Southern Middlesex County Freight Movement Study

MIDDLESEX COUNTY • NJ

NJTPA

About this Report

This report has been prepared as part of the North Jersey Transportation Planning Authority (NJTPA) Subregional Studies Program with financing by the Federal Transit Administration and the Federal Highway Administration of the U.S. Department of Transportation. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The NJTPA is solely responsible for its contents.

The North Jersey Transportation Planning Authority (NJTPA) is the federally authorized Metropolitan Planning Organization (MPO) for the 13-county northern New Jersey region, home to 7 million people. It evaluates and approves transportation improvement projects, provides a forum for cooperative transportation planning, sponsors and conducts studies, assists county and city planning agencies and monitors compliance with air quality goals. The NJTPA Board includes 15 local elected officials representing 13 counties—Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union and Warren—and the cities of Newark and Jersey City. The Board also includes a Governor's Representative, the Commissioner of the New Jersey Department of Transportation (NJDOT), the Executive Director of NJ TRANSIT, the Chairman of the Port Authority of New York & New Jersey and a Citizen's Representative appointed by the Governor.

Table of Contents

LIST OF FIGURES

EXECUTIVE SUMMARY

Southern Middlesex County is home to a large and growing number of freight and logistics businesses. These businesses rely heavily on trucking, and on truck routes throughout the County – including the New Jersey Turnpike, U.S. Route 130, U.S. Route 1, State and County routes, and local roads. With growth in truck volumes, truck facilities being developed further from the Turnpike and U.S. Route 130, and infill residential development, conflicts between truck operations and community activity have become a greater concern.

Middlesex County undertook this Southern Middlesex County Freight Movement Study to address current and future freight movement issues. To focus the analysis, the study considered two geographic areas, a Primary Study Area encompassing four municipalities in Middlesex County, as well as a Secondary Study Area, that included the rest of the County as well as Mercer and Monmouth counties.

This study was completed with assistance and support from the North Jersey Transportation Planning Authority (NJTPA), with technical guidance from state and regional agencies and local governments, and extensive public and community input via stakeholder meetings, public meetings, and web-based survey and comment tools. This included:

- **Technical Advisory Committee**: Comprised of representatives from municipalities, County departments, state agencies, transportation management associations and the NJTPA, this group met four times to provide guidance and insight and to collaborate with the project team throughout the study.

- **Public Engagement**: Two in-person public meetings were held to present information about the study and gather input. In addition, an interactive online map was used to obtain detailed feedback about transportation issues, problems, and opportunities at specific locations. Three newsletters, each available in three languages (Spanish, Hindi, and Gujarati) were distributed, along with print and social media announcements to share information at key milestones during the study.

- **Stakeholder Outreach**: Two stakeholder meetings were convened with various interested parties, along with 12 industry interviews with freight carriers, real estate developers and brokers, and freight customers. Individual meetings were also held between the project team and representatives from the four Primary Study Area municipalities to gain a better understanding of the various freight needs.

Six goals were established for the study:

- **Foster collaboration** among municipal partners, private industry, and regional entities, and build consensus for study recommendations.
- **Evaluate the existing transportation facilities (road and rail)** used for regional and local freight movement within, to, and from the Primary and Secondary Study Areas.
- **Identify potential routing alternatives for trucks** to reduce negative impacts to local communities/neighborhoods within the Primary Study Area, avoiding environmentally sensitive lands and conservation areas.
- **Identify potential improvements to existing road and rail facilities** to address congestion, safety, multi-modal mobility, accessibility, traffic operations, and impacts of regional traffic on local communities/neighborhoods, and to consider benefits to efficiency, equity, reliability, resiliency, and sustainability.
- **Identify recommendations to improve job access for logistics industry workers** employed within the Primary Study Area.
- **Fairly distribute the benefits and burdens of study recommendations**. Avoid recommendations that cause a disproportionate burden on environmental justice communities.

The study addresses two defined geographic areas:

- The **Primary Study Area** includes the townships of Cranbury, Monroe, and South Brunswick and the Borough of Jamesburg, in Middlesex County, New Jersey. This area contains three major north-south highways designated as truck routes – the New Jersey Turnpike (Interstate 95), U.S. Route 1, and U.S. Route 130 – and Turnpike Interchange 8A sits at the center of the area. Improvement recommendations focus on this Primary Study Area.
- The **Secondary Study Area** includes the remainder of Middlesex County and the adjoining counties of Mercer and Monmouth. Freight movement between the Primary and Secondary Study Areas was considered in developing improvement recommendations for the Primary Study Area. Understanding traffic flows and origins/destinations to the larger Secondary Study Area was particularly important in addressing issues that stem from conditions beyond the Primary Study Area.

How was the extent of the Primary Study Area selected?
This boundary was selected due to its proximity to the New Jersey Turnpike, rail lines, and availability of developable land. Southern Middlesex County has long been a locally, regionally, and nationally significant freight and logistics hub, centered on the agglomeration of warehousing and distribution centers near Interchange 8A. Connections to the Port Newark-Elizabeth Marine Terminal, coupled with lower cost land led to the

development of office space and warehousing centers that have increased significantly in recent years as infrastructure investments at the Port, on the New Jersey Turnpike, and the statewide highway network facilitated movement, supporting increased e-commerce consumption trends. At the same time, massive housing growth has occurred and continues to occur in the area, resulting in conflicts between pedestrians, cars, and large trucks, taxing local and County roadways that were not constructed to support such growth.

The study featured detailed data collection on freight and passenger movements to, from, within, and through the Primary Study Area, with emphasis on: (1) identifying congestion, safety issues, neighborhood conflicts, and other issues; (2) understanding why trucks are in those locations and generating the issues; and (3) developing a vision and recommendations for the types of improvements and actions that could avoid, minimize, or mitigate the issues. Data analysis addressed:

- Policy Documents and Previous Studies
- Land Use
- Freight Movement
- Equity Analysis
- Infrastructure Characteristics
- Travel Patterns and Routings
- Congestion, Capacity, Speed
- Wayfinding
- Crashes
- Transit Connections

The Southern Middlesex County Freight Movement Study provides a comprehensive set of recommendations to improve conditions for trucks and residents in the project's Primary Study Area. This report describes the recommendations in detail and provides four appendices including: an implementation matrix; technical data on existing conditions; technical data on analysis and mapping; and public and stakeholder outreach.

The study identified over 60 recommendations for physical improvements to transportation infrastructure, further studies, implementing actions, and policy revisions. These recommendations address the following six key opportunity areas.

Truck Movement – reducing truck congestion on routes to improve truck throughput, decrease overall congestion (including for passenger vehicles), and

provide adequate routes so that truck operators are discouraged from traveling through residential neighborhoods

Wayfinding – upgrading signage and working with the companies responsible for wayfinding software and services to encourage trucks to operate on designated truck routes and discourage them from operating in residential neighborhoods

Neighborhood Protection – evaluating truck restrictions and turn improvements in select locations where trucks are encouraged or required to go and implement Complete Streets measures, where appropriate, to reduce speeding and discourage unwanted and unnecessary truck traffic

Truck Parking – addressing the demand for off-street truck parking for staging at facilities and/or federal Hours of Service rest requirements

Workplace Accessibility – expanding multi-modal workplace accessibility options for freight industry employees

Implementation – identifying funding mechanisms, partnerships, and best practice planning tools to promote implementation of study recommendations

Study recommendations address a wide variety of needs and concerns in the Primary Study Area. The study recommendations are summarized in the following tables and those that are location-specific are mapped in Figure 1. The figure includes ID numbers categorized by timeframe: Immediate (I), Short (S), Mid (M), and Long (L). These same ID numbers are included in the Implementation Matrix.

What follows is a broader summary of the type of improvements recommended for each of the six key opportunity areas.

- **Truck Movement** – corridor and intersection improvements aimed at accommodating trucks on certain corridors while discouraging them on others.
- **Wayfinding** – installing additional signage directing trucks to appropriate routes and collaborating with the private sector to better direct trucks along truck routes and away from residential neighborhoods

- **Neighborhood Protection** – implement Complete Streets improvements that enhance biking and walking, and discourage truck traffic
- **Truck Parking** – adequately accommodate the need for short-term and overnight truck parking in the Primary Study Area
- **Workplace Accessibility** – improving pedestrian pedestrian access and transit service to better facilitate commuting to employers in the Primary Study Area
- **Implementation** – broaden education, enforcement, policy, and coordination efforts to promote the implementation of recommendations put forward in this study

Truck Movement Recommendations	Locations
Adjust signal timing to address queuing issues at selected locations; monitor and review signal timing area-wide	CR 615 (Cranbury-South River Rd.) at Costco Drive; CR 522 (Ridge Rd./Rhode Hall Rd.) at CR 525 (Cranbury-South River Rd.); CR 614 (Prospect Plains Rd.) at CR 619 (Applegarth Rd.); Primary Study Area-wide
Conduct corridor traffic studies to improve traffic operations and signal improvements through Primary and Secondary Study Areas and address congestion, safety, noise, and related issues	US 130 and US 1
Reconfigure the CR 535/SR 32/Exit 8A interchange to accommodate queuing and reduce turn conflicts; widen NB CR 535 right turn lane, provide slip ramp to TPK on-ramp and widen TPK on-ramp to two lanes	Turnpike Exit 8A, CR 535 (Cranbury-South River Rd), SR 32 (Forsgate Dr)
Study a new North-South truck corridor with upgraded geometry, signage, shoulders, etc. as alternative to CR 619 (Applegarth Rd.)	Existing Brick Yard Rd, and Hightstown-Cranbury Station Rd; Gavett Dr. between Cranbury Half Acre Rd. and Prospect Plains Rd
Support Municipalities in working to implement large truck restrictions on key east-west roads between the new North-South truck corridor and CR 619 Applegarth Rd., with jug handles or other reverse-move assists where eastbound trucks encounter the restrictions; can also include supporting installation of additional advisory signage	Prospect Plains Rd. and Cranbury Half Acre Rd.at Gavett Dr.; Station Rd. at Hightstown-Cranbury Station Rd.
Improve travel times and increase capacity between SR 33 and US 130	US 130
Construct turn assists, adjust signal timing, or otherwise upgrade intersections	CR 522 (Ridge Rd.) at CR 679 (Georges Rd.); CR 522 (Ridge Rd./Rhode Hall Rd.) at CR 535 (Cranbury-South River Rd.); Hightstown-Cranbury Station Rd. at Brick Yard Rd.; CR 619 (Applegarth Rd.) at Cranbury Half Acre Rd., Prospect Plains Rd., and Station Rd.
Improve turning radii for trucks to make left turns through changes to markings and geometry	Hightstown-Cranbury Station Rd at CR 615 (Station Rd.)
Signalize intersection	Herrod Blvd. at Stults Rd.

Truck Movement Recommendations	Locations
Other CR 619 (Applegarth Rd.) improvements	Study impacts of future development along the SR 33 corridor; consider geometry improvements at SR 32 (Forsgate Dr.)
Other US 130 improvements	Reconfigure the CR 535 (South River Rd.) interchange and pedestrian access; signalize ramps at CR 522 (Ridge Rd.); consider safety improvements at the CR 539 (South Main St.) traffic circle; eliminate the northbound left turn or connect to CR 614 (Dey Rd.) at North Main St.
Study potential to widen TPK bridge allowing eventual widening of CR 535 (Cranbury-South River Rd) to four lanes	CR 535 (Cranbury-South River Rd) north of Interchange 8A

Wayfinding Recommendations	Locations
Work with private company GPS systems and public GPS providers to discourage them from offering neighborhood roads as preferred route choices	Primary Study Area-Wide
Add signage directing trucks between Exit 8A and NJ 33 to use US 130 in lieu of CR 619 (Applegarth Rd)	NJ 33
Add signage directing trucks west of the Turnpike to use US 130 to access Exit 8A rather than roads east of the Turnpike	East-West roads west of the Turnpike
Designate signage for entry on either CR 619 (Applegarth Rd) or CR 614 (Prospect Plains Rd)	Monroe Freight Cluster
Install additional and compliant vertical clearance signage	CR 522 (Ridge Rd.)
Evaluate need for additional wayfinding signage on other routes	Primary Study Area-Wide
Work with warehouses to establish truck wayfinding signage at their driveways exits encouraging trucks to head westbound to U.S. Route 130 to then travel north or south	Cranbury Station Rd between U.S. Route 130 and Hightstown-Cranbury Station Rd

Neighborhood Protection Recommendations	Locations
Evaluate need/opportunity for: noise mitigation measures; weight restrictions, truck route lighting; speed limits/feedback signs; traffic calming; and bike/ped improvements	Primary Study Area-Wide
Provide Complete Streets guidance and improvements on County roads	Jamesburg; industrial clusters; schools
Implement pilot Complete Streets project with traffic calming, sidewalk improvements, pedestrian crossings, speed feedback, and design	CR 522 (Ridge Rd.) near Indian Fields Elementary
Complete sidewalk network, add traffic calming	CR 614 (Prospect Plains Rd.) at CR 615 (Cranbury-South River Rd.)

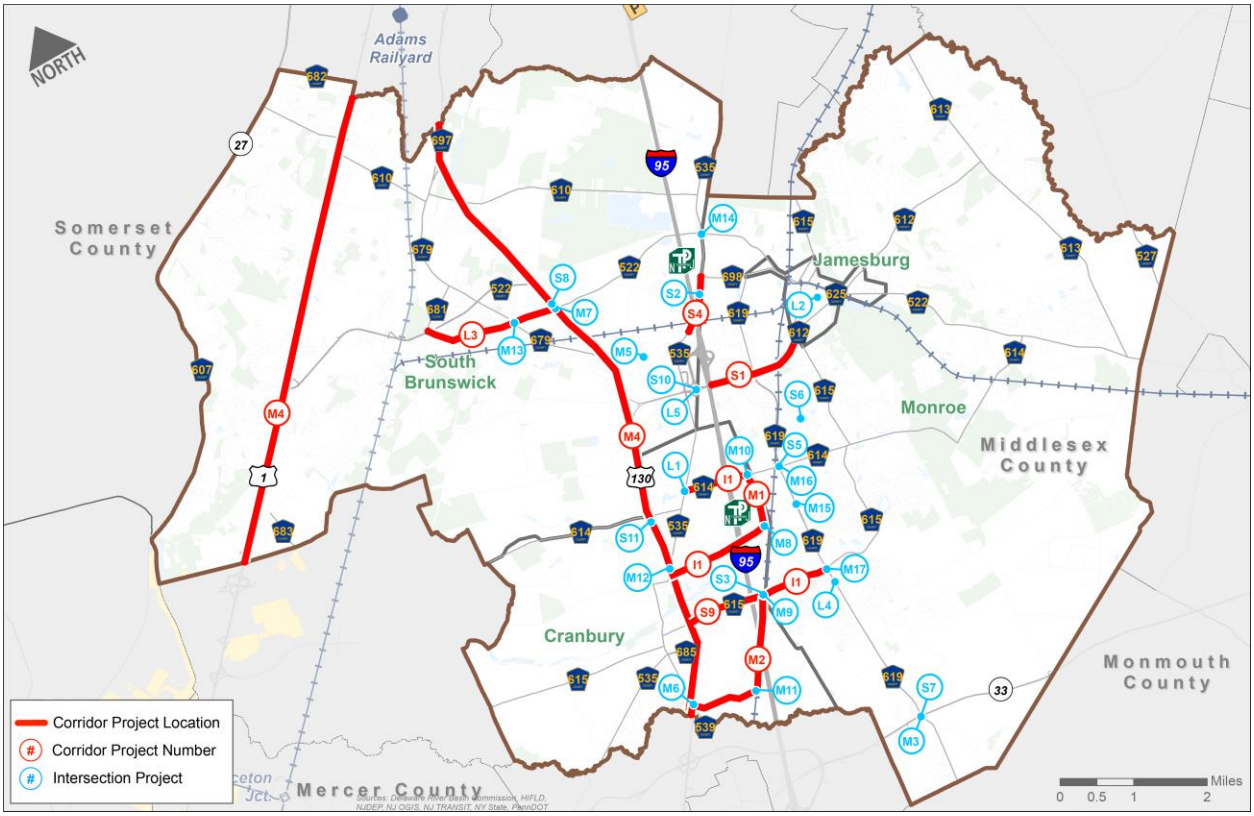
Truck Parking Recommendations	Locations
Study limited-service short-term parking lots for trucks arriving early for appointments	Key locations served by major truck routes
Study longer-term overnight parking lots with amenities and electric charging for trucks where the driver's daily hours-of-service time has expired	

Workplace Accessibility Recommendations	Locations
Improve pedestrian access, amenities, and shelters at bus stops serving industry clusters	Key locations and routes serving industrial clusters
Coordinate with private industries in planning and implementing a broader, coordinated system of worker shuttles to/from New Brunswick, Trenton and interim transit stations, supported by pedestrian amenities and bus stop protection	
Upgrade municipal bus route / County shuttle route coverage, operating hours, headways	

Implementation Recommendations	Locations
Implement a regional adaptive signal system	Primary Study Area-Wide
Educate the public about truck operator blind spots	
Enforce truck parking restrictions	
Establish an Inter-Municipal working group to advance study recommendations	
Establish a regional freight district to implement study recommendations and explore other opportunities related to land use policy coordination (such as on-site truck parking requirements for new development) and innovative funding (such as user fees)	
Coordinate with municipalities to develop truck parking guidance for adoption in comprehensive plans and zoning regulations	

Next steps for Middlesex County include evaluating and prioritizing recommendations and seeking funding to advance the recommendations. Many of the recommendations are identified as being implementable in the short term (within two years) and at low cost (estimated less than $100,000) by the County and/or its local, regional, and state partners, so these are strong targets for initial high-priority actions.

Figure 1: Site-Specific Recommendations



Please refer to **Appendix A – Implementation Matrix** for descriptions of each identified project shown **in Figure 1.**

INTRODUCTION

With its proximity to the New Jersey Turnpike, rail lines, and availability of developable land, Southern Middlesex County has long been a locally, regionally, and nationally significant freight and logistics hub. New Jersey Turnpike Interchange 8A is surrounded by industrial, warehousing and distribution centers, and other commercial uses. A combination of recent infrastructure investments at the Port Newark-Elizabeth Marine Terminal and the New Jersey Turnpike, and the development of commercial, industrial and office spaces on lower-cost land in and around southern Middlesex County has facilitated increased freight movement.

The freight industry's expansion in the area contributes to the increased traffic, congestion, and other associated conflicts between pedestrians, automobiles, and large trucks. This impacts local and County roadways and mobility infrastructure that were not constructed to support that level of growth, and intense use. Inevitably, quality of life issues have surfaced as congestion, travel delays, and crashes have increased, resulting in negative impacts on local communities, non-motorized travel, and the environment.

With industrial, commercial and warehousing growth expected to continue, Middlesex County wanted to better understand the transportation network's needs, performance, and safety issues, to identify recommendations for improvements. The County undertook this Southern Middlesex County Freight Movement Study with assistance and support from the North Jersey Transportation Planning Authority (NJTPA). Technical guidance was provided by state and regional agencies and local governments, while incorporating extensive public and community input.

To focus the analysis, the study considered two geographic areas, a Primary Study Area encompassing four municipalities in Middlesex County, as well as a Secondary Study Area, that included the rest of the County as well as Mercer and Monmouth counties.

Study Goals

Six goals were established for the study:

- **Foster collaboration** among municipal partners, private industry, and regional entities, and build consensus for study recommendations.
- **Evaluate the existing transportation facilities (road and rail)** used for regional and local freight movement within, to, and from the Primary and Secondary Study Areas.
- **Identify potential routing alternatives for trucks** to reduce negative impacts to local communities/neighborhoods within the Primary Study Area, avoiding environmentally sensitive lands and conservation areas.

- **Identify potential improvements to existing road and rail facilities** to address congestion, safety, multi-modal mobility, accessibility, traffic operations, and impacts on regional traffic on local communities/neighborhoods and to consider benefits to efficiency, equity, reliability, resiliency, and sustainability.
- **Identify recommendations to improve job access for logistics industry workers** employed within the Primary Study Area.
- **Fairly distribute the benefits and burdens of study recommendations**. Avoid recommendations that cause a disproportionate burden on environmental justice communities.

Middlesex County's Vision Zero Pledge

Middlesex County is committed to eliminating traffic fatalities and serious injuries on roadways in the County by 2040. This extends to the Southern Middlesex County Freight Movement Study. Middlesex County will work in partnership with local municipalities, agencies, and other stakeholders to achieve this Vision Zero goal.

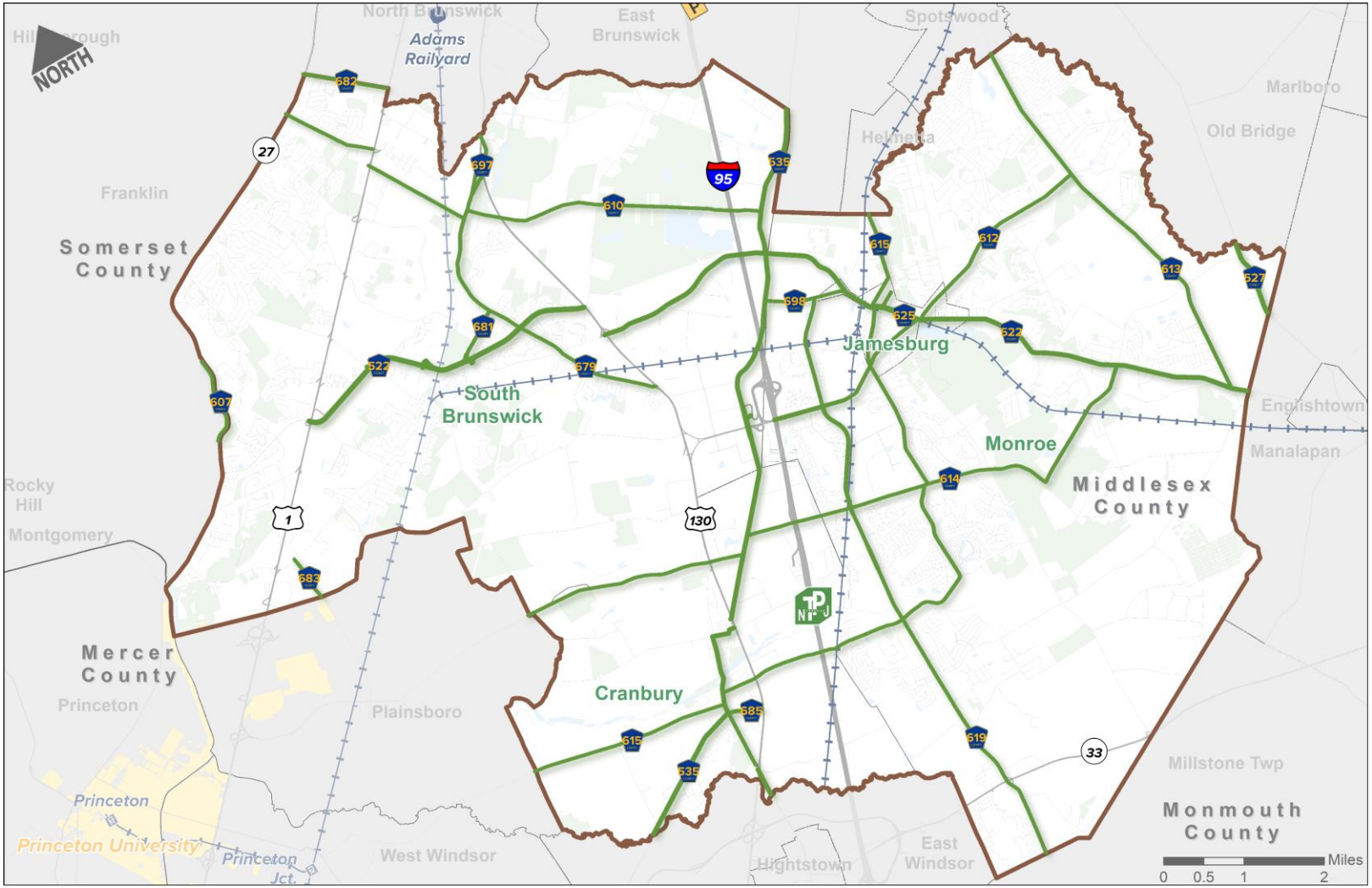
Study Areas

This report focuses its recommendations on a Primary Study Area, which is described below. However, a Secondary Study Area was also included to allow for the assessment of freight movement into and out of the Primary Study Area.

Primary Study Area

This area includes the Townships of Cranbury, Monroe, and South Brunswick, and the Borough of Jamesburg, in Middlesex County, New Jersey (see Figure 2). The area contains three major north-south highways designated as truck routes, including the New Jersey Turnpike (Interstate 95), U.S. Route 1, and U.S. Route 130. East-west routes include County Route 522 (Ridge Road) in the northern section of the Primary Study Area. While State Route 32 (Forsgate Drive) at Interchange 8A, and State Route 33 are in the southern portion of the Primary Study Area. The New Jersey Turnpike Interchange 8A effectively partitions the area into four quadrants with boundaries east and west of the New Jersey Turnpike, and north and south of State Route 32 (Forsgate Drive). The area has a diverse landscape of land uses predominantly comprised of commercial, industrial, agricultural, and residential. Many past agricultural land uses throughout the area have been redeveloped into industrial, warehousing, and commercial uses, particularly around Interchange 8A. Large e-commerce and retail companies, including Amazon, Costco, Wayfair, Home Depot, and Petco have distribution centers near the interchange. Additionally, shipping companies such as UPS and FedEx have warehouses in the area.

Figure 2: Primary Study Area



Primary Study Area County Route

Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS

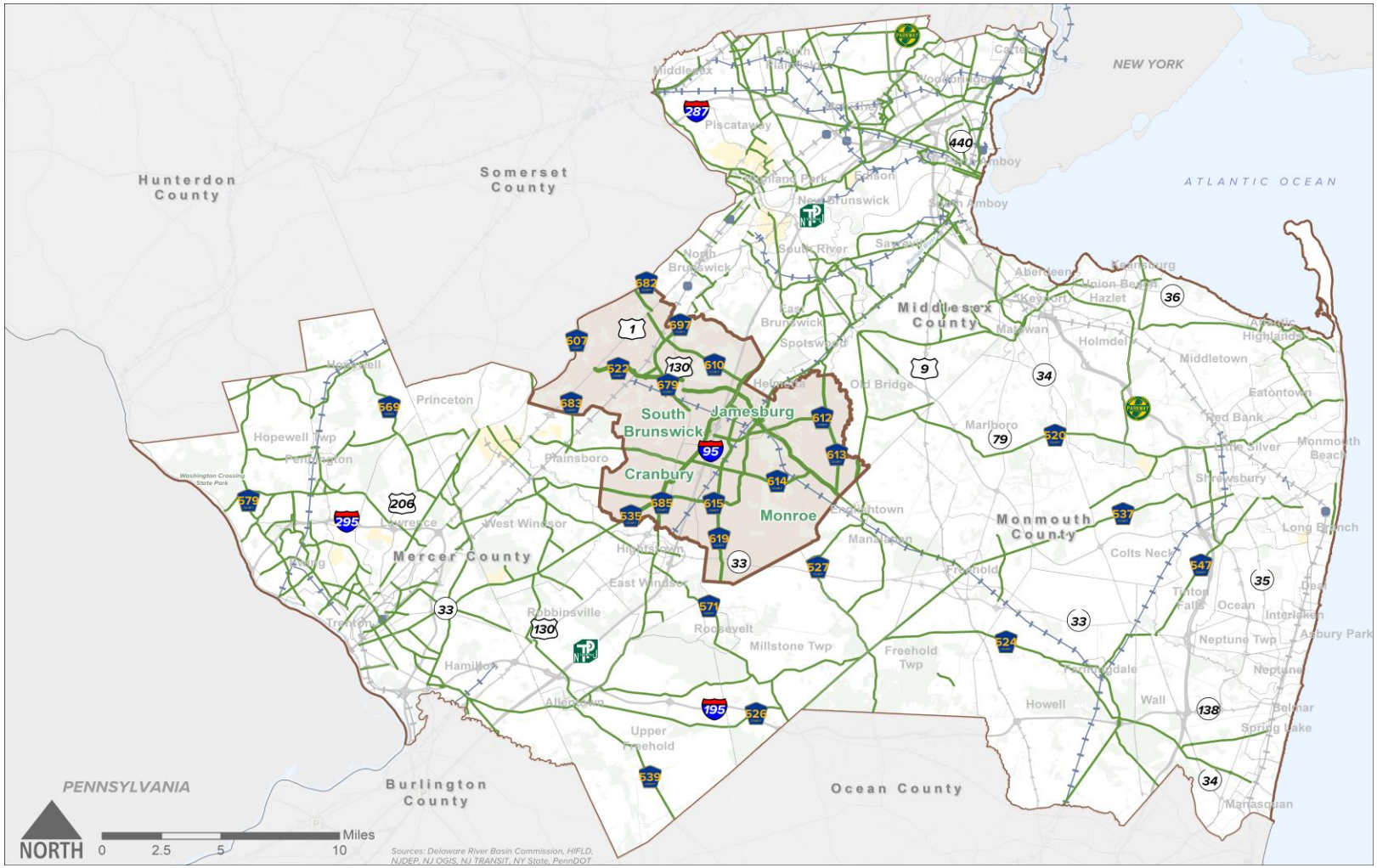
Secondary Study Area

This area includes the remainder of Middlesex County as well as the adjacent Counties of Mercer, and Monmouth in New Jersey (see Figure 3). These counties are linked to the Primary Study Area by three north-south routes – the New Jersey Turnpike, U.S. Route 1, and U.S. Route 130 – as well as two east-west routes – State Route 33 and County Route 522. Though adjacent to the Primary Study Area, Somerset County was not included in the Secondary Study Area due to a lack of major freight routes directly connecting the two areas.

How were the extents of the Primary Study Area selected?

This boundary was selected due to its proximity to the New Jersey Turnpike, rail lines, and availability of developable land. Southern Middlesex County has long been a locally, regionally, and nationally significant freight and logistics hub, centered on the agglomeration of warehousing and distribution centers near Interchange 8A. Connections to the Port Newark-Elizabeth Marine Terminal, coupled with lower cost land led to the development of office space and warehousing centers that have increased significantly in recent years as infrastructure investments at the Port, on the New Jersey Turnpike, and the statewide highway network facilitated movement, supporting increased e-commerce consumption trends. At the same time, massive housing growth has occurred and continues to occur in the area, resulting in conflicts between pedestrians, cars, and large trucks, taxing local and County roadways that were not constructed to support such growth.

Figure 3: Secondary Study Area



Primary Study Area Secondary Study Area County Route

Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS, DRBC, PennDOT, NY State

Public Engagement

Approach

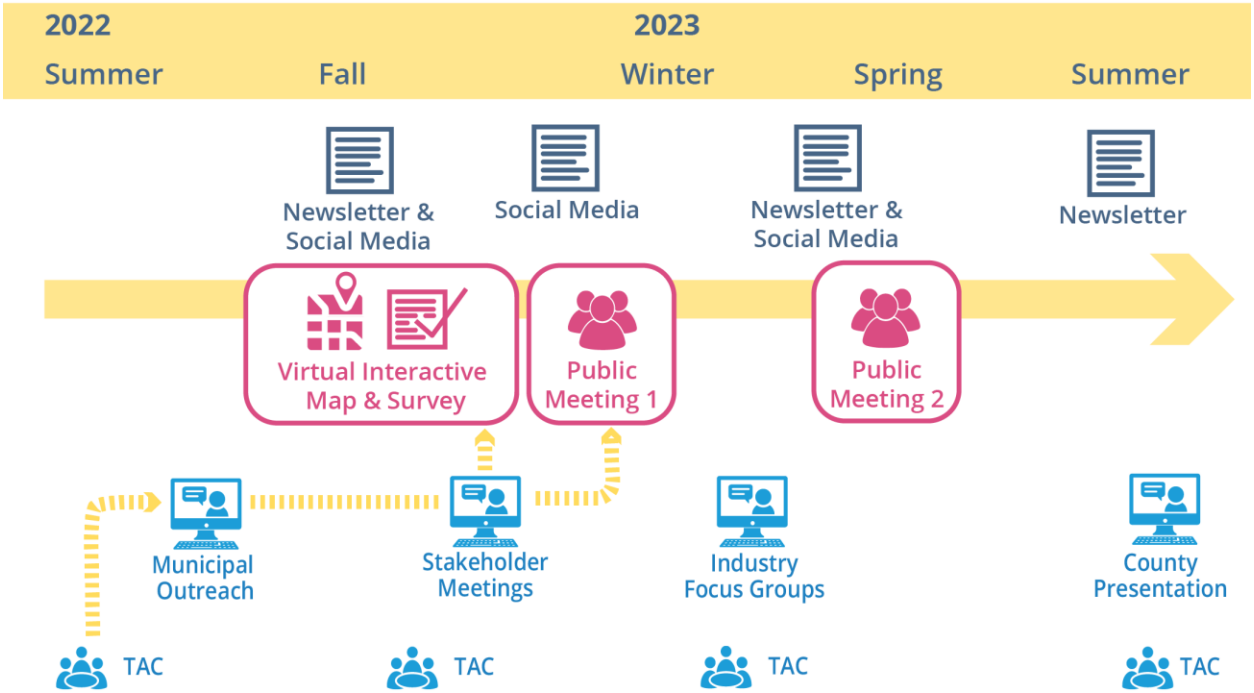
The Southern Middlesex County Freight Movement Study was guided by a robust Public Engagement process. A Public Engagement Plan (PEP) was developed in the early stages of the study, and then refined and executed throughout the study. The PEP and other outreach materials, including meeting summaries and key takeaways, are presented in public outreach for reference. Figure 4 displays a word cloud of solutions suggested via the public survey. The size of each word corresponds to the frequency of its use in the recommendations.

Figure 4: Public Survey Results - Solutions

Throughout the public outreach process, the study team sought opportunities to meet with community members to help build consensus for the outcomes of the project using in-person and virtual outreach formats. The needs of Limited English Proficiency (LEP) stakeholders were considered and addressed throughout the study, and materials followed Middlesex County branding standards.

The key elements of the executed PEP are shown in Figure 5.

Figure 5: Elements of the Executed Public Engagement Plan



Technical Advisory Committee (TAC)

The TAC provided advice on the technical aspects of the study. The TAC members included a mix of local, state, and regional subject matter experts. The County invited representatives from the following agencies and groups to participate in the TAC:

- Middlesex County Office of Public Works
- Middlesex County Office of Planning
- Middlesex County Office of Engineering
- Middlesex County Area Transportation (MCAT)
- NJDOT
- NJTPA
- NJ TRANSIT
- New Jersey Turnpike Authority
- NJ Office of Planning Advocacy
- Keep Middlesex Moving Inc.
- Greater Mercer TMA
- Mercer and Monmouth County Planning Departments
- Cranbury, Jamesburg, Monroe, and South Brunswick Mayors or their designee

- Cranbury, Jamesburg, Monroe, and South Brunswick Planning and Engineering officials, and other entities as directed by the County.

The TAC met four times during the development of the study report.

Web Page

The project web page was launched in summer 2022 with an overview of the study, schedule, map of the Primary and Secondary Study Areas, and comment form. Over the course of the study, materials including meeting flyers, presentations (including Spanish translations), and newsletters were added. Public meetings, as well as the online methods of engagement, were advertised via the County website.

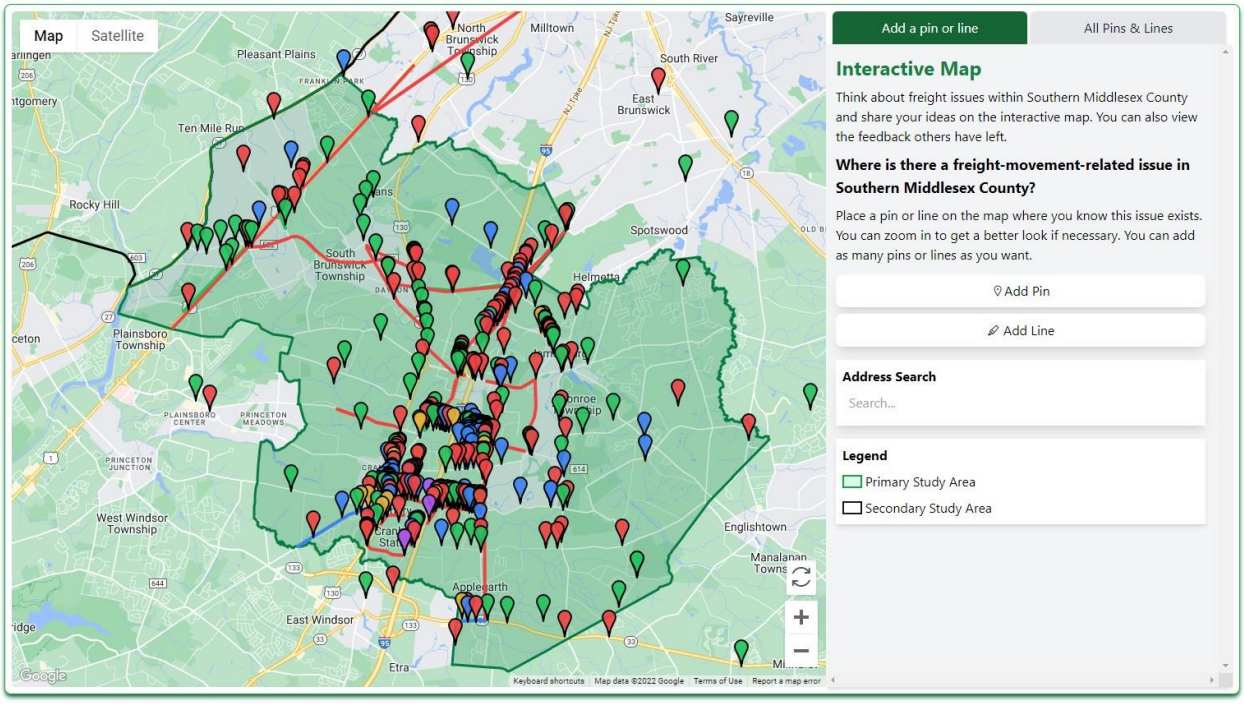
Newsletters, and Social Media

Three newsletters were developed highlighting study goals and objectives, key topics, a schedule, upcoming event and meeting announcements, the project webpage address, and contact information, along with one-page flyers to promote the two public meetings. The newsletters and flyers were provided in PDF format to be emailed to County contact lists, the TAC, and other stakeholders and placed on the web page, and were available in print form at public meetings. The newsletters and flyers were available in four languages (English, Spanish, Hindi, and Gujarati). Print and social media announcements and posts were also distributed at key milestones.

Online Engagement – Map and Survey

An online interactive map was developed to obtain geographic and detailed feedback on transportation issues, problems, opportunities, and recommendations from the general public. The map link was advertised in newsletters, at meetings, on Middlesex County and NJTPA websites, and by municipal partners. Participants had the opportunity to place a "pin" on a map of the study areas to denote a specific freight issue or concern and leave individual comments or feedback on the map. The map was accompanied by an online survey to solicit feedback on study priorities and existing freight conditions. The interactive map/survey was in English but compatible with browser plugins that auto-translate pages into alternative languages (i.e., Spanish, Hindi, or Gujarati). The map/survey platform was open for the majority of the study period and elicited nearly 1,000 comments and over 350 specific recommendations for projects or actions. A screenshot of the interactive map, showing public comments made at the time, is shown in Figure 6.

Figure 6: Interactive Map Screenshot, December 2022



Municipal Outreach

The Middlesex County executive leadership met with elected leaders of the four municipalities at the outset of the study. The goal was to ensure an understanding of the study goals, purposes, general schedule, planned forms of engagement, deliverables, and potential recommendation types. This outreach also sought to bolster buy-in to the study process from the municipal decision-makers and facilitate professional and public participation.

The study team followed up by conducting virtual meetings with municipal staff from Cranbury, Jamesburg, Monroe, and South Brunswick to discuss existing conditions, observed issues/needs, and improvement opportunities.

Stakeholder Meetings

The study team conducted meetings with established community stakeholder groups expressing an interest in the study. One meeting was held in-person with the Monroe Township Senior Advisory Council, and another was held virtually with the South Brunswick Transportation Advisory Committee.

Industry Focus Groups

Twelve interviews with freight stakeholders were conducted. Interviewees included carriers (such as trucking associations and truck fleet owners/operators), real estate developers and brokers, and freight customers. These interviews provided invaluable insights into the challenges and opportunities related to freight movement in the Primary Study Area.

Public Meetings

The study team conducted two public meetings. Meetings were advertised through online flyers and newsletters, online media (including County social media posts) websites, and municipal partners. The first meeting, held in December 2022 at the Monroe Senior Center, attracted nearly 100 participants, and focused on the study's background and purpose, existing conditions, issues, and potential solutions. The second meeting, held in April 2023 at The Cranbury School, attracted approximately 60 participants, and focused on review and discussion of draft recommendations. Each meeting included an open house component where members of the public could talk one-on-one with members of the study team and review presentation boards, as well as a formal Power Point presentation. The presentation was given in English, but a Spanish language version and Spanish-speaking staff were positioned at a work station in the room. The sessions were constructive and provided valuable input, which the study team incorporated into the final recommendations as appropriate.

Figure 7: Public Meetings

Middlesex County Planning Board

Finally, the study team presented an overview of the study to the Middlesex County Planning Board in June 2023, addressed questions, and received several comments and technical suggestions which were incorporated into the report.

ANALYSIS FRAMEWORK

Reader's Key

Each of the following elements of the Analysis Framework begin with a Summary of Takeways in a grey box with a green outline like the one below.

The information provided in these "takeaways" boxes are intended to summarize the importance of the respective Analysis Framework element to the larger Southern Middlesex County Freight Movement Study and its influence on development of recommendations.

The elements of the Analysis Framework are reviewed in the same order as they are presented in the study's two Technical Memos, included in this document's Appendices. This order of elements begins with a review of the background of the study area, including high level policy documents, and previous studies, land use, freight movement, and demographics (through an equity analysis). The framework then shifts to more transportation-focused data, including infrastructure, traffic patterns, wayfinding, crashes, and transit connections.

The Analysis Framework summarizes the methodology by which data from various sources were collected and analyzed to inform the development of recommendations. More details about these processes can be found in Appendix B (Technical Memo on Existing Conditions) and Appendix C (Technical Memo on Data Analysis and Mapping). The summaries below present analysis and findings from both technical memos. For each variable, takeaways and impacts on the development of recommendations are included. Additionally, for purposes of clarity, for each variable, impacts on recommendations are summarized in the gray boxes.

Policy Documents and Previous Studies Review

The review of policy documents and studies provided insight into the history and evolution of infrastructure within the Primary Study Area. Other documents focus on freight within a much larger study area and can provide guidance into broader trends and targeted improvement types to the Primary Study Area. Though concerning a wide area, each of these studies and documents was reviewed and referenced in terms of how they can provide guidance and insight into the Primary Study Area.

Several relevant completed studies and policy documents were reviewed with the purpose of providing insight into the Primary Study Area, including the history and evolution of infrastructure, land uses, and travel patterns, as well as potential improvements. The studies and policies reviewed vary greatly. Some completed studies focus on portions of the County that are similar to the Primary Study Area and thus can provide insight into the larger issues, approaches, and potential recommendations. Other studies focus in part on the Primary Study Area, covering the transportation network and travel patterns (freight and non-freight), land use patterns, safety, and freight goods movement including truck parking. Additionally, master plans for each of the municipalities in the Primary Study Area were reviewed for their relevance to freight.

While more detail concerning the previous studies can be found in Appendix B, several examples of findings and guidance utilized as part of the Analysis Framework and development of recommendations are listed below:

- The 1997 U.S. 130 Corridor Study provides valuable insight into desirable design recommendations for the U.S. 130 corridor in the Primary Study Area.
- The 2007 New Jersey Turnpike Exit 8A Area Transportation & Land Use Study informed the public and stakeholder engagement of the Southern Middlesex County Freight Movement Study by introducing a review of competing perspectives from three user groups: the Statewide Public Sector, Local Government, and Private Sector. An understanding of these groups' distinct needs helps inform further dialogue between stakeholders and the project team.
- The Primary Study Area's municipality's master plans provided insights into the unique needs, concerns, and plans of each community in terms of freight movement. Land use goals in these master plans include encouraging industrial development in sites where existing infrastructure is provided and restricting their development next to residential land uses.

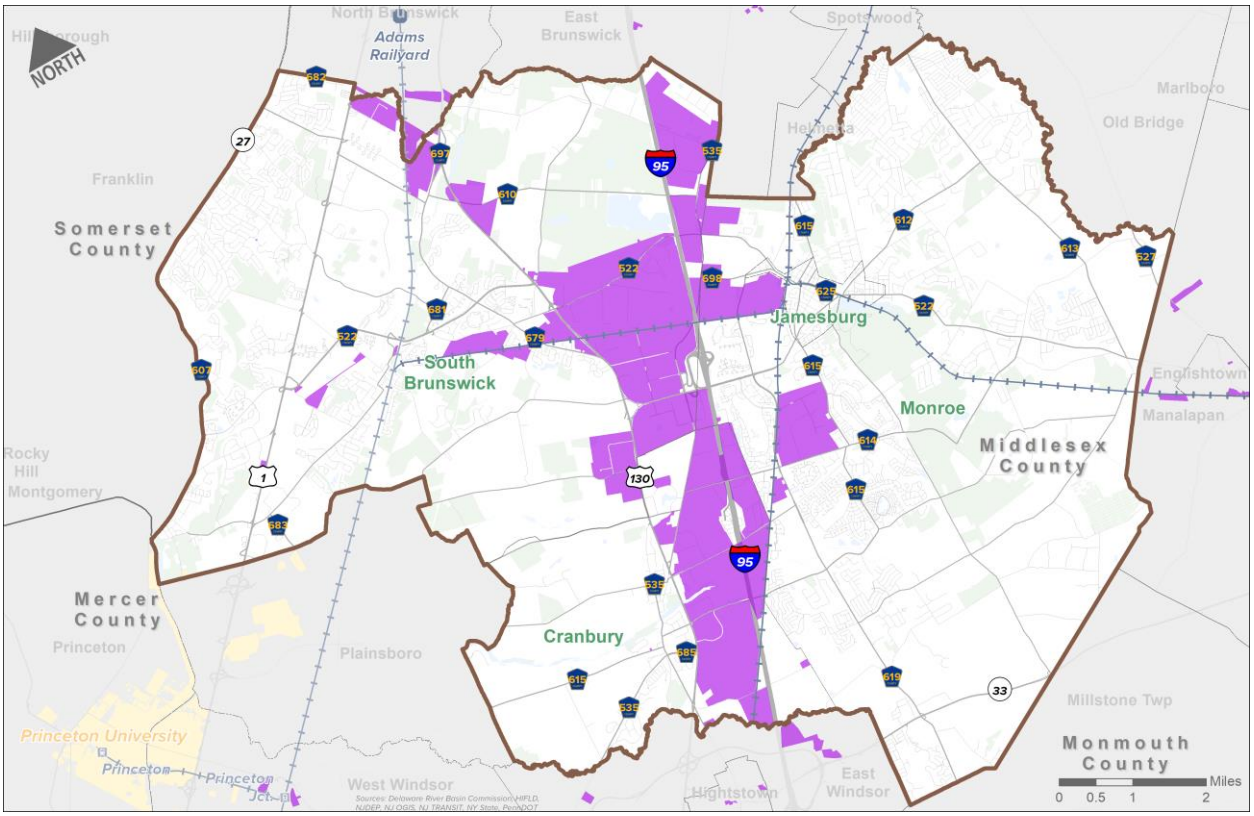
Land Use

Understanding where freight land uses are located is vital to understanding freight movement and demand in the Primary Study Area. Identifying non-freight land uses helps determine how the impact of truck movement throughout the area is distributed. Identification of planned, pending, and approved freight-generating land uses help anticipate future truck needs, including in the development of recommendations.

Land use data for the Primary Study Area was obtained from the New Jersey Office of Geographic Information Sciences. Freight land uses within the Primary Study Area are mainly concentrated north-south along the New Jersey Turnpike. Other predominant land uses in the area include residential, commercial, agricultural, and natural areas, and civic uses.

Several state and County sources were utilized to understand the location and size of freight-generating uses in the Primary Study Area. This resulted in the identification of freight clusters utilized and considered throughout the study process (see Figure 8). Additionally, County records indicate a total of 17 planned, pending, or approved Industrial (>50,000 square feet) and Commercial (>25,000 square feet) site plan applications submitted between 2020 and 2022. Fifteen of the 17 sites comprise applications for warehouses, one is for an office/warehouse project, and one is for a supermarket. Cumulatively, once complete, the 17 sites would add more than 8 million square feet of freight-generating floor area.

Figure 8: Freight Clusters



Identified Industrial Clusters

Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS, Nearmap, 2018-2022

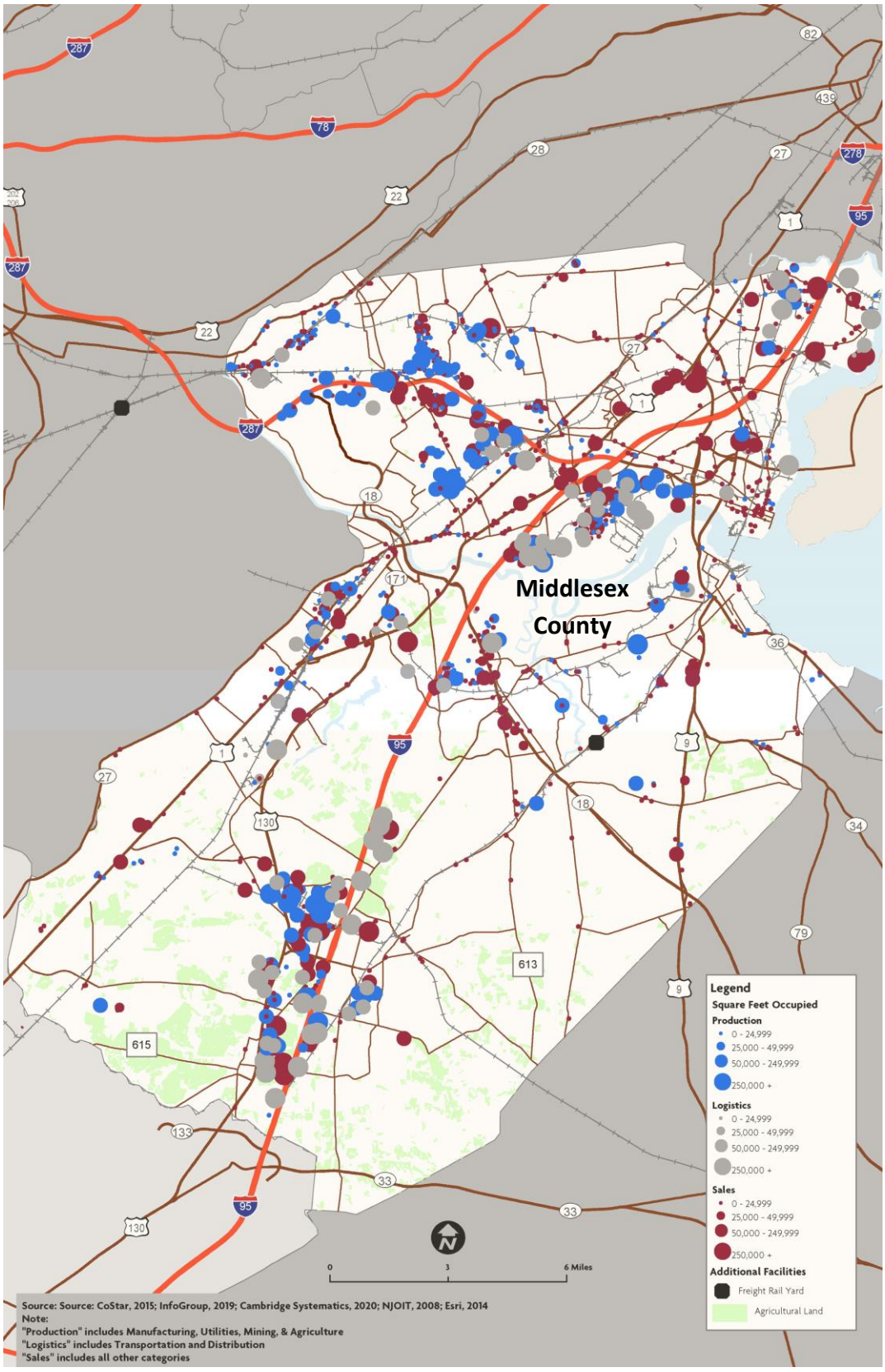
Freight Movement

The freight movement data provided by NJTPA offered a supplement to the land use analysis, providing additional detail as to the importance of freight in the Primary and Secondary Study Areas. By identifying particularly important industries in the area, the data also offered a starting point for identifying potential stakeholder interview

The NJTPA 2050 Freight Industry Level Forecasts provide current and projected freight demand through 2050. Outputs of the study included a review of commodities at the regional level, profiles of individual commodity groups, and subregional freight profiles for each of the NJTPA's subregions, including Middlesex County. While the profiles are not specific to the Primary Study Area, they supplement other land use and traffic data collection efforts specific to the Primary Study Area utilized in the study. These freight profiles provide an understanding of traffic volumes, commodity flows, and freight-generating sites at the larger county and regional level within the Secondary Study Area. One example of a graphic included in Middlesex County's Subregional Freight Profile displaying the square footage of various freight-generating sites is shown in Figure 9: . The main freight clusters of the Primary Study Area are outlined with a green oval. All data reviewed in the following paragraph concerns the entirety of Middlesex County.

The 2050 forecast anticipates a 10 percent decrease in employment in freight-generating industries with the sharpest decline coming in manufacturing. Retail trade employment is expected to increase by 5 percent and construction increase by 1 percent from 2020-2050. Though employment is overall expected to decrease, commodity flow (by tonnage) is expected to increase 10 percent with energy products remaining the number one commodity transported by tonnage. The top goods by value are expected to remain the same, with Chemicals, Machinery, Electronics and Transportation Equipment, and Energy comprising the top three by value. These goods are largely transported in the northern part of the County as part of Port Jersey/Port Newark. The directional movement of shipments containing the top 10 commodities are expected to remain nearly constant and Middlesex County's largest trading partners are expected to continue to be other counties in the NJTPA region though the highest growth rate (20 percent) is expected to be with New York State. Tonnage by rail is expected to stay at 3 percent of goods movement, though this rate is expected to reach 10 percent of inbound tonnage by 2050. Inbound tonnage refers to goods moving from outside Middlesex County to within Middlesex County.

Figure 9: Business Square Footage by Industry Type



Equity Analysis

Consideration of equity and demographic variables improved the public engagement process by identifying locations of historically underserved communities and potential needs for translation services. Equity variables can also be considered in prioritizing the development and implementation of identified recommendations.

The study's equity analysis aimed to identify populations that have been traditionally underserved and underrepresented in the planning process. Accordingly, the resulting recommendations are tailored and equitable to all in the study area and region. The resulting profile from the equity analysis is a useful tool that influenced the remainder of the Analysis Framework, development of recommendations, and public engagement process, including in the following ways:

- The presence of underrepresented and overburdened communities influenced the selection of potential meeting venues, aiming to offer a site and time available for as many people as possible. All outreach materials were translated into Spanish and newsletters were translated into Hindi and Gujarati.
- The presence of underrepresented and overburdened communities was considered when developing recommendations, to ensure they do not have an adverse impact on these communities, and that the benefits are shared as equally as possible.
- Equity is offered as a potential element for prioritizing the implementation of recommendations.

The equity analysis was created using the United States Census 2016-2020 five-year estimates, the most recently updated five-year dataset available at the time of the analysis. The equity analysis is critical because all areas, regardless of wealth, education, or mobility access, may include communities, households, and individuals who are underserved and/or disadvantaged.

An "overburdened communities" measure was also calculated, combining race, ethnicity, poverty, and limited-English proficiency. An overburdened community[1] is a census block group meeting any of the following three criteria:

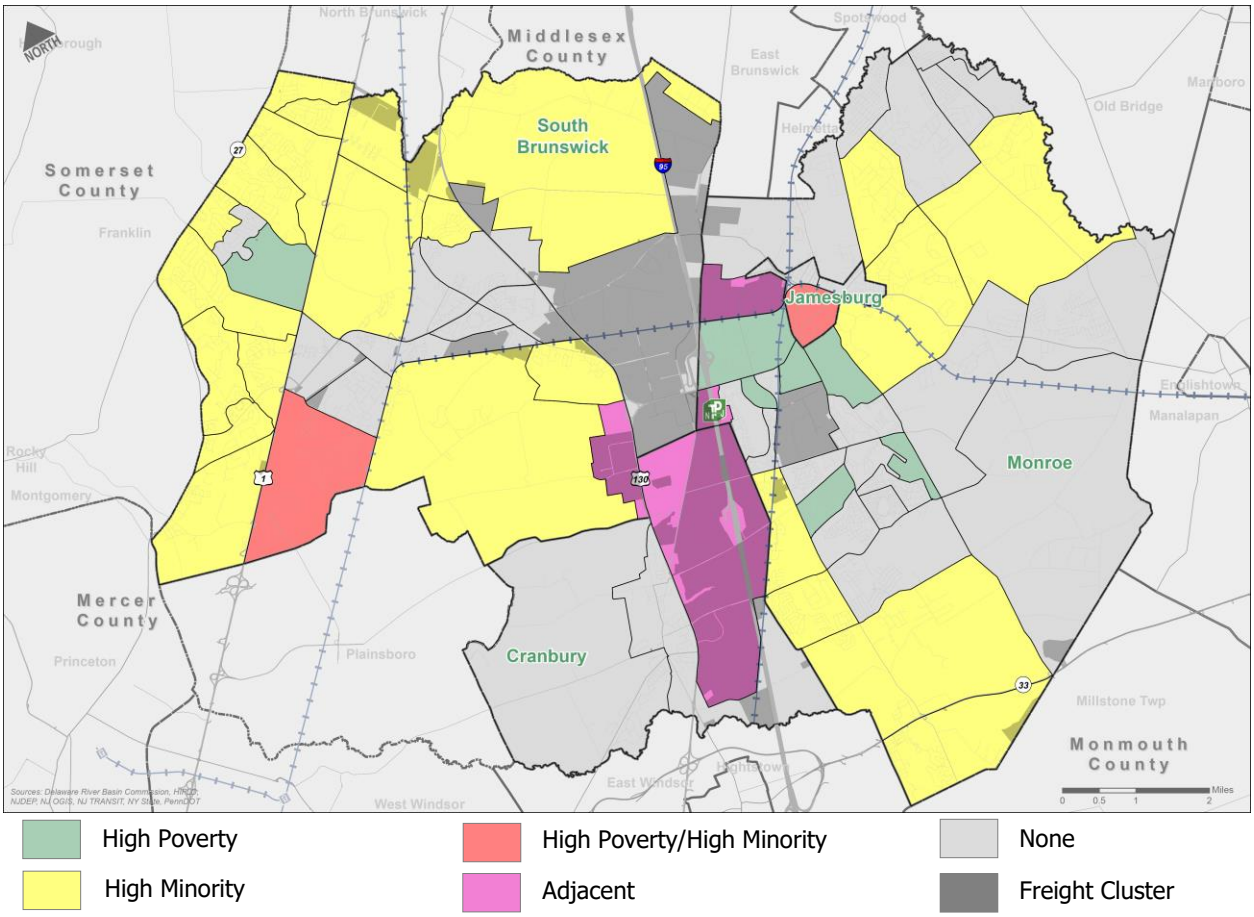
- At least 35 percent of households qualify as low-income households (at or below twice the poverty threshold as determined by the United States Census Bureau)
- At least 40 percent of residents identify as minority or as members of a State recognized tribal community
- At least 40 percent of households have limited-English proficiency (without an adult who speaks English "very well" according to the United States Census Bureau)

Additionally, census block groups with zero population (and thus cannot have any of the identified overburdened communities) but are adjacent to an overburdened community were also identified. Existing or proposed facilities located in adjacent block groups may be required to conduct further analysis in accordance with Environmental Justice rules.

As shown in Figure 10, there are communities with a high poverty rate but not a high minority rate, and high minority rate but not a high poverty rate in South Brunswick and Monroe. The two block groups with both a high poverty and minority rate are in South Brunswick and Jamesburg. No block group in the Primary Study Area was found to meet the threshold of limited-English proficiency. Across the Primary Study Area, 55 percent of the population lives in an overburdened community. This figure also shows the location of freight clusters, mainly located along the New Jersey Turnpike spine.

[1] This measure of overburdened communities was established in 2020 by New Jersey's Environmental Justice Law (N.J.S.A. 13:1D-157).

Figure 10: Overburdened Communities



Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS U.S. Census, 2016-2020 Five-Year Estimates

Infrastructure

Considerable datasets were gathered at the onset of the study to serve as inputs for several analyses conducted throughout this study. This includes considering wayfinding recommendations based on bridge data, improvements to truck routes based on freight infrastructure data, and roadway recommendations based on traffic counts and crash data.

The following datasets were obtained and used in the study's analyses:

- Geographic Information Systems Data – Geographic data concerning points of interest, public transit, freight infrastructure, roadways, natural features, and safety were obtained. These data sources inform understanding how freight operates within and beyond the Primary Study Area.

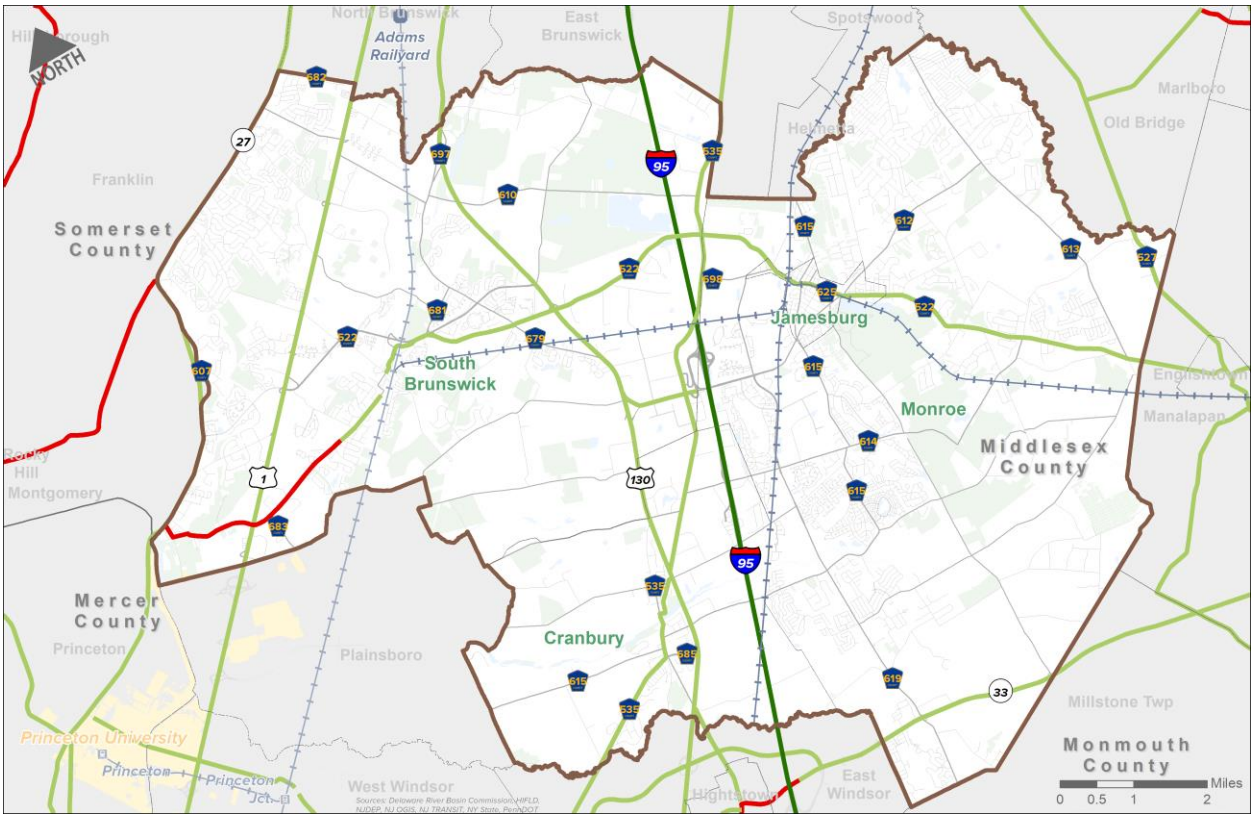
- Bridge Data – Data concerning the location of bridge structures and weight and height restrictions was obtained. The data was then used to determine if any structural and/or operational constraints exist along or near existing or potential future truck routes that may limit the road-bound movement of freight.

- Management Systems – Data from the New Jersey Department of Transportation (NJDOT) was obtained for state routes, including traffic counts, crash data, pavement conditions, and other transportation projects.

- Freight Infrastructure – Freight rail and roadway data were obtained to better understand the larger freight network. Freight rail in the Primary Study Area consists of Conrail Shared Asset Operations comprising Conrail, CSX, and Norfolk Southern lines. Truck routes in the Primary Study Area include both the National Highway Freight Network and the New Jersey Access Network. The Primary Study Area's freight road network is shown in Figure 11.

- Signal Timings and Plans – Middlesex County provided signal timing plans for 12 signalized intersections in and near the Primary Study Area. This information was subsequently used as inputs when evaluating and analyzing traffic conditions.

Figure 11: Freight Road Network - Primary Study Area



Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS, NHFN, 2022

Traffic Patterns

The analysis of traffic patterns was fundamental to understanding truck movement into the Primary Study Area, including where trucks are traveling to and from, how they reach the Primary Study Area, and where they travel once they enter the area. The supplemental analysis of pass-through traffic and additional routes provided additional insights into the use of Primary Study Area roads for both regional and local trips.

The following key insights from the analysis of traffic patterns helped guide the study's recommendations, providing a basis of truck movements:

- ***Most truck trips entering the Primary Study Area begin and end their trip in New Jersey.***
- ***Most truck trips entering the Primary Study Area access Interchange 8A.***
- ***Most trips entering the Primary Study Area on other routes do so to reach Interchange 8A.***
- ***There are very few pass-through trips of the Primary Study Area entirely utilizing State, county, and municipal routes.***

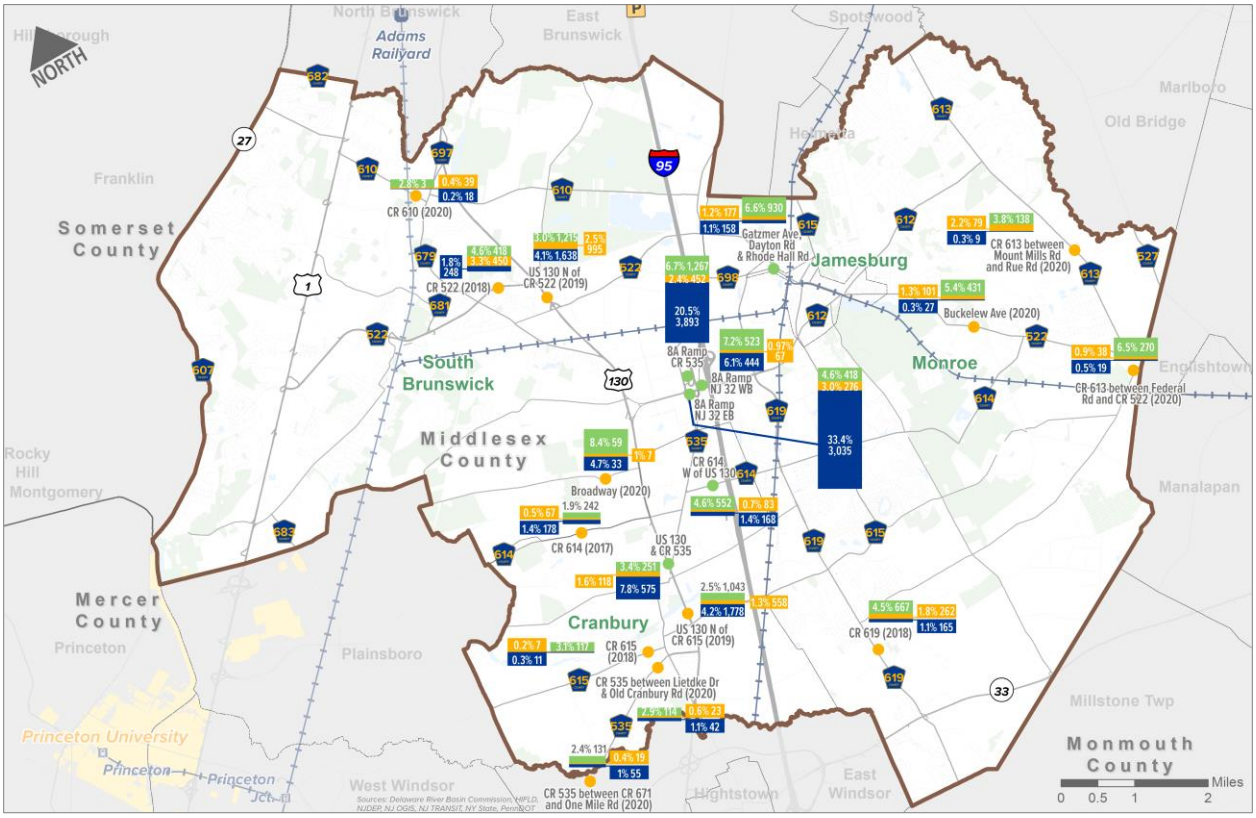
Traffic count data was obtained from the NJDOT Traffic Management Systems database. As part of this study, new traffic counts were conducted in and nearby the Primary Study Area to supplement the NJDOT data and other historical traffic counts. Historical and new traffic counts include both turning movement counts (counting vehicle movements at an intersection) and automatic traffic recorders (counting vehicles mid-block in either direction).

Where data was available, truck counts were split into light, medium, and heavy vehicles. Light trucks are defined as vehicles with two axles and six tires. Medium size trucks include three-axle single, and four-axle single vehicles. Heavy size trucks include five-axle double, and six-axle multi-trailer vehicles. Truck volumes by vehicle size are mapped in Figure 12. The top three locations for truck volumes were found at the Interchange 8A ramp at County Route 535 (Cranbury-South River Road), the Interchange 8A ramp at State Route 32 (Forsgate Drive) eastbound, and U.S. Route 130 between County Route 522 (Ridge Road) and Fresh Ponds Road. The highest share of trucks was found at Interchange 8A.

To better understand past trends and future estimates, pre-COVID (2019) and COVID-era (2020) traffic data were compared for both the Primary and Secondary Study Areas. As expected, most roadways in the Primary and Secondary Study Areas experienced reductions in traffic volumes of 15-25 percent. Traffic at Interchange 8A significantly dropped in early-to-mid 2020 but

increased to pre-COVID levels more quickly than other roadways. This may partially be due to the importance of freight in the area and the increased demand for goods, freight, and home deliveries experienced during the COVID-19 pandemic.

Figure 12: Truck Volumes by Truck Size



Light
Medium
Heavy
% of daily volume

Existing Count Location (with year)

New ATR Count Location (collected June 2022)

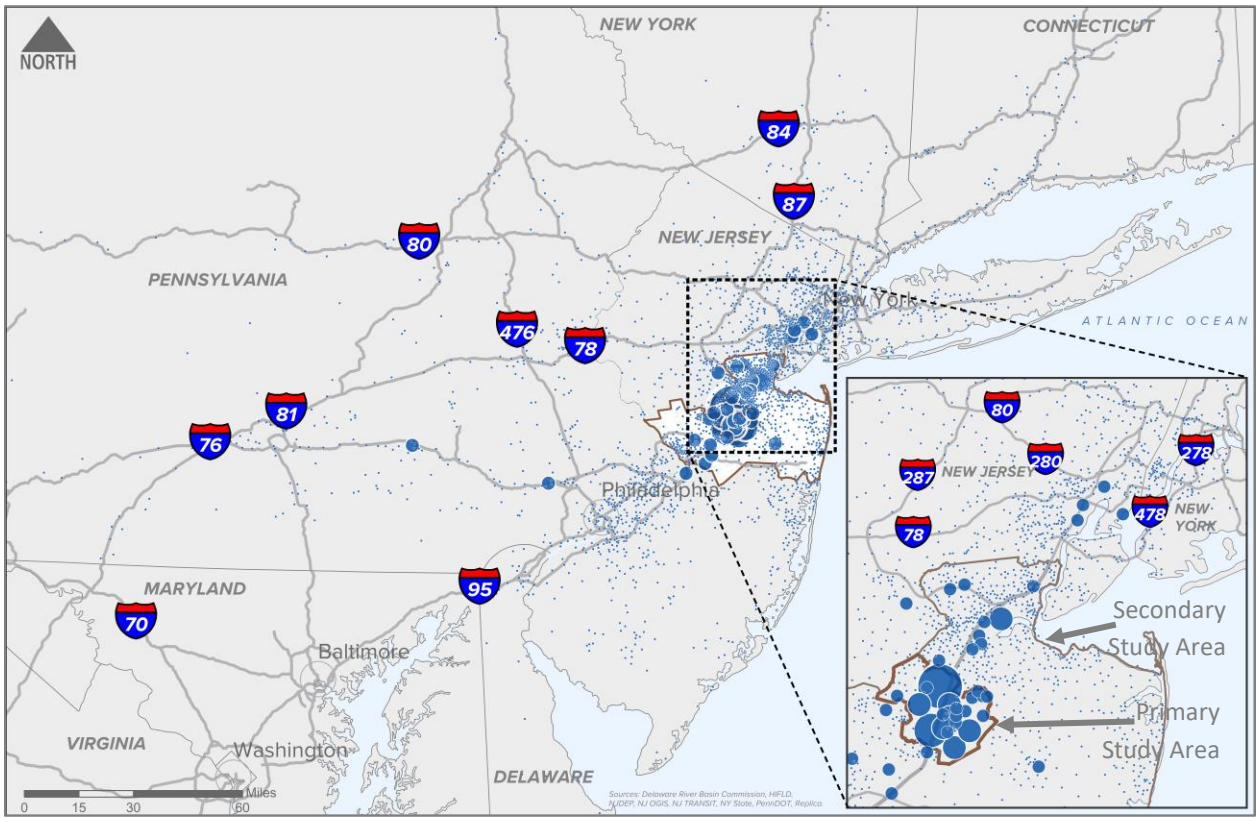
Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS, Tri-State Traffic Data, WSP, Michael Baker, Inc., 2017-2022

Origin and Destination

A fundamental part of the existing conditions analysis and understanding freight movement was identifying traffic flows, including the origin, destination, and routing of vehicles in the Primary Study Area. To gather this information, Origin-and-Destination (OD) and Select-Link studies were conducted. Locations serving the identified freight clusters (based on the earlier land use analysis) were prioritized for OD and Select-Link analysis.

Analysis of OD data revealed that nearly 90 percent of truck trips destined for the freight cluster originate in New Jersey, and more than half begin within Middlesex County. Traffic patterns are similar for truck trips originating within the Primary Study Area. Furthermore, Interchange 8A is the primary access point for trucks into and out of the Primary Study Area. The origins of commercial trips destined for the Primary Study Area are shown in Figure 13. The destined locations of trips beginning in the Primary Study Area displays similar data.

Figure 13: Origin - Commercial Trips Destined to the Primary Study Area



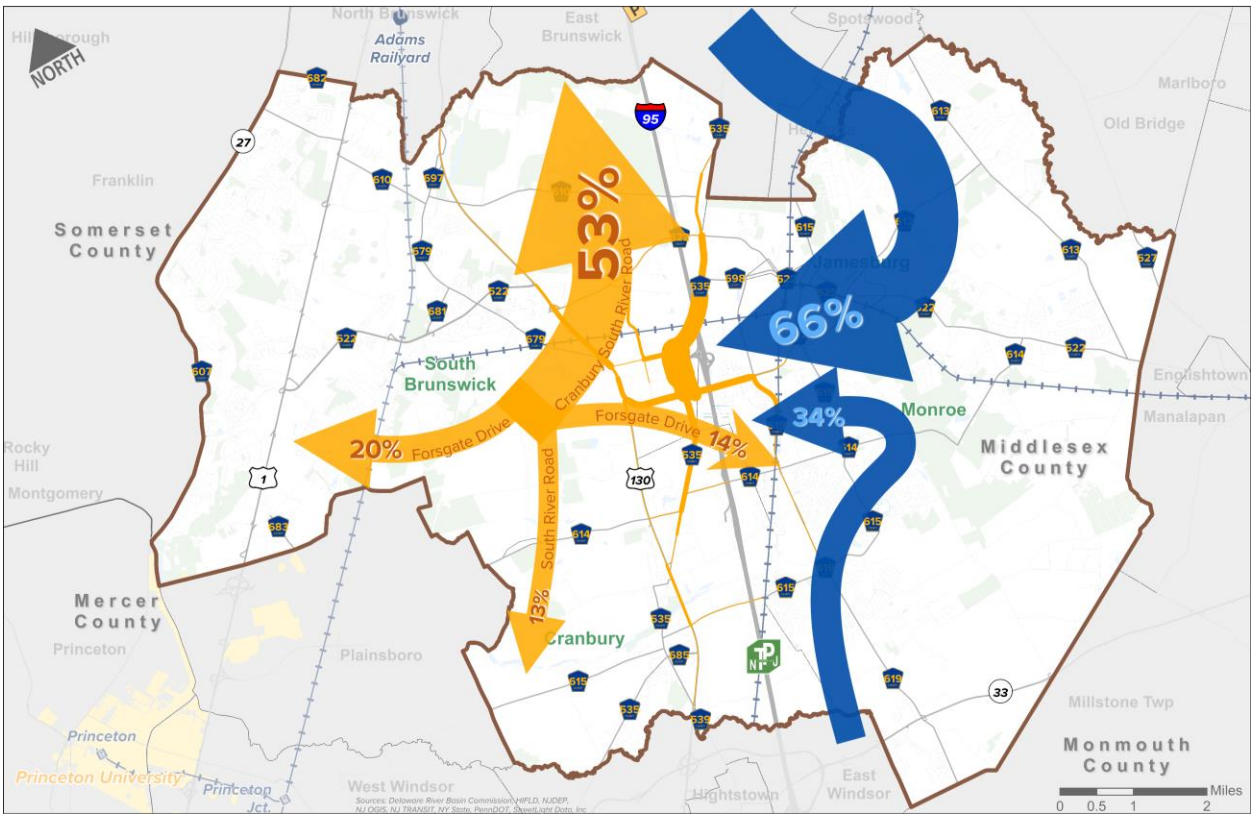
Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS, PennDOT, NY State, U.S. Census, Replica, 2021

Trip Routing for Industrial Clusters

An analysis of trip routing was performed focusing on the New Jersey Turnpike Interchange 8A. The analysis showed that most trips destined for the freight cluster via Interchange 8A come from the north. After exiting the Turnpike at Interchange 8A, most trucks (53 percent) use County Route 535 (Cranbury-South River Road) to travel north from the Interchange, with smaller percentages traveling west on State Route 32 (Forsgate Drive) (13 percent), south on County Route 535 (Cranbury-South River Road) (12 percent), and east on State Route 32 (Forsgate Drive) (14 percent). The distribution of truck trips entering the Primary Study Area via Interchange 8A is mapped in Figure 14.

A more detailed analysis of trip routing was conducted for specific freight clusters within the Primary Study Area. As part of the analysis, the Primary Study Area and freight clusters surrounding Interchange 8A were separated into four quadrants, divided by State Route 32 (Forsgate Drive) and the New Jersey Turnpike. The analysis identified a difference in the local roads used to access each quadrant, dependent upon the origin of trips entering the Primary Study Area. For instance, trucks destined for the southeast quadrant were more likely to access the area via State Route 32 (Forsgate Drive) to County Route 619 (Applegarth Road) than traveling west of the New Jersey Turnpike along County Route 535 (Cranbury South River Road) (as shown in Figure 15). The conclusion drawn from this finding is that the majority of trucks in the Primary Study Area are traveling on the most direct route to reach their destination.

Figure 14: Distribution of Truck Trips Exiting at Interchange 8A (at the Toll Plaza)



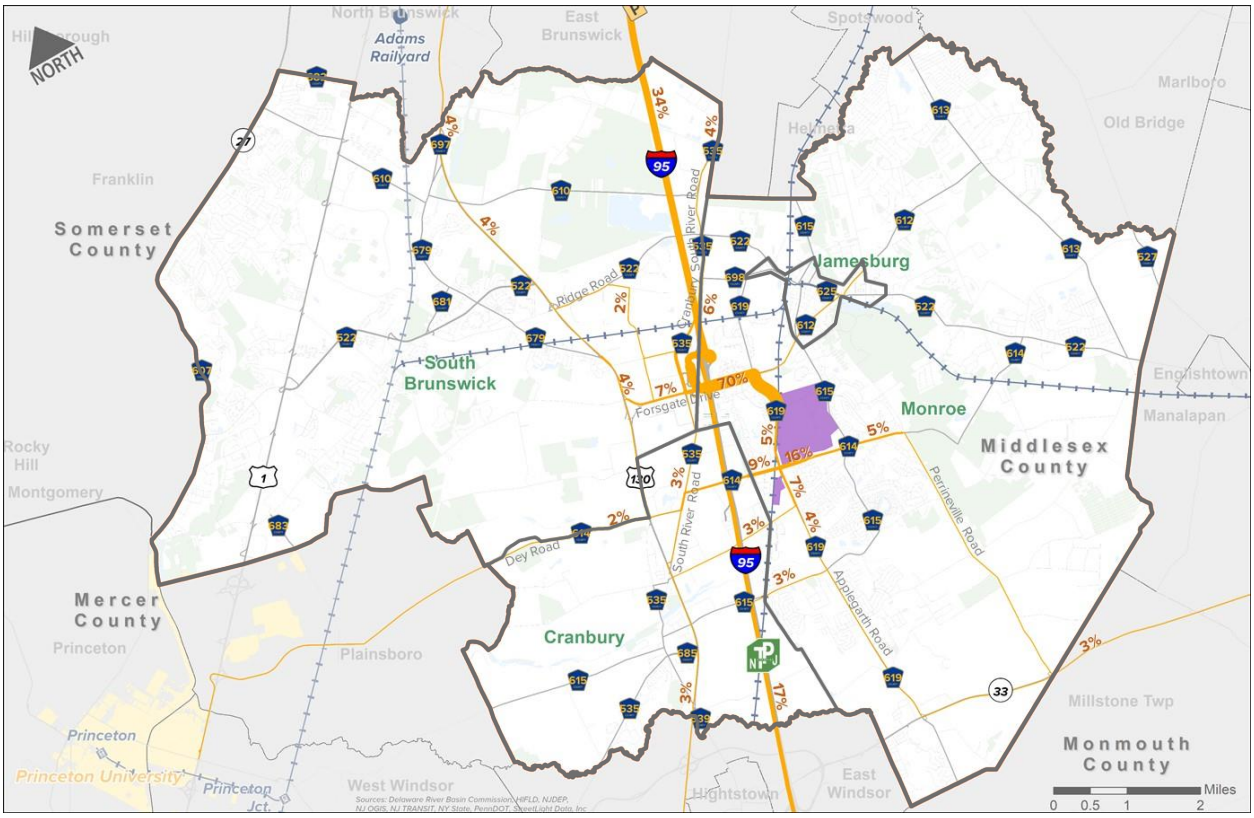
Percentage Trip Distribution

XX% Destination

XX% Origin

Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, StreetLight, 2021

Figure 15: Southeast Quadrant Routing



XX% Trip Proportion

Primary Study Area

Origin

Sources: Middlesex County, NJDOT, NJDEP, NJ OGIS, Streetlight 2021

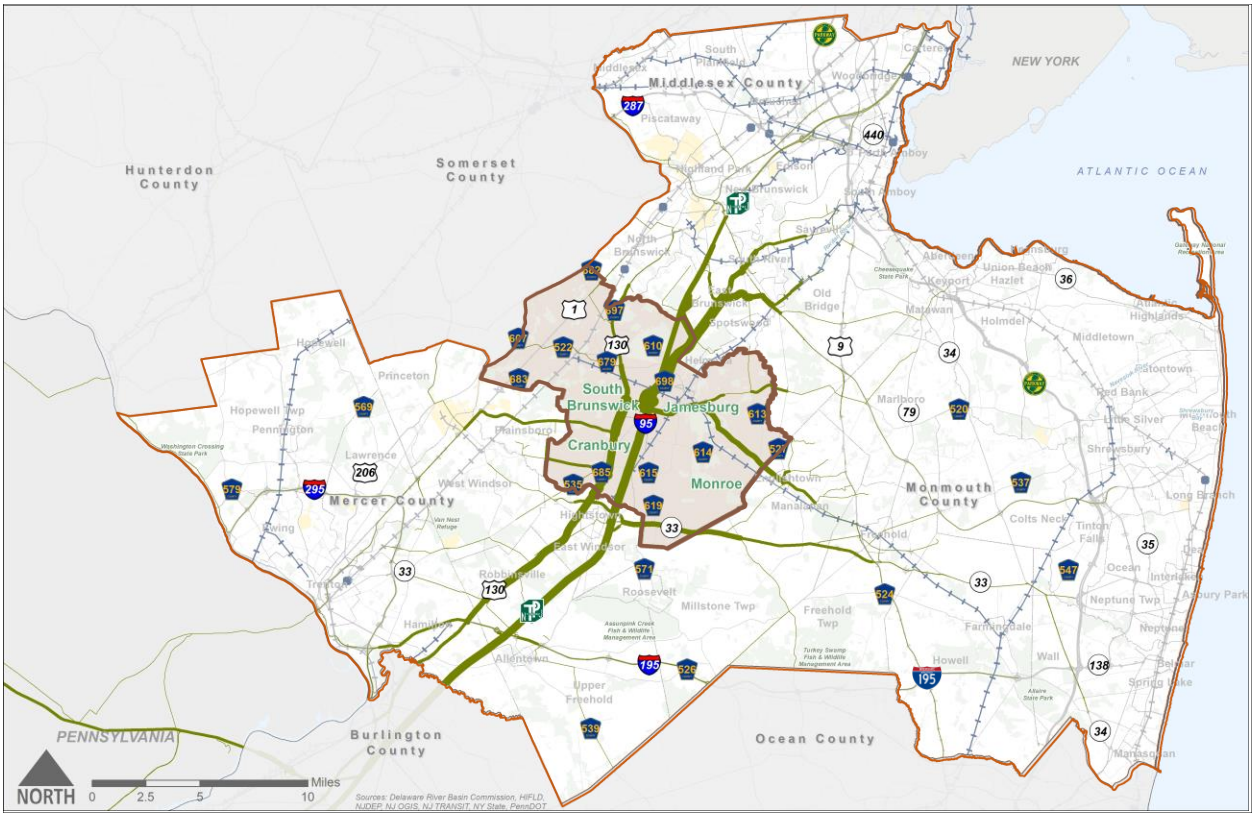
Pass-Through Traffic and Supplemental Analysis

Data for origins, destinations, and network volumes for pass-through traffic data through the Primary Study Area were obtained from *Replica*, a data analysis platform. The methodology used by *Replica* to estimate metrics of mobility is based on a nationwide activity-based travel model. The model, which predicts where and when people go and for how long based on their activity patterns, is updated quarterly with the latest socio-demographic, economic, land use, location-based (cellphone and GPS), and other datasets.

The analysis found trips passing through the Primary Study Area tended to be intra-county trips, meaning that they originate/terminate in nearby communities, including Old Bridge, East Windsor, and East Brunswick. Additionally, these pass-through trips appear to use higher-order roadways, including the New Jersey Turnpike and U.S. Route 130, within the Primary Study Area (see Figure 16). The analysis found that in this area, County roadways are mainly used to reach Interchange 8A, rather than for travel across the County that would bypass the New Jersey Turnpike.

Additional key roadway segments were reviewed as part of the OD analysis. Roadway segments were ultimately selected by County staff, based on public input, engineering guidance, and existing truck traffic volumes. The number of estimated truck trips along each segment varied greatly, with some carrying substantial numbers of regional (within the Secondary Study Area) trips.

Figure 16: Pass-Through Truck Trips



Daily Trips

- <26
- 26-50
- 51-100
- 101-200
- >200

- Primary Study Area
- Secondary Study Area

Sources: Middlesex County, NJDOT, Replica, 2021

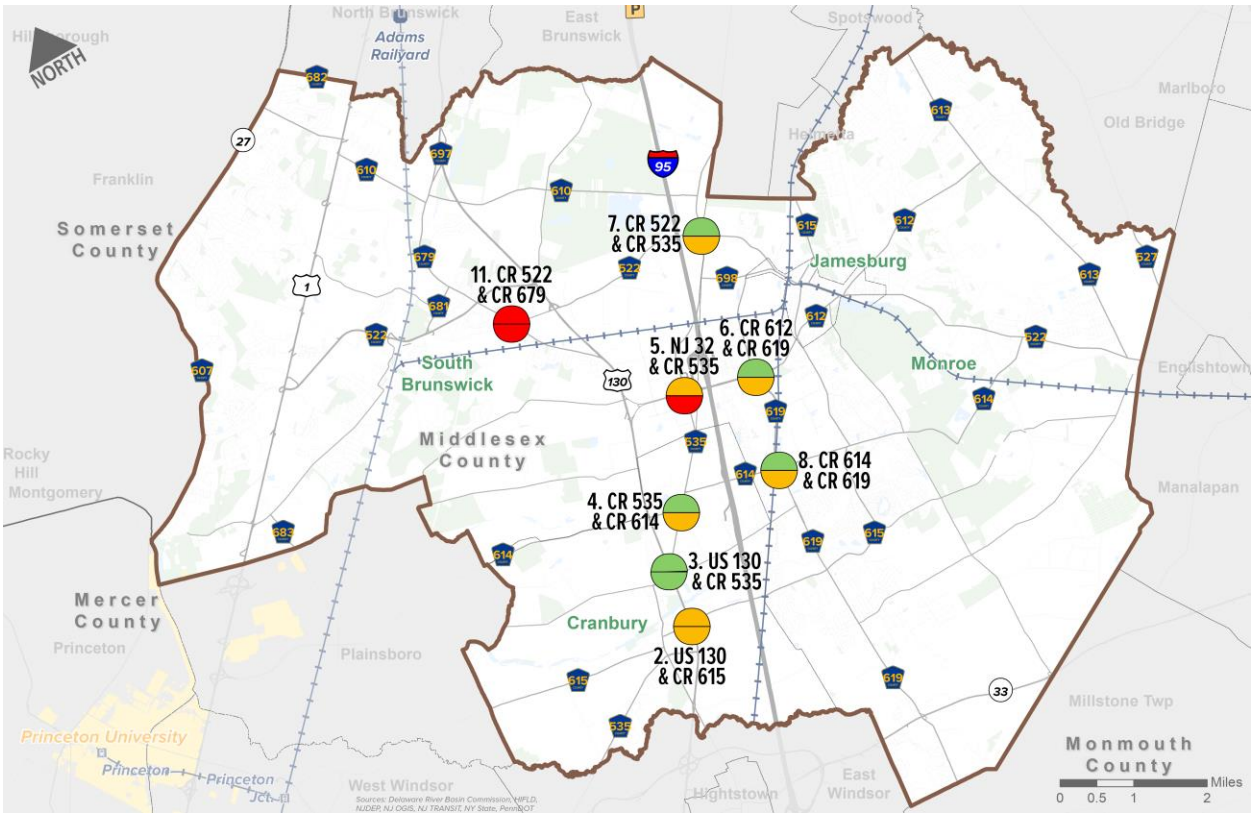
Congestion

Roadway Capacity Analysis

Analysis of existing and projected roadway capacity informed the identification of problem areas and subsequent recommendations to solve identified problems.

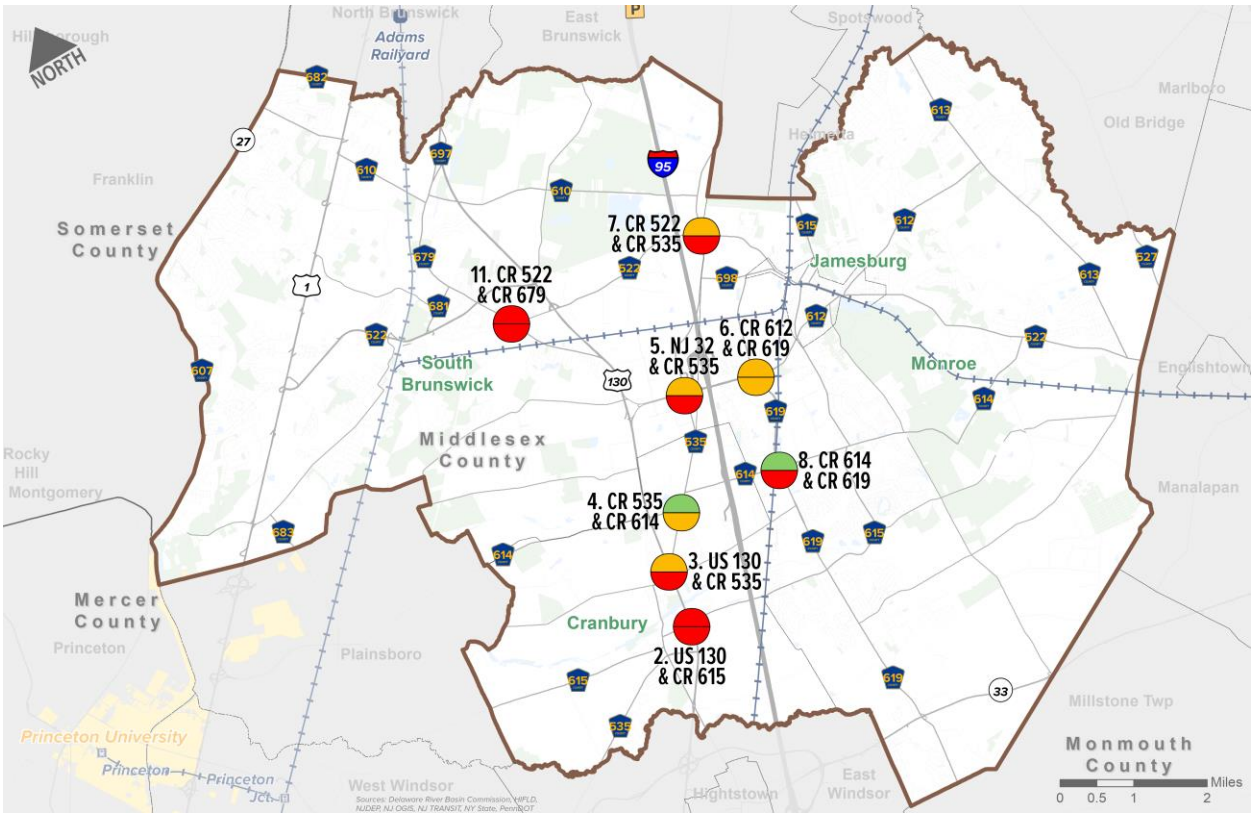
Using existing traffic volumes, future traffic volumes were projected for an assumed full buildout in the year 2050. The existing and future level of service for analyzed intersections are shown in Figure 17 and Figure 18, respectively. Full buildout assumes the completion of all planned, pending, and approved developments identified in the earlier Land Use analysis. A level of service analysis (LOS), which categorizes roads based on traffic flow, was then conducted for existing and projected future conditions to estimate roadway capacity constraints throughout the study area. LOS categories range from A to F, with A being the best rating (traffic flows freely) and F being the worst rating (more demand than capacity). A traffic analysis of existing and projected conditions revealed that several intersections are anticipated to deteriorate to LOS E or F in one or more peak periods (AM and/or PM rush hour) by 2050. Under existing conditions, one intersection during the AM peak and two intersections during the PM peak experience an unacceptable LOS (E or F). Under 2050 conditions, two intersections during the AM peak and six intersections during the PM peak are expected to experience an unacceptable LOS.

Figure 17: 2022 Existing - Overall Intersection Level of Service



Sources: NJDOT, WSP, Michael Baker Inc., Tri-State Traffic Data, NJTPA

Figure 18: 2050 Future - Overall Intersection Level of Service



Sources: NJDOT, WSP, Michael Baker Inc., Tri-State Traffic Data, NJTPA

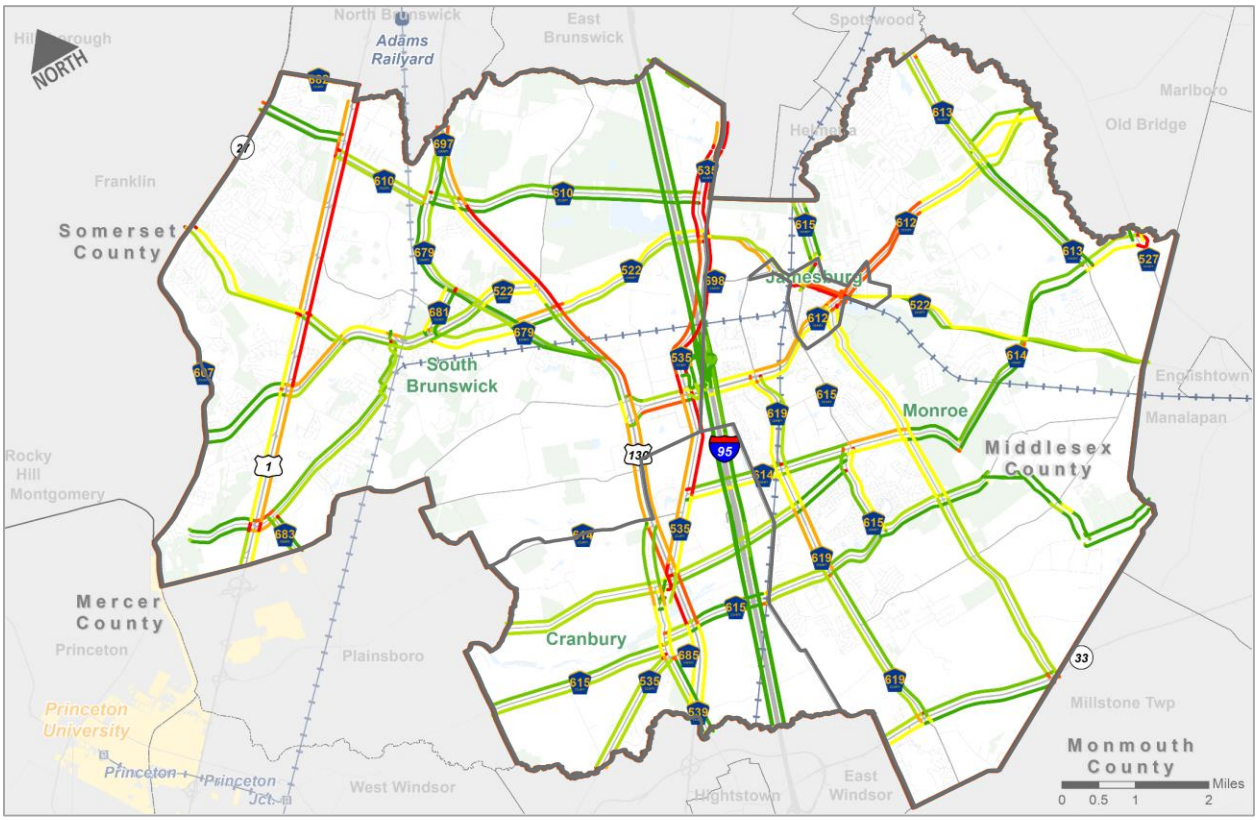
Speed Data

The speed analysis helped determine where traffic calming features may be needed to slow vehicles and where congestion and queuing are most prominent, necessitating recommendations for traffic efficiency, including intersection upgrades and signal retiming.

Speed data was collected from the Regional Integrated Transportation Information System (RITIS). This analytics platform integrates transportation data collected by public and private agencies to estimate a series of performance metrics, including vehicular travel speeds. The peak hours selected for this analysis were 7-8 AM and 5-6 PM. Speed data was used as an additional indicator for capacity and congestion, with observed speeds being compared to speed limits. The resulting analysis identified areas of congestion throughout the Primary Study Area. PM peak measured speed compared to free-flow speeds are shown in Figure 19.

During the AM and PM peak hours, most Primary Study Area roads, except the New Jersey Turnpike, exhibit travel speeds below 40 miles per hour. During both the AM and PM peaks, measured speeds are lower than most posted speed limits. The lowest peak hour speeds are observed in Jamesburg and along County Route 535 (South River Road) in Cranbury. Congestion is more pronounced in the Primary Study Area during the PM peak hour when much of U.S. Route 1, U.S. Route 130, County Route 535 (South River Road), County Route 522 (Ridge Road), and County Route 612 (Forsgate Drive/Buckelew Avenue/Pergola Avenue) are congested.

Figure 19: PM Peak Hour Measured Speeds Compared with Free-Flow Speeds



Sources: INRIX, RITIS, NJDOT, 2021

Wayfinding Analysis

The analysis of wayfinding signage placement and quality provided insights into how truck operators view and use the roadways and identified gaps where additional or enhanced wayfinding is needed.

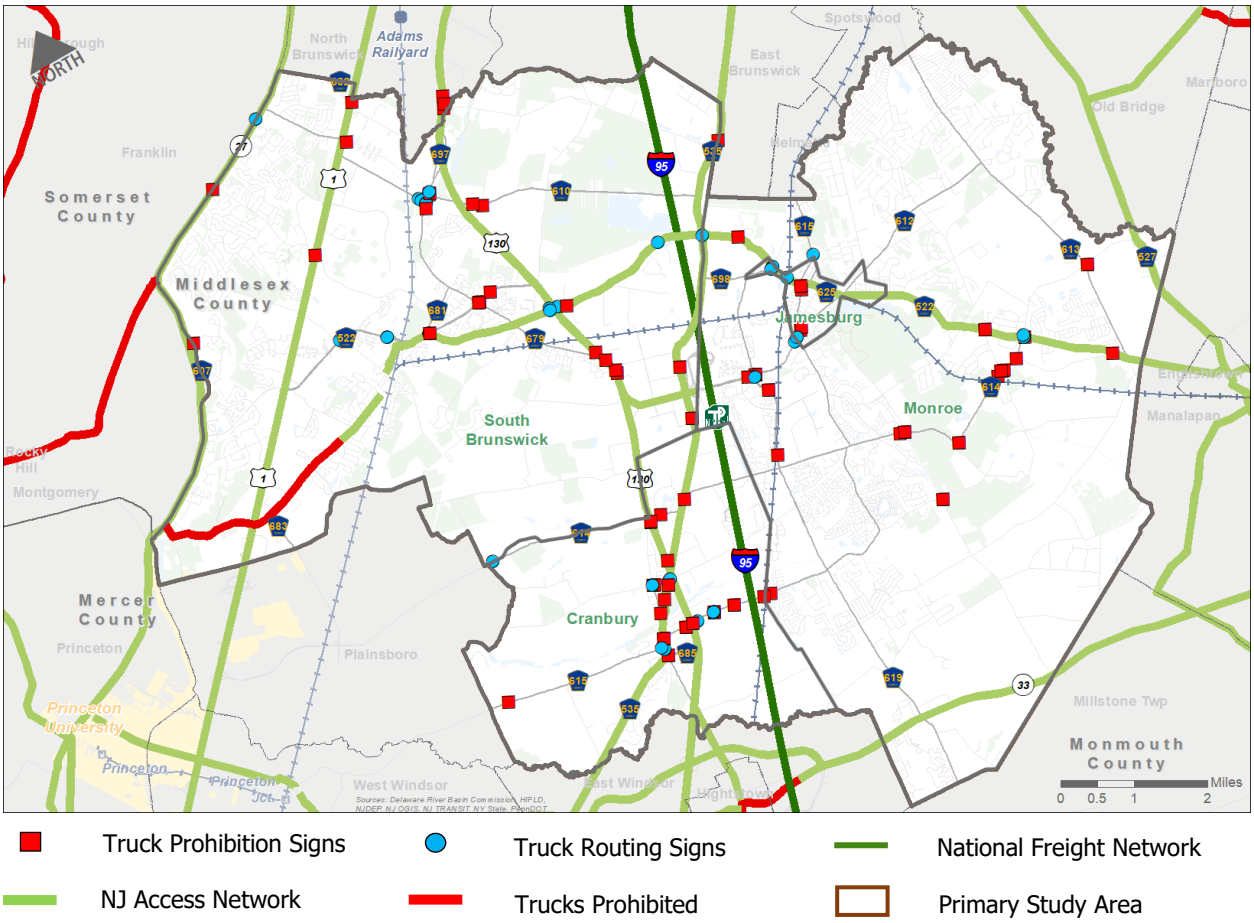
The analysis categorized the condition of signs, designating them as either "Satisfactory" or "Poor," and grouped them into one of four categories: Truck Routing, Truck Prohibition, Vertical Clearance, and Weight Limits. The location of truck prohibition and routing signs are shown in Figure 20.

There is a significant sign concentration in Cranbury along County Route 615 between County Route 535 and the New Jersey Turnpike, and along County Route 535. Many minor/side roads in this area are residential, and the prohibition signs are intended to prevent truck movements to these roads.

There are three underpasses in the Primary Study Area with vertical clearances (from west to east):

- Rail bridge over County Route 610 in South Brunswick – 11 feet, 10 inches
- U.S. Route 130 bridge over County Route 522/Ridge Road in South Brunswick – 13 feet, 10 inches in the westbound direction and 13 feet, 11 inches in the eastbound direction
- Rail bridge over Gatzmer Avenue in Jamesburg – 12 feet

Figure 20: Truck Prohibition and Routing Signs Compared to the Freight Network



Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS, MCAT, GMTMA, Michael Baker, Inc., WSP, 2021-2022

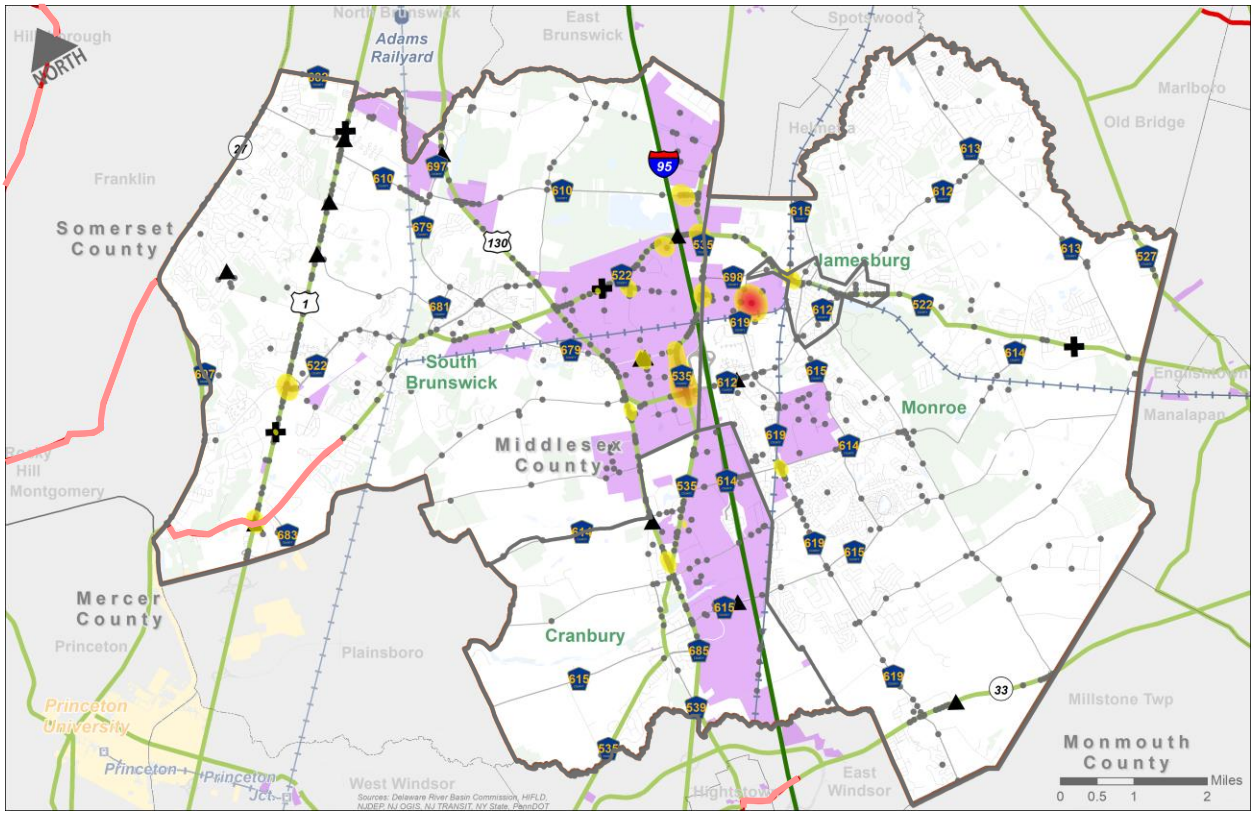
Crash Analysis

The crash analysis identified intersections and corridors with safety concerns, including issues involving trucks. This helped inform roadway recommendations focused on improving safety for vehicles, cyclists, and pedestrians.

Crash data was downloaded from NJDOT's crash database for the most recently available five-year period (2016-2020). Crash characteristics were mapped and reviewed for each municipality based on several variables, including roadway condition, light condition, time of day, crash type, and severity. Additional analyses were conducted for truck crashes and bicycle/pedestrian crashes. Crashes along the New Jersey Turnpike were not reviewed, as the higher-speed crashes unique to tolled interstates would skew the results and are on roadways beyond the County's control.

As part of the analysis, truck crash hotspots – locations with higher crashes – were identified. Most of these hotspots are in the Primary Study Area's freight clusters, as shown in Figure 21. This includes hot spots along County Route 535 (Cranbury-South River Road) near Interchange 8A, Costco Drive, and County Route 522 (Ridge Road). Several crash hotspots are located in commercial areas, including along U.S. Route 1. Four fatal crashes involving trucks were further analyzed, including two on U.S. Route 1, one on County Route 522 (Ridge Road), and one on Corn Road. One of the four fatal crashes occurred in a freight cluster. Pedestrian and bicycle crashes are more spread throughout the Primary Study Area, with a notable concentration in Jamesburg. One of the four fatal crashes resulted in the death of a pedestrian. Additional detail on crash characteristics and hotspots is included in the Appendix.

Figure 21: Truck Crash Hotspots



Sources: Middlesex County, NJDOT, NJ TRANSIT, NJDEP, NJ OGIS, 2016-2020

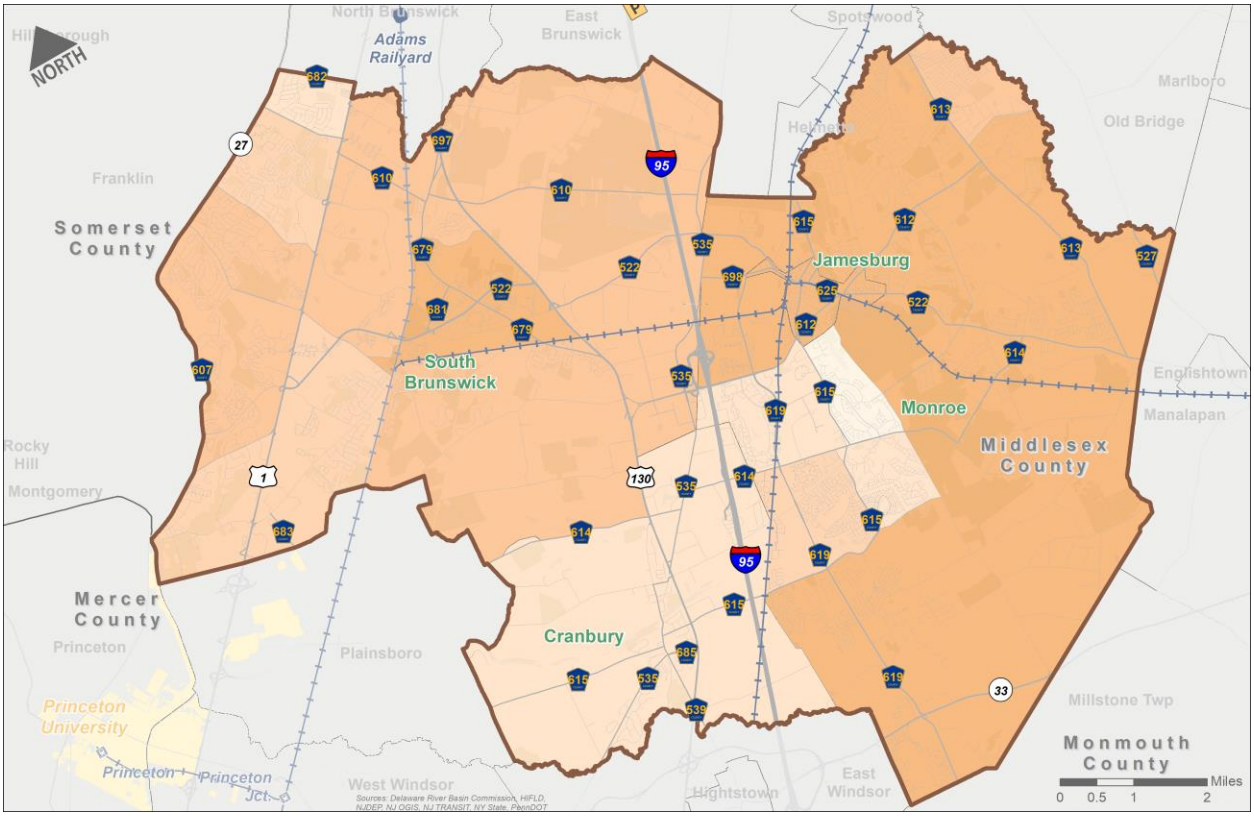
Last-Mile Transit Connections

Analyzing existing transit service and commuting patterns provided a deeper understanding of workplace accessibility. Public transit service and last-mile infrastructure deficiencies were identified, including inadequate trip frequency. Several recommendations were identified to improve these services and connections to better serve the many freight-dependent people commuting into the Primary Study Area.

The Primary Study Area is served by multiple private, County, transportation management association, and municipally-operated bus routes. Data concerning existing transit services informed the development of last-mile transit connections for employment centers. The last-mile connection analysis assessed whether existing public transit provides sufficient access for employees of freight-dependent industries in the Primary Study Area. While several public transit options are available, the analysis found most do not serve freight employees based on the timing and frequency of trips.

Further analysis assessed employment in the Primary Study Area's identified freight clusters, and the commuting patterns to these freight-dependent jobs. Of the 24,000 freight-dependent jobs in the Primary Study Area, 2,000 employees commute from homes within the Primary Study Area, forming a potential base for enhanced public transit and last-mile connections (see Figure 22). More than 12,500 people also commute to freight-dependent jobs in the Primary Study Area from the Secondary Study Area. This commuting pattern forms two distinct areas, including the area immediately northeast of the Primary Study Area (New Brunswick, North Brunswick, etc.) and immediately southwest of the Primary Study Area (East Windsor, Hamilton, etc.), as shown in Figure 22 and Figure 23. The analysis identified several issues regarding the existing public transit service and infrastructure, including service coverage that does not operate during typical freight shifts, infrequent service, inadequate pedestrian infrastructure, such as sidewalks and crosswalks, and a lack of infrastructure at bus stops (signage, benches, lighting, etc.).

Figure 22: Internal Commuting Patterns in Freight-Dependent Employment

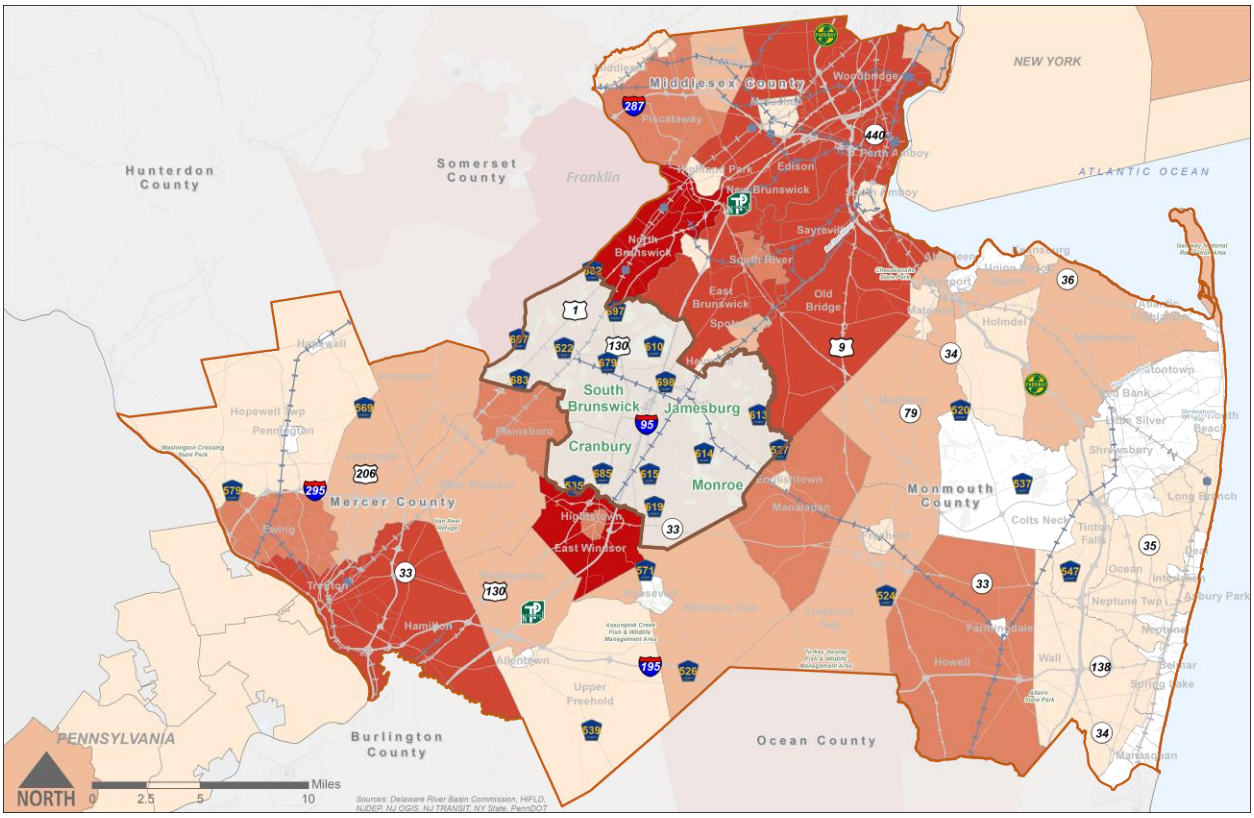


Number of Commuters

- <10
- 10-50
- 50-100
- 100-200
- >200

Sources: Middlesex County, NJDOT, NJ TRANSIT, U.S. Census LEHD Origin-and-Destination Employment Statistics
Note: "Freight-Dependent Employment" described in Census Data as "Goods and Trades"

Figure 23: Internal Commuting in Freight-Dependent Employment Beyond Primary Study Area



Number of Commuters

Sources: Middlesex County, NJDOT, NJ TRANSIT, U.S. Census 2019 LEHD Origin-and-Destination Employment Statistics
Note: "Freight-Dependent Employment" described in Census Data as "Goods and Trades"

RECOMMENDATIONS, SOLUTIONS, AND STRATEGIES

Recommendations were developed to address concerns around increased truck traffic, safety, job access, and other issues raised by stakeholders, and County and municipal staff. Recommendations were informed by data elements and analysis conducted under the Analysis Framework, as well as public engagement and coordination with Middlesex County staff.

Recommendations detailed in this section have gone through several rounds of refinement and vetting. They were presented to the TAC, shared at a public meeting in Cranbury, and discussed with relevant agency representatives, including the New Jersey Turnpike Authority (NJTA) and Middlesex County Engineering.

This section begins with an introduction to the type of recommendations developed, followed by more detail about each recommendation, and closes with an implementation matrix (Appendix A) that includes high-level cost estimates, agency responsibility, and timeframe for each recommendation.

This study includes site-specific recommendations as well as strategies that apply to the entire Primary Study Area. While recommendations are not directed to the Secondary Study Area, some may apply or impact this area (including the wayfinding recommendation to coordinate with GPS providers). Part of the recommendations are developed concepts, while others identify problem areas and recommend more evaluation and refinement. As detailed further in this section, recommendations range from shorter-term infrastructure improvements to longer-term policy and infrastructure improvements that can require several study phases. For ease of review, recommendations are presented below without prioritization or cost information. In Appendix A, each recommendation is assigned a priority timeframe (near-term of 0 to 2 years, mid-term of 2 to 5 years, and long-term of 5+ years) and an order of magnitude cost range (low of under $100,000, medium of $100,000 to $1,000,000, and high of greater than $1,000,000) as a guide for implementation.

Reader's Key

The recommendations are classified into the following categories or planning themes:

Truck Movement – reducing truck congestion on routes to improve truck throughput, decrease overall congestion (including for passenger vehicles), and provide adequate routes so that truck operators are discouraged from traveling through residential neighborhoods or other undesirable truck routes (such as Applegarth Road)

Wayfinding – upgrading signage and influencing wayfinding software to encourage trucks to operate on designated truck routes and discouraging them from operating in residential neighborhoods and other undesirable truck routes

Neighborhood Protection – evaluating truck restrictions and turn improvements in select locations where trucks are encouraged or required to go and implement Complete Streets measures to reduce speeding and discourage unwanted and ill-advised truck traffic

Truck Parking – addressing the demand for off-street truck parking for early arrival and expired Hours of Service trucks

Workplace Accessibility – expanding workplace accessibility options for freight industry employees

Implementation – identifying funding mechanisms, partnerships, and best practice planning tools to promote implementation and further studies

A bright green box, such as the one below, is used to introduce each recommendation category section and provide background information.

A faint green box, such as the one below, is used to highlight the benefits of a recommendation.

Truck Movement

Creating conditions suitable for truck movement and beneficial to truck throughput is key to encouraging an adequate local and regional truck network. This includes improving outdated geometric conditions that may hinder truck movements. Providing such a network encourages trucks to travel on desired truck routes in a manner that minimizes interference with passenger vehicles and buffers residential neighborhoods from unnecessary truck traffic.

Site-Specific Truck Movement Recommendations

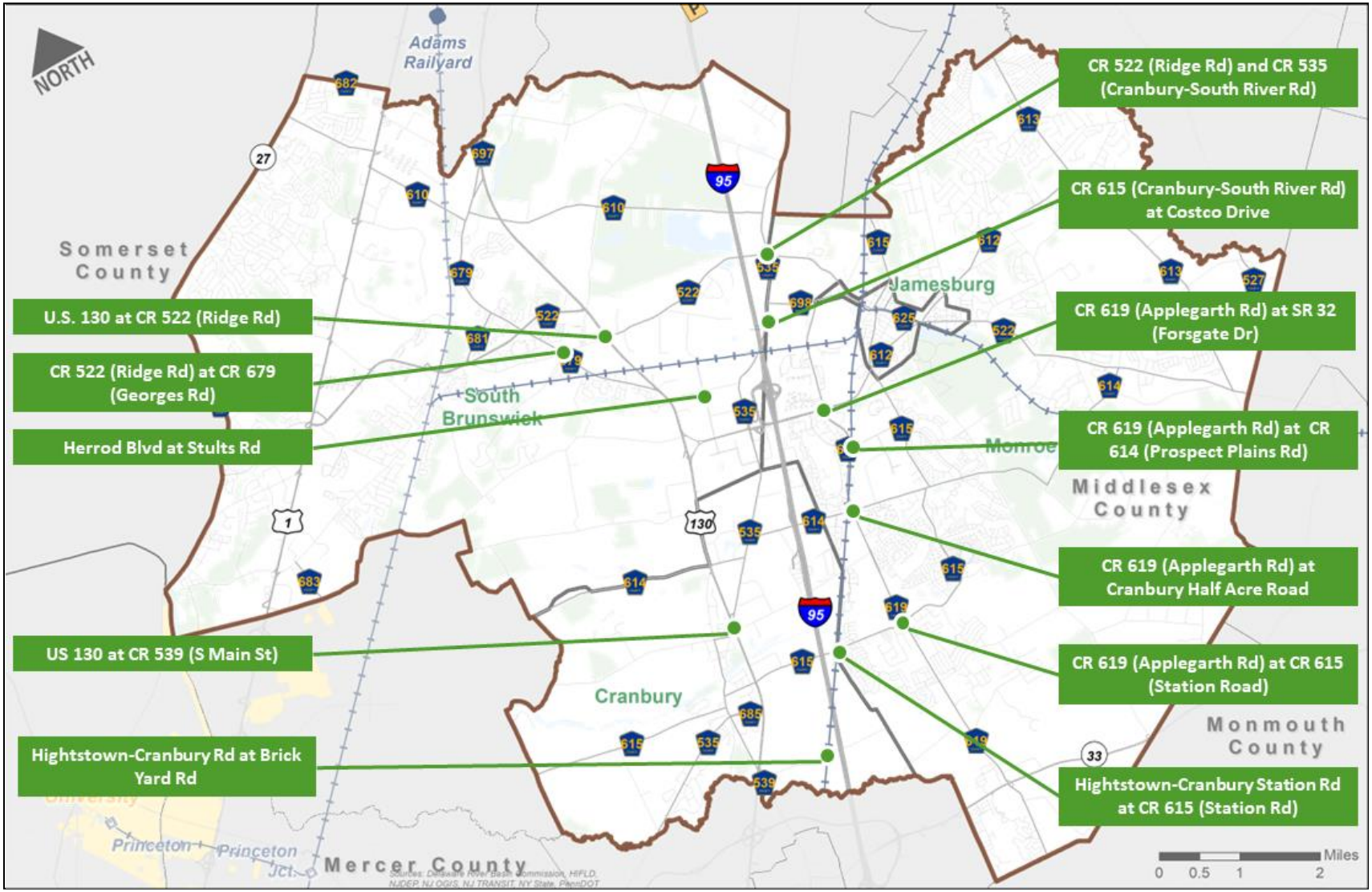
General Intersection Truck Movement Upgrade Locations

Making improvements to 12 key intersections would improve safety and address traffic flow issues. Intersection improvements can include a combination of strategies, such as traffic signal retiming, turn assists (the ability to make a u-turn), simplifying and normalizing turn movements through strategic narrowing and widening of roadways, and reconfiguring the size and number of turn and thru lanes. In addition to the general recommendations for each of these intersections, further analysis is needed to determine the specific nature and extent of improvements. Figure 24 shows the location of these intersections, while Figure 25 through Figure 35 provide detailed improvements for each location. Red stars identify the target intersections in each figure. The figures are presented in counter-clockwise order of how they are labeled in Figure 24, beginning with U.S. 130 at CR 522 (Ridge Rd) and ending at CR 522 (Ridge Rd) and CR 535 (Cranbury-South River Rd).

These general intersection upgrades will improve safety and traffic flow. Specifically, the potential intersection recommendations can accomplish the following:

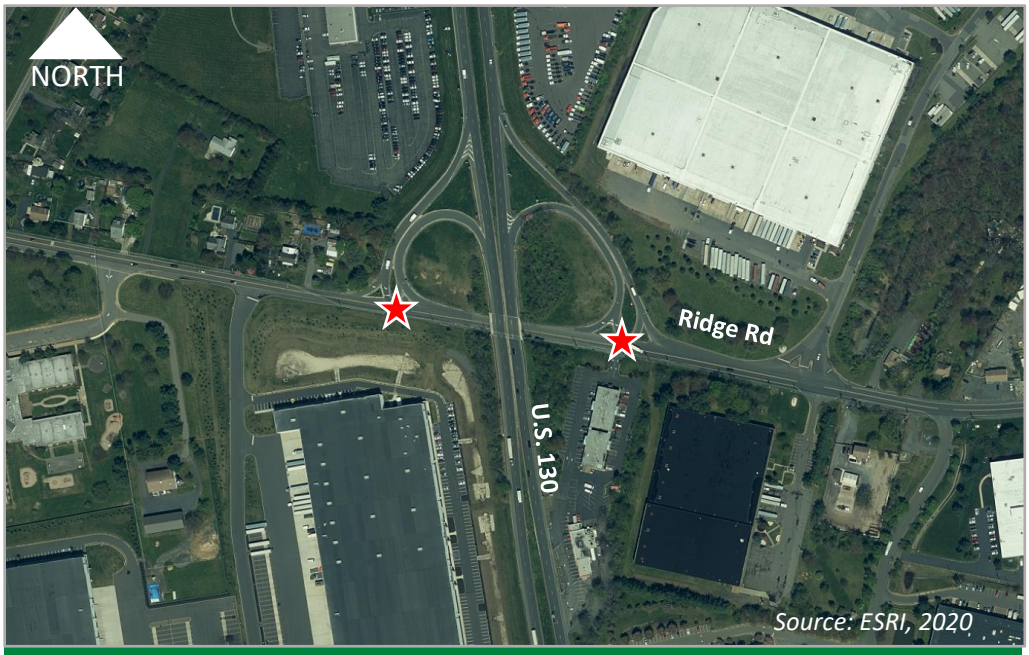
- *Traffic signal timing reduces queuing at intersections, improves traffic flow, and reduces rear-end crashes.*
- *Simplifying and normalizing turn movements can include adjusting turn radii to allow for faster or slower turns, as applicable. This can reduce speeds, improve traffic flow, and improve safety.*
- *Intersection improvements can include narrowing lane widths to reduce travel speeds, adding or reconfiguring turn lanes to better allow for turn movements, and adjusting signal timing through a protected signal phase in which vehicles can turn left unimpeded by oncoming traffic, drastically improving safety.*

Figure 24: General Intersection Truck Movement Upgrade Locations in the Primary Study Area



Source: NJDOT, Middlesex County, 2022

Figure 25: U.S. Route 130 at County Route 522 (Ridge Road)

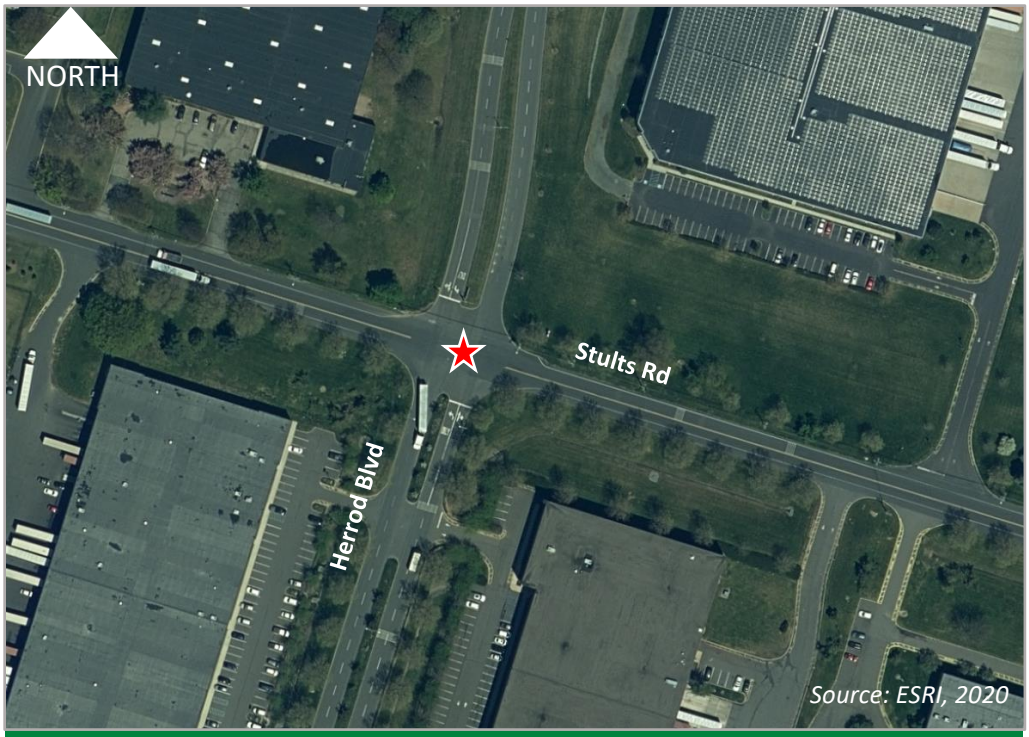


Recommendation: Signalize ramps at interchange

Figure 26: County Route 522 (Ridge Road) at County Route 679 (Georges Road)

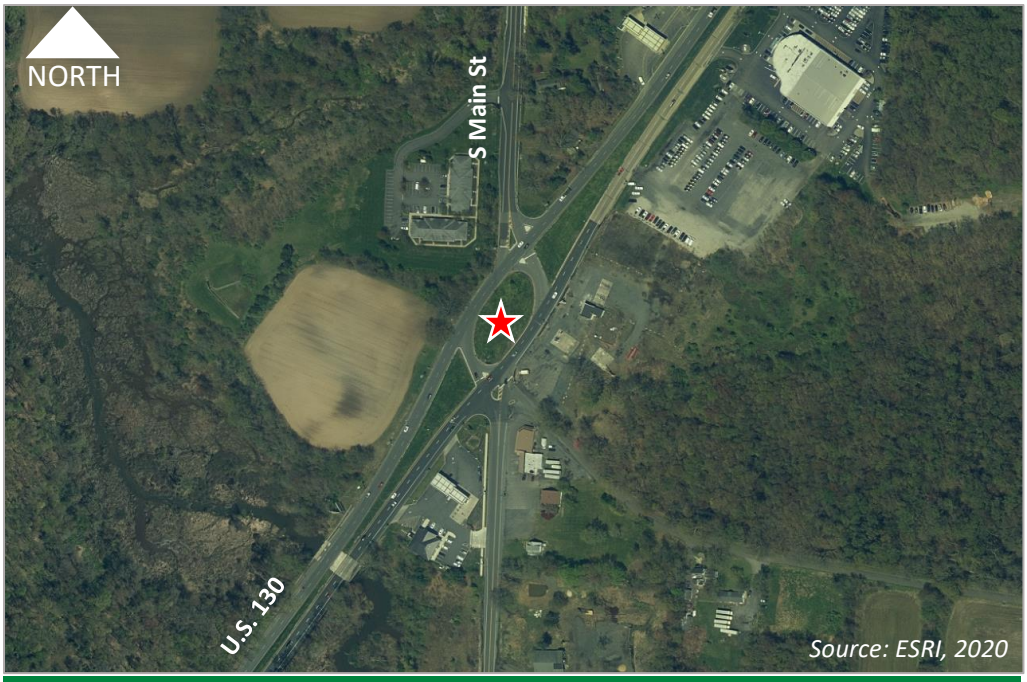
Recommendation: Construct turn assist or otherwise upgrade intersection

Figure 27: Herrod Boulevard at Stults Road



Recommendation: Signalize intersection

Figure 28: U.S Route 130 at County Route 539 (South Main Street)



Recommendation: Consider safety improvements at traffic circle to simplify movements. Coordinate with NJDOT's ongoing study of this location.

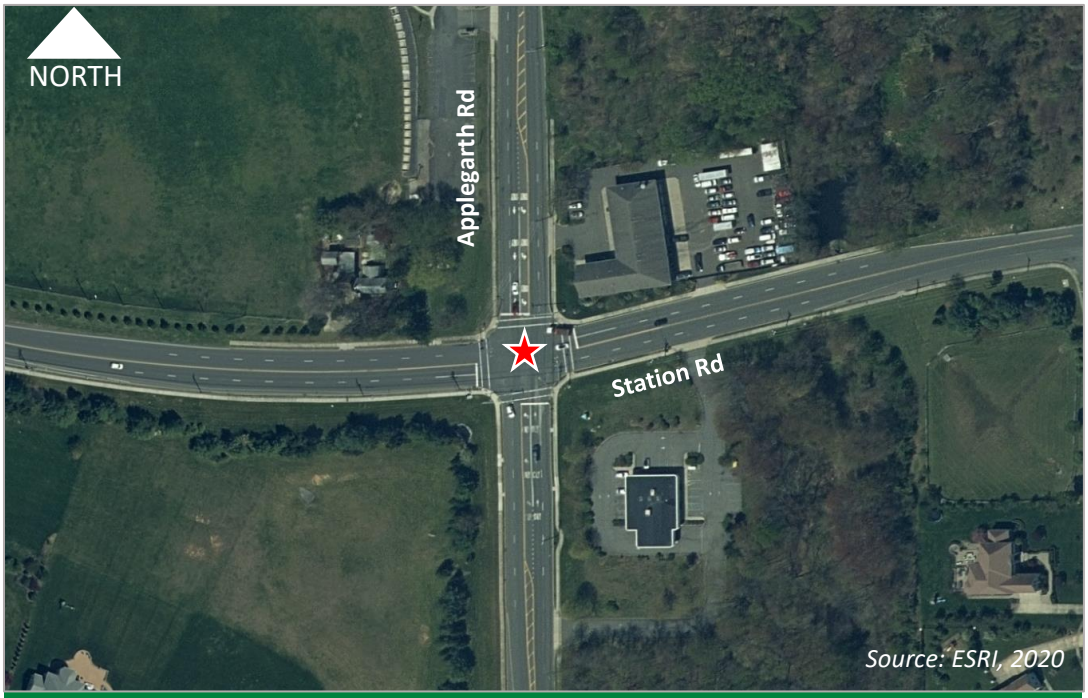
Figure 29: Hightstown-Cranbury Road at Brick Yard Road

Recommendation: Construct turn assist or install traffic signal at intersection

Figure 30: Hightstown Cranbury Station Road at County Route 615 (Station Road)

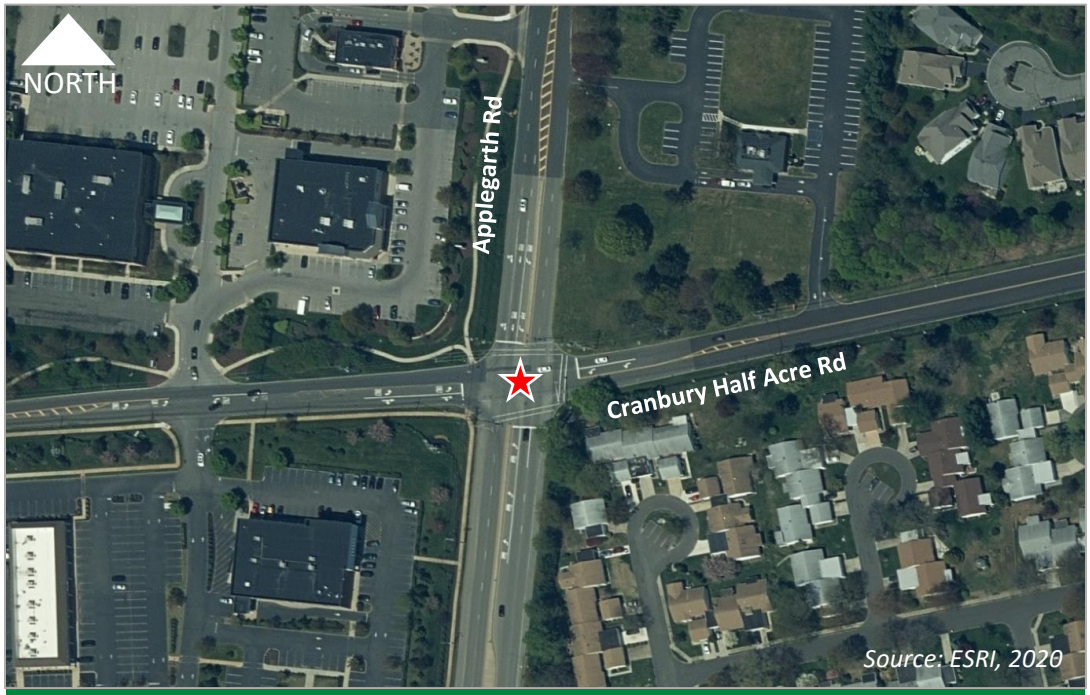
Recommendation: Improve ability for trucks to make left turns at intersection through changes to markings and geometry

Figure 31: County Route 619 (Applegarth Road) at County Route 615 (Station Road)



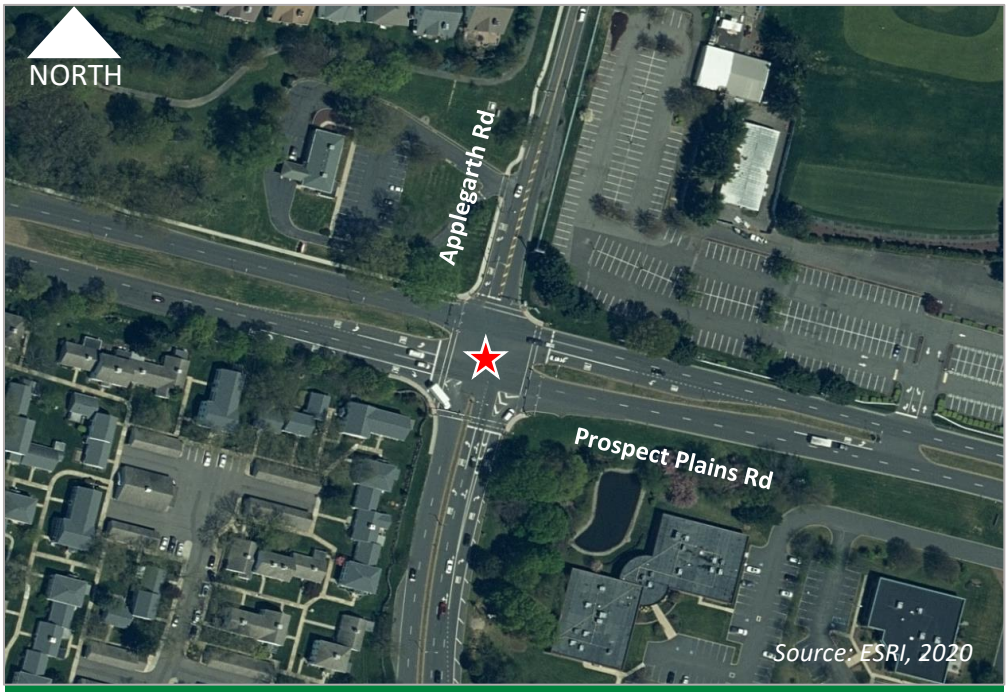
Recommendation: Construct turn assist or otherwise upgrade intersection

Figure 32: County Route 619 (Applegarth Road) at Cranbury Half Acre Road



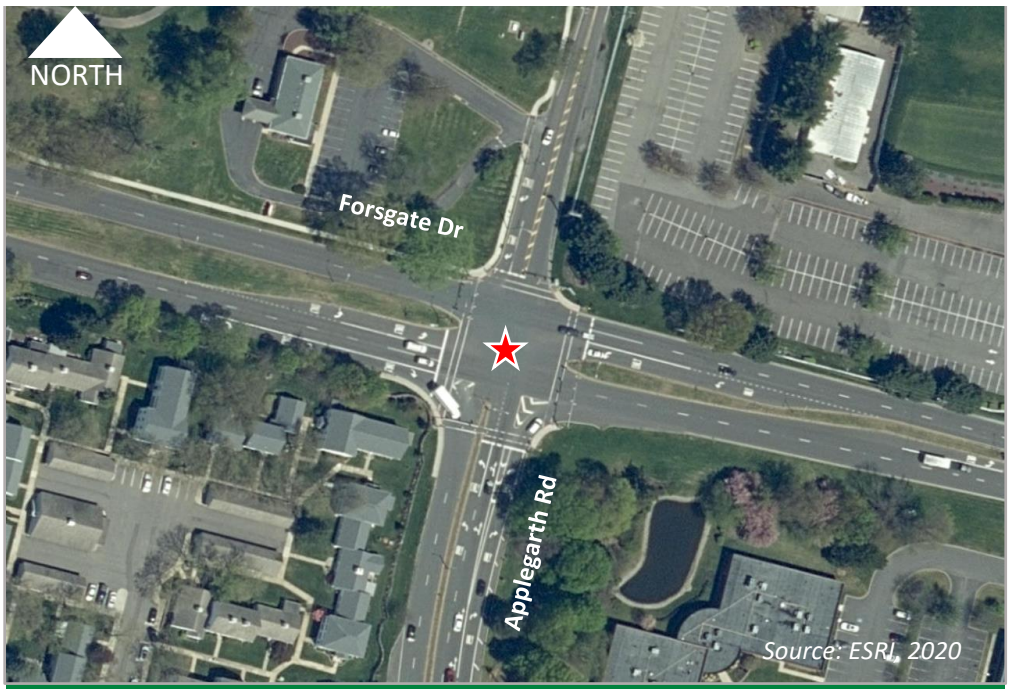
Recommendation: Construct turn assist or otherwise upgrade intersection

Figure 33: County Route 619 (Applegarth Road) at County Route 614 (Prospect Plains Road)



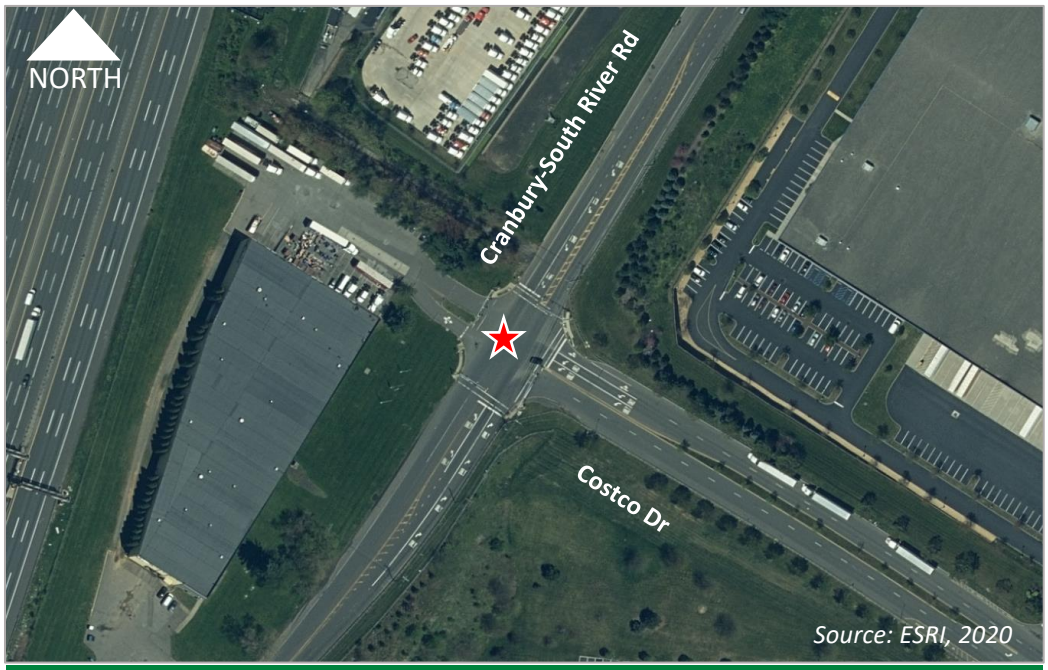
Recommendation: Construct turn assist, adjust signal timing, or otherwise upgrade intersection

Figure 34: Route 619 (Applegarth Road) at State Route 32 (Forsgate Drive)



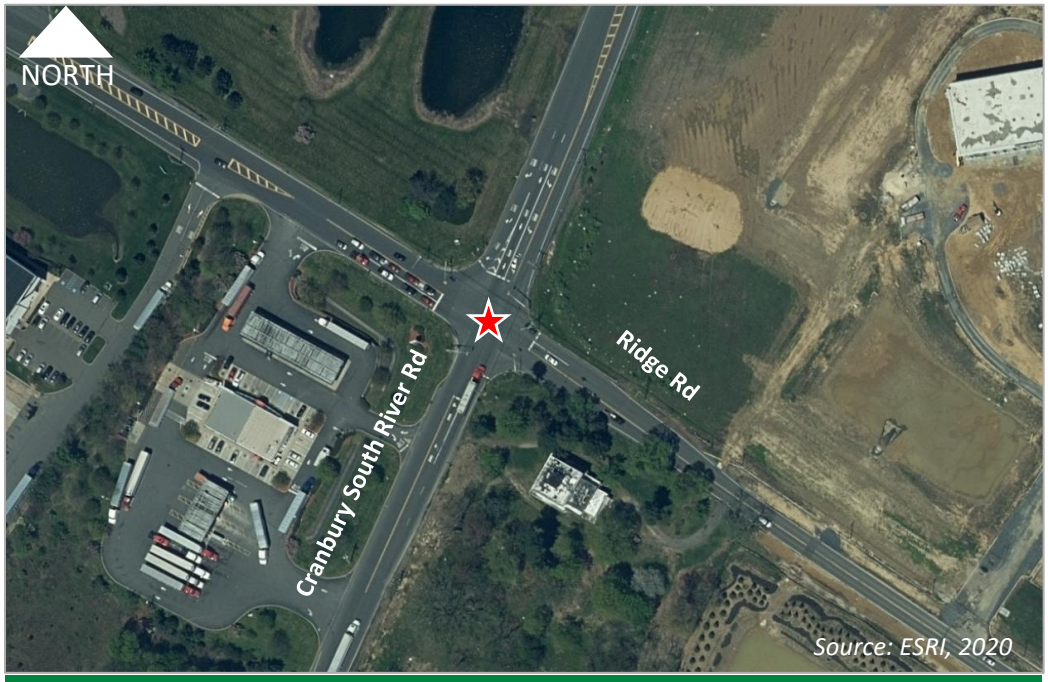
Recommendation: Review turning radii of intersection and movements. The public raised concerns about trucks using the double left turn lanes from County Route 619 (Applegarth Rd) northbound to State Route 32 (Forsgate Dr)

Figure 34: County Route 535 (Cranbury-South River Road) at Costco Drive



Recommendation: Adjust signal timing at intersection to address queuing issues

Figure 35: County Route 522 (Ridge Road) and County Route 535 (Cranbury-South River Road)

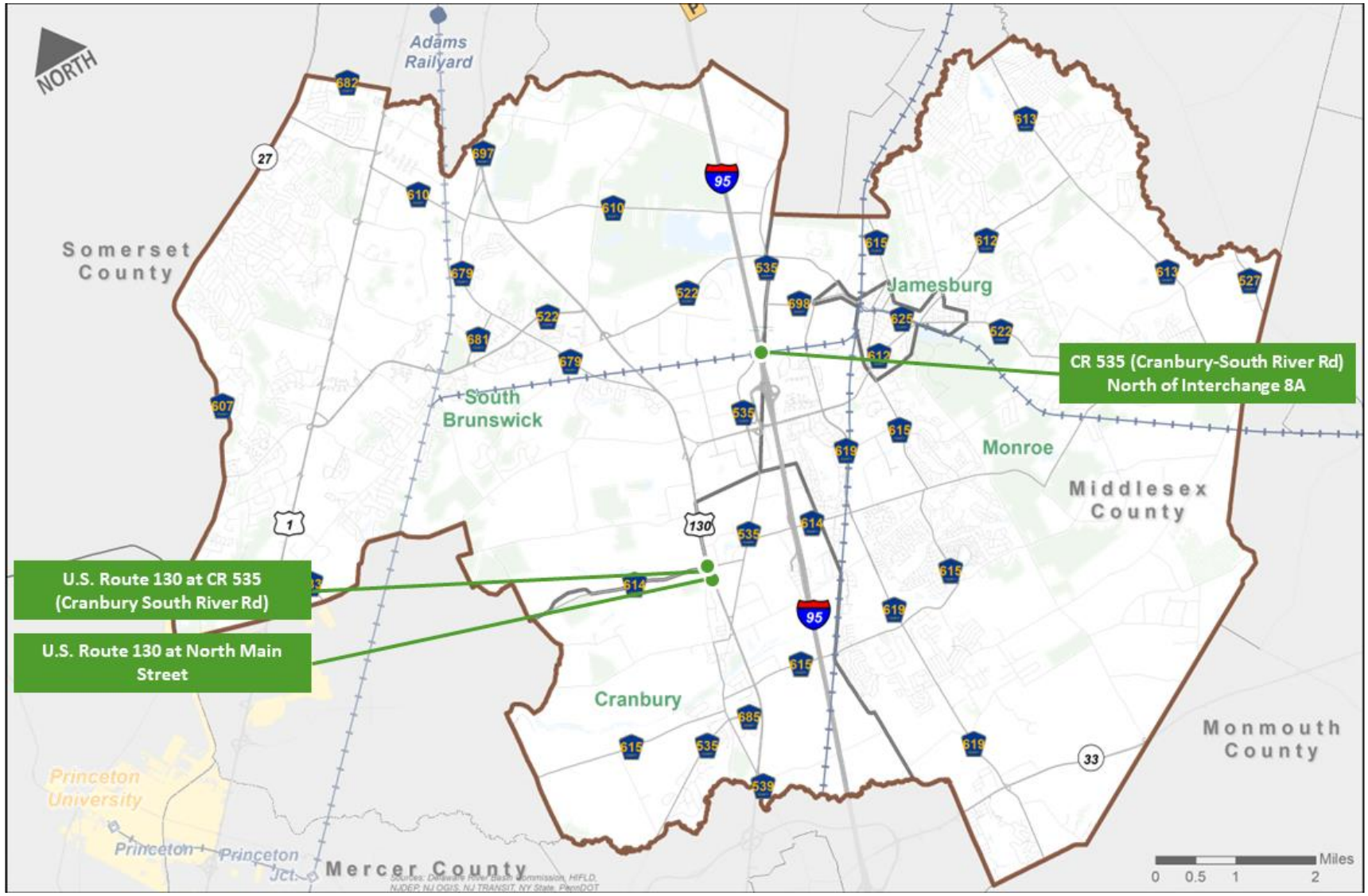


Recommendation: Construct turn assist or adjust signal timing

Specific Intersection Truck Movement Upgrade Locations

Recommendations were developed for three additional intersections due to their close proximity to freight clusters and the volume of truck traffic they carry. Figure 36 shows all three locations, while Figure 37 through Figure 39 provide details for each intersection.

Figure 36: Specific Intersection Truck Movement Upgrade Locations in the Primary Study Area



Source: NJDOT, Middlesex County, 2022

County Road 535 (Cranbury-South River Road) North of Interchange 8A

County Road 535 (Cranbury-South River Road) carries the bulk of north-south local truck traffic in the Primary Study Area, providing several freight clusters with direct access to the New Jersey Turnpike, and indirect access to U.S. Route 130 and State Route 32 (Forsgate Drive). The corridor runs northeast of the New Jersey Turnpike, connecting to a significant freight cluster (high density of freight-generating land uses) as well as north into East Brunswick, serving substantial non-truck traffic. A Turnpike bridge over County Route 535 (Cranbury-South River Road) limits its width.

Recommendation:

Middlesex County should partner with NJTA to study the potential widening of this Turnpike bridge, which would allow for the widening of County Route 535 (Cranbury-South River Road) to four lanes, eliminating a chokepoint (see Figure 38).

Expanding the underpass will allow the larger corridor to be widened to four lanes, reducing the severe congestion experienced at the intersection of County Route 535 (Cranbury-South River Road) and State Route 32 (Forsgate Drive). The County Route 535 (Cranbury-South River Road) corridor south of the New Jersey Turnpike bridge has two travel lanes in each direction. The bridge limits the width of the road. Studying the widening of the bridge to allow for a widened roadway corridor would improve traffic flow and reduce congestion.

Figure 37: CR 535 (Cranbury-South River Rd) North of Interchange 8A

Figure 38: CR 535 (Cranbury-South River Rd) below New Jersey Turnpike (looking north)

Source: Google Maps

U.S. Route 130 at North Main Street

North Main Street travels north from Cranbury's business area and intersects with U.S. Route 130 just south of U.S. Route 130's intersection with Dey Road. The skewed intersection of North Main Street at U.S. Route 130 presents multiple safety issues. The foremost issue is that northbound North Main Street traffic is stop-controlled (ID #1) at the intersection of U.S. Route 130 (as opposed to signalized) and is permitted to turn right or left onto U.S. Route 130. The challenge is that the northbound left turn requires crossing two lanes of high-speed southbound traffic, entering the corridor's median, and joining oncoming high-speed traffic (ID #2). The intersection's geometry also allows southbound U.S. Route 130 traffic to enter North Main Street (ID #3) at a high speed, raising safety concerns. North Main Street, which carries traffic into Cranbury's business corridor, has a much lower speed limit.

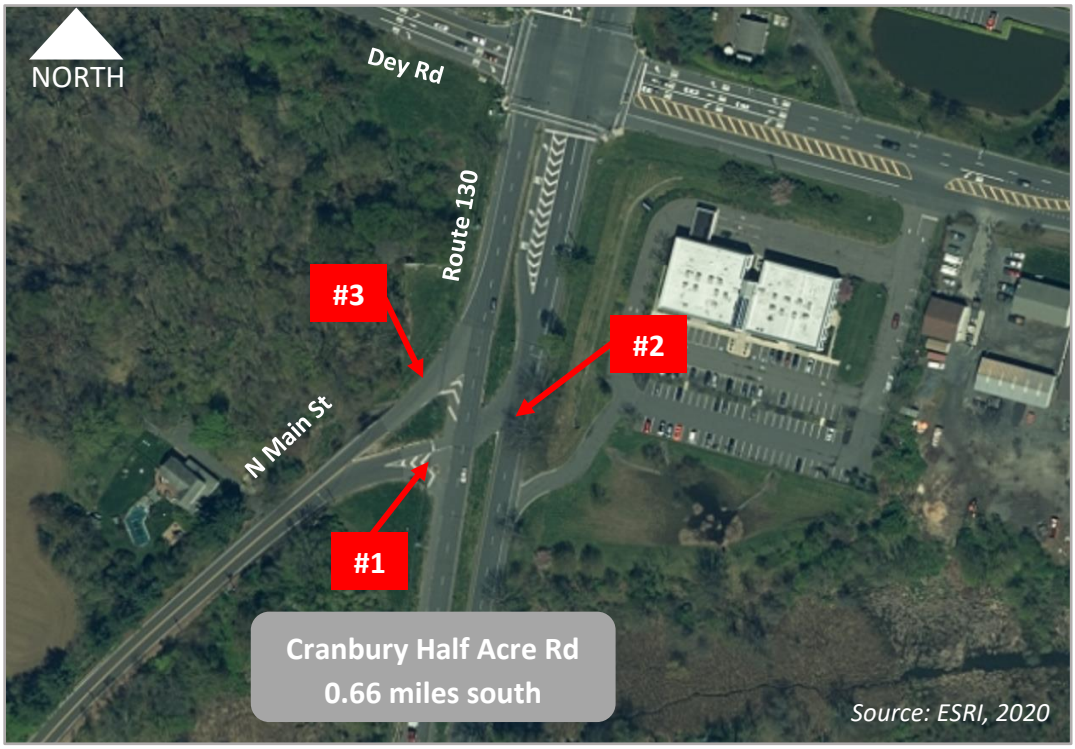
Recommendation:

The northbound left turn from North Main Street onto U.S. Route 130 should be removed by closing the median. Alternatively, North Main Street could be extended to intersect with County Route 614 (Dey Road), east of U.S. Route 130, which would eliminate the need for vehicles to get on U.S. Route 130 to maneuver between North Main Street and County Route 614 (Dey Road).

Restricting the northbound left turn from North Main Street onto U.S. Route 130 would remove a dangerous movement, forcing traffic to instead turn left from Cranbury Half Acre Road to the south, which is a signalized intersection. Cranbury Half Acre Road intersects U.S. Route 130 approximately 0.75 miles to the south of North Main Street. Detouring truck traffic traveling from Cranbury's business district to Cranbury Half Acre Road would not significantly lengthen their trip. There may be a need to review the signal timing at Cranbury Half Acre Road and U.S. Route 130 and upgrade roadway approaches based on changes in traffic volume due to the elimination of the left turn at North Main Street.

Continuing the North Main Street corridor to County Route 614 (Dey Road) would mitigate what would otherwise be a detour, but potentially add vehicle miles traveled. This new intersection would need to be located sufficiently distant from County Route 614's (Dey Road) intersection with U.S. Route 130 to allow for proper queuing and not unduly slow movement along County Route 614 (Dey Road). This new T-intersection may be signalized or stop-controlled (on North Main Street), depending on the traffic analysis results. The result would be an intersection with clearer perpendicular turning movements that is safer for motorists.

Figure 39: U.S. Route 130 at North Main Street



U.S. Route 130 at County Route 535 (South River Road)

At the intersection of South River Road and U.S. Route 130, traffic traveling south on South River Road must turn right onto northbound U.S. Route 130. Traffic also enters this intersection from U.S. Route 130 northbound. Traffic destined for U.S. Route 130 southbound from South River Road can access the corridor at a signalized intersection approximately 0.1 mile to the north. This intersection also accommodates traffic turning right onto U.S. Route 130 northbound. Opposite U.S. Route 130, Maplewood Avenue intersects with U.S. Route 130 in a similar manner, with traffic destined for U.S. Route 130 southbound able to access the corridor from a stop control at Maplewood Avenue or an existing signal at Cranbury Half Acre Road, less than 0.1 mile to the south. The existing intersection (including the location of existing traffic signals) is displayed in Figure 40.

Several problems exist at this intersection, including a lack of pedestrian facilities, despite several pedestrian-friendly uses nearby; lack of an acceleration lane from southbound County Route 535 (South River Road) to northbound U.S. Route 130; visibility issues from northbound Maplewood Avenue to southbound U.S. Route 130; and a surplus of driveways with direct access to U.S. Route 130 northbound south of County Route 535 (South River Road).

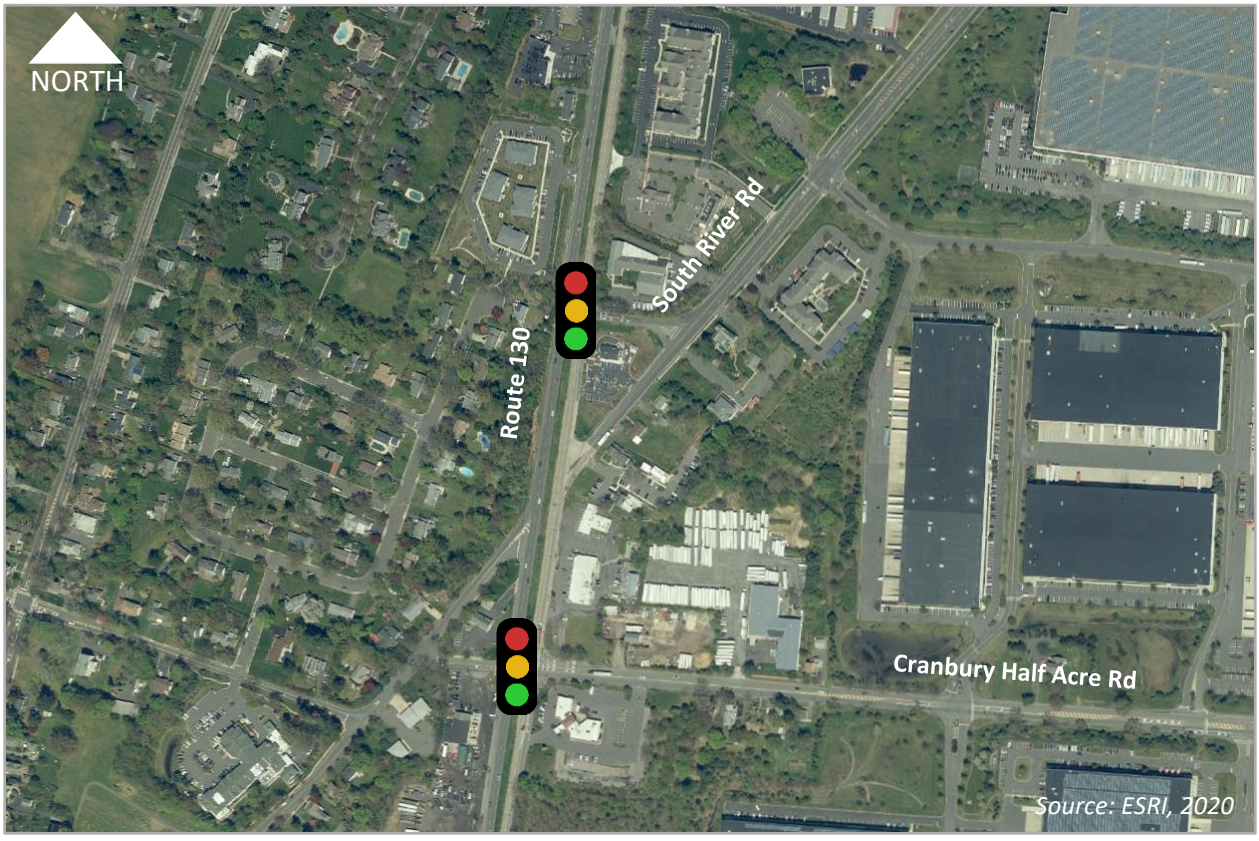
Recommendation:

Recommendations for the intersection of U.S. Route 130 and County Route 535 (South River Road) include removing the northbound right turn from Maplewood Avenue onto U.S. Route 130 southbound, removing the southbound right turn from County Route 535 (South River Road) to U.S. Route 130 northbound, extending the sidewalk network along either side of County Route 535 (South River Road) from Security Drive to U.S. Route 130, and consolidating driveways directly accessing U.S. Route 130 northbound south of County Route 535 (South River Road). Removing northbound traffic on Maplewood Avenue and southbound traffic on County Route 535 (South River Road) would necessitate converting one block on each road to one-way southbound, allowing for redistribution of roadway space for Complete Streets tactics or gateway treatments entering Cranbury village.

Removing northbound traffic from the northernmost block of Maplewood Avenue would eliminate a dangerous turning movement with inadequate visibility. Traffic accessing U.S. Route 130 southbound would need to turn right from northbound Maplewood Avenue to Cranbury Half Acre Road, where a signalized intersection provides access. This would improve safety for turn movements. A traffic analysis would need to be conducted for the intersection of U.S. Route 130 and Cranbury Half Acre Road to ensure this extra volume of vehicles would not be a detriment to traffic flow at the intersection. Changes to signal timing and turn lanes could mitigate any negative impacts. Similarly, removing southbound traffic

from the southernmost block of County Route 535 (South River Road) would eliminate a dangerous turning movement with inadequate visibility. Traffic accessing U.S. Route 130 northbound would need to turn right to the one-way signalized access ramp to the north. This would improve safety for turn movements. Eliminating traffic in one direction would provide space that could be used for sidewalks or other gateway or Complete Streets treatments. Extending the sidewalk network in the area *would provide needed access to local restaurants and better establish a transition zone between the more pedestrian-friendly Cranbury village to the south and truck-centric uses to the north along County Route 535 (South River Road).*

Figure 40: U.S. Route 130 at County Route 535 (South River Rd)

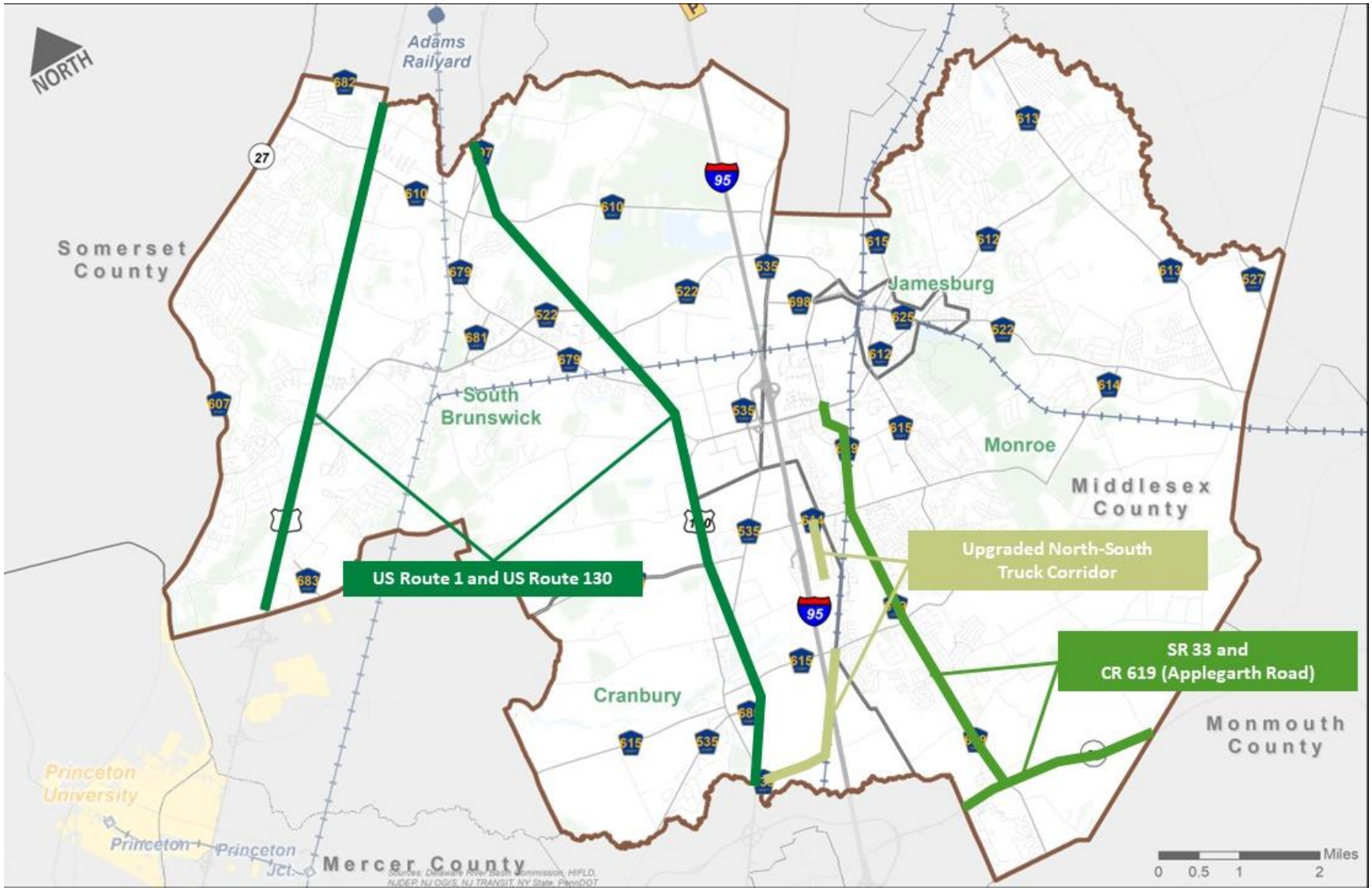


Corridor Truck Movement Recommendations

Corridor Truck Movement Study Locations

Several corridors should undergo further analysis of traffic and land use conditions to develop recommendations. These corridors are either integral to truck movement in the Primary Study Area, detrimentally affected by truck traffic or expected to accommodate significantly increased freight-dependent land uses and associated truck volumes in the near-to-mid future. These corridors are mapped in Figure 41 and discussed below.

Figure 41: Corridor Truck Movement Study Locations in the Primary Study Area



Initial Studies

U.S. Routes 1/130

U.S. Routes 1 and 130 carry significant truck volumes as well as regional passenger trips. U.S. Route 1 travels through many of New Jersey's largest cities, continuing east into New York City and west into Philadelphia. Within the Primary Study Area, U.S. Route 1 provides an un-tolled alternative to the New Jersey Turnpike, as well as more local access to residential neighborhoods and businesses. U.S. Route 130 also parallels the New Jersey Turnpike, accommodating substantial truck volumes accessing Interchange 8A and local and regional traffic. These two corridors are vital to the movement of trucks in the Primary Study Area, and monitoring, study, and analysis should be prioritized.

Recommendation:

Both corridors should be further studied to improve traffic operations and signals through the Primary and Secondary Study Areas. Potential studies could focus on monitoring traffic volumes and crash trends in relation to industrial development in the area, and identifying potential capacity, safety, conflict avoidance, and noise/impact mitigation improvements.

Improving traffic and signal operations along the two corridors will increase capacity and safety along these regional roads, including for the many trucks using them. Monitoring changes to traffic volumes and safety data will better allow the County and its municipalities to proactively respond to changes and address problem areas.

State Route 33 and County Route 619 (Applegarth Road)

Based on input from municipal and County staff, significant residential, commercial, and industrial land development is expected in the areas surrounding both State Route 33 and County Route 619 (Applegarth Road). State Route 33 has experienced noticeable development, in part due to its proximity to Interchange 8 of the New Jersey Turnpike. Increased development along State Route 33 can lead to increased traffic volumes along County Route 619 (Applegarth Road), which intersects with State Route 33 in the southern portion of the Primary Study Area.

Recommendation:

Potential studies could focus on changes in land use and resulting impacts on traffic volumes and traffic flows along the corridors, and on nearby municipal and County roadways.

Studying future land development along State Route 33 and County Route 619 (Applegarth Road) will allow the County to plan for growth and make responsive improvements. The main freight clusters (largely in central Monroe Township and Cranbury Township) in the Primary Study Area are largely developed, with minimal anticipated changes in the near future. Along the Primary Study Area's southern boundary, municipal and county staff highlighted anticipated industrial development along State Route 33 in the near-to-mid future. County Route 619 (Applegarth Road) is expected to experience some industrial development but will be more greatly impacted by increased traffic volumes due to its proximity to State Route 33.

Infrastructure Improvements

Upgraded North-South Truck Corridor and East-West Weight Restrictions

North-south traffic in the Primary Study Area is limited to a few routes, including U.S. Route 130, the New Jersey Turnpike, Applegarth Road, and for a portion of the Primary Study Area, South River Road. This roadway network issue can cause trucks to travel on County Route 619 (Applegarth Road) or create confusion about the appropriate truck route, leading to trucks traveling into residential neighborhoods in search of a route.

Recommendation:

Creating a truck route largely parallel to the New Jersey Turnpike and County Route 619 (Applegarth Road) would add capacity and accommodate north-south truck traffic. The potential truck route travels along Brick Yard Road, Hightstown-Cranbury Station Road, and Gavett Road, which currently discourage truck traffic. Brick Yard Road intersects with U.S. Route 130, where it travels east, then intersecs Hightstown-Cranbury Station Road where it travels northeast past large Amazon and Wayfair centers under the New Jersey Turnpike and intersects at County Route 615 (Cranbury Station Road). Additionally, Gavett Road travels between north of County Route 614 (Prospect Plains Road) to south of Cranbury Half Acre Road. Improvements to the roadways would help better facilitate trucks, including changes to signage, roadway markings, widening lanes, and installing shoulders, among other measures.

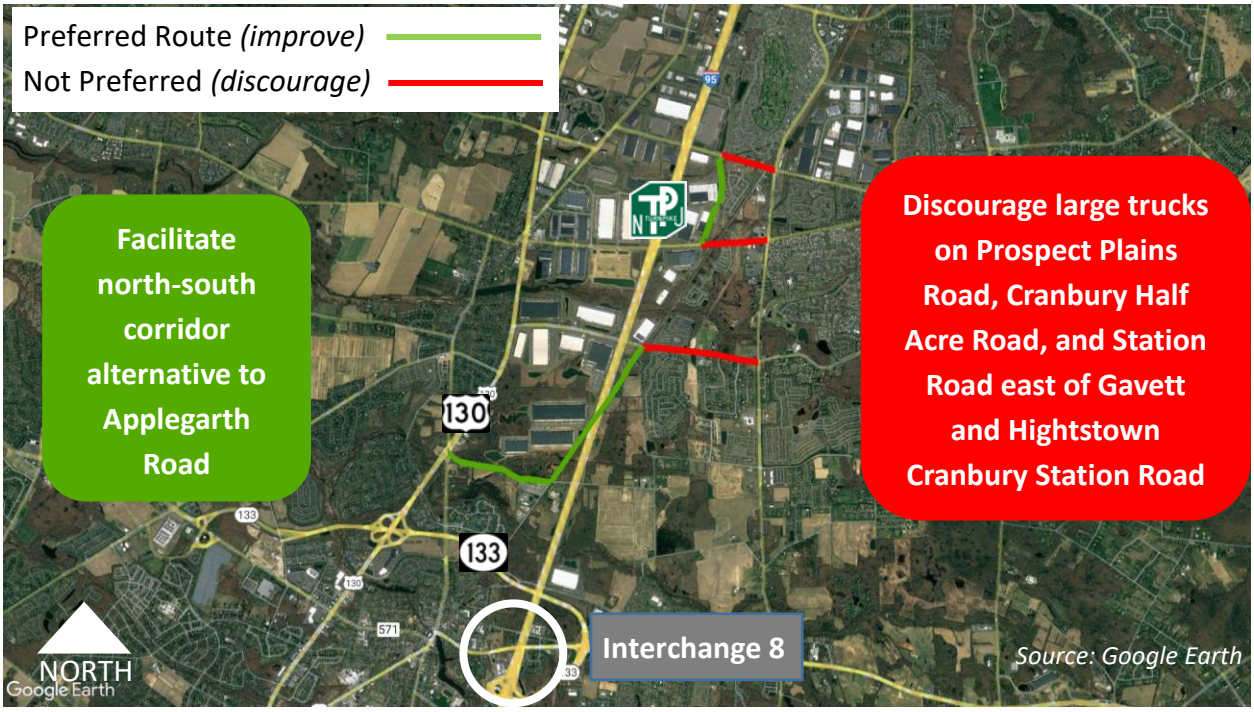
To further limit and discourage truck traffic from County Route 619 (Applegarth Road) and adjacent residential areas, several jughandles or turn assists (roadway allowing a u-turn) should be constructed along Gavett Road at County Route 615 (Station Road), Cranbury Half Acre Road, and County Route 614 (Prospect Plains Road), where eastbound trucks would be discouraged from continuing to Applegarth Road. Municipalities should consider pursuing weight restrictions and/or advisory signage along County Route 615 (Station Road), Cranbury Half Acre Road, and County Route 614 (Prospect Plains Road) between Gavett Road and County Route 619 (Applegarth Road) to further enforce this change.

The Township of Cranbury should work with Middlesex County to install signage on the eastbound approach of Cranbury Station Road before Hightstown-Cranbury Road that encourages trucks to turn right on Hightstown-Cranbury Road toward Brick Yard Road and U.S. Route 130. Additional signage should be installed on southbound Hightstown-Cranbury Road approaching Brick Yard Road encouraging trucks to turn right toward U.S. Route 130. The purpose of this signage is to discourage trucks from heading eastbound toward residential areas and Applegarth Road.

The route and potential restricted locations are shown in Figure 42.

Making upgrades to this larger corridor will provide an additional truck route proximal to freight generators, connecting to higher-order roadways, and largely buffered from residential neighborhoods. Wayfinding and roadway improvements would make clear to truck operators that the route is designated and designed for trucks. Constructing jughandles or other turn assists (allowing the ability to make a u-turn) provides an additional opportunity for trucks to navigate along desired routes and avoid non-desired routes. Signage at these locations can indicate that trucks should not continue straight toward County Route 619 (Applegarth Road).

Figure 42: Upgraded North-South Truck Corridor with East-West Weight Restrictions



Interchange 8A

The New Jersey Turnpike's Interchange 8A provides the primary truck access point into the Primary Study Area. Despite the on/off-ramps being located mid-block, there is congestion at the intersection of County Route 535 (Cranbury-South River Road) and State Route 32 (Forsgate Drive). The presence of congestion causes safety concerns as well. Additionally, public engagement revealed frequent instances of vehicles turning left after the protected left signal had turned red.

Recommendation:

Recommendations for the Interchange 8A area include the following and are shown in Figure 43:

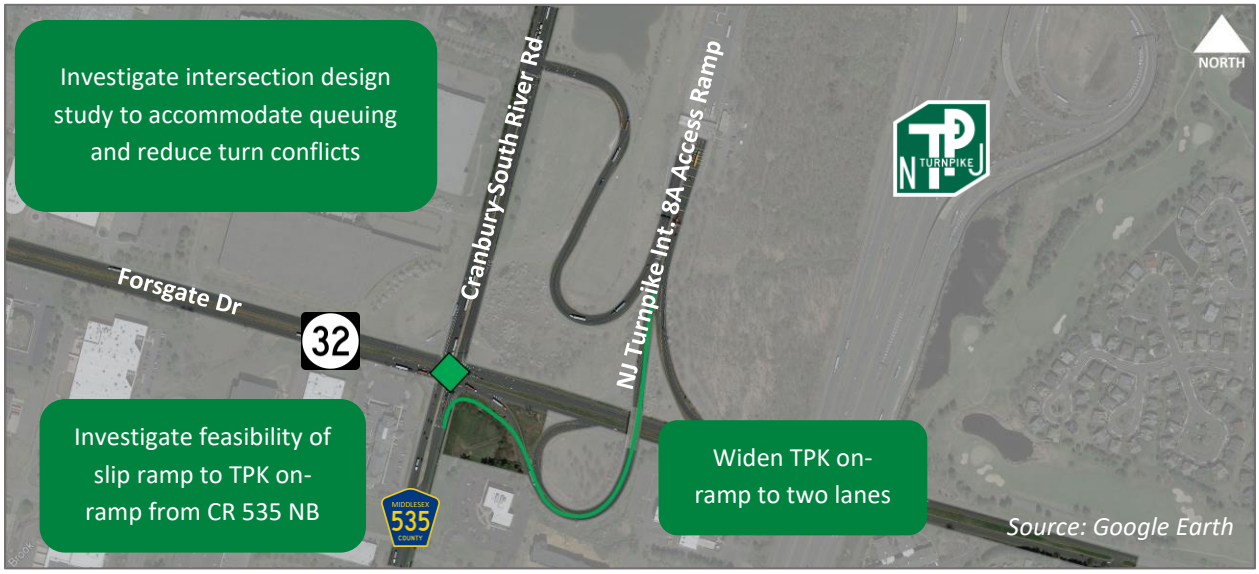
- Study the feasibility of a change in intersection layout that better facilitates and prioritizes movements (based on traffic volumes, demand, and safety) between the two corridors and the Turnpike
- Widen the on-ramp from State Route 32 (Forsgate Drive) eastbound to the New Jersey Turnpike from one to two lanes
- Construct a slip lane from County Route 535 (Cranbury-South River Road) northbound to the on-ramp to the New Jersey Turnpike
    - In the interim, widen the right turn lane from northbound County Route 535 (Cranbury-South River Road) to the New Jersey Turnpike on-ramp

These recommendations will require substantial additional study and consideration. In this study's implementation matrix, recommendations for the interchange are split into multiple phases, conducting studies to further investigate the feasibility, and implementing the actual infrastructure changes.

Studying the feasibility of changing the layout of the intersection of State Route 32 (Forsgate Drive) and County Route 535 (Cranbury South River Road) as it accesses Interchange 8A will provide a better understanding of traffic movements through the intersection, including access to Interchange 8A and thru-movements to the freight-generating land uses along County Route 535 (Cranbury-South River Road). Intersection upgrades could greatly improve traffic flow and safety, and reduce conflict points. Extensive traffic analysis would be required for any substantial changes to this vital and busy intersection. Based on the measure implemented, an education campaign may be necessary and helpful to alert drivers to the new pattern. Widening the on-ramp from State Route 32 (Forsgate Drive) eastbound to the New Jersey Turnpike would reduce congestion and improve traffic flow. Speeds can be particularly slow along this one-lane ramp as the high volume of trucks must travel slowly along the curve. Constructing a slip lane from County Route 535 (Cranbury-South River Road) northbound to the on-ramp to the New Jersey Turnpike would reduce the number of

vehicles processed in the intersection of the two roads, easing congestion while providing an additional access point for the many vehicles reaching the Turnpike. This recommendation would be further enhanced by the previous recommendation to widen the on-ramp to two lanes. If maintaining one lane, this new slip lane would likely need to enter the ramp with a yield control, while if widened to two lanes, both lanes could enter the ramp free-flow. Either circumstance would be an improvement over existing conditions.

Figure 43: Improve Truck Access at Interchange 8A Locations



Primary Study Area-wide Truck Movement Recommendation

Upgrade and Install Signals

Both the U.S. Route 130 and State Route 32 (Forsgate Drive) corridors have adaptive signal timing in the Primary Study Area. Adaptive corridors allow the traffic signal controller to revise the green times (and cycle length) as needed based on traffic conditions. More detail about adaptive signaling is presented in the Adaptive Signaling section on page 92. Signals at other locations may need adjustments based on changes in traffic conditions that bring additional vehicles and affect the ideal signal phasing splits. Currently unsignalized intersections may also benefit from having signals installed.

Recommendation:

Signal timing should be reviewed across the Primary Study Area to explore efficiencies and improvements. Signal timing can be strategically adjusted to better allocate time to congested roadway approaches and reduce timing where excess time is provided. Key truck bottlenecks should be prioritized.

A comprehensive signal timing review will improve traffic flow and reduce queuing throughout the Primary Study Area. Improvements to signal phasing at each intersection can significantly impact traffic operations, improving traffic flow for trucks and passenger vehicles. A comprehensive analysis and adjustment of signal timing across the Primary Study Area can have an even larger impact.

Other Truck Movement Recommendation Options Considered

Additional Truck Turnpike Access Points

One of the greatest strengths of the New Jersey Turnpike is its minimal entry and exit points. This helps discourage local traffic, encourage regional and interstate traffic, and reduce interchange-driven congestion and development. Over time, however, changes in land use and demand along the corridor have led to the periodic addition of new Turnpike access points. This study does not have specific recommendations for new access points in the Primary Study Area but suggests the NJTA may wish to closely monitor development in the area for future evaluation of new access points.

Liberty Way Connection

In 2003, Cranbury Township approached Middlesex County to initiate a bridge project known as the Liberty Way Extension. The Liberty Way bridge span over Cranbury Brook would provide a truck connection from Station Road to County Route 535 (Cranbury-South River Road), providing warehouses south of Cranbury Brook with an alternative to the two existing routes (U.S. Route 130 or Station Road to Applegarth Road to State Route 32 (Forsgate Drive)) to and from Turnpike Interchange 8A. The existing siting of warehouse development necessitates a diagonal bridge span over Cranbury Brook, 40 percent longer than a direct connection and with substantial wetlands disturbance, at a cost of $15 million (in 2003). NJDEP required a purpose and need statement to demonstrate that the proposed new bridge span connecting Liberty Way was in fact necessary with no other feasible regional alternatives, and was not convinced of the need for the project based on the traffic studies provided by the Township. If the Liberty Way Extension bridge span is pursued, an environmental assessment or environmental impact assessment, as per Executive Order 215, will be required and will ultimately dictate if the project can move forward. Given the uncertainty about whether or how this project might advance, this study offers an alternative recommendation to improve access for warehouses south of Cranbury Brook, as shown on Figure 42 previously.

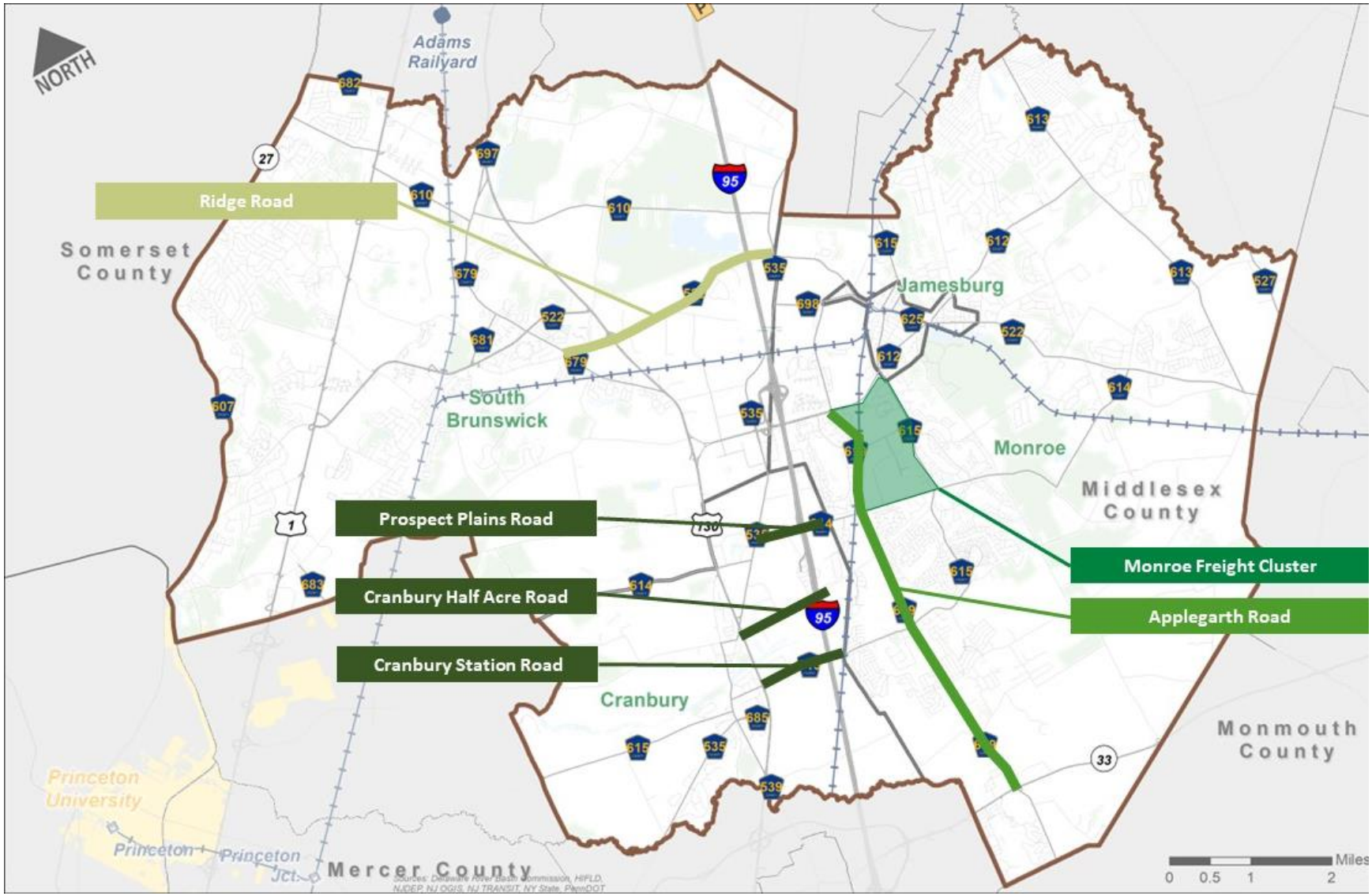
Wayfinding

Though many drivers, including truck operators, use smartphone-enabled GPS for driving, wayfinding signage is also relied upon to reach destinations. Based on local knowledge and conditions, wayfinding signage can inform drivers of both desirable and discouraged routes, as well as warn them of temporary or permanent height and weight restrictions. Wayfinding in the Primary Study Area should direct trucks to identified truck routes, work in tandem and in consideration of existing land uses, and align with community and stakeholder needs and goals.

Site-Specific Wayfinding Recommendations

Site-specific wayfinding recommendations are mapped in Figure 44 and detailed in the paragraphs below. These areas were identified through a combination of public engagement, review of existing truck patterns and signage, and conversations with County staff. Each of the sites selected for wayfinding recommendations cater to a high number of truck volumes and would benefit from improved wayfinding. Figure 45 shows three examples of existing wayfinding signage included in the Moving Mindfully: Monmouth/Mercer freight study funded by NJTPA.

Figure 44: Site-Specific Wayfinding Recommendation Locations in the Primary Study Area



Source: NJDOT, Middlesex County, 2022

Figure 45: Truck Wayfinding Examples

Monroe Freight Cluster

Monroe's freight cluster is contained by County Route 619 (Applegarth Road), County Route 614 (Prospect Plains Road), Half Acre Road, and State Route 32 (Forsgate Drive) and is surrounded by residential areas. Access is only available via County Route 619 (Applegarth Road) and County Route 614 (Prospect Plains Road). This limited access causes substantial truck volumes on both corridors and the presence of nearby residential neighborhoods sometimes leads to trucks entering areas where they should not be traveling. These two access roads are also highly traveled by residents.

Recommendation:

Monroe Township and its residents, Middlesex County, and freight stakeholders located in the freight cluster should collaborate to identify, if possible, a single preferred route between Interchange 8A of the New Jersey Turnpike and the freight cluster. Access to the cluster is only provided on County Route 619 (Applegarth Road) and County Route 614 (Prospect Plains Road). If a preferred route is identified, wayfinding signage should be installed at strategic locations to encourage trucks to use this desired route. Signage could read "For NJ Turnpike, exit at County Route 619 (Applegarth Road)" or "For Monroe freight cluster, use County Route 619 (Applegarth Road)," or something similar. Stakeholders, including members of the TAC, were unable to reach a consensus during this study as to which of the two routes should cater to freight cluster-bound trucks. This can be decided in part based on which roadways receive other improvements in this study's recommendations. For example, a truck restriction is proposed for a portion of County Route 614 (Prospect Plains Road). This may make County Route 619 (Applegarth Road) north of Prospect Plains Road a more appealing truck route.

Currently, trucks may take various routes to reach the Monroe freight cluster. A study focused on identifying a preferred truck route and subsequent installation of wayfinding signage has the potential to reduce truck volumes on undesirable routes.

County Route 619 (Applegarth Road)

This study identifies many issues with County Route 619 (Applegarth Road). This corridor provides one of only a few north-south corridors in the Primary Study Area, supplying a direct route between State Route 33 and State Route 32 (Forsgate Drive) parallel to the New Jersey Turnpike and U.S. Route 130. Some trucks access County Route 619 (Applegarth Road) from State Route 33 rather than continuing west to the Hightstown Bypass (State Route 133) and U.S. Route 130. Traveling via County Route 619 (Applegarth Road) allows for a direct route, but requires traveling down roads not designed for trucks, frequently through residential areas.

Recommendation:

Wayfinding signage should be installed near the intersection of State Route 33 and County Route 619 (Applegarth Road) to encourage trucks to continue west to the Hightstown Bypass and U.S. Route 130. Signage should also be installed along County Route 619 (Applegarth Road) encouraging trucks to travel north-southwest of the New Jersey Turnpike on either U.S. Route 130 and/or County Route 535 (Cranbury-South River Road).

Added wayfinding signage will better direct trucks to roads designed for them and discourage trips through residential areas. This strategic location of signing will notify trucks before they enter residential areas and the center of the Primary Study Area where truck routes are located.

County Route 522 (Ridge Road)

Vertical and weight clearance signage is largely adequate and compliant throughout the Primary Study Area. However, the County Route 522 (Ridge Road) underpass of U.S. Route 130 only has vertical clearance signage installed on the off-ramps from U.S. Route 130 to County Route 522 (Ridge Road).

Recommendation:

Though compliant with New Jersey State Laws 27:5G-1 through 27:5G-4[2] requiring vertical clearance signage, additional signage should be installed earlier along U.S. Route 130 within Middlesex County to prevent vehicles from exiting onto County Route 522 (Ridge Road) and only later realizing that they cannot turn in their desired direction.

Adding selected height restriction signage reduces confusion and last-second traffic movements, clarifying the truck network and allowing for safer truck movements and travel.

Cranbury Station Road (CR 615) between U.S. Route 130 and Hightstown-Cranbury Station Road

Cranbury Half Acre Road between U.S. Route 130 and Gavett Drive

Prospect Plains Road (CR 614) between South River Road (CR 535) and Gavett Drive

Driveways on privately owned lots are the responsibility of the landowner. Truck-dependent businesses can have a variety of designs for signage directing trucks from their businesses.

[2] https://www.nj.gov/transportation/eng/documents/BDC/pdf/DMB-SEC3p1-5-rev20120620.pdf

Recommendation:

The Townships of Cranbury and Monroe should work with warehouses located on Cranbury Station Road between U.S. Route 130 and Hightstown-Cranbury Station Road, Cranbury Half Acre Road between U.S. Route 130 and Gavett Drive, and County Route 614 (Prospect Plains Road) between County Route 535 (South River Road) and Gavett Drive to establish truck wayfinding signage at their driveway exits encouraging trucks to head westbound to U.S. Route 130 to then travel north or south. This would discourage trucks from driving eastbound toward residential communities and Applegarth Road.

Primary Study Area-wide Wayfinding Recommendations

Comprehensive Wayfinding Analysis

There has been significant residential, commercial, and industrial development in the Primary Study Area and this growth is projected to continue to some extent, which may change traffic flow patterns. This would necessitate further consideration of the larger wayfinding signage network.

Recommendation:

A comprehensive wayfinding analysis should be conducted to promote and encourage truck operations along desired routes. Particular attention should be paid to encouraging trucks to access Interchange 8A by traveling west of the New Jersey Turnpike via U.S. Route 130 or County Route 535 (Cranbury-South River Road) rather than narrower, more residential County routes east of the Turnpike.

In cooperation with the many other recommendations made in this study, a comprehensive wayfinding analysis will continue efforts made as part of the Southern Middlesex County Freight Movement Study and reevaluate wayfinding signage to more responsively address issues and direct trucks to routes that can adequately accommodate them.

Coordinating with GPS Providers

Truck operators use a variety of public (Google Maps) and private GPS navigation providers. Each GPS provider uses its own software, algorithm, and methodology for directing vehicles to destinations. Each can prioritize or emphasize certain desired routes (such as the New Jersey Turnpike) and discourage other routes (such as low-speed, circuitous residential streets).

Recommendation:

Middlesex County should work with GPS navigation providers to adjust routing protocols to avoid certain routes the County deems undesirable for trucks. Trucks should be encouraged to

use U.S. Route 130, State Route 32 (Forsgate Drive), and County Route 535 (Cranbury-South River Road), and discouraged from using County Route 619 (Applegarth Drive). This report's recommendations for additional study and analysis of wayfinding and truck patterns will help inform discussions with GPS navigation providers.

There are various mechanisms available for coordinating with GPS providers. For GPS systems controlled and deployed by large truck fleet operators to their carriers, routing information and requests to avoid certain routes can be reported directly to the fleet operators themselves. Several freight industry representatives interviewed for this study indicated they would consider such requests, if offered.

Additionally, to suggest altering routes for privately-developed GPS systems used by truck operators and the public, the federal government maintains an online clearinghouse to report improper truck routings through residential communities. The following website provides links to report GPS problems with commonly used GPS providers, including Google Maps, Waze, Uber, TomTom, HERE, Garmin, MapQuest, Apple Business Register, and OpenStreetMap: https://www.gps.gov/support/user/mapfix/truck-traffic/#:~:text=If%20your%20neighborhood%20has%20posted%20restrictions%20on%20commercial,plate%20number%20and%20company%20name%20for%20each%20incident

For privately-developed GPS systems marketed primarily to truck operators (such as PC Miler), reports can be made to the respective companies. Some of these GPS systems are bundled with Electronic Logging Devices used to record truck driver hours of service, and reports regarding bundled systems can also be made to the Federal Motor Carrier Safety Administration.

Collaborating with GPS providers will better direct trucks to preferred routes and discourage them from using undesired routes. Maintaining a relationship with the providers, rather than a single communication, will better allow future edits to be made and ensure trucks continue to move efficiently in the Primary and Secondary Study Areas, maintaining the area's desirability for freight-generating land uses.

Subarea Travel Demand Model

Traffic analysis and traffic counts tend to be performed piecemeal for specific projects and sites. Combining all these data points and sources provides the opportunity to routinely review traffic conditions and allow for a more proactive response that would allow the County to easily incorporate expected changes in land use and roadway geometry into an established, calibrated, trusted, and comprehensive model.

Recommendation:

Middlesex County should work with the municipalities and NJDOT to develop a Subarea Travel Demand Model covering geometry and traffic volumes on roadways in the Primary Study Area. A travel demand model typically has a four-step process used to accurately determine and predict routes for various trips. A subarea travel demand model would utilize this process for the Primary Study Area, or potentially a larger County or inter-county area. The model should include State and County roadways as well as strategic municipal roadways that face substantial truck volumes, passenger vehicle volumes, or are expected to experience a substantial growth in volumes due to development. The County and municipalities can then use this model as changes to local land uses and traffic conditions are made. Recommendations made in this report can be further validated and refined based on the maintained model.

A Subarea Travel Demand Model will allow the County to plan ahead, consider anticipated and ongoing needs, and ultimately better prepare for future changes and concerns. The model will also allow for more oversight and direction from the County rather than relying on external data sources. Updates to the model can be made routinely as new traffic counts are conducted and in tandem with the Primary Study Area municipalities' land development processes.

Neighborhood Protection

Neighborhood Protection refers to safeguards that preserve, protect, and enhance the quality of life in residential neighborhoods by restricting truck access. Neighborhood protection works hand in hand with Truck Movement, requiring adequate truck routes to be present elsewhere in the Primary Study Area that provide truck traffic viable alternatives to using residential/neighborhood streets.

Site-Specific Neighborhood Protection Recommendations

State Route 32 (Forsgate Drive)

State Route 32 (Forsgate Drive) provides regional access to the New Jersey Turnpike and U.S. Route 130 west of the Turnpike. The western part of the corridor serves regional high-speed traffic, while the eastern portion provides access to several age-restricted communities before continuing east toward the more pedestrian-oriented community of Jamesburg. State Route 32 (Forsgate Drive) should continue to handle regional traffic and trucks.

Recommendation:

The speed limit along State Route 32 (Forsgate Drive) east of the New Jersey Turnpike should be reduced from 45 to 40 mph. Short segments of the corridor feature three lanes in either direction. These segments should be narrowed to two lanes, to maintain consistency, discourage speeding, and reduce the frequency of last-second unsafe merges. Additionally, speed limit signs should be installed along the eastern part of the corridor, east of Forsgate Country Club. These signs should be located where the corridor operates with one travel lane in each direction and indicate a speed limit of 30 mph. Also, along the corridor, the travel lane withs could be narrowed, and shoulders widened, to reduce speeding.

Lowering the speed limit will reduce speeding and improve safety while having an insignificant impact on traffic flow. Standardizing the number of lanes will also improve safety. Added speed limit signs traveling eastward past the railroad tracks into Jamesburg will help establish a gateway effect indicating that slower speeds are expected.

Complete Streets Improvements (Location-Specific)

Complete Streets are designed for all users, all modes of transportation, and all ability levels, according to NJDOT's *Complete Streets Design Guide*. They balance the needs of drivers, pedestrians, bicyclists, transit riders, emergency responders, and goods movement based on local context. The NJDOT *Complete Streets Design Guide* should be used as a resource for improvements. Covering a plethora of programmatic and geometric improvements, Complete Streets measures consider sidewalks, roadways, and intersections. Topics addressed in the

guide include sidewalk widths, bus shelters, traffic calming, crosswalk design, and roundabouts, among others. Recommendations for all user groups are included throughout this document. Figure 46 highlights recommendations to make walking and biking safer. Additional details are provided in Figure 47 through Figure 50.

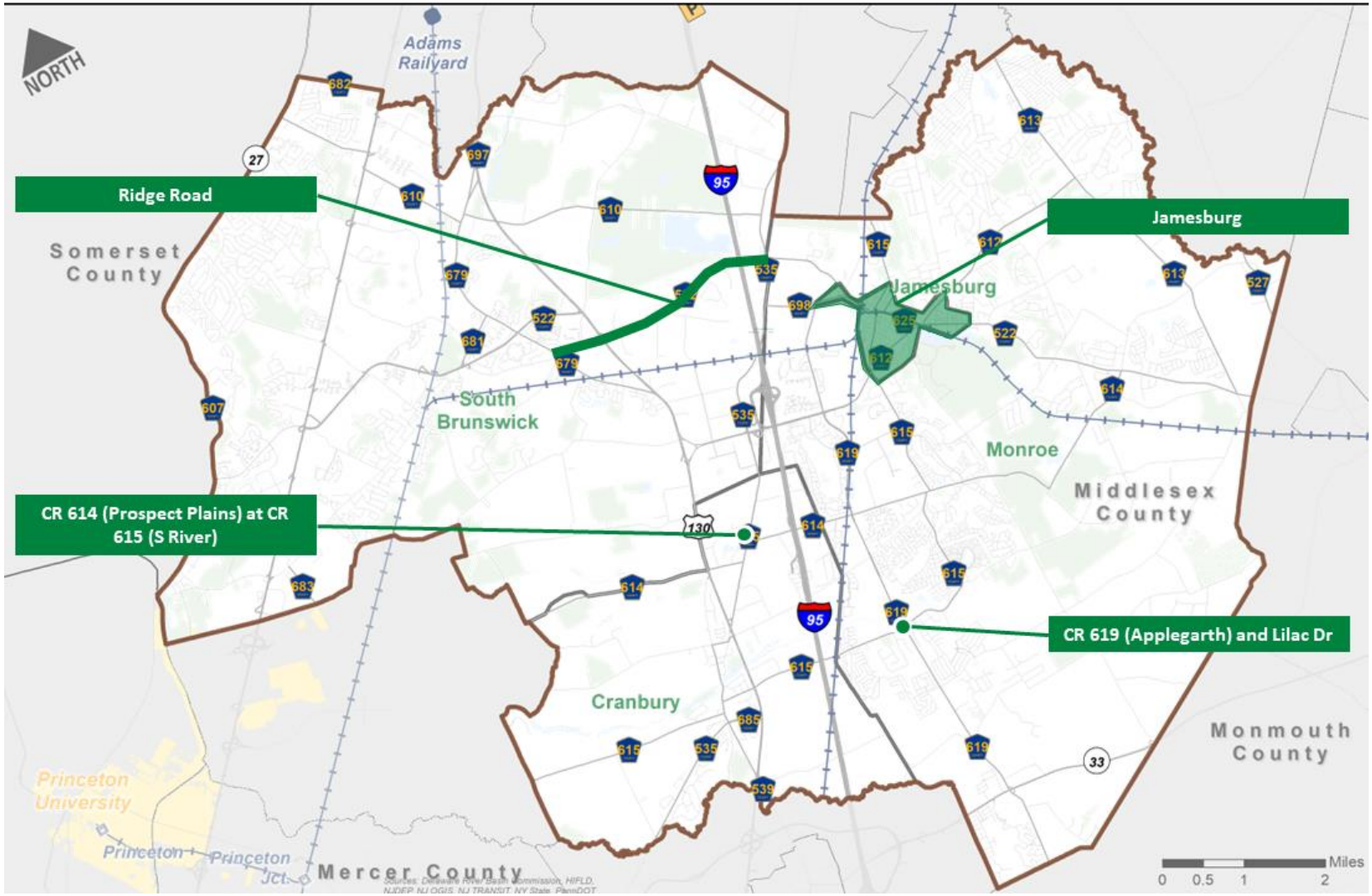
Complete Streets improvements promote physical and mental health by supporting walking and biking, provide last-mile connections to public, promote safety, and reduce speeding. For example, installing sidewalks and crosswalks to connect existing bus stops and freight-dependent employers will promote public transit and active transportation to work, reducing congestion and enhancing safety. This may also encourage employees to live closer to work, improving work performance and reducing transportation costs. Marking a crosswalk at Lilac Drive will formalize an existing pedestrian movement and take advantage of existing ADA-compliant infrastructure. A comprehensive analysis of Complete Streets in Jamesburg will help improve biking and walking safety in the borough. Conducting a Road Safety Audit, which identifies areas of concern and potential solutions, could provide a better understanding of how key corridors operate and what improvements can be made. Improvements to County Route 522 (Ridge Road) will reduce travel speeds, encourage biking and walking, including to Indian Fields Elementary School, and introduce Complete Streets measures to community members.

Cranbury Station Road

Recommendation:

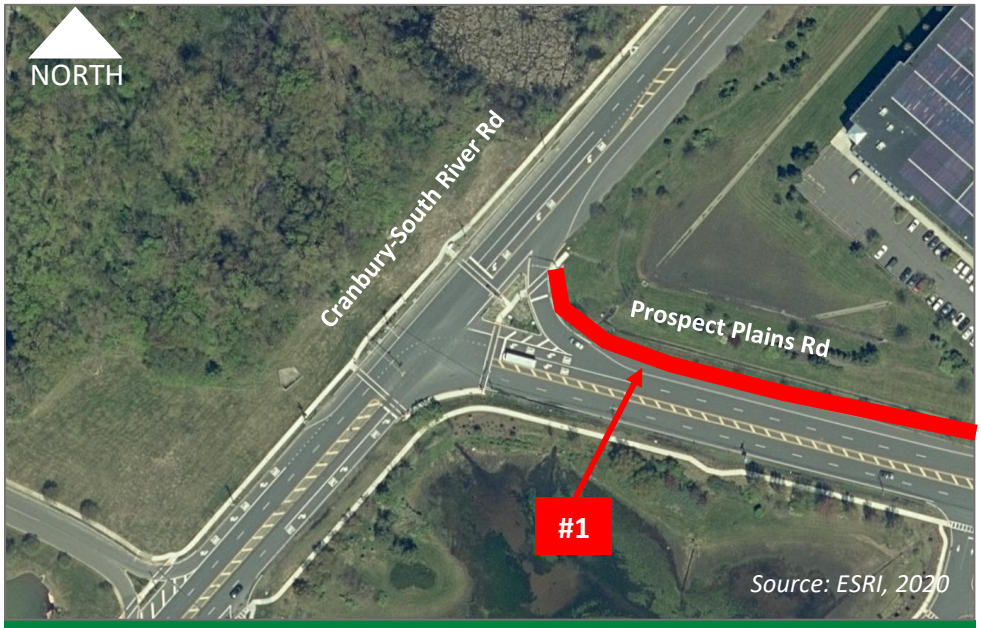
For immediate implementation, Monroe Township should pursue a weight restriction on Cranbury Station Road between Hightstown-Cranbury Road and Applegarth Road.

Figure 46: Complete Streets Recommendations Locations in the Primary Study Area



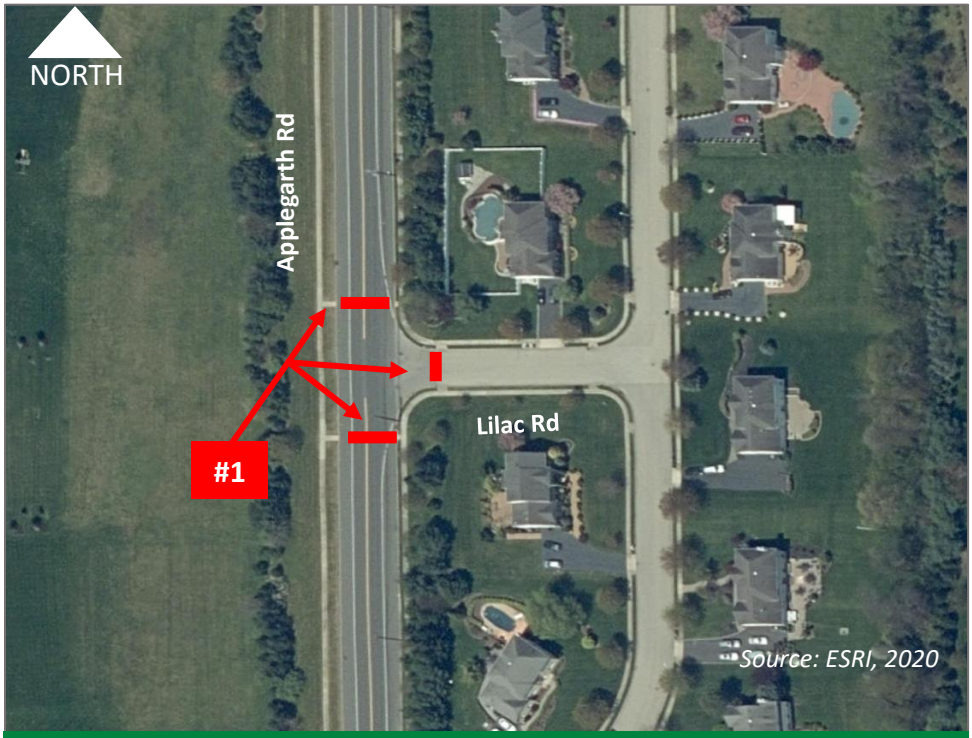
Source: NJDOT, Middlesex County, 2022

Figure 47: County Route 614 (Prospect Plains Road) at County Route 535 (Cranbury-South River Road)



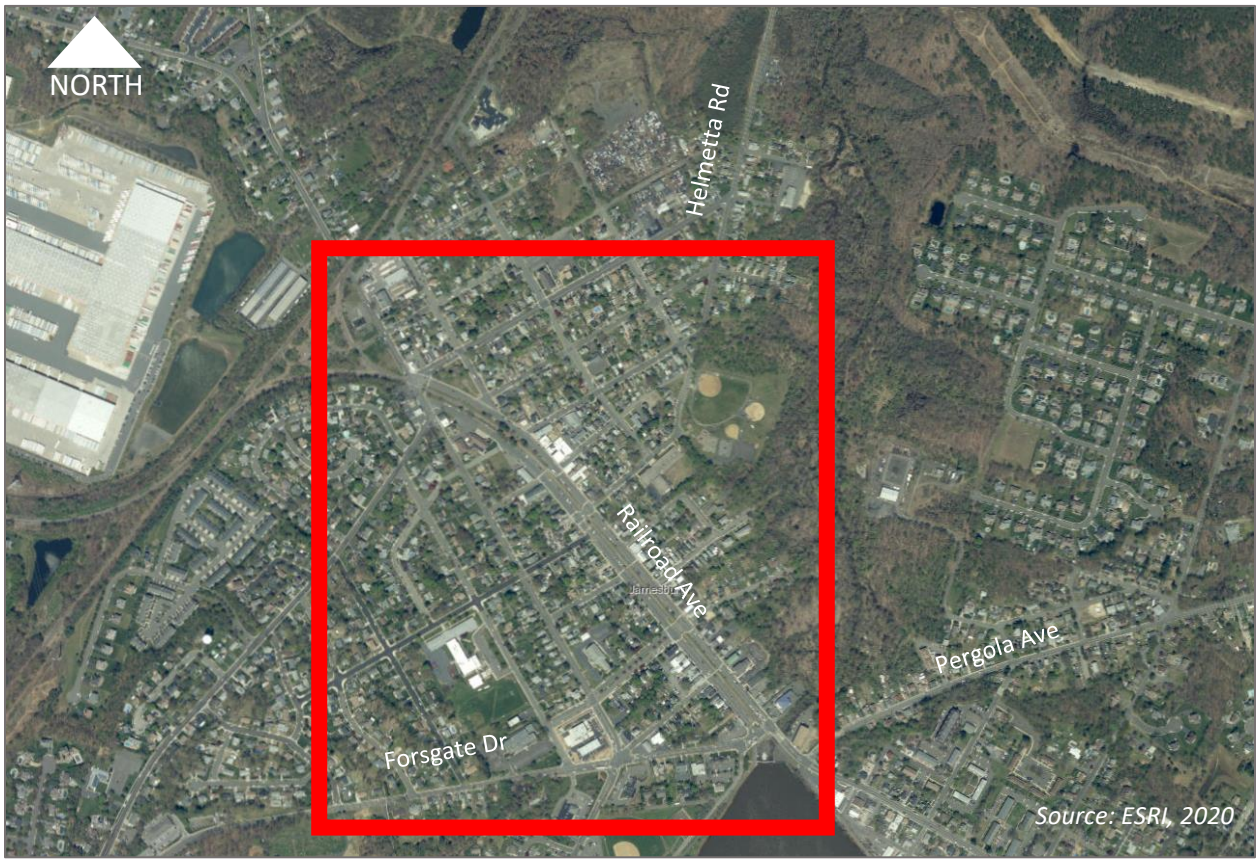
Recommendation: Provide sidewalks (ID #1) connecting to existing bus stops and major freight-dependent employers

Figure 48: County Route 619 (Applegarth Road) at Lilac Road



Recommendation: Paint the crosswalk (ID #1) across Lilac Drive and County Route 619 (Applegarth Road), connecting existing curb ramps

Figure 49: Jamesburg



Recommendation: Study the feasibility of Complete Streets improvements on County roads throughout the pedestrian-oriented community of Jamesburg (generally outlined in red in above map). The area was identified as a hotspot for crashes involving cyclists and pedestrians. Consider signaling the railroad crossing and conducting a Roadway Safety Audit (RSA) to better identify deficiencies and improvements. RSA's can be conducted along corridor facing a high number of crashes and/or congestion.

Figure 50: County Route 522 (Ridge Road)

Recommendation: Consider several improvements along the County Route 522 (Ridge Road) corridor that serves a mix of industrial, residential, and institutional uses, including an elementary school. Conduct a Road Safety Audit to better identify deficiencies and potential improvements. Consider conducting a pilot Complete Streets project to further calm traffic and promote biking and walking. Consider implementing traffic calming measures and narrowing the shoulder to reduce speeding. Build out the sidewalk network and mark pedestrian crossings to improve the ability to walk safely to school. Install speed feedback signs to slow traffic. Consider designing a special roadway treatment near Indian Fields Elementary School, combining Complete Street and traffic calming measures.

Primary Study Area-wide Neighborhood Protection Recommendations

Complete Streets (Area Wide)

Complete Streets principles can be implemented to support freight movement, discouraging trucks from traveling on roads where they are not allowed while considering the needs of trucks based on where they are allowed and encouraged. NJDOT's *Complete Streets Design Guide* offers recommendations for reallocating roadway space; reducing speeding; and properly designing a roadway based on design year, design speed, and design vehicle. These topics are all relevant to truck movement.

Recommendation:

The feasibility of implementing bicycle and pedestrian improvements and traffic calming measures across the entire Primary Study Area should be systematically investigated, particularly near bus stops, freight clusters, and expected development. Complete Streets and traffic calming measures should also be considered by municipal planning boards and potentially incorporated into municipal development regulations. NJDOT's *Complete Streets Design Guide* can be a resource for these improvements and discussions. In response to problem areas, including those identified in this study and as a result of analysis recommended in this study, additional improvements can be investigated, including the construction of curb extensions, center islands, dedicated bike facilities, rectangular rapid flashing beacons, and others.

Complete Streets measures aim to improve safety for all, including motor vehicles. Strategically designing roadways based on their context and need will promote safety by better establishing desired speed limits and better indicating where residential neighborhoods are located.

Lighting Along Truck Routes

Roadway lighting is essential for encouraging safe travel for all modes. Lighting can be of particular concern when trucks park on shoulders on dark roadways, creating hazardous conditions for passing vehicles, including drivers with limited vision.

Recommendation:

Existing lighting along truck routes should be inventoried (if needed) and reviewed for its adequacy and effectiveness. Any identified gaps in lighting should be addressed to support safety. Pedestrian-scale lighting, designed for sidewalks and pedestrians, can also be considered along sidewalks, particularly in freight-generating areas.

Additional lighting will promote safety and visibility, making roadways and sidewalks more appealing for all users to travel.

Speed Feedback Signs and Lower Speed Limits

Speeds limits and measured vehicle speeds vary throughout the Primary Study Area. Several high-speed roads divide the area and carry high volumes of regional traffic. While higher speeds can increase vehicle throughput, they also cause safety issues, particularly at intersections, and where there are pedestrians and cyclists present. The Primary Study Area contains a mix of roadway user groups and must consider each group's safety needs. During the public engagement process, several stakeholders identified truck speeding as an issue, particularly on residential roadways and along corridors with more than one travel lane in each direction.

Recommendation:

Based on public feedback, speed data, and police input, speed limits and the actual speed of traffic should be reviewed throughout the Primary Study Area. Speed feedback signs should be installed in select locations, and lowering speed limits should be investigated. Speed feedback signs show a driver's current speed and can be monitored by law enforcement to better gauge travel speeds along a corridor.

Speed feedback signs will help identify problem areas and reduce traffic speeds. They also help inform where speed limits should be lowered. Where feasible, reduced speed limits should be paired with other measures that make it more difficult to speed, including reducing lane widths, marking bike facilities, and other Complete Streets and traffic calming measures.

Traffic Calming Design Treatments for Schools and Warehouses

Traffic calming slows vehicles through geometric improvements to the roadway. Traffic calming can include a slew of potential measures, including, but not limited to curb extensions, neckdowns, chicanes, speed humps, center islands, speed cushions, and speed tables. More detail about traffic calming measures can be found in NJDOT's *Complete Streets Design Guide*. Areas with schools and warehouses within the Primary Study Area may warrant additional analysis and design guidance to better accomodate people biking, walking, and taking transit to schools and warehouses.

Recommendation:

Middlesex County should work with municipalities within the Primary Study Area to develop traffic calming and Complete Streets guidance specific to areas with warehouses and schools. This will better allow municipal and state planners and engineers to select traffic calming and Complete Streets measures that slow traffic speeds and accommodate cyclists and pedestrians while also allowing for adequate truck movements. Collaboration with NJTPA can lead to cooperation with the many other municipalities in North Jersey where freight, Complete Streets, and schools coincide.

Developing traffic calming design treatments for schools and warehouses will help recognize the overlapping presence and needs of schools and warehouses and better consider traffic calming measures beneficial to both user groups. In the Primary Study Area, the needs of trucks must be considered when implementing Complete Streets to ensure trucks can continue to adequately maneuver where they need to go.

Weight Restrictions

Weight restrictions can help restrict trucks from certain roadways. Some weight restrictions are enacted due to structural limitations, while others can be enacted to limit trucks from unwarranted areas where they should not travel. Enacting weight restrictions requires analysis of land uses and truck routing.

Recommendation:

In light of other recommendations and changes resulting from this study, a comprehensive analysis of weight restrictions should be pursued, with the potential of implementing additional restrictions where appropriate. It is recommended that Monroe and other Primary Study Area municipalities pursue regulatory weight restrictions on municipal roads in instances where they believe these policies would remove/reduce truck traffic. Weight restrictions should also be considered in partnership with wayfinding. Adequate wayfinding can and should direct trucks along desired truck routes and away from weight-restricted roads. Simply restricting roads without proper wayfinding reduces the positive impact of such restrictions and can lead to confusion for truck operators who may not be familiar with the local roadway network.

NJDOT has procedures in place for limiting or excluding commercial motor vehicles (trucks) on non-state roadways, including County roadways. The following data points must be submitted to NJDOT's Bureau of Traffic Engineering:

- Type of proposed restriction
- Traffic count data to justify restriction
- Crash summary and collision diagrams

- Locations where entrapment (trucks getting stuck at restricted route) may occur
- Alternate routes available to commercial motor vehicles
- Evidence of support from the requesting governing authority for an alternative route within or impacting another authority non-State highway
- A resolution concurring with the affected governing authority engineer's recommendations and acknowledging the impact within its jurisdiction
- Engineer's Certification

It is recommended that the respective municipality leads the process of obtaining and submitting this supporting data for weight restrictions.

Additional weight restrictions are a potential mechanism to discourage trucks from using roads where they are undesirable.

Noise Mitigation

The public frequently raised concerns about noise from truck travel through the study's outreach activities. The NJTA analyzes air and noise impacts as part of the planning and construction of significant roadway projects and incorporates mitigation measures as needed. However, the agency typically does not provide mitigation measures (such as noise barriers) for residential developments constructed after the Turnpike was built. Noise was also reported as a concern around state-managed roadways, including U.S. Route 130. NJDOT has a *Traffic Noise Management Policy and Noise Wall Design Guidelines* at the following link that details the agency's policy toward providing noise mitigation measures on their roadways: https://www.nj.gov/transportation/eng/documents/env/pdf/TrafficNoisePolicy.pdf

Recommendation:

Several of the projects recommended in this study would likely be led by NJDOT and a subset might require noise mitigation due to the agency's noise policy. Additionally, the County should further investigate the potential need for noise mitigation along County and State routes in the Primary Study Area through a high-level hotspot analysis. Noise management best practices may be considered in parallel with corridor studies and Complete Streets planning. Finally, municipalities may independently elect to address local impacts from future developments through the land development approval process.

Noise mitigation is an important strategy for neighborhood protection, but the County's ability to act on roads it does not own is limited.

Truck Parking

Truck parking is a concern for community members, truck operators, and freight company managers alike. A major concern across the region and state, the truck parking supply has not kept up with the proliferation of freight-intensive uses. A scattering of established truck parking locations across New Jersey must cater to the wide-ranging truck parking needs of truck operators traveling to, from, and through New Jersey. The lack of truck parking has resulted in parking on shoulders along County and local roads, posing a safety hazard for oncoming vehicles. Truck operators largely prefer to park at locations where they can comfortably and safely wait to make a delivery or park overnight. They do not prefer to park on shoulders. Truck parking should be provided for both short-term (up to several hours) and overnight needs.

Most freight distributors prioritize efficiency above all else. This includes trucks entering and exiting their properties and facilities expeditiously. Driving in such an unpredictable traffic network as New Jersey, and sometimes traveling from far away, occasionally results in truck operators arriving to the area early before a drop off or pickup. They are often unable to access their delivery site early and are forced to wait elsewhere. Additionally, strict hours-of-service rules are in place to assure truck operators do not drive for overly extended periods of time, in an effort to promote health and safety. Once truck operators reach their hours-of-service limit, they must stop driving. These realities are what spur the need for short-term parking.

Furthermore, truck operators are often away from their homes overnight or for somewhat extended periods of time, requiring facilities for sleeping, eating, and taking care of other basic needs. Existing lodging facilities often cannot accommodate large tractor-trailers in the parking lots. This creates the need for overnight parking.

Primary Study Area-wide Truck Parking Recommendations

Short and overnight parking facilities should be considered in the Primary Study Area to accommodate local and regional needs. While local needs are paramount, trucking is a regional issue and will require regional cooperation. It is not the responsibility of municipalities within the Primary Study Area and Middlesex County to completely solve the much larger regional truck parking issue. Improvements to truck parking in the Primary Study Area will be a part of a larger regional solution.

Short-term and overnight parking facilities should be close to a truck's destination or origin facility and proximal to Interchange 8A of the New Jersey Turnpike, where most trucks in the Primary Study Area pass through. Short-term parking facilities can operate and be designed similarly to an airport's cell phone lot, offering limited services such as a bench and minimal lighting. While a paved facility is more appealing, paving is not required for short-term parking. Parking facilities must consider the geometric needs of tractor trailers. Parking spaces must be adequately large to accommodate trucks, and turning movements and spacing must accommodate trucks.

Overnight parking facilities are more akin to truck stops or rest areas, offering parking as well as fuel, lodging, food service, and restrooms. In consideration of increased demand and need for electric vehicle charging for trucks, overnight parking facilities should provide electric vehicle charging in addition to diesel fuel.

Recommendation:

Middlesex County should work with large freight operators in the area, municipalities, and other landowners to consider potential short-term and overnight parking locations. Short-term parking can potentially be accommodated at existing facilities such as park and rides, schools, distribution centers, large parks, among other potential opportunities. The County should work with freight operators to determine the time of day and days of the week when parking is most needed. This will help identify potential locations for short-term parking so as not to conflict with other parking needs. Siting overnight parking will require additional coordination and negotiations. The County should work with freight operators in the area to determine proper siting for overnight parking that will improve freight operations and potentially entice additional freight development.

Providing both short-term and overnight parking will discourage trucks from unsafely parking along shoulders and make the area more appealing for trucks and freight-dependent uses, promoting business. Truck parking solutions in the Primary Study Area must be part of a larger regional strategy to accommodate truck parking for the benefit of truck operators and communities.

Workplace Accessibility

Within the Primary Study Area and throughout New Jersey and the United States, most people who are employed commute to work by car, either by driving alone or via carpool. According to insurance.com, the average cost of owning a car in New Jersey is $26,240 per five years. Due to this cost, or due to other concerns or limitations, many people are unable or uninterested in owning a motor vehicle, instead relying on public transit, active transportation, and micro-mobility (electric bikes and scooters). People employed in the freight industry earn a large range of salaries and wages, some of which may not be sufficient to own or lease a motor vehicle. Workplace Accessibility refers to the ability to access an employment site by a mode other than an automobile. This includes the full trip between home and the employment site, including a public transit trip, reaching public transit from home, reaching a job site from public transit, and any parking needs at the job site or public transit departure. For this study, workplace accessibility mainly refers to public transportation, including those "last-mile connections" between public transit, employment, and one's residence.

Primary Study Area-wide Workplace Accessibility Recommendations

Public Transit Services

Existing public and private transit conditions were reviewed as part of this study. The Primary Study Area does not have any rail or bus service operated by NJ TRANSIT. Private bus companies operate peak hour bus service between the Primary Study Area and New York City. Middlesex County Area Transit (MCAT) and Greater Mercer Transportation Management Association (TMA) each operate regional bus services during business hours, and some local municipalities offer local shuttle service, aimed at shopping and healthcare trips for the elderly and residents with disabilities. The current service providers do not operate with the frequency, timing, infrastructure, or locations necessary to adequately serve freight-dependent employers or employees.

Current MCAT service and Greater Mercer TMA service via the Route 130 Connection, generally provide good coverage of industrial areas west of the New Jersey Turnpike, with MCAT providing far more frequent stops. However, the Route 130 Connection can require commuters to walk along County Route 535 (Cranbury-South River Road), U.S. Route 130, or other industrial corridors to reach their work site or place of employment. In addition to the issue of stop spacing, the other major impediments to commuting by public transit are the frequency of service and limited hours of service.

Employees' working schedules and associated commuting often do not align with a standard 9 AM to 5 PM workday and accompanying transit service.

Recommendation:

Middlesex County and Greater Mercer County TMA should consider extending their shuttles system's hours of service to encompass typical shift start and end times. Both the County and Greater Mercer TMA services connect to public transit hubs, including NJ TRANSIT and Amtrak in New Brunswick and NJ TRANSIT, SEPTA, Amtrak, and the River Line in Trenton. Attempts at shortening headways or increasing hours of service should improve transit connections in New Brunswick and Trenton, as well as interim train stops, as employees may be unwilling or unable to wait up to an hour for the next bus, as currently required by MCAT and Route 130 Connection service.

Several employers in the Primary Study Area already operate their own limited systems of employee shuttles. These services benefit from being better able to cater to employees' needs, such as the timing of their work shifts and 'express' service from transit hubs to workplaces. There is an opportunity for Middlesex County and Primary Study Area municipalities to collaborate and coordinate with private employers to design and implement a larger and more coordinated system of private shuttles, linking key transit stations (New Brunswick and Trenton) with multiple drop-off/pick up points in the Primary Study Area. These are envisioned to be private services, but could benefit from public investment in sidewalks, shelters, signage, lighting, and related amenities.

Additional and extended public transit service will better allow employees to commute to the Primary Study Area, reducing the number of cars on the road and easing financial burdens on commuters. Opportunities to expand, collaborate, and partner in the provision of private shuttle services to serve the Primary Study Area more broadly could have significant additional freight-specific benefits.

Last Mile Infrastructure and Complete Streets

Existing infrastructure between bus and shuttle stops and freight-dependent employers varies in quality across the Primary Study Area. People are more likely to commute by public transit where there is adequate bus stop infrastructure. The precise infrastructure installed at each stop can vary based on demand and needs, but there are several best practices that should be considered for enhancing public transit infrastructure.

Recommendation:

Existing bus stop infrastructure should be analyzed and targeted improvements shall be made accordingly. Infrastructure can include bus shelters, wayfinding signage, bus schedules, lighting, and seating. Bus stops should, at a minimum, include a sign indicating the location is a bus stop. NJDOT's *Complete Streets Design Guide* can be a resource for bus stop infrastructure.

With employment expected to grow in the Primary Study Area, the County should work with the municipalities to study pedestrian demand along truck routes and near freight-generating employers. This demand can be accommodated by constructing sidewalks and marking crosswalks.

Improved last-mile infrastructure and Complete Streets measures will make commuting by public transit more appealing, reducing the number of cars on the road. Physical and mental health will also be improved by encouraging walking and biking. Conducting further study of future employment growth will better set expectations and provide amenities for future demand. Compete Streets measures will also improve safety.

Implementation

This study is intended to set the stage for action. This plan aims to provide implementable solutions and a larger framework for continuing to develop and refine network recommendations, including identifying funding mechanisms and establishing partnerships to sustain momentum and deliver improvements.

Implementation Recommendations

Adaptive Signaling

The Federal Highway Administration defines adaptive signaling as adjusting the timing of red, yellow, and green lights to accommodate changing traffic patterns and ease traffic congestion. Adaptive signal control can improve traffic flow by continuously distributing green light time for consecutive traffic movements, progressively moving vehicles through green lights, and reducing congestion by creating a smooth traffic flow at a safe speed. Adaptive signaling uses sensors to monitor traffic flow and adjust signal timing accordingly and efficiently. This tool is already used along the U.S. Route 130 and State Route 32 (Forsgate Drive) corridors.

Recommendation:

Adaptive signaling should be expanded to other strategic locations in Southern Middlesex County where congestion or high truck volumes are present. This larger system can function similar to the Hackensack Meadowlands District's Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR). MASSTR incorporates 125 traffic signals into a self-adaptive network and is monitored and controlled in real-time at the New Jersey Sports and Exposition Authority's Traffic Management Center. A comprehensive network could be maintained at a central location, such as NJDOT, Middlesex County, or an office of a regional freight district. This recommendation is related to the recommendation under Truck Movement to "Upgrade and Install Signals" but specifically relates to adaptive signaling rather than standard signal practices.

Adaptive signaling will improve traffic flow and reduce congestion. Though requiring a vast effort to gather the necessary data to evaluate traffic signals throughout the Primary Study Area, such a comprehensive review would significantly impact the continuous improvement of traffic flow.

Education

Education is essential for assuring operators of both trucks and passenger vehicles, as well as pedestrians and cyclists, better understand the needs and limitations of one another. The New York City Department of Transportation has developed a "Truck's Eye View" program to provide education to the public about the blind spots around large trucks, allowing members of the public to sit in the driver's seat of a truck and learn about the vehicle's blind spots from a professional truck driver to increase safety awareness for all road users. This program educates truck drivers about how cyclists and pedestrians experience the road and vice versa.

Recommendation:

A program similar to the Truck's Eye View program should be implemented in the Primary Study Area. The program can be led by Middlesex County, municipalities, and/or in collaboration with state agencies or other entities, as appropriate. One potential project partner is the New Jersey Motor Truck Association, an organization focused on trucking statewide that is based in East Brunswick in Middlesex County. The effort would include truck operators and local freight stakeholders so that community members better understand truck needs and restrictions. Similarly, bicycle educators and advocates, including those from organizations such as Tri-State Transportation Campaign and Rutgers University's Alan M. Voorhees Transportation Center could be involved to educate truck operators about the needs and limitations of cyclists and pedestrians.

Implementing such an educational program will promote greater awareness among all roadway users. In addition to educating people about each other's needs, resulting in safer movements, the collaboration developed through discussion will ultimately reduce tensions and misunderstandings between what can sometimes seem like the competing and mutually exclusive needs of truck operators and cyclists/pedestrians.

Enforcement

Rules are only effective if they are enforced. The public raised concerns about the need for additional enforcement of truck parking regulations, particularly discouraging trucks from idling on roadway shoulders and encouraging trucks to leave their headlights on (for safety reasons).

Recommendation:

To improve enforcement, the County and the four municipalities within the Primary Study Area should collaborate with the police departments with jurisdiction in the area to improve enforcement. If appropriate, enforcement can be targeted to specific locations where trucks parking on shoulders poses a particular safety concern, such as on narrow roads, where there is

poor lighting, or in residential areas, while placing less emphasis on other roads where trucks parking in the shoulder poses less of a public nuisance.

Improved and targeted enforcement will reduce unsafe behaviors and improve traffic flow. If short-term or overnight truck parking is designated, enforcement can include educating truck operators on the nearby availability of truck parking.

Intermunicipal Working Group

New Jersey has 565 municipalities spread across 21 counties. Many of these municipalities are fairly small geographically. Though each operates as its own entity, it is common for municipalities to share resources, most commonly schools and utilities. Sharing resources reduces costs but is also beneficial and essential for dealing with regional issues, including freight.

Recommendation:

It is recommended that an inter-municipality working group of municipalities located within the Primary Study Area and Plainsboro Township (also located in Middlesex County) convene to consider freight needs in the area. Plainsboro is adjacent to the Primary Study Area, and representatives from the Township have expressed interest in collaborating with municipalities located within the Primary Study Area to address freight concerns. This working group can collaborate on advancing this study's recommendations. While the County can facilitate this working group, accomplishing these recommendations will require input and cooperation from the municipalities. The working group can include a mix of residents, stakeholders, freight employers, and elected and appointed officials. Alternatively, individual municipal commissions and task forces can also be established for a similar purpose.

An inter-municipal working group will allow the County to be more responsive to the negative impacts of freight and be a resource and sounding board for local complaints.

Land Use Coordination

Municipal planning and zoning boards are ultimately responsible for approving and denying land use applications as well as requiring additional conditions. Municipal boards must follow their municipality's land development ordinance and related regulations. Municipal boards can consider freight in regards to encouraging or requiring truck parking and incorporating truck parking regulations into their zoning ordinances.

Recommendation:

Throughout the study, the public raised the need for municipalities to require more (or sufficient) truck parking within their facilities to reduce illegal parking outside those facilities. This study is not designed to develop or make land use recommendations to the municipalities in or around the Primary Study Area. However, a similarly fast-growing freight region – the Lehigh Valley in Pennsylvania – is addressing this issue in a unique way and can be an example to the Primary Study Area. The Lehigh Valley Regional Planning Commission, the region's Metropolitan Planning Organization, is coordinating directly with each of its municipalities to develop truck parking guidance to be adopted in municipal comprehensive plans and zoning regulations. The key to the success of this effort is the consistency of this guidance across different municipalities, which – over time – leads to a consistent, equitable set of improved policies and practices. The Primary Study Area municipalities, and others within the NJTPA region, may wish to explore this kind of approach, possibly as one of the activities of the intermunicipal working group.

Regional Freight District

Recommendation:

Establishing a regional freight district could promote cooperation and collaboration across jurisdictions. This would include County and municipal officials as well as representatives from freight-intensive businesses in the Primary Study Area. Enabled by municipal legislation, this regional freight district could work together to coordinate land use recommendations (if desired), plan and operate workplace shuttle services, and generally incorporate the needs and impacts of freight movement into municipal, County, and business decision-making. The regional freight district would function more as a technical resource for freight than the inter-municipal working group, which would be more advisory. The regional freight district could perform similar duties to business improvement districts, typically located in more urban areas. This can include maintaining and enhancing properties and infrastructure, including shared resources for public transit, biking, and walking.

A regional freight district would allow the County and its municipalities to better plan for the future and mitigate the negative impacts of industrial development in the Primary Study Area, offering expert guidance and operating support.

Innovative Funding Opportunities

Recommendation:

Utilizing a regional freight district opens up several innovative funding opportunities. This could potentially include implementing a congestion charging system in which trucks are charged for access via geofencing. Such a revenue stream could help fund district improvements such as supplemental local wayfinding, improved workplace accessibility, safety and capacity improvements, and other projects with direct benefits to those being charged. Additionally or alternatively, a revenue model can be generated based on a region-wide traffic model to elicit a fee per new trips generated or by charging each new property access point.

User charging programs can be difficult to plan and implement, and many questions must be addressed to build necessary support and buy-in. This study recommends taking the first step by exploring some potentially applicable financing models, considering the cost of improvements identified in this study and the benefits likely to accrue to those that could be asked to support them through charging programs.

Innovative funding mechanisms improve the ability of the municipalities to provide infrastructure and resources to mitigate the negative impact of trucks. These efforts can work in tandem with County and State efforts on their respective roadways.

FUNDING AND PRIORITIZATION

Funding

Funding for the recommendations established in this study is available from federal, state, regional, and local sources.

NJDOT's Local Aid Resource Center helps connect counties and municipalities with consultants to provide guidance in grant applications, project planning, and project delivery. Guidance for both federal funding and state funding is available, including municipal aid, transit village, bikeway and walkways, local bridges and local freight impact funds, Safe Routes to School, and other transportation funding sources.

NJDOT also operates a Local Freight Impact Fund grant program that began operation in fiscal year 2018. The program assists counties and local municipalities with the mitigation of impacts on the local transportation system associated with the State's freight industry. Fiscal year 2021 included 30 million dollars in funding. A competitive grant program, applicants must demonstrate that the project will provide access to port, warehouse distribution center, or any other freight node and must have a minimum 10 percent large truck volume within the project limits, informed by a traffic study. Additionally, eligible projects are categorized into one of five categories: Pavement Preservation, Truck Safety and Mobility, Bridge Preservation, New Construction, and Pedestrian Safety. Additional information about the program, including where to submit applications, can be found at the following link: https://www.state.nj.us/transportation/business/localaid/localfreight.shtm

Additionally, NJDOT can receive guidance and direction from the Federal Highway Administration in prioritizing funding for multimodal transportation capital improvements.

Middlesex County and its municipalities should work with the NJTPA, as appropriate, to apply for planning support via NJTPA's various programs, including those focused on freight and complete streets. NJTPA funds subregional studies, such as the Southern Middlesex County Freight Movement Study, and has several municipally focused planning support programs. For example, NJTPA's Complete Streets Technical Assistance program provides communities with Complete Streets training and technical assistance. In addition, NJTPA can provide data, technical support and guidance on other studies recommended in this document. The NJTPA can also provide assistance with applying for applicable federal funding under the Infrastructure Investment and Jobs Act.

Strategic partners for Middlesex County include each of the four municipalities located within the Primary Study Area, as well as municipalities and counties in the Secondary Study Area,

NJTPA, NJDOT, the Federal Highway Administration, the New Jersey Turnpike Authority, and the many trucking and freight-dependent businesses operating in and through Middlesex County.

Prioritization

A system of prioritization should be used to best allocate resources and prioritize which recommendations detailed in this study, as well as previous and future studies, should move forward. The prioritization process should include a cost-benefit analysis utilizing several indicators. The following indicators are suggested for initial consideration for prioritization. The County should subsequently finalize which indicators will be used and how they should be weighted. Once this is complete, scores can be assigned in a matrix to each project with projects receiving the highest scores advanced for funding, planning, design, and construction, as applicable. Anticipated costs and timeframes are provided in the implementation matrix found in Appendix A.

- **Safety** – what impact does the project have on improving safety, including for crashes involving trucks, cyclists, and pedestrians
- **Congestion** – what impact does the project have on congestion
- **Environment** – what impact does the project have on the environment, including on sensitive areas, wetlands, noise, and air pollution
- **Equity** – what impact does the project have on overburdened communities and environmental justice populations.
- **Cost** – what is the project's anticipated cost
- **Impact to Local Economy** – what is the project's impact to the local economy, including small businesses, and large freight-dependent employers
- **Impact on Residents** – what is the project's impact on local residents and communities
- **Timeframe** – what is the project's expected timeframe
- **Cooperation and Identification of Funding/Implementation Partner** – is funding available for the project and has a lead implementation partner been designated (if necessary)

CONCLUSIONS AND NEXT STEPS

This final report of the Southern Middlesex County Freight Movement Study provides a comprehensive set of recommendations to improve conditions for trucks and residents in the study's Primary Study Area. An implementation matrix is included in the Appendix to assist in implementing the recommendations, by providing a centralized source of valuable information (for each recommendation) such as to responsible party, cost estimate, priority of need, and time frame, among others. The two technical memos developed as part of the study, included in the Appendix, offer essential data analysis in seeking funding for the recommended projects and studies. The extensive public outreach conducted during the study, both online and in-person, is a valuable resource for the County in further dissecting and monitoring issues. Additionally, the data used during the study has been provided to Middlesex County and the NJTPA for further use in implementing recommendations.

Next steps for Middlesex County include evaluating and prioritizing recommendations, based in part on the above recommended prioritization process and below implementation matrix; and then seeking funding as detailed in the above recommended funding process. Funding sources will vary based on the focus and status of recommendations (i.e., whether they involve infrastructure implementation or begin with further study and analysis).

APPENDIX A - IMPLEMENTATION MATRIX

The implementation matrix below provides a concise summary of recommendations from the Southern Middlesex County Freight Movement Study. All recommendations in the matrix are further detailed in the main body of the report, which should be consulted when considering the recommendations. Recommendations are also shown in Figure 51. The descriptive fields in the matrix are described below.

- "Category" refers to which of the six recommendations categories the strategy is classified as.

- "Sub-Category" is intended to make it easier to find the recommendation in the body of the report, referring to the sub-category under each of the six categories.

- "Detail" provides a brief description of the recommendation.

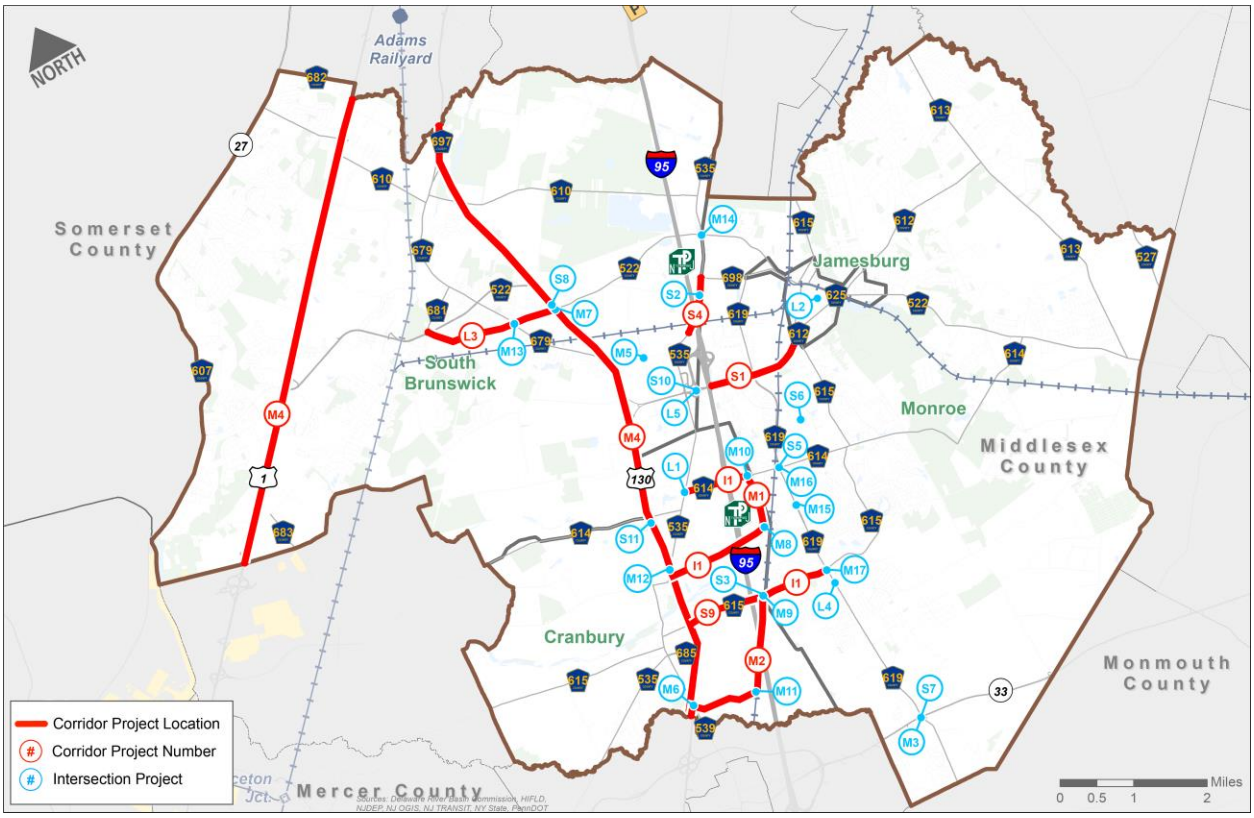
- "Responsible/Lead Party" indicates the likely lead agency or entity responsible for investigating or implementing the recommendation.

- Cost Estimates are preliminary order of magnitude estimates of the cost of implementing a recommendation which should be updated after further study and/or prior to construction. Estimates are categorized as either: Low (<$100,000), Medium ($100,000-$1,000,000) or High (>$1,000,000).

- Timeframes are preliminary estimates of when a strategy should be implemented, which should be updated after further study and/or prior to construction. Estimates are categorized as either: Short (<2 years), Mid (2-5 years) or Long (>5 years).

Recommendations are sorted first by timeframe, and then by cost.

Figure 51: Site-Specific Recommendations



Implementation Matrix: Short-Term Recommendations by Cost

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
I1	Wayfinding	Site-Specific	Cranbury Station Rd, Cranbury Half Acre Rd, and Prospect Plains Rd	Cranbury and Monroe Townships (where appropriate) should pursue weight restrictions along Cranbury Station Road between Hightstown-Cranbury Road and Applegarth Road for immediate implementation	Cranbury and Monroe Townships	L	Immediate
NA	Implementation	PSA-wide	PSA-wide	Consider coordinating with municipalities to develop truck parking guidance and adopt it in comprehensive plans and zoning regulations	County	L	Short
NA	Implementation	PSA-wide	PSA-wide	Encourage additional truck/idling enforcement; encourage trucks to leave headlights on	Municipality	L	Short
NA	Implementation	PSA-wide	PSA-wide	Setup inter-municipal working group of PSA municipalities and Plainsboro; or municipal commission/task force	County	L	Short
NA	Implementation	PSA-wide	PSA-wide	Research congestion charging to fund district improvements	NJDOT / State	L	Short
NA	Neighborhood Protection	PSA-Wide	PSA-Wide	Conduct evaluation of potential need for noise mitigation measures	County	L	Short
S1	Neighborhood Protection	Site Specific	SR 32 (Forsgate Dr)	Lower speed limit from 45 to 40 mph and standardize number of lanes in each direction	NJDOT	L	Short
NA	Neighborhood Protection	PSA-Wide	PSA-wide	Consider developing traffic calming design treatments specific to areas around schools and warehouses	County / Municipalities	L	Short

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
S2	Truck Movement	General Intersection	CR 615 (Cranbury-South River Rd) @ Costco Dr	Adjust signal timing to address queuing issues	County	L	Short
S3	Truck Movement	General Intersection	Hightstown Cranbury Station Rd at CR 615 (Station Rd)	Improve ability for trucks to make left turns through changes to markings and geometry	County	L	Short
S4	Truck Movement	Specific Intersection	CR 535 (Cranbury-South River Rd) N of Int. 8A	Study potential to widen TPK bridge allowing widening of CR 535 (Cranbury-South River Rd) to four lanes	NJTA / County	L	Short
S5	Truck Movement	Site Specific	CR 619 (Applegarth) @ SR 32 (Forsgate Dr) northbound	Consider turning radii and make geometric improvements, as necessary	NJDOT / County	L	Short
NA	Wayfinding	PSA-Wide	PSA-wide	Work with private companies and GPS providers to adjust their routing protocols to avoid certain routes	County / Private	L	Short
NA	Wayfinding	PSA-Wide	PSA-wide	Install additional wayfinding signage along desired routes	County	L	Short
NA	Wayfinding	PSA-Wide	PSA-wide	Add signage to encourage trucks to go west of TPK to U.S. 130 to reach Int. 8A	County	L	Short
S6	Wayfinding	Site Specific	Monroe freight cluster	Designate signage for entry on either CR 619 (Applegarth Rd) or CR 614 (Prospect Plains Rd)	County / Municipalities	L	Short

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
S7	Wayfinding	Site Specific	SR 33 and US 130	Add signage directing trucks to US 130 instead of CR 619 (Applegarth Rd)	NJDOT / County	L	Short
S8	Wayfinding	Site Specific	CR 522 (Ridge Rd)	Install additional and compliant vertical clearance signage	County / Municipalities	L	Short
S9	Wayfinding	Site Specific	Cranbury Station Rd between U.S. Route 130 and Hightstown-Cranbury Station Rd	Work with warehouses to establish truck wayfinding signage at their driveways exits encouraging trucks to head westbound U.S. Route 130 to then travel north or south	County / Private	L	Short
NA	Workplace Access	Last Mile Infrastructure and Complete Streets	PSA-wide	Identify areas of existing or expected pedestrian demand along truck routes and near freight-generating employers, mark crosswalks and implement additional pedestrian amenities	Municipalities	L	Short
NA	Implementation	PSA-wide	PSA-wide	Implement program to educate people about visibility of truck operators (based on NYC's Truck Eye View program)	NJDOT / County / NJ Motor Truck Association	L-M	Short
NA	Neighborhood Protection	PSA-Wide	PSA-wide	Work with freight industries and communities to adjust weight restrictions	County / Municipalities	L-M	Short
S10	Truck Movement	Site Specific	Int. 8A	Study the feasibility of the following: Change the layout of the intersection of CR 535 (Cranbury-South River Rd) and SR 32 (Forsgate	NJTA / County	L-M	Short

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
				Dr) to better facilitate and prioritize movements between the two corridors and the Turnpike Widen the on-ramp from SR 32 (Forsgate Dr) eastbound to the New Jersey Turnpike from one to two lanes Construct a slip lane from CR 535 (Cranbury-South River Rd) northbound to the on-ramp at the New Jersey Turnpike Widen the right turn lane from northbound CR 535 (Cranbury-South River Rd) to the New Jersey Turnpike on-ramp			
S11	Truck Movement	Specific Intersection	US 130 @ N Main St	Eliminate northbound left or connect road to CR 614 (Dey Rd)	NJDOT	L-M	Short
NA	Truck Movement	PSA-Wide	PSA-wide	Study/review signal timing area-wide at key truck bottlenecks	NJDOT / County	L-M	Short
NA	Truck Parking	Truck Parking	PSA-wide	Study potential for short-term truck parking areas/wait lots, similar to airport cell phone lot with limited services; consider at park and rides, schools, distribution centers, Thompson Park	County / Private	L-M	Short
NA	Truck Parking	Truck Parking	PSA-wide	Study potential sites for overnight parking, accommodating overnight parking and incorporating EV services	County / Private	L-M	Short

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
NA	Workplace Accessibility	Public Transit	PSA-wide	Collaborate with private sector in planning and implementing a broader area-wide private worker shuttle system, supported by public improvements at stop locations	County / Municipalities / Keep Middlesex Moving TMA	L-M	Short
NA	Workplace Accessibility	Last Mile Infrastructure and Complete Streets	PSA-wide	Improve bus stop infrastructure (shelters, signage, schedules, lighting, seating, etc.) near freight-generating land uses and trip origins	County / Municipalities / NJ TRANSIT	L-M	Short
NA	Wayfinding	PSA-Wide	PSA-wide	Develop Subarea Travel Demand Model covering major roadways to refine and validate recommendations to produce desired routings	County	L-M	Short

Implementation Matrix – Mid-Term Recommendations by Cost

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
NA	Neighborhood Protection	PSA-wide	PSA-wide	Study the feasibility and implement bicycle and pedestrian improvements, and traffic calming, particularly near bus stops, freight clusters, and expected development	County / Municipalities	L-M	Mid
M1	Truck Movement	Corridor	Gavett Rd	Study north-south truck-serving link providing alternative to CR 619 (Applegarth Rd); utilize existing Gavett Rd between CR 614 (Prospect Plains Rd) and Cranbury Half Acre Rd; upgrade, signage, markings, lane widenings, shoulder installation, etc.	County / Private	L-M	Mid
M2	Truck Movement	Corridor	Brick Yard Rd, Hightsown Cranbury Station Rd, Gavett Rd	Study north-south truck-serving corridor providing truck alternative to CR 619 (Applegarth Rd); utilizing existing Brick Yard Rd, Hightstown Cranbury Station Rd, and Gavett Rd.; upgrade signage, markings, widen lanes, and install shoulders, as necessary	NJDOT / County/ Municipalities	L-M	Mid
M3	Truck Movement	Corridor	SR 33 @ CR 619 (Applegarth Rd)	Study impacts of potential land development along SR 33 east of Turnpike and potential impacts on neighborhood roads east of Turnpike	County / Municipalities	M	Mid
M4	Truck Movement	Corridor	U.S. Routes 1/130	Conduct corridor traffic studies to improve traffic operations and signal improvements through Primary and Secondary Study Areas	NJDOT	M	Mid
M5	Truck Movement	General Intersection	Herrod Blvd @ Stults Rd	Signalize intersection	County / Municipalities	M	Mid
M6	Truck Movement	General Intersection	U.S. 130 @ CR 539 (S Main St)	Consider safety improvements at traffic circle to simplify movements	NJDOT / County	M	Mid

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
M7	Truck Movement	General Intersection	U.S. Route 130 @ CR 522 (Ridge Rd)	Signalize ramps	NJDOT	M	Mid
M8	Truck Movement	Corridor	Cranbury Half Acre Rd at Gavett Rd	Construct jughandle for truck u-turns; restrict trucks east of CR 619 (Applegarth Rd); support municipalities to install additional advisory signage	County	M-H	Mid
M9	Truck Movement	Corridor	Hightstown Cranbury Station Rd at CR 615 (Station Rd)	Construct jughandle for truck u-turns; restrict trucks east of CR 619 (Applegarth Rd); support municipalities to install additional advisory signage	County	M-H	Mid
M10	Truck Movement	Corridor	Prospect Plains Rd at Gavett Rd	Construct jughandle for truck u-turns; restrict trucks east of CR 619 (Applegarth Rd); support municipalities to install additional advisory signage	County	M-H	Mid
M11	Truck Movement	General Intersection	Hightstown-Cranbury Rd @ Brick Yard Rd	Construct turn assist or install signal	County	M-H	Mid
M12	Truck Movement	Specific Intersection	U.S. Route 130 @ CR 535 (South River Rd)	Remove northbound right onto U.S. 130 SB, reconfigure northbound lanes at CR 535 (South River Rd), accommodate pedestrians on CR 535 (South River Rd), and improve NB access management between Cranbury Half Acre and CR 535 (South River Rd)	NJDOT	M-H	Mid
M13	Truck Movement	General Intersection	CR 522 (Ridge Rd) @ CR 679 (Georges Rd)	Construct turn assist, adjust signal timing, or other upgrade intersection	County	H	Mid
M14	Truck Movement	General Intersection	CR 522 (Ridge Rd/ Rhode Hall Rd) @ CR 535	Construct turn assist, adjust signal timing, or other upgrade intersection	County	H	Mid

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
			(Cranbury-South River Rd)				
M15	Truck Movement	General Intersection	CR 619 (Applegarth Rd) at Cranbury Half Acre Rd	Construct turn assist or otherwise upgrade intersection	County	H	Mid
M16	Truck Movement	General Intersection	CR 619 (Applegarth Rd) at Prospect Plains Rd	Construct turn assist, adjust signal timing, or otherwise upgrade intersection	County	H	Mid
M17	Truck Movement	General Intersection	CR 619 (Applegarth Rd) at CR 615 (Station Rd)	Construct turn assist or otherwise upgrade intersection	County	H	Mid

Implementation Matrix – Long-Term Recommendations by Cost

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
NA	Neighborhood Protection	PSA-Wide	PSA-wide	Install additional lighting along truck routes	NJDOT / County / NJTA / Municipalities	L	Long
NA	Neighborhood Protection	PSA-Wide	PSA-wide	Review speeds and volumes on high-speed roads and consider installing speed feedback signs and/or lowering speed limits	County	L	Long
NA	Workplace Access	Public Transit	PSA-wide	Encourage County shuttle systems to extend hours of service and frequency to accommodate typical shift times	County	L	Long
NA	Truck Movement	Recommendation	PSA-wide	Collaborate with NJTA to consider the feasibility of additional Turnpike access points	NJTA / County	L	Long
NA	Workplace Access	Public Transit	PSA-wide	Consider operating additional municipal bus routes which operate during freight-generating land use times to attract commuters	Municipalities	L	Long
NA	Implementation	PSA-wide	PSA-wide	Establish regional freight district	County	L-M	Long
NA	Implementation	PSA-wide	PSA-wide	Charge by property access point or new trips generated (NJSEA) model	NJDOT / State	L-M	Long
L1	Neighborhood Protection	Complete Streets	CR 614 (Prospect Plains Rd) @ CR 615 (Cranbury-South River Rd)	Complete sidewalk network, and implement traffic calming	County	L-M	Long
L4	Neighborhood Protection	Complete Streets	CR 619 (Applegarth Rd) @ Lilac Dr	Add pedestrian crossing, traffic controls, and traffic calming to connect existing curb ramps	County	L-M	Long

Map ID	Category	Sub-Category	Location	Detail	Responsible/ Lead Party	Cost Estimate	Timeframe
L3	Neighborhood Protection	Complete Streets	CR 522 (Ridge Rd)	Implement traffic calming, narrow shoulder, conduct pilot Complete Street project, complete sidewalk network, add pedestrian crossings, install speed feedback signs, design special treatment near Indian Fields Elementary School, and conduct a Road Safety Audit	County	L-M	Long
L2	Neighborhood Protection	Complete Streets	Jamesburg	Study the feasibility of Complete Streets improvements on County roads, consider signalizing railroad crossing, and conduct Road Safety Audit	County	M	Long
NA	Implementation	PSA-wide	PSA-wide	Implement regional adaptive signal system similar to MASSTR (US 130 and SR 32 already adaptive)	County / NJDOT	M	Long
L5	Truck Movement	Site Specific	Int. 8A	Change the layout of the intersection of CR 535 (Cranbury-South River Rd) and SR 32 (Forsgate Dr) to better facilitate and prioritize movements between the two corridors and the Turnpike Widen the on-ramp from SR 32 (Forsgate Dr) eastbound to the New Jersey Turnpike frm one to two lanes Construct a slip lane from CR 535 (Cranbury-South River Rd) northbound to the on-ramp at the New Jersey Turnpike Widen the right turn lane from northbound CR 535 (Cranbury-South River Rd) to the New Jersey Turnpike on-ramp	NJTA / County	H	Long