Newark Downtown Circulation Improvement Study

June 2019

NJTPA
NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

Sam Schwartz

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Newark Downtown Circulation Improvement Study

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EXECUTIVE SUMMARY

The City of Newark is the Garden State's largest city and has experienced population growth every year since 2010. New employers, residences, parks, plazas, entertainment venues, hotels, and retail stores have spurred development throughout the Downtown neighborhoods. The City's extensive transportation network provides residents several transportation modes, including safe pedestrian and bicycle pathways, bus, light rail, and regional rail. Its network also allows businesses to thrive, ensuring that employees can arrive to their jobs on time. To ensure that Newark remains economically competitive as a desirable place to live, work, study and visit, the transportation network must be functional and accessible for all users, including pedestrians, bicyclists, motorists, buses, and people with disabilities.

The Newark Downtown Circulation Improvement Study (NDCIS) evaluates the current and future Downtown street network and identifies locations and strategies for improvement. In addition to pursuing economic benefits by addressing the goals, objectives, findings and recommendations of this study, Newark has a pressing need to improve safety for all roadway users. Newark is a Federal Highway Administration (FHWA) designated Pedestrian Focus City, due to a high rate of motor vehicle crashes involving pedestrians and bicyclists on city streets. The NDCIS develops the framework for improving the transportation network, which supports the continued economic growth of downtown Newark and enhances safety of the City's streets. This study supports the City of Newark Pedestrian and Bicycle Safety Action Plan, which identifies where to address pedestrian safety issues with the goal of reducing the frequency and severity of pedestrian crashes.

This study also advances the City of Newark's Complete Streets Policy, adopted in 2012, which states that Newark is "committed to creating street corridors and intersections that safely accommodate all users of all abilities," and that Newark "wishes to implement the Complete Streets Policy through the planning, design, construction, maintenance and operation of new and retrofitted transportation facilities, enabling safe access and mobility of pedestrians, bicyclists, transit users of all ages and abilities."

This study was led by the City of Newark with financial and technical support and collaboration from the North Jersey Transportation Planning Authority (NJTPA) and with input from stakeholders and the community. The study recommends a variety of pedestrian safety, bicycle, and vehicular improvements for five focus areas, or "Activity Centers" of downtown Newark.

The five focus areas are listed below with a highlight of recommendations at each location. Additional recommendations are listed and described in the Findings & Recommendations section of this report. A map is provided below showing an overview of the recommendations.

University Area Activity Center

The University Area activity center has high vehicle, pedestrian, and bicycle volumes associated with several major universities in the vicinity including the New Jersey Institute of Technology (NJIT), Rutgers University – Newark, and the Essex County Community College. This area is served by two light rail stations, Washington Street and Warren Street.

University Area Activity Center recommendations included:

- Intersection improvements at Dr. Martin Luther King, Jr Boulevard and Warren Street, including curb extensions to reduce crossing distances and increase visibility for pedestrians
- Adding a leading pedestrian interval (LPI) at the intersection of Sussex Avenue, Central Avenue and Dr. Martin Luther King, Jr Boulevard
- One-way separated bicycle lanes on Raymond Boulevard
- One-way (southbound) separated bicycle lane on University Avenue

Newark Penn Station Activity Center

The Newark Penn Station activity center has high pedestrian and vehicular volumes due to heavy transit use at Newark Penn Station. Newark Penn Station is a critical regional transit hub providing connections to and from commuter rail, Amtrak, PATH, light rail, and buses.

Newark Penn Station Activity Center recommendations included:

- Intersection improvements at the Market Street, Ferry Street and Raymond Plaza East intersection, including curb extensions to reduce crossing distances and increase visibility for pedestrians, adding a LPI, and extending Peter Francisco Park into Raymond Plaza East south of Ferry Street
- Intersection improvements at the McCarter Highway and Market Street intersection, including pedestrian refuge islands allowing safer crossings for pedestrians on the McCarter Highway approaches and adding a LPI
- Intersection improvements at the McCarter Highway and Raymond Boulevard intersection, including restricting left-turns on northbound McCarter Highway onto Raymond Boulevard, and adding a LPI
- Adding a LPI at the intersection of Raymond Boulevard and Raymond Plaza West
- One-way separated bicycle lanes from the intersection of Raymond Boulevard, Market Street and Prospect Street to University Avenue in the University Area Activity Center
- A roundabout to be studied further on Raymond Plaza West adjacent to Newark Penn Station along with the conversion from a one-way to a two-way street between Market Street and Raymond Boulevard

Military Park Activity Center

The Military Park activity center experiences high pedestrian and vehicular volumes in part due to the New Jersey Performing Arts Center (NJPAC) and recent mixed-use development.

Military Park Activity Center recommendations included:

- Intersection improvements at the Broad Street and Central Avenue intersection, including highly visible crosswalks at all approaches and the addition of a LPI
- Intersection improvements at the Rector Street and Park Place intersection, including curb extensions to reduce crossing distances and increase visibility for pedestrians and adding a LPI
- Intersection improvements at Park Place and E. Park Street, including highly visible crosswalks at all approaches and curb extensions
- Alternatives for a two-way separated bicycle lane along various routes throughout this activity center, connecting to the proposed bicycle lane routes along the Riverfront Park to Newark Broad Street Station and Newark Penn Station
- Pedestrian refuge islands allowing safer crossings for pedestrians at the intersections of Broad Street and Prudential Drive, and Broad Street and New Street
- Extending park space and reducing street width on Park Place between Raymond Boulevard and Center Street
- Conversion of Bleeker Street from two-way to one-way in the westbound direction.
- Closure of Halsey Street to vehicle traffic (except for vehicles making deliveries and emergency vehicles) between between Bleeker Street and Linden Street to activate a pedestrian plaza
- Bus shelter upgrades on Park Place

Lincoln Park Activity Center

The Lincoln Park activity center has high vehicular and pedestrian volumes. Clinton Avenue and Broad Street serve as major feeder roadways into and out of the downtown area.

Lincoln Park Activity Center recommendations included:

- Pedestrian refuge islands with fences or street trees in the median of Broad Street north of Chestnut Street, between Camp Street and Pennington Street, and between Pennington Street and Tichenor Street.
- Extending park space and reducing street width on Lincoln Park South between Clinton Avenue and Broad Street and adding on-street reverse angle parking spaces
- A roundabout at the intersection of Clinton Avenue, Washington Street, and Lincoln Park to provide continuous traffic flow and reduce congestion
- Conversion of Lincoln Park West from a one-way street to a two-way street
- Adding a LPI at the intersection of Broad Street and Pennington Street, and Broad Street and Camp Street

Prudential Center Activity Center

The Prudential Center activity center experiences high vehicular and pedestrian volumes, particularly during various types of events at Prudential Center.

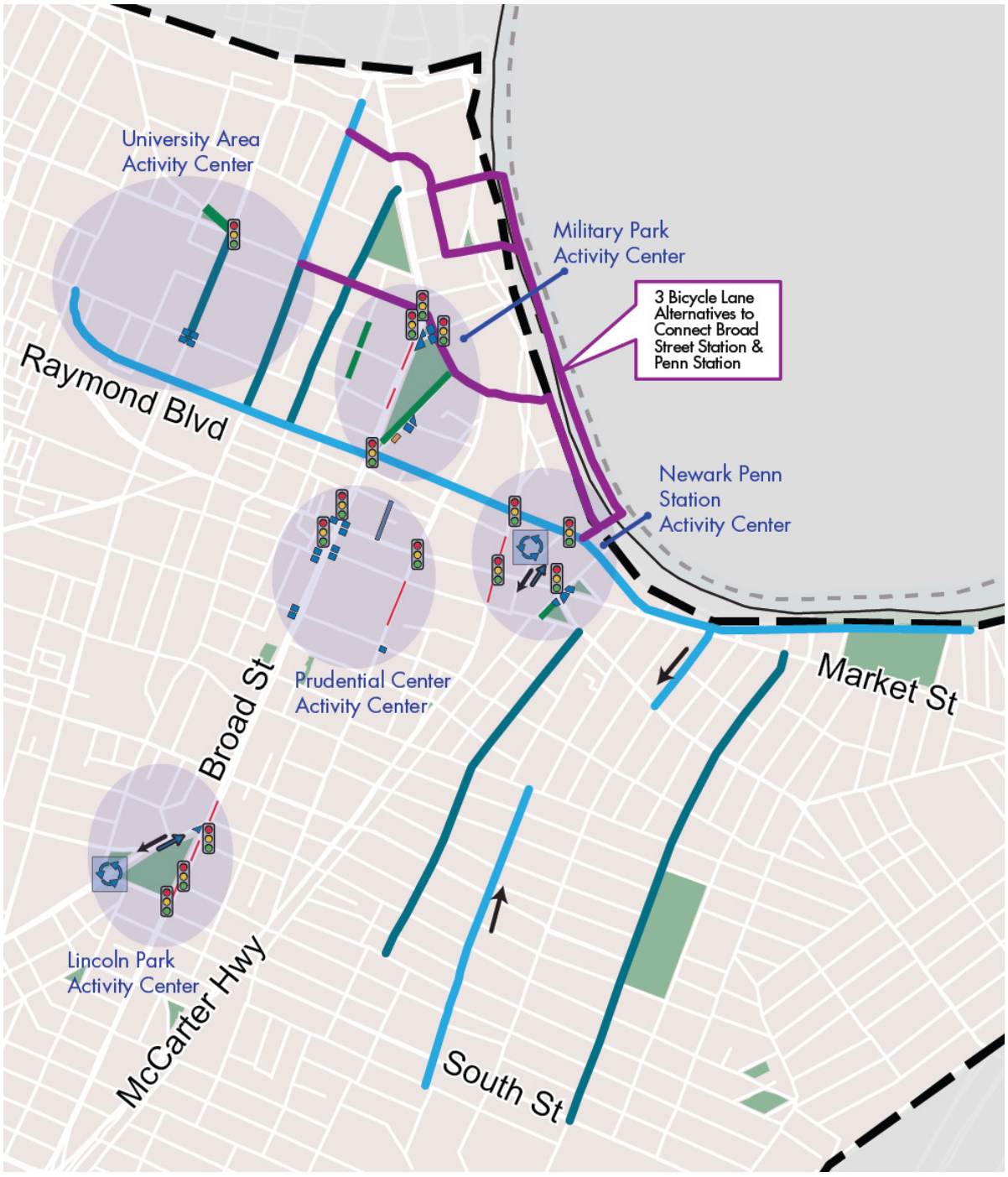
Prudential Center Activity Center recommendations included:

- Intersection improvements at the Broad Street, Branford Place and Edison Place intersection, including highly visible crosswalks at all approaches, curb extensions to reduce crossing distances, and the addition of a LPI
- Intersection improvements at the Broad Street and Market Street intersection, including curb extensions to reduce crossing distances and the addition of a LPI
- Curb extensions at Broad Street and William Street
- A curb extension at Mulberry Street and Lafayette Street
- A pedestrian refuge island along the section of Mulberry Street neighboring the Prudential Center, south of Edison Place.
- Adding a LPI to the intersection of Market Street and Mulberry Street
- A flexible pedestrian plaza on Beaver Street between Clinton Street and Market Street, closed off to vehicle traffic at specified times and days
- Additional pedestrian lighting along streets throughout the activity center

The NDCIS is both a data-driven and community-driven study that will support future transportation network improvements for all modes and users. The study:

- Documents existing conditions of Downtown Newark's multi-modal transportation network.
- Includes a record of public engagement efforts involving a Steering Advisory Committee, Stakeholder Group Meetings, and Public Meetings.
- Provides results of an extensive traffic analysis.
- Presents Findings and Recommendations.
- Recommends funding opportunities for recommended improvements.

An action plan for next steps, organized into an Implementation Matrix, identifies recommended improvements, location of each improvement, the responsible implementing agency, and the cost and timeframe for completion. Additionally, funding sources to be pursued by the City of Newark for implementing recommended improvements are listed in detail in the Funding Sources Matrix.


University Area
Activity Center
Military Park
Activity Center
3 Bicycle Lane
Alternatives to
Connect Broad
Street Station &
Penn Station
Raymond Blvd
Newark Penn
Station
Activity Center
Prudential Center
Activity Center
Broad St
Market St
Lincoln Park
Activity Center
McCarter Hwy
South St
Base Layers
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County boundary
Newark City Boundary
Bicycle Improvements
Recommended Bicycle Lanes
Bicycle Lane Alternatives
Pedestrian Improvements
Curb Extension
Pedestrian Refuge Island
Park Extension /
Pedestrian Plaza
Beaver Street Flex
Pedestrian Plaza
Leading Pedestrian Interval
Signal Phase
Vehicular Improvements
Roundabout
1-way to 2-way
Street Conversion
2-way to 1-way
Street Conversion
Transit Improvements
Bus Shelter
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1
INTRODUCTION

The City of Newark is undergoing massive growth and redevelopment as new residential, mixed-use, and commercial developments are constructed in the downtown area. This reinvestment and momentum in the downtown area is expected to continue in the years to come. One of the main reasons that the City is experiencing this resurgence is due to the fact that Newark is a major transportation hub and is home to major employment centers, educational institutions, sports and the arts venues, and freight facilities and is proximate to New York City and the northeast corridor. As a result, Newark is the destination for thousands of commuters on a daily basis and is attracting a growing number of new residents and businesses to the downtown area. With this new growth and influx of people, planning for multimodal circulation is essential for Newark to continue its economic vitality and and its role as a destination for businesses, residents and visitors.

The City of Newark's street network is a critical component in the city's vitality and making the downtown area and the region function effectively and efficiently through the movement of pedestrians, cyclists, public transit, private vehicles, and trucks. Having the necessary infrastructure to support walking and bicycling in the downtown is essential to maintain the ongoing reinvestment and momentum in the downtown area as residents and businesses increasingly view this infrastructure as a critical amenity.

The Newark Downtown Circulation Improvement Study aims to support Newark's growth and ability to stay competitive ensuring that people using all transportation modes can safely and efficiently travel within the city. This is a data-driven study that assesses existing conditions and future traffic forecasts, and engaged extensively with community leaders and residents for their input. As the focus of the study is to improve multimodal accessibility and mobility, following its recommendations may impact traffic operations. As with most improvements, tradeoffs may be needed to balance the needs of different users of the street.

This study has been informed by and furthers the goals and objectives outlined in several key plans and capital improvement projects in the City of Newark. These include:

- Newark Master Plan Mobility Element
- Bike Ironbound
- Morris Canal Greenway Corridor Study
- City of Newark Pedestrian and Bicycle Safety Action Plan
- The City's Congestion Management Air Quality (CMAQ) Traffic Signal Optimization / Adaptive
- Signals projects along McCarter Highway and Broad Street
- Newark Riverfront Pedestrian and Bicycle Access Project
- Greenway Bikeway Transit Connector Project

1.1 Study Objectives

The Newark Downtown Circulation Improvement Study aims to ensure that Newark retains and improves its competitive advantage as a desirable place to work, live, visit, and learn. The study has four main objectives that support the development of the City and advances local and regional goals.

1. Collect and analyze transportation data, including vehicle, pedestrian and bicycle volumes, and transit information.
2. Build a transportation model of the study area using the collected data. This model was used to understand the traffic issues within the area and to establish baseline traffic conditions. The model will be used to identify signal and roadway improvements as well as quantify traffic impacts of developed improvements. The model forecasts travel behavior in and around the City of Newark for the horizon year of 2025.
3. Provide recommendations, which enhance the experience of all travelers, not just vehicular traffic. This will provide an opportunity for balanced multimodal circulation in the City's downtown core.
4. Provide cost estimates, implementation timeframes, and responsible implementing agency for each of the recommendations outlined in this study.

1.2 Study Area Boundary

The study area is bound by Bergen Street to the west, US Route 1 & 9 in the east, Interstate 280 and the Passaic River to the north, and Interstate 78 to the south. The study area encompasses downtown Newark, the University Heights district, the Ironbound district and the South Broad Street area. These areas vary in character as downtown has towering office buildings, the Ironbound and University Heights districts boast an array of mixed-use and residential developments, and the South Broad Street area contains a variety of historic homes and commercial activities. The study boundaries are shown in **Figure 1**.

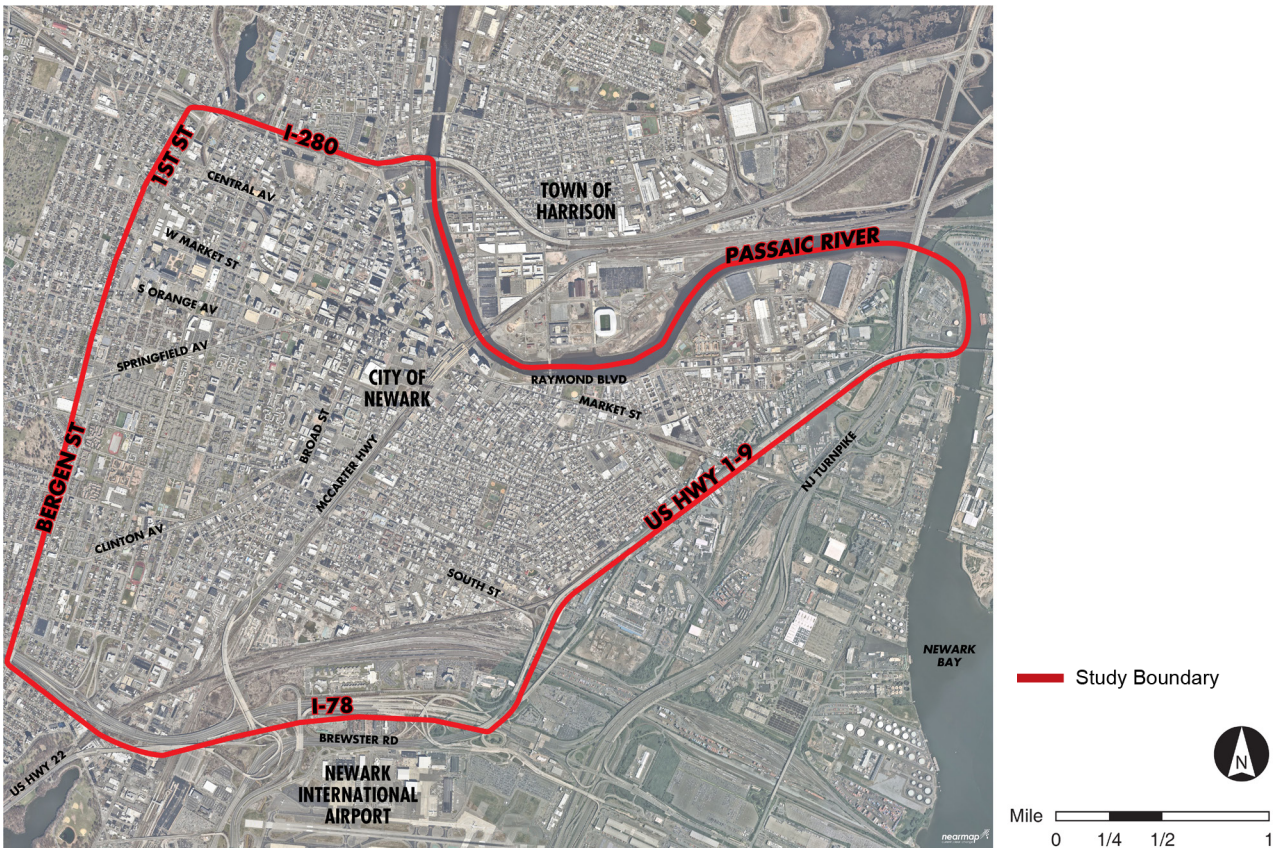

Figure 1: Newark Downtown Circulation Improvement Study Area

1.3 Activity Centers

Since the study area is quite large, it was not possible to study each block and intersection in detail. In response, activity centers were identified to guide the discussion and focus the analysis. Activity centers are areas with high pedestrian, bicycle, and vehicular activity; a major attractor such as an event center; and/or have a historically high number of crashes. Activity centers were identified through the use of historical data, analysis to identify areas with high pedestrian and vehicle volumes and that serve as major attractors, and discussions with the City of Newark, the Steering Advisory Committee, the Stakeholder Group, and the public. Recommendations were developed primarily for the areas within the activity centers. The types of recommendations developed for these activity centers (e.g. bike lanes, curb extensions, etc.) can be implemented in other areas of the City to improve multimodal traffic and additional activity centers can be evaluated in the future to build upon this work.

The study includes the following activity centers:

- **University Area** – The University Area activity center has high vehicle, pedestrian, and bicycle volumes associated with several major universities in the vicinity including the New Jersey Institute of Technology (NJIT), Rutgers University – Newark, and the Essex County Community College. This area is served by two light rail stations, Washington Street and Warren Street.
- **Newark Penn Station** – The Newark Penn Station activity center has high pedestrian and vehicular volumes due to heavy transit use at Newark Penn Station. Newark Penn Station is a critical regional transit hub providing connections to and from commuter rail, Amtrak, PATH, light rail, and buses.
- **Military Park** – The Military Park activity center experiences high pedestrian and vehicular volumes in part due to the New Jersey Performing Arts Center (NJPAC) and recent mixed-use development.
- **Prudential Center** – The Prudential Center activity center experiences high vehicular and pedestrian volumes, particularly during various types of events at Prudential Center.
- **Lincoln Park** – The Lincoln Park activity center has high vehicular and pedestrian volumes. Clinton Avenue and Broad Street serve as major feeder roadways into and out of the downtown area.

The activity centers within the study area are shown in **Figure 2** (see page 5).

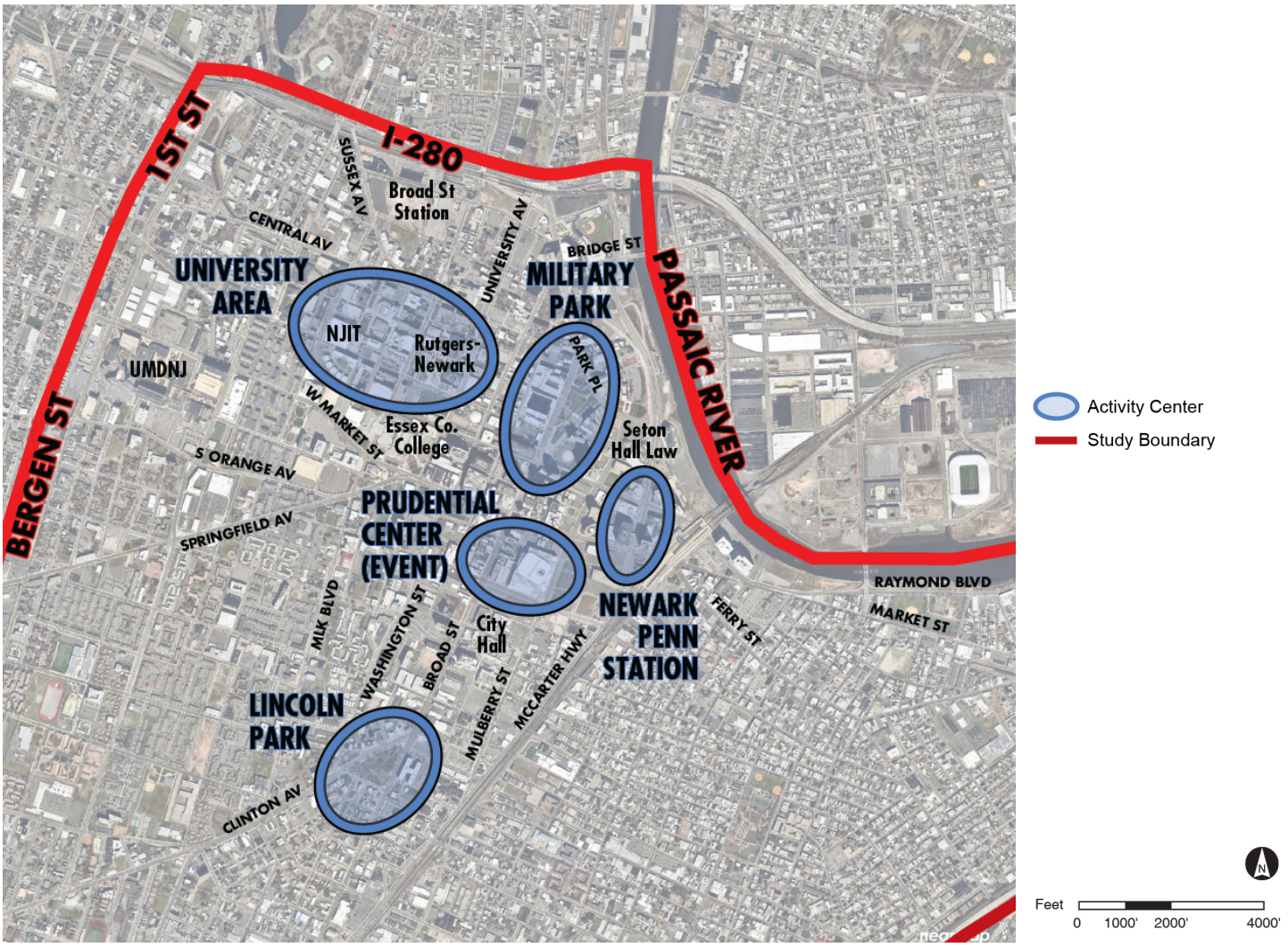

Figure 2: Activity Centers

2
PUBLIC ENGAGEMENT

Early and active public engagement was an important element of the Newark Downtown Circulation Improvement Study. The public engagement process was a key way for residents, businesses, and stakeholders to provide input and feedback throughout the study. A Steering Advisory Committee (SAC) and the Stakeholder Group were identified at the outset of the study. Notices, presented materials, and summaries of the meetings are provided in **Appendix A**.

2.1 Steering Advisory Committee (SAC)

The SAC was created to oversee the development of the Newark Downtown Improvement Study and to provide technical and logistic guidance during the study. The SAC consisted of a sample of major organizations within the study area including universities, local government departments, and regional transportation organizations.
Four SAC meetings were held at each stage of the planning process at the North Jersey Transportation Planning Authority's (NJTPA) offices in downtown Newark, which are summarized below.

- SAC Meeting 1 was held on September 27, 2017 to present the project purpose and goals, the scope of work, and to provide an overview of the roles and responsibilities of the SAC. At this first meeting, the SAC also provided input on the data collection effort.
- SAC Meeting 2 was held on February 28, 2018 to solicit guidance for the modeling and analysis tasks.
- SAC Meeting 3 was held on November 7, 2018 after completion of the transportation model to present refined recommendations and solicit feedback.
- SAC Meeting 4 was held on March 14, 2019 to present the final recommendations and solicit feedback prior to the completion of the final report.

2.2 Stakeholder Group Meetings

The stakeholder group was created to provide feedback throughout the study regarding their respective needs and concerns, local issues, and the potential impacts of recommended improvements. The stakeholder group consisted of local arts and cultural institutions, health institutions, universities, economic development and business organizations, and local resident groups. Four stakeholder group meetings were held throughout the course of the study, which are summarized below.

- Stakeholder Meeting 1 was held on November 15, 2017 to introduce the stakeholders to the study and to solicit feedback prior to the data collection portion of the study.
- Stakeholder Meeting 2 was held on May 22, 2018 prior to the completion of transportation model to present preliminary recommendations and solicit feedback.
- Stakeholder Meeting 3 was held on November 7, 2018 after completion of the transportation model to present refined recommendations and solicit feedback.
- Stakeholder Meeting 4 was held on March 5, 2019 to present the final recommendations and solicit feedback prior to the completion of the final report.

2.3 Public Meetings

Three public meetings were held in Newark City Hall Council Chambers to solicit feedback from the public throughout

the project. Flyers advertising and inviting local residents and workers were posted in public spaces within the study area, such as Newark City Hall, around Newark Penn Station and Lincoln Park. The public meetings were also advertised on the City of Newark's website, Facebook page, and Twitter account, and NJTPA's website.

- Public Meeting 1 was held on November 15, 2017 to introduce the public to the study and solicit feedback.
- Public Meeting 2 was held on May 22, 2018 prior to the completion of the transportation model to present preliminary recommendations and solicit feedback.
- Public Meeting 3 was held on March 5, 2019 and presented the study's findings and recommendations and solicit feedback.

2.4 Key Issues & Findings

The SAC, Stakeholders, and the public brought up a variety of topics, many of which were similar in nature. The issues discussed and comments made during the study's public outreach influenced the recommendations for this study. **Figure 3** shows an example of the outreach materials presented during one of the public meetings. The following topics were discussed:

- Pedestrian safety improvements and new pedestrian facilities such as pedestrian plazas
- Areas and intersections where crossings are difficult and crosswalks or curb extensions are needed
- Improved bicycle connectivity and bike share opportunities
- Opportunities for new bicycle lanes within the study area
- Transit connections for buses and light rail
- Extending the light rail system to additional neighborhoods
- Improvements to the bus network such as dedicated bus lanes, queue jumps, and bus arrival time information
- Better connectivity of the streets within the City

During these meetings, the SAC, Stakeholders, and the public identified specific intersections and areas where they recommended that pedestrian safety improvements be made. The public generally viewed pedestrian plazas as favorable and identified Halsey Street, Beaver Street, and Academy Street as locations where pedestrian plazas may be beneficial.

The SAC, Stakeholders, and public also identified a connected network of bicycle lanes as a priority and further identified opportunities for new on-street bicycle lanes that would link to the existing network. These groups were also interested in bringing bike sharing programs to Newark and brought up the possibility of having bicycle tours as a way to promote a culture of biking within the city.

Transit improvements including improved wayfinding signage, countdown clocks at transit stops indicating when the next bus is arriving, dedicated bus lanes and queue jumps, and incentives for transit use were also considered favorable. The public was interested in extending the light rail system to other neighborhoods including towards Teacher's Village, along the Broad Street/Broadway corridor, and on Central Avenue.

The SAC, Stakeholders, and the public indicated that having a better connected and more efficient street network would improve vehicular circulation. These groups brought up having synchronized traffic signals, the possibility of congestion pricing, and the conversion of one-way to two-way streets or two-way to one-way streets.

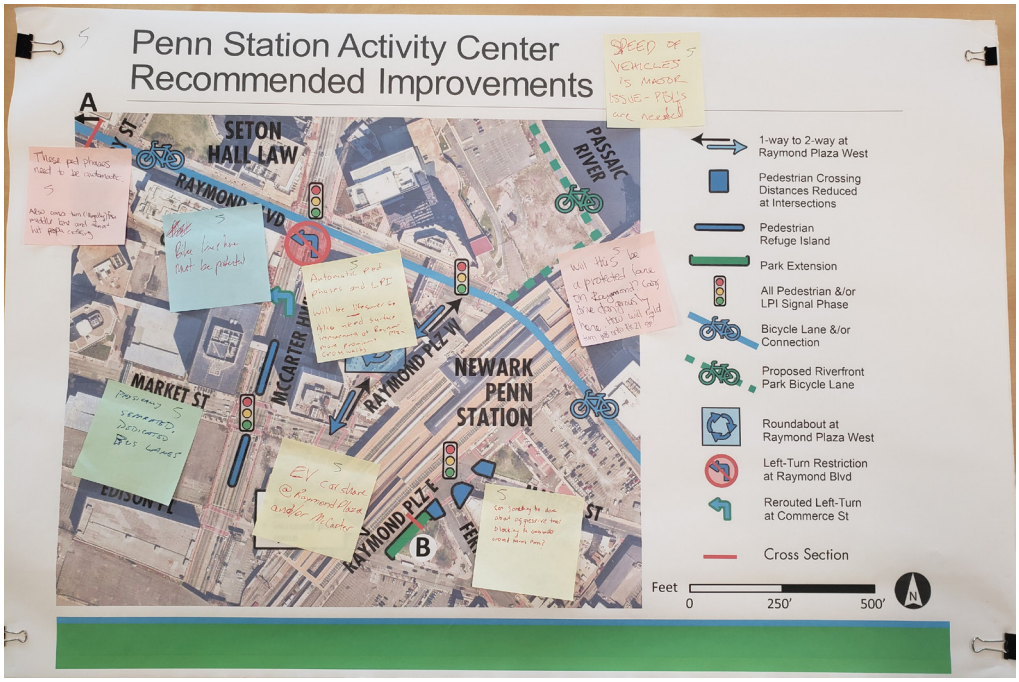

Figure 3: Public Outreach Materials and Comments

3
EXISTING CONDITIONS

3.1 Pedestrian

The pedestrian experience within the study area varies by activity center and neighborhood. Overall, the robust pedestrian network in the study area provides pedestrian infrastructure, including marked crosswalks, sidewalks, signals, pedestrian refuge islands, street furniture, and lighting. However, the types and conditions of these amenities vary across the activity centers.

Sidewalks
Sidewalks in general are in good condition and are an appropriate width to accommodate pedestrian traffic. The sidewalks in the activity centers usually accommodate street furniture, signage, bus stops and/or shelters, and street lighting.

Crosswalks
Crosswalks are generally provided within the study area and are in good condition overall. Many crosswalks are of the zebra or ladder striped variety, which are appropriate for these crossings. In the Newark Penn Station, Prudential Center, Military Park, and University Area activity centers, there are several high visibility crosswalks using decorative, brick-like paving materials. These types of crosswalks are especially prominent along sections of Broad Street, which have very high pedestrian volumes. These high visibility crosswalks are effective ways to communicate to drivers to expect pedestrian activity. Some crosswalks also have pedestrian crossing warning signs as well as in-street pedestrian crossing signs. An example of a decorative, high visibility crosswalk is shown in **Figure 4**.

However, there are some crosswalks within the study area that have faded pavement markings or are lacking altogether. In the Lincoln Park activity center, the crosswalk at the intersection of Lincoln Park and Broad Street (southside of the park) is faded and no longer visible. Crosswalks in the vicinity of the park at Tichenor Street, Pennington Street, and Camp Street are also faded or in poor condition. Currently, a New Jersey Department of Transportation (NJDOT) Local Aid sponsored project is improving the sidewalks and crosswalks in the area around Tichenor Street and Broad Street. The crosswalk at the intersection of Lincoln Park and Broad Street on the north side of Lincoln Park is marked with a ladder style crosswalk and is in good condition, however, the crossing distance is extremely long and difficult to navigate safely.

Figure 4: High Visibility Crosswalk Near Newark Penn Station

Pedestrian Refuge Islands

Pedestrian refuge islands are provided in several of the activity centers to aid pedestrians of all ages and abilities the opportunity to cross the street safely. Pedestrian refuge islands are implemented on streets with several lanes of traffic that create lengthy crossing distances. Refuge islands allow pedestrians to safely wait mid-crossing if they are unable to cross the entire width of the intersection during a traffic cycle. Most of the refuge islands found within the study area include bollards and curbs while some also have decorative plantings and street trees. Pedestrian refuge islands can be found in the Prudential Center, Newark Penn Station, University Area, and Military Park activity centers. There are, however, additional crossings that would benefit from the implementation of pedestrian refuge islands along sections of McCarter Highway, Raymond Boulevard, and Broad Street, all of which are detailed in the Findings and Recommendations section of this report.

Signals

Pedestrian signals are widespread and located at signalized intersections with crosswalks. Many of these pedestrian signals include audible tones or messages to assist pedestrians crossing the road. These pedestrian signals also have push buttons for pedestrians to indicate that they would like to traverse the street. The pedestrian pushbuttons were observed to be functional but infrequently used by pedestrians. Anecdotal information received during the public meetings indicated that the public does not believe that the pushbuttons are effective or should be used in an urban setting like Newark.

3.2 Transit

Two major transportation hubs, Newark Penn Station and Newark Broad Street Station, fall within the study area.

Newark Penn Station is the main transportation hub with a variety of different transportation options connecting the city to the local region and beyond. Amtrak, NJ TRANSIT rail lines, Port Authority Trans-Hudson (PATH), Newark Light Rail, and local and regional bus operators, all serve the station.

Broad Street Station is served by NJ TRANSIT rail lines, Newark Light Rail, and multiple bus routes connecting it to Newark Penn Station and regional destinations.

3.2.1 Commuter Rail

NJ TRANSIT has commuter rail lines serving both Newark Penn Station and Broad Street Station. Newark Penn Station is served by the Northeast Corridor Line, the North Jersey Coast Line, and the Raritan Valley Line serving Newark Penn Station. The Broad Street Station is served by the Gladstone Branch, Montclair-Boonton Line, and the Morristown Line. Average weekday NJ TRANSIT rail ridership at Newark Penn Station is 28,000, and 3,000 at Broad Street Station.

3.2.2 PATH

The Port Authority of New York and New Jersey operates PATH, which is a rapid transit rail system serving Newark, Jersey City, Harrison, Hoboken, and Manhattan. PATH operates four servces with one line operating from Newark Penn Station to the World Trade Center station in Lower Manhattan. According to the Port Authority of New York and New Jersey, ore than 30,000 passengers board PATH at Newark Penn Station during the average weekday.

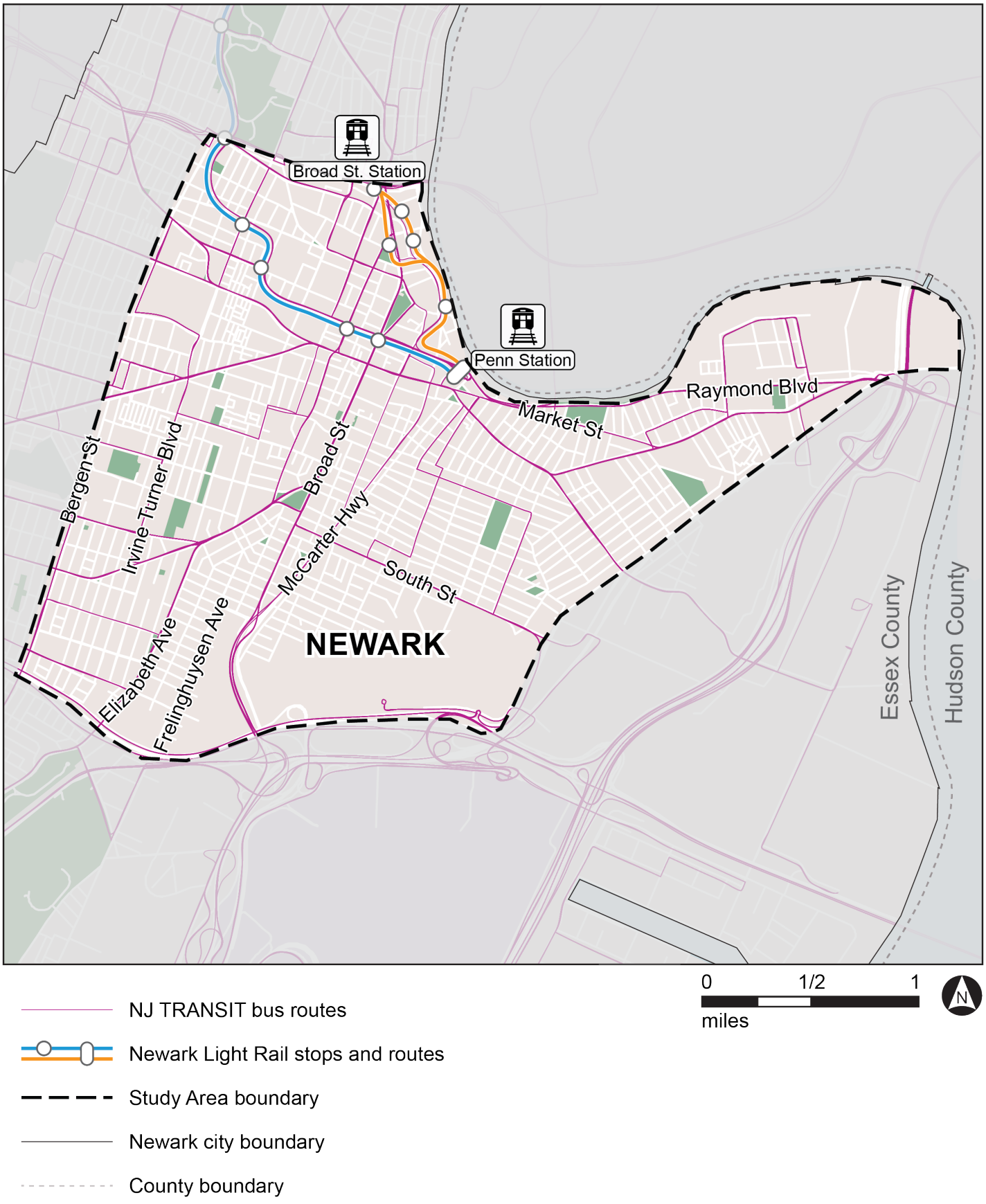

Figure 5: NJ TRANSIT Bus & Light Rail Routes

3.2.3 Light Rail

The Newark Light Rail system operates in two main branches: the Newark Light Rail and the Broad Street Extension (see **Figure 5** on page 13). The Newark Light Rail branch runs to Grove Street Station in Bloomfield, New Jersey. However, the stations within the study area are between Newark Penn Station and the Orange Street Light Rail station. The Broad Street Extension runs from Newark Penn Station to Broad Street Station, and serves stations located along the Passaic River, such as NJPAC and the Washington Park stations. All of the Broad Street Extension line stations fall within the study area. Newark Light Rail stations are listed in **Table 1**.

Newark Light Rail Stations	
Newark Light Rail	Broad Street Extension
Newark Penn Station	Newark Penn Station
Military Park	NJPAC/Center Street
Washington Street	Atlantic Street
Warren Street	Washington Park
Norfolk Street	Riverfront Stadium
Orange Street	Broad Street Station
Park Avenue	
Bloomfield Avenue	
Davenport Avenue	
Branch Brook Park	
Silver Lake	
Grove Street	

Table 1: Newark Light Rail Stations

Ridership

Light rail service runs on a frequent schedule during the weekday peak hours and runs at a modified schedule during the weekends. According to NJ TRANSIT, the average weekday passenger boarding for the whole light rail system is approximately 19,500 in the 2017 Fiscal Year. Among the busiest stations within the study area are Newark Penn Station, which has about 6,300 weekday passengers and Military Park, which has about 1,700 weekday passengers. **Table 2** shows the 2017 average weekday passenger boarding for the stations within the study area.

According to NJ TRANSIT, the weekday passenger ridership on the Newark Light Rail system has decreased about 5 percent from 2007 to 2017. **Figure 6** shows the fluctuating trend of ridership within the 10-year period. The highest weekday average ridership data recorded was 21,650 in 2009. The lowest recorded average weekday ridership data was 18,400 in 2013.

3.2.4 Bus

The bus service, primarily provided by NJ TRANSIT, serves as a major transportation link for the City of Newark. There are also a number of private bus operators and corporate and educational facility shuttle services. Like the rail systems, several bus routes originate or terminate at Newark Penn Station and serve Newark and other neighboring municipalities. NJ TRANSIT operates 32 bus routes that provide service to the study area. NJ TRANSIT also operates two routes, Go Bus 25 and Go Bus 28, that provide limited stop Bus Rapid Transit-style service for more convenient connections between Irvington Bus Terminal and Newark Penn Station, and Bloomfield and downtown Newark, respectively.

Newark Light Rail Station	2017 Average Weekday Passenger Boarding
Newark Penn	6,241
Military Park	1,647
Washington Street	1,207
Warren Street	1,065
Orange Street	975
Norfolk Street	720
Broad Street	454
Washington Park	263
NJPAC/Center Street	60
Atlantic Street	12
Riverfront Stadium	2

Table 2: 2017 Newark Light Rail Average Weekday Ridership

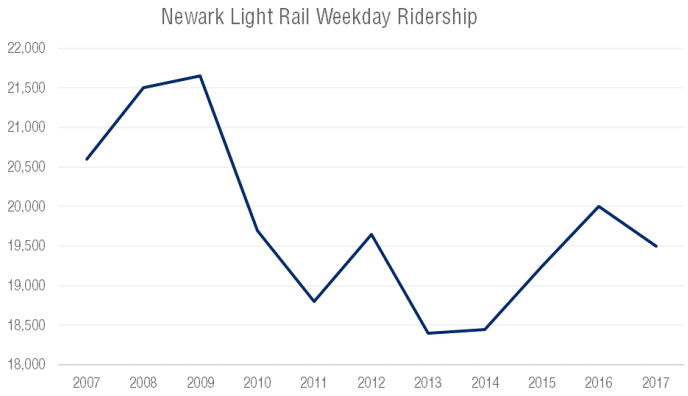

Figure 6: Newark Light Rail Ridership

Bus priority lanes are in place on Broad Street during the peak weekday periods from 6:30 AM – 9:00 AM and from 4:00 PM – 6:00 PM and there are exclusive bus lanes adjacent to Newark Penn Station on Raymond Boulevard east of McCarter Highway. The daily bus ridership of NJ TRANSIT routes serving Newark is approximately 120,000. This data is based on a typical weekday passenger trip in November 2017. **Table 3** (on page 16) lists these bus routes with the daily average ridership numbers.

Go Bus in Newark

Route	Starting Point/Origin	End Point/Destination	Daily Ridership
1	Irvington- Ivy Hill Loop	Jersey City- Exchange Place/Journal Sq.- Newark	12,797
5	East Orange- 14th and Main Streets	Newark Penn Station	925
11	Irvington- Valley Fair or Bus Terminal	Newark- City Hall or Penn Station	2,358
13	Wayne- Willowbrook Mall	Clifton or Nutley	10,240
21	West Orange or Orange	Newark Penn Station	8,223
25	Maplewood- Valley Street/Millburn Avenue	Newark- Port Newark	10,477
27	Irvington Bus Terminal	Newark- Lake Street Loop, Branch Brook Park LR Station or Clifton- Delwanna Rail Station	9,122
28	Montclair State University Station/Willowbrook Mall	Newark- City Hall or Penn Station	1,716
29	Newark- City Hall or Penn Station	West Caldwell- Essex Mall or Parsippany Routes 202 & 46	3,136
30	North Arlington Loop	Newark- Lincoln Park or Penn Station	1,994
34	Montclair- Bloomfield	Newark- South Street or Penn Station	6,941
39	Irvington- Chancellor Avenue	Newark Penn Station or Washington Park	5,649
40	North Arlington Loop	Elizabeth- Jersey Gardens Mall/Port Newark	1,970
41	Orange Rail Station	Newark- Lincoln Park	2,606
59	Dunellen Rail Station or Cranford- Union County College	Newark- Washington Park	4,600
62	Perth Amboy Rail Station or Elizabeth	Newark Penn Station	5,751
65	Bridgewater- Bridgewater Commons	Newark- Washington Park	454
66	Mountainside- Dunellen	Newark- Washington Park	1,622
67	Toms River- Highland Parkway	Newark Penn Station	825
70	Florham Park	Newark Penn Station	5,308
71	West Caldwell- Essex Mall	Newark Penn Station	2,133
72	Paterson- Broadway Bus Terminal	Newark Penn Station	3,133
73	East Hanover- Florham Park or Livingston Mall	Newark Penn Station	3,087
76	Hackensack Bus Terminal	Newark Penn Station	4,149
78	Newark Penn Station	Seacaucus- Harmon Meadow	638
79	Parsippany- Troy Hills	Newark Penn Station	379
99	Hillside- Ramsey Avenue	Newark- Bloomfield Avenue	4,137
108	Newark- Colonnade Park	New York- Port Authority Bus Terminal	1,197
319	Atlantic City Bus Terminal	New York- Port Authority Bus Terminal	1,362
361	Irvington- Ivy Hill Loop	Newark Penn Station	346
375	Maplewood Loop	Newark Penn Station	208
378	Newark Penn Station	Seacaucus- Harmon Meadow	645

Table 3: 2017 NJ TRANSIT Bus Routes Average Daily Ridership

Private Carriers

Privately operated bus service runs from Newark Penn Station to bus terminals in the region. Operators include Coach USA, BOLT bus, and Greyhound. Educational institutions like Rutgers University Newark Campus and Essex County College, provides bus service for students, faculty, and staff in and around the University Heights and Newark downtown area. Additionally, a number of corporations, such as Prudential and Audible, operate shuttles to and from Newark Penn Station for their employees.

3.3 Bicycle

3.3.1 Bicycle Lanes

There are only a few dedicated bicycle facilities within the study area (see **Figure 7** on page 18). As those facilities do not provide a connected or continuous network, bicycling can be challenge. There are plans to provide additional bicycling facilities in several neighborhoods within the study area with a goal of improved mobility, connectivity and accessibility. For instance, the Bike Ironbound plan focuses on enhancing facilities and connections for the Ironbound neighborhood. Proposed bicycle facilities range from protected bicycle lanes that separate bicycles from vehicular traffic by a buffer to shared bicycle routes where bicyclists are traveling in the same lane as motorists. The study area has a few bike lanes traveling in the north-south direction but there are no established routes traveling in the east-west direction.

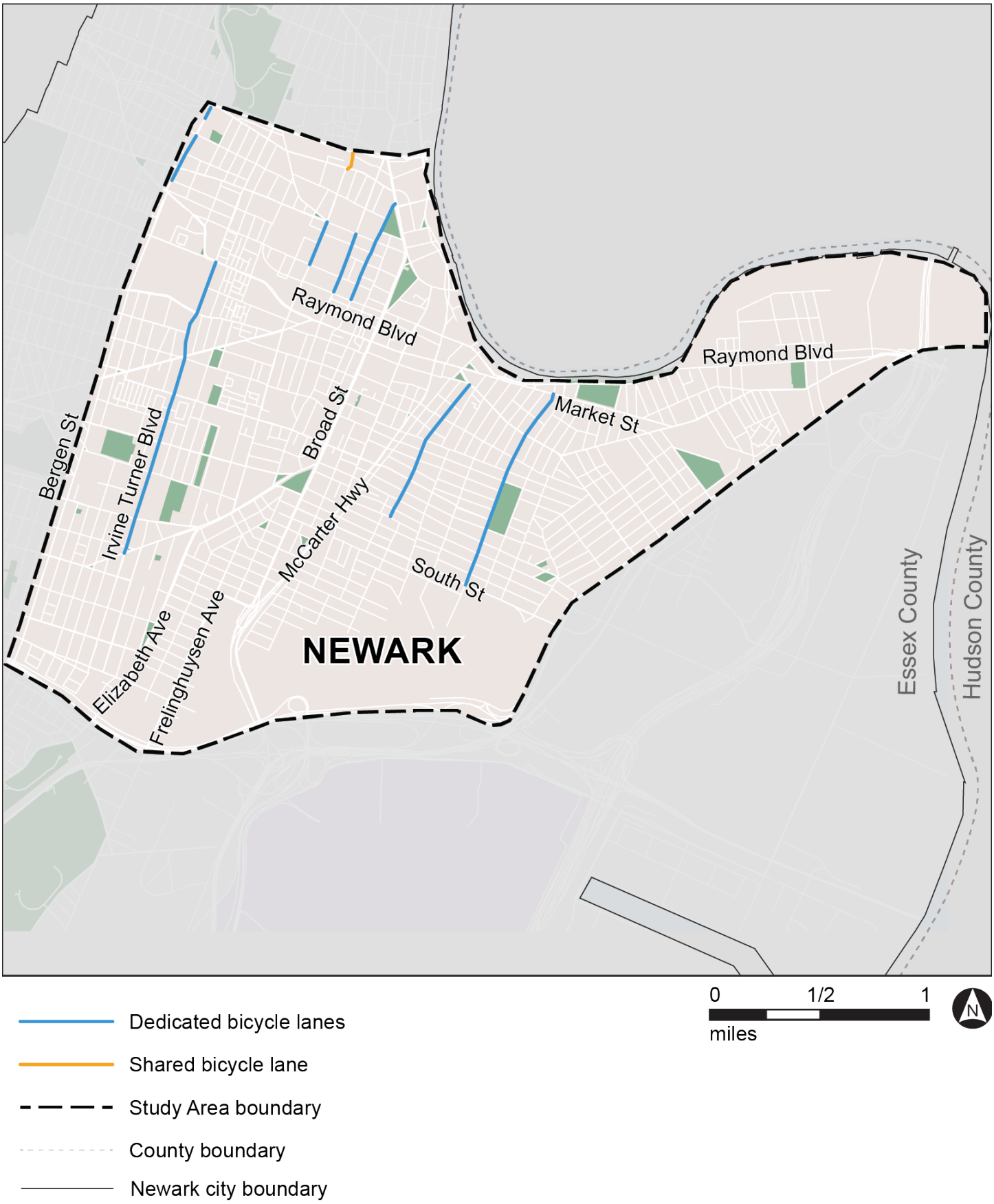

Figure 7: Existing Bicycle Facilities within the Study Area

The existing bicycle facilities are as follows:

- University Avenue: One-way southbound separated bicycle lane with a narrow-striped buffer that runs between Central Avenue and Raymond Boulevard.
- Washington Street: One-way northbound separated bicycle lane with a narrow-striped buffer that runs between Raymond Boulevard and Broad Street.
- Dr. Martin Luther King Jr Boulevard: One-way northbound and one-way southbound separated bicycle lanes between Central Avenue and Warren Street.
- Norfolk Street / Irvine Turner Boulevard: Two-way shared use lanes (sharrow) between Market Street and Orange Street. One-way northbound and one-way southbound separated bicycle lanes with narrow striped buffers that runs between Clinton Avenue and Market Street.
- Adams Street: One-way northbound separated bicycle lane with a striped buffer between Edison Place/ Ferry Street and Johnson Street.
- McWhorter Street: One-way southbound separated bicycle lane with a striped buffer between Market Street and South Street.

3.3.2 Bicycle Parking

There are limited bicycle racks and storage spaces within the study area. Within the University Area and adjacent to Newark Penn Station there are a few bicycle racks that are highly utilized. In the Newark Penn Station activity center, due to the lack of adequate bicycle parking, bicycle commuters use street signs, light posts, and street trees to secure their bicycles. It was noted that additional bicycle parking near Newark Penn Station may be difficult due to safety and security concerns.

3.4 Vehicular

The study area is bound by three critical roadways, Interstate 280, Interstate 78, and Route 1 & 9, which provide regional and local access for the state of New Jersey and for Newark residents. Route 21, which is also known as McCarter Highway in Newark, also provides regional access to and from Newark. The majority of the study area is comprised of local and county roads that facilitate the movement of people and goods in and around the various neighborhoods of the city. **Figure 8** (on page 20) shows the vehicular street network within the study area.

Interstates & State Roads

Interstates and regional roads typically have multiple lanes and provide regional access to and from Newark. Interstate 280 and Interstate 78 are limited access roadways with grade separated ramp access and speed limits of 50 MPH or greater.

Interstate 280 provides east-west access through the northern part of the study area linking Newark to Morris County. Interstate 280 also connects to the NJ Turnpike to the east of Newark and it terminates at Interstate 80 in the west.

Interstate 78 is the southern boundary of the study area. It provides east-west access for Newark and the surrounding areas. Interstate 78 serves as a connector from Pennsylvania to the Holland Tunnel.

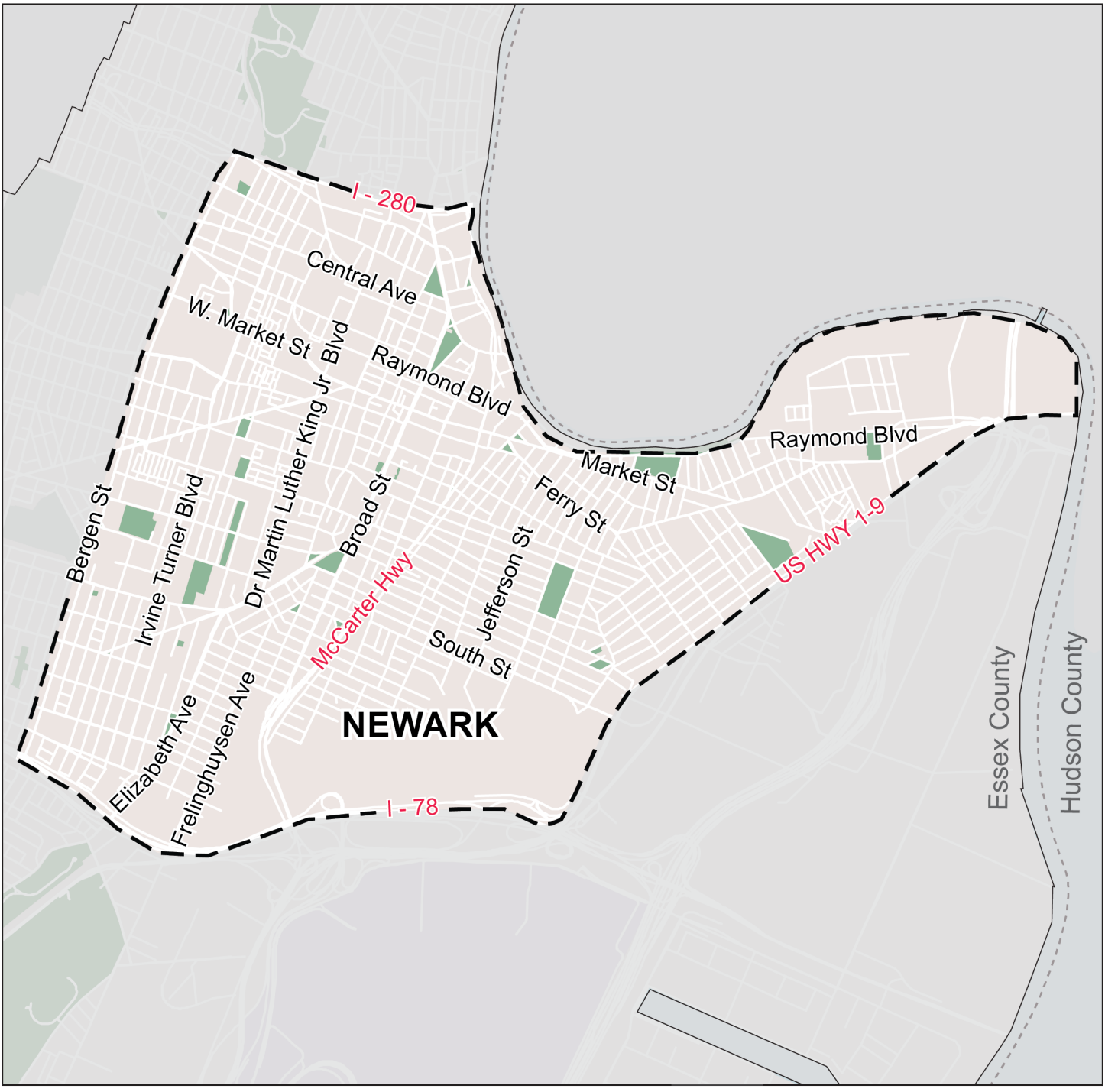

Figure 8: Vehicular Street Network

Route 1 & 9 runs north-south in Newark and serves as the eastern boundary of the study area. It provides connections from Newark to Hudson County in the east and to Union County, Middlesex County and further south.

McCarter Highway (NJ Route 21) is a heavily trafficked road running north-south bisecting the study area. It connects Newark with Passaic to the north and it terminates at Interstate 78 to the south.

Local Roads

Local roads move people and goods between the varying neighborhoods in Newark and nearby municipalities. These roads are typically controlled by traffic signals or by traffic signs and oftentimes offer on-street parking and access to bordering properties.

3.4.1 Crash Data

Data on crashes from 2015 - 2017 was obtained from NJDOT and was analyzed to determine crash hot spots of more than ten crashes within the study area. See **Appendix B** for detailed crash information and for crash maps of each activity center.

University Area Activity Center

The majority of vehicle crashes in this activity area occurred at intersections. Several crash hot spots are found along Dr. Martin Luther King Jr. Boulevard between Raymond Boulevard and Central Avenue. Hot spots where more than ten crashes occurred were at the intersections of Washington Street and Raymond Boulevard, and Dr. Martin Luther King Jr. Boulevard and Central Avenue. Few pedestrian crashes occurred in this activity center with reports of minor injuries. Pedestrian crashes occurred at the intersection of Central Avenue and Summit Street, the intersection of Central Avenue and Dr. Martin Luther King Jr. Boulevard, and at the intersection of University Avenue and Warren Street.

Newark Penn Station Activity Center

Vehicle crashes in this activity area occurred at both intersections and roadway segments between intersections. Roadway segments along Raymond Boulevard between Newark Penn Station and McCarter Highway, and along McCarter Highway between Market Streets and Cherry Street experienced a high amount of crashes compared to other surrounding roads. Hot spots where more than ten crashes occurred were at the intersections of McCarter Highway and Edison Place, Raymond Boulevard and Mulberry Street, and Market Street east of Newark Penn Station. High numbers of pedestrian crashes occurred at the intersection of McCarter Highway and Raymond Boulevard and the intersection of McCarter Highway and Market Street with seven and ten crashes, respectively. There were two pedestrian fatalities in this activity center, one at the intersection of McCarter Highway and Market Street and one at the intersection of Raymond Boulevard and Mulberry Street.

Military Park Activity Center

The majority of vehicle crashes in this activity area occurred at intersections. Broad Street, which borders the west side of Military Park, contains several crash hot spots between Clinton Street and Park Place. Several crash hot spots are found along Raymond Boulevard between Halsey Street and Mulberry Street. Hot spots where more than ten crashes occurred were at the intersections Broad Street and Raymond Boulevard, and Mulberry Street and Raymond Boulevard. A cluster of crash hot spots occurred at the southern tip of Military Park on Broad Street,

Raymond Boulevard and Park Place. Few pedestrian crashes occurred in this activity center with reports of minor injuries. Pedestrian crashes occurred at the intersection of Broad Street and Fulton Street; the intersection of Central Avenue, Broad Street, and Park Place; the intersection of Park Place and Rector Street; the intersection of Park Place and Park Place; and the intersection of Broad Street and New Street.

Lincoln Park Activity Center
The majority of vehicle crashes in this activity area occurred at intersections. Broad Street, which borders the east side of Lincoln Park, contains several crash hot spots between Thomas Street and Chestnut Street. Hot spots where more than ten crashes occurred were at the intersections of Broad Street and South Street, and Broad Street and Chestnut Street. High numbers of pedestrian crashes occurred at the intersection of Broad Street and Pennington Street, the intersection of Broad Street and Camp Street, and at the intersection of Broad Street and Chestnut Street. No pedestrian fatalities occurred in this activity center.

Prudential Center Activity Center
Vehicle crashes in this activity area occurred at both intersections and roadway segments between intersections. The roadway segment on Mulberry Street between Lafayette Street and Edison Place experienced a cluster of crashes near the entrances of the Prudential Center. Hot spots where more than ten crashes occurred were at the intersections of Market Street and Broad Street, and Broad Street and Edison Place. High numbers of pedestrian crashes occurred at the intersection of Market Street and Broad Street and at the intersection of Market Street and Mulberry Street. There was one pedestrian fatality at the intersection of Mulberry Street and Lafayette Street.

3.5 Parking

On- and off-street parking facilities are abundant in the study area and change with the characteristics of the neighborhoods in which they are found. An inventory of the off-street parking garages and parking lots was conducted and utilized as part of the modeling and traffic analysis portion of this study. Approximately 100 lots and garages were identified through the inventory that was conducted. Majority of these off-street parking facilities are found in the northern portion of the study area in the Military Park, Prudential Center, and Newark Penn Station activity centers as these activity centers attract high vehicle volumes. The off-street parking facilities near event spaces such as the Prudential Center and NJPAC often reach capacity prior to events. On-street parking spaces are more prevalent in the University Area and Lincoln Park activity centers as well as in the residential Ironbound neighborhood. These on-street parking spaces are usually metered spaces and are generally in effect Mondays through Saturdays. There are on-street parking spaces within the study area that are free and not metered. The detailed inventory of parking facilities can be found in **Appendix B**. The detailed inventory provides information regarding each garage/lot entry street address, number of parking spaces, and parking operator where available. For each location, the northern, southern, eastern, and western boundary streets were added to the inventory table.

3.6 Freight

The City of Newark is a major goods movement center with Port Newark-Elizabeth Marine Terminal, located adjacent to the study area. The City of Newark sees a large amount of truck traffic due to of a variety of factors including its location adjacent to the Newark Liberty International Airport, Port Newark/Elizabeth, the major highways that traverse the City, as well as the large number of warehouses and distribution centers in the area. Freight is moved by rail and truck within the region, with rail serving primarily east-west movements and truck serving north-south movements. There are several truck routes that enter the study area which are designated by municipal ordinance or state regulations. These truck routes include Interstate 78, Interstate 280, Route 1 & 9, McCarter Highway, Raymond Boulevard, South Street, and Frelinghuysen Avenue.

Discussions with the SAC and Stakeholder group focused on local truck traffic and deliveries that impact downtown circulation. The City of Newark discussed that off-peak delivery hours were being implemented in certain areas so that delivery trucks would not cause additional congestion.

4
MODELING & TRAFFIC ANALYSIS

4.1 Data Collection

Data collected throughout this study consisted of traffic data, crash data, transit data, parking data, previous studies, and field observations. This includes data drawn from traffic studies for future major developments that are either approved or under construction, not accounted for in the regional transportation model. Traffic data includes vehicular, pedestrian, and bicyclist counts. Transit data obtained from NJ TRANSIT includes ridership figures for NJ TRANSIT buses, light rail, and commuter rail within the study area. Crash data includes statistics and summary reports regarding vehicular, pedestrian, and bicycle crashes obtained from the NJDOT Safety Voyager website.

Parking data for the Central Business District includes information on supply and demand for on-street and off-street parking spaces obtained from public, Newark Parking Authority, and private parking lot operators. Traffic studies generated for future major developments were obtained from the City of Newark. These traffic studies included data on traffic volumes projected to impact the transportation network within the study area in the future. For detailed information on data collection, please see **Appendix B**.

The traffic data collection effort consisted of a combination of manual and automated traffic counts conducted along major intersections and corridors within the study area. Automatic Traffic Recorders (ATR) were placed strategically on the primary routes in, out, and within the Newark downtown area to collect 24-hour volumes from Sunday, November 12, 2017 to Saturday, November 18, 2017 and from Monday, November 13, 2017 to Sunday, November 19, 2017. The timing of these counts was chosen to capture baseline traffic conditions and potential increases in traffic due to major events at venues such as the Prudential Center or NJPAC.

Manual intersection turning movement counts (TMCs) were collected at major intersections within the study area on Wednesday, November 15, 2017 and on Thursday, November 16, 2017 for the AM peak period from 6:30 AM to 9:00 AM and the PM peak period from 3:30 PM to 6:30 PM. The vehicle TMCs were categorized as cars, trucks, or buses. Additionally, pedestrian and bicycle volumes were counted and recorded as pedestrians using each crosswalk and "bicycles on crosswalk," which is a count of how many mounted bicyclists crossed the intersection using the crosswalk instead of occupying the entire vehicle lane. Such a count is a good measure of the potential demand for exclusive bicycle facilities. Additional turning movement counts were collected on Wednesday, December 5, 2018 for the PM peak period and Thursday, December 6, 2018 for the AM peak period for the intersection of Raymond Boulevard and Washington Street. Turning movement counts were also collected on Tuesday, December 18, 2018 for the PM peak period and Wednesday, December 19, 2018 for the AM peak period for the intersection of Broad Street and Lincoln Park at the north side of the park. Turning movement counts were collected on Wednesday, January 30, 2019 for the AM and PM peak periods at the intersection of Lincoln Park and Broad Street at the south side of the park.

Traffic signal timing plan and phasing data were not available from the City of Newark, therefore, signal timings were manually collected by field technicians for the existing operations. The signal timing and phasing data was collected during the AM peak period from 6:00 AM – 10:00 AM and the PM peak period from 3:00 PM to 7:00 PM. Video recordings of each of the intersections were made for both the AM peak period and the PM peak period. These observations were conducted on Tuesday, May 22, 2018; Wednesday, May 23, 2018; Thursday, May 24, 2018; Tuesday, May 29, 2018; Tuesday, May 5, 2018; and Thursday, June 14, 2018.

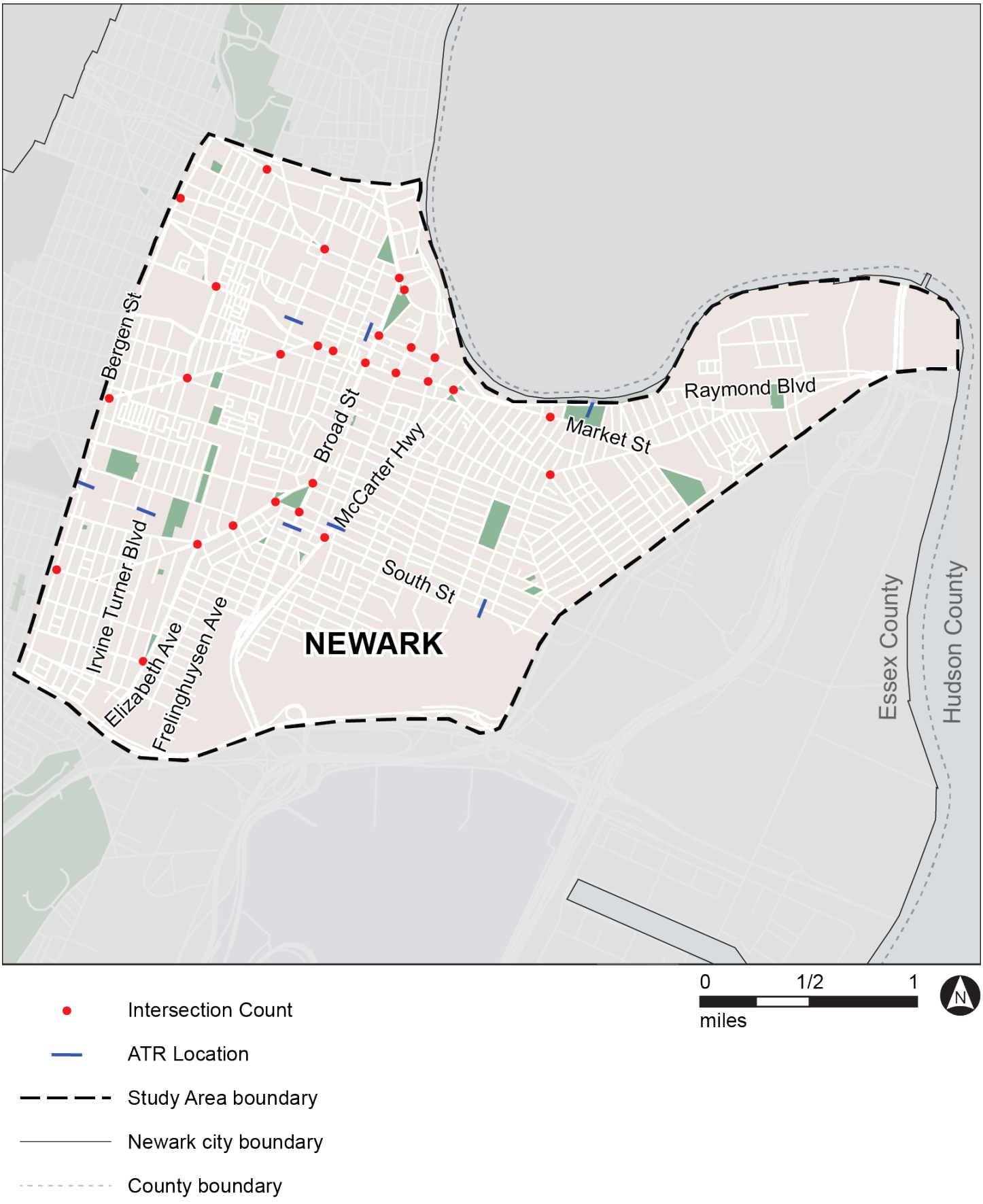

Figure 9: Traffic Count Program

Figure 9 (on page 26) shows the map of the traffic count program that was conducted as part of this study.

The data collection effort was supplemented with ATR data from the NJ Department of Transportation's interactive traffic count portal and the Newark Master Plan Mobility Element.

The collected and compiled data were critical inputs to the Cube Voyager model to determine future traffic volume projections and for the capacity and Level of Service (LOS) Synchro analysis of study intersections for the existing and future road network conditions.

4.2 Modeling Methodology

A circulation analysis was performed for the study area to model and analyze the flow of vehicles, pedestrians, and bicycles throughout key activity centers for both the AM and PM peak hours in several scenarios. The analysis used the Cube Voyager model, the regional transportation planning model used by NJTPA, to provide travel demand forecasts for future traffic conditions in the horizon year of 2025. The model projects origin-destination based travel demand onto the applicable roadway network for each future scenario (No-Build and Build). The model accounted for regional growth through universally applied rates and the inclusion of specific land development projects expected to be completed by the horizon year.

The outputs from the Cube Voyager model were then entered into the Synchro traffic analysis software, which was used to calculate the performance of key intersections and roadway segments within the study area. In accordance with the Highway Capacity Manual methodologies, the volume projections for each lane configuration were used to calculate the volume-to-capacity (V/C) ratio and the Level of Service (LOS) for the lane configurations at each intersection. Since these metrics evaluate vehicle, but not pedestrian mobility, consideration was also given to the long-term multimodal objectives from the Newark Master Plan Mobility Element when developing recommendations. During the development of recommendations, it was understood that tradeoffs may be needed to balance vehicle operations and overall multimodal safety.

The first scenario consisted of the existing (2017) conditions on a typical weekday in both the AM and PM peak hours. The collected data provided the necessary inputs to model the key intersections throughout the Newark downtown area. Additionally, the PM peak hour was modeled and analyzed separately for the typical traffic volumes that occur in the PM peak hour prior to a major event at the Prudential Center or at NJPAC, which is referred to as the PM Pre-Event peak period. Note that the AM peak hour on major event days was not modeled separately because typical events at both venues occur in the evening.

The next two scenarios consisted of future conditions in the horizon year of 2025, on a typical weekday in both the AM and PM peak hours. The first of these scenarios, (No-Build Option) reflected future traffic conditions in which no NDCIS recommendations are implemented. The second scenario (Build Option) reflected future conditions in which NDCIS recommendations are implemented. The results of these three scenarios were used as a critical tool in determining which potential improvements to Newark's Downtown transportation network became recommendations of this study.

Additional technical information regarding the study's transportation modeling process can be found in **Appendix C,** including a complete list of the specific downtown streetscape improvement concepts analyzed in the Build scenario. The summary results for each of the activity centers can be found in the next section.

4.3 Adaptive Signal Control

The City of Newark is in the process of implementing Adaptive Signal Control (ASC) along sections of McCarter Highway from Miller Street to 3rd Avenue and Broad Street from Emmet Street to Clay Street.

Traditionally, traffic signals in urban centers are pre-timed at closely spaced intersections where traffic volumes and patterns are consistent on a daily or day-of-week basis. In New Jersey, intersections commonly feature semi-actuated traffic signals, which utilize vehicle detection for the minor roadway movements to adjust green time.

Adaptive signal control is an advanced system designed to detect, verify, and respond to changes in traffic in real-time. ASC technologies adjust the cycle lengths of signalized intersections to accommodate current traffic patterns to enable improved traffic flow and ease congestion *(source: Federal Highway Administration (FHWA)*). ASC allows traffic signals to "communicate" with each other along a corridor without human intervention. The green time of the primary roadway is constantly adjusted by using smart technology based on real-time traffic conditions.

How does ASC work?

1. Traffic sensors receive and process traffic data
2. Traffic data is evaluated and ASC develops signal timing improvements accordingly
3. ASC implements updated signal timings along corridor
4. Repeat process

In addition to mitigating traffic congestion, improving travel times, and continuously adapting to unexpected changes in traffic along corridors, ASC has numerous benefits. In terms of safety benefits, studies indicate that crashes could be reduced by up to 15 percent through improved progression and limiting stop-and-go traffic which cause crashes. ASC can also provide roadway operators with the "big data" needed to measure performance corridor-wide. From an environmental and air quality perspective, improved roadway performance reduces fuel consumption and idling.

More information about the benefits of ASC can be found on the FHWA website.

4.4 Modeling Results

The existing operating LOS of the intersections within the five activity centers was determined using Synchro. Synchro utilizes the methodology contained in the Highway Capacity Manual (HCM) to model operation of intersections based on calculations of the anticipated average delay a vehicle experiences or would experience at a given intersection. Information such as lane approach geometry, lane width, traffic signal timing, traffic volume, truck percentages, and turning restrictions are entered into the program to reflect existing and proposed traffic conditions. Resulting average delays are categorized by the HCM into LOS. **Table 4** shows LOS criteria and a general description of each LOS.

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤ 10	Free Flow
B	> 10- 20	Stable Flow (slight delays)
C	> 20- 35	Stable Flow (acceptable delays)
D	> 35- 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding
E	> 35- 80	Unstable Flow (intolerable delays)
F	> 80	Forced Flow (congested and queues fail to clear)

Table 4: Level of Service Criteria for Signalized Intersections

Source: Highway Capacity Manual 2010

Traffic analysis was conducted for 16 signalized intersections and three road segments within the study's five activity centers. To simulate the effects of adaptive signal control, the cycle lengths and the phase splits for the signals was optimized for each intersection in the 2025 Build scenario. The V/C ratios for street segments were calculated for streets in two of the activity centers to complement the LOS analysis. The relative differences between the V/C ratios for each of the scenarios was taken into consideration as was whether the segment was exceeding capacity.

University Area Activity Center

There was one intersection in the University Area activity center where LOS traffic analysis was conducted for the 2017 Existing AM, PM and PM Pre-Event peak periods, 2025 No-Build Scenario AM and PM peak periods, and 2025 Build Scenario AM and PM peak periods. The results of this analysis is provided in **Table 5**, parsed by scenario, intersection, and peak period.
The intersection includes:

- Central Avenue and Dr. Martin Luther King Jr. Boulevard

University Area	2017 Existing LOS (sec of delay)			2025 No-Build LOS (sec of delay)		2025 Build LOS (sec of delay)	
Intersection	AM	PM	PM Pre-Event	AM	PM	AM	PM
Central Avenue and Dr. Martin Luther King Jr. Boulevard	F (85.5)	F (87.4)	F (87.4)	F (111.3)	F (104.1)	F (142.5)	F (179.0)

Table 5: LOS for University Area Activity Center

Under existing conditions (2017) during the AM, PM, and PM Pre-Event peak periods, the intersection of Central Avenue and Dr. Martin Luther King Jr. Boulevard operates at LOS F, indicating demand exceeds capacity causing a breakdown of traffic flow. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS F for both peak periods, but the delay will increase by nearly 26 seconds during the AM peak period and nearly 16 seconds during the PM peak period. For the 2025 Build scenario, the intersection operation will also remain unchanged at LOS F for both peak periods, but the delay will increase by 57 seconds during the AM peak period and nearly 91 seconds during the PM peak period.

There are three street segments in the University Area activity center where V/C ratio analysis was conducted. The results of this analysis is provided in **Table 6** parsed by scenario, street segment, and peak period.
The street segments include:

- Raymond Boulevard between Lock Street and University Avenue (eastbound)
- Raymond Boulevard between Lock Street and University Avenue (westbound)
- University Avenue between Lackawanna Avenue and Central Avenue

University Area	2017 Existing		2025 No-Build		2025 Build	
Street Segment	AM	PM	AM	PM	AM	PM
Raymond Boulevard between Lock Street and University Avenue (eastbound)	0.15	0.15	0.16	0.14	0.26	0.24
Raymond Boulevard between Lock Street and University Avenue (westbound)	0.14	0.13	0.14	0.14	0.09	0.09
Raymond Boulevard between Lackawanna Avenue and Central Avenue (southbound)	0.25	0.36	0.26	0.37	0.56	0.8

Table 6: V/C Ratios for University Area Activity Center

Using 2017 Existing V/C ratios and comparing them to the 2025 No-Build scenarios for Raymond Boulevard traveling eastbound, the analysis indicates that the ratios for the street segment increase slightly for the AM peak period and decrease slightly for the PM peak period. Comparing the 2017 Existing V/C ratio to the 2025 Build scenario, the AM and PM peak periods increase slightly but do not exceed the capacity.

Using 2017 Existing V/C ratios and comparing them to the 2025 No-Build scenarios for Raymond Boulevard traveling westbound, the ratio stays the same for the AM peak period and increases slightly for the PM peak period. Comparing the 2017 Existing V/C ratio to the 2025 Build scenario, the AM and PM peak periods decrease slightly.
Using 2017 Existing V/C ratios and comparing them to the 2025 No-Build scenarios for University Avenue traveling southbound, the ratio increases slightly for the AM and PM peak periods. Comparing the 2017 Existing V/C ratio to the 2025 Build scenario, the AM and PM peak periods both increase considerably but do not exceed the capacity.

Newark Penn Station Activity Center

There are four intersections in the Newark Penn Station activity center where LOS traffic analysis was conducted for the 2017 Existing AM, PM and PM Pre-Event peak periods, 2025 No-Build Scenario AM and PM peak periods, and 2025 Build Scenario AM and PM peak periods. The results of this analysis is provided in **Table 7**, parsed by scenario, intersection, and peak period. The intersections include:

- McCarter Highway and Market Street
- McCarter Highway and Raymond Boulevard
- Market Street/Ferry Street and Raymond Boulevard
- Raymond Boulevard and Mulberry Street

Newark Penn Station	2017 Existing LOS (sec of delay)			2025 No-Build LOS (sec of delay)		2025 Build LOS (sec of delay)	
Intersection	AM	PM	PM Pre-Event	AM	PM	AM	PM
McCarter Highway and Market Street	C (29.5)	D (39.1)	D (39.6)	D (41.6)	D (48.9)	D (35.9)	F (129.3)
McCarter Highway and Raymond Boulevard	D (44.7)	F (83.4)	F (83.1)	E (75.6)	F (88.0)	E (61.9)	F (87.5)
Market Street/Ferry Street and Raymond Plaza East	D (36.5)	D (36.8)	D (37.0)	D (39.5)	D (37.4)	F (92.5)	F (144.2)
Raymond Boulevard and Mulberry Street	C (28.0)	F (217.7)	F (215.2)	C (29.1)	F (225.0)	C (31.8)	D (35.6)

Table 7: LOS for Penn Station Activity Center

As Newark Penn Station is a multimodal transit center and has more train passengers than any train station or transit center in New Jersey, this activity center tends to have less pronounced peak periods with relatively consistently high traffic volumes throughout the day.

Under existing conditions (2017) during the AM peak period, the intersection of McCarter Highway and Market Street operates at LOS C, indicating stable traffic flow with acceptable delays. The intersection operates at LOS D during the PM and PM Pre-Event peak periods, indicating it's nearing an unstable traffic flow. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will degrade from LOS C to LOS D during the AM peak period with an increase in delay of 12 seconds and remains at LOS D during the PM peak period with an increase in delay of 10 seconds. For the 2025 Build scenario, the intersection operation will also degrade from LOS C to LOS D during the AM peak period, but with a lesser increase in delay of 6 seconds. However, the intersection operation will degrade further during the PM peak period from LOS D to LOS F with an increase in delay of 90 seconds.

Under existing conditions (2017) during the AM peak period, the intersection of McCarter Highway and Raymond Boulevard operates at LOS D, indicating it's nearing unstable traffic flow. The intersection operates at LOS F during the PM and PM Pre-Event peak periods, indicating that demand exceeds capacity causing a breakdown of traffic flow. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will degrade from LOS D

to LOS E during the AM peak period with an increase in delay of nearly 31 seconds but remains relatively unchanged at LOS F during the PM peak period. For the 2025 Build scenario, the intersection operation will also degrade from LOS D to LOS E during the AM peak period, but with a lesser increase in delay of 17 seconds. The intersection operation will also remain relatively unchanged at LOS F during the PM peak period.

Under existing conditions (2017), during the AM, PM, and PM Pre-Event peak periods, the intersection of Market Street, Ferry Street, and Raymond Boulevard operates at LOS D, indicating it's nearing an unstable traffic flow. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS D for both the AM and PM peak periods with minimal increases in delay. However, for the 2025 Build scenario, the intersection operation will degrade from LOS D to LOS F during the AM peak period with an increase in delay of 56 seconds. Furthermore the intersection operation would degrade from LOS D to LOS F for the PM peak period with an increase in delay of 107 seconds.

Under existing conditions (2017) during the AM peak period, Raymond Boulevard and Mulberry Street operates at LOS C, indicating stable traffic flow with acceptable delays. The intersection operates at LOS F during the PM and PM Pre-Event peak periods, indicating that demand exceeds capacity causing a breakdown of traffic flow. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS C for the AM peak period with a minimal increase in delay of 1 second and remains at LOS F during the PM peak period with an increase in delay of 7 seconds. For the 2025 Build scenario, the intersection operation will also remain unchanged at LOS C for the AM peak period with a minimal increase in delay of about 4 seconds but will improve from LOS F to LOS D for the PM peak period with a decrease in delay of 182 seconds.

Military Park Activity Center

There are four intersections in the Military Park activity center where LOS traffic analysis was conducted for the 2017 Existing AM, PM and PM Pre-Event peak periods, 2025 No-Build Scenario AM and PM peak periods, and 2025 Build Scenario AM and PM peak periods. The results of this analysis is provided in **Table 8**, parsed by scenario, intersection, and peak period. The intersections include:

- Broad Street and Raymond Boulevard/Park Place
- Park Place and Rector Street
- Broad Street and Rector Street
- Central Avenue and Broad Street

Military Park	2017 Existing LOS (sec of delay)			2025 No-Build LOS (sec of delay)		2025 Build LOS (sec of delay)	
Intersection	AM	PM	PM Pre-Event	AM	PM	AM	PM
Broad Street and Raymond Boulevard/Park Place	E (69.0)	D (42.8)	D (43.7)	E (77.2)	D (47.8)	F (160.9)	F (154.1)
Park Place and Rector Street	C (22.1)	B (10.3)	B (10.4)	D (47.6)	B (11.1)	D (42.8)	B (12.5)
Broad Street and Rector Street	B (12.3)	B (12.9)	B (13.1)	B (12.6)	B (13.2)	B (11.6)	A (4.4)
Central Avenue and Broad Street/Park Place	C (26.8)	D (36.5)	D (36.6)	D (48.1)	F (97.5)	F (84.9)	F (141.3)

Table 8: LOS for Military Park Activity Center

Under existing conditions (2017) during the AM peak period, the intersection of Broad Street and Raymond Boulevard operates at LOS E, indicating an unstable traffic flow. The intersection operates at LOS D during the PM and PM Pre-Event periods, indicating it's nearing an unstable traffic flow. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS E for the AM peak period with an increase in delay of 8 seconds and would remain at LOS D for the PM peak period with an increase in delay of 5 seconds. However, for the 2025 Build scenario, the intersection operation will degrade from LOS E to LOS F for the AM peak period with an increase in delay of 92 seconds and will degrade from LOS D to LOS F for the PM peak period with an increase in delay of 111 seconds.

Under existing conditions (2017) during the AM peak period, the intersection of Park Place and Rector Street operates at LOS C, indicating a stable traffic flow with acceptable delays. The intersection operates at LOS B during the PM and PM Pre-Event peak periods, indicating stable traffic flow with minor delays. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will degrade from LOS C to LOS D for the AM peak period with an increase in delay of 25 seconds and will remain unchanged at LOS B for the PM peak period with a minimal increase in delay of less than 1 second. For the 2025 Build scenario, the intersection operation will also degrade from LOS C to LOS D for the AM peak period with an increase in delay of about 21 seconds and will remain unchanged at LOS B for the PM peak period with a minimal increase in delay of 2 seconds.

Under existing conditions (2017) during the AM, PM, and PM Pre-Event peak periods, the intersection of Broad Street and Rector Street operates at LOS B, indicating stable traffic flow with minor delays. The analysis indicates for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS B for both the AM and PM peak periods with minor increases in delay of less than 1 second. For the 2025 Build scenario, the intersection operation will also remain unchanged at LOS B for the AM peak periods with a minimal decrease in delay of about 1 second. The intersection operation will, however, improve from LOS B to LOS A for the PM peak period with a decrease in delay of about 9 seconds.

Under existing conditions (2017) during the AM peak period, the intersection of Central Avenue, Broad Street and Park Place operates at LOS C, indicating stable flow. During the PM and PM Pre-Event peak periods the intersection operates at LOS D, indicating it's nearing unstable traffic flow. The analysis indicates that for the 2025 No-Build

scenario, the intersection operation will degrade from LOS C to LOS D for the AM peak period with an increase in delay of 21 seconds and will degrade from LOS D to LOS F for the PM peak period with an increase in delay of 61 seconds. For the 2025 Build scenario, the intersection operation will degrade from LOS C to LOS F for the AM peak period with an increase in delay of 58 seconds and will also degrade from LOS D to LOS F for the PM peak period with an increase in delay of nearly 105 seconds.

There is one street segment in the Military Park activity center where the V/C ratio analysis was conducted. The results of this analysis is provided in **Table 9** parsed by scenario and peak period. The street segment includes:

- Park Place between Broad Street and Park Place (northbound)

Military Park	2017 Existing		2025 No-Build		2025 Build	
Street Segment	AM	PM	AM	PM	AM	PM
Park Place between Broad Street and Park Place (northbound)	0.08	0.05	0.08	0.05	0.26	0.17

Table 9: V/C Ratios for Military Park Activity Center

Using 2017 Existing V/C ratios and comparing them to the 2025 No-Build scenarios for Park Place traveling northbound, the ratios remain the same for the AM and PM peak periods. Comparing the 2017 Existing V/C ratio to the 2025 Build scenario, the AM and PM periods increase slightly but do not exceed the capacity.

Lincoln Park Activity Center

There are five intersections in the Lincoln Park activity center where LOS traffic analysis was conducted for the 2017 Existing AM, PM and PM Pre-Event peak periods, 2025 No-Build Scenario AM and PM peak periods, and 2025 Build Scenario AM and PM peak periods. The results of this analysis is provided in **Table 10**, parsed by scenario, intersection, and peak period. PM Pre-Event data was not available.

The intersections include:

- Clinton Avenue and Lincoln Park
- Lincoln Park South and Broad Street
- Broad Street and Tichenor Street
- Lincoln Park North/Chestnut Street and Broad Street
- Broad Street and Camp Street

Lincoln Park	2017 Existing LOS (sec of delay)			2025 No-Build LOS (sec of delay)		2025 Build LOS (sec of delay)	
Street Segment	AM	PM	PM Pre-Event	AM	PM	AM	PM
Clinton Avenue and Lincoln Park	B (12.9)	C (33.3)	N/A	B (13.3)	C (34.1)	B (17.0)	D (43.6)
Lincoln Park South and Broad Street	E (63.8)	A (7.8)	N/A	E (75.9)	A (8.7)	B (11.3)	B (10.5)
Broad Street and Tichenor Street	E (72.9)	B (12.6)	N/A	F (86.1)	B (14.8)	C (21.4)	B (13.3)
Lincoln Park North/Chestnut Street and Broad Street	A (8.2)	B (11.6)	N/A	A (8.3)	B (12.1)	B (18.1)	C (24.8)
Broad Street and Camp Street	B (17.6)	A (3.5)	N/A	B (18.9)	A (3.6)	C (25.1)	A (9.8)

Table 10: LOS for Lincoln Park Activity Center

Under existing conditions (2017) during the AM peak period, the intersection of Clinton Avenue and Lincoln Park operates at LOS B indicating a stable traffic flow with minor delays. The intersection operates at LOS C for the PM peak period, indicating a stable traffic flow with acceptable delays. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS B for the AM peak period and at LOS C for the PM peak period with minimal changes in delay. For the 2025 Build scenario, the intersection operation will also remain unchanged at LOS B for the AM peak period with a minimal increase in delay of 4 seconds. The intersection operation will, however, degrade from LOS C to LOS D for the PM peak period with an increase in delay of 10 seconds.

Under existing conditions (2017) during the AM peak period, the intersection of Lincoln Park South and Broad Street operates at LOS E indicating an unstable traffic flow. The intersection operates at LOS A for the PM peak period, indicating free flow of traffic. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS E for the AM peak period and LOS A for the PM peak period, with an increase in delay of 12 seconds and 1 second, respectively. However, for the 2025 Build scenario, the intersection operation will improve from LOS E to LOS B for the AM peak period with a decrease in delay of nearly 53 seconds. The intersection operation will degrade from LOS A to LOS B for the PM peak period with a minimal increase in delay of about 3 seconds.

Under existing conditions (2017) during the AM peak period, the intersection of Broad Street and Tichenor Street operates at LOS E indicating unstable traffic flow. The intersection operates at LOS B during the PM peak period, indicating stable traffic flow with minor delays. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will degrade from LOS E to LOS F for the AM peak period with an increase in delay of 13 seconds and will remain unchanged at LOS B for the PM peak period with a minor increase in delay of about 2

seconds. However, for the 2025 Build scenario, the intersection operation will improve from LOS E to LOS C for the AM peak period with a decrease in delay of about 52 seconds. The intersection operation will also remain unchanged at LOS B for the PM peak period with a minor increase in delay of less than 1 second.

Under existing conditions (2017) during the AM peak period, the intersection of Lincoln Park North, Chestnut Street and Broad Street operates at LOS A indicating a free flow of traffic. The intersection operates at LOS B during the PM peak period, indicating stable traffic flow with minor delays. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS A for the AM peak period and LOS B for the PM peak period with minor increases in delay of less than 1 second. For the 2025 Build scenario, the intersection operation will degrade from LOS A to LOS B for the AM peak period with an increase in delay of 10 seconds and will degrade from LOS B to LOS C for the PM peak period with an increase in delay of 13 seconds.

Under existing conditions (2017) during the AM peak period, the intersection of Broad Street and Camp Street operates at LOS B, indicating stable traffic flow with minor delays. The intersection operates at LOS A during the PM peak period, indicating free flow of traffic. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS B for the AM peak period and LOS A for the PM peak period with minor increases in delay of about 1 second. For the 2025 Build scenario, the intersection operation will degrade from LOS B to LOS C for the AM peak period with a modest increase in delay of 8 seconds and will remain unchanged at LOS A for the AM peak period with a slight increase in delay of 6 seconds.

Prudential Center Activity Center

There are two intersections in the Prudential Center activity center where LOS traffic analysis was conducted for the 2017 Existing AM, PM, and PM Pre-Event peak periods, 2025 No-Build Scenario AM and PM peak periods, and 2025 Build Scenario AM and PM peak periods. The results of this analysis is provided in **Table 11**, parsed by scenario, intersection, and peak period. The intersections include:

- Broad Street and Market Street
- Market Street and Mulberry Street

Prudential Center	2017 Existing LOS (sec of delay)			2025 No-Build LOS (sec of delay)		2025 Build LOS (sec of delay)	
Intersection	AM	PM	PM Pre-Event	AM	PM	AM	PM
Broad Street and Market Street	B (18.1)	C (24.3)	C (24.7)	B (18.7)	C (24.7)	C (27.4)	C (26.5)
Market Street and Mulberry Street	D (47.7)	E (60.8)	E (62.0)	D (49.7)	E (66.3)	D (40.9)	E (69.9)

Table 11: LOS for Prudential Center Activity Center

Under existing conditions (2017) during the AM peak period, the intersection of Broad Street and Market Street operates at LOS B indicating stable traffic flow with minor delays. The intersection operates at LOS C during the PM and PM Pre-Event peak periods, indicating a stable traffic flow with acceptable delays. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS B for the AM peak period and LOS C for the PM peak period with minor increases in delay. For the 2025 Build scenario, the intersection operation will degrade from LOS B to LOS C for the AM peak period with a modest increase in delay of 9 seconds and will remain unchanged at LOS C for the PM peak period with a minimal increase in delay of 2 seconds.

Under existing conditions (2017) during the AM peak period, the intersection of Market Street and Mulberry Street operates at LOS D, indicating it's nearing unstable traffic flow. For the PM and PM Pre-Event peak periods, the intersection operates at LOS E, indicating unstable traffic flow. The analysis indicates that for the 2025 No-Build scenario, the intersection operation will remain unchanged at LOS D for the AM peak period and LOS E for the PM peak period with a minimal increase in delay of 2 seconds and 6 seconds, respectively. For the 2025 Build scenario, the intersection operation will remain unchanged at LOS D for the AM peak period and LOS E for the PM peak period with a modest decrease in delay of 7 seconds and 9 seconds, respectively.

5
FINDINGS & RECOMMENDATIONS

The Newark Downtown Circulation Improvement Study recommends a variety of pedestrian safety, bicycle, and vehicular improvements for each of the activity centers. These types of improvements are briefly described as follows:

Pedestrian Strategies

All Pedestrian Signal Phase and Leading Pedestrian Intervals

All pedestrian signal phases give pedestrians the ability to cross the intersection in any direction, including diagonally. Vehicular traffic is stopped in all directions as a result.

A leading pedestrian interval (LPI) gives pedestrians a several second advance to start crossing the intersection before vehicular traffic enters the intersection. This aids pedestrians cross the street and provides greater visibility of pedestrians within the crosswalk. LPIs have shown to reduce pedestrian and vehicle collisions, are fairly low cost to implement, and is a FHWA Proven Safety Countermeasure.

Curb Extensions

Curb extensions are often implemented at intersections to narrow the roadway. These curb extensions provide shorter crossing distances for pedestrians while also giving drivers more visibility of the pedestrians waiting to cross the intersection.

Pedestrian Refuge Islands

Pedestrian refuge islands are implemented on streets with lengthy crossing distances giving pedestrians the opportunity to safely wait mid-crossing if they are unable to cross the entire length of the intersection during a traffic cycle. Pedestrian refuge islands often have bollards or other safety features to protect pedestrians and can include planters and street trees. They are an FHWA Proven Safety Countermeasure.

Bicycle Strategies

Protected Bicycle Lanes

Protected bicycle lanes are exclusive lanes for bicyclists to use and are separated from pedestrian and motorized traffic. These bicycle lanes are often designated by signage, striping, and other pavement markings and can be protected from vehicles with a variety of treatments including striped buffers, bollards, and placing the bike lanes curbside with vehicle parking as separation from travel lanes. Bicycle lanes increase safety for bicyclists on the road and improve comfort and the perceived safety for them as well.

This study recommends bicycle lanes on roads with NJ TRANSIT bus routes. The public and stakeholders expressed concern about the configuration of bicycle lanes at bus stops from a safety perspective. Other cities have explored strategies for addressing this concern. For instance, depending on street widths, boarding islands for buses can be created to reduce the conflicts between buses and bicyclists at bus stops. In this scenario, the bicycle lane continues next to the curb while a boarding island is adjacent to the bicycle lane on the other side. Buses would be able to pull up directly to the boarding island without crossing into the bicycle lane. An example of this street configuration is shown in **Figure 10**.

Figure 10: Boarding Island and Adjacent Bicycle Lane

Source: NACTO

Another treatment that could be implemented at and around bus stops is to change the bicycle lane into a shared lane to accommodate the bus. The NACTO Transit Street Design Guide permits a shared bus-bike lane. This may be the preferred option in areas where boarding islands cannot be accommodated.

Street lane configurations are not uniform across the study area, especially at intersections. Accordingly, the design of bicycle lanes recommended by this study will need to be studied further prior to construction to determine what street lane configuration will work best for each intersection. The following bicycle facility treatments from the National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide are relevant best practices of how to design bike lanes at vehicular intersections. These treatments will accommodate a wide variety of street lane configurations.

Through Bicycle Lanes

When approaching an intersection, it is vital that bicyclists are provided an opportunity to correctly position themselves to avoid conflicts with turning vehicles. Through bicycle lanes are typically applied on streets with right-side bike lanes and right-turn only lanes at intersections. This can also apply to one-way streets with left-side bike lanes and left-turn only lanes at intersections. An example of through bicycle lanes is shown in **Figure 11**.

Figure 11: Through Bicycle Lanes

Source: NACTO

Combined Bike Lane / Turn Lane

A combined bike lane / turn lane places a suggested bike lane within the inside portion of a dedicated motor vehicle turn lane. This can be delineated with shared lane markings or conventional bicycle stencils with a dashed line to identify the intended intersection approach for bicyclists. An example of combined bike lane / turn lane is shown in **Figure 12**.

Intersection Crossing Markings

Intersection crossing markings guide bicyclists through intersections by indicating the intended paths. An example of intersection crossing markings is shown in **Figure 13**.

Figure 12: Combined Bike Lane / Turn Lane

Source: NACTO

Figure 13: Intersection Crossing Markings

Source: NACTO

Bike Box

A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase. An example of a bike box is shown in **Figure 14**.

Two-Stage Turn

Two-stage turn queue boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a right side cycle track or bike lane, or right turns from a left side cycle track or bike lane. These improve bicyclist ability to safely and comfortably make left turns and reduce turning conflicts between bicyclists and motor vehicles. An example of a two-stage turn is shown in **Figure 15**.

Figure 14: Bike Box

Source: NACTO

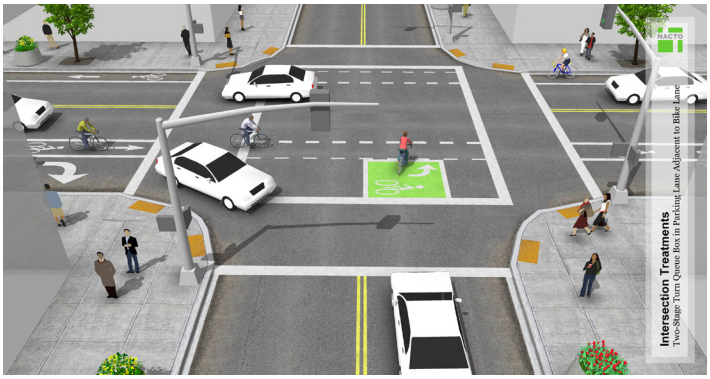

Figure 15: Two-Stage Turn

Source: NACTO

Street Conversions

A variety of street conversions were reviewed as part of this study. Converting a street from a one-way to a two-way or a two-way to a one-way operation can improve vehicular traffic in the specific area. Street conversions can only be achieved through the action of the City Council.

Roundabouts

Roundabouts eliminate the need for an intersection to be signalized while maintaining vehicular flow and reducing queuing that would have occurred at the signal. At complex intersections, roundabouts reduce the number of conflict points that may occur between vehicles and pedestrians. Roundabouts have also been found to decrease the number of vehicle collisions while also minimizing the severity of these crashes due to lower speeds. Roundabouts are a FHWA Proven Safety Countermeasure.

An overview of all of the recommendations for each of the activity centers is shown in **Figure 16** (see page 43). The recommendations for each of the activity centers is described in further detail in the next sections. These recommendations include improvements whose benefits will extend beyond the boundaries of the activity centers and therefore will improve the overall circulation in the study area.

Further design guidance and details for many of the above treatments and countermeasures are available with clickable links below:

- 2017 State of New Jersey Complete Streets Design Guide
- AASHTO Guide for the Development of Bicycle Facilities, 2012
- NACTO Urban Bikeway Design Guide (Requires Purchase), 2011
- Manual on Uniform Traffic Control Devices, 2009 Edition with Revisions No. 1 and 2 Incorporated, May 2012
- New Jersey Bicycle and Pedestrian Master Plan (NJDOT), November 2016

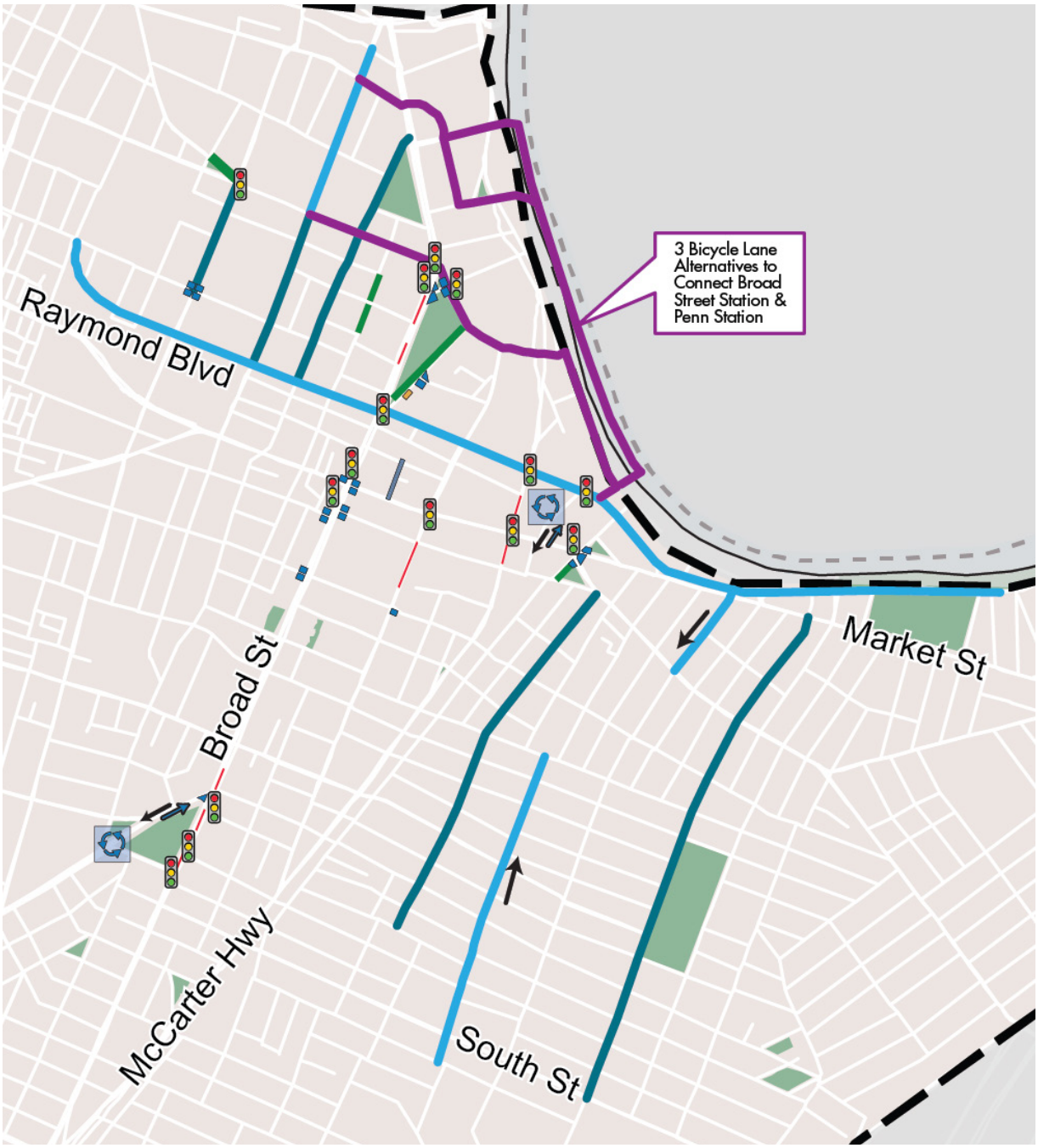

Figure 16: Overview of All Recommendations

5.1 University Area Activity Center

The University Area activity center sees high pedestrian, vehicular, and bicycle volumes throughout the day as students, faculty, and staff move throughout the campus areas. The recommendations for the University Area activity center are shown in **Figure 17** and are described in detail below.

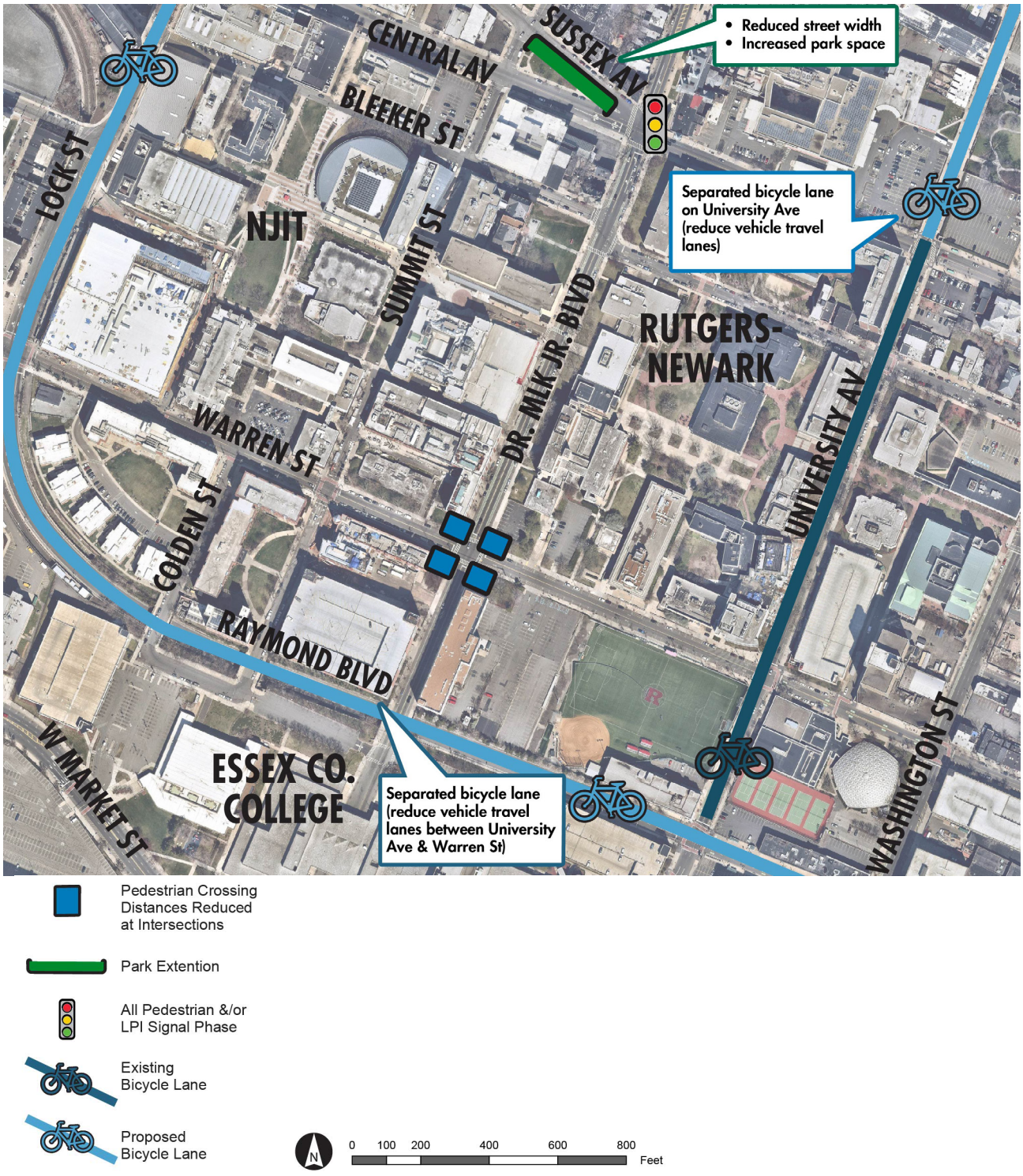

Figure 17: University Area Activity Center Recommendations

5.1.1 Pedestrian

The section of Sussex Avenue between Summit Street and Dr. Martin Luther King Jr. Boulevard was identified as an area that was confusing to motorists and difficult for pedestrians. It is recommended that the street width be reduced in this area with an extension of the park on the southern section of the street. One parking lane and one vehicular travel lane would be removed to accommodate the park extension. Ten on-street metered parking spaces would be removed from the southern portion of Sussex Avenue. Additionally, the westbound Sussex Avenue approach at Summit Street would consist of a through and right-turn lane to reduce traffic using this portion of Summit Street as a cut through route to I-280. The park extension could include additional pedestrian amenities including street furniture such as benches or chairs, street trees and planters, and bollards to designate the area. **Figure 18** shows the existing cross section of Sussex Avenue and the proposed cross section with the addition of the park extension.

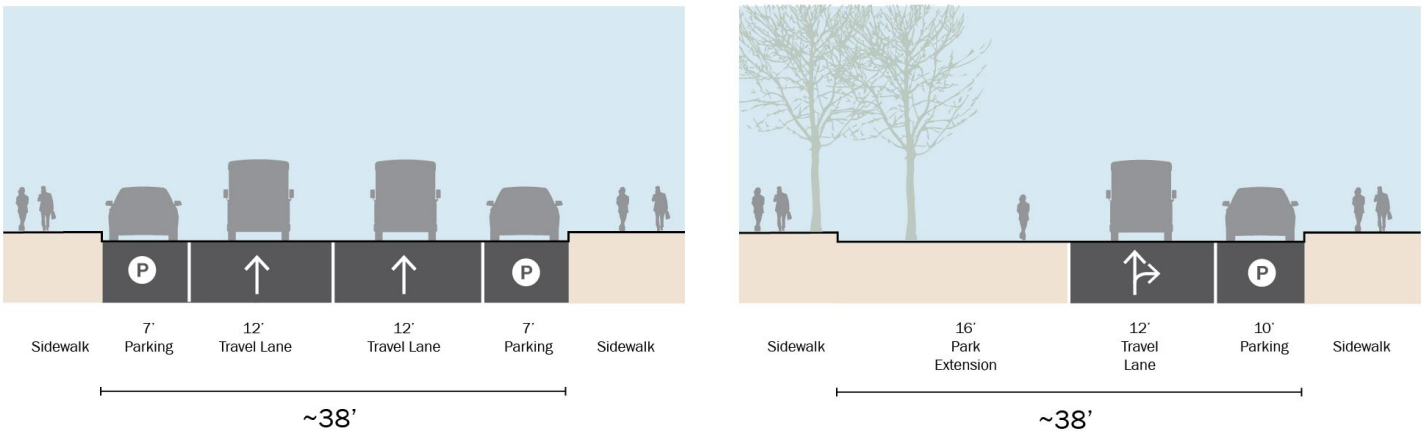

Figure 18: Existing and Recommended Cross Section of Sussex Avenue (looking west)

As there is a lengthy pedestrian crossing at the intersection of Sussex Avenue, Central Avenue, and Dr. Martin Luther King Jr. Boulevard, a leading pedestrian interval (LPI) is recommended for this intersection. This will give pedestrians more time to be able to cross the street, while also alerting drivers to their presence in the crosswalk.

It is recommended that curb extensions be implemented at the intersection of Warren Street and Dr. Martin Luther King Jr. Boulevard. Curb extensions reduce crossing distances for pedestrians and increase the visibility of pedestrians near the intersection. Both Warren Street and Dr. Martin Luther King Jr. Boulevard have on-street parking in the vicinity of this intersection. No travel lanes or parking spaces would need to be removed for this recommendation to be implemented.

The pedestrian experience along Washington Street was a concern that the community voiced. It was mentioned that safety improvements need to be implemented in order to improve the comfort and safety of pedestrians in this area. Safety improvements such as curb extensions can be implemented at many intersections where there are lanes for on-street parking so that pedestrians are more visible to drivers. Additional crosswalk signage, flashing in-pavement lights, or illuminated crosswalk signage can be implemented in the near-term to increase safety in this area.

5.1.2 Bicycle

The University Area includes existing bicycle lanes along University Avenue, Dr. Martin Luther King Jr. Boulevard, and Washington Street. It is recommended that the existing protected southbound bicycle lane on University Avenue, that runs a quarter mile from Central Avenue southward to Raymond Boulevard, be extended to Broad Street Station from Orange Street southward to Central Avenue. One vehicular travel lane in the southbound direction would be removed and on-street parking would be retained. This would provide bicycle connectivity between Broad Street Station southbound to the University Area activity center. The overall set of bicycle lane recommendations provides bicycle connectivity from the University Area activity center to Broad Street station. **Figure 19** shows the existing cross section of University Avenue between Central Avenue and Lackawanna Avenue and the proposed cross section of the street with the addition of extension of the bicycle lane.

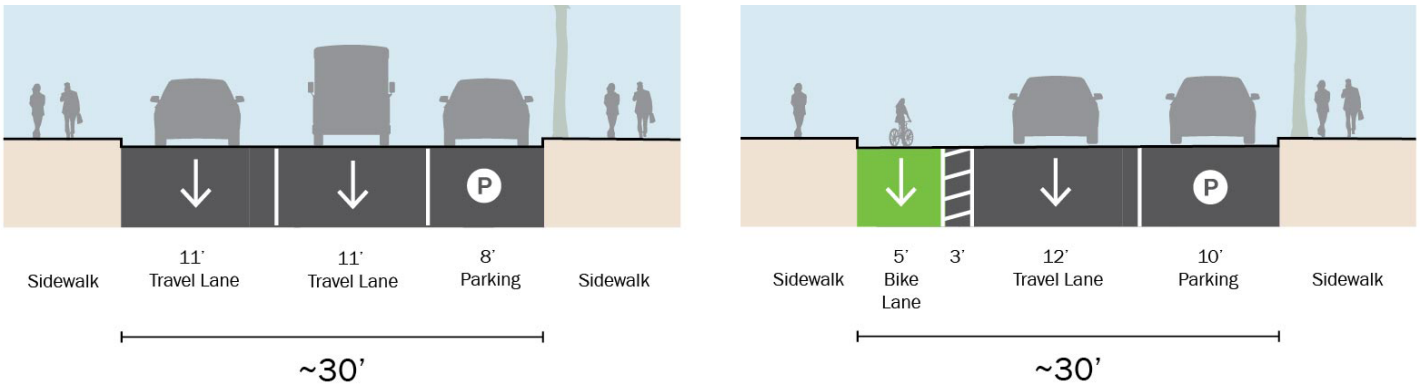

Figure 19: Existing and Recommended Cross Section of University Avenue (looking south)

It is also recommended that one-way separated bicycle lanes in each direction be implemented on Raymond Boulevard between Lock Street and University Avenue. Three vehicle travel lanes would be maintained with two traveling uphill in the westbound direction and one traveling downhill in the eastbound direction. One vehicular travel lane would be removed to accommodate the new bicycle lanes. This would provide critical east-west bicycle connections in the City, which are currently lacking. Providing bicycle lanes along Raymond Boulevard would also support the Morris Canal Greenway Corridor Study, which aims to provide an uninterrupted bicycle and pedestrian route throughout the state of New Jersey along the historic Morris Canal. The recommended bicycle lanes on this segment of Raymond Boulevard are part of the preferred route for the Morris Canal Greenway Corridor Study. **Figure 20** shows the cross section of Raymond Boulevard between Lock Street and University Avenue and the proposed configuration of the street with the addition of the bicycle lanes.

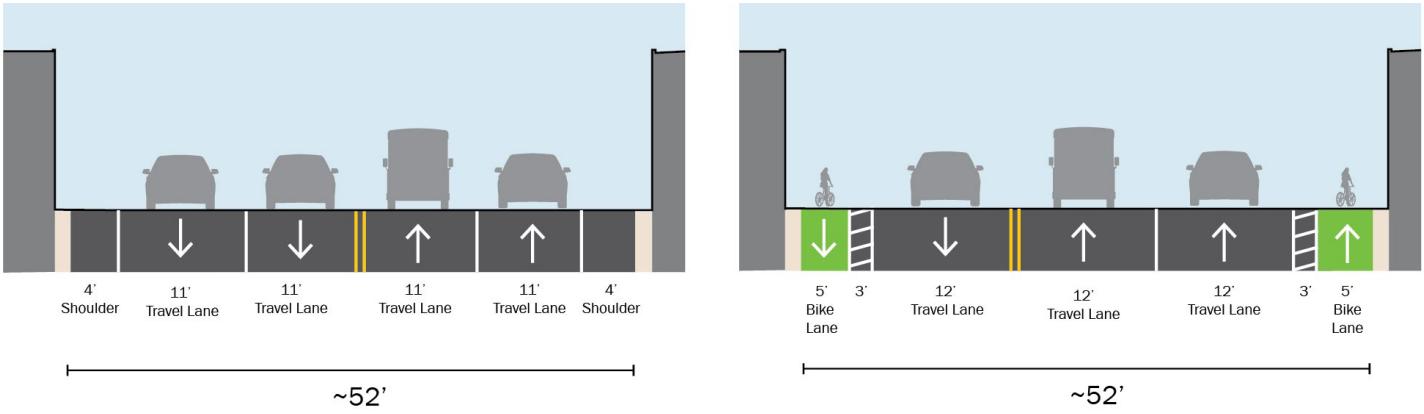

Figure 20: Existing and Recommended Cross Section of Raymond Boulevard (looking west)

5.2 Newark Penn Station Activity Center

The Newark Penn Station activity center sees high pedestrian, vehicular, transit, and bicycle volumes throughout the day as commuters and residents alike travel to and from Newark Penn Station and the surrounding office buildings. This portion of the study area has high volumes throughout the day, especially during the morning and evening peak periods. The recommendations for the Newark Penn Station activity center are shown in **Figure 21** and are described in detail below.

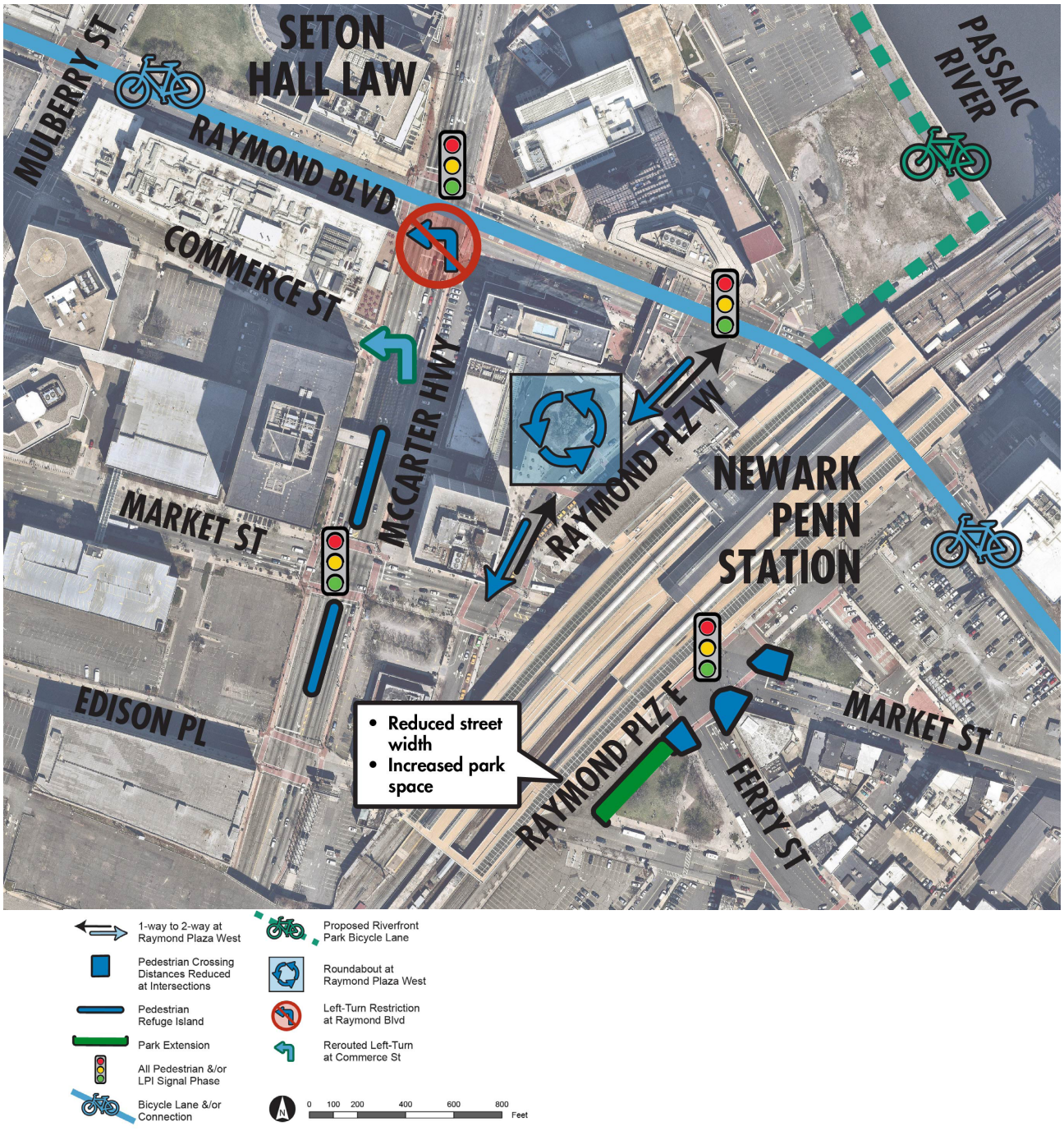

Figure 21: Newark Penn Station Activity Center Recommendations

5.2.1 Pedestrian

Within the Newark Penn Station activity center, there are several streets and intersections with long crossing distances and high vehicular volumes. It is recommended that pedestrian refuge islands be placed along McCarter Highway near the intersection of Market Street. By providing pedestrian refuge islands, pedestrians of all abilities would be able to more safely cross this extremely wide intersection. Additionally, an LPI is recommended for the intersection of McCarter Highway and Market Street so that pedestrians would be able to start crossing the street before vehicles enter the intersection.

On Raymond Plaza East between Ferry Street and Edison Place, reducing the street width by extending Peter Francisco Park is recommended. The two lanes of vehicular traffic in each direction would be reduced to one vehicular travel lane with one lane of parking on the east side of the street adjacent to the park extension. The parking adjacent to the park extension could be designated as time limited parking or could be specified for For-Hire-Vehicle pick-up and drop-off operations to ease congestion around Newark Penn Station. The park extension could include additional pedestrian amenities including street furniture such as benches or chairs, street trees and planters, and bicycle parking. Additional bicycle parking in this area would beneficial on this portion of Raymond Plaza East as bicycles are often locked to street signs, street trees, and light posts. **Figure 22** shows the cross section of the existing section of Raymond Plaza East between Ferry Street and Edison Place as well as the recommended cross section, which includes the park extension.

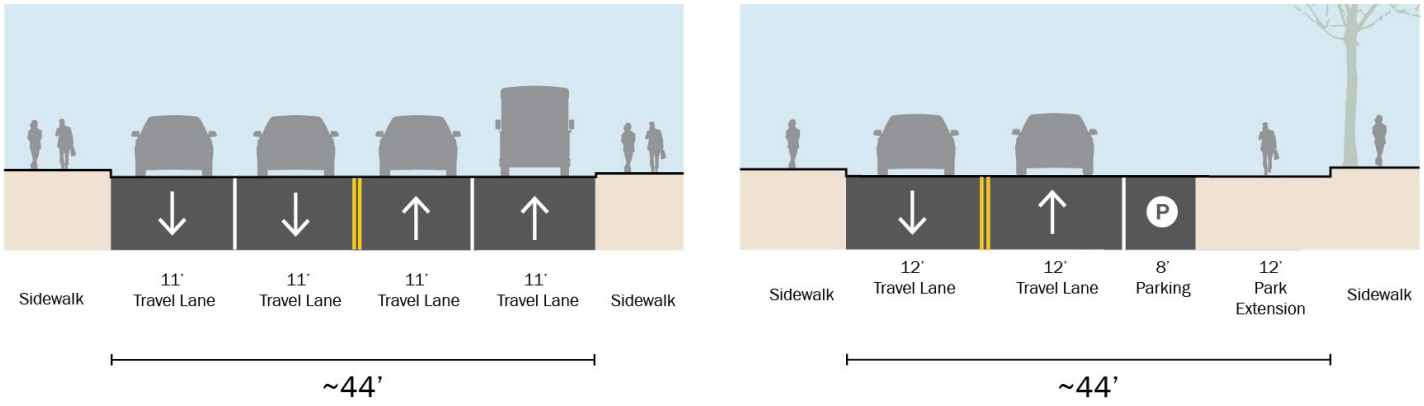

Figure 22: Existing and Recommended Cross Section of Raymond Plaza East (looking north)

Curb extensions are recommended for the east side of the intersection of Raymond Plaza East, Ferry Street, and Market Street. This intersection is difficult to cross, and pedestrians are often uncertain about where they should be going. The addition of curb extensions would allow pedestrians to be more visible to drivers while also providing shorter crossing distances.

A leading pedestrian interval is recommended for the intersection of Raymond Plaza West and Raymond Boulevard. This will give pedestrians more time to be able to cross the street, while also alerting drivers to their presence in the crosswalk.

5.2.2 Bicycle

It is recommended that one-way separated bicycle lanes in each direction be implemented on Raymond Boulevard continuing from University Avenue to the intersection of Raymond Boulevard, Market Street, and Prospect Street. These bicycle lanes will link to the recommended bicycle lanes in the University Area Activity Center on Raymond Boulevard between Lock Street and University Avenue and further provide critical east-west bicycle connections in the City, which are currently lacking. One vehicular travel lane in each direction of Raymond Boulevard from University Avenue to the intersection of Market Street and Prospect Street would be removed to accommodate the proposed bicycle lanes. For the short segment of Raymond Boulevard that runs one-way in the westbound direction east of the Market Street and Prospect Street intersection, the recommended eastbound bicycle lane would run contraflow to vehicular traffic. At intersections along Raymond Boulevard, approaches will need to be further reviewed for optimal lane group configuration, which should be accomplished during a future study. As discussed earlier, the NACTO Urban Bikeway Design Guide should be consulted for designs of bike lanes. **Figure 23** shows the cross section of the existing lane configuration Raymond Boulevard and the recommended cross section, which includes bicycle lanes.

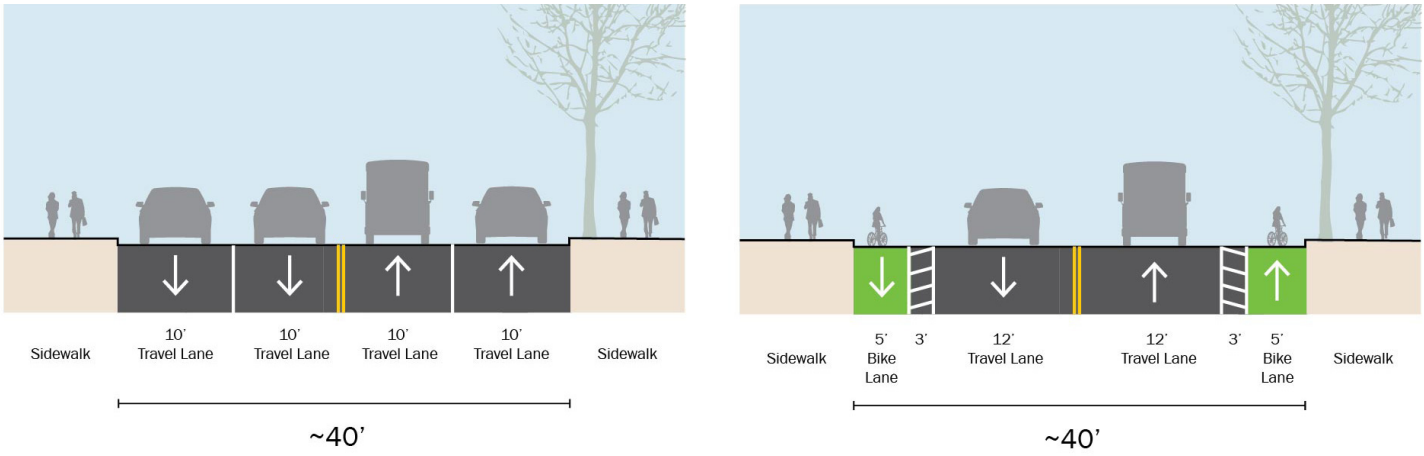

Figure 23: Existing and Recommended Cross Section of Raymond Boulevard between University Avenue and Market Street (looking west)

5.2.3 Vehicular

It is recommended that the northbound left-turn turn from McCarter Highway to Raymond Boulevard be prohibited. Vehicles would be able to make left-turns onto Commerce Street immediately south of the Raymond Boulevard intersection. This would benefit traffic traveling southbound on McCarter Highway. By having fewer turning movements at this intersection, there would also be fewer conflicts with pedestrians and other vehicles. The optimal lane configuration would need to be studied in further detail.

Different concepts for vehicular traffic at Raymond Plaza West have been generated in the past. One of the concepts that is recommended to be studied further is the implementation of a roundabout at Raymond Plaza West and the conversion of Raymond Plaza West to a two-way street between Market Street and Raymond Boulevard. Currently, vehicles dropping of hotel guests and customers at the Hilton Newark Penn Station have the ability to make the right turn onto Raymond Plaza West from Raymond Boulevard and continue towards the parking facility. These vehicles

cannot continue towards Market Street as Raymond Plaza West is one-way and exit this area back onto Raymond Boulevard. This recommendation would allow all vehicles to exit Newark Penn Station area either on Market Street or on Raymond Boulevard. Allowing customer pick-ups and drop-offs to occur on the eastern side of Newark Penn Station would also improve vehicular circulation in this area.

5.3 Military Park Activity Center

The Military Park activity center sees high pedestrian, vehicular, and transit volumes throughout the day as residents and workers move about this area. The City of Newark is working on a federally funded project, The Newark Riverfront Pedestrian and Bicycle Access Project, which will improve pedestrian and bicycle connections between Broad Street and McCarter Highway throughout the length of the Park Place and the Center Street corridor. Since the City is working on this pedestrian and bicycle project, the recommendations for this portion of the activity center were limited. The recommendations for the Military Park activity center are shown in **Figure 24** and are described in detail below.

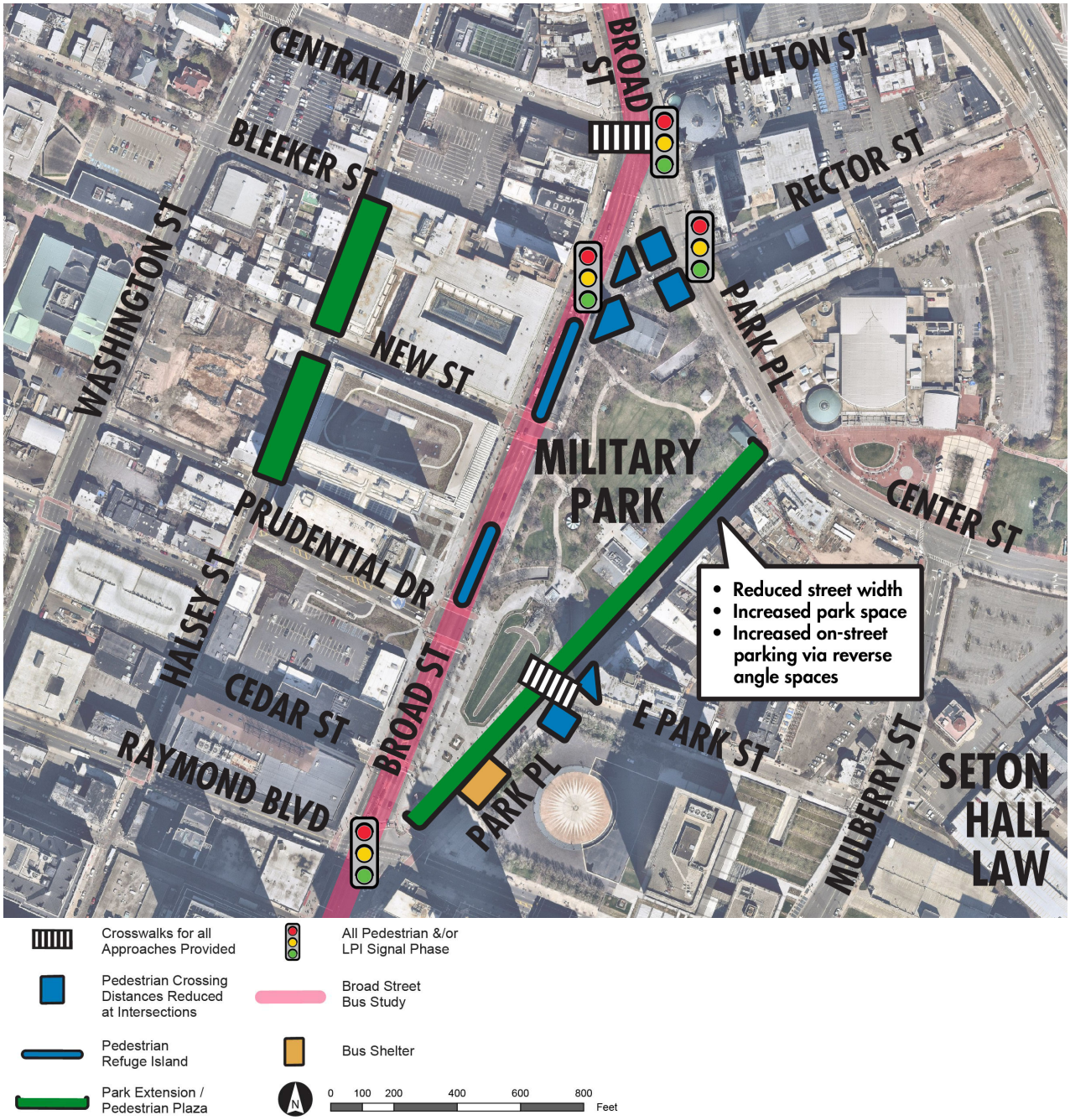

Figure 24: Military Park Activity Center Recommendations

5.3.1 Pedestrian

Within the Military Park activity center, the Broad Street corridor has long crossing distances that would be alleviated with the addition of pedestrian refuge islands. Pedestrian refuge islands are common along Broad Street in other areas of the city as this is a wide road that is highly trafficked. It is recommended that pedestrian refuge islands be added to the northern intersection of Broad Street and Prudential Drive as well as Broad Street and New Street.

There are several intersections within the Military Park activity center where the addition of curb extensions could be implemented to reduce pedestrian crossing distances. Curb extensions are recommended for the northwest and southwest corners of the intersection of Rector Street and Park Place as well as the northeast and southeast corners of Rector Street and Broad Street. Additionally, curb extensions are recommended for the northeast and southeast corners of East Park Street at Park Place.

The addition of highly visible crosswalks at the intersection of Park Place and East Park Street, along with the intersection of Central Avenue and Broad Street at all approaches is recommended. While ladder crosswalks already exist at the intersection of Central Avenue and Broad Street, a highly visible brick paving stylized crosswalk would further alert drivers to anticipate pedestrians in the crosswalk.
Leading pedestrian intervals are recommended for the intersection of Broad Street and Raymond Boulevard, Rector Street and Park Place, and Broad Street and Central Avenue.

On Park Place, between Raymond Boulevard and Center Street, reducing the street width to one vehicular travel lane is recommended. Extending the park space and eliminating the on-street parking on the westbound side of the street adjacent to the park. The addition of back-in parking along the east side of Park Place will maintain parking along this street. The park extension can function as a multi-use path where pedestrians and bicyclists are able to use this space while being safely separated from vehicular traffic. The park extension could include additional pedestrian amenities including street furniture such as benches or chairs, street trees and planters, bicycle parking, and bollards to designate the space as a pedestrian area. This area could also provide space for other programming, street vendors, or local food trucks. **Figure 25** shows the existing and recommended cross sections for the portion of Park Place between Raymond Boulevard and Center Street.

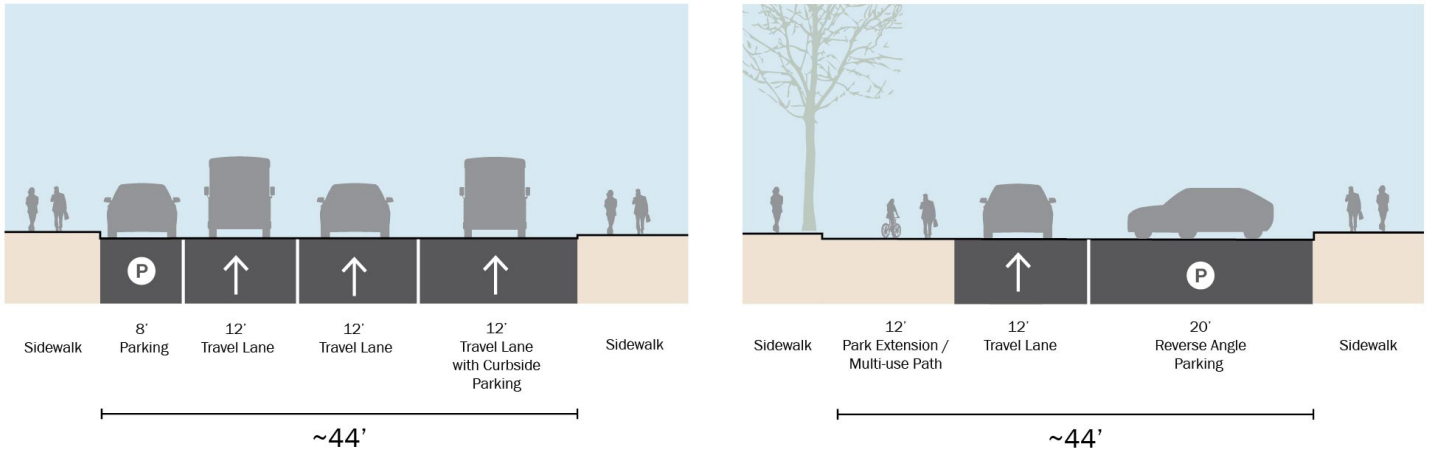

Figure 25: Existing and Recommended Cross Section of Park Place (looking north)

To continue creating a vibrant pedestrian friendly area, a pedestrian plaza is recommended on Halsey Street between Bleeker Street and Linden Street. This portion of Halsey Street would be closed to vehicular traffic except for vehicles making deliveries to businesses during designated hours and emergency vehicles. Bleeker Street would change from a two-way street to a one-way street in the westbound direction. Vehicles traveling southbound on Halsey Street would be required to turn right onto Bleeker Street. New Street would remain open to vehicular traffic at Halsey Street and the pedestrian plaza would not limit vehicular movement at this intersection. The changes to the vehicular traffic direction on Bleeker Street are shown in **Figure 26**.

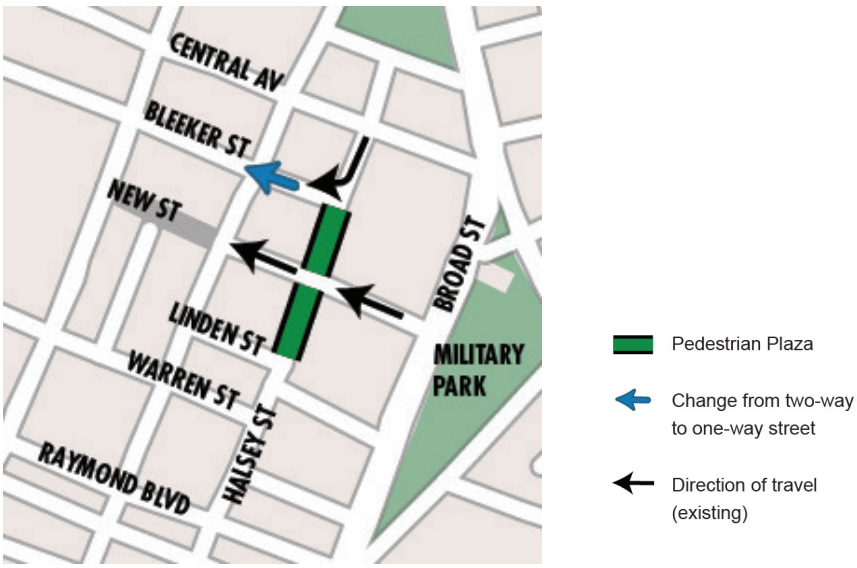

Figure 26: Halsey Street Pedestrian Plaza Travel Direction Changes

The pedestrian plaza could include additional amenities including street furniture such as benches, chairs, and tables; planters; pedestrian lighting; and bicycle parking. The space could be designated as a pedestrian space through the use of a different paving color, signage, and a flexible gate to alert motorists. The pedestrian plaza can be implemented initially through a pilot program to further gauge the public's and business owners' interest. The City of Newark would work with and to educate business owners prior to the implementation of the pedestrian plaza. This pedestrian plaza could also be implemented as a seasonal plaza, operating only certain times of the year or certain days of the week. Thriving pedestrian plazas can be found across the country and throughout New Jersey, including the Newark Avenue Pedestrian Mall in Jersey City and Division Street in the Borough of Somerville. An example of the Newark Avenue Pedestrian mall in Jersey City is shown in **Figure 27**. Examples of signage for the Newark Avenue Pedestrian Mall in Jersey City, New Jersey are shown **Figure 28**.

Figure 27: Newark Avenue Pedestrian Mall; Jersey City, NJ

Figure 28: Newark Avenue Pedestrian Mall Signage

5.3.2 Bicycle

Connecting Broad Street Station to Newark Penn Station with a dedicated bicycle lane is a priority for the City of Newark. As of 2019 the city was working on two projects including the Newark Riverfront Pedestrian and Bicycle Access Project and Greenway Bikeway Transit Connector Project in effort to determine the appropriate route and lane configuration for this integral bike route. This study builds off these efforts, providing three alternatives for bicycle lanes within and adjacent to the Military Park activity center to connect Broad Street Station with Newark Penn Station shown in **Figure 29.** These alternatives would also connect with recommended bicycle lanes in other activity centers, providing an integrated bike network connecting important destination in Downtown Newark. This study does not recommend any one of these alternatives but does recommend further study to determine the best route and configuration.

Figure 29: Alternative Bicycle Connections between Broad Street Station and Newark Penn Station

The first alternative for bicycle connections between these two stations is a two-way separated bicycle lane from University Avenue along Central Avenue, Park Place, and Center Street, connecting to a proposed bike lane routed along the Riverfront Park to Newark Penn Station. The City of Newark previously ran a pilot program of this street configuration and observed significant congestion along Central Avenue due to vehicles making left-turns onto Washington Street and Halsey Street. The modeling analysis indicated that the removal of vehicular travel lanes in each direction to accommodate the bicycle lanes would significantly degrade the intersection LOS at Central Avenue, Broad Street, and Park Place. If the bicycle lanes along Central Avenue were implemented, left-turns onto Washington Street and Halsey Street would need to be prohibited in order to maintain vehicular flows. The existing and proposed cross section of Central Avenue from University Avenue to Broad Street is shown in **Figure 30**.

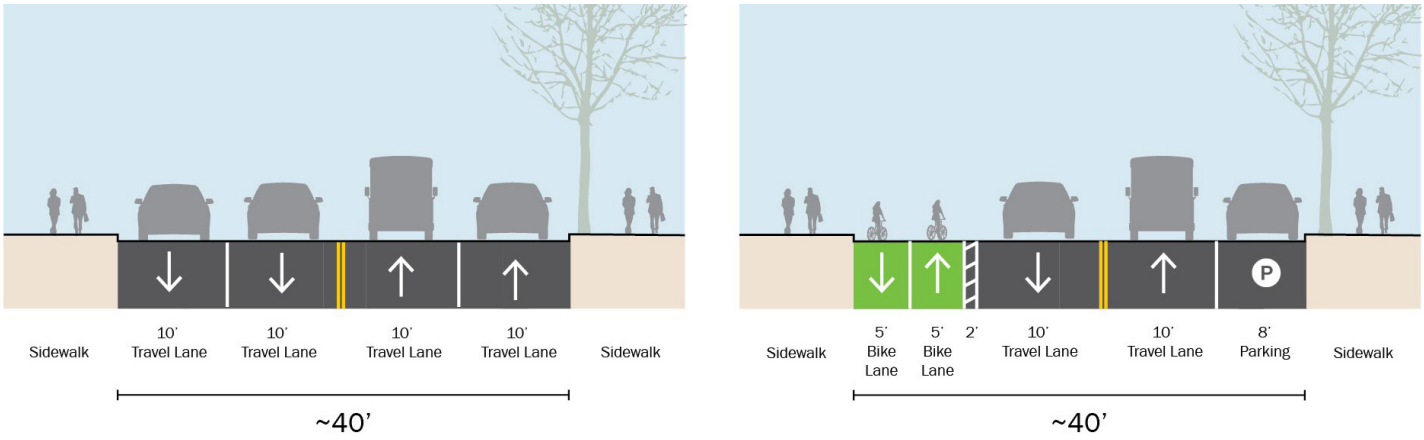

Figure 30: Alternative 1: Existing and Potential Cross Section of Central Avenue (looking west)

This alternative will be studied further in the Newark Riverfront Pedestrian and Bicycle Access Project that the City will be conducting.

The second alternative for bicycle connections from Broad Street Station to Newark Penn Station is a two-way bicycle lane starting at the intersection of Orange Street and University Avenue running eastbound along Orange Street, southbound on Atlantic Street, eastbound on Lombardy Street with connections to a proposed bike lane routed along the Riverfront Park to Newark Penn Station. This alternative will need to be studied further as the portion of this route along Atlantic Street may fall within the right of way of NJ TRANSIT near the light rail.

The third alternative for bicycle connections from Broad Street Station to Newark Penn Station is a two-way bicycle lane starting at the intersection of Orange Street and University Avenue running eastbound along Orange Street, southbound on Atlantic Street, eastbound on Bridge Street, and connecting to a proposed bike lane routed along the Riverfront Park to Newark Penn Station. This alternative would need to be studied further to assess feasibility.

5.4 Lincoln Park Activity Center

The Lincoln Park activity center has high pedestrian, vehicular, and transit volumes throughout the day as residents and workers move about this area. The recommendations for the Lincoln Park activity center are shown in **Figure 31** and are described in detail below.

Figure 31: Lincoln Park Activity Center Recommendations

5.4.1 Pedestrian

Similar to the Military Park activity center, the Broad Street corridor also traverses through the Lincoln Park activity center. Broad Street has lengthy crossing distances that would be alleviated with the addition of pedestrian refuge islands. Pedestrian refuge islands with fences or street trees are recommended for the portion of Broad Street north of Chestnut Street, Broad Street between Camp Street and Pennington Street as well as Broad Street between Pennington Street and Tichenor Street. The addition of fences or trees would help prevent midblock pedestrian crossings in this area.

For the portion of Lincoln Park between Clinton Avenue and Broad Street south of Lincoln Park, reducing the street width by extending the park is recommended. The vehicular traffic would be reduced to one travel lane in the eastbound direction. Reverse-angle parking is recommended for the north side of the street adjacent to the park extension. The existing and recommended cross sections for this portion of Lincoln Park are shown in **Figure 32**.

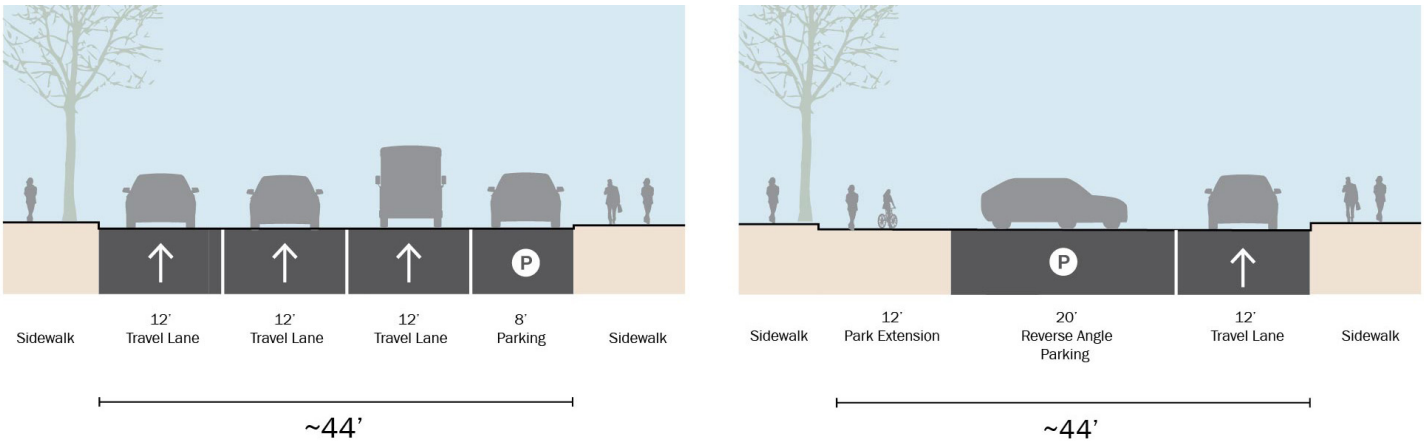

Figure 32: Existing and Recommended Cross Section of Lincoln Park (South Side of the Park looking east)

5.4.2 Vehicular

In the morning peak hour, drivers are traveling in this area towards destinations north of Lincoln Park. The intersection of Lincoln Park and Broad Street on the south side of the park sees heavy traffic in the left-turn lanes to travel north along Broad Street. Currently, Lincoln Park on the north side of the park between Clinton Avenue and Broad Street is extremely wide and has three vehicular travel lanes in the southbound direction with parking on both sides. Modifying the section of Lincoln Park from a one-way southbound street to a two-way street would improve the overall circulation in this activity center. Drivers would no longer need to travel along the south side of the park in order to continue northbound on Broad Street as they would be able to continue from Clinton Avenue onto Lincoln Park on the northern portion of the park and continue northbound on Broad Street. This change would help alleviate congestion at the intersection of Lincoln Park and Broad Street near Tichenor Street as the through traffic on Broad Street would be able to have longer green time. **Figure 33** shows the existing and recommended cross sections of this portion of Lincoln Park between Clinton Avenue and Broad Street.

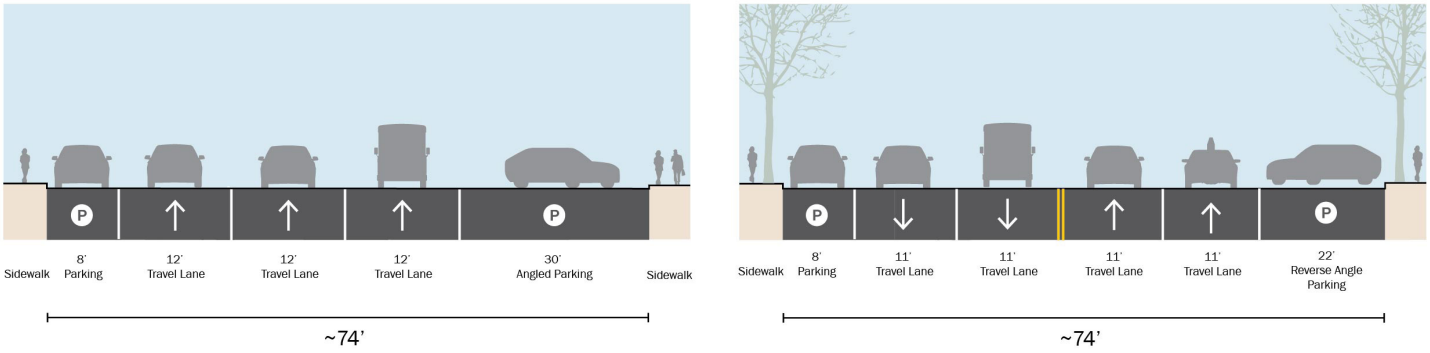

Figure 33: Existing and Recommended Cross Section of Lincoln Park between Clinton Avenue and Broad Street (looking north)

The intersection of Broad Street, Lincoln Park, Camp Street, and Chestnut Street would operate together to accommodate the two-way travel direction along Lincoln Park. The approach from Lincoln Park to Broad Street would need to be realigned to be more perpendicular. Realigning the intersection would also improve pedestrian safety at this intersection as it currently is extremely wide and is difficult to cross. A large pedestrian refuge island would be created to reduce the crossing distance, create a more perpendicular intersection for the vehicle lanes traveling eastbound, and increase green space. **Figure 35** shows the recommended alignment of the new intersection at Lincoln Park and Broad Street near Camp Street.

Figure 34: Existing and Recommended alignment of Intersection

A roundabout at the intersection of Clinton Avenue, Washington Street, and Lincoln Park is recommended to accommodate the two-way traffic on the north side of Lincoln Park. The addition of a roundabout would help congestion as there would be continuous traffic flow and vehicles would not need to stop at a signal. The implementation and the configuration of the roundabout at this intersection should be studied in further detail.

5.5 Prudential Center Activity Center

The Prudential Center activity center has high pedestrian, vehicular, and transit volumes throughout the day including before and after events occurring at the Prudential Center. Moreover, Mulberry Commons is planned to further transform this activity center as a destination for residents, workers, and visitors. The recommendations for the Prudential Center activity center are shown in **Figure 35** and are described in detail below.

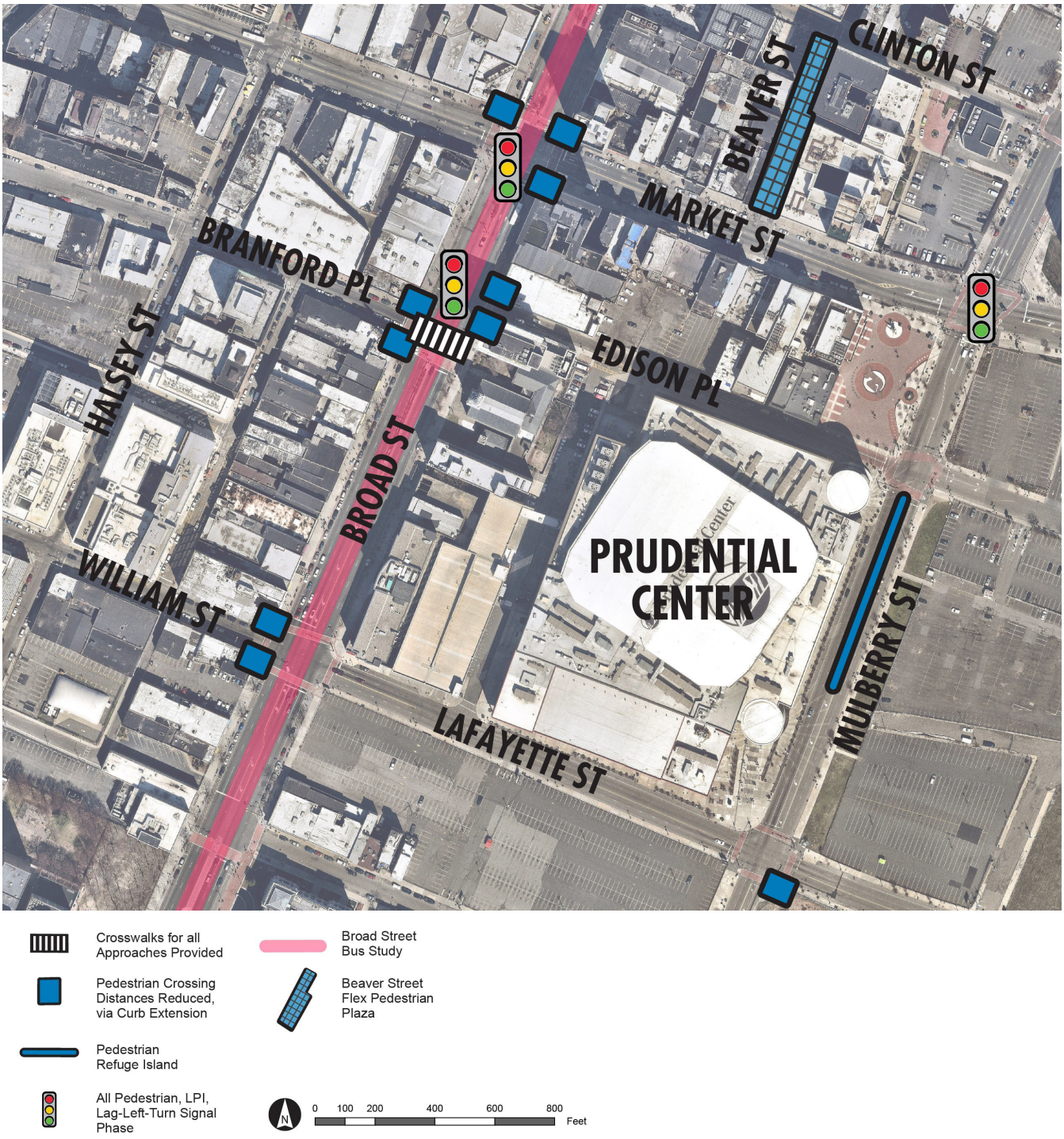

Figure 35: Prudential Center Activity Center Recommendations

5.5.1 Pedestrian

Since the Prudential Center activity center is heavily trafficked by both pedestrians and vehicles, several curb extensions and other pedestrian safety improvements are recommended. Curb extensions are recommended for the northwest and southwest corners of the intersection of William Street/Lafayette Street and Broad Street; the southeast corner of Mulberry Street and Lafayette Street; all corners of the intersection of Broad Street at Branford Place/Edison Place; and at all corners except the southwest corner of Market Street and Broad Street.

Leading pedestrian intervals are recommended for the intersection of Market Street and Mulberry Street, Market Street and Broad Street, and Branford Place/Edison Place and Broad Street. This will give pedestrians more time to be able to cross the street, while also alerting drivers to their presence in the crosswalk.

A flexible pedestrian plaza at Beaver Street between Clinton Street and Market Street is recommended. This narrow block would be closed off to vehicular traffic at specified times and days in order for pedestrians to use the space freely. The flexible pedestrian plaza could be identified using overhead signage and mobile planters. It is recommended that the City of Newark conduct a pilot program to further gauge the public's interest. **Figure 36** shows a flexible pedestrian plaza along a section of Orchard Street in Lower Manhattan where vehicles are prohibited during specified times on Sundays.

Figure 36: Orchard Street Pedestrian Mall Signage

A pedestrian refuge island is recommended along the section of Mulberry Street neighboring the Prudential Center, south of Edison Place. Since this portion of Mulberry Street is closed before and during events at the Prudential Center and vehicles park in front of the venue, having a textured or a different color paving material for the pedestrian refuge island is preferred.

Additional pedestrian lighting along streets and near crosswalk in this area is recommended as drivers have reported difficulty seeing pedestrians at night in this area.

5.6 Ironbound

The Ironbound neighborhood has high pedestrian and vehicular activity. The recommendations for bicycle connectivity and vehicular improvements in the Ironbound neighborhood are shown below in **Figure 37** and are described in further detail below.

Figure 37: Ironbound Neighborhood Recommendations

5.6.1 Bicycle and Vehicular

It is recommended that the section of Pacific Street between Elm Street and South Street be converted from a two-way street to a one-way street in the northbound direction with a one-way bicycle lane with a striped buffer in the northbound direction. One vehicular travel lane in the southbound direction would also be removed in order to accommodate the addition of the bicycle lane. All on-street parking spaces would be maintained on this section of the street. Conversion of the street from a two-way street to a one-way street would align with the northbound/ southbound alternating direction of streets in this neighborhood, providing more legibility to the local transportation network. Southbound traffic that would have taken Pacific Street would be diverted to the two nearby streets, McWhorter Street and Jefferson Street, which are both one-way southbound streets. **Figure 38** shows the existing and recommended lane configuration of Pacific Street between Elm Street and South Street.

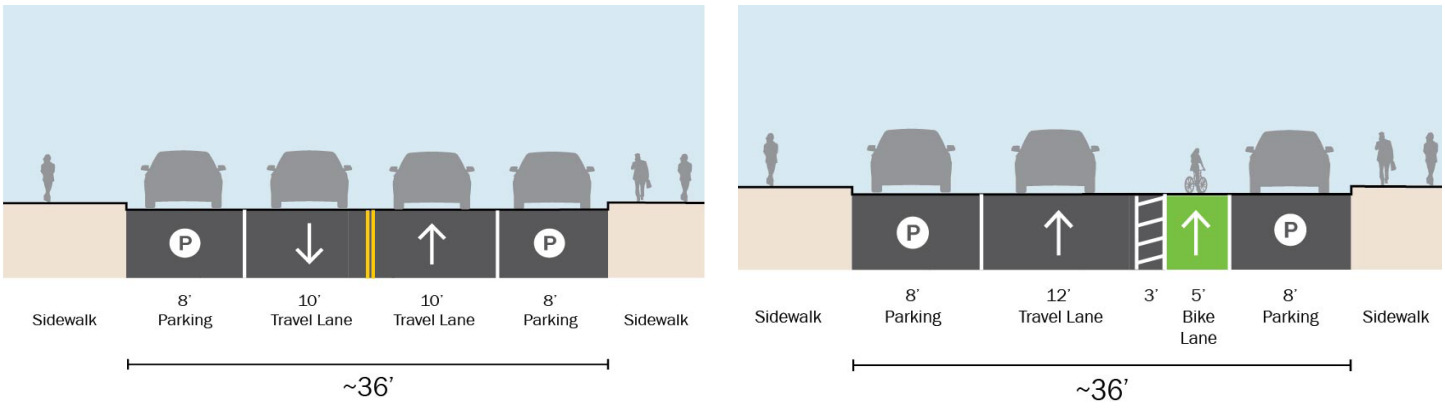

Figure 38: Existing and Recommended Cross Section of Pacific Street (looking north)

It is recommended that Jefferson Street between Market Street and Ferry Street be converted from a two-way street to a one-way street in the southbound direction with a one-way bicycle lane with a striped buffer. Converting these two blocks that operate as a two-way street to a one-way street would align with the remainder of Jefferson Street. As on-street parking is valuable in this residential area of town, the on-street parking spaces would be maintained. **Figure 39** shows the existing and recommended lane configuration of Jefferson Street between Market Street and Ferry Street.

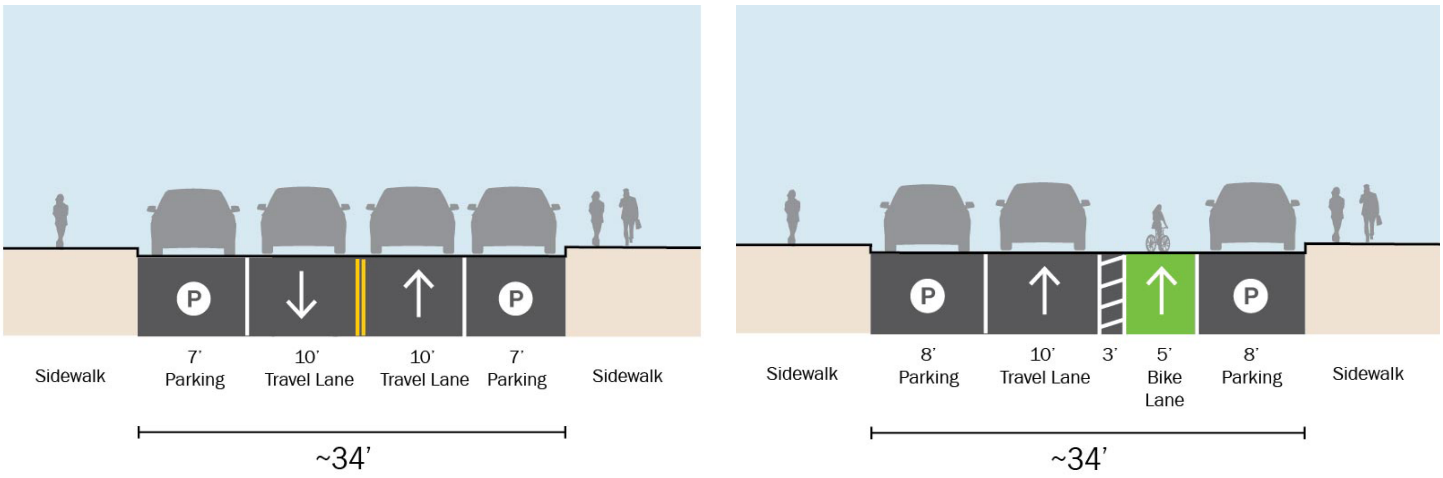

Figure 39: Existing and Recommended Cross Section of Jefferson Street (looking south)

6
IMPLEMENTATION MATRIX

Actions for implementation are contained in the Implementation Matrix (see **Table 12** on page 67), organized as line-items. The Implementation Matrix provides the list of infrastructure recommendations by Activity Center, along with additional detailed information:

- Specific locations of the recommendations
- Estimated timeframe for completion
- Estimated order-of-magnitude costs
- Responsible implementing agency

The timeframe for implementation is divided into three categories. These ranges are project durations from conceptual to design and construction.

- 1-3 Years
- 3-5 Years
- 5+ Years

The cost estimates include design and construction related costs (operating and maintenance costs are not included).

The majority of the recommendations in the matrix indicate the City of Newark as the responsible agency. An outside implementing agency (or agencies) is identified when a particular line item requires the approval of another jurisdictional agency.

6.1 Potential Funding Sources

The City of Newark has the opportunity to receive financial assistance for transportation infrastructure projects. Federal and state programs are available to be used for the types of infrastructure recommendations listed in the Implementation Matrix. **Table 13** (see page 68) provides a list of these programs, along with the program administrators, the estimated award amounts based on previous recipient amounts, eligibility information, and the website link of each program.

Improvement	Location	Timeframe Immediate = 1-3 Years Short-Term = 3-5 Years Long-Term = 5+ Years	Estimated Cost	Responsible Department / Agency
		Grand Total	**$9,505,000**	
University Area Activity Center			**Subtotal --> $615,000**	
Road Diet and addition of separated bike lanes	Raymond Blvd between Lock St and University Ave	1-3 Years	$175,000	City of Newark
Road Diet and addition of separated bike lane	University Ave between Lackawanna Ave and Central Ave	1-3 Years	$65,000	City of Newark
Sussex Park Extension with lane reduction	Sussex Ave at MLK Blvd and Summit St	3-5 Years	$275,000	City of Newark
Add curb extensions	MLK Blvd and Warren Street	1-3 Years	$100,000	City of Newark
All Pedestrian and/or Leading Pedestrian Interval signal phase	Central Ave. and MLK Blvd	1-3 Years	$55,000	City of Newark
Penn Station Activity Center			**Subtotal --> $3,060,000**	
Road Diet and addition of separated bike lanes	Raymond Blvd between University Ave and Market St	1-3 Years	$325,000	City of Newark
Park Extension with lane reduction	Raymond Plaza East between Edison Pl and Ferry St	3-5 Years	$150,000	City of Newark
All Pedestrian and/or Leading Pedestrian Interval signal phase	McCarter Highway and Market St McCarter Highway and Raymond Blvd Raymond Blvd and Raymond Plaza West Market St and Ferry St/Raymond Plaza East	1-3 Years	$20,000	NJDOT, City of Newark
Remove Left Turn Movement	McCarter Highway and Raymond Blvd - Northbound approach	3-5 Years	$25,000	NJDOT
Add Left Turn Movement	McCarter Highway and Commerce St - Northbound approach	3-5 Years	$15,000	NJDOT
Add curb extensions	Market St and Ferry St/Raymond Plaza East	1-3 Years	$75,000	City of Newark
Add Pedestrian Refuge Islands	McCarter Highway and Market St - Northbound and Southbound approaches	3-5 Years	$400,000	NJDOT
Reconfiguration of one-way street to two-way street	Raymond Plaza West between Market St and Raymond Blvd	5+ Years	$250,000	NJ TRANSIT, City of Newark
Add roundabout	Raymond Plaza West between Market St and Raymond Blvd	5+ Years	$1,800,000	NJ TRANSIT, City of Newark
Military Park Activity Center			**Subtotal --> $1,940,000**	
Park Extension with lane reduction and conversion to angle parking	Park Place between Broad St and Park Place (East of Military Park)	3-5 Years	$760,000	City of Newark
All Pedestrian and/or Leading Pedestrian Interval signal phase	Broad St and Bleeker St Park Pl and Rector St Broad Street and Park Pl/Central Ave Raymond Blvd and Broad St	1-3 Years	$20,000	City of Newark
Add pedestrian refuge islands	Broad St and Prudential Dr - Southbound approach Broad St and New St - Southbound approach	1-3 Years	$975,000	City of Newark
Add curb extensions	Broad St and Bleeker St Park Pl and Rector St Park Pl and E. Park St	1-3 Years	$75,000	City of Newark
Add crosswalks	Park Pl and E. Park St Broad St and Central Ave	1-3 Years	$40,000	City of Newark, Essex County
Install bus shelter	Park Pl between Raymond Blvd and E. Park St	1-3 Years	$50,000	City of Newark, NJ TRANSIT
Create pedestrian plaza (seasonal)	Halsey St between Prudential Dr and Bleeker St	1-3 Years	$20,000	City of Newark
Lincoln Park Activity Center			**Subtotal --> $3,210,000**	
Reconfiguration of one-way street to two-way street	Lincoln Park - North of Lincoln Park	3-5 Years	$75,000	City of Newark
Park extension with lane reduction and conversion to angle parking	Lincoln Park - South of Lincoln Park	3-5 Years	$425,000	City of Newark
Intersection improvements	Lincoln Park / Broad St / Camp St Intersection	3-5 Years	$300,000	City of Newark
All Pedestrian and/or Leading Pedestrian Interval signal phase	Broad St and Pennington St Broad St and Camp St	1-3 Years	$10,000	City of Newark
Add pedestrian refuge islands	Broad St and Chestnut St - Southbound approach Broad St and Camp St - Northbound approach Broad St and Pennington St - Northbound approach	1-3 Years	$600,000	City of Newark
Reconfigure intersection to roundabout	Clinton Ave and Washington St/Lincoln Park South	5+ Years	$1,800,000	City of Newark
Prudential Center Activity Center			**Subtotal --> $465,000**	
Create pedestrian plaza	Beaver St between Market St and Clinton St	1-3 Years	$50,000	City of Newark
All Pedestrian and/or Leading Pedestrian Interval signal phase	Broad St and Branford Pl Broad St and Market St Mulberry St and Market St	1-3 Years	$15,000	City of Newark
Add pedestrian refuge island	Mulberry St and Edison Pl - Northbound approach	1-3 Years	$300,000	City of Newark
Add curb extensions	Mulberry St and Lafayette St Broad St and William St Broad St and Branford Pl/Edison Pl Broad St and Market St	1-3 Years	$100,000	City of Newark
Bike Irounbound Recommended Improvements			**Subtotal --> $160,000**	
Reconfiguration of two-way street to one-way street with addition of bike lane	Pacific St between Elm St and Thomas St	3-5 Years	$125,000	City of Newark
Reconfiguration of two-way street to one-way street with addition of bike lane	Jefferson St between Ferry St and Market St	3-5 Years	$35,000	City of Newark

Table 12: Implementation Matrix

Program Name	Program Administrator	Estimated Award ($) (Based on previous recipient amounts)	Eligibility	Website with more information
Municipal Aid	NJDOT	$100,000 - $3,000,000	Municipalities are eligible to apply for improvement of any public road or bridge governed by the municipality. $10 million is allotted for municipalities qualifying for Urban Aid. Eligible Project Categories: Bikeway, Bridge Preservation, Mobility, Pedestrian Safety, Quality of Life, Roadway Preservation, Roadway Safety For more information, see Municipal Aid Program Handbook.	https://www.state.nj.us/transportation/business/localaid/documents/MunicipalAidProgramHandbook8-22-2017.pdf
County Aid	NJDOT	N/A	Any public road or bridge under the jurisdiction of a county, regardless of location within that county is eligible for funding. For more information, see State Aid Handbook.	https://www.state.nj.us/transportation/business/localaid/documents/StateAidHandbook.pdf
Bikeway Grant Program	NJDOT	$100,000 - $300,000	Counties and municipalities are eligible for the program. Bike projects must create new bike path mileage. Typical eligible projects: New bikeway mileage Separation of bikeway from motor vehicle traffic through a barrier or an open space. Bikeway connecting to an existing local or regional bicycle system Bikeway improving access to public facilities For more information, see Bikeways Handbook	https://www.state.nj.us/transportation/business/localaid/documents/BikewayHandbook19.pdf
Safe Streets to Transit Grant Program	NJDOT	$150,000 - $400,000	Counties and municipalities are eligible for the SSTT grant program. Typical eligible projects: Intersection safety improvements that eliminate pedestrian barriers. Constructing new sidewalks, curb ramps, sidewalk widening, and major reconstruction. Safety enhancements for pedestrian access to transit stops. Traffic control devices that benefit pedestrians. Traffic calming measures. Pedestrian signals and push buttons at key intersections. Pedestrian oriented lighting. Major sidewalk reconstruction. For more information, see Safe Streets to Transit Handbook.	https://www.state.nj.us/transportation/business/localaid/documents/SSTTHandbook.pdf
Transit Village Grant Program	NJDOT	$80,000 - $400,000	Any municipality which has received the Transit Village designation from the Commissioner of Transportation is eligible to apply to this program. A half-mile radius circle around a transit facility defines the transit village area. For more information, see Transit Village Program Handbook. Typical eligible projects: Bicycle/pedestrian paths and lanes. Bike route signs. Bicycle parking and storage. Way-finding signage. Improvements to transit stations. Rehabilitation of historic train stations. Information kiosks with transit info. Construction of a modern roundabout. Traffic flow improvement/signal synchronization. Traffic calming measures.	https://www.state.nj.us/transportation/business/localaid/documents/TransVillageHandbook.pdf
Local Lead Program	NJDOT	Design costs should exceed $100,000. Construction costs should be a minimum of $250,000.	Projects must be located on roads with functional classifications other than rural minor collector, rural local collector, or urban local or part of the National Highway System (NHS). Projects must be transportation related. Bridges must be included on the most recent National Bridge Inventory, Highway Bridge Replacement and Rehabilitation List. A project must have received a current Categorical Exclusion, a Finding of No Adverse Affect, or a Record of Decision from the Federal Highway Administration (FHWA). A project must have received a current environmental document, or actions that are included in the “Programmatic Agreement for Approval of Certain Categorical Exclusions” found elsewhere in the Federal Aid Handbook. For more information, see Federal Aid Handbook.	https://www.state.nj.us/transportation/business/localaid/documents/FederalAidHandbook.pdf
Safe Routes to School	NJDOT	$175,000 - $700,000	Any county, municipality, school, school district, or board of education may submit an SRTS application, provided they demonstrate an ability to meet the requirements of the program. This includes charter and private schools, provided that the project is in the public rightof-way. Non-profit entities who are responsible for the administration of local transportation safety programs are eligible to apply. Examples of SRTS infrastructure projects: On-street bike lanes or shoulders, off-road bike paths or trails, bike routes signs, bicycle parking, new or upgraded sidewalks, ADA curb ramps, crosswalk installation or striping, pedestrian crossing signs, pedestrian push buttons or signal heads, school zone delineation (signs, striping, lighting), traffic calming devices (i.e. medians, curb extensions, speed humps/tables, and full partial street closures), new or upgraded intersection and/or crosswalk treatments. For more information, see Safe Routes to School Handbook	https://www.state.nj.us/transportation/business/localaid/documents/SRTSHandbook20185-14-18.pdf
Transportation Alternatives Program	NJDOT	$250,000 - $1,000,000	Eligible entities include local governments, regional transportation authorities, transit agencies, any other local or regional governmental entity with responsibility for oversight of transportation (other than a MPO or a State agency). Eligible activities include design and construction of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, conversion and use of abandoned railroad corridors for trails for pedestrians, bicyclists, and other non-motorized transportation users. For more information, see Transportation Alternatives Program Handbook.	https://www.state.nj.us/transportation/business/localaid/documents/2018TASet-AsideHandbook5-15-18.pdf
Local Safety Program	NJTPA/NJDOT	N/A	Projects on municipal or county roadways are eligible. Projects are focused on crash prone locations that are prioritized through collected crash data. Safety improvements must be construction ready. For more information, see the Federal Aid Handbook.	https://www.state.nj.us/transportation/business/localaid/documents/FederalAidHandbook.pdf
New Jersey Transportation Bank	NJDOT/New Jersey Infrastructure Bank	N/A	Municipalities, counties, regional transportation authorities, or any other political subdivision of the state are eligible to apply. NJTIB Loans are available for capital projects for public highways, approach roadways and other necessary land-side improvements, ramps, signal systems, roadbeds, transit lanes or rights of way, pedestrian walkways and bridges connecting to passenger stations and servicing facilities, bridges, and grade crossings.	https://www.njib.gov/njtib

Table 13: Funding Sources Matrix