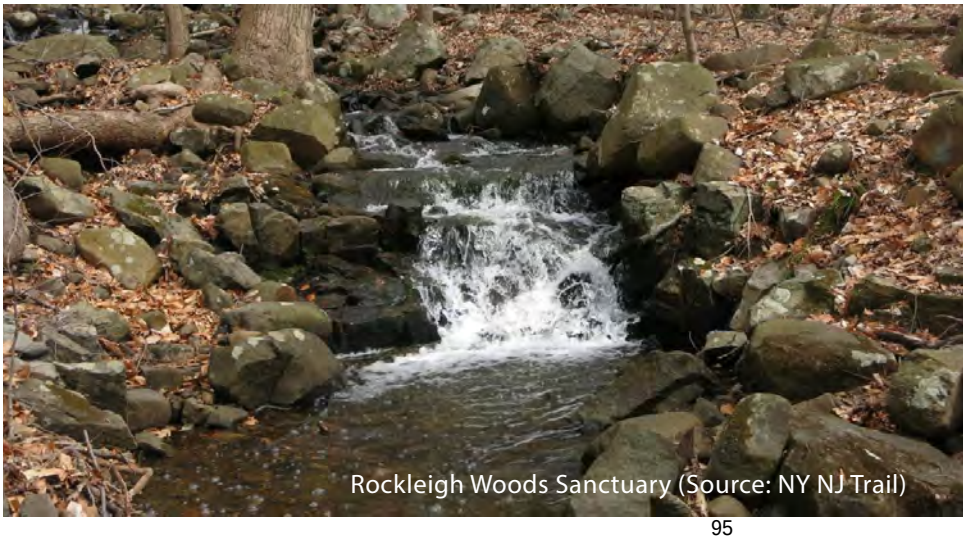


Figure 1.1: Study Area Overview (Data Source: Buro Happold, NYS API, NJTPA API, Rockland County, Tiger/Line)


Fort Lee Historic Park (Source: Wikipedia)


Rockleigh Woods Sanctuary (Source: NY NJ Trail)


Carpenter's Loop

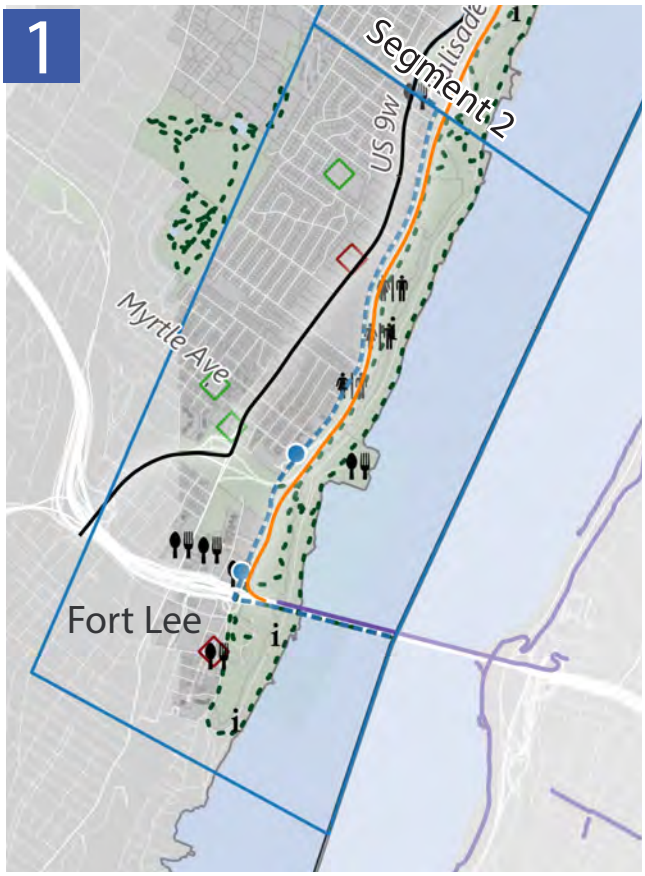

Piermont Pier (Source: I Love NY)

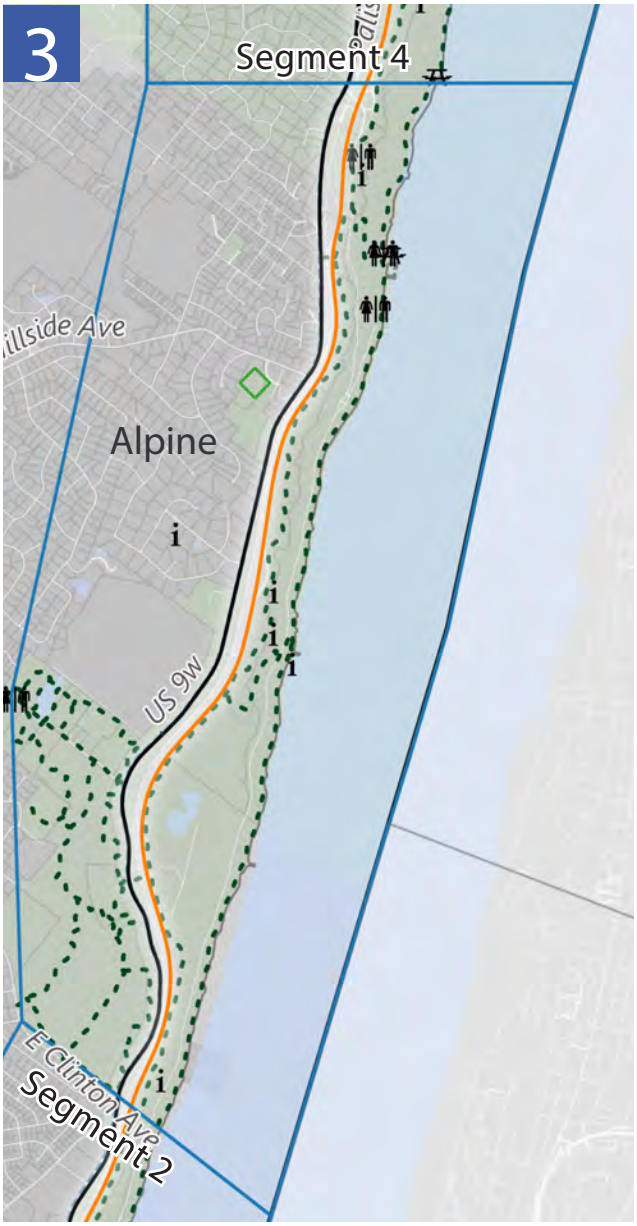

Source: Tenafly Nature Center


Panorama of George Washington Bridge (Source: Adobe)


(Source: Palisades Interstate Park)


Clinton Point (Source: Palisades Interstate Park)





Study Area

Boundaries
- US 9W
- Palisades Interstate Parkway

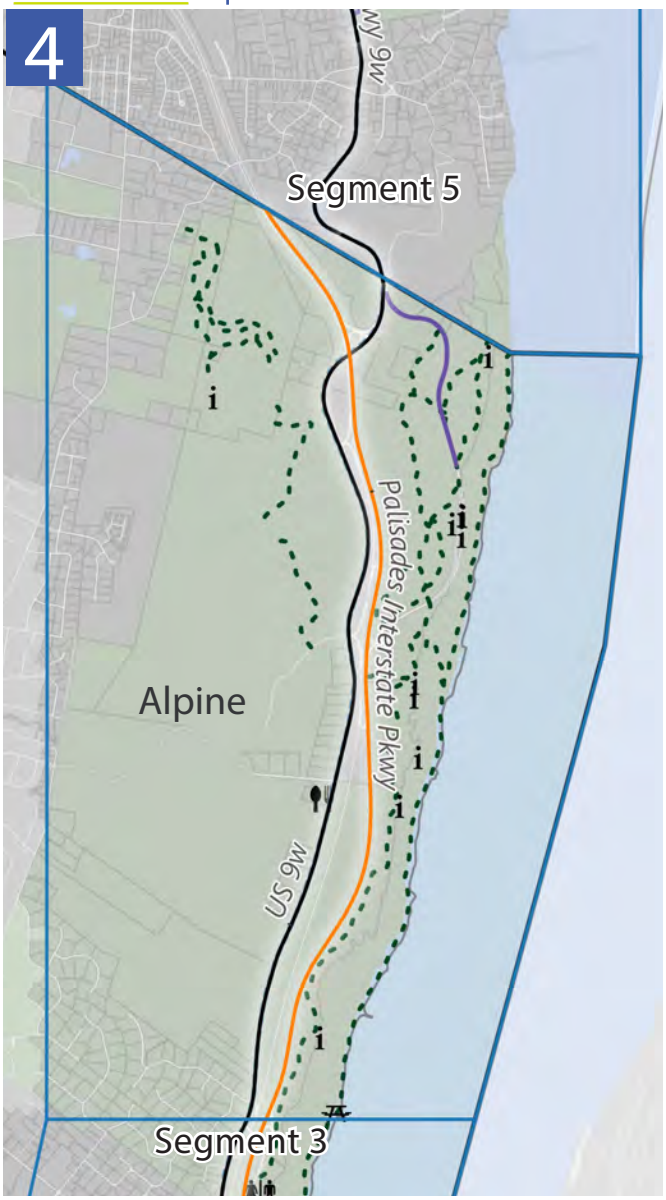
Bicycle Route
- Class III/Shared Roadway

Active Transportation and Destinations
- Cafe, Restaurant, Food Vendor
- Tourism Destination, Information, Viewpoint
- Picnic Area

Access & Amenities
- Bicycle Shop
- Restroom

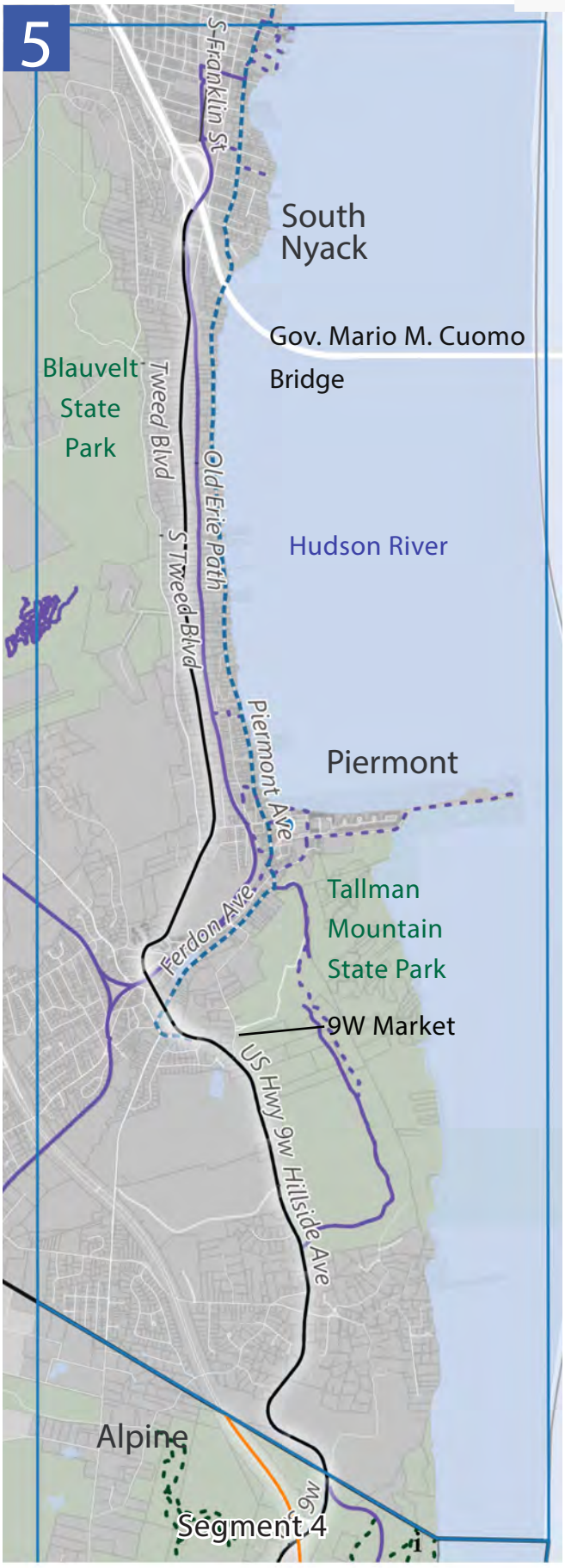
Services
- School
- Other Services
- Existing Mountain Bike Trail
- Existing Multiuse Path
- Existing Shared Roadway

0 0.5 1 mi



The "Giant Stairs" along State Line Lookout presents a challenging stretch of trail for hikers.

(Source: Jersey's Best, Photo by Mario Burger)



PLACE

Topography

The corridor follows the western bank of the Hudson River and showcases a terrain characterized by rolling hills and steep cliffs. Elevation changes are a prominent feature of the corridor. This dynamic landscape offers numerous overlooks that provide stunning views of the river and the surrounding area as well as challenging hill climbs. The Parkway is flanked by woodlands, rocky outcrops, and occasional meadows, contributing to its visual appeal. This blend of natural features creates a topographically interesting and visually engaging journey for those traveling along the Parkway corridor.

This section will assess the topography using four well-traveled routes popular among cyclists, hikers, and other outdoor enthusiasts:

- Hudson Terrace/US 9W from the George Washington Bridge to South Nyack (Segments 1-5)
- Henry Hudson Drive from the George Washington Bridge to Timberline Drive (Segments 1-3)
- Joseph B. Clarke Rail Trail/Old Erie Path from Piermont to South Nyack (Segment 5)
- River Road from Piermont to South Nyack (Segment 5)

Elevation profiles were taken from "Ride with GPS" to evaluate change in elevation gains and average grade.

"Average grade" is the average slope of a given terrain, whether it's a natural landscape, a constructed road, or a designated trail. This information is important in assessing the level of difficulty associated with a particular route for outdoor enthusiasts.

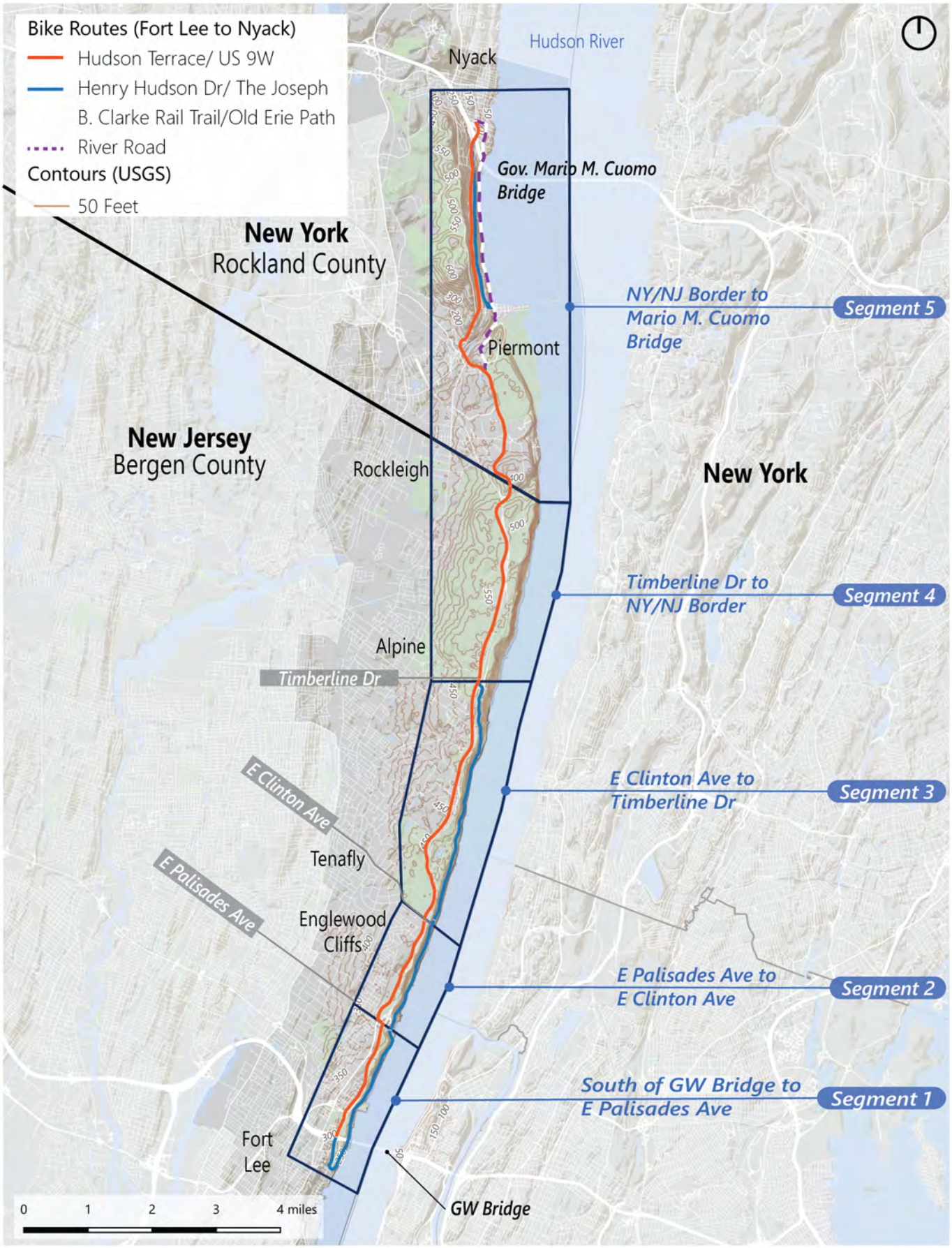


Figure 1.2: Study Area Topography (Data Source: USGS)

SEGMENT ONE "FORT LEE"

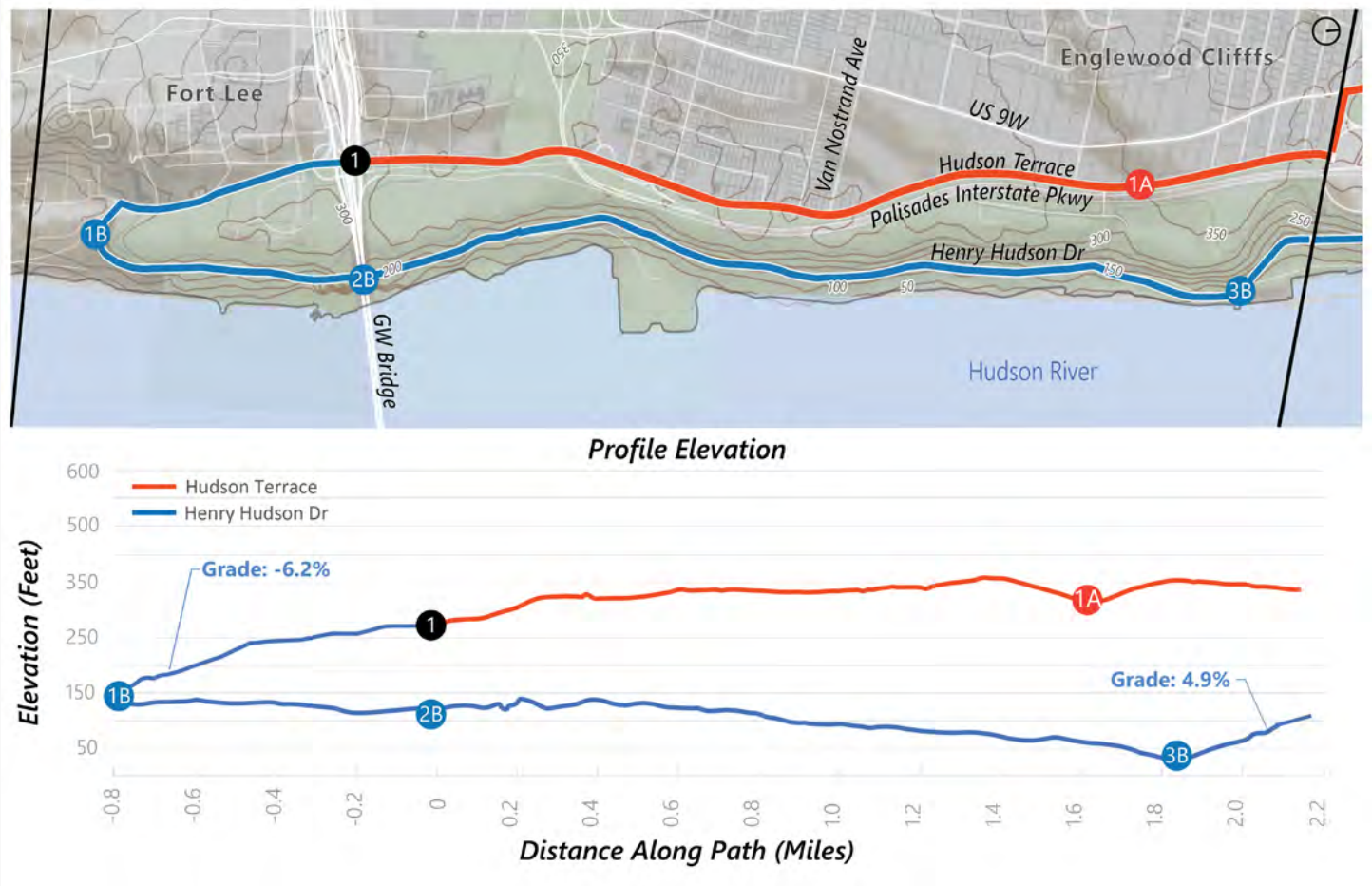


Figure 1.2.1: Elevation profile of paths in segment one (Data Source: Ride with GPS)

Hudson Terrace

This 2.2-mile paved segment maintains an average grade of 0.6%, with the steepest incline of 4% occurinng just before the junction with the Palisades Interstate Parkway at the northern end of the segment. This corridor segment has an 80-foot elevation gain. IAs compared with Henry Hudson Drive, this route provides flatter terrain.

Henry Hudson Dr

This 4-mile section has an average grade of -0.2%, with the steepest incline reaching 4.9%. The corridor has a total elevation drop of 130-feet. This route closely follows the Hudson River and descends to nearly sea level, as indicated by call-out "3B" on the map.

Key Facts

Hudson Terrace

Distance: 2.2 mi
Elevation Gain: 80 ft
Average Grade: 0.6%

Henry Hudson Dr

Distance: 4 mi
Elevation Gain: -130 ft
Average Grade: -0.2%

SEGMENT TWO "ENGLEWOOD CLIFFS"

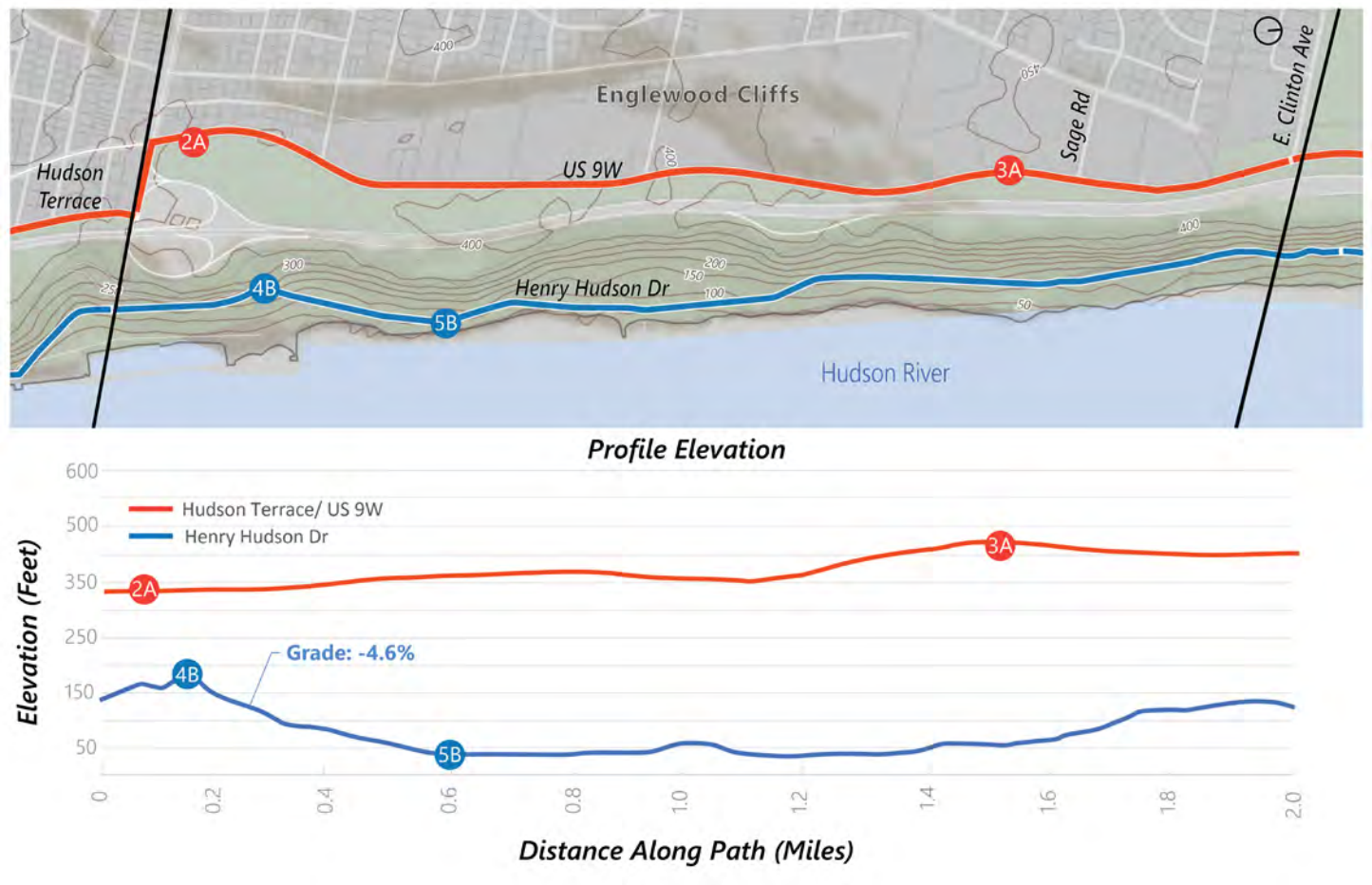


Figure 1.2.2: Elevation profile of paths in segment two (Data Source: Ride with GPS)

Hudson Terrace/9W

This 2-mile section has an average grade of 0.4%, with the steepest grade change of 4.6%. The segment experiences an elevation gain of 45 feet. It is entirely paved and is relatively flat.

Henry Hudson Drive

This 2-mile section has an average grade of 0.6% and features a total elevation descent of 49 feet. At call-out 4B, the route begins its steepest drop of 4.6%.

Key Facts

Hudson Terrace/9W

Distance: 2 mi
Elevation Gain: 45 ft
Average Grade: 0.4%

Henry Hudson Drive

Distance: 2 mi
Elevation Gain: -49 ft
Average Grade: 0.6%

SEGMENT THREE "ALPINE LOOKOUT"

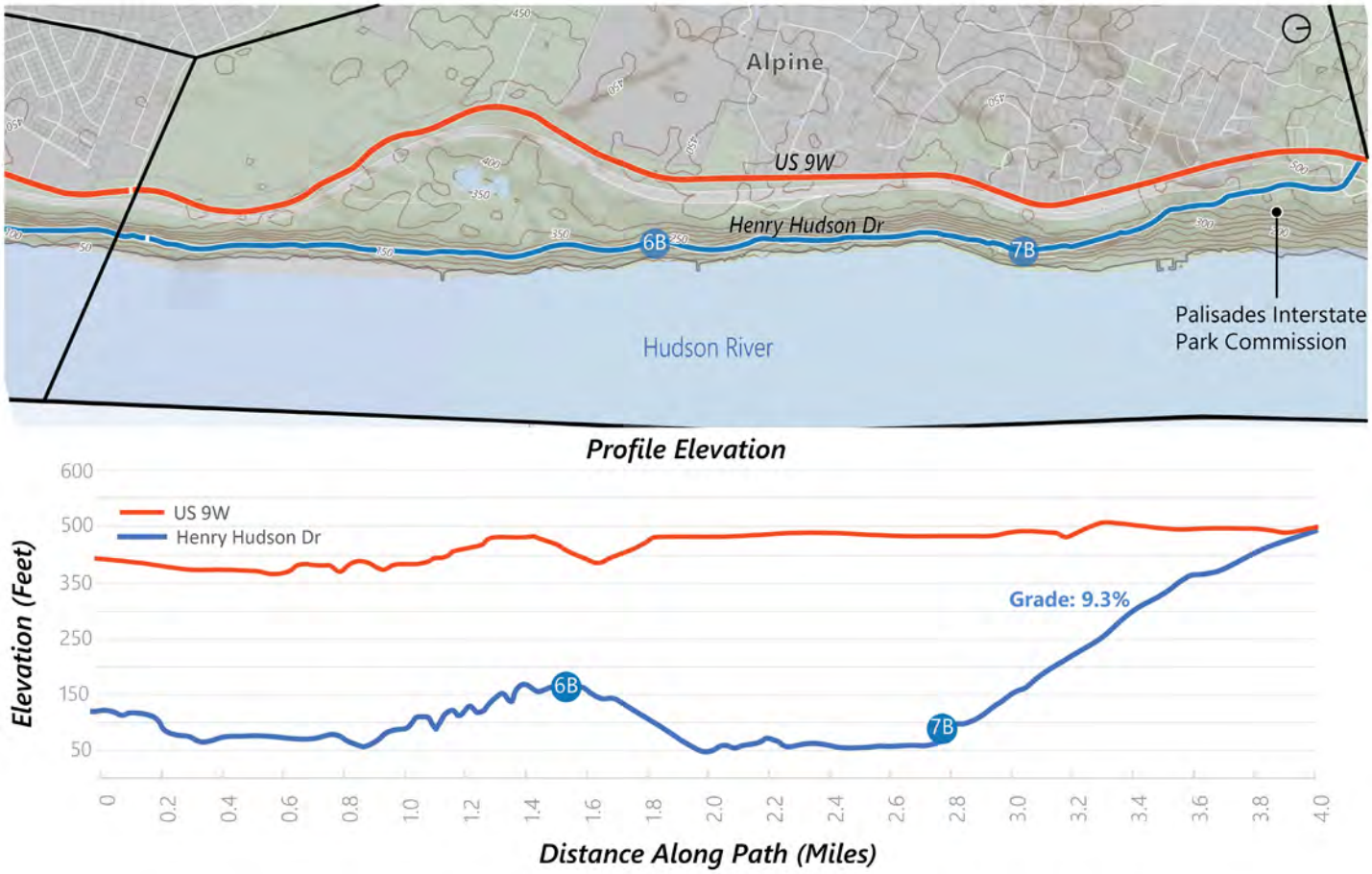


Figure 1.2.3: Elevation profile of paths in segment three (Data Source: Ride with GPS)

US 9W

This 4-mile paved segment boasts a 100-foot change in elevation, with the steepest incline of 4.3% near the intersection of Montammy Drive. In contrast to Henry Hudson Drive, this corridor offers a relatively flat terrain, with an average grade of just 0.4%.

Henry Hudson Drive

This 4-mile paved segment covers a 369-foot variation in elevation, with the steepest incline of 9.3% where the roadway climbs back up to Alpine and meets the Palisades Interstate Parkway. This is the farthest north people can bike on Henry Hudson Drive.

Key Facts

US 9W

Distance: 4 mi
Elevation Gain: 100 ft
Average Grade: 0.4%

Henry Hudson Drive

Distance: 4 mi
Elevation Gain: 369 ft

SEGMENT FOUR "BOROUGH OF ALPINE"

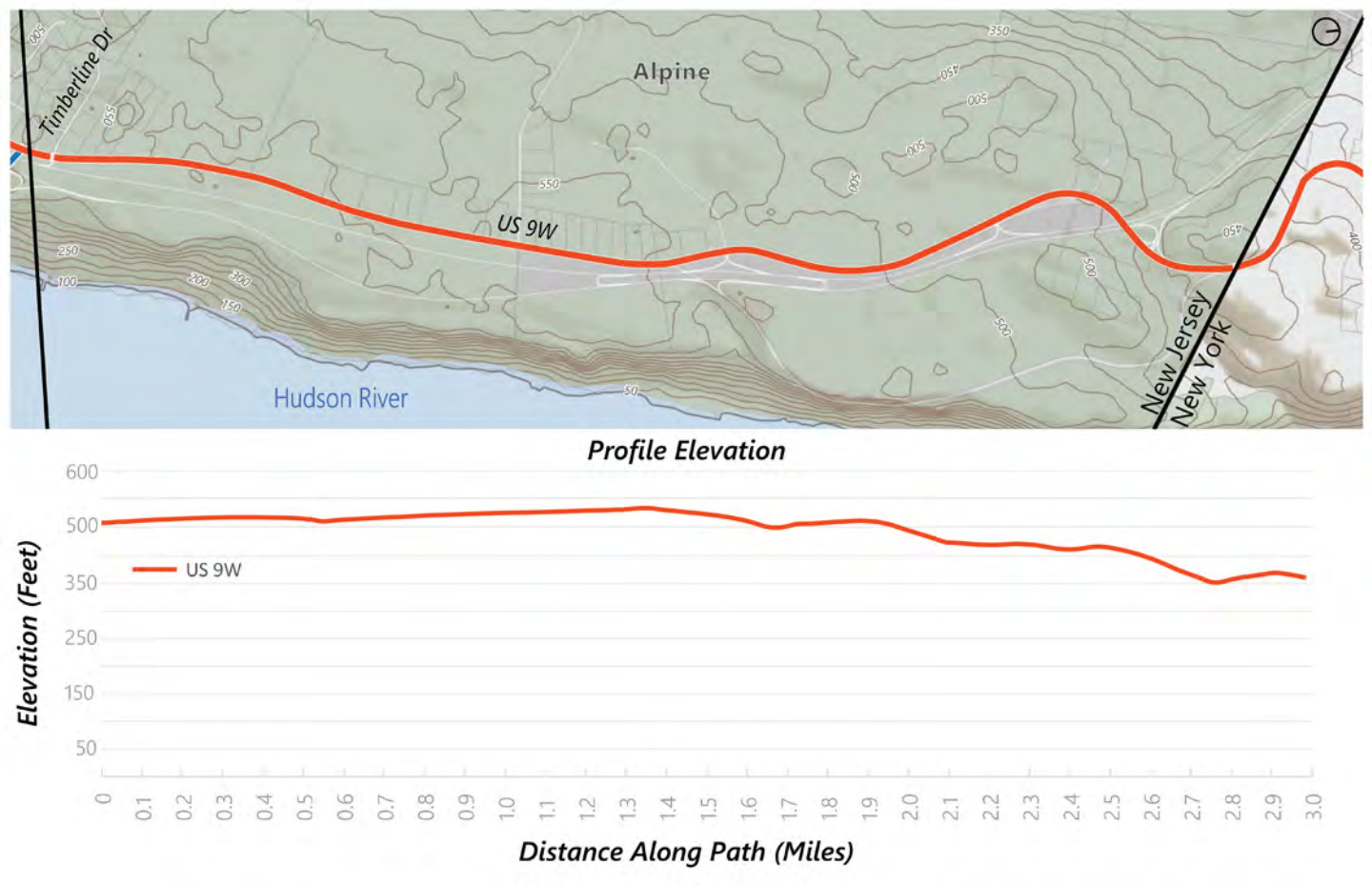


Figure 1.2.4: Elevation profile of paths in segment four (Data Source: Ride with GPS)

US 9W

This 3-mile paved section features a 112-foot descent, reaching its steepest point with a 1.9% decline at the approach to the NJ/NY state border. This marks the initiation of the gradual descent into New York State.

Key Facts

US 9W

Distance: 3 mi
Elevation Gain: -112 ft
Average Grade: -1.4%

SEGMENT FIVE "ROCKLAND COUNTY"

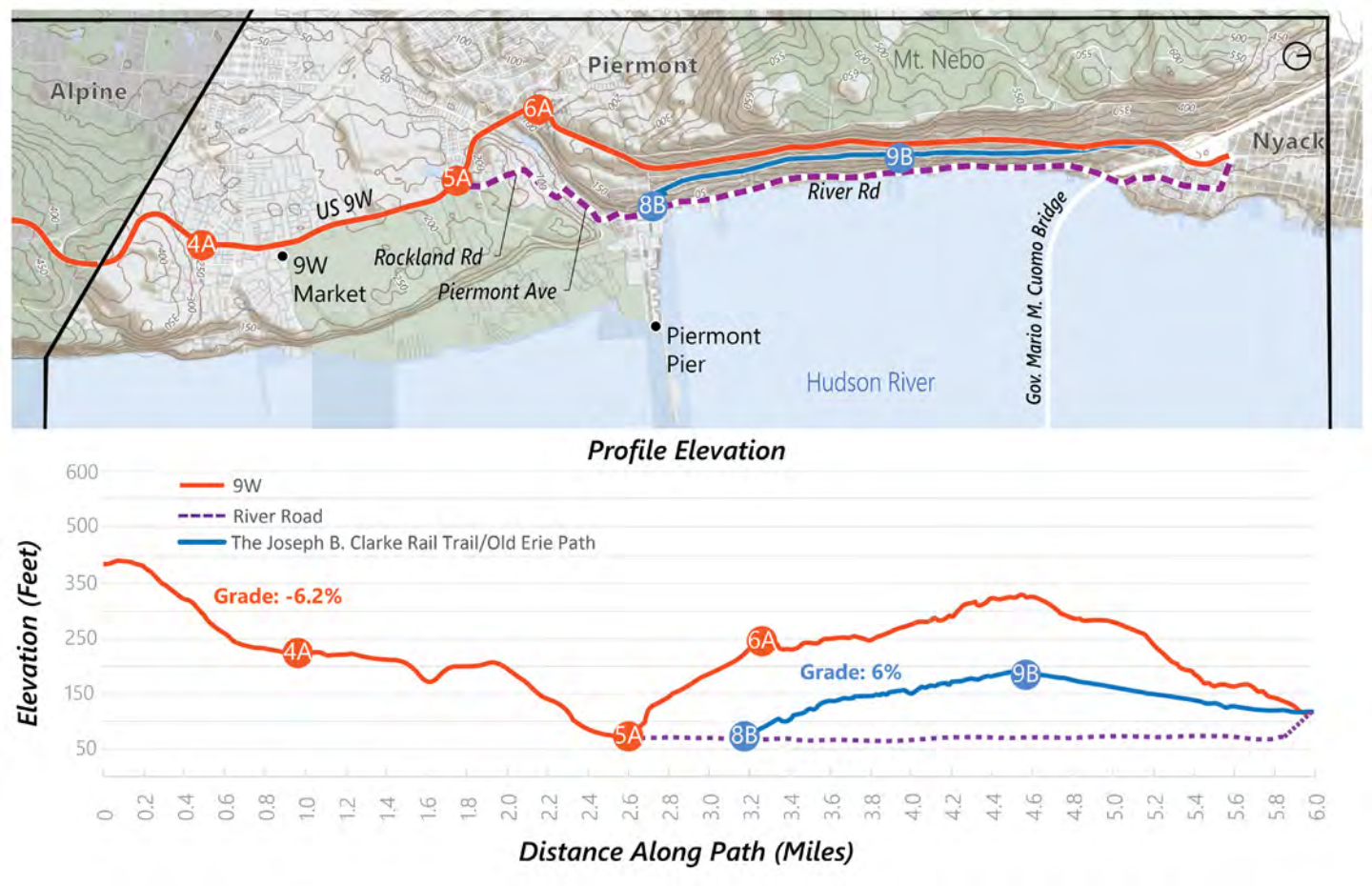


Figure 1.2.5: Elevation profile of paths in segment five (Data Source: Ride with GPS)

US 9W

This 6-mile paved stretch showcases a 272-foot descent, reaching its steepest point at 6.2% just prior to the 9W Market. Unlike the Joseph B. Clarke Rail Trail/Old Erie Path and River Road, this section of US 9W is hilly, with an average grade of 3.8%.

The Joseph B. Clarke Rail Trail/ Old Erie Path

This north-south rail trail spans 3.2 miles and has a 40-foot drop in elevation. The most pronounced incline of 6%, occurs around the midpoint in Grandview on Hudson. Unlike the neighboring Clarke and Esposito trails, it features a rougher unpaved surface. The consistent inclines and declines contribute to an average grade of 0.3%.

River Road

This 3.6-mile corridor has a 40-foot increase in elevation and features a level terrain with an average grade of 0.6%. It is just above the Hudson River.

Key Facts

US 9W

Distance: 6 mi
Elevation Gain: -272 ft
Average Grade: 0.6%

The Joseph B. Clarke Rail Trail/Old Erie Path

Distance: 3.2 mi
Elevation Gain: -41ft
Average Grade: 0.3%

River Road

Distance: 3.6 mi
Elevation Gain: 40 ft

Source: Palisades Interstate Park Commission

PLACE

Land Use

The study corridor is comprised mainly of open space and residential neighborhoods, with some commercial corridors along Route 9. The commercial areas are largely concentrated in the southern portion of the study corridor in Fort Lee and Englewood Cliffs, while the middle of the corridor is largely open space and low density residential. The uppermost portion of the corridor is primarily residential, including higher density residential, with large parks and a commercial center in Piermont.

Segment 1 "Fort Lee"

- Open space along the river in Palisades Interstate Park and Fort Lee Historic Park
- Commercial corridor along US 9W
- Residential

Segment 2 "Englewood Cliffs"

- Open space along the Hudson River in Palisades Interstate Park
- Commercial along US 9W
- Large office parks concentrated along US 9W
- Residential farther inland

Segment 3 "Alpine Lookout"

- Open space in Palisades Interstate Park and Greenbook Sanctuary
- Open Space west of US 9W in Tenafly Nature Preserve

Segment 4 "Borough of Alpine"

- Predominantly open space of the Palisades Interstate State Park and Camp Alpine

Segment 5 "Rockland County "

- Commercial center in downtown Piermont
- Residential, including multi-family residential
- Large swaths of open space in Tallman Mountain State Park and Blauvelt State Park

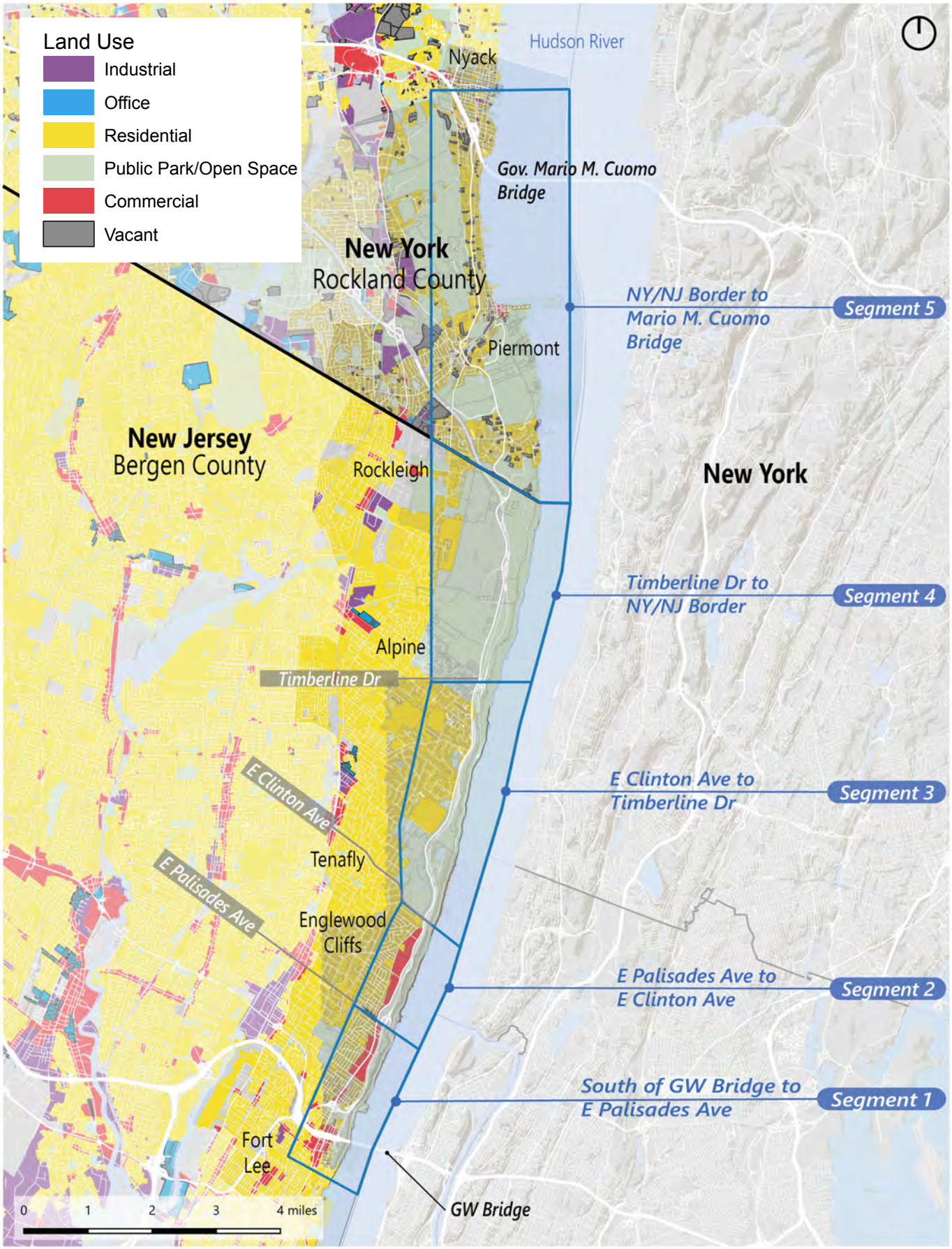


Figure 1.3: Study Area Land Use (Data Source: Bergen County, NJTPA API, Rockland County)

Source: Adobe

02
PEOPLE

The study area is defined by more than just the physical landscape, but also the communities that live, work, and play in and around it. The project will intersect with lives of neighboring residents, so it is important gain understand the communities within the study area. The demographics of the study area are explored to understand how it compares to the region, identify community trends, and populations of equity concern. This analysis explores demographics related to population characteristics, equity indicators, and commuting characteristics. These metrics are explored to inform who will be using the path and how the path can be made accessible to the surrounding community.

PEOPLE

Population

The total population of the study area as of 2023 is about 78,000 residents. Population is expected to grow in the future, with projected population growth of 15% between 2023 and 2050. This is faster than growth in the New York-New Jersey Metropolitan area in general, which is projected to grow 10% between 2023 and 2050.

Population density across census tracts in the study area is highly varied. Population density ranges from 200 people per square mile in Alpine at the lowest density 18,158 people per square mile in Fort Lee at the densest. Half of census tracts have a population density greater than the New York- Metropolitan area average of 2,940.

Table 2.1: Population density by census tract compared to NY-NJ-PA Metro region
(Data Source: NJTPA Travel Demand Model, Census Reported)

Geography	2023 Population	2050 Population	Growth
Study Area	77,974	89,518	15%
New York Metro Area	24,649,474	27,192,945	10%

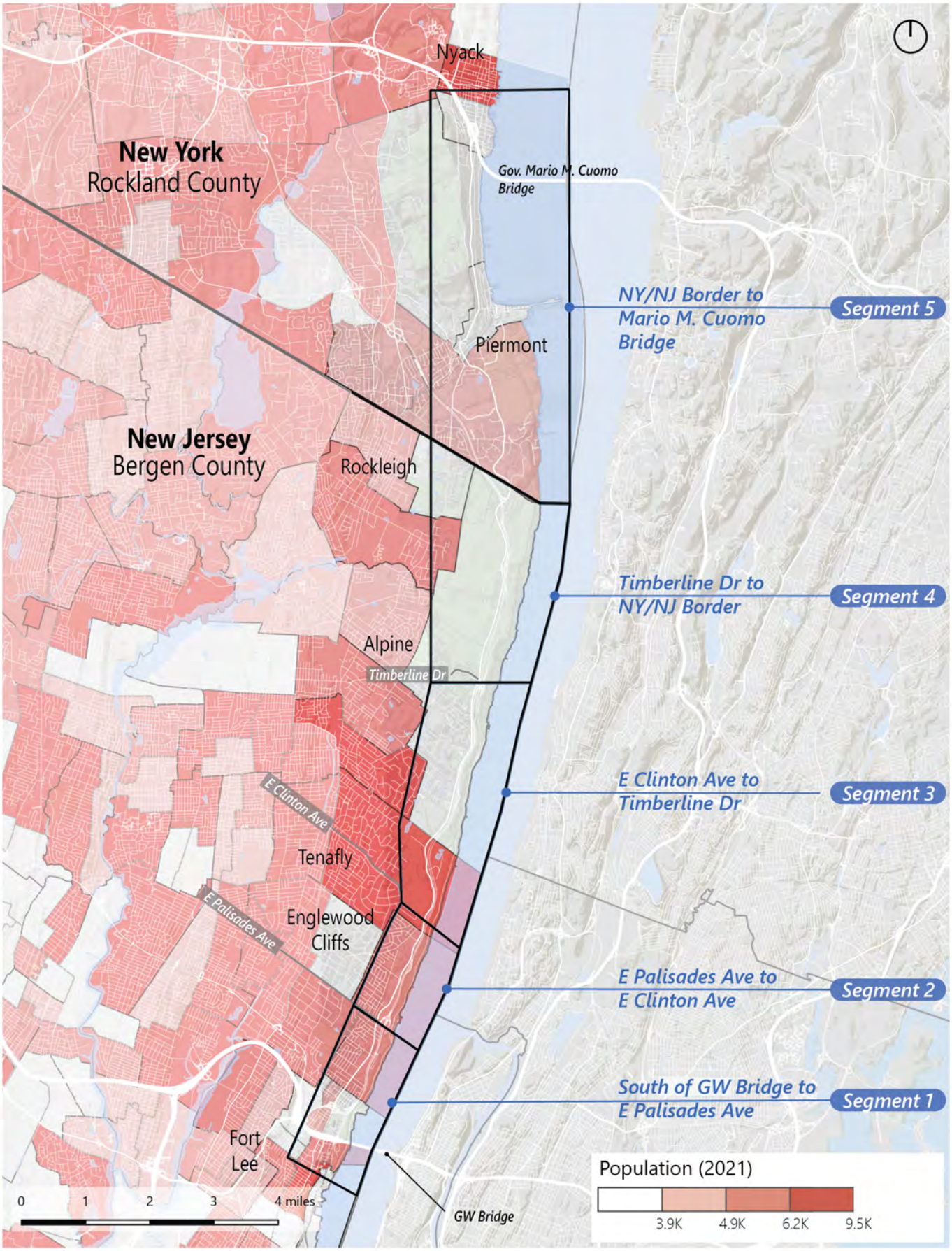


Figure 2.1: Total projected population by census tract in 2023 (Data Source: NJTPA Travel Demand Model)

PEOPLE

Households

The average household size in the study area is 2.7 people, just above the regional average of 2.6 people per household. Most census tracts have an average household size just above or below the regional average, except for one tract in Rockleigh Borough with a significantly higher average household size of 5.8 people per household. The number of households in the study area is expected to grow about 12% from 2023 to 2050. This is a slightly greater than the New York Metro region as a whole, which is projected to see a 10% increase in households between 2023 and 2050.

Table 2.2: Total number of household in the study area compared to NY-NJ-PA Metro Region (Data Source: NJTPA Travel Demand Model, Census Reported)

Geography	2023 Households	2050 Households	Growth
Study Area	30,696	34,301	12%
New York Metro Area	9,319,497	10,276,531	10%

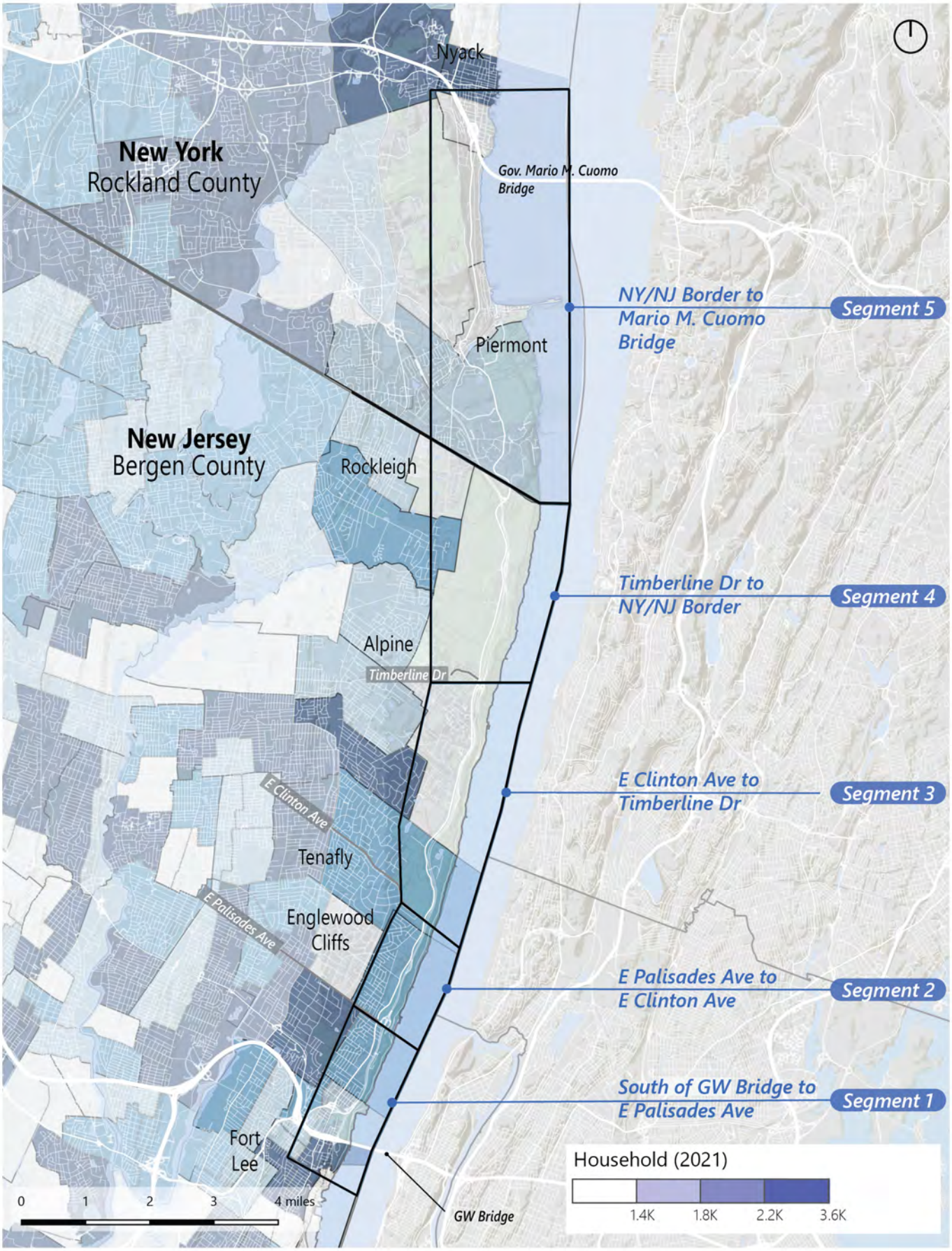


Figure 2.2: Number of projected households per census tract in 2023 (Data Source: NJTPA Travel Demand Model)

PEOPLE

Income

Most census tracts in the study area have a high average household income. Of the 18 census tracts partially or entirely within the study area, half have an average household income above $138,000 and another 4 have an average household income between $106,000 and $138,000.

Together, two-thirds of the census tracts in the study area have an average household income above the New York metro median household income of $91,562. However, income is not uniform across the study area. Census tracks at the northern and southern edges of the study area have lower incomes than those in the middle.

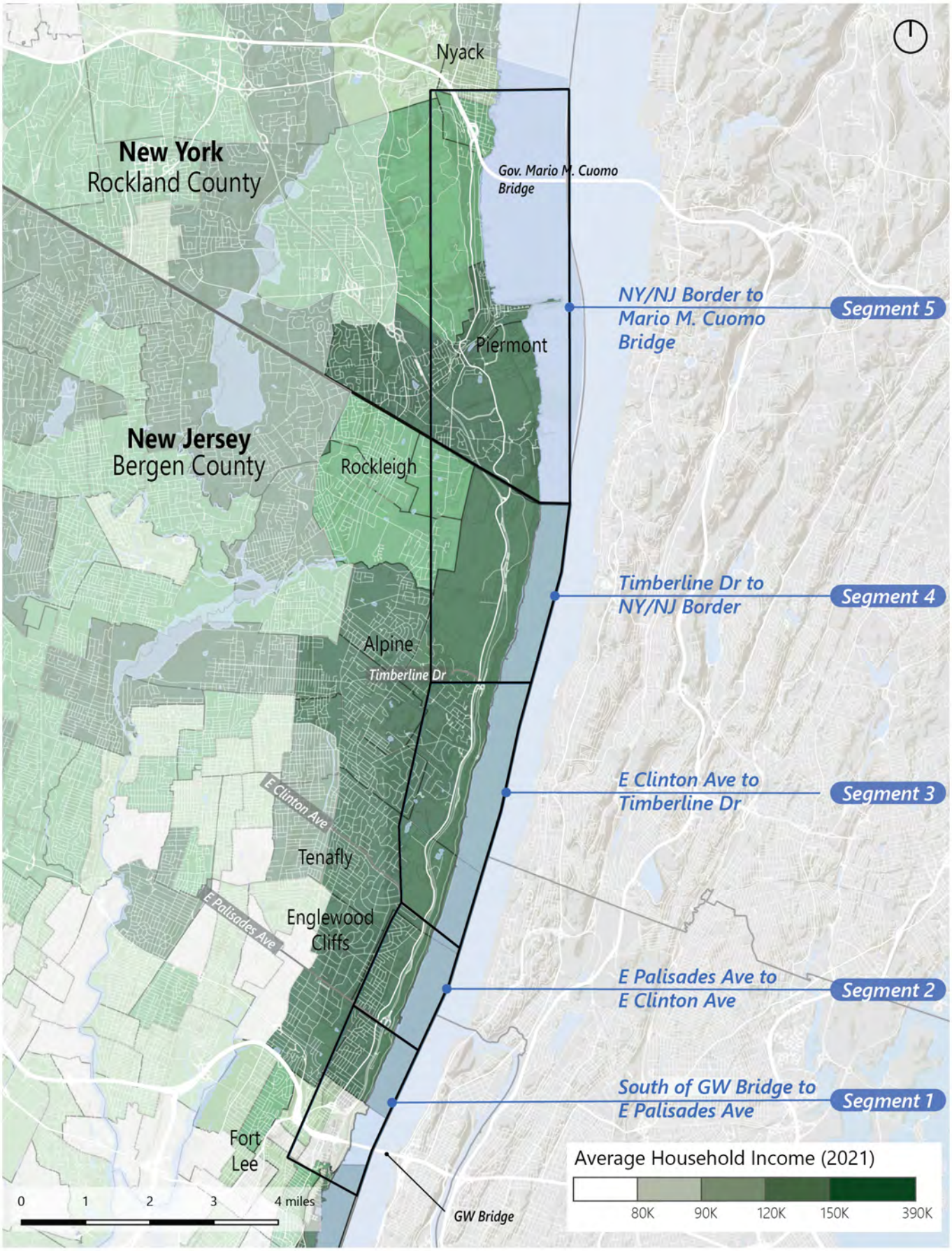


Figure 2.3: Projected average household income by census tract in 2023 (Data Source: NJTPA Travel Demand Model)

PEOPLE

Communities of Color

Many of the census tracts in the study area have a high proportion of communities of color. Communities of color are comprised of people who identify as Black, Hispanic or Latino, Asian American, American Indian or Alaskan Native, or Native Hawaiian and Other Pacific Islander. Six census tracts have a proportion of communities of color higher than the metro region average. Eight census tracts are more than half community of color. There is an especially high concentration of communities of color in the Fort Lee.

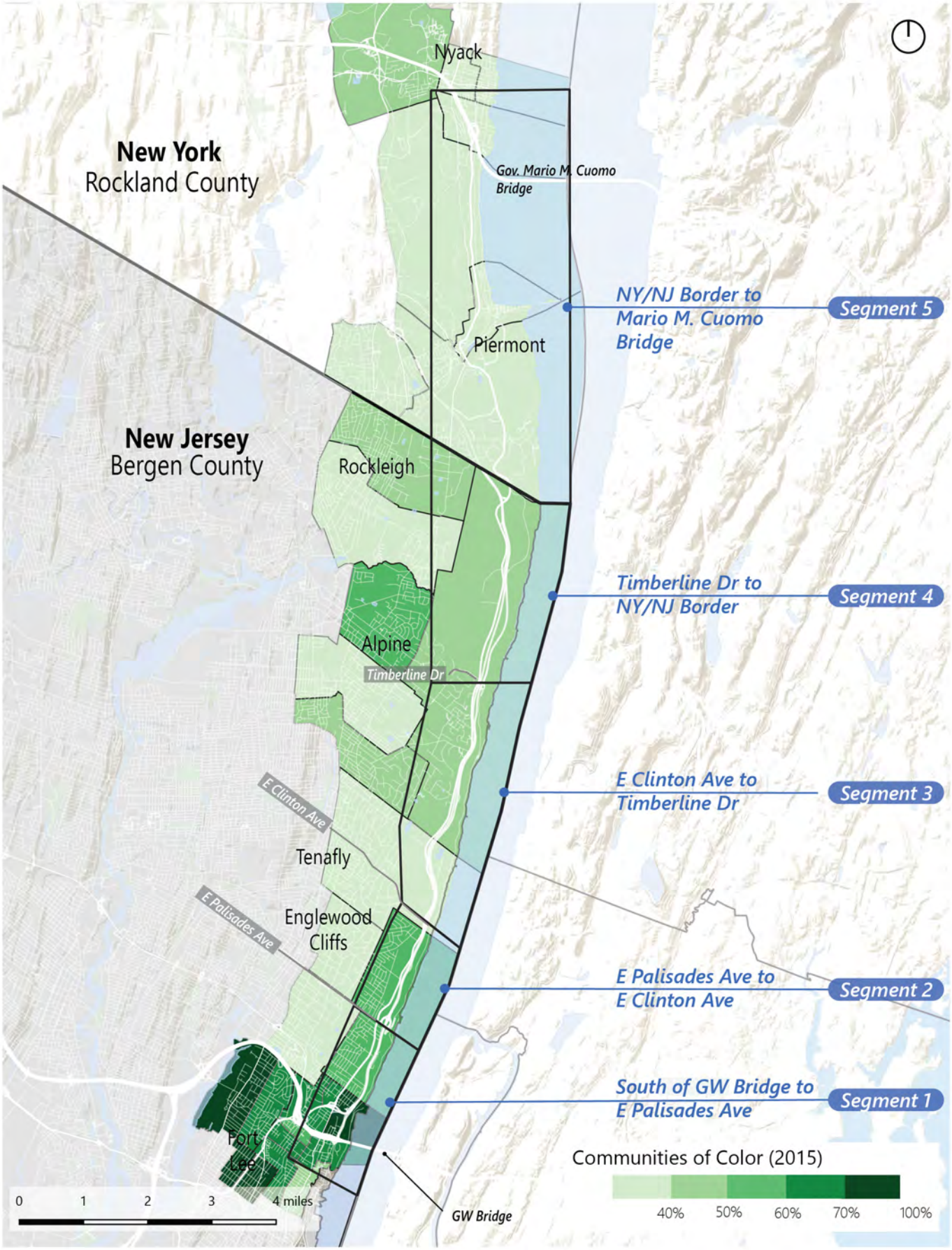


Figure 2.4: Percent of BIPOC residents by census tract (Data Source: ACS 2015)

PEOPLE

Foreign-Born Populations

There is a high proportion of foreign-born population in the Twelve census tracts in the region have a greater foreign-born population than the metro region. Five census tracts have a predominantly foreign-born population. These census tracts are concentrated along the lower portion of the study area, around Fort Lee (Segment 1) and between E Clinton Ave to E Palisade Ave (Segment 2).

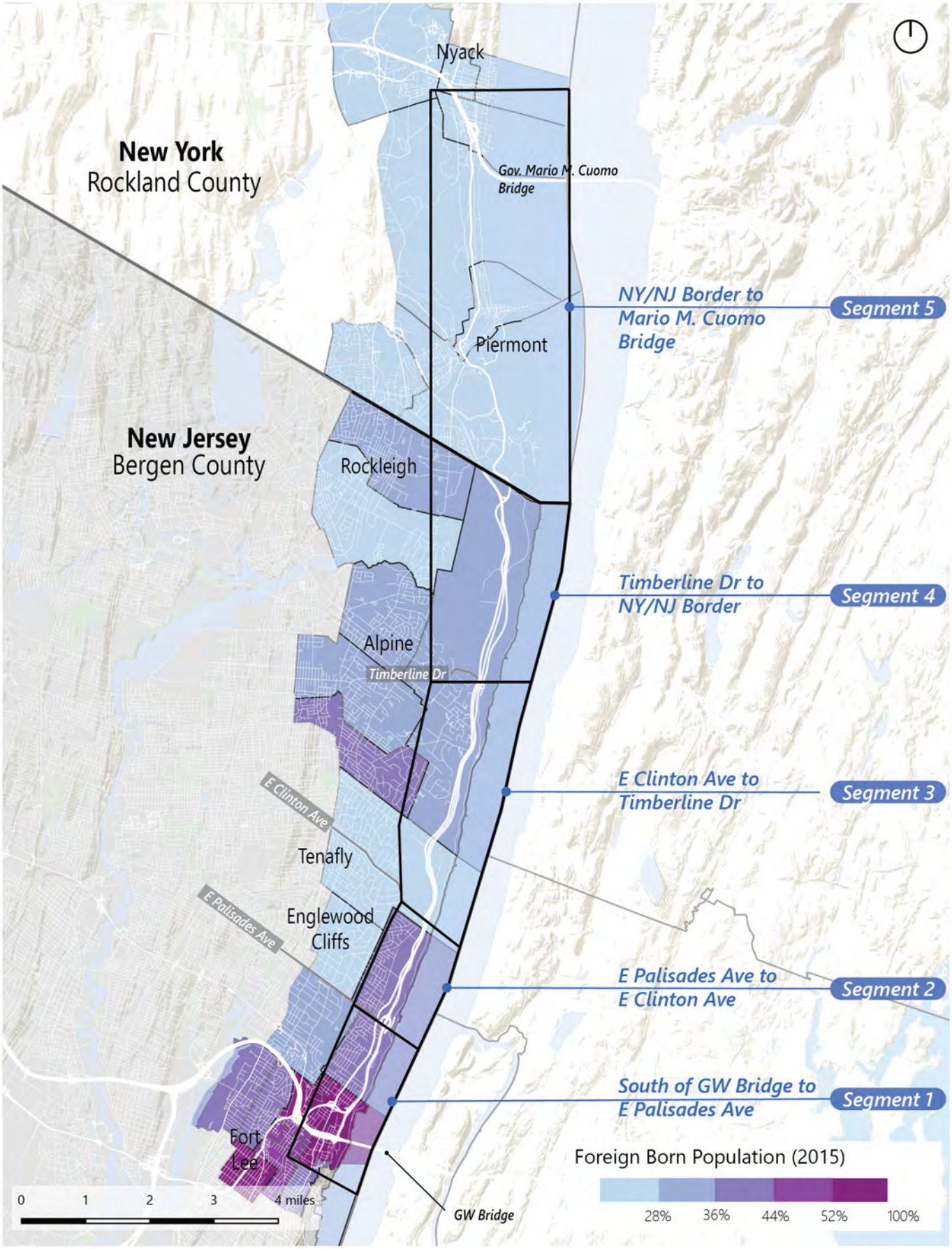


Figure 2.5: Proportion of foreign-born residents (Data Source: ACS 2015)

PEOPLE

Limited English Proficiency

Many census tracts within the region have a significant population that speak English "less than very well." There is an especially high concentration of people who speak English "less than very well" in the Fort Lee segment of the study area. The most common non-English langugage in this area is Korean.

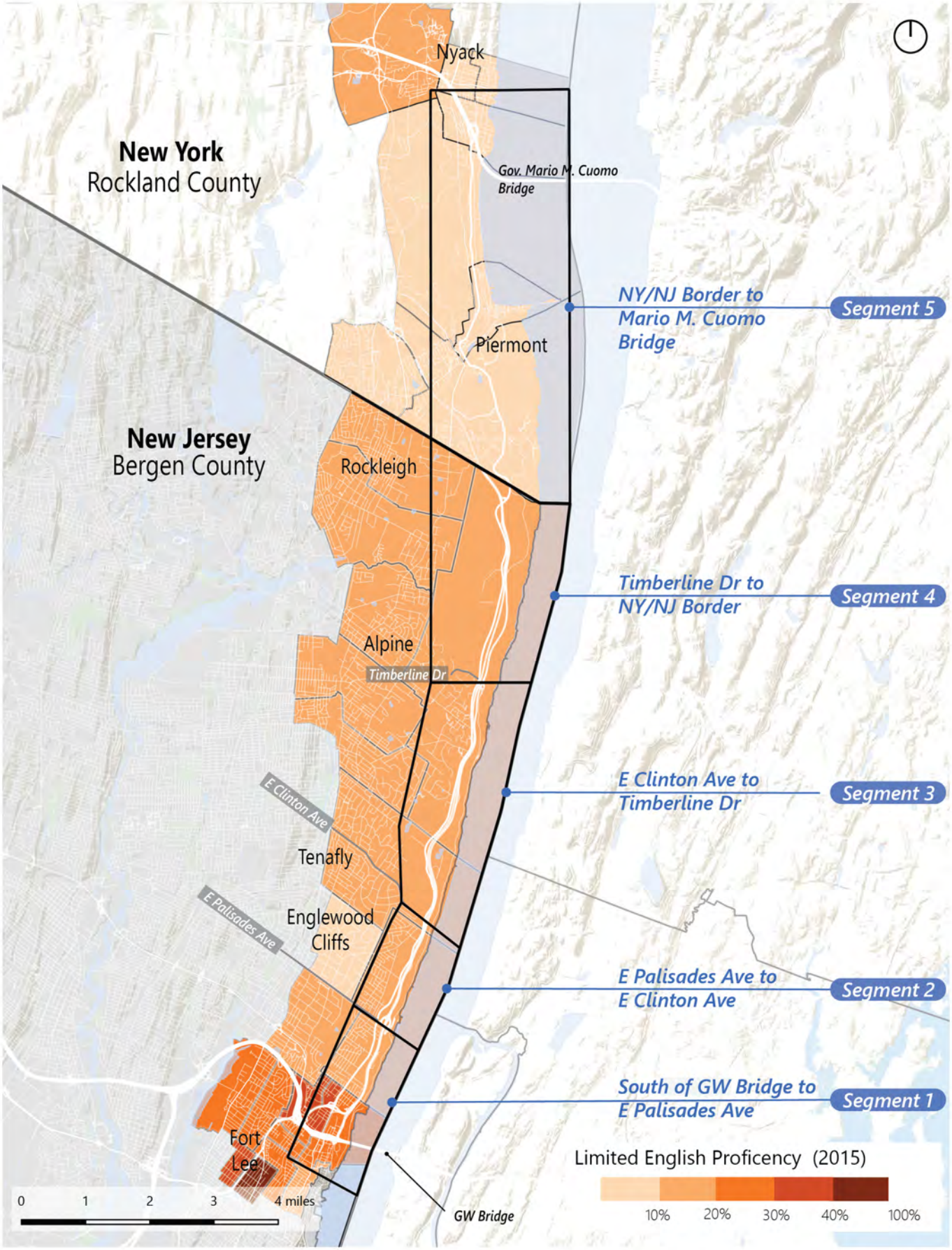


Figure 2.6: Proportion of residents with limited English proficiency (Data Source: ACS 2015)

PEOPLE

Carless Households

Most households in the study area have access to a vehicle. The areas with the highest concentration of households without access to a vehicle are in Nyack, South Nyack and Fort Lee. However, 80% or more of households do have a vehicle.

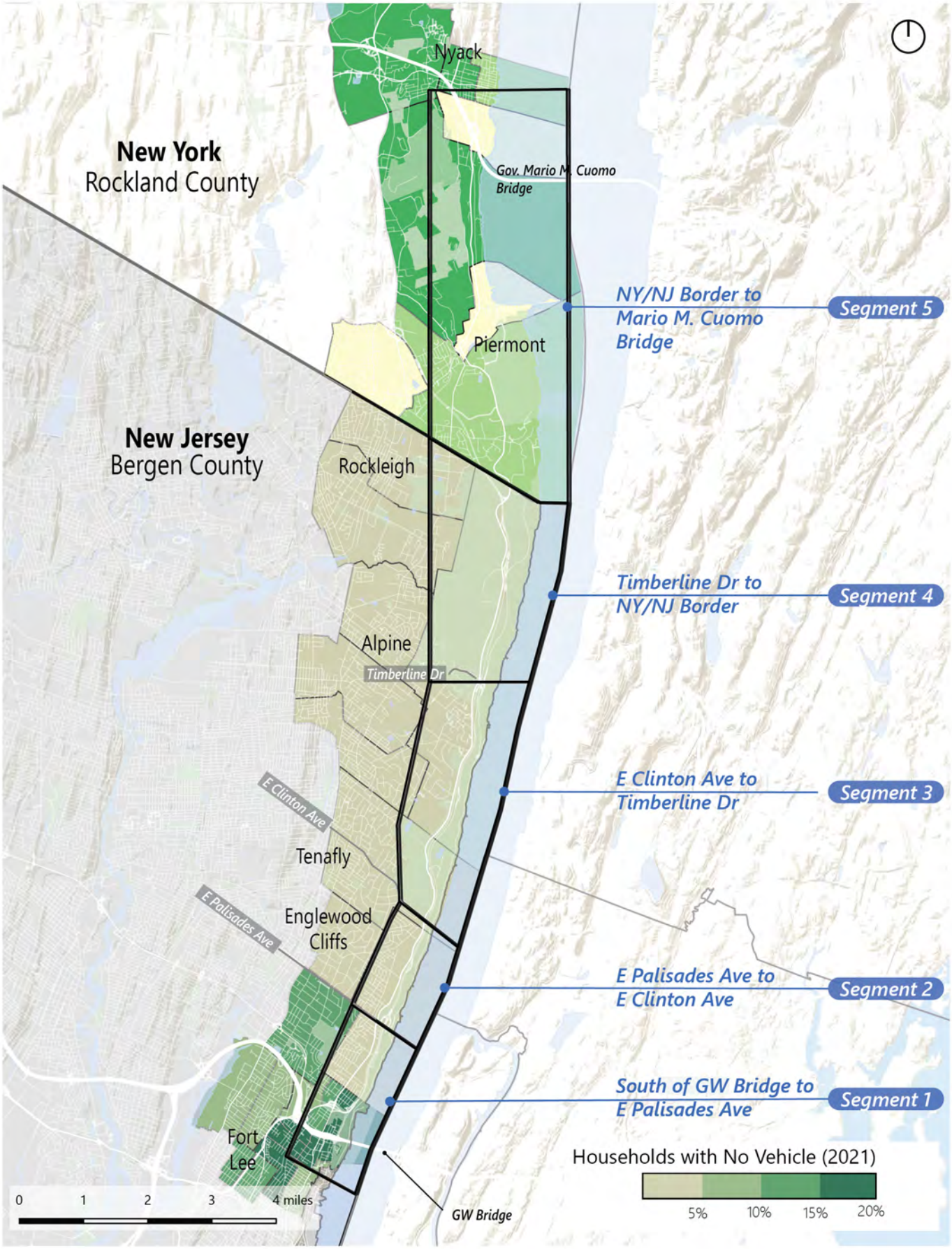


Figure 2.7: Proportion of residents with no access to a vehicles (Data Source: ACS 2017-2021)

PEOPLE

Commute Time

Mean commute times of workers in the study area varies by census block between 26 and 42 minutes. There is no apparent trend in length of commute across the study area. Census blocks in the Fort Lee area have both the longest and the shortest commute times. Likewise, census blocks around Nyack have both high and low acommute times.

Commute times depend on multiple variables, including distance to work, mode of transportation, congestion, and transit frequencies. As the previous two maps illustrated, census tracts in the middle of the study area are more likely to drive. They are also further from job centers.

Similarly, households around Fort Lee and Nyack are less likely to commute by driving, and are likely more dependent on transit, and therefore commute time may depend more on the availability of transit infrastructure.

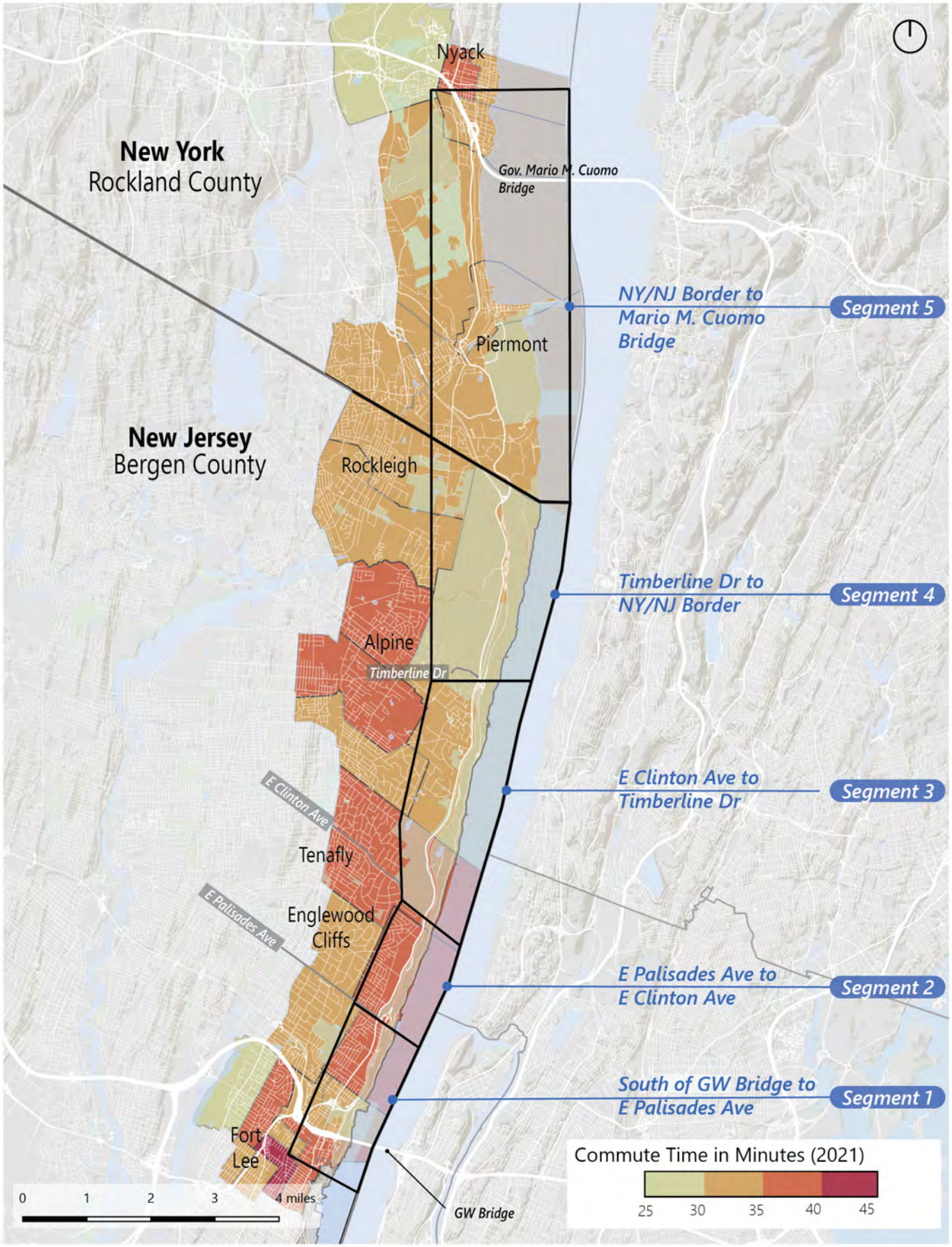


Figure 2.8: Average commute time in minutes by census tract (Data Source: ACS 2017 - 2021)

PEOPLE

Commute Mode

A majority of workers in the study area commute to work by driving (either alone or as part of a carpool). Census tracts in the middle of the study area have the highest rates of driving to work, while census tracts in the southern potion of the study area, around Fort Lee, have the lowest rate of driving to work. This follows the land use patterns: more mixed use areas have a higher concentration of destinations and greater access to transit. Less than 5% of the study area population commutes by active transportation methods of biking or walking.

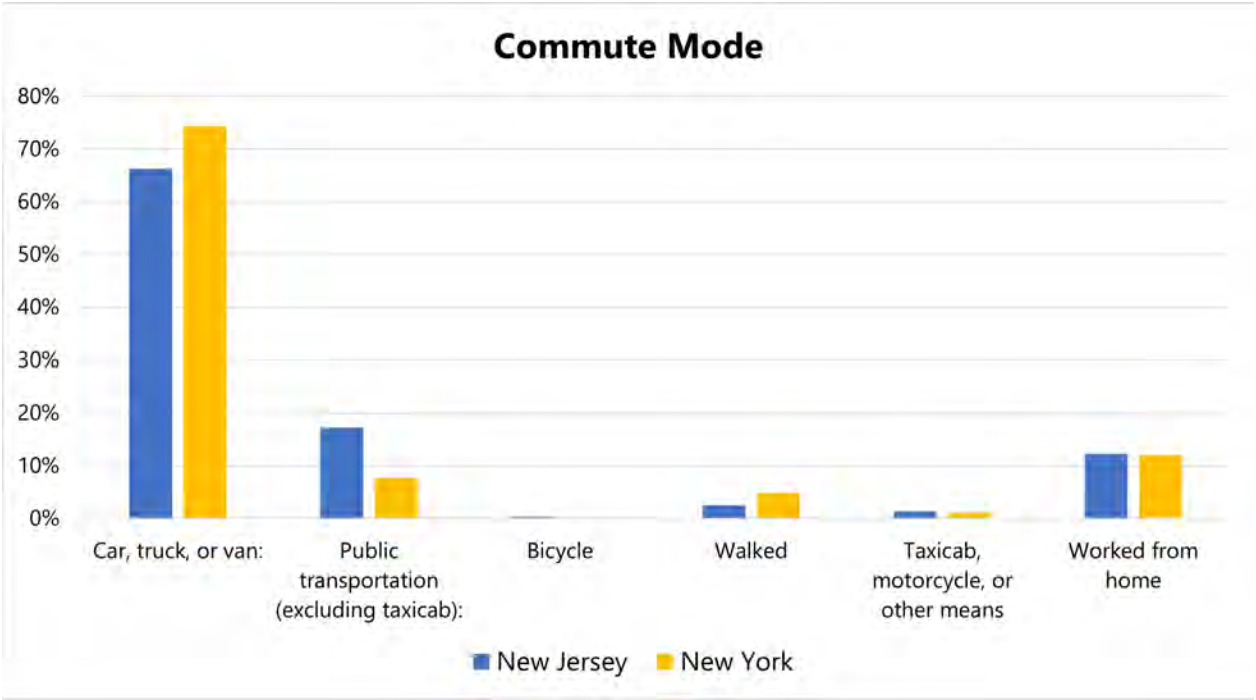


Figure 2.9.1 Modes of commuting in the study area (Data Source: ACS 2017-2021)

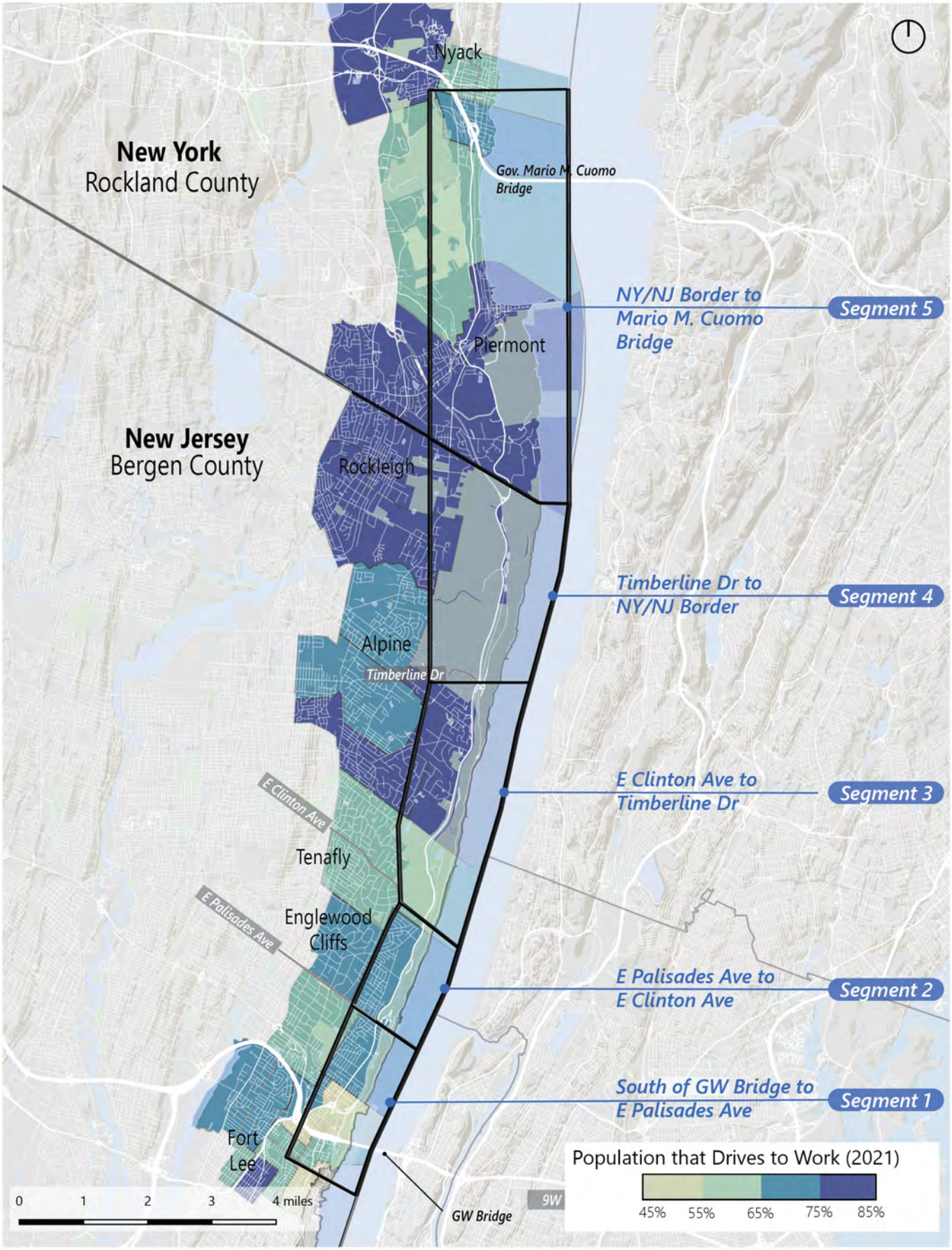


Figure 2.9.2: Proportion of commuters who drive to work (Data Source: ACS 2017-2021)

04

TRANSPORTATION

Several transportation factors impact the functionality, accessibility, and safety of study area. The level of bike compatibility (LBC), defined by the North Jersey Transportation Planning Authority (NJTPA), is a key determinant of biking comfort for cyclists. Other considerations include functional classifications of adjacent highways, transit accessibility, street widths, and traffic flow. These considerations play a fundamental role in shaping the user experience and overall utility of the corridor and provide valuable insights into the area's effectiveness, potential improvements, and its integration with the broader transportation network.

TRANSPORTATION

Functional Classifications & Street Widths

Functional classification is a system of classifying groups of highways according to the mix of access and mobility functions they provide. The four main classifications that occur within the study area include the following:

- Principal Arterials: These are the highest-capacity roads in the network and serve as major transportation corridors, often connecting major cities and regions. Principal arterials can be further subdivided into various classes, such as freeways, expressways, or other high-capacity roads. Given its uses, this type of roadway connects major centers of activity and a corridor that experiences the highest amount of traffic volume.
- Minor Arterials: These roads have a lower capacity than principal arterials but still serve as important connectors between cities, towns, and regions. They typically have fewer lanes and lower travel speeds than principal arterials.
- Major Collector Roads: Collector roads collect traffic from local streets and funnel it onto arterial roads. They serve as intermediaries between local roads and higher-capacity arterials.
- Local Streets: Local roads primarily serve neighborhoods, communities, and provide access to individual properties. They have the lowest traffic capacity and are generally not intended for long-distance travel.

Local streets are serviced by Major Collectors which are connected to Minor Arterials and then Principal Arterials.

Within the corridor study area, the main routes have the following functional classifications:

- US 9W is a Principal Arterial throughout the entire study area from Segments 1-5.
- Palisades Interstate Parkway is a Principal Arterial thought the entire study area from Segments 1-5.
- Henry Hudson Drive does not have a functional classification. The drive is open to cars and bicycles during daylight hours only and is intended to serve as a scenic route.
- River Road is a Major Collector.

Table 4.1: Functional classifications and street widths of roads (Source: NJDOT and NYSDOT)

Roadway	Functional Classification	Travel Way (ft)	Shoulder (ft) [per side]	Total (ft)
Segment 1-2 (From George Washington Bridge to E Clinton Ave)				
Henry Hudson Drive	N/A	18- 20	0	18-20
Palisades Interstate Parkway	Principal Arterial	22-24	4	30-32
US 9W	Principal Arterial	56	0-4	56-64
Segment 3 (From Clinton Ave to Timberline Dr)				
Henry Hudson Drive	N/A	18- 20	0	18-20
Palisades Interstate Parkway	Principal Arterial	22-24	4	30-32
US 9W	Principal Arterial	24	0-12	24-48
Segment 4 (From Timberline Dr to NY/NJ Border)				
Palisades Interstate Parkway	Principal Arterial	22-24	4	30-32
US 9W	Principal Arterial	24	0-8 (SB) 0-4 (NB)	40-48
Segment 5 (From NY/NJ Border to Gov. Mario M. Cuomo Bridge)				
US 9W	Principal Arterial	22-24	0-6	22-30

TRANSPORTATION

NJ Level of Bike Compatibility

LBC is an indicator used to describe the level of comfort or discomfort experienced by cyclists when navigating a road or pathway. The LBC value of a path is based on an aggregation of transportation related attributes including traffic volume, vehicle speed, the presence of biking infrastructure, and overall road conditions.

In 2023, the NJTPA conducted an analysis of road network bicycle compatibility for its service region, which is mostly inclusive of the study area. Segment 5 is located in Rockland County, New York and not included in NJTPA's study. Findings from the analysis provide guidance for the development of a connected regional bicycle network based on LBC. These range from LBC 1, offering low stress and safety for most individuals, to Level 5, characterized by high traffic stress and prohibit cyclists. A comprehensive breakdown of LBC characteristics for each designation is described below.

- LBC 1 segments were either off-road bike paths or those on which there was a protected bike lane, the roadway had a speed limit of less than 30 mph, and there were 3 or fewer lanes.

- LBC 2 segments generally had protected bike facilities and/or a shoulder lane greater than 14-feet wide and had posted speeds of 30 mph or less.

- LBC 3 segments include principal arterials, if they do not have bike lanes, and all roads with a pavement width greater than 30 feet

- LBC 4 roads were those that have six or more lanes or at least 4 lanes with no shoulder and a speed limit greater than 35 mph. All ramps were also coded as LBC 4.

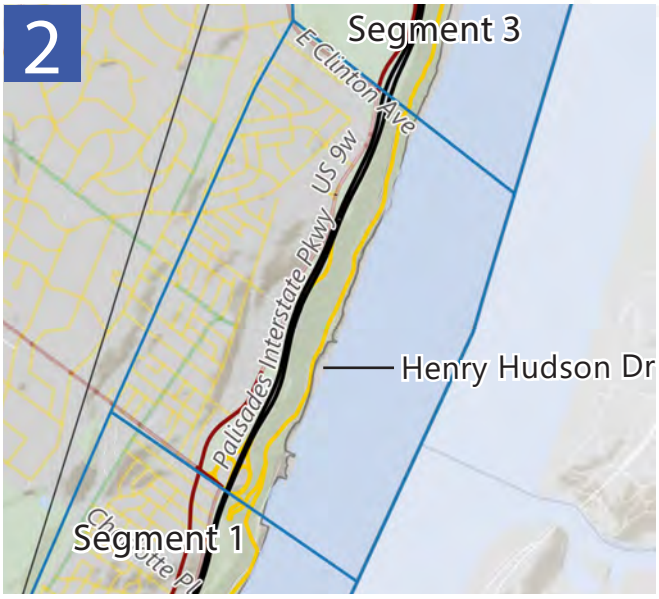
- LBC 5 are segments classified as interstates, freeways and toll routes, all of which are limited to vehicle access and prohibit cyclists.

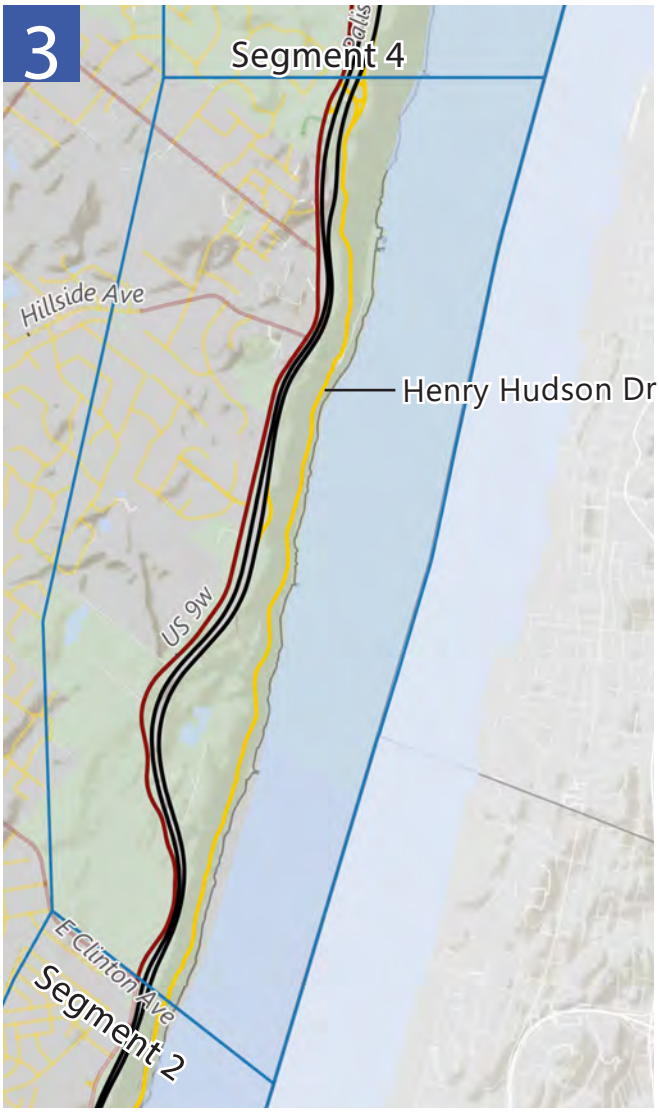
Within the corridor study area, the bicycle network encompasses varying LBCs. The following maps illustrate the LBCs by segment. The three main routes included in the study area and NJTPA study are the US 9W, the Palisades Interstate Parkway, and the Henry Hudson Drive. The LBC classifications for these routes are as follows: US 9W is LBC 4, Palisades Interstate Parkway is LBC 5, and Henry Hudson Drive is LBC 3.

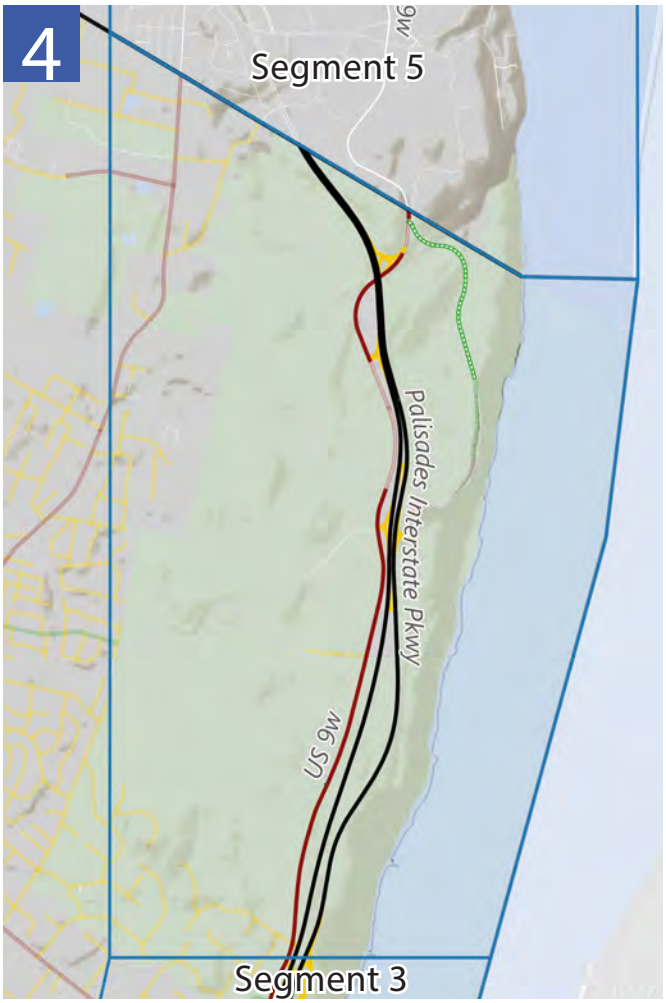
US 9W: NJTPA generally classifies US 9W as LBC 4. Further examination of the highway reveals more in-depth differentiations of biking conditions along the roadway. US 9W is a four-lane undivided road up until Segment 3 (Clinton Ave.). In Segment 3, US 9W turns into a two-lane undivided road with approximately12ft shoulders widths in each direction. The shoulders disappear after Orbach Way in Section 4. US 9W continues in Section 4 with two-way undivided lanes with no shoulders.

Palisades Interstate Parkway: NJTPA generally classifies Palisades Interstate Parkway as LBC 5. Palisades Interstate Parkway is a four-lane divided road with 4ft shoulders. This roadway is prohibited to cyclists.

Henry Hudson Drive: NJTPA generally classifies Henry Hudson Drive as LBC 3. Henry Hudson Drive is a 30ft wide, scenic roadway with low car volume. The roadway begins at the Edgewater Park entrance in Fort Lee and follows the Hudson River to the Alpine Park entrance in Segment 3, where it merges with US 9W.







Level of Bike Compatibility (LBC)

- 1 - Very Low Traffic Stress
- 2 - Low Traffic Stress
- 3 - Mid Traffic Stress
- 4 - High Traffic Stress
- 5 - Prohibits cyclists

TRANSPORTATION

Transit

The study area can be accessed by car or bicycle, as well as a number of public transit services. The study area is serviced by New Jersey Transit (NJT), Transport of Rockland (TOR), Hudson Link, and Rockland Coaches bus routes.

Table 4.2: Bus service by study area segment

Bus Service	Segments Served	Frequency (buses per hour at AM peak)
Rockland Coaches 9A (Nyack– Stony Point, New York)	1, 2, 3, 4, 5	2.5
New Jersey Transit Bus Route 156 (Englewood Cliffs- Fort Lee- NY)	1	2
New Jersey Transit Bus Route 186 (Dumont – New York (GWB))	1, 2	3
Transport of Rockland Bus Routes 59 (Nyack – Suffern)	5	3
Transport of Rockland Bus Roue 91 (Nyack – Spring Valley)	5	1
Transport of Rockland Bus Route 92 (Spring Valley – Nyack)	5	2
Hudson Link Routes H03, H05, H07, H07X	5	3

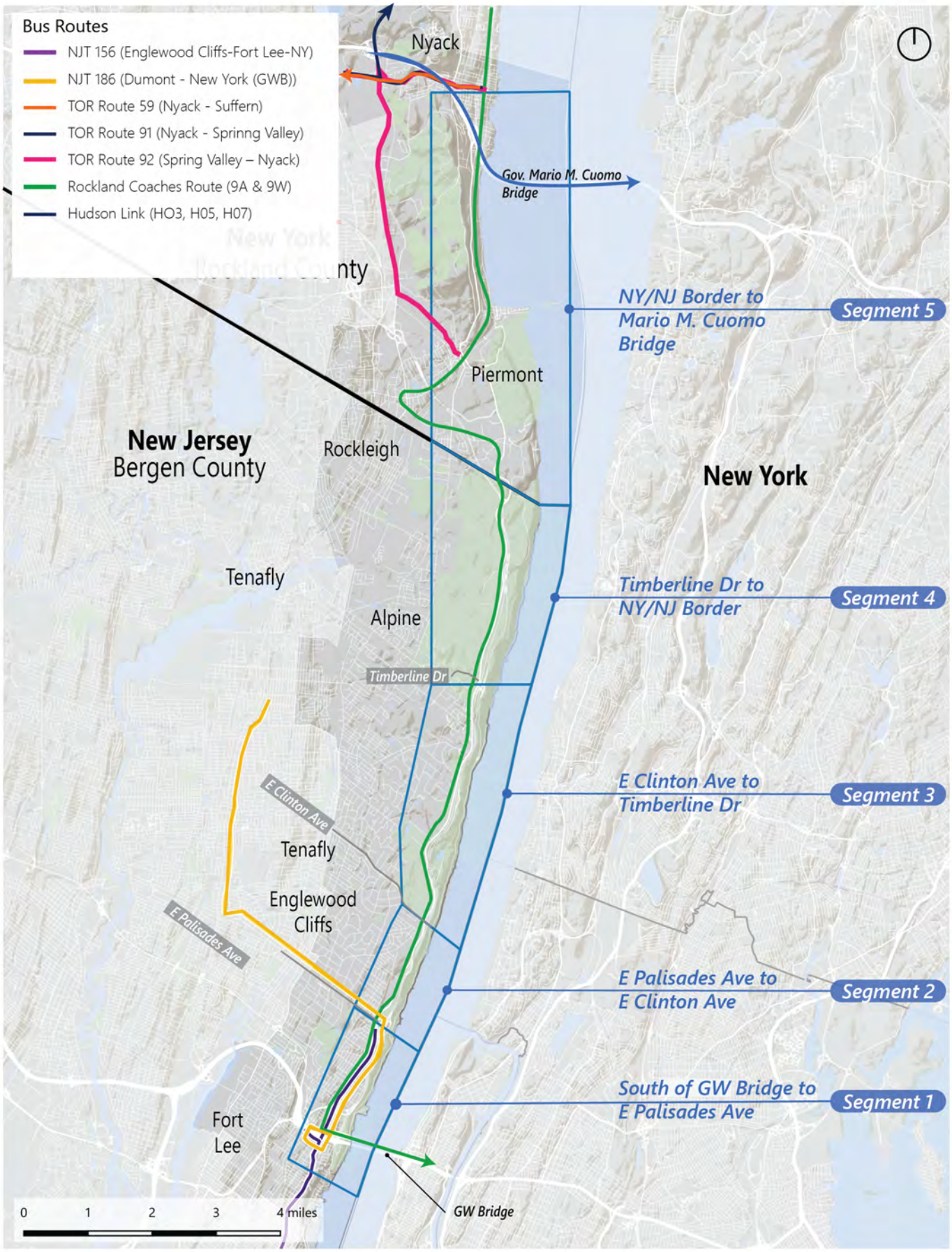


Figure 4.3: Transit routes serving the study area (Data Source: New Jersey Transit, 2023)

TRANSPORTATION

Average Annual Daily Traffic

Table 4.3: Average Annual Daily Traffic for study segments (Source: NJDOT Traffic Counts 2012-2022 and NYSDOT 2023)

Roadway	Average Annual Daily Traffic	Source (Year)
Segment 1-2 (From George Washington Bridge to E Clinton Ave)		
Henry Hudson Drive	2,239	NJDOT (2020)
Palisades Interstate Parkway	48,821	NJDOT (2021)
US 9W	21,293	NJDOT (2022)
Segment 3-4 (From E Clinton Ave to NY/NJ Border)		
Henry Hudson Drive	2,239	NJDOT (2020)
Palisades Interstate Parkway	37,327	NJDOT (2021)
US 9W	7,667	NJDOT (2020)
Segment 5 (From NY/NJ Border to Gov. Mario M. Cuomo Bridge)		
Palisades Interstate Parkway	44,957	NYSDOT (2023)
US 9W	9,613	NYSDOT (2023)

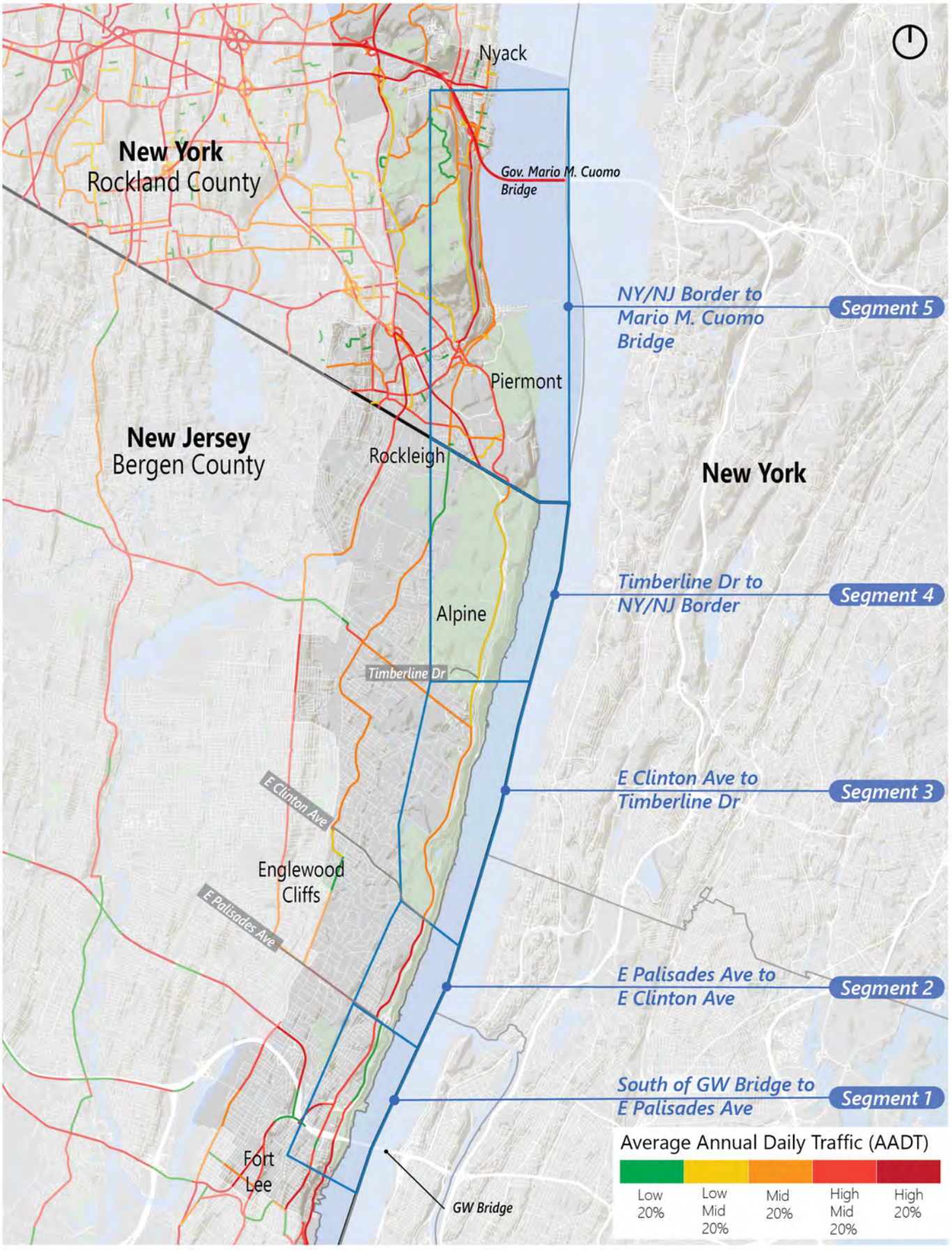


Figure 4.5: Annual Average Daily Traffic (Data Source: NYS and NJDOT)

Appendix 3: Crash Analysis

CRASH ANALYSIS FINDINGS

Summary

This memorandum outlines initial findings from the crash analysis for the Palisades Shared Use Path Feasibility Study. The crash analysis uses data on pedestrian and bicyclist crashes in the study area from NJDOT and NYSDOT. The data was filtered for bike and pedestrian crashes between 2016 and 2020 (Bergen County) and 2018-2023 (Rockland County) that resulted in injuries.

Crash hot spots occurred most often at intersections and areas around on/off ramps. Available data on pre-crash actions and the location of collisions within the street also suggest that intersections are more common sites for crashes than mid-block locations. This pattern of crash locations suggests that intersections in the study corridor may warrant further study for safety improvements.

Bicycle crashes occurred most often on weekends during daylight hours. This suggests that the corridor is used mostly for recreational bicycling as opposed to commuting or other transportation uses. Available data indicates that men between the ages of 30 and 59 were the most common demographic for bicycle and pedestrian crash victims. The prevalence of this demographic in the crash data suggests that this group may also make up the majority of bicyclists and pedestrians currently using the study corridor.

It is important to note that there are a number of limitations in the data used in crash analyses. This analysis should be interpreted and incorporated into other aspects of the Palisades Shared Use Path Study with knowledge of the following limitations.

Exposure Data

This analysis does not adjust for motor vehicle, pedestrian, or bicyclist exposure rates based on volumes for these modes. Therefore, results show crash events but not the frequency of crashes normalized by level of traffic or pedestrian and bicyclist volumes, which is also referred to as exposure. As an example, pedestrian crashes are more common in daylight than in dark conditions. This does not mean that daylight conditions are inherently more dangerous than nighttime conditions. Rather, it indicates that people are more likely to walk or bike in light conditions than in dark conditions.

Limited Data

Fortunately, more serious crashes are relatively rare along the study corridor, but even one serious injury crash is too many. Given that a total of 93 crashes occurred along the study corridor in the 5-year analysis period, there was not sufficient data to produce statistically meaningful trends.

Data Reporting

This analysis relies on how and whether crashes were reported to NJDOT or NYSDOT. It is impossible to know how many crashes go unreported and whether some types of crashes are reported more than others. A 2021 study in Washington, D.C., found that almost one in three crashes involving a bicyclist or pedestrian goes

unreported.[1] This trend has been noted for decades across numerous studies in the United States. Attributes in the crash data are also dependent on how crash reports were filled out by the investigating police officer. These fields may be filled out differently across different responding police departments, or even between individual officers. This study, which includes two states, is particularly prone to reporting differences between the New Jersey and New York systems.

Study Area

A study of pedestrian and bicycle crashes that occurred along the project extent have been analyzed and are shown by project study segments in Figures 1 through 5. This includes crashes that occurred on road segments and intersections along Hudson Terrace, Sylvan Avenue, US Route 9W, Rockland Road, Ferdon Avenue, Piermont Avenue, and the Valentine Avenue/Highland Avenue connection to the Joseph B. Clarke Rail Trail.

Due to differences in crash reporting between states, the following crash data has been used to analyze pedestrian and bicycle crashes along the project extents:

- Segments 1-4: Bergen County, New Jersey. Most recent 5-year crash analysis, 2016-2020
- Segment 5: Rockland County, New York. Most recent 5-year crash analysis, 2018-2023

Data Sources

Data used to create the following maps and tables was collected from the following sources:

- New Jersey Department of Transportation Crash Tables (Bergen County) 2016-2020
- New York State Department of Transportation Crash Data (Rockland County) 2018-2023
- New Jersey State Open Street Map 2023
- New York GIS Clearinghouse 2023
- New York State Open Street Map 2023
- NJGIN Open Data 2020
- North Jersey Transportation Planning Authority Regional Active Transportation Plan 2023

[1] Jain, S. (2021). Underreported crashes are a barrier to making streets safer for bicyclists and pedestrians. *State Smart Transportation Initiative. https://ssti.us/2021/07/27/underreported-crashes-are-a-barrier-to-making-streets-safer-for-cyclists-and-pedestrians/*

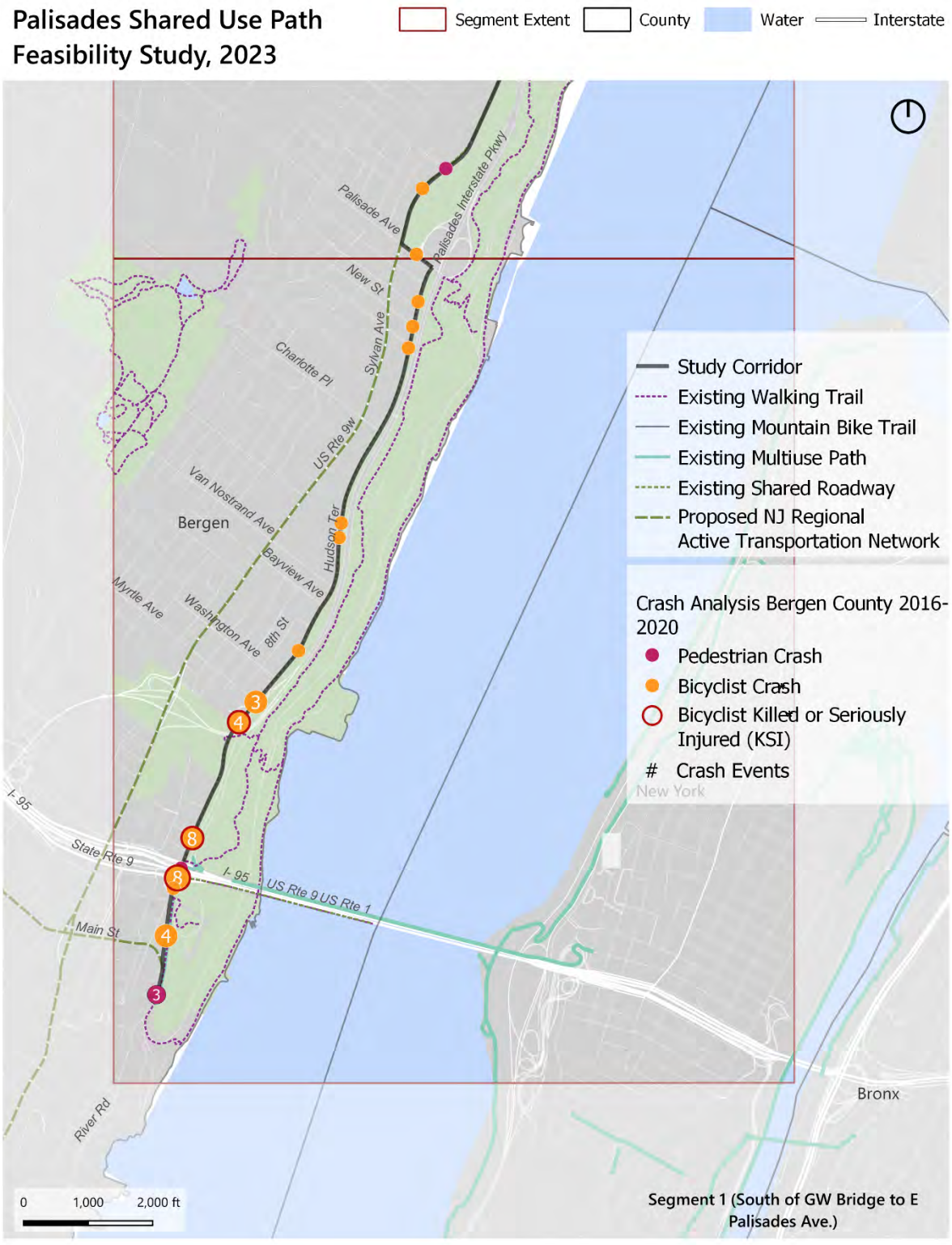


Figure 1 Segment 1: 2016-2020 Pedestrian and Bicycle Crashes

Crash hot spots in Segment 1 of the study corridor occur along Hudson Terrace at several locations:

- Old Palisades Road (pedestrian)
- South of Central Avenue (bicyclist)
- Underpass of I-95 (bicyclist)
- Sylvan Street (bicyclist)
- Hudson Terrace Park access (bicyclist)
- Myrtle Avenue (bicyclist)

Three killed or severely injured (KSI) crashes occurred within Segment 1, including the hotspot near the I-95 underpass. It is possible that safety will improve in this area thanks to the recent change of bike traffic to the northside of the bridge and other improvements that have been made on the New Jersey side. This path entrance remains an area of concern due to the high volumes of both car and bike traffic. The other two KSIs occurred at the intersection of Sylvan Street and at the access to Hudson Terrace Park. There were no reported crashes along Henry Hudson Drive in segments 1 through 3.

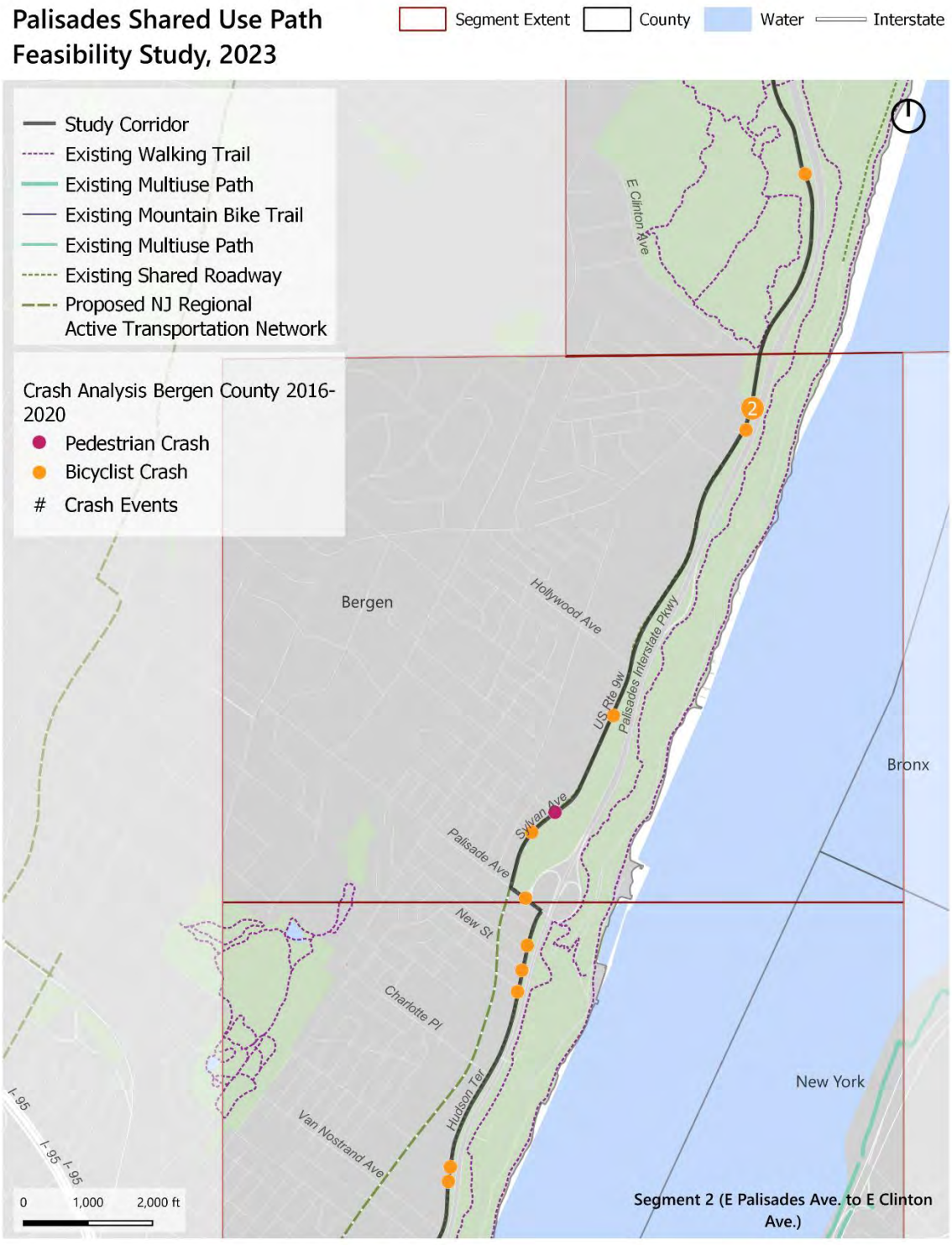


Figure 2 Segment 2: 2016-2020 Pedestrian and Bicycle Crashes

Crashes along Segment 2 are fairly evenly distributed with slightly more crashes occurring towards the southern end of the segment between Van Nostrand Avenue and Hollywood Avenue. There is a hotspot where two crashes occurred at an access from Sylvan Avenue. This segment of 9W is four to five lanes wide, often with no shoulder.

The suburban office parks along this stretch of 9W generate a lot of turning traffic, especially during peak morning and evening commute hours.

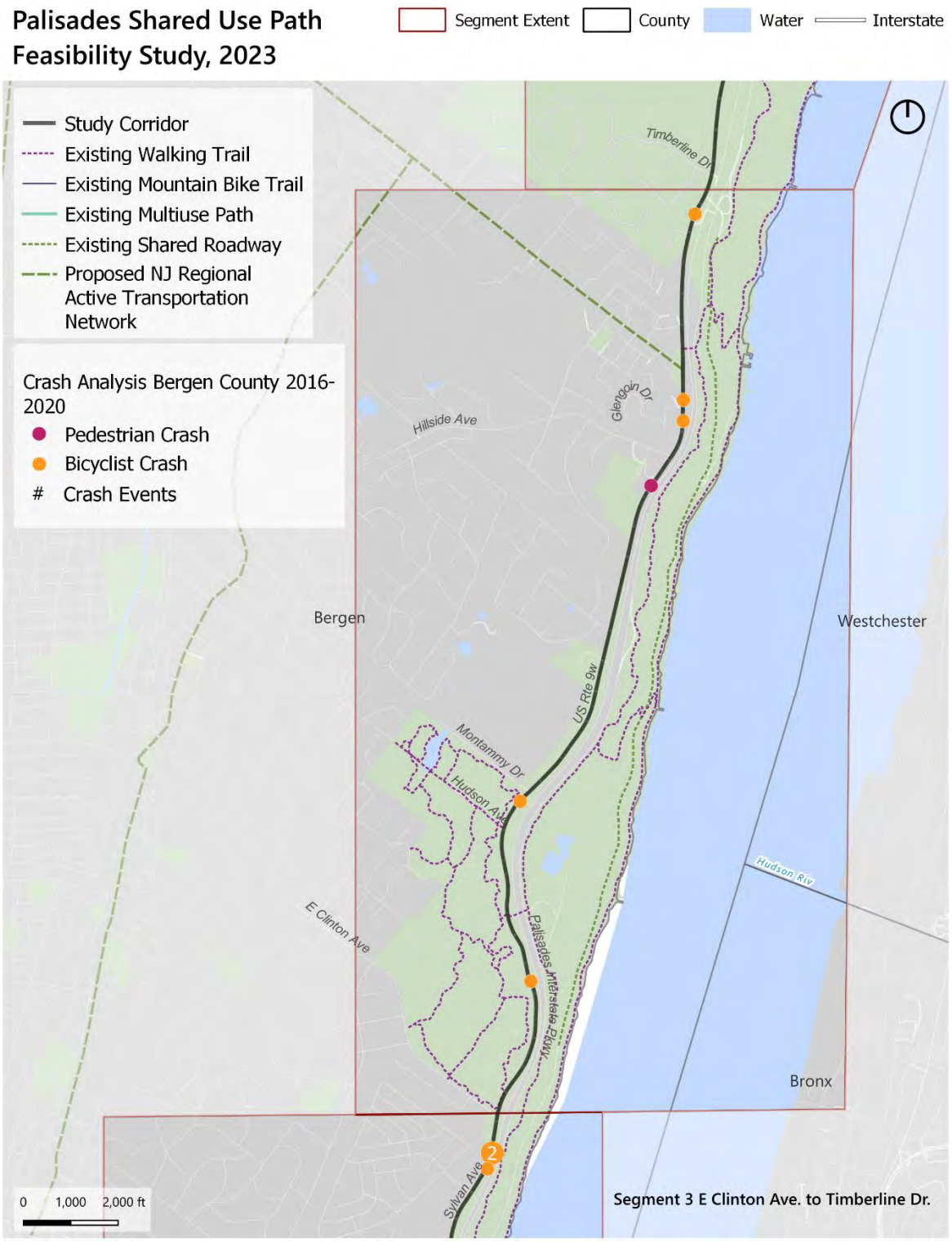


Figure 3 Segment 3: 2016-2020 Pedestrian and Bicycle Crashes

Crashes within Segment 3 occur sporadically along the corridor. No clear patterns or crash hot spots appear in the latest five years of data.

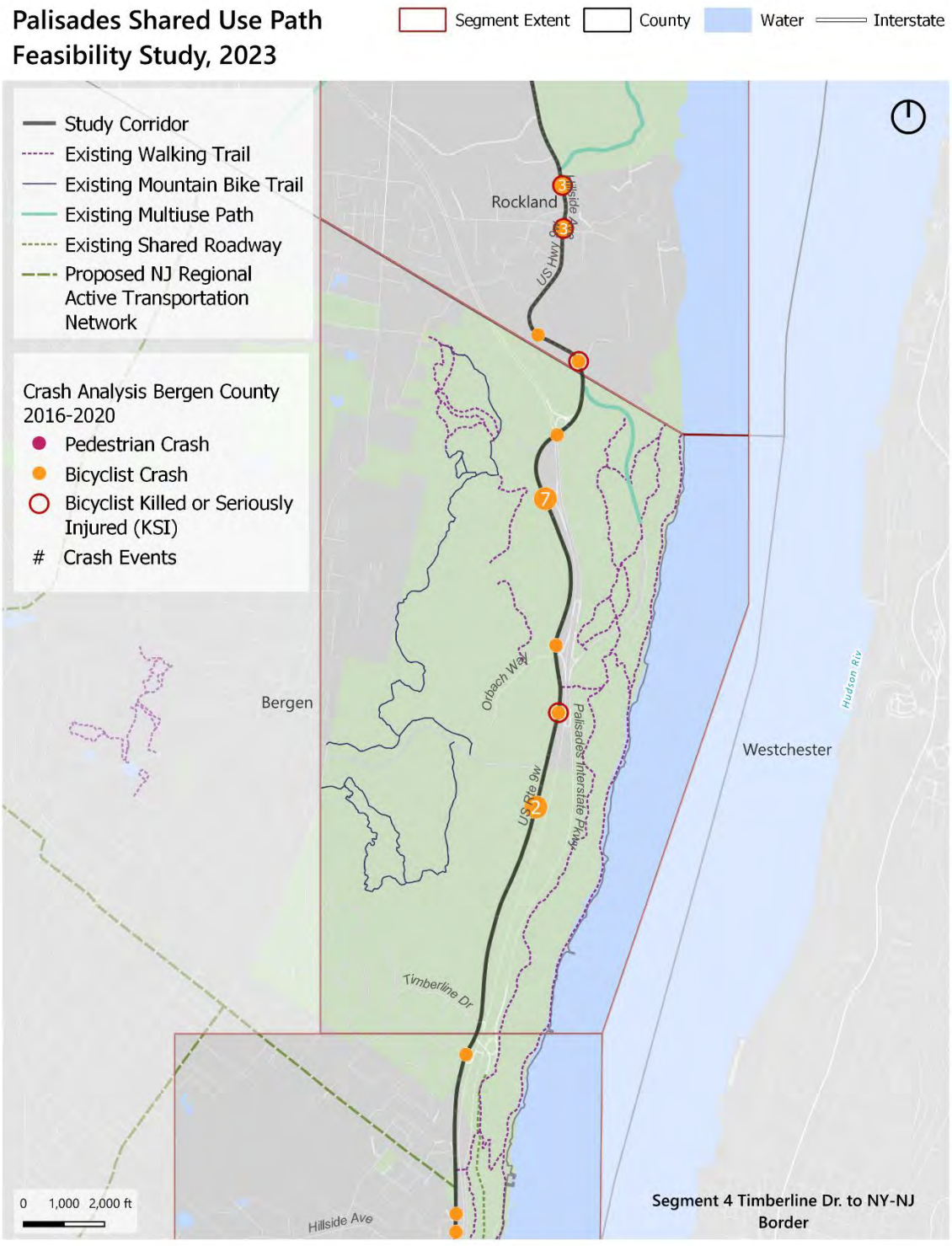


Figure 4 Segment 4: 2016-2020 Pedestrian and Bicycle Crashes

Crashes in Segment 4 are generally concentrated near on/off ramps for the Parkway. This includes a hotspot at the on/off ramp of the State Line Lookout. One KSI crash occurred in this segment near the pedestrian bridge for the Forest View Trail.

Figure 5 Segment 5: 2018-2023 All Pedestrian and Bicycle Crashes

Four crash hot spots and six KSI crashes occur within Segment 5:

1. The first hot spot is at the intersection of Oak Tree Road and is a cluster of three bicycle crashes, one of which is a KSI.

2. The second hot spot is a cluster of three bicycle crashes, one of which is a KSI, at the 9W Market, a popular spot for cyclists to stop and eat.
3. The third hot spot is at the intersection of US Route 9W and Rockland Road where there are three bicycle crashes, one of which is a KSI. Rockland Road is a common route for cyclists to connect between U.S. 9W and downtown Piermont.
4. The fourth hot spot occurs at the intersection of Rockland Road and Ferdon Avenue where there are three bicycle crashes. None of these crashes resulted in a KSI.

A pedestrian KSI occurs at the intersection of Hovey Lane and two further bicyclist KSIs occur in this segment: one at the southern end of the segment north of Ludlow Lane and another at the intersection of Broadway Street.

Summary Crash Statistics

The section below presents descriptive data derived from the last five years of available bicycle and pedestrian crash data in the study area. The descriptive data also notes crashes included from the overall dataset that resulted in fatalities or severe injuries (KSI).

General Crash Descriptions

Chart 1. Segment 1-4 Bicycle and Pedestrian Crashes by Year (2016 – 2020)

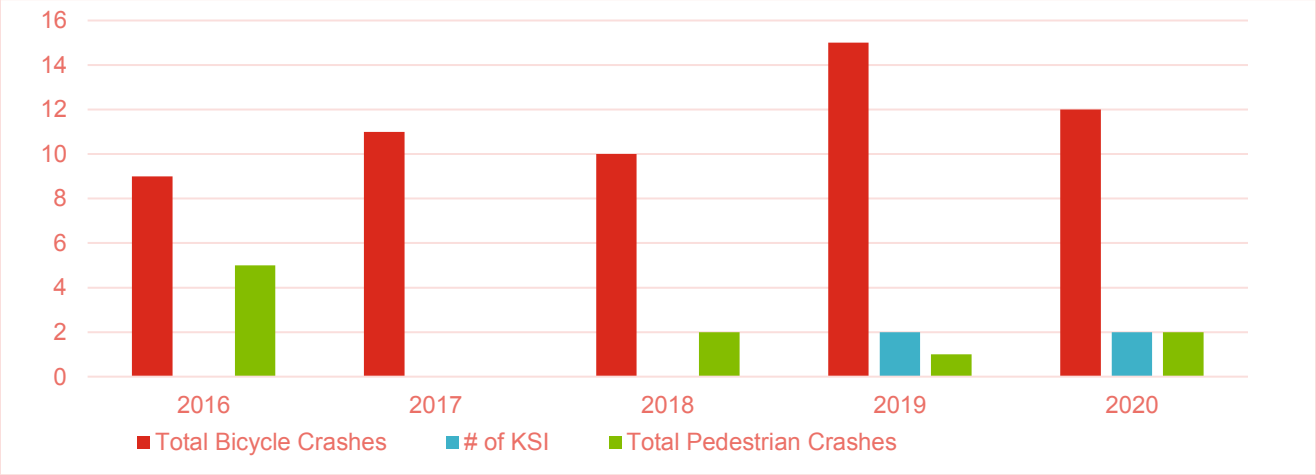
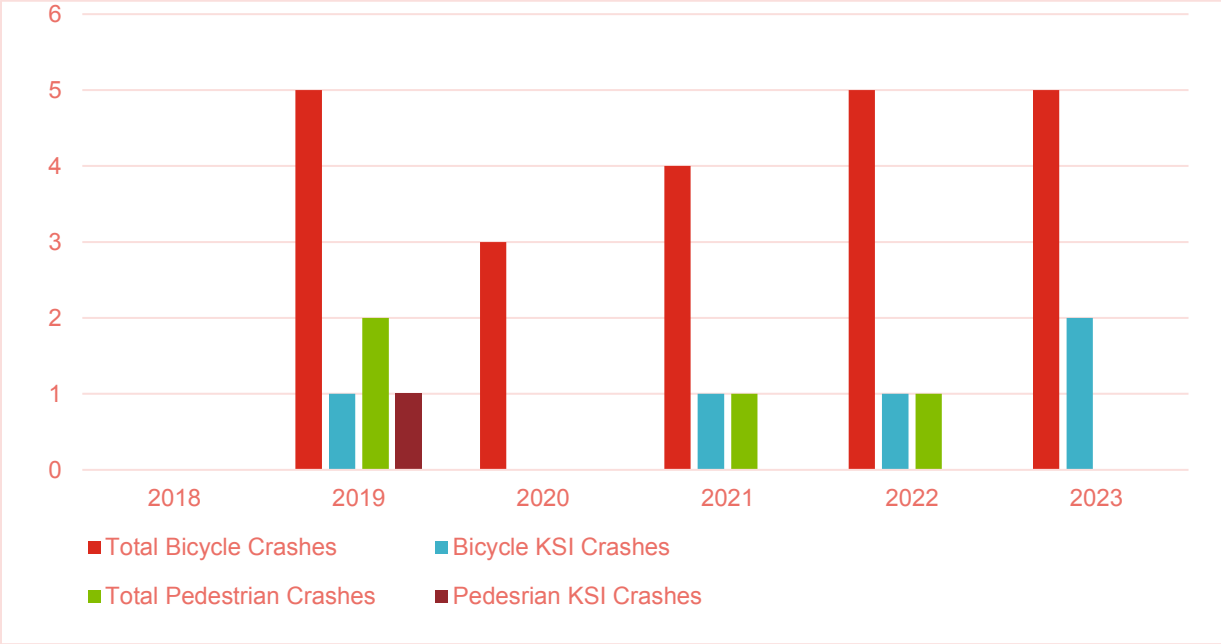


Table 1. Segment 1-4 Bicycle and Pedestrian Crash Severity

	Crash Severity	# Crashes	% Crashes
Bicycle Crashes	Complaint of Pain	21	37%
	Other Visible Injury	26	46%
	Severe	4	7%
	Fatal	**0**	0%
	Unknown	**6**	11%
	Bicycle Sub-Total	**57**	**100%**
Pedestrian Crashes	Complaint of Pain	5	50%
	Other Visible Injury	5	50%
	Severe	0	0%
	Fatal	0	0%
	Pedestrian Sub-Total	**10**	**100%**
	Total	**67**	**-**

Chart 2. Segment 5 Bicycle and Pedestrian Crashes by Year (2018 – 2023)*



**2018 includes October-December. 2023 includes January – September*

Table 2. Segment 5 Bicycle and Pedestrian Crash Severity

	Crash Severity	# Crashes	% Crashes
Bicycle Crashes	Possible Injury	4	18%
	Injury	10	45%
	Serious Injury	5	23%
	Fatal	0	0%
	Unknown	2	9%
	Bicycle Sub-Total	**22**	**100%**
	Possible Injury	1	25%
	Injury	1	25%
	Serious Injury	1	25%
	Fatal	0	0%
	Unknown	1	25%
	Pedestrian Sub-Total	**4**	**100%**
	Total	**26**	**-**

Bicycle crashes in both the Bergen County and Rockland County parts of the study area have generally increased in the past five years of data. It should also be noted that the data is not normalized by exposure and ridership. Data from 2020 and 2021 may be affected by changes in travel patterns during the COVID-19 pandemic. Other factors, such as availability of bicycle facilities and demographic composition, also likely influence exposure and ridership rates.

Table 3. Segment 1-4 Crashes by Travel Mode

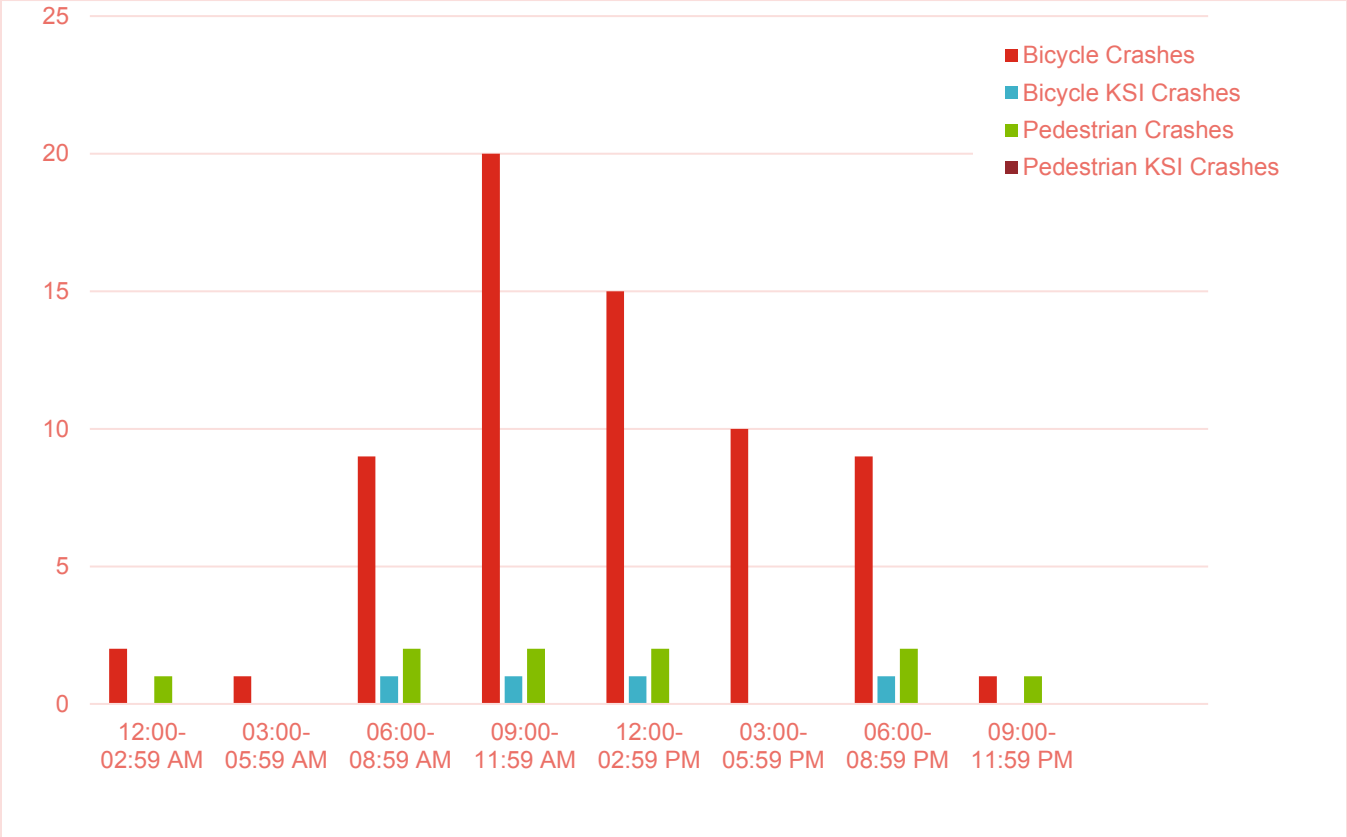
Crash Modes	# Crashes	% Crashes	# of KSI	% of KSI
Vehicle-Bicycle	52	78%	4	100%
Vehicle-Bicycle-Pedestrian	5	7%	0	0%
Vehicle-Pedestrian	5	7%	0	0%
Unknown	5	7%	0	0%
Total	**67**	100%	**4**	0%

Table 4. Segment 5 Crashes by Travel Mode

Crash Modes	# Crashes	% Crashes	# of KSI	% of KSI
Vehicle-Bicycle	22	85%	5	83%
Vehicle-Pedestrian	4	15%	1	17%
Total	**26**	100%	**6**	100%

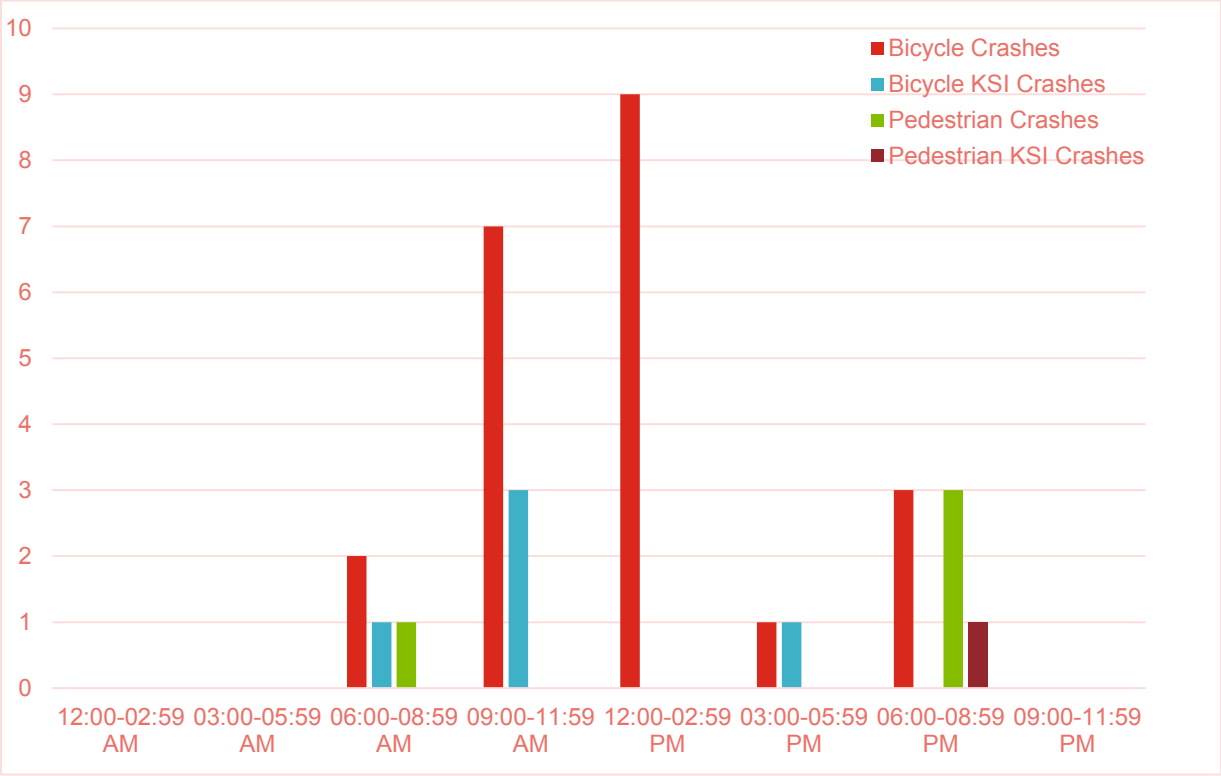
Vehicle-bicycle crashes were more common along the study corridor than vehicle-pedestrian crashes or crashes involving all three modes (vehicle, bicycle, and pedestrian). Crashes involving bicycles also resulted in more KSIs than vehicle-pedestrian crashes.

Chart 3. Segment 1-4 Bicycle and Pedestrian Crashes by Time of Day



The majority of crashes in Bergen County occurred during the daytime between 9:00 am and 3:00 pm. There are not sufficient numbers of KSI crashes to draw conclusions about patterns by time of day.

Chart 4. Segment 5 Bicycle and Pedestrian Crashes by Time of Day



Most bicycle crashes in Rockland County occurred between 9am and 3pm. Pedestrian crashes were concentrated in the hours between 6am and 9am, and 6pm and 9pm, which suggests that nighttime lighting conditions may play a role, especially in the winter months.

Environmental Factors

Table 5. Segment 1-4 Collision by Lighting Condition (Bicyclists)

Lighting Type	# Crashes	% Crashes	# of KSI	% of KSI
Daylight	51	89%	4	100%
Dawn	1	2%	0	0%
Dusk	0	0%	0	0%
Dark (street lights off)	0	0%	0	0%
Dark (no street lights)	0	0%	0	0%
Dark (street lights on)	3	5%	0	0%
Dark (street lights on, spot)	2	4%	0	0%
Total	**57**	**100%**	**4**	**100%**

Table 6. Segment 1-4 Collision by Lighting Condition (Pedestrians)

Lighting Type	# Crashes	% Crashes	# of KSI	% of KSI
Daylight	6	60%	0	0%
Dawn	0	0%	0	0%
Dusk	1	10%	0	0%
Dark (street lights off)	0	0%	0	0%
Dark (no street lights)	0	0%	0	0%
Dark (street lights on)	2	20%	0	0%
Dark (street lights on, spot)	1	10%	0	0%
Total	**10**	**100%**	**0**	**-**

Table 7. Segment 5 Collision by Lighting Condition (Bicyclists)

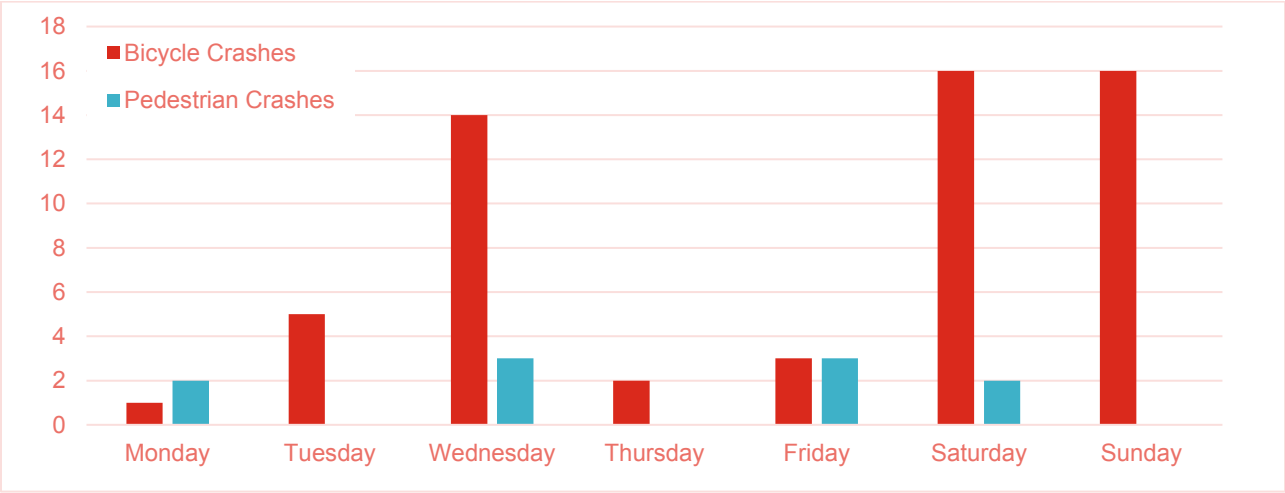
Lighting Type	# Crashes	% Crashes	# of KSI	% of KSI
Daylight	21	95%	5	100%
Dawn	0	0%	0	0%
Dusk	1	5%	0	0%
Dark (road lighted)	0	0%	0	0%
Dark (road unlighted)	0	0%	0	0%
Total	**22**	**100%**	**5**	**100%**

Table 8. Segment 5 Collision by Lighting Condition (Pedestrians)

Lighting Type	# Crashes	% Crashes	# of KSI	% of KSI
Daylight	3	75%	1	100%
Dawn	0	0%	0	0%
Dusk	0	0%	0	0%
Dark (road lighted)	1	25%	0	0%
Dark (road unlighted)	0	0%	0	0%
Total	**4**	**100%**	**1**	**100%**

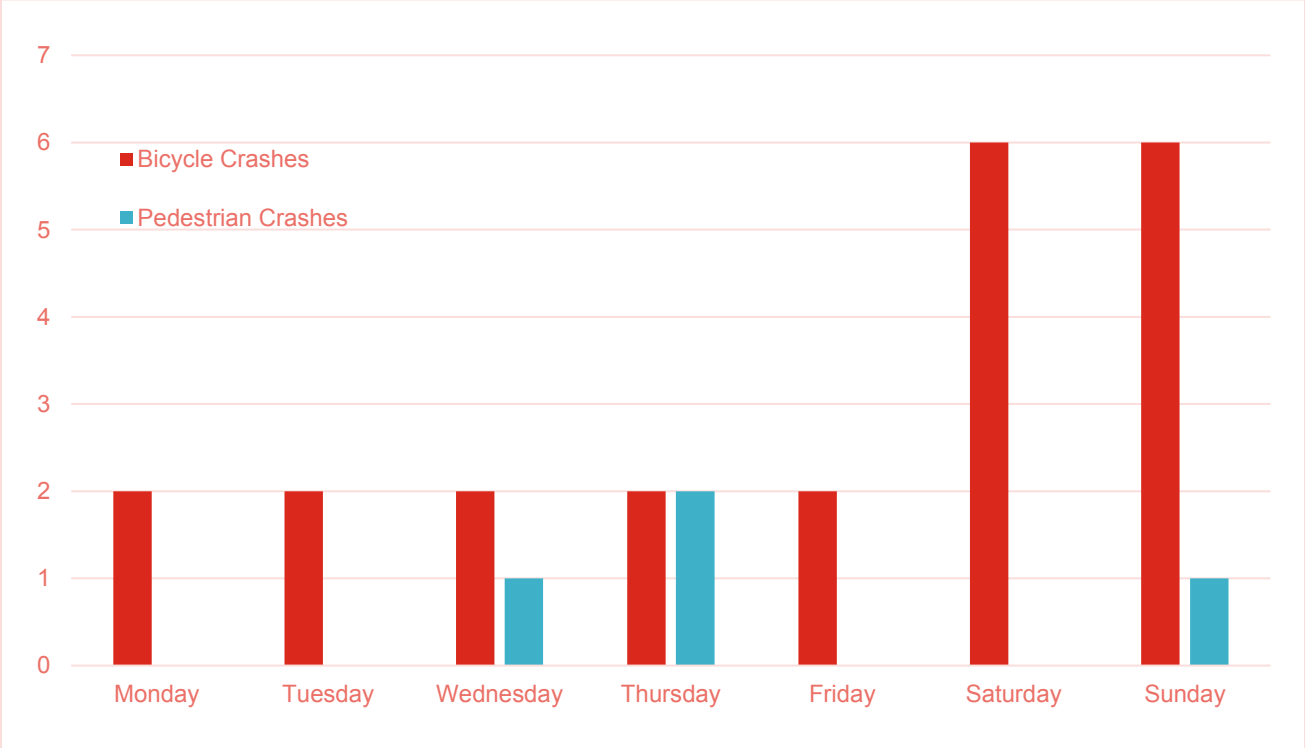
Daylight is the most common condition for crashes that occurred in the study corridor. Fewer crashes during dark hours may not necessarily indicate safe nighttime conditions for bicyclists and pedestrians but rather that fewer people choose to bike and walk during this time.

Chart 6. Bicycle and Pedestrian Crashes and Day of the Week (Segments 1-4)



Most bicycle crashes occurred during the weekend and on Wednesday in the Bergen County section of the study area. The higher number of crashes on weekends suggests that recreational bicycling is popular in the study area. Pedestrian crash frequency is fairly evenly distributed across the week.

Chart 6. Bicycle and Pedestrian Crashes and Day of the Week (Segments 5)



In Rockland County, most bicyclist crashes occurred on the weekend, which also suggests that the area is used for recreational bicycling (this aligns with anecdotal data). There were too few pedestrian crashes to draw conclusions about distribution across the week.

Table 9. Segment 1-4 Collisions by Location in Street (Bicyclists)

Crash Location	# Crashes	% Crashes	# of KSI	% of KSI
At street segment	34	60%	3	75%
At intersection	23	40%	1	25%
Grand Total	57	100%	4	100%

Table 10. Segment 1-4 Collisions by Location in Street (Pedestrians)

Crash Location	# Crashes	% Crashes	# of KSI	% of KSI
At street segment	7	70%	0	0%
At intersection	3	30%	0	0%
Grand Total	10	100%	0	-

Over a third of bicycle collisions and nearly a third of pedestrian collisions occurred at intersections. This may suggest the need for intersection safety improvements within the study corridor.

Table 11. Segment 5 Collisions by Location in Street (Bicyclists)

Crash Location	# Crashes	% Crashes	# of KSI	% of KSI
Not at intersection	6	27%	1	20%
At intersection	8	36%	2	40%
Unknown	8	36%	2	40%
Grand Total	22	100%	5	100%

Table 12. Segment 5 Collisions by Location in Street (Pedestrians)

Crash Location	# Crashes	% Crashes	# of KSI	% of KSI
Not at intersection	1	25%	0	0%
At intersection	2	50%	1	100%
Unknown	1	25%	0	0%
Grand Total	4	100%	1	100%

There are an insufficient number of crashes to draw conclusions from regarding potential intersection safety issues in the Rockland County data.

Table 13. Segment 1-4 Pre-Crash Action by Mode

Precrash Action		# Crashes	%	KSI	%
Vehicle	**Pedestrian /Bicycle**				
Parked	Going straight ahead	1	1%	1	25%
Going straight ahead	Going straight ahead	11	16%	0	0%
Going straight ahead	Changing lanes	1	1%	0	0%
Going straight ahead	Driving on Shoulder	1	1%	0	0%
Going straight ahead	Making right turn (not turn on red)	1	1%	0	0%
Going straight ahead	Making left turn	3	4%	0	0%
Passing	Changing lanes	1	1%	0	0%
Right turn on red	Going straight ahead	1	1%	0	0%
Right turn on red	Other Vehicle / cyclist action	1	1%	0	0%
Making right turn (not turn on red)	Going straight ahead	9	13%	1	25%
Making left turn	Going straight ahead	19	28%	1	25%
Making U-Turn	Going straight ahead	1	1%	0	0%
Starting from parking	Going straight ahead	2	3%	0	0%
Starting in traffic	Going straight ahead	1	1%	0	0%
Slowing or stopping	Going straight ahead	2	3%	0	0%
Stopped in traffic	Going straight ahead	1	1%	0	0%
Unknown	Unknown	11	16%	1	25%
Total		**67**	**100%**	**4**	**100%**

The most common pre-crash actions for vehicles in the Bergen County section of the study corridor were going straight ahead, left turns, and right turns. The higher prevalence of turning actions suggests that looking into improvements to intersection safety may be warranted.

Table 14. Segment 5 Vehicle Crash Behaviors (Bicyclist Crashes)

Vehicle Crash Behavior	# Crashes	% Crashes	# of KSI	% of KSI
Driver inattention	2	9%	0	0%
Failure to yield right of way	5	23%	2	40%
Glare	2	9%	1	20%
Passing or lane usage improperly	4	18%	2	40%
Traffic control devices disregarded	1	5%	0	0%
Improper turning	1	5%	0	0%
Unknown *	7	32%	0	0%
Grand Total	**22**	**100%**	**5**	**100%**

**Bicyclist crash behavior not applicable/unknown in data entry*

Table 15. Segment 5 Vehicle Crash Behaviors (Pedestrian Crashes)

Vehicle Crash Behavior	# Crashes	% Crashes	# of KSI	% of KSI
View obstructed / limited	2	50%	0	0%
View obstructed / limited, pavement slippery	1	25%	0	0%
Unknown*	1	25%	1	100%
Grand Total	**4**	**100%**	**1**	**100%**

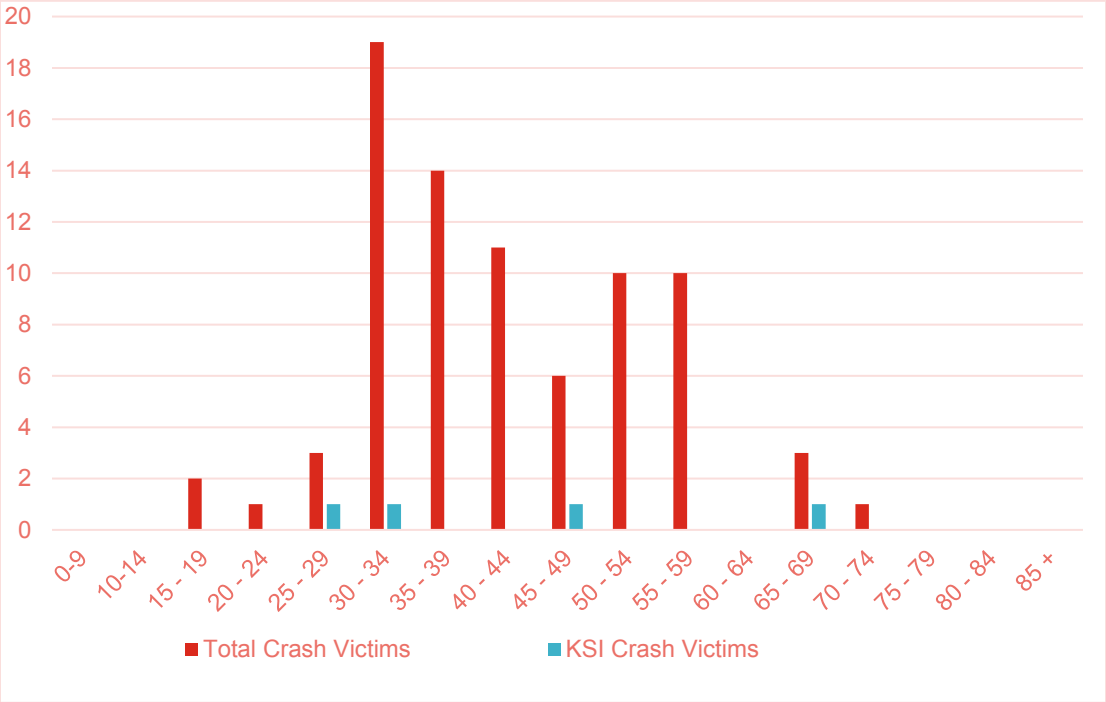
**Pedestrian crash behavior not applicable/unknown in data entry*

Behaviors of drivers involved in bicycle and pedestrian crashes in Rockland County show a weak trend towards failure to yield. There is also a weak pattern of crashes occurring when drivers are passing bicyclists. Stronger trends and patterns are possibly absent due to the small sample size.

Table 16. Segment 1-4 Crash Victims by Age (Bicyclists and Pedestrians)

Ages	Number of Victims	Percent of Victims	Number of KSI Victims	Percent of KSI Victims
0 - 4	0	0%	0	0%
5 - 9	0	0%	0	0%
10 - 14	0	0%	0	0%
15 - 19	2	3%	0	0%
20 - 24	1	1%	0	0%
25 - 29	2	3%	1	25%
30 - 34	14	21%	0	0%
35 - 39	12	18%	0	0%
40 - 44	7	10%	0	0%
45 - 49	5	7%	1	25%
50 - 54	7	10%	0	0%
55 - 59	8	12%	0	0%
60 - 64	0	0%	0	0%
65 - 69	3	4%	1	25%
70 - 74	1	1%	0	0%
75 - 79	0	0%	0	0%
80 - 84	0	0%	0	0%
85 +	0	0%	0	0%
Unknown	1	7%	1	25%
Grand Total	67	100%	**4**	**100%**

Chart 7. Segment 1-4 Crash Victims by Age Range



The majority of pedestrian and bicyclist crash victims were between the ages of 30 and 59, and over a third were between the ages of 30 and 39 in the Bergen County section of the study corridor.

Table 17. Segment 1-4 Collision Victims by Gender (Bicyclists and Pedestrians)

Gender	Total Crashes	Percent of Total Crashes	KSI Crashes	Percent of KSI Crashes
Female	9	13%	0	0%
Male	53	79%	3	75%
Unknown	5	7%	1	25%
Grand Total	67	100%	4	**100%**

The majority of crash victims were male in the Bergen County section of the study corridor. This is on par with national trends for bicyclist crashes, where males consistently account for more bicycle related deaths and injuries from motor-vehicle traffic crashes as well as other non-traffic incidents.[2]

[2] National Safety Council. Injury Facts. https://injuryfacts.nsc.org/home-and-community/safety-topics/bicycle-deaths/