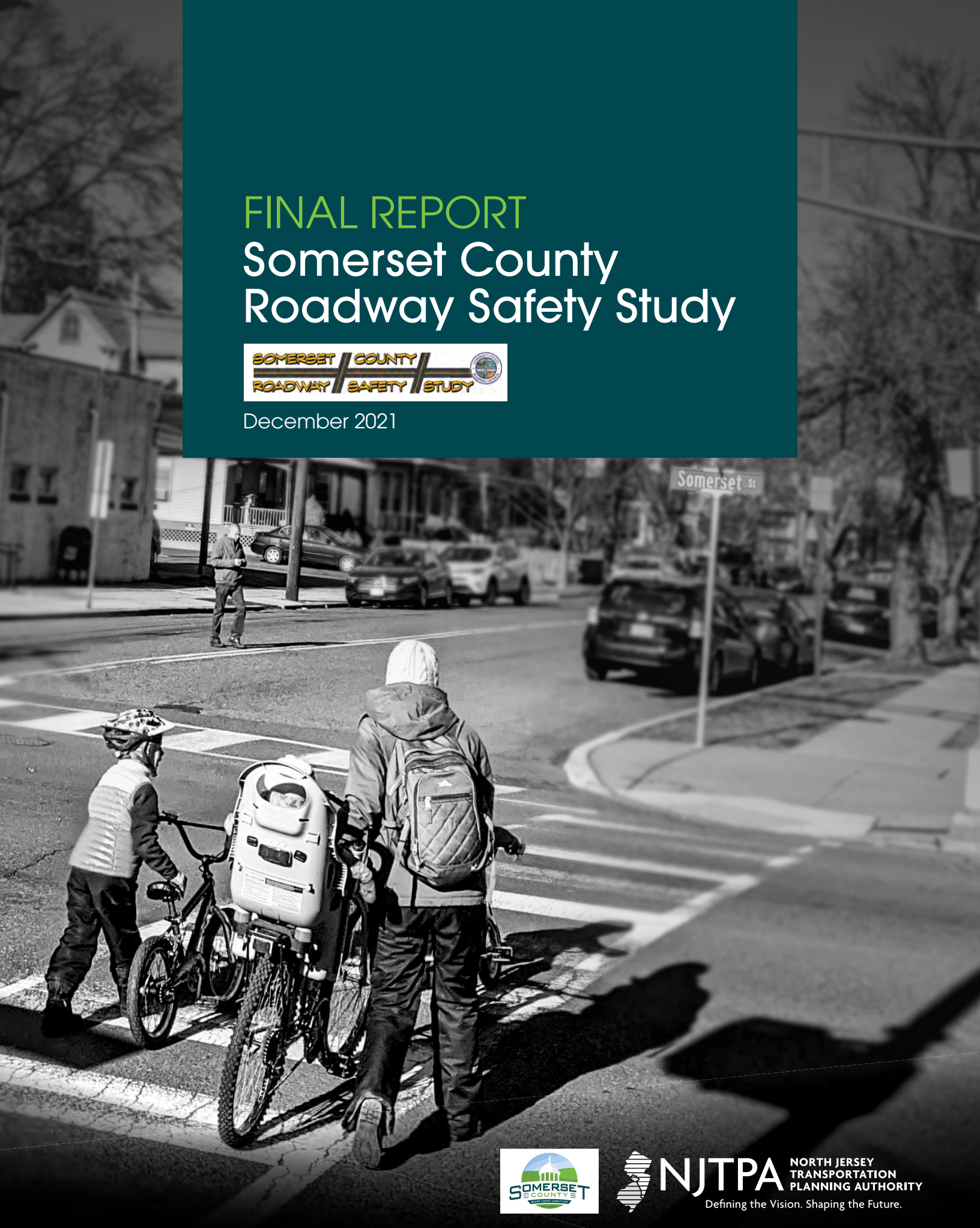
FINAL REPORT
Somerset County Roadway Safety Study

SOMERSET COUNTY ROADWAY SAFETY STUDY

December 2021



SOMERSET COUNTY

NJTPA NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

Defining the Vision. Shaping the Future.

Executive Summary

The Somerset County Roadway Corridor Safety Analysis study conducted Road Safety Audits (RSAs) on five County roadway corridors and developed recommendations to improve safety for all roadway users, whether walking, biking, driving, or traveling by transit. The County conducted the study as part of the North Jersey Transportation Planning Authority's (NJTPA's) subregional studies grant program. Intersection and corridor crash rankings from the NJTPA Network Screening List (NSL), an equity analysis to screen for underserved communities, and comprehensive public and stakeholder outreach informed the selection of the five corridors. The following five locations underwent Road Safety Audits:

1. Finderne Avenue/Main Street (CR 533) in Bridgewater Township, MP 29.60-30.60
2. Franklin Boulevard (CR 617) in Franklin Township, MP 0.00-1.00
3. Main Street (CR 533) in Millstone Borough, MP 25.14-25.87
4. Greenbrook Road (CR 636) in North Plainfield Borough, MP 0.70-1.97
5. Somerset Street (CR 626) in Raritan Borough, MP 0.00-0.67

In response to the COVID-19 pandemic, many agencies restricted in-person travel and working/gathering in groups. Therefore, the project team conducted the in-field RSA review in a socially distanced manner, while pre- and post-audit meetings were held virtually via video conferencing to orient the RSA team and recap road safety observations.

Public and stakeholder outreach was also conducted virtually. An online mapping tool was used to gather input on areas of concern. Five virtual meetings were held, three for stakeholders and two for the public, to gather feedback and present findings. The road safety audit recommendations proposed in this report are presented for consideration of further development through many different paths, such as locally or regionally funded concept development studies; the NJTPA's Local Safety Engineering Assistance Program; incorporation into a planned County or municipal project; or through other means. While the recommendations herein seek to improve roadway safety, they should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner (County and Municipal) and/or a professional engineer for conformance to all applicable codes, standards, and best practices.

Finderne Avenue/Main Street (CR 533) in Bridgewater Township

This audit recommended investigating the feasibility of a road diet, which would reduce the number of vehicle travel lanes, on Main Street from Finderne Avenue to Chimney Rock Road, possibly extending eastward of this study area. Reducing the number of vehicle travel lanes and converting to a center two-way left turn lane, would create enough space for vehicle lane, bike lane and buffer in each direction of travel. A road diet would result in safety and mobility improvements for pedestrians and cyclists who use the corridor.

Franklin Boulevard (CR 617) in Franklin Township

Previous planning studies called for a road diet with bike lanes on Franklin Boulevard from Route 27 to Hamilton Street. This study explored the feasibility of adding bike lanes but found that since the curb-to-curb cartway width is limited at approximately 44 to 46 feet, there would not be a buffer and the bike lanes would be of substandard width. An alternate road diet option would include narrow shoulders in each direction that transition to curb extensions, which reduce pedestrian crossing distances at intersections and improve pedestrian visibility.

Main Street (CR 533) in Millstone Borough

These recommendations focus on improving pedestrian infrastructure, including implementing Leading Pedestrian Intervals (LPIs), which give pedestrians time to cross before vehicles get a green light; curb extensions; and continued maintenance of the sidewalk. The recommendations also include bridging the gap in the sidewalk that exists between Amwell Road (CR 514) and North River Street. The Borough is seeking to acquire the needed right-of-way for this improvement via redevelopment or acquisition of a vacant residential property located off the east side of Main Street. The Borough commented that State intervention would likely be needed to obtain property, or an easement, to construct this new sidewalk along the east side of Main Street. State intervention is needed for property acquisition since it is a financial hardship for the Borough to implement such an idea.

Greenbrook Road (CR 636) in North Plainfield Borough

This audit recommends making sidewalk and crosswalk upgrades at school locations to enhance pedestrian safety. Considering the location of the corridor near parks, schools, and other land uses that tend to have a relatively high share of active mode trip generation, it was recommended to stripe or construct curb extensions, refresh crosswalk striping, and/or consider the installation of Rectangular Rapid-Flashing Beacons (RRFBs) at unsignalized crossings. Daylighting or other striping on the shoulder would aid in prohibiting parking, allocating bus standing, and calming traffic speeds. At nearby signalized intersections, push-button upgrades, lighting, No Turn on Red restrictions, and LPIs are recommended. Further investigation would be necessary to implement these recommendations appropriately.

Somerset Street (CR 626) in Raritan Borough

This RSA recommends building upon the Complete Streets improvements proposed for Somerset Street as part of the Borough's active Transportation Alternative Set-Aside Program grant, under which the Borough is designing new streetscaping surrounding the Somerset Street corridor. The proposed TAP grant changes in side street circulation from two-way to one-way flow for this project provide an opportunity for ample curb extensions, allowing integrated green stormwater infrastructure that will provide a more resilient design to better receive and filter future stormwater. Additionally, RSA recommendations propose that ergonomic (or flared) crosswalks be striped between these intersection corner curb extensions to better reflect the pedestrian paths of travel at downtown intersections.

Next Steps/Conclusion

The study team worked with County Engineering to develop a list of tasks to improve traffic safety on these corridors, codified in the Implementation Matrix in the appended RSA reports. The recommendations should be shared with all responsible jurisdictions to aid in implementation. This approach recognizes a shared responsibility across numerous professions to see improved benefits in corridor crash performance beyond the anticipated reduction in crashes with the implementation of proven crash countermeasures. RideWise (the County's Transportation Management Association), law enforcement, and EMS are encouraged to continue their efforts to educate drivers, enforce traffic laws, improve response times to crashes, and reach underserved communities with these safety strategies.

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Disclaimer

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.

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Introduction

The Somerset County Roadway Safety Study presents recommendations to improve safety of all people on the five county roads. This report outlines the data collection, methodologies, findings, and recommendations used to address safety concerns on five corridors and explains select improvement strategies that best address the prevailing issues in each corridor. Improvement options vary from low-cost, rapid response action items to higher-cost, longer-term construction projects in need of engineering, stakeholder vetting, and funding.

Purpose & Need of Study

Every year, considerable resources are used to improve roadway safety and reduce crashes. The purpose of this study was to perform Road Safety Audits (RSAs) on Somerset County roadways. The corridors were selected based on public, stakeholder, and Technical Advisory Committee input, as well as crash data, equity data, and recommendations from prior County studies. An RSA is a proactive formal safety performance examination of an existing or future road or intersection by an independent and multi-disciplinary team. Typically, the safety improvements RSAs recommend can reduce fatal crashes by 10-60 percent.[1]

RSAs provide methods to achieve the following benefits[1]:

- Reduced number and severity of crashes due to safer designs.
- Reduced costs resulting from early identification and mitigation of safety issues before projects are built.
- Improved awareness of safe design practices.
- Increased opportunities to integrate multimodal safety strategies and proven safety countermeasures.
- Expanded ability to consider human factors in all facets of design.

Corridor Selection Process

The North Jersey Transportation Planning Authority's (NJTPA) Network Screening Lists (NSL) was used as a starting point to identify top crash corridors in Somerset County. The NSL is a programmatic analysis of statewide locations utilizing data for arterial county roadway corridors with the highest density of motor vehicle crashes. The project team also used supporting collision data, equity data, recommendations from prior studies, and public/stakeholder input to develop a shortlist of top crash segments. Segments with recently constructed safety improvements or locations undergoing study/design were identified through discussions with County Engineering and removed from this shortlist to target segments not currently being considered. The project team prioritized and ranked the remaining locations with more recent crash severity and frequency data (old crash data from NSL superseded with more recent crash data from the New Jersey Department of Transportation's Safety Voyager tool), traffic volume

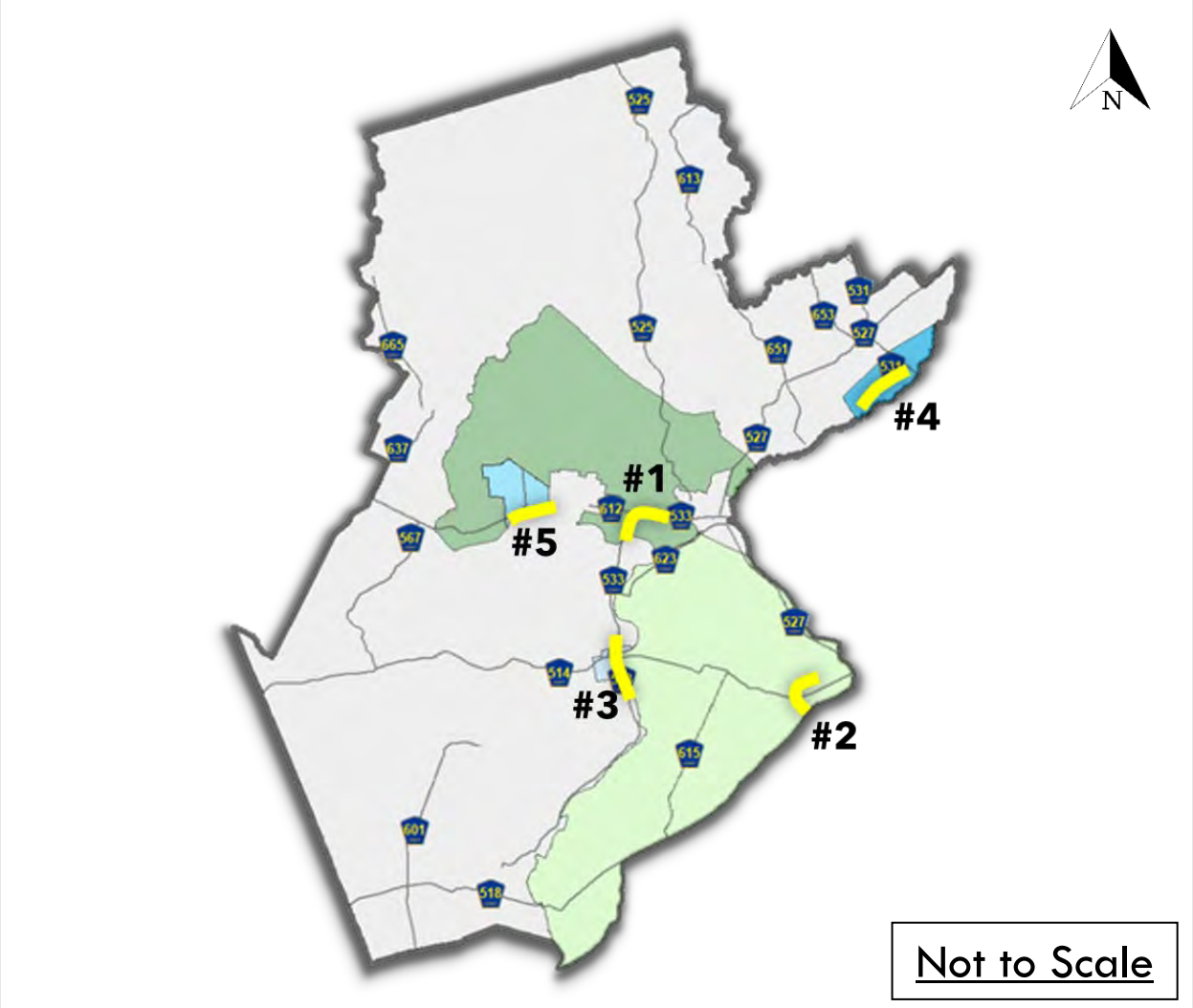
[1] Proven Safety Countermeasures - Road Safety Audits - https://safety.fhwa.dot.gov/provencountermeasures/road_safety_audit/

data from NJTPA's regional travel demand model (NJRTM-E), and environmental justice data from NJTPA. The decision-making criteria and process are detailed further on in this report.

Input on these top crash locations was obtained from the public via a virtual mapping tool and project email address and gathering information from a Technical Advisory Committee (TAC) via an initial virtual meeting. Based upon public and stakeholder input, the following five segment locations were selected for RSA review in this study:

1. Finderne Avenue/Main Street (CR 533) in Bridgewater Township, MP 29.60-30.60
2. Franklin Boulevard (CR 617) in Franklin Township, MP 0.00-1.00
3. Main Street (CR 533) in Millstone Borough, MP 25.14-25.87
4. Greenbrook Road (CR 636) in North Plainfield Borough, MP 0.70-1.97
5. Somerset Street (CR 626) in Raritan Borough, MP 0.00-0.67

Figure 1 - Selected RSA Locations



Funding of Study

Somerset County applied to the NJTPA for financial assistance to develop this plan. The NJTPA is the federally funded Metropolitan Planning Organization (MPO) for the northern New Jersey region, home to 7 million people and covering over one-half of the State's land area. 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. The NJTPA conducts comprehensive long-range transportation planning and annually oversees over $2 billion in transportation investments for one of the nation's most dynamic and complex transportation systems. The NJTPA sponsors and conducts studies, assists member planning agencies (known as NJTPA "subregions"), and provides a forum for inter-agency cooperation and public input into funding decisions.

Public & Stakeholder Input

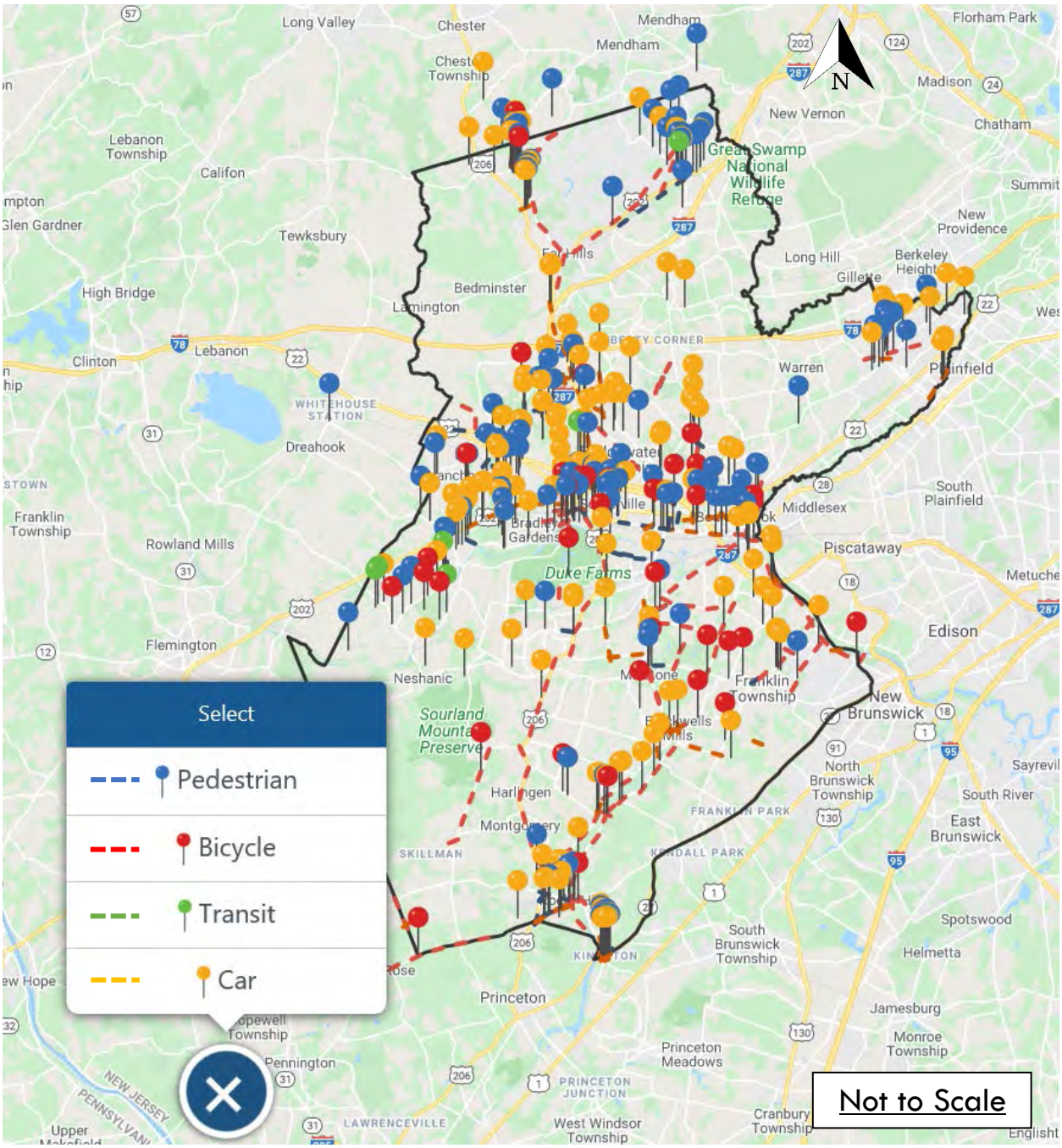
The County and project team led a multi-pronged and iterative public and stakeholder engagement effort. Originally planned to be carried out in person, public and stakeholder engagement transitioned to virtual meetings due to the COVID-19 pandemic. The primary tasks included an equity assessment, a virtual mapping exercise, three TAC meetings, and two virtual public meetings. The project team also maintained a project website and email address, as well as shared flyers and press releases to advertise meetings.

An interactive mapping tool and virtual meetings were used to engage the public and stakeholders throughout the study. This input informed the corridor selection process and the list of safety concerns and recommendations for each selected corridor location. Detailed below is an overview of each component of the public outreach undertaken.

Virtual Mapping Tool

Beginning in August 2020, the project team shared a custom, web-based interactive mapping tool to gather input on transportation issues and opportunities concerning walking, biking, driving, and taking public transit. Through the mapping tool, participants were able to write comments, place pins and draw lines on areas of concern within Somerset County. Each pin is color coordinated by transport mode. The mapping tool remained open throughout the remainder of the project, and the public continued to share feedback on the study corridor locations until the project concluded in fall 2021. By October 2021, 193 comments and 705 pins/lines were added to the interactive map.

Figure 2 - Virtual Mapping Tool



The feedback received on this tool was used throughout the project. First, the project team considered corridors that had received an abundance of feedback when selecting the RSA locations. Next, the input was shared with the TAC members, RSA participants, and public meeting attendees when considering potential improvements to the corridors. Last, the public input was used in developing recommendations, and was documented in the RSA reports.

Technical Advisory Committee Meetings

A TAC identified by the County met three times over the course of the study. The list of TAC members is included in the Acknowledgments section of this report. The committee included a mix of local, state, regional, and federal stakeholders, as well as community leaders such as representatives from transportation management associations, transit agencies, emergency management, public works, and municipal engineering/planning departments.

All three meetings were held virtually via the Zoom conferencing platform. Meetings covered introducing the study, identifying concerns in the five selected RSA corridors, and gathering information on proposed recommendations.

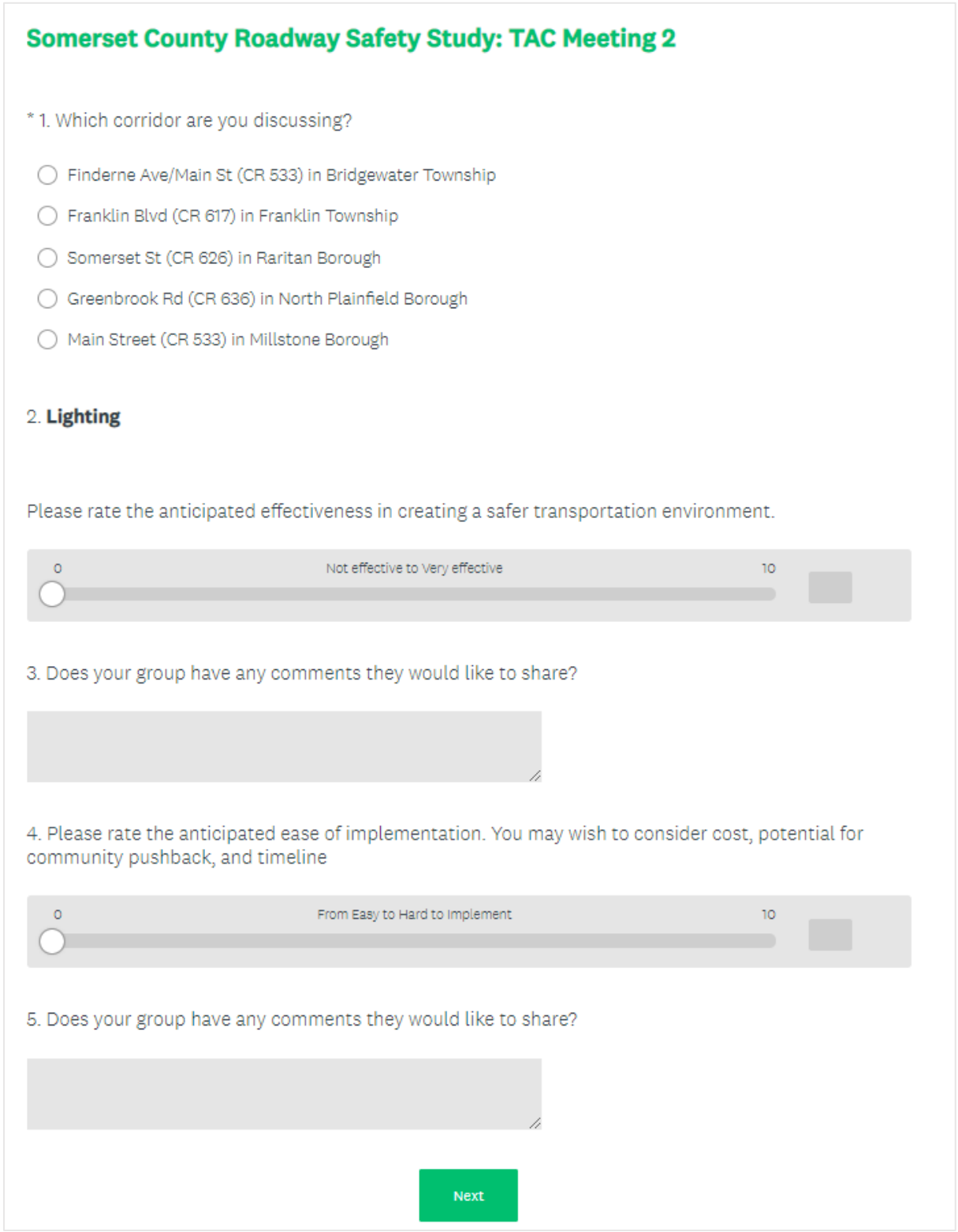
TAC Meeting 1

The first meeting, held on Wednesday, August 19, 2020, introduced the project team. The project team provided an overview of the study, presented the public involvement plan, and summarized the feedback received from the online mapping tool. The project team explained the RSA process and the technical analysis used in the development of the shortlist. Several questions were then posed to the committee members, which asked how the shortlist of RSA corridors should be prioritized. Analysis factors included vehicle crash history, pedestrian/bicycle crash history, environmental justice/Title VI populations, and previous studies. After a brief discussion, the committee was asked a final question regarding which corridors should be selected to be advanced in the RSA process.

TAC Meeting 2

The second meeting was held on Thursday February 18th, 2021, and focused on identifying areas of concern on the five selected corridors, as well as potential safety improvements. This meeting format consisted of a 45-minute presentation with interactive breakout rooms. The presentation included the following topics: project background, summary of selected corridors, description of potential safety measures, and a discussion of demonstration projects, which are short-term, low-cost, temporary roadway projects used to pilot potential long-term design solutions to improve walking/bicycling and public spaces (e.g., parklets, pilot programs, green stormwater infrastructure, etc.). During the breakout rooms, participants were asked to review the 10 safety measures discussed during the presentation. They were then asked to rate the effectiveness and ease of implementation of each safety measure according to the corridor. Participants were also asked to identify specific areas within each corridor that were areas of concern.

Figure 3 - TAC Meeting #2 Corridor Improvement Survey



Somerset County Roadway Safety Study: TAC Meeting 2

* 1. Which corridor are you discussing?

- ◯ Finderne Ave/Main St (CR 533) in Bridgewater Township
- ◯ Franklin Blvd (CR 617) in Franklin Township
- ◯ Somerset St (CR 626) in Raritan Borough
- ◯ Greenbrook Rd (CR 636) in North Plainfield Borough
- ◯ Main Street (CR 533) in Millstone Borough

2. **Lighting**

Please rate the anticipated effectiveness in creating a safer transportation environment.

0 Not effective to Very effective 10

3. Does your group have any comments they would like to share?

4. Please rate the anticipated ease of implementation. You may wish to consider cost, potential for community pushback, and timeline

0 From Easy to Hard to Implement 10

5. Does your group have any comments they would like to share?

Next

TAC Meeting 3

The final meeting was held on Tuesday August 3, 2021, and focused on gathering feedback on proposed recommendations for the five corridors. This meeting format also consisted of a 45-minute presentation with interactive breakout rooms. The presentation included the following topics: project background, project status, identification of needs, and proposed safety measures by corridor. The meeting was then divided into five breakout rooms, one for each of the selected corridors. Each breakout room discussed a specific set of recommendations pertaining to that corridor. Participants were asked to provide their general reactions to the proposed recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed.

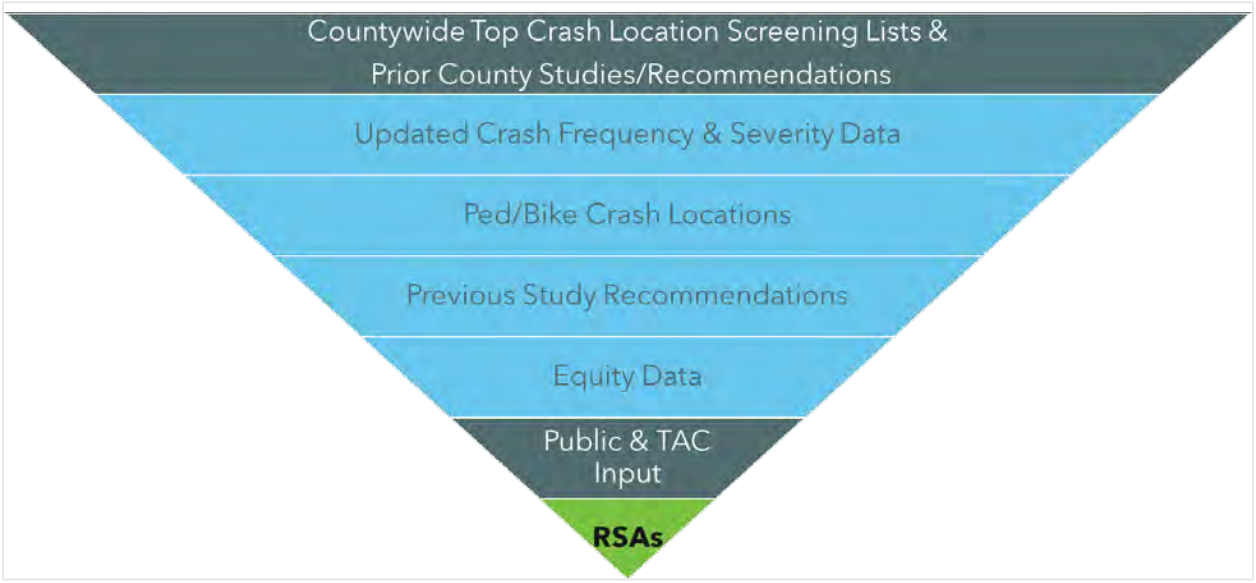
Public Meetings

Two virtual public meetings were held for community input.

Public Meeting 1

The first meeting was held on November 12, 2020, with 59 participants in attendance. At this meeting the project team provided an overview of the study, stating the purpose and need. The project team presented statistics of crashes on County jurisdiction roadways, which showed a steady increase of crashes over the past 10 years. The project team explained the RSA process and the technical analysis used in the development of the shortlist of corridors. The project team explained the process for selecting the five corridors where RSAs would be conducted. Following the presentation, attendees were split into breakout rooms to discuss one of the five corridors selected for RSAs or to provide general comments.

Figure 4 - Selection Process Slide from Public Meeting #1



Public Meeting 2

The second public meeting was held on Wednesday September 29, 2021, with 29 participants in attendance. At this meeting, the project team presented on the project background, project status, identification of needs, and proposed safety measures for each corridor. The meeting was then divided into five breakout rooms, one for each of the selected corridors. Each breakout room discussed a specific set of recommendations pertaining to that corridor. Participants were asked to provide their general reactions to the proposed safety recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed.

Data Collection

As noted earlier, the NJTPA's NSL crash ranking list for Somerset County was used to identify the high-crash county roadway segments. This list is assembled utilizing 2012 through 2016 crash data history, roadway volume data, and crash severity data. This data also served to inform the RSA process in determining the existing crash hotspots, multimodal needs, and environmental justice needs at each reviewed corridor location. The data collection process undertaken is detailed below.

Crash Data

The study incorporated reportable crash information resulting in any combination of fatality, injury, or property damage. The datasets used for this analysis were sourced from local law enforcement responses to reported vehicular crashes. To be entirely inclusive in obtaining complete crash information, the data was accumulated using three distinct resources: NJDOT's Safety Voyager, New Jersey Division of Highway Traffic Safety (NJDHTS) Crash Analysis Tool, and the NJDOT raw crash tables. The project team compared the three sources to identify and discard duplicate records and include only distinct records to produce a complete and comprehensive representation of the crashes within the extent of each corridor.

Figure 5 - NJDOT Safety Voyager - Sample Crash Data (Greenbrook Road, North Plainfield Borough)

This analysis evaluated crash attributes such as crash type and severity as a percentage of the total crashes to achieve a more robust understanding of the locations compared to the crash activity on the County roadway system. The project team then mapped all crashes along the segments onto collision diagrams, which can be found in Appendix D, providing a quick spatial overview of crash clustering patterns.

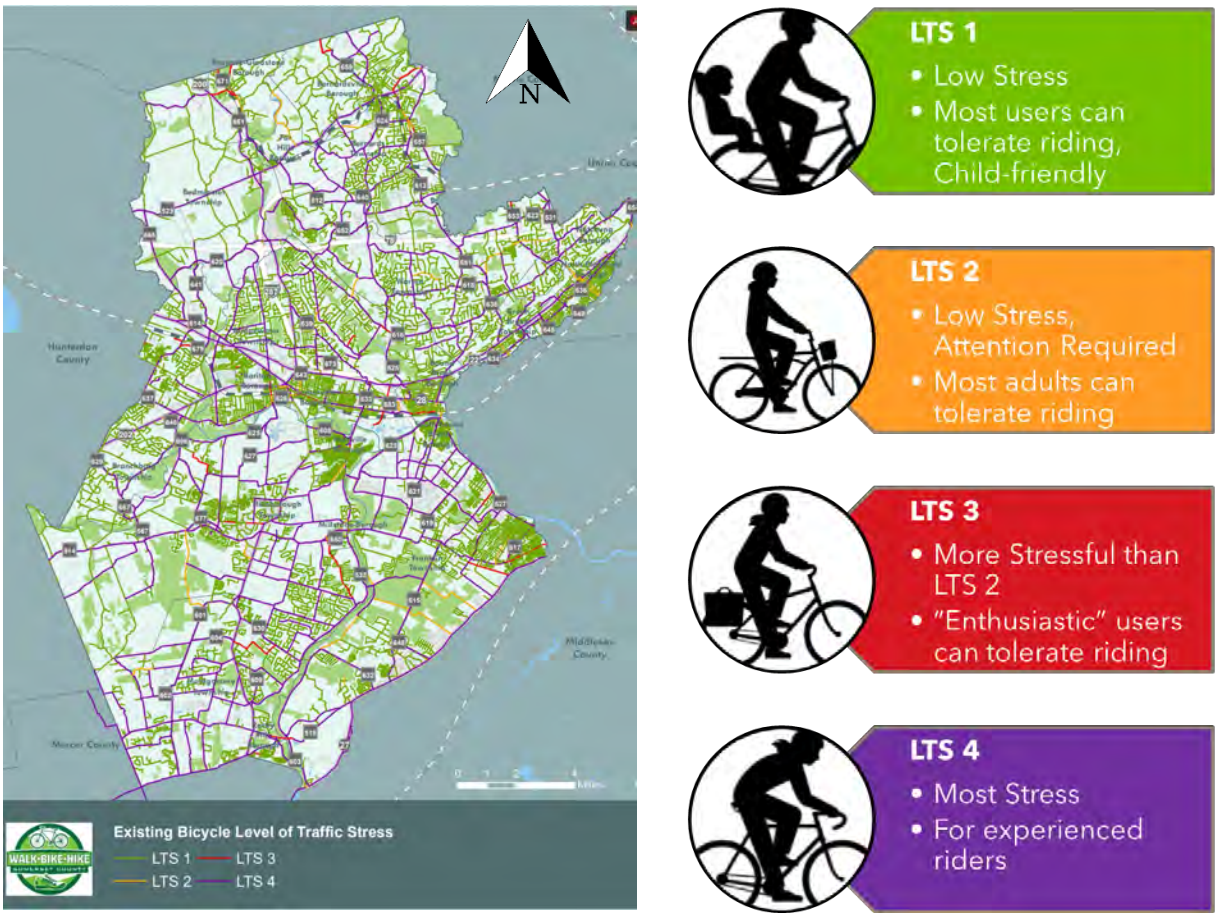
Volume Data

Average Annual Daily Traffic (AADT) data was collected using NJDOT count stations. This count data was further refined using the NJTPA NJRTM-E travel demand model.

Multimodal Data

Existing bicycle and pedestrian accommodations were reviewed utilizing the most current available Google StreetView imagery. The project team obtained Level of Stress[2] data, specific to bicyclists, from the Somerset County's WalkBikeHike (2019) study to measure the comfort level for cyclists, given the stress created by roadway conditions such as volume, speed, and proximity of automobile traffic[3]. Additionally, sidewalk and roadway widths were obtained using Google Satellite imagery. Site visits were made to all selected corridors to confirm these accommodations. Bus and rail services for each of the selected corridors were obtained from NJ TRANSIT databases as well as from the Somerset County Department of Transportation.

Figure 6 - Level of Stress Map, WalkBikeHike (2019)



[2] Level of Stress (LTS) is an approach that quantifies the amount of discomfort that people feel when they bicycle close to traffic

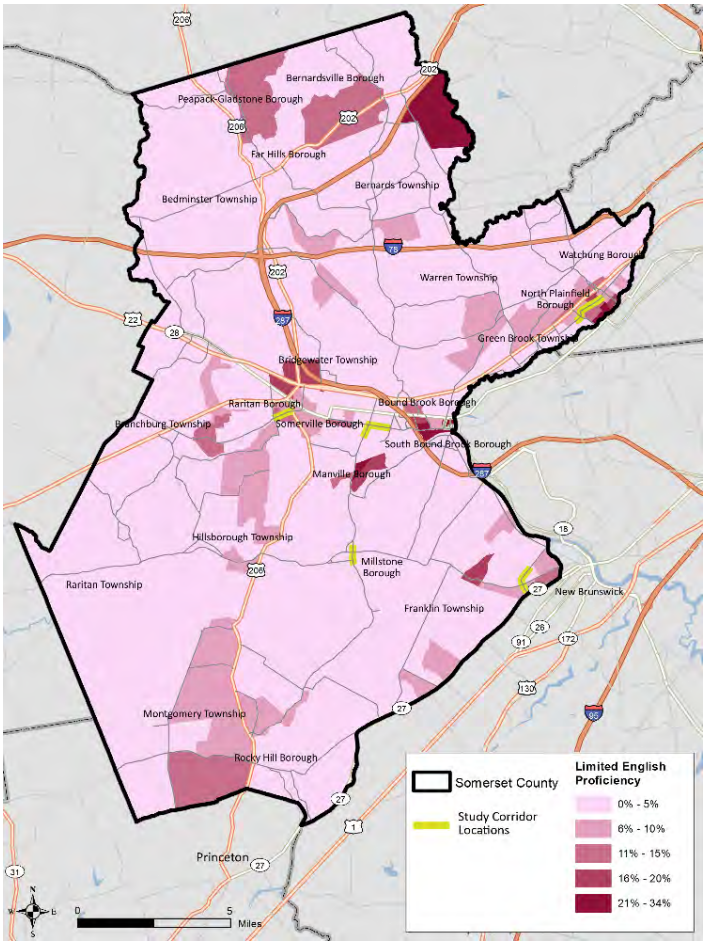
[3] WalkBikeHike - Somerset County https://www.co.somerset.nj.us/home/showpublisheddocument/35013/637045063842570000

Equity Assessment

Equity considerations received substantial focus throughout the study. Historically, environmental justice and Title VI communities have been underrepresented in decision-making related to infrastructure and are disproportionately exposed to negative impacts. The equity assessment helped to inform the needs for improvements for each corridor. The project team developed an equity assessment to outline where there are identified environmental justice and Title VI communities and how they relate to regional and statewide statistics. Factors considered in the equity assessment included:

- Race
- Low income
- Limited English Proficiency
- Population over 65
- Population under 5
- Population Aged 5-17
- People with Disabilities
- Zero Vehicle households
- Sex
- Country of Birth

Figure 7 - Equity Analysis Map



The assessment found that the demographic characteristics of Somerset County and its top 20 crash locations are similar to regional and statewide averages. However, racial minority populations are more highly concentrated near the top crash locations. As a result, the project team highlighted these locations for the TAC and recommended that the committee consider this factor when determining RSA locations. Later in the study, the project team considered the needs of all the identified populations (e.g., minority populations, low-income households, people with limited English proficiency, seniors, young children, and people with disabilities) when making recommendations. Any updates to intersection and roadway designs considered people using mobility devices or strollers.

Ranking and Selection

Examining the Top-20 crash locations for overall crash data and pedestrian/bicycle crashes was the preliminary determinant criteria for the selection process. Public and stakeholder feedback helped narrow the shortlist to the five sites selected for RSAs. The selected corridors are shown in **Figure 8**.

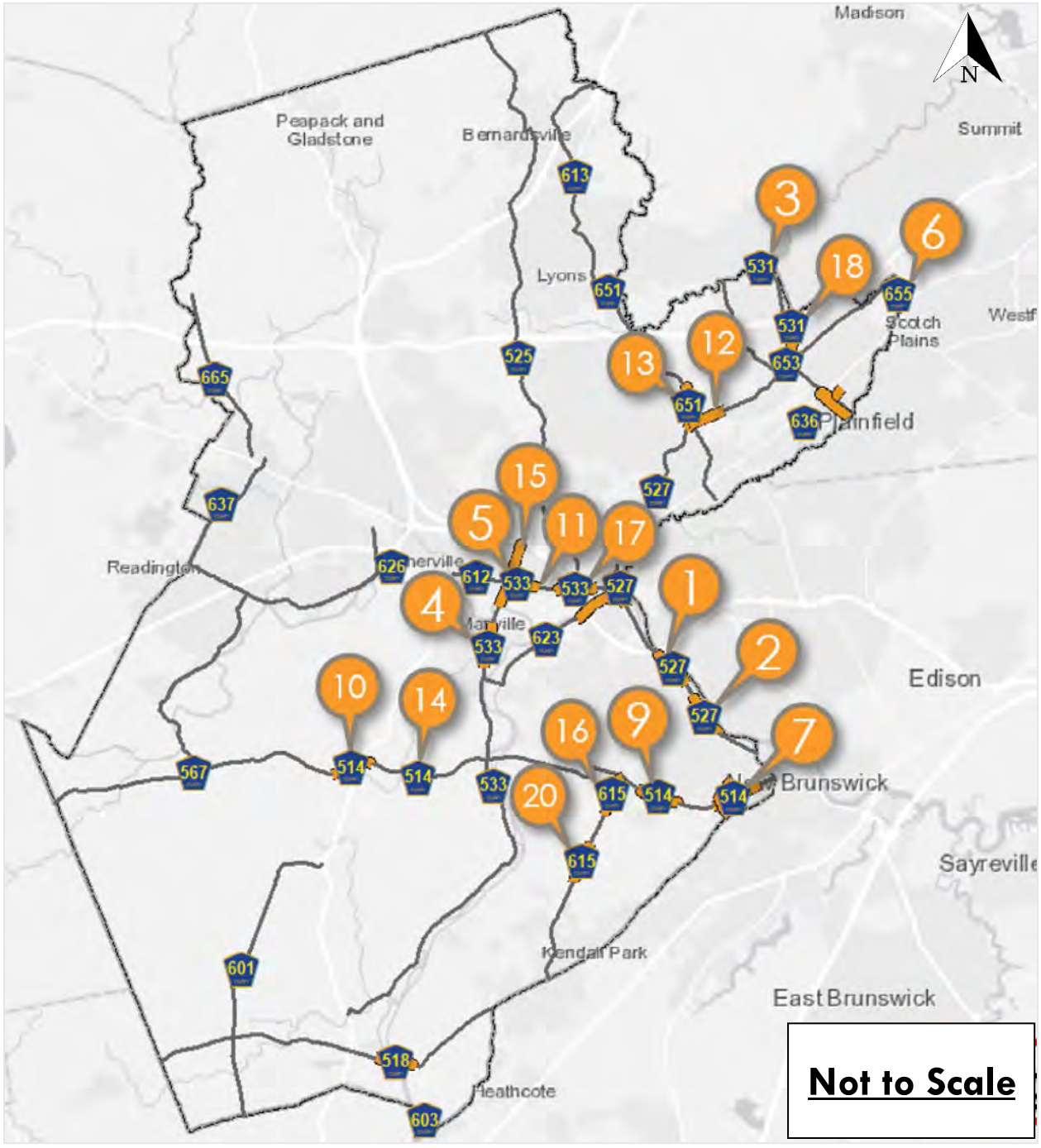
Figure 8 - Selected Corridors

Figure 9 - Corridor Ranking and Selection Matrix

Table 2. Top 20 Somerset County Pedestrian/Bicycle Crash Locations - NJTPA Network Screening List [Updated with 2014-2018 Crash Data]

Segment Rank[1] for 2014-2018 Crash Data	NJTPA Rank[2] for Segment	Street (County Route)	Town	Milepost From	Milepost To	AADT[3]	Crash Frequency/ Severity Rating	Bus Routes	School Adjacent to Segment?	Equity Score[7]	Bike LTS[8]
1	5	S. Main St (CR 533)	Manville Borough	27.77	28.77	26,000	219	858, 859, 860, R1, R2	No	2	3
2	3	Easton Ave (CR 527)	Franklin Township	49.12	50.12	43,000	196	851, 852, 871	Yes	2	4
3	20	Main St/Mountain Ave (CR 527)	Bound Brook Borough	52.86	53.86	10,000	158	851, 852, 871, R1, R2, (Bound Brook Rail Station)	Yes	3	2
4	20	Greenbrook Rd (CR 636)	North Plainfield Borough	0.70	1.97	11,000	141	822, 872	Yes	4	4
5	18	Finderne Ave/Main St (CR 533)	Bridgewater Township	29.60	30.60	21,000	125	858, 859, 860, 871, R1, R2	No	2	4
6	4	Somerset St (CR 626)	Raritan Borough	0.00	0.67	10,000	115	871, 873	No	2	2
7	19	Mountain Ave (CR 642)	North Plainfield Borough	0.13	0.51	5,000	93	65, 114, 117, 872, 986	No	4	4

Figure 10 - NJTPA Network Screening List Top-20 Vehicle Crash Locations[4]



[4] Roadways not within County jurisdiction removed from Top 20 Screening List mapping

Table 1 - NJTPA Network Screening List Top-20 Vehicle Crash Locations[5]

NJTPA Rank for Segment	Street (County Route)	Town	Jurisdiction
1	Easton Ave (CR 527)	Franklin Township	County
2	Easton Ave (CR 527)	Franklin Township	County
3	Somerset St/Hillcrest Rd (CR 531)	Watchung Borough	County
4	Finderne Ave/Main St (CR 533)	Bridgewater Township	County
5	S. Main St (CR 533)	Manville Borough	County
6	New Providence Rd (CR 655)	Watchung Borough	County
7	Hamilton St (CR 514)	Franklin Township	County
~~8~~	~~Bonnie Burn Rd~~	~~Watchung Borough~~	~~Union County~~
9	Amwell Rd/Hamilton St (CR 514)	Franklin Township	County
10	Amwell Rd (CR 514)	Hillsborough Township	County
11	Franklin Blvd (CR 617)	Franklin Township	County
12	Mountain Blvd (CR 527)	Warren Township	County
13	Mount Bethel Rd (CR 651)	Warren Township	County
14	Amwell Rd (CR 514)	Franklin Township	County
15	Finderne Ave (CR 633)	Bridgewater Township	County
16	S Middlebush Rd (CR 615)	Franklin Township	County
17	Canal Rd (CR 623)	Franklin Township	County
~~18~~	~~Somerset St~~	~~North Plainfield Borough~~	~~Municipal~~
20	S Middlebush Rd (CR 615)	Franklin Township	County

Road Safety Audits

Pandemic Conditions & Challenges

Under normal circumstances, the RSA team would complete an in-field assessment together, traveling from site to site. However, in response to the COVID-19 pandemic, many agencies restricted in-person travel and working/gathering in groups. Additionally, social distancing requirements presented further challenges. Socially distanced solutions were crucial to keeping the study progress in motion. Nevertheless, identifying and recommending safety improvements for the study was still a necessary course of action.

The following FHWA tools and tips were employed to overcome the potential challenges of a remote RSA activity.[6]

[5] Roadways not within County jurisdiction removed from Top 20 Screening List mapping

[6] Pedestrian and Bicyclist Road Safety Audit (RSA) Guide and Prompt Lists https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa20042.pdf

- *Use technology to enhance communication and understanding:*
  Any virtual event relies heavily on available technology, and these RSAs were no different. The team maximized technology to collect data prior to the RSAs and gather collectively, which helped the team better understand the sites and feel connected to the rest of the RSA team. The video component helped participants to connect throughout the meetings.

- *Communicate with team members and stakeholders:*
  Every RSA participant brings a unique set of skills and experiences that are valuable to the RSA Team. As with all RSAs, it was essential to establish an environment where all felt comfortable sharing their thoughts and to provide opportunities for each team member to speak. Verbal and non-verbal communication was fostered using web cameras throughout the process. Facilitators and local organizers also asked pointed questions to specific participants to hear their thoughts or experiences. The chat function in the virtual meeting room also allowed members of the team to share links, thoughts, and questions with all participants. The entire RSA team was engaged throughout the process.

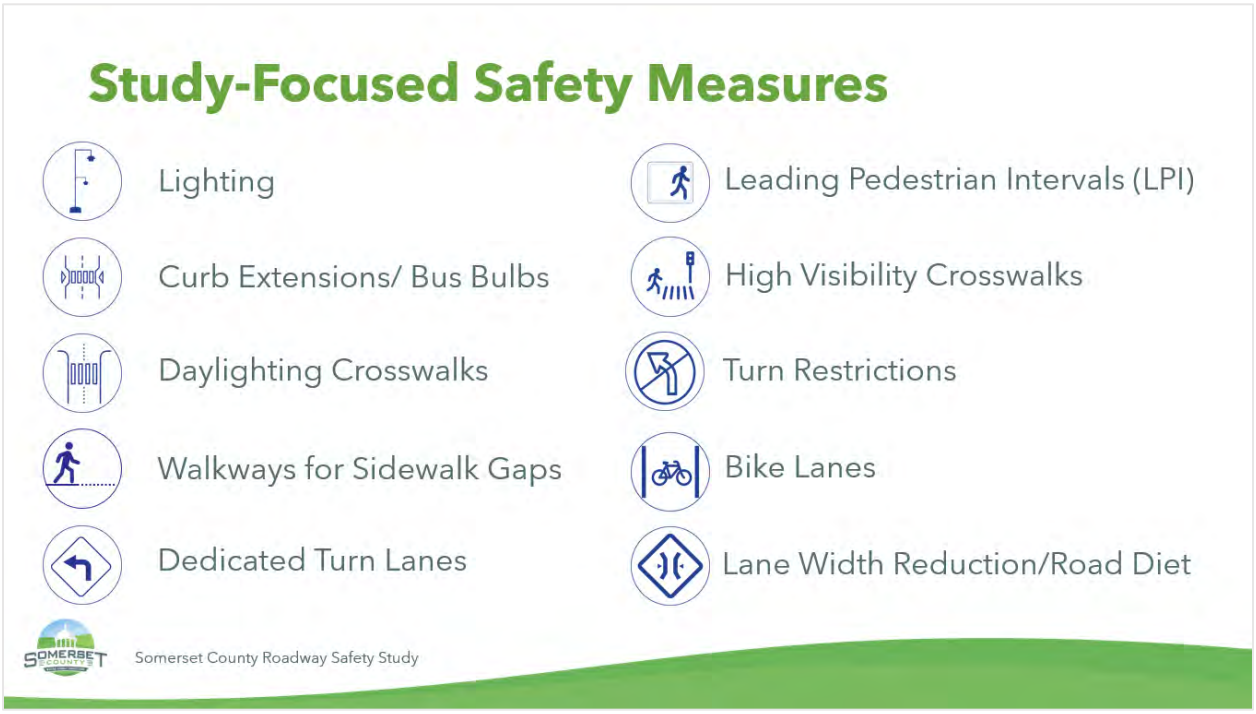
- *Incorporate in-person components:*
  In-person components are vital to the success of an RSA. The RSA team performed in-person field reviews, and before the first day of the RSAs, staff walked the study area, took preliminary photos, and made observations. The photos and experiences conveyed the characteristics of the study area to the RSA Team and helped all team members better understand the safety issues.

Safety Protocols

RSAs planned initially for Fall 2020 were postponed to Spring 2021. In addition to postponement, the County took additional steps to conduct this study safely. The start-up meetings and RSA debriefings traditionally conducted in-person were conducted virtually via video conferencing. Virtual meetings allowed for a larger group to participate in the RSA advisory and review teams. Furthermore, the essential step of in-field review was conducted in a socially distanced manner, with participants paired off in groups spaced more than six feet apart from each other. All in-field RSA participants were masked for the entire duration of the field visit to reduce the risk of disease transmission.

Pre-Audit Meeting

Figure 11 - Pre-Audit Meeting Presentation



For each RSA, the pre-audit meeting was virtually held via video conferencing the morning of the in-field audit. Background on the Somerset County Roadway Safety Study and its initiatives were provided to RSA participants. Team members were asked to provide feedback on study-focused safety measures, including corridor boundaries, roadway characteristics, multimodal components, land use, and local demographics. The team also presented public and stakeholder feedback on the corridor-specific existing conditions to the group. The steps of the RSA process, and the definition of the RSA itself, were identified. Lastly, participants were carefully educated with an orientation of the guidelines and safety for the in-field RSA observation component.

In-Field Meeting

Figure 12 - In-field RSA Review

Following their walk through the corridor, participants gathered to debrief and share their key observations. Before departing, participants were asked to complete and submit a survey rating their impression of the corridor.

During the in-field inspection, RSA participants gathered in a socially distanced manner and were briefed once again on key components to identify during their inspection. They were given a "what to look for" list and an aerial map of the corridor, which they could use to note their observations. Emphasis was placed on how roadway users may perceive or adjust behavior based on roadway characteristics. This allowed for identifying any aspects of the roadway where drivers' expectations about the road and traffic might be violated or where the layout fails to give the right message.[7]

Figure 13 - Post In-field RSA Debrief

Post-Audit Meeting

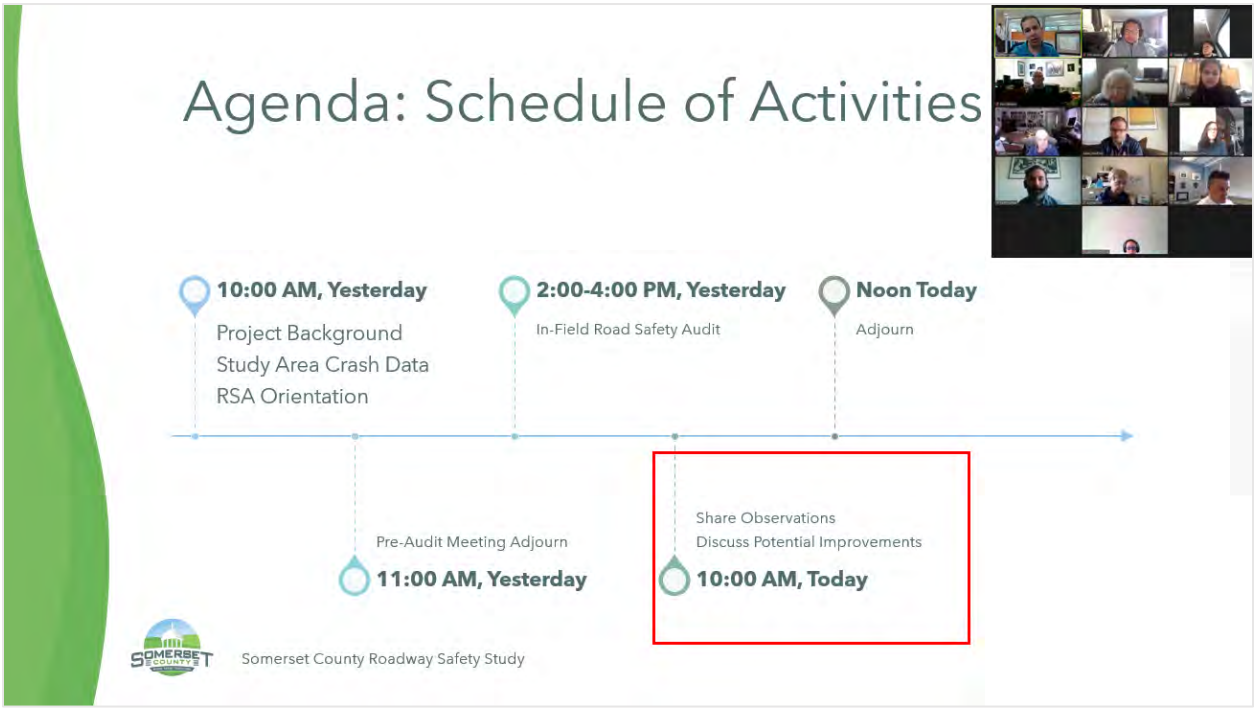
Like the Pre-Audit Meeting, this component of the RSA process was conducted virtually via video conferencing. Participants shared their observations and discussed potential improvements. The virtual presentation showcased photos participants took during the RSA and prompted discussion throughout the meeting.

[7] Alexander, G., Lunenfeld, H. 1986. *Driver expectancy in Highway Design and Traffic Operations.* Technical Report FHWA-TO-86-1. FHWA, U.S. Department of Transportation

Discussion points included but were not limited to:

- "What safety improvements do you propose for reducing crashes?"
- "What is your vision for the corridor? How should it look in 10 years?"
- "What are the short-term changes that could be made now?"

Figure 14 - Post-Audit Virtual Meeting



These meetings were held a day after the RSA was conducted. Participants said this format worked well because it gave them time to share photos, videos, and scans of their observations and allowed them to process their observations and organize their thoughts before the discussion the next day. Screen sharing allowed for quick review and consensus of RSA observations; a wider audience of stakeholders was involved in the discussion of observations and recommendations.

Identified Needs

To understand the characteristics and needs of the select locations, historical crash data revealed what collision types were the most overrepresented for each select corridor. This provided insight for what safety goals and challenges were most prevalent. Additionally, one of the many advantages of conducting an RSA site visit is the ability to walk the study segment of the corridor and obtain a pedestrian's perspective of any safety concerns. Observations of roadside signage, sight distance issues, deteriorating infrastructure, traffic patterns, and pedestrian, cyclist and driver behavior convey the information necessary to understand the characteristics and needs of the location. Recognizing the needs of the corridor helps identify potential mitigation strategies to improve safety. Summaries and photos representing some of the challenges and observations noted for each corridor are presented on the following pages.

Main Street/Finderne Avenue, Bridgewater Township, South Street to Chimney Rock Road

- 201 crashes occurred on the one-mile segment study area during the analysis period
- Two fatal fixed object collisions have occurred on this corridor, which may suggest unsafe speeds
- At the Central Avenue intersection
    - Multiple right-angle collisions, mostly resulting in injury
    - Opposite direction sideswipe crashes on the eastbound approach perhaps due to lack of striping
- At the Bridgewater Avenue/Second Street intersection
    - Multiple right-angle collisions, mostly resulting in injury
    - Cyclist collisions, indicating difficulty for non-motorized modes in crossing Finderne Avenue
- At the Main Street & Finderne Avenue intersection
    - Numerous left-turn collisions between northbound left-turn and southbound through traffic, the vast majority resulting in in injury
    - Left-turn crashes on other approaches to intersection, perhaps due to permissive left turns, which are where left turns are made through gaps in oncoming traffic
    - Five crashes between northbound and southbound traffic and crossing pedestrians and cyclists
    - Clustering of rear end crashes on the northbound, southbound, and westbound approaches to the intersection
- At the Fulton Avenue/shopping center driveway intersection
    - Multiple left-turn and right-angle collisions suggesting short gaps being taken by drivers
    - Crashes involving non-motorized modes (pedestrian/cyclist) showing crossings at this location
- Lack of turning bays at Ramsey Street/Pearl Street resulting in rear end/left-turn collisions
- At the Chimney Rock Road intersection
    - Numerous collisions between eastbound left-turn and westbound through vehicles
    - Eastbound and westbound rear end collisions between through/left-turn traffic due to lack of turn bays

Figure 15 - Collision Highlights, Finderne Avenue and Main Street

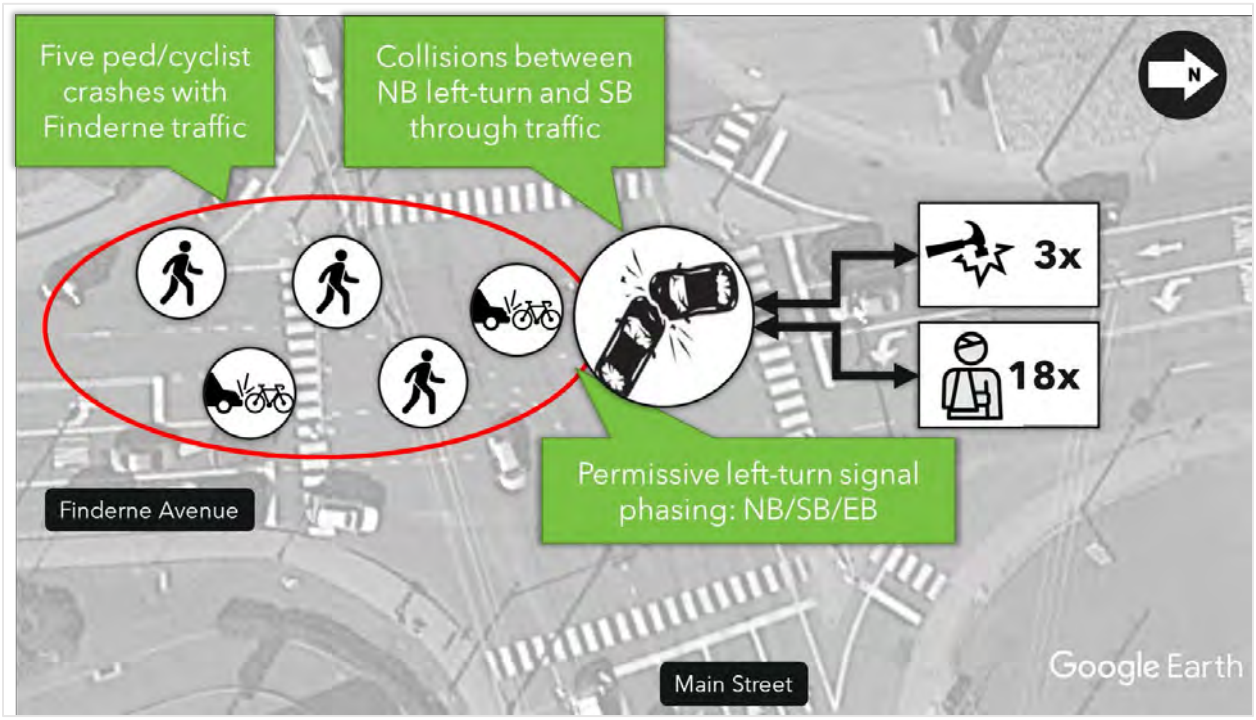


Figure 16 - Field Observations and Identified Needs, Main Street/Finderne Avenue

Close calls between northbound permissive left and southbound through traffic at Finderne Avenue & Main Street intersection

Sidewalk on north side of Main Street often interrupted by wide asphalt curb cuts and parked/standing vehicles

Cycling on Finderne Avenue restricted to narrow multiuse path over bridge with minimal delineation from travel lanes

Heavily used cycling route lacking updated wayfinding to connect local communities

Franklin Boulevard, Franklin Township, Somerset Street to Viking Avenue

- 214 crashes occurred within the one-mile segment study area during the analysis period
- At the Somerset Street intersection
  - Numerous fixed object collisions on the northwest intersection corner with a pedestrian signal pole
  - Numerous sideswipe collisions on the southbound approach due to narrow lanes
  - Crashes on southbound Route 27 including rear ends and crashes with left-turn and cross-street traffic
- Crashes between northbound traffic and traffic trying to turn on from Fuller Street
- At the Hamilton Street intersection
  - Heavy volume of rear end collisions on the eastbound approach to the intersection
  - Crashes between vehicles in the eastbound approach queue to the intersection and vehicles looking to turn out of a strip mall
  - Significant amount of right-angle and left-turn collisions involving eastbound traffic
  - Numerous crashes at this intersection involving pedestrian and cyclist traffic (half on east crosswalk)
  - Numerous fixed object collisions with signal pole on southeast intersection corner
  - Numerous sideswipe collisions just south of intersection, both same and opposite directions
- Northbound and southbound rear end collisions and cyclist crashes clustered in front of Hillcrest Elementary School driveway
- Numerous struck parked vehicle and fixed object collisions at Matilda Avenue intersection

Figure 17 - Collision Highlights, Franklin Boulevard and Hamilton Street

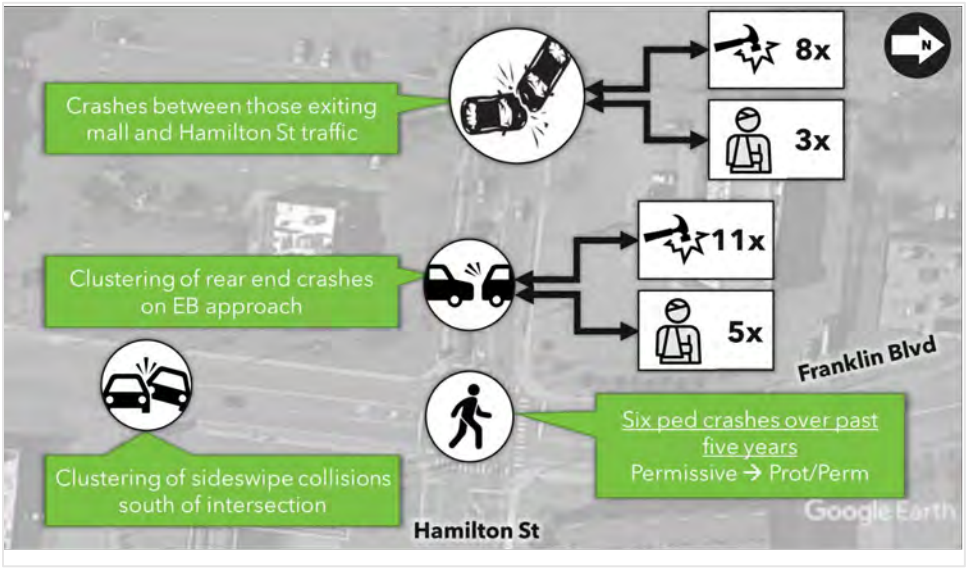


Figure 18 - Field Observations and Identified Needs, Franklin Boulevard

School signage to be upgraded; bike lane not adequately striped

Gap in sidewalk connectivity between Fuller Street and Somerset Street

Heavy vehicles encroaching onto Somerset Street left turn lane onto Franklin Boulevard

Sidewalk interrupted by wide curb cuts and vehicles encroaching on pedestrian paths

Main Street, Millstone Borough, Yorktown Road to Beardslee Road

- 35 crashes occurred on the 0.67-mile segment study area during the analysis period
- Clustering of rear end collisions on the northbound, eastbound, and westbound approaches to the intersection
- Struck fixed objects on the northwest and southeast corners of the intersection
- Two animal crashes occurring just south of the intersection

Figure 19 - Collision Highlights, Main Street and Amwell Road

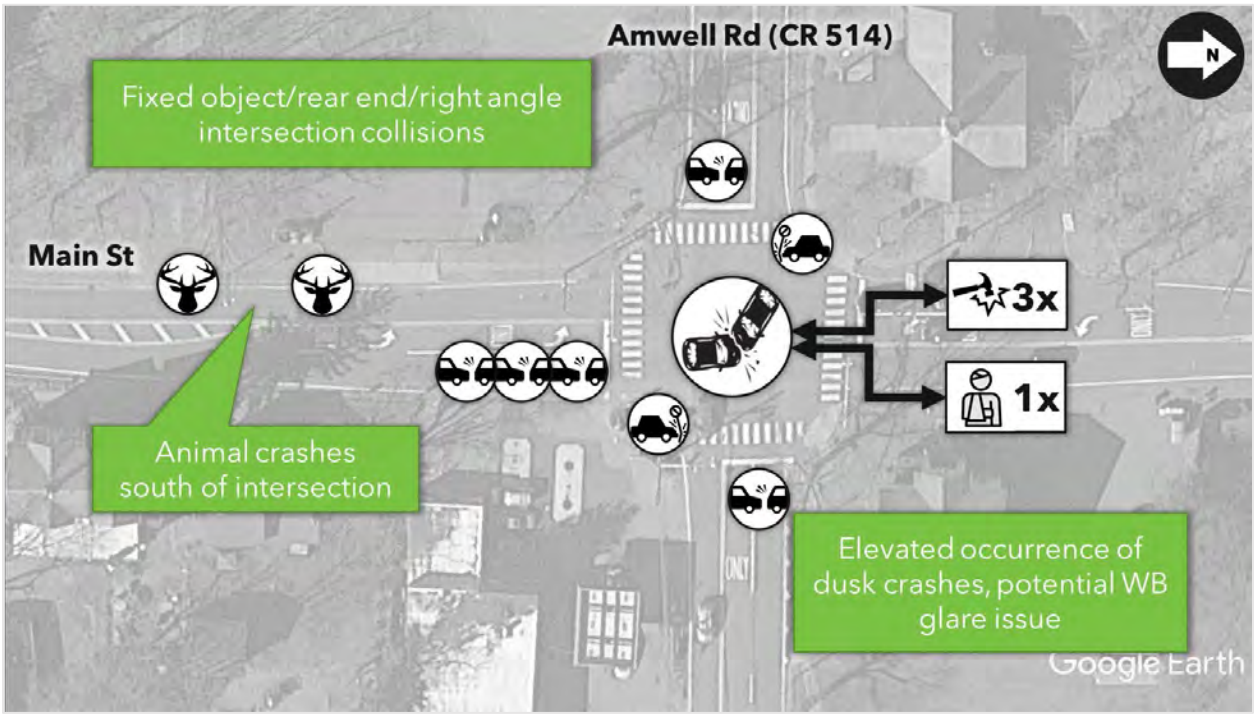


Figure 20 - Field Observations and Identified Needs, Millstone Borough

Brick paver sidewalks need to be reset and repaired along corridor

Gaps in pedestrian connectivity and pavement drop-offs on side of road

Signal at Amwell Road & Main Street lacks pedestrian countdown signal heads

Branches obstructing signage along Main Street

Greenbrook Road, North Plainfield, Harrington Avenue to Somerset Street

- 100 crashes occurred on the 1.27-mile segment study area during the analysis period
- At the West End Avenue intersection
  - Numerous right-angle and left-turn collisions, some involving injuries
  - Two pedestrian crashes occurred at this intersection, located next to two schools
- Three fixed object collisions involving westbound traffic heading into the double S-curve near Crosson Place
- Right-angle collisions, resulting in injuries, have occurred at the intersection with Harrison Avenue
- At the Wilson Avenue intersection
  - Right-angle and left-turn collisions
  - Rear end crashes involving traffic on the southbound approach
- At the Grove Street intersection
  - Four pedestrian crashes are clustered at this intersection
  - Crashes with parked vehicles occurring on Grove Street north and south of the intersection
- At the Duer Street intersection
  - Right-angle collisions, mainly involving eastbound traffic, clustered at this intersection
  - Bicycle and pedestrian crashes have been reported at this location
- Crashes between parked vehicles and westbound traffic have occurred from Stone Street and Grove Street

Figure 21 - Collision Highlights, Greenbrook Road

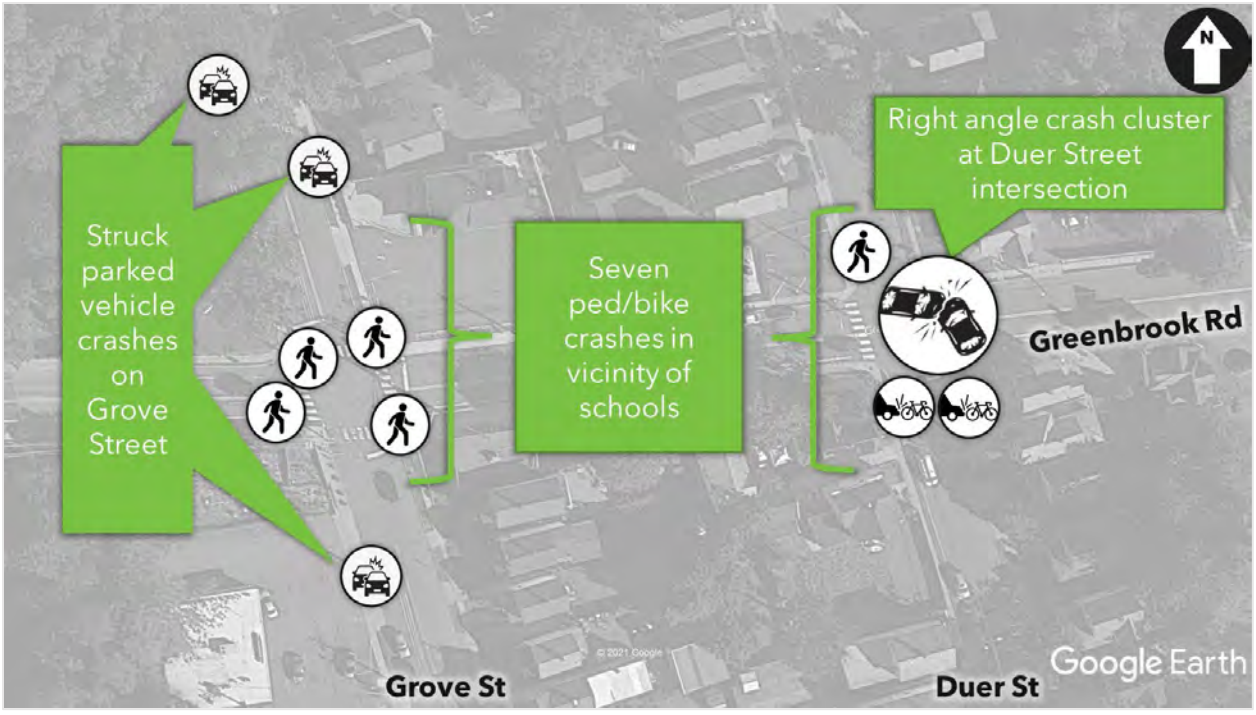
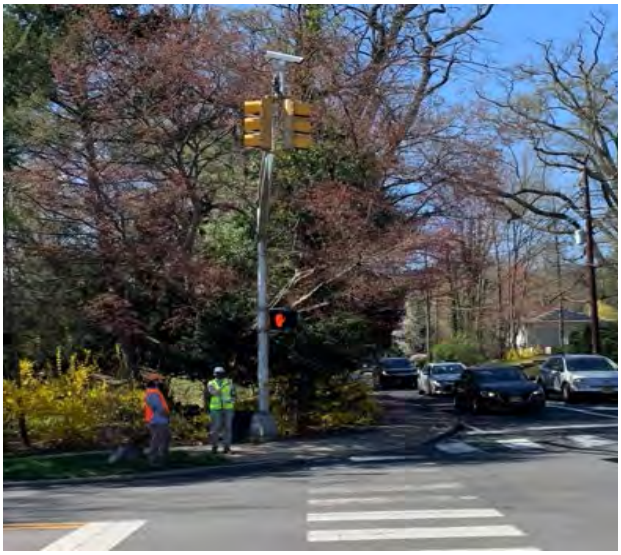


Figure 22 - Field Observations and Identified Needs, Greenbrook Road

Severe sidewalk heaving at locations with mature trees



Branches and foliage at the northwest corner of West End Avenue intersection impairing motorists sight distance should be trimmed back

Steep driveway pitch that slopes toward street near Judges Lane

Parked vehicles block motorists' sight line to pedestrians at Duer Street

Somerset Street, Raritan Borough, 1st Avenue / Lyman Street to US 206

- 144 crashes occurred within the 0.67-mile segment study area during the analysis period.
- At the First Avenue intersection
  - Two crashes involving cyclists perhaps due to nearby recreational destinations
  - Multiple rear end crashes occurring on the northbound, southbound, and westbound approaches
- Struck parked vehicle and sideswipe crashes clustered between Nevius and Codington streets
- Pedestrian crashes clustered at Anderson, Doughty, Thompson, and Codington streets
- Multiple right-angle crashes at the Thompson Street signalized intersection
- At the Route 206 intersection
  - Multiple crashes involving pedestrians crossing the south side of intersection, including one fatal
  - Multiple right-angle crashes, which tend to involve injuries due to high speed on Route 206
  - Multiple right-angle crashes between the eastbound queue and vehicles from strip mall on southwest corner
  - Numerous rear end collisions on northbound, southbound, and eastbound approaches to the intersection resulting in injuries

Figure 23 - Collision Highlights, Somerset Street and Route 206

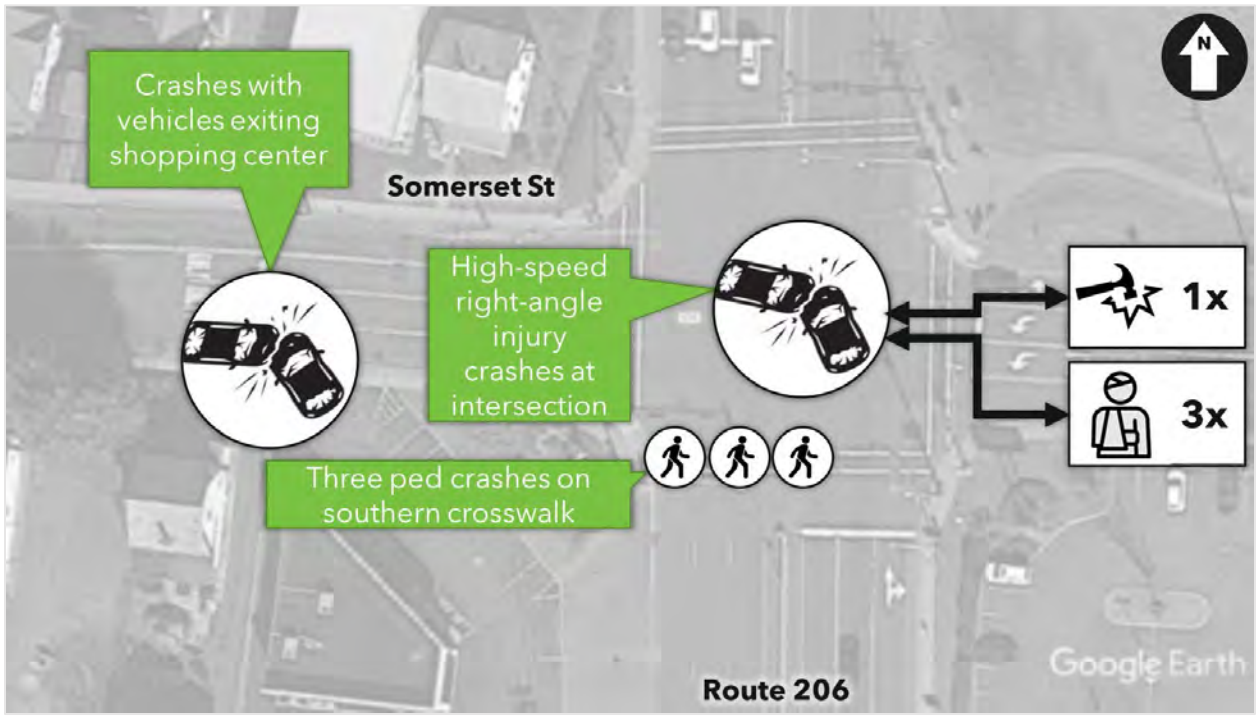


Figure 24 - Field Observations and Identified Needs, Somerset Street

Signs are blocked by roadside tree branches

Crosswalk pavement and striping may benefit from updating for better pedestrian/motorist visibility

Ponding near crossings indicates drainage problems

Stop bar on Route 206 South is set too far back

Study Recommendations

Somerset County has had previous successes utilizing local and regional programs to develop recommendations for transportation improvements consistent with the NJTPA's long range transportation plan. Ultimately, they actively participate in concept programs to encourage further development. The team examined relevant recent studies to apply concepts consistent with regional planning goals while developing RSA recommendations to mitigate the concerns each specific corridor presents.

County Studies Reviewed

Raritan Sustainable Economic Development Plan (2021)

The Plan is a 10-year economic, land-use and multi-modal vision for Downtown Raritan. Created through extensive community engagement, the plan presents a people-centered approach to economic development. It calls for creating inclusive public spaces that welcome people of all ages and abilities; for new development that respects the community's character; and strengthening the Borough's relations with existing and future businesses.

Circulation Plan Element & Bicycle and Pedestrian Safety Plan (2020)

This circulation plan element summarizes the future traffic impact to Raritan Borough based on current land use and traffic data. It also proposes a set of recommended road improvements that may be needed to serve anticipated future traffic volumes. To lessen any impacts additional traffic will have on the pedestrian experience in the Borough, this plan offers a section on Bicycle and Pedestrian Safety, goals for achieving safe passage, and recommendations to achieve those goals.

WalkBikeHike (2019)

The Walk Bike Hike study is designed to improve multimodal mobility and safety for Somerset County travelers of all ages and abilities. The findings and candidate improvements of the Framework Strategy will guide the development of convenient, equitable, and interconnected travel routes, facilities, and networks, over time, and in a collaborative manner. It includes more than 220 potential improvements, totaling almost 275 miles of new facilities across Somerset County. Concepts from this study were utilized for all the selected corridors.

Raritan Borough Street Smart Pedestrian Safety Campaign (2019)

Street Smart NJ is a public education, and awareness campaign developed by the NJTPA and funded through the Federal Highway Administration.

Supporting Priority Investment in Somerset County Phase III Study (2017)

The Supporting Priority Investment in Somerset County study supports opportunities for local and regional smart growth, preservation, economic revitalization, and resiliency planning initiatives through tactical alignment of land use, resources, programs, policies, and investment decisions; and conveys a clear investment message regarding local and regional land use priorities to both public and private sectors. Concepts from this study were utilized for Franklin Boulevard in Franklin Township, Main Street in Millstone Borough, Greenbrook Road in North Plainfield Borough, and Somerset Street in Raritan Borough.

Regional Center Pedestrian, Bicycle and Greenways Systems Connection Plan (2009)

This study involved developing a plan to provide a comprehensive analysis of the Regional Center of Somerset County by reviewing and assessing vehicular traffic and other multi-modal travel opportunities, including walking and bicycling. Concepts from this study were utilized for Main Street/Finderne Avenue in Bridgewater Township and Somerset Street in Raritan Borough.

Raritan Borough Master Plan Updated (2003)

This circulation plan element summarizes the future traffic impact to Raritan Borough based on current land use and traffic data. It also proposes a set of recommended improvements that may be needed to serve anticipated future traffic.

National/State Publications Reviewed

National and state publications were assessed with the goal of aligning concepts and recommendations with the most common safety initiatives. These reviews helped the team identify proven concepts and ideas and apply them to each study corridor. This section provides visualizations of some of the larger proposed safety measures on the corridors. Visualizations of these safety measures, along with accompanying descriptions on how these ideas seek to improve safety for vehicular, pedestrian, and cyclist travel, are adapted from the following state and national videos and publications:

- New Jersey Pedestrian and Bicycle Resource Center video library, 202117
- Cross County Connection TMA video library, 202118
- NJDOT Technology Transfer video library, 202119
- NJDOT Safe Routes to School video library, 202120
- 2017 State of New Jersey Complete Streets Design Guide, NJDOT, 2017
- Proven Safety Countermeasures, FHWA, 2017
- Small Town and Rural Multimodal Networks, FHWA, 2016
- Separated Bike Lane Planning and Design Guide, FHWA, 2015
- New Jersey School Zone Design Guide, NJDOT, 2014
- Urban Bikeway Design Guide 2nd Edition, National Association of City Transportation Officials, 2014
- Urban Street Design Guide, National Association of City Transportation Officials, 2012

Larger Recommendations by Corridor

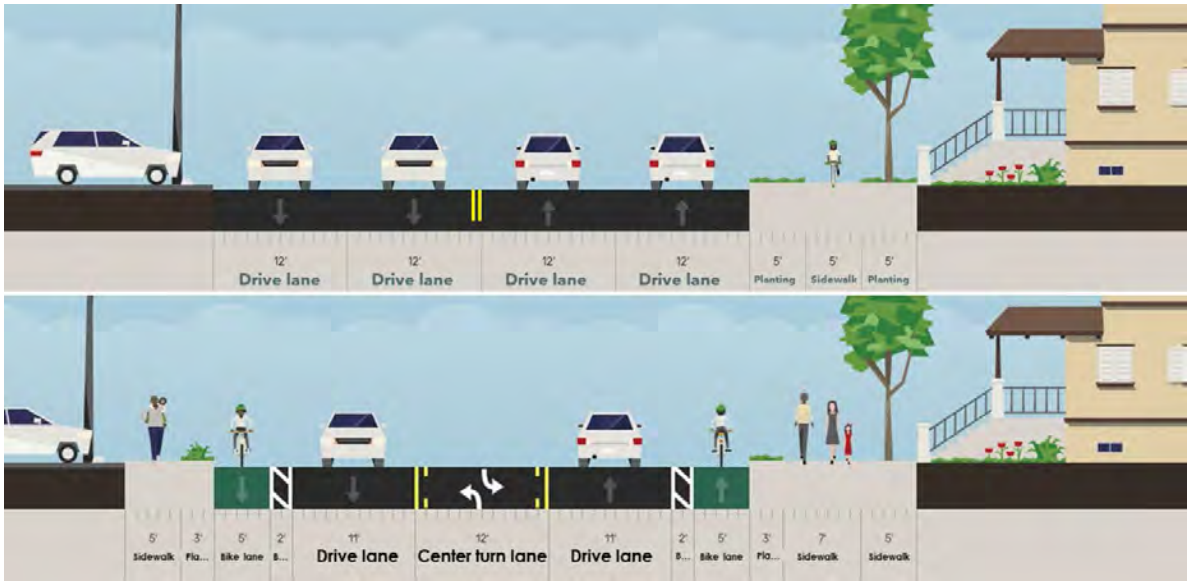
The larger recommendations for the corridors, such as road diets and pedestrian infrastructure, were derived from the observations noted by the RSA team. Detailed information on each of these larger recommendations are found on the following pages.

Road Diet

While this roadway corridor has a vehicle-centric design with two lanes of travel in each direction, both Main Street and Finderne Avenue act as a conduit of intercity pedestrian and cyclist travel between the downtowns of Somerville, Bound Brook, and Manville. Redesigning Main Street to accommodate a road diet, which is a technique in transportation planning whereby the number of travel lanes and/or effective width of the road is reduced in order to achieve systemic improvements, would potentially result in significant safety and mobility improvements for those who use the corridor via active modes of travel such as walking and cycling.

If the roadway AADT is above 20,000, FHWA recommends further analysis to justify feasibility of a road diet. Since Main Street has an AADT (vehicle volume) of 21,000, thorough intersection-by-intersection capacity analysis, design, administrative approval, and public vetting is needed to ensure the efficacy and success of the road diet. A four-lane to three-lane road diet, where properly implemented, could result in a 19-47percent [8] reduction in total crashes. Standard types of crashes on a four-lane section of roadway such as Main Street include "ghosting" right-angle crashes (where left-turn vehicles cannot see an approaching vehicle in the right lane due to a stopped opposing left-turn vehicle) and "lane shopping" crashes where vehicles jump from the left lane to right lane and back to aggressively pass slower vehicles.

Figure 25 - Example of Road Diet[9]



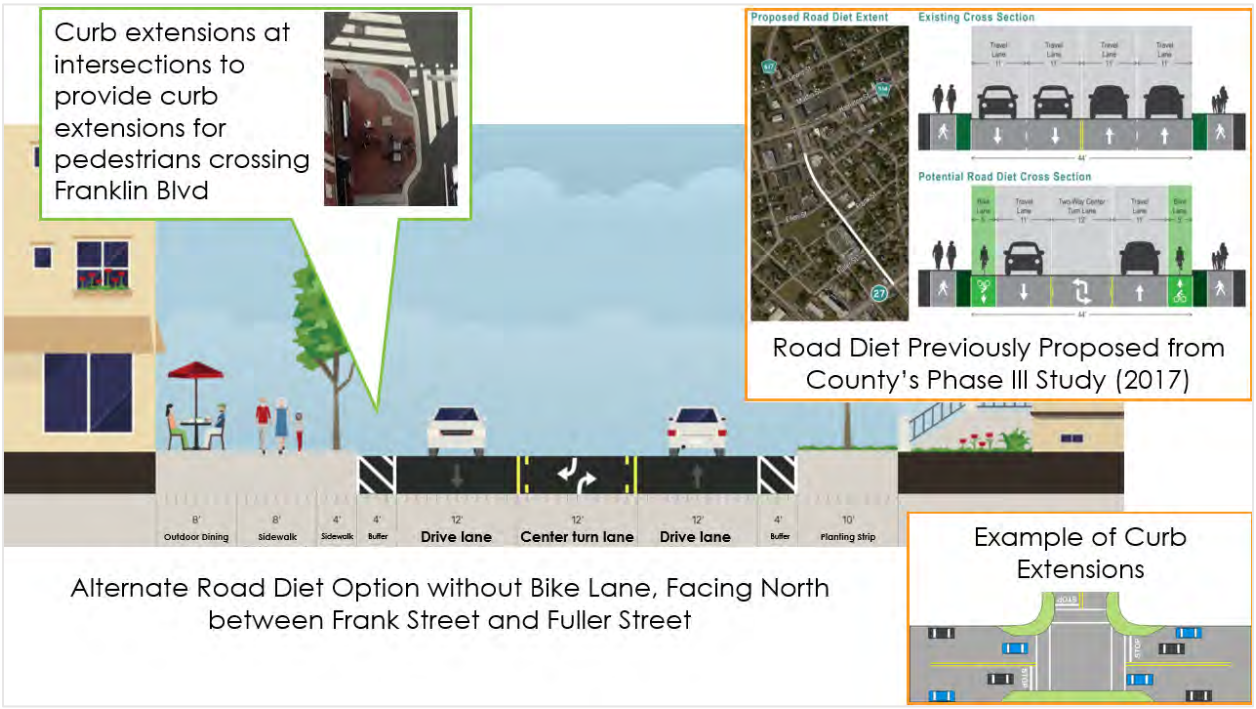
8 FHWA. (2017). Proven Safety Countermeasures. https://safety.fhwa.dot.gov/provencountermeasures/.
9 Created with Streetmix - Interview-Report-TSTC-StreetMix-v7-20-16.pdf (njtpa.org)

Road Diet

As recommended in the WalkBikeHike and Supporting Priority Investment in Somerset County Phase III studies, the County could consider a redesign of Franklin Boulevard from two travel lanes in each direction to one travel lane and one bike lane in each direction with a two-way left-turn lane. Thorough intersection-by-intersection capacity analysis, design, administrative approval, and public vetting is needed to ensure the efficacy and success of the road diet.

As previously noted, reducing the road from four to three lanes could result in a 19-47 percent[10] reduction in total crashes. Like Main Street, standard crashes on Franklin Boulevard include "ghosting" right-angle and "lane shopping" crashes.

Figure 26 - Example Road Diet[11]



[10] FHWA. (2017). Proven Safety Countermeasures. https://safety.fhwa.dot.gov/provencountermeasures/.
[11] Created with Streetmix - Interview-Report-TSTC-StreetMix-v7-20-16.pdf (njtpa.org)

Main Street, Millstone Borough, Yorktown Road to Beardslee Road

Pedestrian Connectivity/Infrastructure

Recommendations along the Main Street corridor include implementing Leading Pedestrian Intervals (LPI), which stop traffic to give pedestrians a head start, at crossings where no conflicting left-turn phasing exists to improve pedestrian safety. Other improvements include installing wayfinding to increase the visibility of historic sites within the neighborhood, implementing curb extensions at the County Route 650 intersection, and shoring up eroded pavement drop-off areas with a Safety Edge treatment, which shapes the edge of the pavement to 30 degrees instead of a vertical drop-off. Research has shown this is the optimal angle to allow drivers to re-enter the roadway safely,

The Borough is working to close the gap in sidewalk coverage between Amwell Road (CR 514) and North River Street through the redevelopment and acquisition of a vacant residential property located on the east side of Main Street. The Borough commented that State intervention, based on financial needs expressed by the current Millstone borough Mayor, would likely be needed to obtain property, or an easement, to construct this new sidewalk along the east side of Main Street to connect existing sidewalk to the north and south. Currently, pedestrians either walk along the shoulder on Main Street, or utilize the sidewalks along North River Street and Amwell Road (CR 514) to make this connection.

Figure 27 - Pedestrian Infrastructure Improvement Recommendations, Millstone, NJ

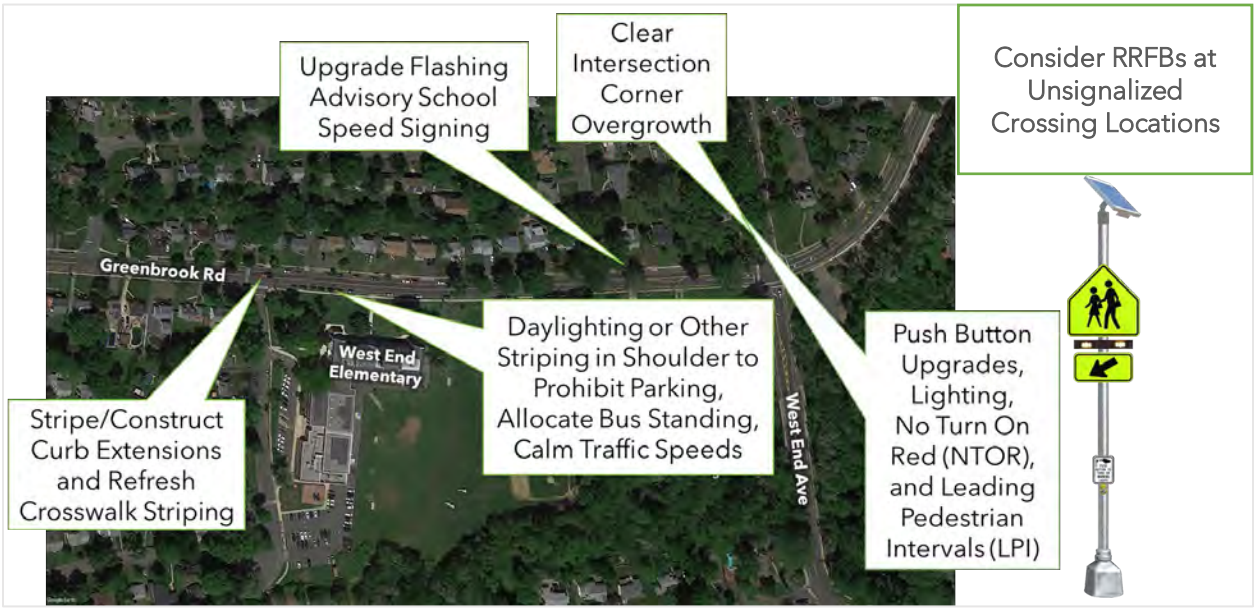
Greenbrook Road, North Plainfield Borough, Harrington Avenue to Somerset Street

Pedestrian Infrastructure

The Greenbrook Road corridor is near parks, schools, and other land uses that have a relatively high share of active transportation trips. Thus, recommendations focused on improving pedestrian infrastructure including implementing LPIs at the Grove Street and West End Avenue intersections and daylighting treatments at unsignalized intersections, which would restrict parking, to preserve sight lines between through traffic and those crossing Greenbrook Road.

Demonstration projects, that are short-term, low-cost, temporary roadway projects used to pilot potential long-term design solutions to improve walking/bicycling and public spaces, are also proposed to promote the awareness of those walking to school and installing rectangular rapid-flashing beacons (RRFBs) at locations with significant pedestrian volumes.

Figure 28 - Pedestrian Infrastructure Improvement Recommendations, North Plainfield, NJ



Curb Extensions/Daylighting

Evidence of daylighting, which increases pedestrian/driver visibility around an intersection, has faded, and vehicles were observed parking in these prohibited areas during the RSA. Continued enforcement and maintenance are needed to make this crash countermeasure effective. Curb extensions can be an effective way to entirely preclude vehicles from parking on top of intersections and provide pedestrians with a space to better establish their presence at a roadway crossing location.

As designs of these improvements on Somerset Street move forward, additional treatments that could be implemented alongside curb extensions should be considered, including ergonomic crosswalks (used to better reflect the more curved paths of pedestrian circulation at an intersection) and infiltration planters (used to act as a receptacle to filter stormwater runoff).

Figure 29 - Aerial Perspective of Daylighting and Curb Extensions, Millburn, NJ

Figure 30 - Street-level Perspective of Daylighting and Curb Extensions, Millburn, NJ[12]

[12] NJDOT / FHWA. (2017). Millburn Township,: 2017 CS. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=XjRPx5YhwoU.

Conclusion

To address these potential concerns, discussions were held with the RSA team and County Engineering to develop a list of tasks to improve traffic safety on the corridors, which are codified in the Implementation Matrix (Chapter VI, Subsection A) in this report. To assist the responsible jurisdictions (whether municipal, County, or separate agency) to schedule and prioritize these recommendations, the matrix organizes improvements by anticipated timeline and cost magnitude. The study team recommends sharing these proposed improvements with all responsible jurisdictions.

While the recommendations in the Implementation Matrix are centered around the engineering (and associated maintenance) of roadway features, changes to hard infrastructure alone will fall shy of the benefit that would be seen by implementing the 5E's of highway safety[13]:

- Engineering: highway design, traffic, maintenance, operations, and planning professionals;
- Enforcement: state and local law enforcement agencies;
- Education: communication professionals, educators, and citizen advocacy groups;
- Emergency response: first responders, paramedics, fire, and rescue; and,
- Equity: prioritizing the safety of vulnerable roadway users.

This approach recognizes a shared responsibility across numerous professions to reduce crashes and improve overall corridor safety. RideWise (the County's TMA), law enforcement, and EMS are encouraged to continue their efforts in educating drivers, enforcing laws, improving the response times to severe crash incidents, and reaching underserved communities with these safety strategies.

[13] Adapted from FHWA, https://safety.fhwa.dot.gov/hsip/resources/fhwasa1102/flyr3_in.cfm

Road Safety Audits

Finderne Avenue / Main Street (CR 533)
Bridgewater Township

Franklin Boulevard (CR 617)
Franklin Township

Main Street (CR 533)
Millstone Borough

Greenbrook Road (CR 636)
North Plainfield Borough

Somerset Street (CR 626)
Raritan Borough

Somerset County Roadway Safety Study
Subregional Project

ROAD SAFETY AUDIT REPORT

MAIN STREET/FINDERNE AVENUE IN BRIDGEWATER TOWNSHIP

NJTPA

SOMERSET COUNTY

November 2021

Executive Summary

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has conducted the Somerset County Roadway Corridor Safety Analysis study. The study will advance the County's efforts to address pedestrian, bicycle, and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. This RSA report has been prepared for the Main Street/Finderne Avenue corridor (Somerset County Route 533, CR 533), from 100' north of the South Avenue intersection at MP 29.60 to the Chimney Rock Road intersection at MP 30.60, in Bridgewater Township. According to the compiled crash data, 201 crashes occurred on the 1-mile segment analysis area during the 3-year vehicle and 5-year pedestrian crash analysis period.

The pre-audit meeting was held at 10:00 AM via video conferencing on Tuesday, April 6th, 2021, on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. Participants were paired off with each other to walk halves of the corridor. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as safety measures to address potential safety concerns. On the following day (Wednesday, April 7th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit to discuss each potential safety concern, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study.

Discussions from the RSA process helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report, which serves as a record of items discussed during the post-audit meeting. Major findings (or recommendations) from these discussions included:

- Turning prohibitions on Finderne Avenue to address sight distance issues and cut-through traffic;
- Ideas (striping/signing/signalization) to facilitate ped/bike crossings at north/south of bridge location;
- Signal modifications at Main Street & Finderne Avenue to improve ped/bike/left turn safety;
- Cycling route connections/speed humps within the neighborhood SE of Main Street & Finderne Avenue;
- Diverter island at Main Street & Fulton Avenue to preclude left turn movements within queued area;
- New sidewalks on north side of Main Street to define pedestrian walking areas; and,
- LPIs/countdown signals at Main Street intersections with Ramsey/Pearl Streets and Chimney Rock Road.

A key recommendation from this RSA was to investigate the feasibility of a road diet on Main Street from Finderne Avenue to Chimney Rock Road, possibly extending eastward beyond the RSA study area. Redesigning Main Street to accommodate a road diet would result in significant safety and mobility improvements for those who use the corridor via active modes of travel. Since Main Street has an AADT of 21,000, thorough intersection-by-intersection capacity analysis, design, administrative approval, and public vetting is needed to ensure the efficacy and success of the road diet. Main Street has a cartway width of 46' to 48' and could potentially accommodate one 11' travel lane, 5' bike lane, and 2' buffer in each direction of travel with a center two-way left turn lane.

Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process and are meant to be a record of ideas discussed. As these recommendations are considered for advancement into either a Concept Development (CD) study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices.

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I. Introduction

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has conducted the Somerset County Roadway Corridor Safety Analysis study. The study will advance the County's efforts to address pedestrian/bicycle and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. One of the locations that have been selected is the Main Street/Finderne Avenue corridor (Somerset County Route 533, CR 533), from 100' north of the South Avenue intersection at MP 29.60 to the Chimney Rock Road intersection at MP 30.60, in Bridgewater Township.

The purpose of this RSA Report is to detail the site selection, road/multimodal inventory, land use investigation, crash data collection, crash analysis efforts, post/pre-audit meetings, and in-field RSA investigation conducted for the Main Street/Finderne Avenue corridor. Flowing from this RSA is a list of potential recommendations proposed to improve safety. These recommendations were based on the investigated crash data, as well as recommendations made during the in-field RSA and post-audit meeting. This introduction serves to provide background on selection of the investigated corridor and covers the logistics of the RSA process that was performed. This RSA report also seeks to provide sample figures of improvements and crash countermeasures that could be considered as the County, or municipality, seeks to move forward on its Concept Development (CD) and/or Local Safety Program grant (or other funding) application. Please note, in applying these ideas to the corridor, design of such improvements, conceptual or otherwise, is the responsibility of the designated jurisdiction as is standard RSA practice.

A. Site Selection

Selection of the Main Street/Finderne Avenue corridor was based on a rigorous process which started with a list of top crash segments for the County from NJTPA's Network Screening Lists (NSL)[1] and used supporting collision data, equity data, recommendations from prior studies, and public/stakeholder input to develop a shortlist of top crash segments. Segments with recently constructed safety improvements or locations undergoing study/design were identified through discussions with County Engineering and removed from this shortlist to target segments not currently being considered. The remaining locations were further prioritized and ranked with more recent crash severity and frequency data (old crash data from NSL superseded with more recent crash data from Safety Voyager), traffic volume data from NJTPA's regional travel demand model (NJRTM-E), and environmental justice data from NJTPA.

Input on these top crash locations was obtained through the Public Involvement Plan for this project, which included gathering information from the public via a virtual mapping tool and project email address and gathering information from a Technical Advisory Committee (TAC)[2] via an initial virtual meeting conducted in August 2020. Based upon public and stakeholder input, the following (5) segment locations (including the segment being studied in this report) were selected to be advanced for RSA review:

1. Finderne Avenue/Main Street (CR 533) in Bridgewater Township, MP 29.60-30.60
2. Franklin Boulevard (CR 617) in Franklin Township, MP 0.00-1.00
3. Somerset Street (CR 626) in Raritan Borough, MP 0.00-0.67
4. Greenbrook Road (CR 636) in North Plainfield Borough, MP 0.70-1.97
5. Main Street (CR 533) in Millstone Borough, MP 25.14-25.87

[1] https://www.njtpa.org/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/Local-Safety-Program/Network-Screening-Lists.aspx Top crash segment lists on this webpage are based upon a programmatic analysis of statewide locations utilizing 2014-2018 crash data.
[2] Stakeholders on the TAC include NJDOT, NJ TRANSIT, FHWA, RideWise, AARP, Vorhees Transportation Center, and various County advocates.

Main Street/Finderne Avenue was selected based on the relatively high crash frequency on this corridor and recommendations from previous studies. This corridor was identified within the *WalkBikeHike* (2019) and *Regional Center Pedestrian, Bicycle and Greenways Systems Connection Plan* (2009) studies as in need of improved facilities for pedestrian and cyclist connectivity, with bike lanes proposed on Main Street in both studies. **Table 1** shows the portions of the selected segment, or intersections, that qualified as one of the top 100 crash locations[1] in the County based on either overall crash data for the years of 2016 through 2018 or pedestrian/cyclist crash data for the years of 2014 through 2018 as listed on the NSLs.

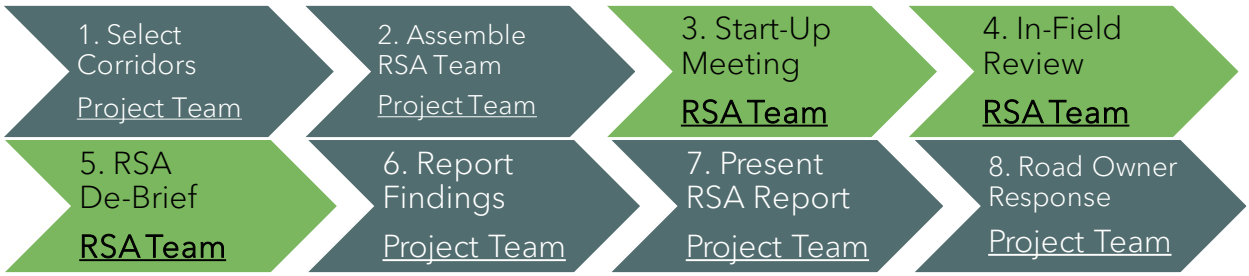
Table 1 – Main Street/Finderne Avenue NJTPA 2019 NSL Rankings for Somerset County

Corridor Segments Overall Crash Data	Corridor Segments Ped/Bike Crash Data	Intersection Locations Overall Crash Data	Intersection Locations Ped/Bike Crash Data
#4 MP 29.27-30.27	#18 MP 29.6-30.6	Main/Finderne (#1)	Main/Finderne (#11)
		Chimney Rock Road (#77)	Bridgewater Avenue (#72-tie)
			Fulton Avenue (#72-tie)

B. What is a Road Safety Audit (RSA)?

An RSA is a formal safety performance examination of an existing or future road or intersection by a multi-disciplinary audit team, including public works, law enforcement, emergency medical services, engineering, and planning. It qualitatively estimates and reports on existing and potential road safety issues and identifies opportunities for improvements in safety for all road users. RSAs can be used on any size project, from minor maintenance to mega-projects, and can be conducted on facilities with a history of crashes or during the design phase of a new roadway or planned upgrade. RSAs consider all road users, account for human factors and road user capabilities, are documented in a formal report, and require a formal response from the road owner. **Figure 1** shows the steps employed by the County to complete the RSA, as informed by the Federal Highway Administration's (FHWA's) RSA process. The steps that traditionally consist of an in-field review of conditions with an RSA team are highlighted in green in Figure 1.

Figure 1 – Eight-Step RSA Process as Adopted from FHWA RSA Process



The RSA program is conducted to identify potential countermeasures for roadway segments demonstrating a history of, or potential for, a high frequency of crashes or an identifiable pattern of crash types. Recommendations range from low-cost, quick-turnaround safety improvements to more complex strategies, which are all codified in this report within an Implementation Matrix, categorizing improvements by timeline, cost, and jurisdiction. Implementation of improvement strategies identified through this process may be eligible for Local Federal Aid Safety Funds. Because the RSA process is adaptable to local needs and conditions, recommendations can be implemented incrementally as time and resources permit. Please note that the RSA process does not include the design or thorough evaluation of improvements that are being considered, conceptual or otherwise. Following the eighth and final step of the RSA process, it will be incumbent for the designated jurisdiction to start to evaluate and design the potential improvements presented herein, as is standard RSA practice.

At the request of NJTPA, RSAs originally planned for Fall 2020 were postponed until Spring 2021, due to the COVID-19 pandemic. In addition to postponement, the County took additional steps to safely conduct this RSA. Both the start-up meeting and RSA de-brief (steps #3 and #5 shown in **Figure 1**), which are traditionally conducted in-person, were conducted virtually via video conferencing to reduce the exposure and potential risk of disease transmission. Furthermore, the essential step of in-field review was conducted in a socially distanced manner with participants paired off in groups spaced more than six feet apart from each other. All in-field RSA participants were masked for the entire duration of the field visit to further reduce the risk of disease transmission. Through this process, the post-audit "de-brief" meeting benefitted from being held virtually after the day on which the in-field review was conducted.

Some notable benefits produced by a virtual post-audit included:

- Additional time for participants to share photos, videos, and scans of their observations;
- Available screensharing for quick review and consensus of RSA observations;
- An involved discussion of the observations and recommendations was well established by the wide audience of stakeholders;
- Additional time for participants to process their observations and organize their thoughts for discussion.

II. Corridor Description & Analysis

A. *Study Location*

The study area consists of one mile of CR 533 (Main Street/Finderne Avenue) extending from 100' north of the South Avenue intersection at MP 29.60 to the Chimney Rock Road intersection at MP 30.60 (Figure 2). A straight-line diagram of the corridor is provided in **Appendix A**. The identified segment is in the Township of Bridgewater in the County of Somerset. The corridor includes varied land use types, including industrial/manufacturing, single-family detached residential, multi-family attached residential, and commercial neighborhood business. Industrial uses are located at both ends of the corridor with buildings used for storage, medical research and development, warehousing/distributing, and auto repair. The residential neighborhood southeast of the Main Street & Finderne Avenue intersection is comprised of multi-family and single-family housing, while other housing along the corridor is generally comprised of single-family. Land adjacent to the intersection of Main Street & Finderne Avenue intersection, and land on the north side of Main Street, is zoned as a neighborhood business, which includes strip malls, medical offices, and gas stations, but can also include single-family and multi-family buildings repurposed for commercial use. Institutional uses on the corridor include the Finderne Fire Department, which has signal pre-emption for fire calls, and the Somerset County Transportation Office, where the County's transit vehicles are parked and maintained.

Figure 2 – Study Area Location Map

Major vehicle and pedestrian trip generators on the study corridor include the Bridgewater Corporate Campus and the Somerset County Educational Services Commission on the southern end of the corridor, the retail center on the northeast quadrant of the Main Street & Finderne Avenue intersection, and the County Public Works Facility/ Transportation Office on the eastern end of the corridor.

B. *Roadway and Intersection Characteristics*

Main Street is classified by NJDOT (the New Jersey Department of Transportation) as an urban minor arterial and has a posted speed of 40 mph, which transitions to 45 mph beyond either end of the corridor. The corridor consists of two 11'-12' travel lanes (two in each direction) undivided. No parking or shoulders are provided on the corridor. There are three signalized and 13 unsignalized intersections along the corridor. The cartway for the corridor widens at the intersection of Main Street & Finderne Avenue to provide northbound and westbound left-turn bays.

C. *Existing Bicycle/Pedestrian Accommodations*

Sidewalks are provided on the south side of Main Street and the west side of Finderne Avenue and provide sidewalk connectivity from one end of the corridor to the other. Sidewalks are provided on both sides of the road between Second Street and Pearl Street. Worn paths have been noted to exist where gaps in the sidewalk are present on one side of the road. Sidewalks consist of concrete and bituminous asphalt paving. Curb cuts for commercial driveway locations, particularly those closer to the intersection of Main Street & Finderne Avenue are generally wide, which can increase pedestrian exposure and risk to vehicular crashes.

D. *Traffic Volumes*

According to traffic data available from NJDOT[3] count station #091816, Average Annual Daily Traffic (AADT) on Main Street is approximately 20,000 vehicles per day. Supporting count data from NJDOT is provided in **Appendix B**. NJTPA's NJRTM-E travel demand model provides an AADT estimate of 21,000 based upon 2020 pre-COVID-19 conditions.

E. *Transit Service*

There are no transit services on this section of Main Street/Finderne Avenue. The NJ TRANSIT Bridgewater Train Station with Raritan Valley Line service is approximately one mile east of the study corridor. The County, however, operates several SCOOT bus lines on the corridor, which include (as of Winter 2020):

- SCOOT PEAK (Hillsborough to Bedminster) – Also known as Bus Routes 858, 859, and 860, these bus lines serve the same route, for the most part, traveling through Manville, Somerville, and Bridgewater. The bus stop at Main Street & Finderne Avenue is served during weekday AM and PM peak periods with varying headways of approximately one hour. These routes travel on Finderne Avenue south of the intersection and Main Street west of the intersection.
- CAT-1R (Branchburg to New Brunswick) – This bus line has listed stops in Branchburg (Raritan Valley Community College), Somerville, Bound Brook, South Bound Brook, Franklin, and New Brunswick. Buses also travel on Main Street through the study area with no listed stops; however, the bus schedule for this line says that route deviation is available. Weekday service is provided during AM, afternoon, and PM peak times with headways of one to two hours.
- R1 (Bound Brook to Somerville) – This bus line serves Bound Brook, Bridgewater, Hillsborough, Manville, and Somerville. The bus stop at Main Street & Finderne Avenue is served during late morning and afternoon periods with varying headways of approximately two hours. This route travels on Finderne Avenue south of the intersection and Main Street east of the intersection.
- R2 (Bound Brook to Somerville) – This bus line serves destinations similar to R1. The bus stop at Main Street & Finderne Avenue is served during the morning and early afternoon periods with varying headways of approximately one to two hours. This route travels on Finderne Avenue south of the intersection and Main Street east of the intersection.
- Inbound (far side) and outbound (near side) bus stops are signed on Main Street 200' east of Finderne Avenue, which are able to serve CAT-1R, R1, and R2 bus services. Since SCOOT PEAK turns west of the intersection, buses might be boarding and alighting at unsigned locations.

F. *Community Profile*

Population and income characteristics from the American Community Survey (ACS), an update to the 2010 Census performed by the U.S. Census Bureau, were used to identify Environmental Justice populations. The latest ACS for this study area is a five-year estimate from 2015 through 2019 for County Census Tract 510. A summary of the demographics is listed in

Table 2. Study area demographics show that there are fewer zero vehicle households and fewer people commuting to work via transit than the County average despite the available nearby transit options.

[3] AADT data obtained from https://www.njtms.org/map/.

Table 2 – Main Street/Finderne Avenue RSA Study Area Demographics

Characteristic		Census Tract Average	County Average
Below Poverty Level[4]		4.0%	5.1%
Race/ Ethnicity[5]	White	66.0%	66.3%
	Asian American	20.3%	17.7%
	Black or African American	5.6%	9.7%
	American Indian/Alaskan	0.0%	0.3%
	Other	8.1%	6.0%
	Hispanic/Latino (Ethnicity)	21.0%	14.7%
Limited English Proficiency (LEP)[6]		7.5%	4.4%
Use Public Transportation[7]		2.5%	5.3%
Zero Vehicle Households[7]		1.6%	2.1%

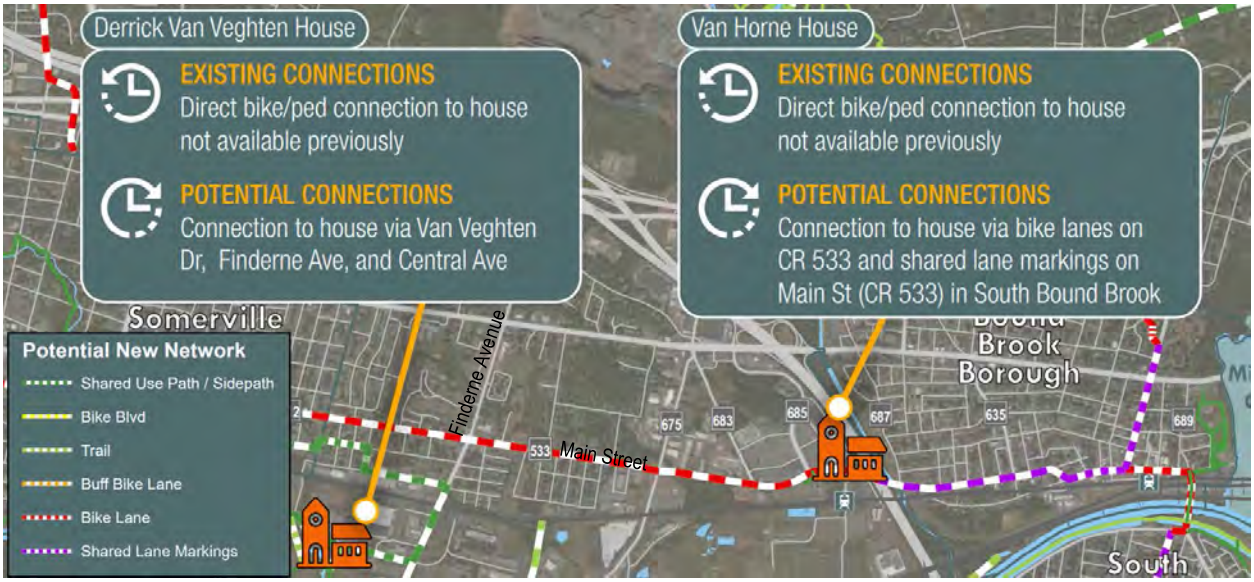
G. Redevelopment

This corridor was identified within the *WalkBikeHike* (2019) and *Regional Center Pedestrian, Bicycle and Greenways Systems Connection Plan* (2009) planning studies as in need of improved facilities for pedestrian and cyclist connectivity, with bike lanes proposed on Main Street in both studies. A shared-use sidewalk had also been proposed to run along Finderne Avenue in the *WalkBikeHike* study. In addition to improving access to nearby historical sites, as shown in **Figure 3**, these mobility improvements could spur local redevelopment and economic growth. Redevelopment applications on the study segment have mainly consisted of minor subdivisions, lot line adjustments, changes to uses, gas station upgrades, and changes to parking. The following significant applications are currently pending approval and/or construction according to data delivered by County Planning:

- *K9 Resorts Day Care & Luxury Hotel Bridgewater* – Currently under construction at 600 East Main Street just to the west of the Main Street & Finderne Avenue intersection is a one-story building that will be a daycare/hotel for pets.
- *7-11* – Multiple applications have been submitted to construct a 3,000 SF convenience store at both the southwest and northeast corners of the intersection of Main Street & Finderne Avenue.
- *Eden Wood Realty* – A formal site application has been submitted to redevelop the former Weyerhauser property located south of Main Street, located along Radel Avenue, as a 220-unit one- and two-bedroom non-age-restricted apartment complex with various amenities. Existing parking and paving would make way for a new building and a 464-space parking lot.

[4] 2019: ACS 5-Year Estimates Data Profiles, TableID S1701, "Poverty Status in the Last 12 Months"
[5] 2019: ACS 5-Year Estimates Data Profiles, TableID DP05, "ACS Demographic and Housing Estimates"
[6] 2019: ACS 5-Year Estimates Data Profiles, TableID S1602, "Limited English-Speaking Households"
[7] 2019: ACS 5-Year Estimates Data Profiles, TableID S0802, "Means of Transportation to Work by Selected Characteristics"

Figure 3 – Multimodal Recommendations from WalkBikeHike Study



H. *Proposed Improvements from Previous Studies*

Previously proposed transportation improvements on or near the Main Street/Finderne Avenue corridor include the following from the *WalkBikeHike* (2019) and *Regional Center Pedestrian, Bicycle and Greenways Systems Connection Plan* (2009) studies:

- Implement a road diet along Main Street to provide adequate shoulders/width for bike lanes;
- Complete sidewalk connectivity on Main Street corridor;
- Add new crosswalk striping and refresh existing crosswalk striping, where applicable;
- Standardize curb ramps to appropriate grades, widths, and tactile surface with truncated domes;
- Reconstruct railroad/highway grade crossing at Main Street & Chimney Rock Road intersection
- Decrease 40 mph speed limit; and,
- Construct shared-use sidewalk on Finderne Avenue from Central Avenue southward.

Pertinent excerpts from these studies, and associated improvements, are provided in **Appendix C**.

I. *Public Meeting #1*

On Thursday, November 12, 2020, the first public meeting for this project was held via Zoom conferencing to obtain feedback for the five locations selected for RSA review. Email blasts, advertisements, and social media notifications were provided in advance of the meeting. This meeting introduced the project team, who provided an overview of the study, stating the purpose and need. Statistics of crashes on County jurisdiction roadways were reviewed, showing a steady increase of crashes over the past ten years. The Consultant Team explained the RSA process and the technical analysis used in the development of the shortlist of corridors. Due to the pandemic, virtual, or socially distanced options for conducting the RSA process were discussed.

The Consultant Team then explained the study's Public Involvement Plan (PIP), an iterative process designed to collect feedback and input. The opportunities to collaborate on the PIP were virtual, including public meetings and comments received through the project website and project email. The Consultant Team then explained the process of selecting the five corridors. The selection process was based on County roadway screenings for top crash locations, and evaluation of equity data. Moreover, a virtual mapping tool was employed to gather Public/stakeholder input obtained from the initial virtual mapping outreach conducted in Fall 2020. The virtual mapping tool allowed users to pin comments on areas of concern on a virtual map.

As part of the PIP, the public meeting included an opportunity to hear from attendees on comments specific to each corridor selected for RSA review by splitting the overall meeting into breakout rooms. The group in the Main Street/Finderne Avenue breakout room discussed various concerns and suggestions regarding pedestrian and cyclist safety and connectivity. Comments received were as follows:

- Traffic volumes are very high, particularly truck traffic. There was a suggestion to limit truck travel.
- The pedestrian environment at the Main Street & Finderne Avenue intersection feels unsafe. Pedestrians do not have enough crossing time.
- Speeding, evasive maneuvers, and running through red lights are driving behaviors that have been observed on Main Street from Chimney Rock Road to Adamsville Road. Enforcement seems to be lacking at this location.
- The intersection of Ramsey Street & Main Street often has near misses for turning vehicles for residents turning out of the neighborhood to the south. A participant was in a crash at this location.
- There is not enough lighting to see pedestrians and cyclists. Cyclists tend to share the right lane with vehicles on the corridor.
- Turning on to Main Street from driveways and side streets is a common issue because there are not enough gaps in traffic to safely turn, particularly near shopping areas. The County Public Works Facility is another challenging location to turn out onto Main Street.
- Suggestion to explore connecting the County Public Works Facility to Polhemus Lane where there is signalized control.
- Ponding on the corridor has been observed during periods of heavy rain. Participants suggested that it would be worthwhile to explore green infrastructure to address ponding.
- The lack of street trees on Finderne Avenue was raised by community members.
- There is an expectation that the baseball stadium to the east of the study area will generate more traffic in the future. The stadium lights may also create visibility challenges for drivers.
- The corridor has a lot of driveway curb cuts to which participants requested better driveway and access management.
- The Bridgewater train station attracts significant commuter traffic, and people use surrounding streets (e.g., Pearl Street) as cut-throughs. Speeding is common on these streets. The neighborhood southeast of the intersection of Main Street & Finderne Avenue sees a particularly high amount of cut-through traffic despite signing that would discourage such activity.
- People often pass school buses and emergency vehicles, even when their lights are flashing.

J. Technical Advisory Committee Meeting #2

Following an August 2020 meeting with the TAC (Technical Advisory Committee) to select the five corridor locations for further review, the County held the second TAC meeting in February 2021. This meeting consisted of a 45-minute presentation followed by interactive breakout rooms with discussion centered around the corridors selected for further review. The presentation included the following topics: project background, summary of selected corridors, description of potential safety measures, and a discussion of demonstration projects.

A breakout room was dedicated solely to the discussion of potential safety measures to be implemented in response to potential issues on the Main Street/Finderne Avenue corridor in Bridgewater Township. Participants were asked to review the ten safety measures discussed during the presentation. They were then asked to rate the effectiveness and ease of implementation of each safety measure based on their own opinion/perspective. Participants were also asked to identify specific areas within each corridor that were areas of concern.

Table 3 contains a summary of those ratings and discussions for each safety measure, along with additional comments made toward each safety measure.

Table 3 – Perceived Effectiveness and Ease of Implementation for Various Safety Measures

Safety Measure	Effectiveness (1 = not effective; 10 = very effective)	Ease of Implementation (1 = easy; 10 = hard)
Lighting	10	8
Curb Extensions/Bus Bulbs	4	8
Daylighting[8] and Crosswalks	10	0
Walkways for Sidewalk Gaps	10	8
Dedicated Turn Lanes	8	8
Leading Pedestrian Intervals (LPI)	10	1
High Visibility Crosswalks	10	1
Turn Restrictions	8	5
Bike Lanes	8	2
Lane Width Reduction/Road Diet	10	2

Breakout Group Additional Comments:

- Lighting:
  - Crashes occurring at night; may be matters of spacing of lighting overhead.
  - Pedestrian scale lighting important, but also important near residential areas.
- Curb Extensions/ Bus Bulbs:
  - Curb extension and bus bulb design to be investigated at Finderne Avenue & Main Street intersection.
  - Existing curb radii at Finderne Avenue & Main Street should be enlarged to accommodate trucks.
- Daylighting and Crosswalks:
  - Crosswalks should be lit at all crossing locations, keep utilities in mind.
- Walkways for Sidewalk Gaps:
  - Access management for sidewalks is a top priority. One possibility could be potential easements that take away driveways and/or consolidate driveways.
  - There were maintenance concerns with regards to sidewalks.
- Dedicated Turn Lanes:
  - The Chimney Rock Road intersection has left turn conflict issues, substantiating a need for eastbound and westbound dedicated left turn lanes. There was no push back when considering center turn lanes as part of a road diet on Main Street. However, capacity reduction was a concern.
  - Could also consider a roundabout at Chimney Rock Road & Main Street, depending on available right-of-way.
- Leading Pedestrian Intervals (LPI):
  - LPIs at Finderne Avenue & Main Street intersection could reduce pedestrian crashes, should phasing permit implementation. There needs to be a public education component if LPIs are implemented.
- High Visibility Crosswalks:
  - There are no high visibility crosswalks; this is a good opportunity for placemaking.
  - Such crosswalks would be effective at Finderne Avenue & Main Street, especially for pedestrians.

[8] Daylighting is the act of restricting parked or standing vehicles through striping or curbing to improve sight distance at crosswalks or intersections.

- Bike Lanes:
  - If there is room on the road for bike lanes, participants would be supportive.
  - Biking and truck traffic between Bound Brook, Manville, and Somerville Boroughs is a concern.

- Lane Width Reduction/Road Diet:
  - Lane width reductions were suggested as a possible demonstration project. Participants agreed that lane width reductions are appropriate in this area to reduce speeds.
- Additional Comments:
  - Other safety improvements included backplates at signals to improve nighttime visibility.
  - The park on the northwest corner of Finderne Avenue & Main Street used for public art installations.

K. Technical Advisory Committee Meeting #3

Following the RSAs in Spring 2021 and authoring of the draft RSA reports and accompanying recommendations soon thereafter, the County held the third and final TAC meeting for the study in August 2021. The virtual meeting format consisted of a 45-minute presentation with interactive breakout rooms. The presentation included the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into five breakout rooms, one for each of the selected corridors. Each breakout room discussed a specific set of recommendations pertaining to that corridor. Participants were asked to provide their general reactions to the proposed recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed. The topic of discussion for the breakout room specific to the Bridgewater Township RSA was the road diet proposed for the Main Street corridor, between Finderne Avenue and Chimney Rock Road. Provided below is participant feedback received on this specific proposed safety measure:

- The County would need to consider improving capacity on parallel routes (such as Route 28) before reducing the capacity of Main Street with a road diet.
- There are fewer pedestrians on the Main Street corridor itself, but the road diet may encourage additional traffic. Significant bike activity has been observed along the corridor, but most commonly near Harry Ally Park.
- Fast moving traffic is common on Main Street, which can make turning in and out of various businesses and cross streets difficult. Left turns leave drivers feel particularly exposed, which may be helped with the addition of a two-way left-turn lane.
- A benefit of the road diet is that drivers would be crossing fewer lanes to take turns out of the cross streets. Main Street west of Finderne Avenue has less volume, so there would be even more of a potential for a road diet. Main Street east of Finderne Avenue needs further study.
- Signage and green paint were recommended by a participant for proposed bike infrastructure to align with NACTO recommendations. The participant also requested if bike lanes could be made wider to accommodate buffers. It should be noted that existing bike lanes striped by the County do not include green paint.

Additional comments were received during the breakout room (not pertaining to the road diet):

- The most notable crash cluster for the study area involves vehicles turning left on Finderne Avenue northbound on toward Somerville. The safety recommendation is to provide protected left-turn phasing through signal redesign. The project team needs to confirm that this works.
- It was requested that crossing times at the Main Street & Finderne Avenue intersection should be extended for pedestrians. New pedestrian signal heads and ADA curb ramps at this intersection

(and along the corridor) would further improve pedestrian safety. A full reconstruction of the intersection may be required.
- There is overgrowth on the bridge heading to Manville.

L. Public Meeting #2

On Wednesday, September 29, 2021, from 7:00 PM to 9:00 PM, Somerset County held the second and final public meeting for the study. The virtual meeting format consisted of a 45-minute presentation touching on the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into seven breakout rooms, one for each of the selected corridors, one for county-wide general transportation comments and suggestions, and one for Spanish speakers. Much like at the third TAC meeting, participants were asked to provide their general reactions to the proposed road diet recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed. Provided below is participant feedback received on this specific proposed safety measure:

- Additional development of this concept is needed to show how the road diet would tie into existing intersections (such as Manville Boulevard), as well as turning lanes at signals.
- While the road diet proposed is a dramatic change, addition/widening of sidewalks along Main Street are welcome changes.
- There is a concern of traffic volumes being constrained with the reduction of travel lanes.
- Road diet could be extended east of Chimney Rock Road.
- Vehicle speeding was a concern on this portion of Main Street, which the road diet could address.
- Existing Main Street intersections are not safe for pedestrian crossings, which could be improved with a road diet.

Additional comments were received during the breakout room (not pertaining to the road diet):

- Speed bumps proposed for side streets are welcome to slow traffic speeds.
- Main Street tractor trailer truck limitations should be implemented.
- Trucks should be restricted to local deliveries. There is a large amount of truck traffic in the area.
- Amazon delivery trucks cause congestion when they park in the middle of the road for a drop off instead of pulling into driveways.
- The Ramsey Street traffic signal at the Finderne Fire Station should be on side street recall to act as a traffic calming measure.
- There is a concern of e-bike speeds and safety on roadways with conflicting vehicles and pedestrians.
- The northwest corner of Main Street & Finderne Avenue and the southwest corner of Main Street & Chimney Rock Road (County-owned properties) can be viewed as landscaping opportunities, rather than the existing river stone or chain link fence that is in place.

III. Crash Findings

The analysis used to support the RSA process incorporated a data-driven effort to utilize reportable crash information resulting in any combination of fatality, injury, or property damage. The datasets used for this analysis are sourced from local law enforcement responses to reported vehicular crashes. These on-scene responses subsequently translate to official law enforcement generated reports. Concurrently, the individual reports are aggregated to render serviceable crash information. To be entirely inclusive in obtaining complete crash information, the data was accumulated using three (3) distinct resources: NJDOT's Safety Voyager[9], New Jersey Division of Highway Traffic Safety (NJDHTS) Numetrics[10], and the NJDOT raw crash tables[11]. The three sources were compared against each of the other obtained sources to allow for duplicate records to be discarded and all distinct records to be included with the goal of producing a complete and comprehensive representation of the crashes within the extent of the corridor.

The datasets were obtained for a three-year analysis period from the beginning of January 2016 through the end of December 2018 for vehicle-vehicle crash incidents and from the beginning of January 2014 through the end of December 2018 for vehicle-pedestrian/cyclist crash incidents. According to the compiled crash data, 201 crashes occurred on the 1-mile segment analysis area during the analysis period. The following evaluation breaks down crash attributes as a percentage of the total crashes to achieve a stronger understanding of the localized trends compared to County roadway systems crash performance. Furthermore, all crashes along this segment were mapped onto collision diagrams, which can be found in **Appendix D**, providing a quick spatial overview of crash clustering patterns.

In reviewing the crash data, the following crash clusters and prevailing safety issues were noted:

- Two fatal fixed object collisions have occurred on this corridor, which may suggest unsafe speeds
- At the Central Avenue intersection
    - Multiple right-angle collisions, mostly resulting in injury
    - Opposite direction sideswipe crashes on the EB approach perhaps due to lack of striping
- At the Bridgewater Avenue/Second Street intersection
    - Multiple right-angle collisions, mostly resulting in injury
    - Cyclist collisions, indicating difficulty for non-motorized modes in crossing Finderne Avenue
- At the Main Street & Finderne Avenue intersection
    - Numerous left-turn collisions between NB left-turn and SB through traffic, the vast majority are injury
    - Left-turn crashes on other approaches to intersection perhaps due to permissive lefts
    - Five crashes between NB and SB traffic and crossing pedestrians and cyclists
    - Clustering of rear end crashes on NB, SB, and WB approaches to intersection
- At the Fulton Avenue/Shopping Center driveway intersection
    - Multiple left-turn and right-angle collisions suggesting short gaps being taken by drivers
    - Crashes involving non-motorized modes (pedestrian/cyclist) showing crossings at this location
- Lack of turning bays at Ramsey Street/Pearl Street resulting in rear end/left-turn collisions
- At the Chimney Rock Road intersection
    - Numerous collisions between EB left-turn and WB through vehicles
    - EB and WB rear end collisions between through/left-turn traffic due to lack of turn bays

[9] https://www.njvoyager.org/App/
[10] https://www.numetric.com/
[11] https://www.state.nj.us/transportation/refdata/accident/rawdata01-current.shtm

A. Temporal Trends

Sorting the crashes by month reveals that the study segment experienced the highest crashes in October, 11.0%. During the five (5) months of February, March, August, September, and October, the corridor experienced higher crash frequencies than the County-wide average. Notably, February experienced more frequent crashes than the County-wide average (7.0% vs. 9.5%), as shown in yellow in **Figure 4**.

Figure 5 highlights the crash percent distributions by day of the week. Results indicate statistical significance on Fridays compared to the County-wide averages, 23.0% vs. 15.8%, as shown in yellow in **Figure 5**. However, no recurring events or incidents were noted during the study timeframe. The period between 1:00 PM and 7:00 PM reveals higher crash frequencies than the County-wide average, as shown in **Figure 6.** More specifically, the 2:00 PM hour has crash frequencies higher than the County-wide average, 9.5% local distribution versus a 6.4% County-wide distribution, as shown in yellow in **Figure 6**. The highest frequency of crashes occurred during the 05:00 PM hour, 11.0%, shown in yellow in **Figure 6**.

Figure 4 – Vehicular Crashes, Percent Distribution by Month

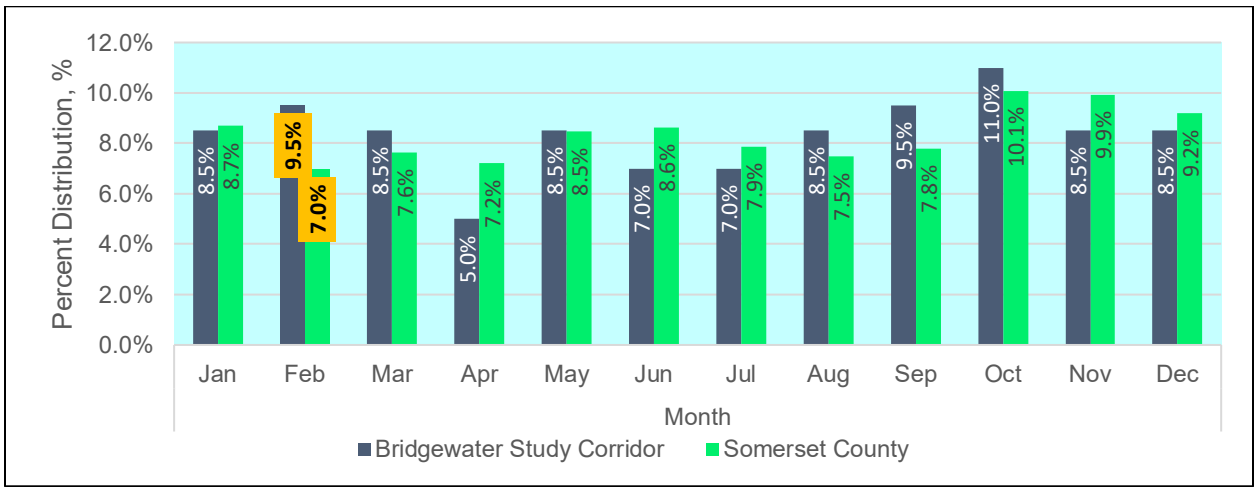


Figure 5 – Vehicular Crashes, Percent Distribution by Day

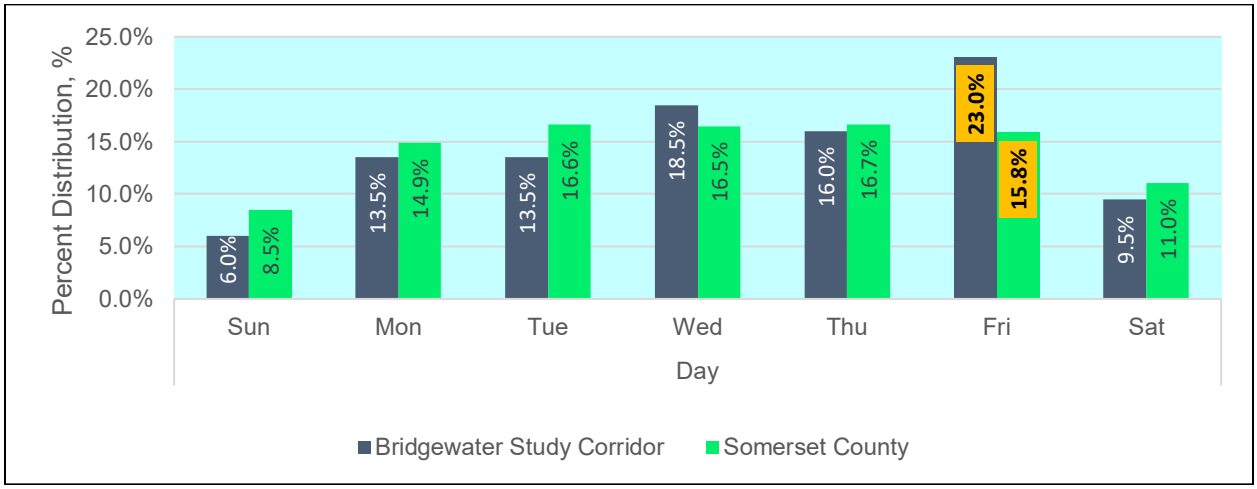
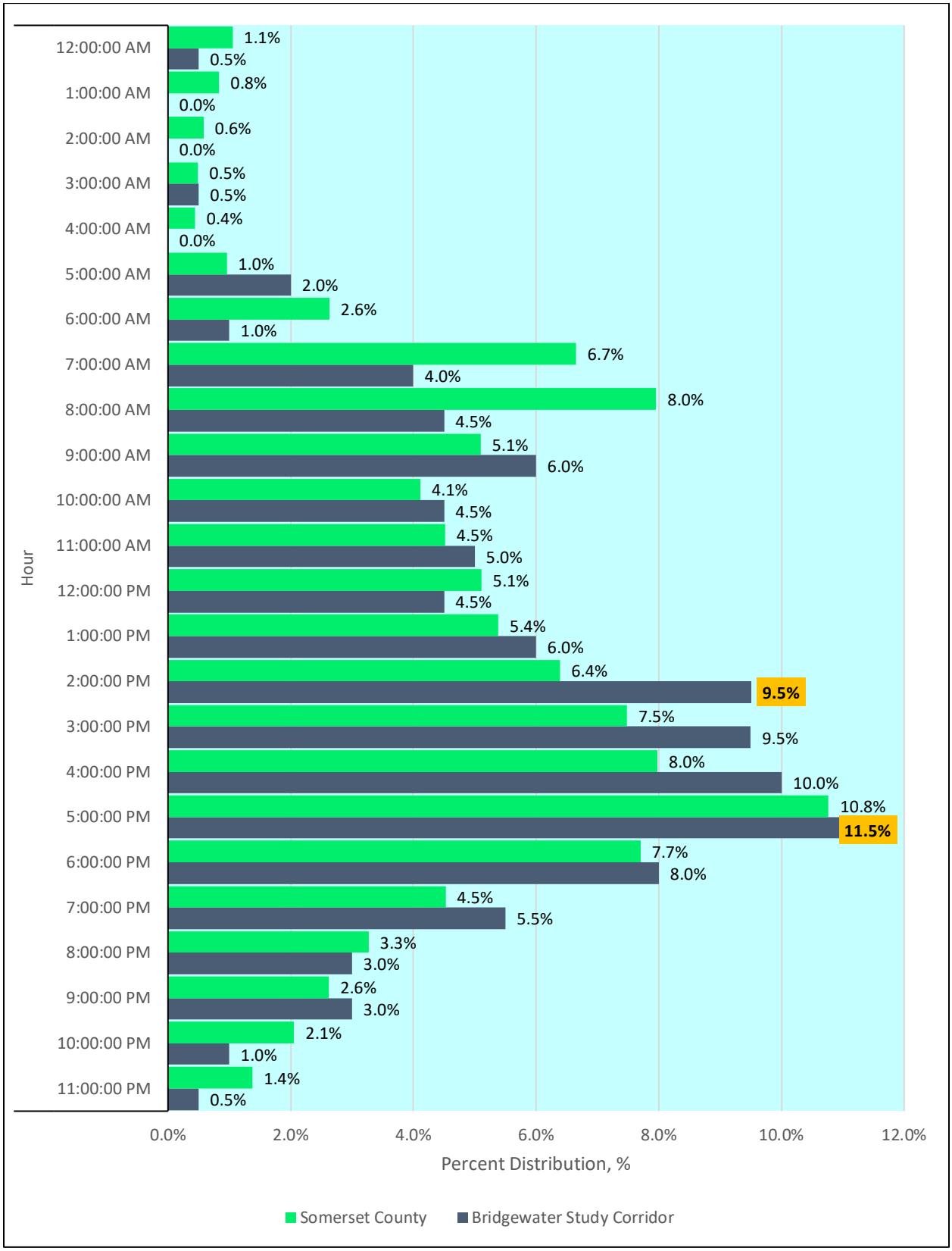


Figure 6 – Vehicular Crashes, Percent Distribution by Hour



B. Collision Types

Sixty-three rear end and 37 left-turn crashes make up approximately half of the crash distribution on the study segment, which are common types of crashes on roadways with two lanes in each direction without turning bays for left-turn movements. When compared to County-wide averages, left-turn, sideswipe, cyclist, and pedestrian collisions were found to be overrepresented, with left-turn crashes almost three times more frequent (18.5% vs. 6.5%, as shown in yellow in **Figure 7**). The frequency of cyclist and pedestrian crashes is approximately three and two times, respectively, the average share seen on the County roadway system. A breakdown of crash frequency by type is provided in **Table** 4.

Figure 7 – Vehicular Crashes, Percent Distribution by Crash Type

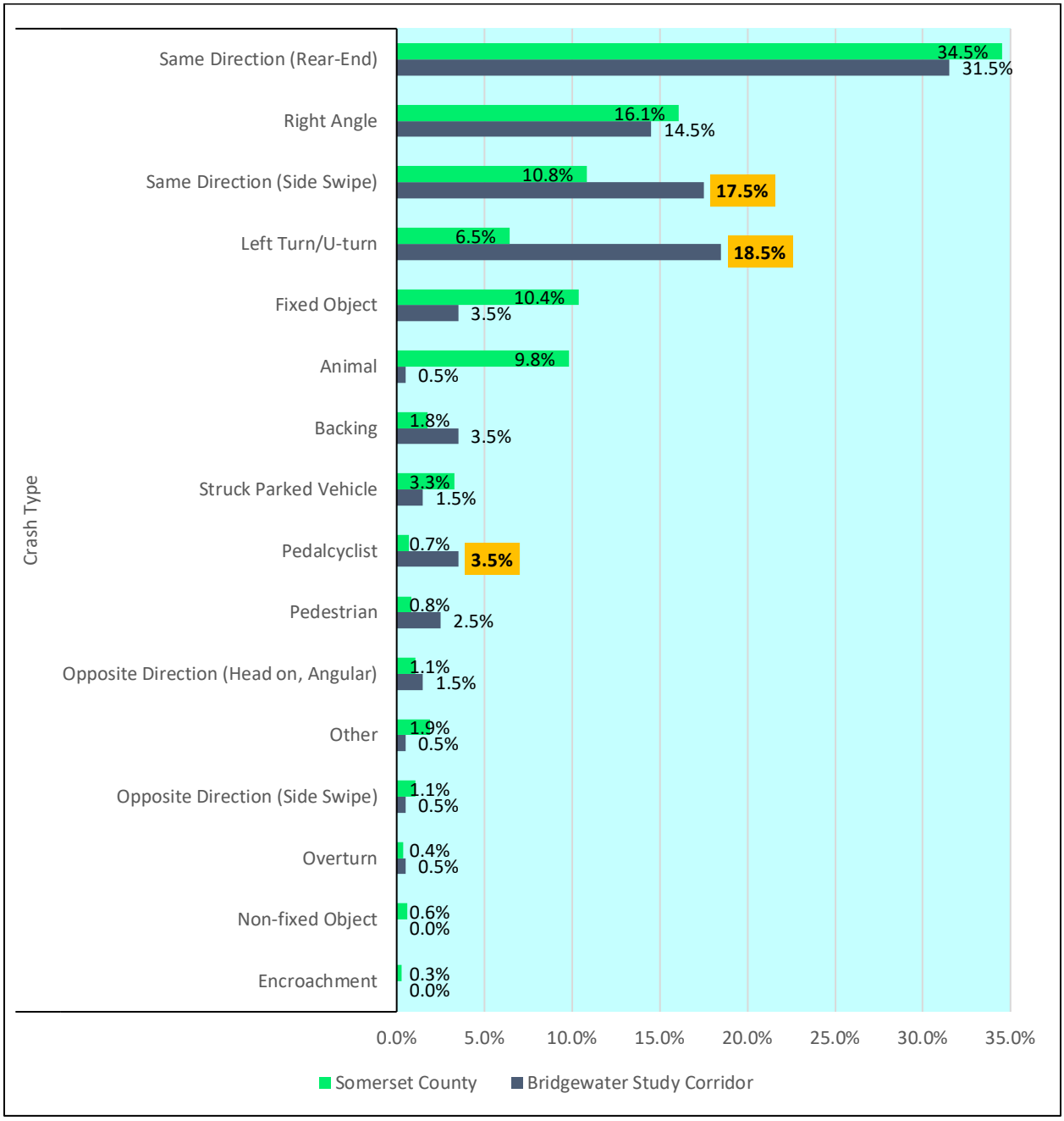


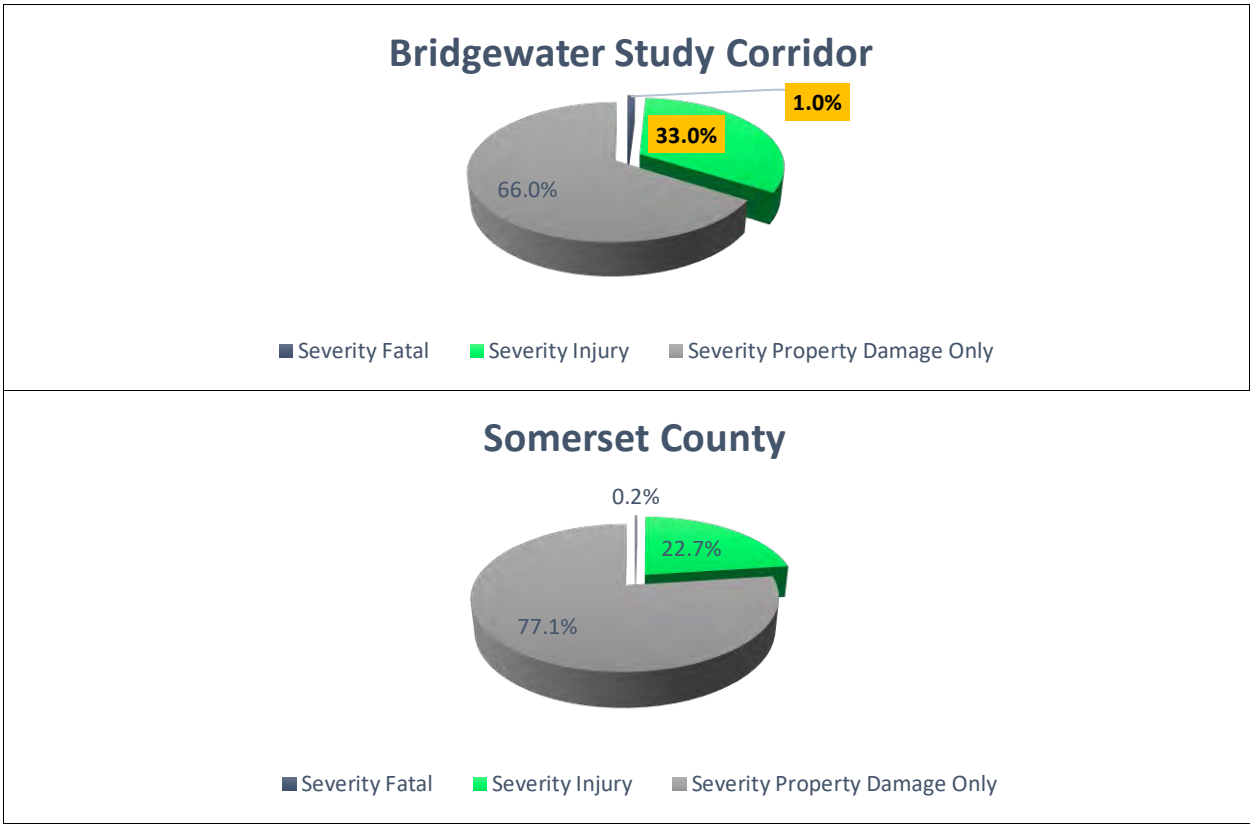
Table 4 – Vehicular Crashes by Type

Crash Type	Total
Animal	1
Backing	7
Fixed Object	7
Left Turn/U-turn	37
Opposite Direction (Head on, Angular)	3
Opposite Direction (Side Swipe)	1
Other	1
Overturn	1
Pedalcyclist	7
Pedestrian	5
Right Angle	30
Same Direction (Rear-End)	63
Same Direction (Side Swipe)	35
Struck Parked Vehicle	3
Total	201

C. *Crash Severity*

The study segment revealed noticeable injury and fatal crash severity trends greater than County-wide averages, which may be evidence of speeding on the corridor. Data shows an increase in crashes resulting in injury when compared to the County, 33.0% versus 22.7%. Crashes that involved fatalities were approximately five times as prevalent on the study segment than at the County level, occurring 1.0% of the time analyzed compared to the 0.2% County-wide average for fatality severities (highlighted in yellow in **Figure 8**).

Figure 8 – Vehicular Crashes, Percent Distribution by Severity



D. Roadway Surface & Light Condition

Most crashes occurred during dry driving conditions (14.5%), and the percentage of wet conditions was lower than the County wide average (16.1%) (highlighted in yellow in **Figure 9**).

Figure 9 – Vehicular Crashes, Percent Distribution by Surface Condition

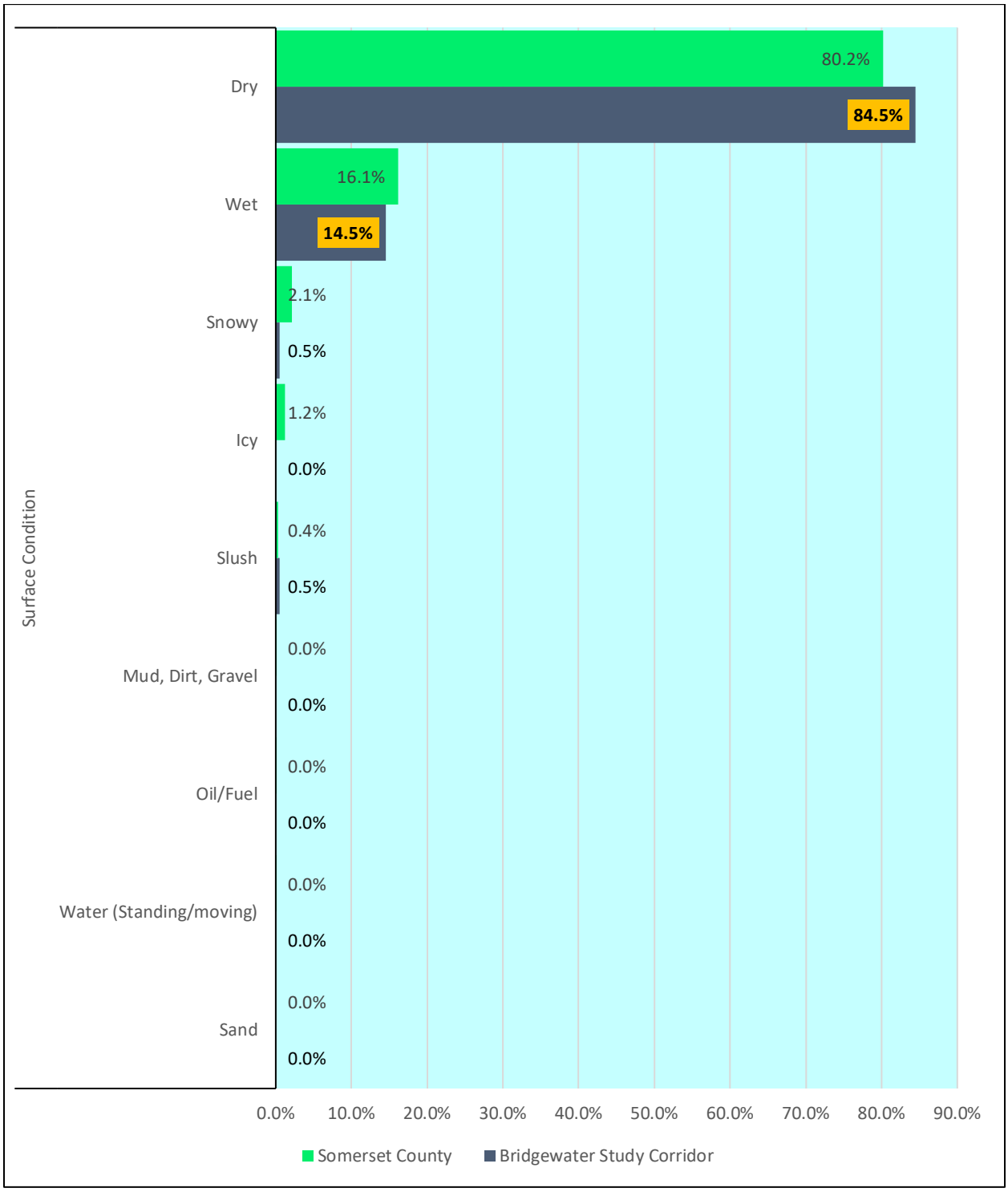
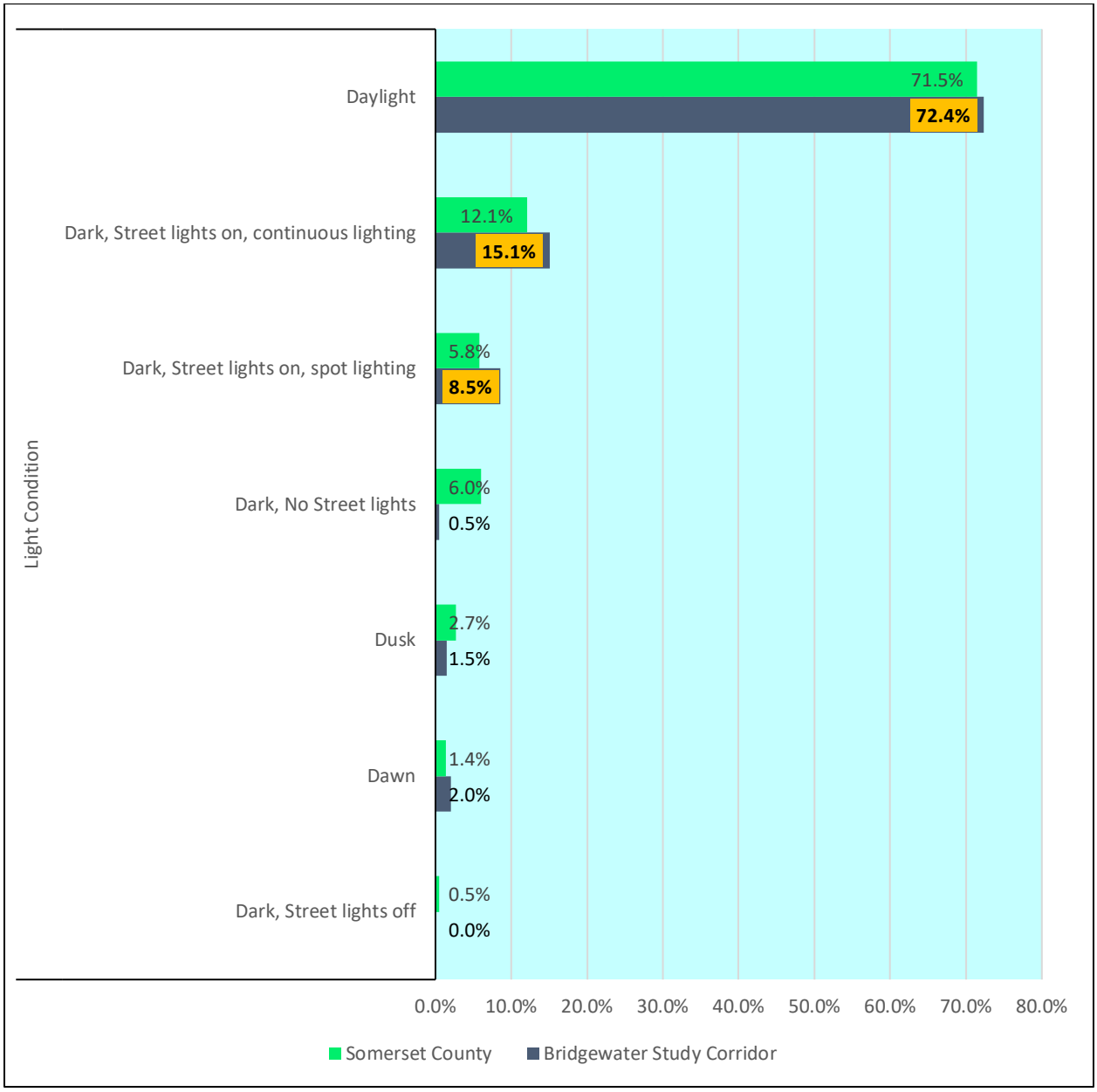


Figure 10 – Vehicular Crashes, Percent Distribution by Light Condition



Approximately 72.4% of crashes on the study segment occurred during daylight conditions. This is slightly higher than the County-wide average of 71.5%. Crashes occurring during Dark, Street lights on, spot lighting, and Dark, Street lights on, continuous lighting are noticeably higher than the County average due to the developed nature of the study area. (Highlighted in yellow in **Figure** 10)

E. Location

A histogram of crash history, grouped in 0.02-mile segments, is provided in **Figure 11** and indicated that the signalized intersection of Main Street (CR 533/612) & Finderne Avenue (CR 533/633) experiences the highest occurrence of crashes on study segment corridor as shown highlighted in yellow in **Figure 11.** This intersection is also ranked as having the highest crash frequency and severity in the County on NJTPA's intersection NSL for Somerset County. The crashes at this location account for 36.5% of all study area crashes. Other crash hotspots include intersections with Chimney Rock Road (17 crashes), Fulton Street (12 crashes),

and Second Street (11 crashes), highlighted in yellow in **Figure 11.** A three-dimensional representation of this crash histogram for the 2016 through 2020 timeframe, imposed onto a map of the study area, is shown on **Figure 12.**

Figure 11 – Vehicular Crash Totals by Milepost

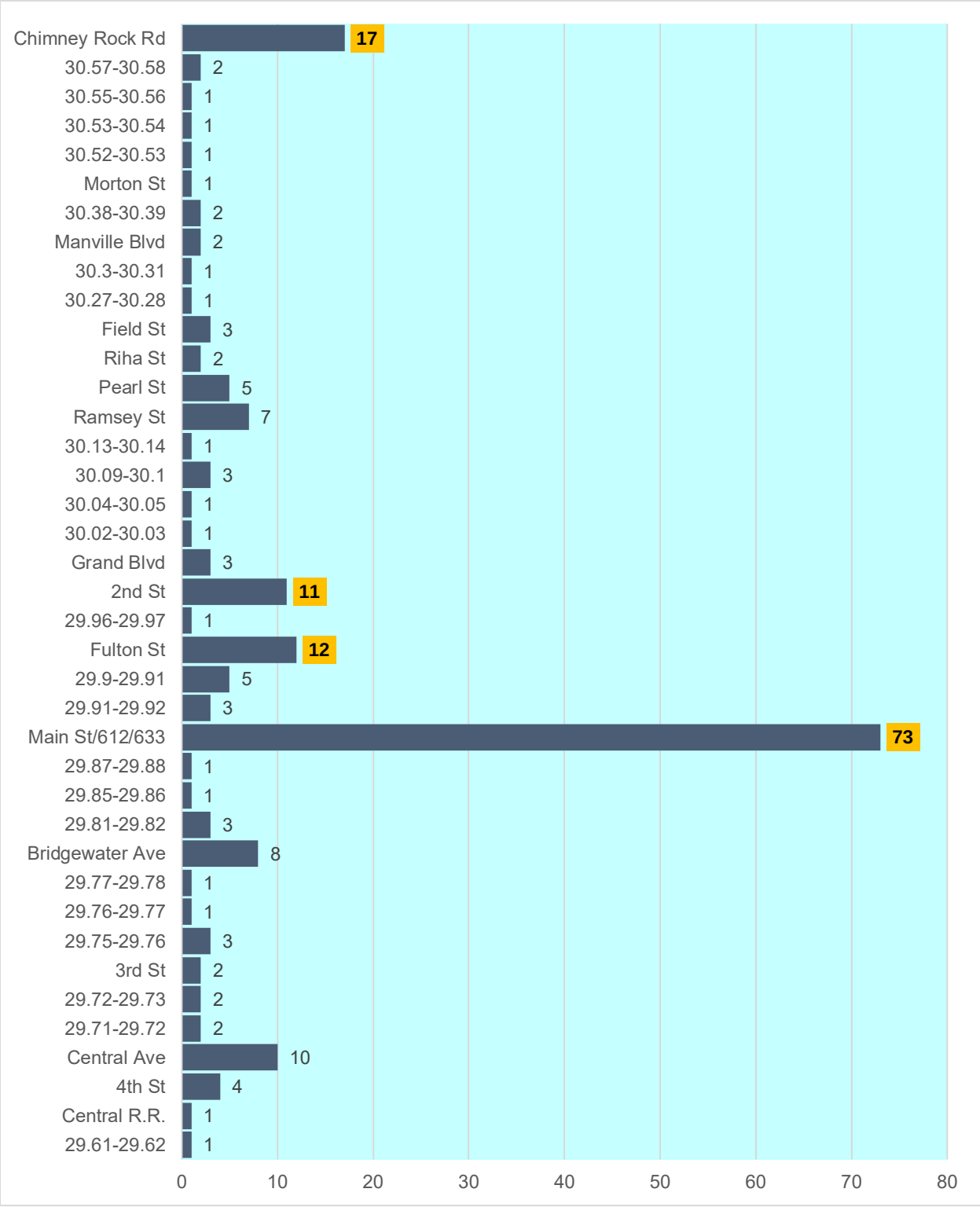


Figure 12 – Visual Estimation of 5-Year (2016 - 2020) Crash History Obtained from Safety Voyager [12]

F. Age of Those Involved

Person(s) involved data was also accessible from the NJDOT crash tables. Using this data for more investigation into age involved, a normal distribution table was developed in Figure 13 . Amongst the 201 crashes reported, the average person(s) involved age was determined to be approximately 42 years old. Approximately 68% of person(s) involved were between the ages of 23 and 61 years old.

[12] Five-year crash totals shown on histogram from Safety Voyager may vary from crash report data obtained from municipality's police department and do not include crashes recorded as occurring on side street approaches, which are included in the record of analyzed collected crash data.

Figure 13 – Histogram of Age(s) Involved

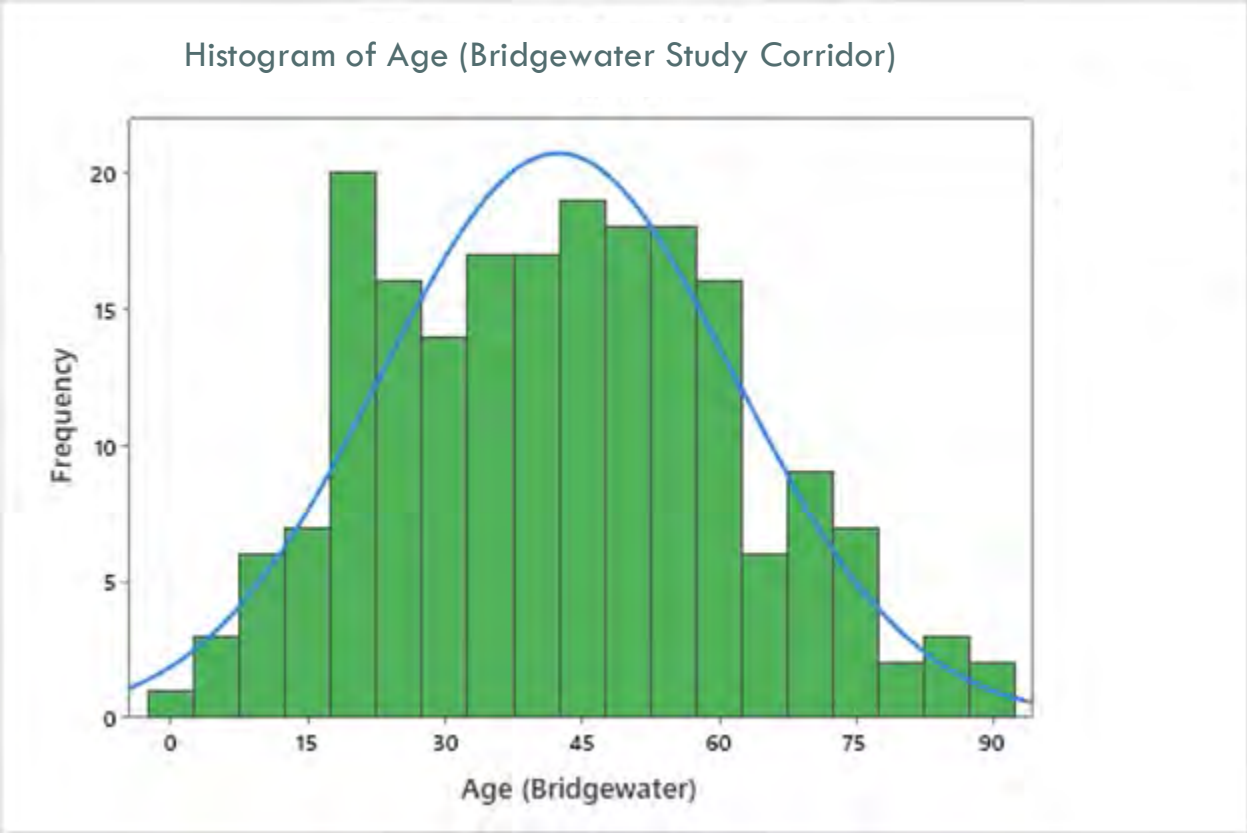


Table 5 lists the percent distribution of the age(s) of those involved in vehicular crashes, grouped by ten years of age. Data from the table indicates that crashes with drivers between the ages of 46 and 85 years old occur with a higher frequency on the study corridor than the County average for the same age groups. Ages 46-55 account for the highest frequency of those involved at 19.0%, marginally higher than the County average of 16.7%.

Table 5 – Age(s) Involved, percent distribution

Age Involved	Bridgewater Township Study Corridor	Somerset County
Under 16	6.0%	7.9%
16-25	16.5%	23.1%
26-35	17.5%	16.9%
36-45	15.5%	15.8%
46-55	19.0%	16.7%
56-65	12.5%	11.3%
66-75	8.5%	5.1%
76-85	3.0%	2.5%
86-95	1.5%	0.7%
96-105	0.0%	0.0%
106-116	0.0%	0.0%

IV. RSA Logistics

All data previously discussed in this report was used to inform the RSA conducted on this corridor. All participants involved in this RSA, whether in attendance during the pre-audit meeting, in-field review, and/or post-audit meeting, are listed in **Appendix E**. The pre-audit meeting was held at 10:00 AM via video conferencing on Tuesday, April 6th, 2021, on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The PowerPoint used to facilitate this discussion is provided in **Appendix F**.

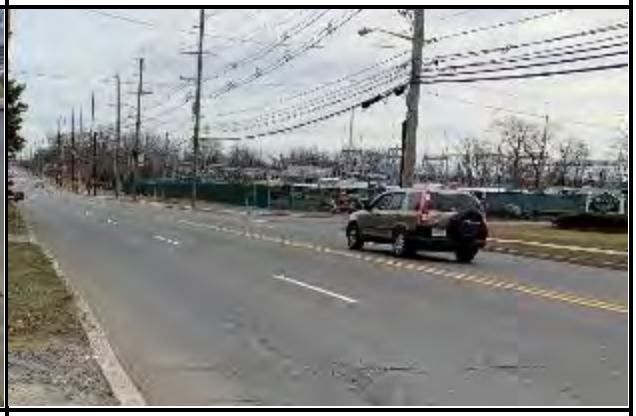
The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. The audit team met in a social-distanced manner, while masked, in the parking lot of the Finderne Fire Station for a flipbook RSA orientation presentation to reiterate the ground rules of the audit. Upon conclusion of the orientation, participants were paired off with each other to walk halves of the corridor, seeking to pair each Somerset County Roadway Safety Study project team member (whether with the County or Consultant team) with each of the stakeholders. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as potential safety measures to address potential safety concerns. After walking the corridor, the RSA team met back in the parking lot to share overall thoughts on the corridor and fill out a survey on corridor identity, crossings, pedestrian-vehicle interactions, sidewalk and roadway conditions, and streetscape amenities, the answers of which were compiled and are averaged in **Appendix G**. Based on survey results, the corridor had the following perceived concerns:

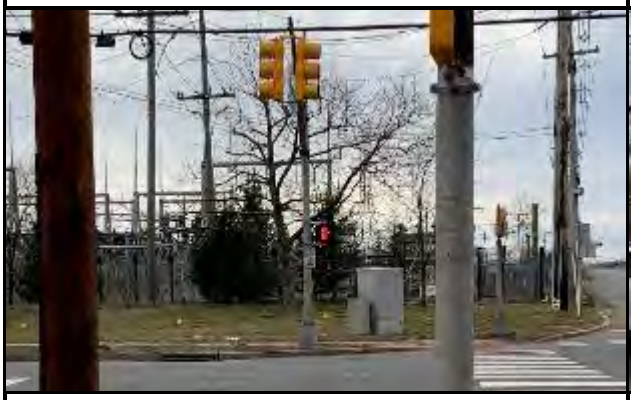
- Lack of personal safety;
- Missing pedestrian signals;
- Faded or missing crosswalks;
- Missing curb ramps;
- Overall pedestrian-vehicle interactions, particularly due to vehicle speed and noise level;
- Cycling on the sidewalk;
- Narrow or non-existent buffer areas between sidewalks and travel lanes;
- Sidewalk nearing end of service life;
- Lack of benches, places to rest, trash cans, etc.
- Lack of lighting for pedestrians; and,
- Lack of street trees and landscaping.

On the following day (Wednesday, April 7th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit, some of which are presented in the following section, to discuss each observation, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study. This discussion helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report. The PowerPoint used to facilitate this discussion is provided in **Appendix H**.

V. Identified Issues & Observations

This section depicts a sampling of overall issues identified during the RSA. Please refer to the Implementation Matrix in the following section of the report for a comprehensive list of identified corridor issues.

Pedestrian & Cyclist	Pedestrian & Cyclist
	
Sidewalk on north side of Main Street often interrupted by wide asphalt curb cuts and parked/standing vehicles	Cycling on Finderne Avenue restricted to narrow multiuse path over bridge with minimal delineation from travel lanes
	
Sidewalks along Main Street lacking maintenance and are discontinuous	Vehicular-centric corridor could benefit from road diet, dedicating cyclist space while slowing vehicles
	
History of pedestrian crashes at Finderne Avenue & Main Street involving vehicles making permissive turns	Heavily-used cycling route lacking updated wayfinding to connect local communities

Operations & Visibility	Maintenance
	
Close calls between NB permissive left and SB through at Finderne Avenue & Main Street intersection	Ponding at side street crossings compromises pedestrian crossing areas, location also lacks curb ramps
	
Older signals at Chimney Rock Road and Ramsey Street lacking countdown pedestrian heads and proper clearance times	Transit stops on Main Street lack amenities, dedicated pull off areas, and updated bus route information
	
Right turn channelized operations at Finderne Avenue & Main Street are signalized, but conflicting crosswalks lack pedestrian heads	Non-compliant curb ramps filled with debris, crosswalk is missing, sight lines hard to establish due to bridge crest

VI. Findings & Recommendations

This section summarizes the site-specific and corridor-wide safety issues, potential strategies, and recommendations to improve safety. An Implementation Matrix is provided that summarizes the recommendations and provides qualitative information on time frame, cost, and responsible jurisdiction. Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process and are meant to be a record of ideas discussed. Symbols used in the Implementation Matrix are defined in **Table 6** as follows:

Table 6 – Legend of Symbols in Implementation Matrix

Symbol	Meaning	Definition
$	Low cost	Could be accomplished through maintenance
$$	Medium cost	May require some engineering or design and funding may be readily available
$$$	High cost	Longer term; may require full engineering, ROW acquisition, and new funding
🕐	Short term	Could be accomplished within 1 year
🕐🕐	Medium term	Could be accomplished in 1 to 3 years; may require some engineering
🕐🕐🕐	Long term	Could be accomplished in 3 years or more; may require full engineering

A. Implementation Matrix

The following represents the specific findings and recommendations made by the interdisciplinary RSA team, which were subsequently evaluated via discussions with County Engineering on Wednesday, June 2nd, 2021, and Thursday, June 3rd, 2021. As these recommendations are considered for advancement into either a CD study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices. Corridor-wide recommendations, requiring a review of all important applicable infrastructure along the corridor pertinent to these specific topics, are provided in **Table 7**. Further defined recommendations at specific intersection or mid-block locations are provided in **Table 8**. **Recommendations bolded within the Implementation Matrix below feature one of the twenty Proven Safety Countermeasures from the FHWA[13], which means that the recommendation is shown to have a significant safety benefit as proven by substantial traffic safety research.** These recommendations are tied to Crash Modification Factors (CMFs) showing a substantial reduction in crashes, as well as research documented on the Crash Modification Factor Clearinghouse website that has a high-quality ranking. This high ranking indicates the quality of study design, sample size, statistical methodology, statistical significance, etc. for the research backing each CMF. Mapping of proposed location-specific recommendations is provided in **Appendix I**.

Table 7 – Corridor-Wide Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
Bicycle				
1	Evaluate and replace existing drainage grates with bicycle-safe drainage grates.	$	🕐🕐	County
Education				
2	Consider sidewalk, crosswalk, multimodal education campaign and code enforcement	$	🕐🕐	Municipality

[13] https://safety.fhwa.dot.gov/provencountermeasures/

No.	Recommendation	Cost	Time Frame	Jurisdiction
Maintenance				
3	**Restripe faded crosswalks**	$	🕐	Municipality/ County
4	Perform maintenance to clear overgrowth and debris on sidewalks and curb ramps.	$	🕐	Municipality
Operations				
5	**Perform a speed study along the corridor to determine the specific segments experiencing excessive speeds to recommend targeted traffic calming strategies.**	$$	🕐🕐	County
6	Evaluate intersection sight distances at unsignalized intersections with minor side streets.	$$	🕐	County
Pedestrian				
7	**Conduct a sidewalk assessment to determine the extent of sidewalk that needs to be replaced, repaired, and constructed.**	$$	🕐🕐	Municipality
8	Perform curb ramp assessment to determine the number of curb ramps that need to be replaced, repaired, and constructed.	$$	🕐🕐	Municipality/ County
Transit				
9	Coordinate with Somerset Transportation Office to provide amenities and information at existing bus stops. Improvements should consider any applicable triggers that could warrant construction of accessible walking routes to existing bus stops.	$	🕐	Municipality/ County
10	Consider branding of bus stop signing of existing bus stop locations with SCOOT, CAT, or RideWise logos to help improve the visibility and usability of transit options. Improvements should consider any applicable triggers that could warrant construction of accessible walking routes to existing bus stops.	$	🕐	County

Table 8 – Location-Specific Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
KEY STUDY RECOMMENDATION – Main Street from Fulton Avenue to Chimney Rock Road				
11	Evaluate the feasibility of a road diet, and construct if feasible. The road diet could include left turn refuges, bike lanes, pullout areas for transit stops, and/or curb extensions with striped parking in between.	$$	🕐🕐🕐	County
Finderne Avenue from Bridgewater Avenue to South Avenue				
12	Evaluate intersection sight distance at side streets and explore ways to mitigate issues.	$$	🕐🕐	Municipality/ County
13	Explore ways to reduce cut-through traffic on side streets, including dead ends and speed tables; perform an origin-destination study; consistently apply NB right turn restrictions at side streets.	$$	🕐🕐	Municipal
South Avenue				
14	**Investigate feasibility of prohibiting EB left turns to mitigate intersection sight distance issue.**	$$	🕐🕐	Municipality/ County
15	Consider constructing overhead flashing "RED SIGNAL AHEAD" sign for NB direction to reduce vehicles speeds over the bridge and reduce rear end crashes that occur on other side of bridge.	$$	🕐🕐	County

No.	Recommendation	Cost	Time Frame	Jurisdiction
16	Consider widening striped asphalt paving to the extent possible for opposing cyclist traffic with appropriate striping and signing at intersection.	$$	🕐🕐	Municipality
Finderne Avenue Bridge over New Jersey Transit Raritan Valley Line				
17	Improve bicycle wayfinding in vicinity of bridge.	$	🕐	County
18	Clear dirt and overgrowth on sidewalk over the bridge.	$	🕐	County
19	Improve delineation of multi-use path over bridge.	$	🕐	County
20	Once the bridge has reached the end of its serviceable life, the concept development study completed for the bridge replacement project should determine the scope of services and bridge width needed to accommodate a full-width multi-use path for comfort of pedestrian and cyclist travel.	$$$	🕐🕐🕐	County/ Railroad
21	Consider upgrading guiderail on bridge.	$$	🕐🕐🕐	County/ Railroad
4th Street				
22	Consider constructing cul-de-sac or restrict turning movements due to sight distance issues due to bridge.	$$	🕐🕐	Municipality
23	**Consider installing temporary traffic diverters to modify access to 4th Street**	$	🕐	Municipality/ County
Central Avenue				
24	Install stop sign and stop bar.	$	🕐	Private
25	Conduct a driveway intersection safety improvement study to determine if Central Avenue (private driveway) cartway or pavement width can be reduced (or multiuse path crossing distance can be reduced via striping and curb extensions) to improve safety for crossing pedestrians and cyclists. Coordination with property owner is needed, especially upon redevelopment.	$$	🕐🕐	County/ Property Owner / Municipality
26	**Investigate feasibility of constructing offset signalized intersection with 4th Street to mitigate sight distance issues and improve pedestrian connectivity.**	$$$	🕐🕐🕐	County/ Municipality
27	**Explore adding curb extensions at corners to decrease vehicle/pedestrian conflict area.**	$	🕐🕐	County
28	Consider widening striped asphalt paving to the extent possible for opposing cyclist traffic with appropriate striping and signing at intersection.	$$$	🕐🕐🕐	Municipality
3rd Street				
29	**Install sidewalk on east side of road with a crosswalk and curb ramps across 3rd Street to provide a pedestrian connection.**	$$	🕐🕐	County/ Municipality
2nd Street				
30	Install timed right turn restriction signage.	$	🕐	Municipality
31	Improve ponding issue along crossing path along crosswalk on east side of Finderne Avenue.	$$	🕐🕐	County
32	Consider utilizing sharrows to connect bicycle route with the existing Township bicycle route west of Finderne Avenue on Bridgewater Avenue.	$	🕐	Municipality

No.	Recommendation	Cost	Time Frame	Jurisdiction
2nd Street/Bridgewater Avenue				
33	Consider exploring crossing options to better connect neighborhoods and bike route on both sides of Finderne Avenue, including hardscaped median refuge area, pedestrian-scale lighting, and RRFB.	$$$	🕐🕐🕐	County/ Municipality
Bridgewater Avenue				
34	Install more wayfinding for bicycle route.	$	🕐	Municipality
35	Consider adding truck restrictions.	$	🕐	Municipality
36	**Consider installing midblock crossings with refuge islands**	$$	🕐🕐	Municipality
Main Street/Finderne Avenue				
37	**Perform an intersection improvement study that looks at volumes, geometry, lane configuration, signal improvements, drainage, roadway improvements, and striping layout.**	$$	🕐🕐	County
38	Consider adjusting signal timing for NB protected left turns to reduce through/left vehicle conflicts, depending on capacity, and longer FDW times.	$	🕐🕐	County
39	Analyze the possibility of NO TURN ON RED signage for all approaches. No Turn on Red (NTOR) restrictions can be enacted at this intersection to mitigate the occurrence of right-hook pedestrian collisions.	$	🕐	County
40	**Investigate feasibility of constructing additional pedestrian signal heads and push buttons for crossing right turn slip ramps.**	$$	🕐🕐	County
41	Consider constructing overhead signals for right turn slip ramps.	$$	🕐🕐	County
42	Consider removing channelized right turns in favor of reducing vehicular-pedestrian conflicts.	$$$	🕐🕐🕐	County
43	Consider reducing striped radii on SE corner while providing truck apron.	$	🕐	County
44	**Upgrade signal heads from 8" to 12" and add backplates.**	$	🕐🕐	County
45	Redevelop County-owned land / electronic message sign on NW corner as a pocket park with mini recreation activities, shaded seating areas, and a focal point for congregating, such as a fountain or flagpole.	$$	🕐🕐	County
46	Perform study to look at the realignment of Finderne Avenue NB at this intersection to connect traffic more directly to the opposite leg.	$$$	🕐🕐🕐	County
47	**Consider implementing LPIs to help pedestrians establish their presence before conflicting vehicles have the right-of-way.**	$	🕐	County
48	**Consider changing left turn signal phasing from protective/permissive (eastbound, northbound, and southbound approaches) to protected-only (westbound approach) to provide further clearance and protection for pedestrians from left-hook collisions.**	$	🕐	County
49	Consider narrowing the channelized right-turn island, vehicular turning radii become less sweeping, right turning movements are slowed, and drivers turning right are forced to stop or yield to	$$$	🕐🕐🕐	County

No.	Recommendation	Cost	Time Frame	Jurisdiction
	approaching traffic while being provided with a better sight line to vehicles to the left.			
50	Consider installing a biofilter for Green Stormwater Infrastructure (GSI) on Northwest Corner of Finderne Avenue & Main Street. Municipality would be responsible for maintenance.	$$$	🕐🕐🕐	Municipality
Fulton Avenue				
51	**Investigate feasibility of installing crosswalk traversing Main Street with RRFB and pedestrian refuge island. Refuge island also acts as diverter island to change Fulton Avenue and shopping center access to RIRO.**	$$	🕐🕐	County/ Municipality
52	**Consider restricting left turns exiting Fulton Avenue**	$	🕐	Municipality
53	**Consider making driveway to shopping center right-in, right-out.**	$$	🕐🕐	County/ Property Owner
54	**Explore ways to reduce cut-through traffic, possibly with a speed table.**	**$**	🕐🕐	Municipality
55	Consider utilizing sharrows to connect bicycle route with the existing Township bicycle route west of Finderne Avenue on Bridgewater Avenue.	**$**	🕐🕐	Municipality
56	**Consider placing a diverter island in the cross-hatched median of Main Street to preclude at-risk turning movements at this intersection.**	$$	🕐🕐	County
57	Consider installing either paved or raised speed humps on Fulton Avenue between Main Street and 2nd Street	$$	🕐	Municipality
Grand Boulevard				
58	Install wayfinding for neighborhood park and add concrete sidewalk space.	$	🕐	Municipality
59	Resurface SB approach to eliminate ponding and erosion.	$	🕐	Municipality
Grand Boulevard to Ramsey Street				
60	**Reconstruct (or construct) sidewalks through driveway aprons to comply with ADA guidelines.**	$$	🕐🕐	Municipality/ Property Owner
Ramsey Street (Driveway)				
61	**Construct concrete sidewalk across driveway apron.**	$	🕐	Municipality/ Property Owner
Ramsey Street/Pearl Street				
62	**Install pedestrian countdown heads on signal.**	$	🕐	County
63	**Improve ponding issue along crosswalk traversing Pearl Street.**	$	🕐🕐	County
64	Consider coordinating with NJ TRANSIT to provide amenities and information at bus stops.	$	🕐	Municipality/ County
65	**Consider implementing LPIs to help pedestrians establish their presence before conflicting vehicles have the right-of-way**	$	🕐	County

No.	Recommendation	Cost	Time Frame	Jurisdiction
Riha Street				
66	Correct drainage issue on north side of Main Street.	$$	🕐🕐	County
67	**Repair pavement and stripe crosswalk across NB approach.**	$	🕐	Municipality/ County
Field Street to Chimney Rock Road/Polhemus Lane				
68	**Evaluate feasibility of installing sidewalk on north side of Main Street.**	$$	🕐🕐	Municipality
Field Street				
69	**Investigate feasibility of installing crosswalk for shopping center if sidewalks are provided on both sides of the roadway**	$$	🕐	County
Driveway between Newberry Street and Chimney Rock Road				
70	**Explore possibility of striping curb extensions to reduce length of vehicle/pedestrian conflict space.**	$	🕐	County
Chimney Rock Road/Polhemus Lane				
71	**Install pedestrian countdown heads on signal.**	$	🕐	County
72	**Construct new curb ramps where missing.**	$$	🕐🕐	County
73	**Consider implementing Lead Pedestrian Intervals (LPIs) to help pedestrians establish their presence before conflicting vehicles have the right-of-way**	$	🕐	County

B. Road Owner Response

An essential final step of the RSA process (see **Figure 1**) is a response from the roadway owner, which provides accountability between the funding body and the participating jurisdiction who acknowledges the findings within the RSA and their planned steps to address concerns. In responding to the RSA's findings, the road owner, in this case the County, must weigh the safety benefits posed by the recommendations within this report against the available resources to implement such improvements to make an informed decision. Because the audit process generated a long and wide-ranging list of improvements, the road owner is expected to implement these recommended improvements as time and funds allow in coordination with other projects and priorities.

Somerset County delivered their response following the finalization of the findings and recommendations table (see **Appendix J**). While the County has overseen this RSA process, by no means should this report be considered as a commitment to address some or all concerns and implement some or all improvements listed within this report. All potential recommendations must be fully studied. It is acknowledged that some recommendations may not be feasible.

C. Potential External Funding Sources

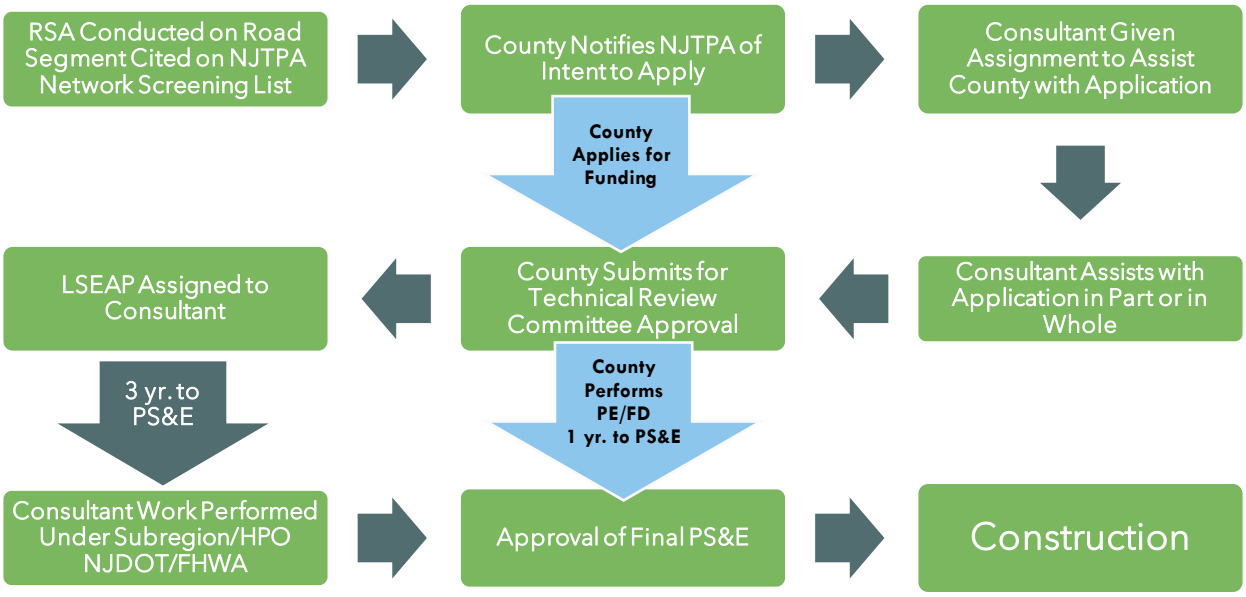
Local Safety Program

The County has previously used RSAs as a "launching pad" for pursuing funding for corridor safety improvement projects, such as Main Street in Manville and Hamilton Street in Franklin, via the Local Safety Program (LSP) offered through NJTPA. Should the County desire to pursue funding of safety improvements on this corridor, the RSA can help to scope the specific safety improvements to be conceptualized and designed for eventual funding and construction. The RSA can also be appended to Section 4 of the funding application[14] submitted to NJTPA as a further substantiation and documentation of the understanding of the existing safety issues and proposed safety measures. This application, which also requests information on scope, location ranking, HSM analyses, estimated costs, and environmental impacts, may be filled out by the

[14] Application for FY 2020 provided here: https://www.njtpa.org/NJTPA/media/Documents/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/FY-2020-LSHRRRP-Application-Rev_191003.doc?ext=.doc

County itself or with assistance from a consultant designated by NJTPA. Pending determination of eligibility by NJTPA's Technical Review Committee, the County can choose to either perform the Preliminary Engineering and Final Design work in-house or obtain assistance for such work through NJTPA's Local Safety Engineering Assistance Program. It should be noted that implementation of improvements through the LSP often takes around five to six years from corridor selection to construction. A simplified flowchart of this process from RSA to construction is shown in **Figure 14**. If faster implementation is desired, County and municipal operating and capital budgets could be relied upon if internal funding is available.

Figure 14 – Project Development Process for Local Safety Program after RSA Completion



Transportation Alternatives Program

The purpose of the Transportation Alternatives Set-Aside Program (TA Set-Aside) federal grant initiative is to support the construction of "non-traditional" surface transportation projects, which typically involves the designing of infrastructure for active modes such as pedestrians, cyclists, and other non-motorized forms of travel. Supported projects can also have elements that bolster the recreational, historic, cultural, or environmental assets of the project area. Grant funding for a given project can range from $150,000 to $1,000,000. The amount of funding is determined on a project-by-project basis with award of prior grant money, and successful execution of prior funded projects, playing a factor. The County would not be prohibited from applying for both Safe Routes to School and TA Set-Aside funding at the same time.

TA Set-Aside lists the following activities that are eligible for funding under its "Pedestrian/Bicycle Facilities" and "Community Improvement" categories:

- New/reconstructed sidewalks/curb ramps;
- Bike lane striping;
- Wide paved shoulders;
- Bike parking and bus racks;
- New or reconstructed off-road trails;
- Bike/pedestrian bridges and underpasses;
- Lighting;
- Historic sidewalk paving;
- Benches;
- Planting containers;
- Decorative walls; and,
- Walkways.

The recommendations within the Implementation Matrix touch on many of the prior elements listed. To best position itself to attain approval for funding, the applying jurisdiction, whether County or municipal, should pass a resolution of support showing the commitment of maintenance of the proposed complete streets elements. Furthermore, the applicant should have data supporting that the implementation of similar

improvements elsewhere within its jurisdiction has resulted in the increase of non-motorized transportation, the stimulus of economic activity, and the improvement in quality of life. A handbook summarizing the process of applying for these funds can be found at NJDOT's Local Aid website[15].

D. Demonstration Project

Demonstration projects are where an example improvement is completed for a selected corridor with foresight to prepare for larger rollouts. The improvement(s) should highlight the concept and illustrate the benefits of RSAs and how RSAs may improve the overall level of safety for the road users. The selected demonstration projects should be of strategic importance, and which is representative of the general safety theme suggested for the selected corridor.

Some of the greatest challenges along Main Street and Finderne Avenue are how drivers use local cross streets to perform cut-through traffic maneuvers, especially in the Finderne Avenue neighborhood southeast of the intersection of Finderne Avenue & Main Street. There are several signed turn restrictions during peak periods, including one at the intersection of Finderne Avenue & 4th Street. Temporary traffic diverters (**Figure 15**) could be installed to modify access to 4th Street. By only allowing right turns from 4th Street to Finderne Avenue, the temporary diverters would prevent drivers from using the 4th Street as a cut-through to bypass congestion experienced at Finderne Avenue & Main Street, whether turning right from Finderne Avenue northbound onto 4th Street or making the left turn from 4th Street to Finderne Avenue southbound, which has substandard sightlines due to the crest of the overpass. The vertical delineators pictured would preserve temporary first responder access, while still accommodating movements that would not adversely affect traffic flow in the neighborhood.

Should the temporary access modification prove to be successful, the Township/County could consider full street closure, with 4th Street becoming a dead end, using hard curbing and trees to screen the street, while preserving pedestrian access. Shown in

Figure 16 is a similar improvement implemented by Mercer County. This could be considered as an alternate option to the recommendation within the Implementation Matrix to install an offset signal at Finderne Avenue & Central Avenue/4th Street. With the closure of 4th Street, capacity analysis software should be used to determine if sufficient capacity exists on alternate routes (3rd Street and 2nd Street) to handle the additional demand.

Figure 15 – Temporary Traffic Diverter Allowing Right Turns onto Main Road[16]

[15] https://njdotlocalaidrc.com/perch/resources/Uploads/2020-ta-set-aside-handbook-8-12-20.pdf
[16] From SFMTA implementation (San Francisco, CA)

Figure 16 – Street Closure near Similar Vertical Crest in Hamilton Township (Google Streetview)

E. Visualization of Potential Safety Measures

Provided in this section of the report are visualizations of some of the larger reaching proposed safety measures on the corridor in the Implementation Matrix (**Table 7** and **Table 8**). Visualizations of these safety measures, along with accompanying descriptions on how these ideas seek to improve safety for vehicular, pedestrian, and cyclist travel, are adapted from the following state and national videos and publications:

- *New Jersey Pedestrian and Bicycle Resource Center* video library, 2021[17]
- *Cross County Connection TMA* video library, 2021[18]
- *NJDOT Technology Transfer* video library, 2021[19]
- *NJDOT Safe Routes to School* video library, 2021[20]
- *2017 State of New Jersey Complete Streets Design Guide*, NJDOT, 2017
- *Proven Safety Countermeasures*, FHWA, 2017
- *Small Town and Rural Multimodal Networks*, FHWA, 2016
- *Separated Bike Lane Planning and Design Guide*, FHWA, 2015
- *New Jersey School Zone Design Guide*, NJDOT, 2014
- *Urban Bikeway Design Guide 2nd Edition*, National Association of City Transportation Officials, 2014
- *Urban Street Design Guide*, National Association of City Transportation Officials, 2012

Key Study Recommendation – Road Diet on Main Street

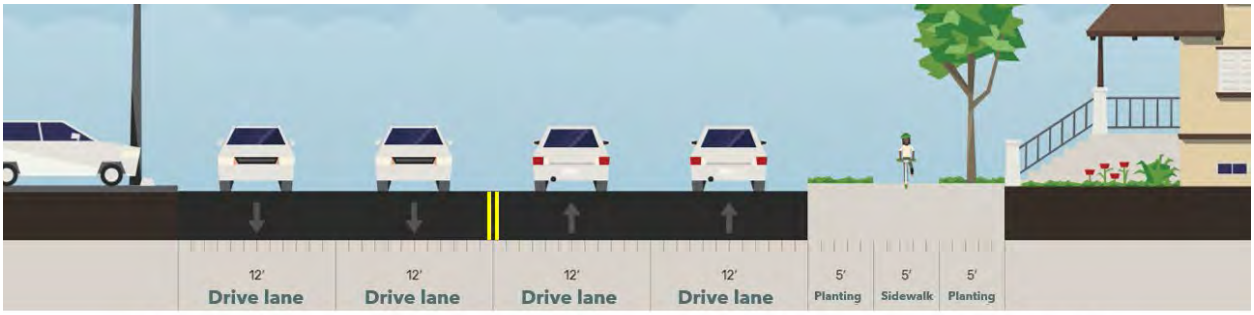
While this roadway corridor has a vehicle-centric design with two lanes of travel allocated for each direction, both Main Street and Finderne Avenue act as a conduit of intercity pedestrian and cyclist travel between the downtown areas of Somerville, Bound Brook, and Manville, which are comprised of census tracts citing zero-vehicle households of up to 11%. While pedestrian connectivity throughout the corridor is needed, especially the completion of sidewalk on the northern side of the Main Street corridor, redesigning Main Street to accommodate a road diet would have significant safety and mobility improvements for those who use the corridor, via active modes of travel.

Since Main Street has an Average Annual Daily Traffic (AADT) of 21,000, thorough intersection-by-intersection capacity analysis, design, administrative approval, and public vetting is needed to ensure the efficacy and success of the road diet. A four-lane to three-lane road diet, where properly implemented, could result in a 19-47%[21] reduction in total crashes. Standard types of crashes on a four-lane section of roadway such as Main Street include "ghosting" right angle crashes (where left turn vehicles cannot see an approaching vehicle in the right lane due to a stopped opposing left turn vehicle) and "lane shopping" crashes where vehicles jump from left lane to right lane and back to aggressively pass slower vehicles. An example view of a road diet is shown in **Figure 17**.

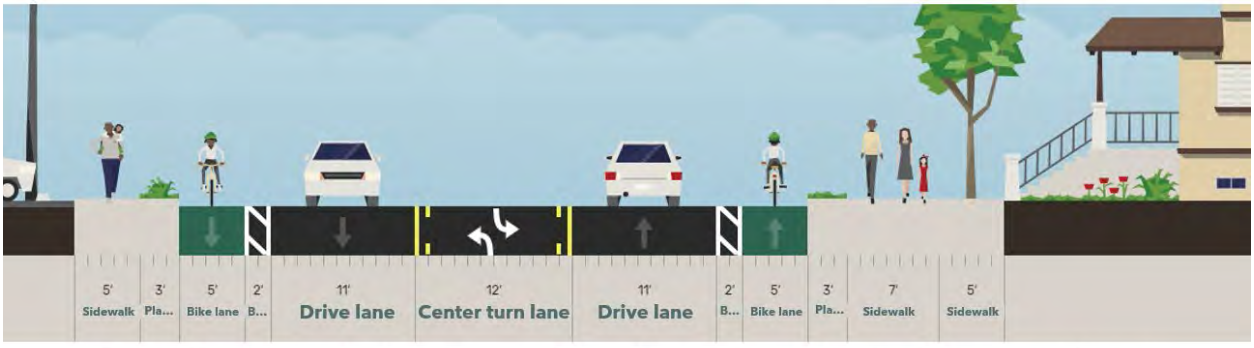
[17] https://www.youtube.com/channel/UCMsSU487ZPfaOAjcC7K8_SQ
[18] https://www.youtube.com/channel/UC5C0fODzuDqT9ycKMYv0C3Q
[19] https://www.youtube.com/channel/UC-L3YfqzFHcuDw6aI7wDrJQ
[20] https://www.youtube.com/channel/UCjlvrPjwNZ97MkX5IRol4ow
[21] FHWA. (2017). Proven Safety Countermeasures. https://safety.fhwa.dot.gov/provencountermeasures/.

Figure 17 – Road Diet Enacted in Pompton Lakes Borough on Former Four-Lane Section[22]

Figure 18 – Road Diet on Main Street Facing East, West of Ramsey Street, Before and After[23]



Existing Cross-Section of Main Street, West of Ramsey Street



Cross-Section of Main Street After Road Diet, West of Ramsey Street

Main Street is of a similar cartway width (46' to 48') as this example and could potentially accommodate one 11' travel lane, 5' bike lane, and 2' buffer in each direction of travel with a center two-way left turn lane. With a 71-foot ROW, there is an opportunity to enhance sidewalks including installing a sidewalk on the north side of Main Street and widening the existing sidewalk on the south side of Main Street (**Figure 18**). Both sidewalks could be increased to a minimum 6' feet in width and should be separated from the

[22] NJDOT / FHWA. (2015). 2015 CS Winner: Passaic County. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=_BAqvIRwjfM.
[23] Streetmix utilized for cross-section visualization: https://streetmix.net/-/505994.

street with a small buffer area. In addition, bus pull-offs could be provided by transitioning the bike lane and buffer area to sharrows at bus stops (**Figure 19**). Ideally, the road diet would be carried to the east towards Bound Brook to connect with more densely populated areas. While the intersection of Finderne Avenue & Main Street may not be able to accommodate cartway width for a bike lane, sharrows on Fulton Avenue and 2nd Street could be utilized by the Township to connect this bicycle route with the existing Township bicycle route west of Finderne Avenue on Bridgewater Avenue. Multiuse crossings with refuge islands at the intersections of Finderne Avenue & Bridgewater Avenue and Main Street & Fulton Avenue, if feasible, would help to further facilitate these connections.

Figure 19 – Transition from Bike Lane to Shared Bus Stop Area in Boston, Massachusetts[24]

Bus Stop Branding

For the six SCOOT bus routes utilizing Main Street, RSA participants observed the lack of amenities for transit service with no bus shelters, sitting areas, etc. Furthermore, as shown in the **Identified Issues & Observations** section of this report, these stops are incorrectly signed as having NJ TRANSIT service. While the installation of amenities, such as bus shelters, on the inbound (eastbound) side of Main Street would certainly help improve the visibility and useability of transit options in the Finderne neighborhood, a low-cost improvement that could be implemented within the corridor is the branding of bus stop signing with SCOOT, CAT, or RideWise TMA (Transportation Management Authority) logos. An example of bus stop branding for the Cross County Connection TMA's bus service in southern New Jersey is shown in **Figure 20**.

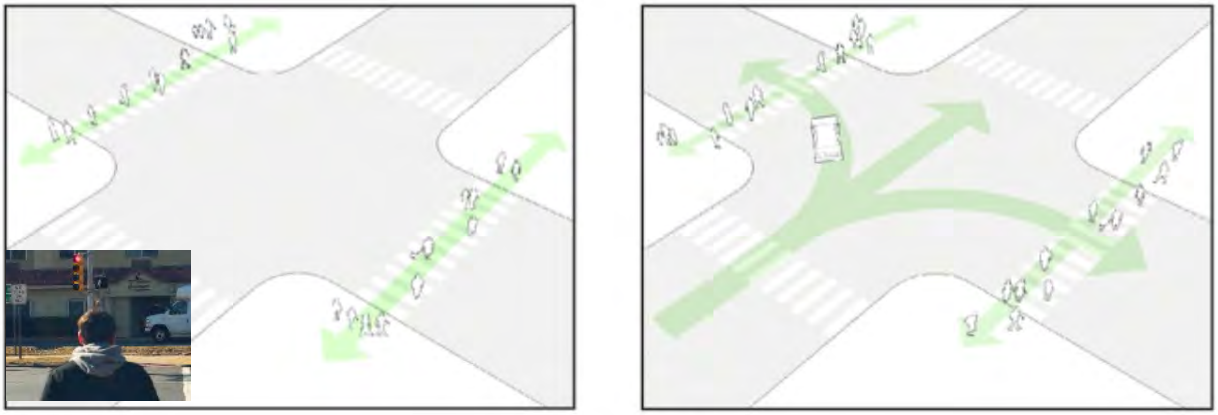
[24] USDOT / FHWA. (2015). *Separated Bike Lane Planning and Design Guide.*

Figure 20 – Sample of Bus Stop Branding[25]

Leading Pedestrian Intervals (LPIs) & Signal Phasing

LPIs are a low-cost, effective way to help pedestrians establish their presence at signalized crossing locations before conflicting vehicles have the right-of-way (**Figure 21**). This is one of FHWA's Proven Safety Countermeasures, boasting an approximate reduction of 13%[26] of pedestrian-vehicle crashes with proper implementation. Signal phasing and vehicular capacity are noted to be barriers to implementation, especially at signalized locations with lead left turn phasing, such as Main Street & Finderne Avenue. The County could take the approach to implement LPIs at every intersection where capacity and phasing allows, which could potentially make Main Street intersections with Ramsey Street/Pearl Street and Chimney Rock Road/Polhemus Lane candidates for implementation.

Figure 21 – Leading Pedestrian Interval (from NACTO and Lakewood Township)[27]



PHASE 1

Pedestrians are given a minimum head start of 3–7 seconds when entering the intersection.

PHASE 2

Through and turning traffic are given the green light. Turning traffic yields to pedestrians already in the crosswalk.

[25] CCC TMA. (2019). The Route 54-40 Community Shuttle Story. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=goRZBrrc8Tw.
[26] FHWA. (2017). Proven Safety Countermeasures. https://safety.fhwa.dot.gov/provencountermeasures/.
[27] Figure from National Association of City Transportation Officials. (2012). *Urban Street Design Guide*. Photo from NJDOT Technology Transfer. (2019). *What is an LPI?* YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=xk8hn7rdHds.

At Main Street & Finderne Avenue, this improvement would be a way to target the pedestrian crash issues seen at this location (averaging one pedestrian crash per year). However, since all approaches have lead left turns, phasing at the intersection would have to drastically change to properly allocate LPIs on all crossings via lag left phasing, which could itself result in driver confusion and additional congestion. Left turn signal phasing itself can also be changed from protective/permissive (eastbound, northbound, and southbound approaches) similar to the protected-only (westbound approach) to provide further clearance and protection for pedestrians from left-hook collisions. In addition to LPIs and left turn signal phasing, No Turn on Red (NTOR) restrictions can be enacted at this intersection to mitigate the occurrence of right-hook pedestrian collisions.

All such signal phasing changes at Main Street & Finderne Avenue would result in the reduction of vehicular capacity at an already congested intersection. Initial investigation of the aforementioned signal phasing safety improvements discussed above within Synchro (with current signal timings and 2017 volumes delivered by the County) indicates the potential for queue spillback and failing conditions. The County should use caution and conduct a more detailed capacity analysis to determine if additional delay and queuing is outweighed by the potential safety benefit of the LPI. Costs calculated from HSM analyses and benefits calculated from the NJDOT *Road User Cost Manual* could be compared with each other for a B/C ratio.

Refuge Island/Diverter at Fulton Avenue Intersection

Through various outreach efforts (Public Meeting and TAC Meetings), both public and stakeholder participants have indicated occurrence of both cut-through and aggressive driving movements at the Main Street intersection with Fulton Avenue/Shopping Center Driveway. Drivers either drive straight across Main Street, turn left onto Main Street westbound, or turn left onto Main Street eastbound, which results in close calls and collisions at this four-leg unsignalized intersection location. A diverter island could be placed in the cross-hatched median of Main Street to preclude these at-risk turning movements at this intersection such as the crossing of three to four travel lanes, potential conflicting queues, and a wide median.

Figure 22 – Diverter Island for Consideration at Fulton Avenue[28]

[28] Figure from National Association of City Transportation Officials. (2014). Urban Bikeway Design Guide.

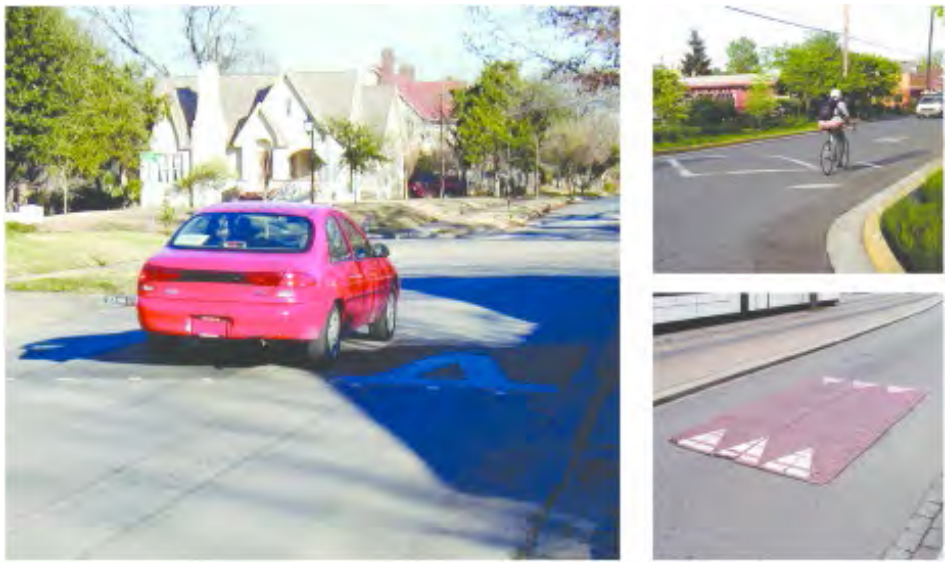
Figure 23 – RRFB Installation in Metuchen Borough by Middlesex County[29]

Furthermore, with the presence of multi-family housing to the south of the intersection and retail and recreational uses to the north of the intersection, such a diverter island (constructed in line with the current cross-hatched median on the westbound Main Street approach to Finderne Avenue) could also accommodate a 20' refuge area width for pedestrians to cross Main Street in two stages (**Figure 22**). It is recommended that pedestrian-actuated Rectangular Rapid Flashing Beacons (RRFBs, **Figure 23**Error! Reference source not found.) be implemented in conjunction with the diverter island to improve pedestrian visibility and improve the rate at which vehicles would stop for pedestrians.

Speed Humps on Fulton Avenue

At the Township's discretion, either paved or raised speed humps could be installed on Fulton Avenue between Main Street and 2nd Street (and other locations throughout the neighborhood) to further discourage cut-through traffic. Speed humps can be designed to slow an average passenger car vehicle with a standard wheelbase width yet can also allow for bicyclists and larger emergency vehicles, such as firetrucks, to move along the street unimpeded (**Figure 24**).

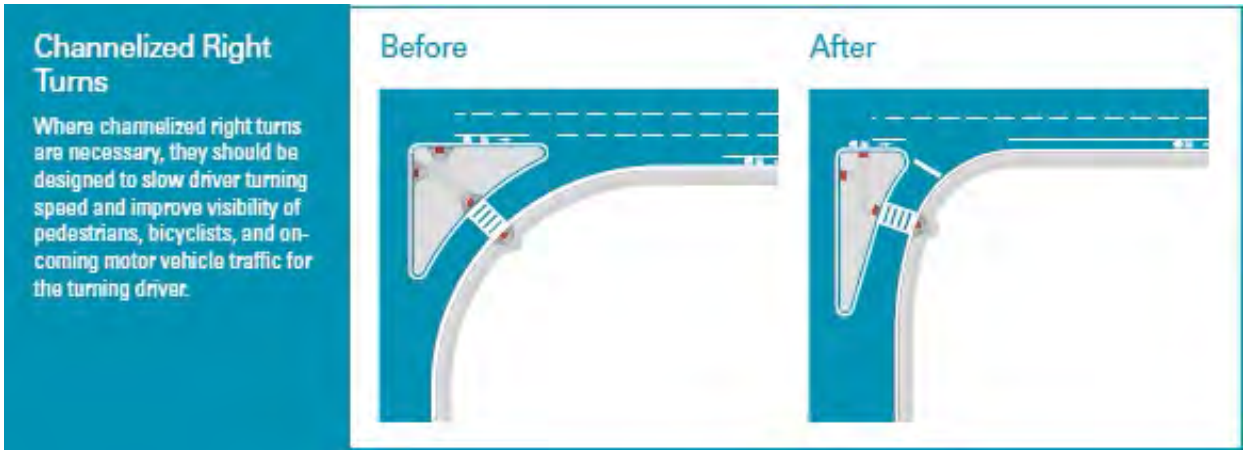
Figure 24 – Sample Speed Humps from NACTO[30]



[29] NJDOT / FWHA. (2012). The Complete Streets Movement. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=IKAKxQvpeHk.
[30] Figure from National Association of City Transportation Officials. (2012). *Urban Street Design Guide*.

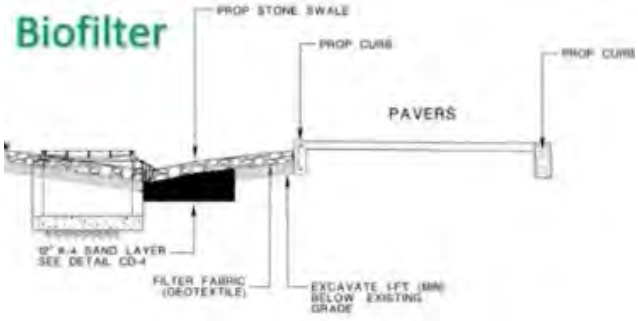
Channelized Right Turns at Finderne Avenue & Main Street
Channelized right turns introduce additional conflict points for a pedestrian crossing at an intersection. While these channelized right turn islands cannot be eliminated due to needed capacity at Finderne Avenue & Main Street, the design of these islands could be re-worked alongside ADA improvements for the non-compliant curb ramps at this intersection. By narrowing the channelized right-turn island, vehicular turning radii become less sweeping, right turning movements are slowed, and drivers turning right are forced to stop or yield to approaching traffic while being provided with a better sight line to vehicles to the left, as shown in **Figure 25**.

Figure 25 – Redesign of Channelized Right Turns[31]



Green Stormwater Infrastructure (GSI) – Biofilter on Northwest Corner of Finderne Avenue & Main Street
Currently, a small park exists in the northwest corner of the Finderne Avenue & Main Street intersection, which is owned and maintained by the County. Behind this small park exists a roughly 80' by 100' empty gravel lot owned by the County (according to Township tax maps), which could be redeveloped to incorporate a GSI feature, such as a bioswale or biofilter that would have plantings and mulch to slow infiltration and filter impurities (**Figure 26**). Such a feature would need to be maintained by the Township if the County is to consider implementation. A stormwater analysis should be performed to determine if an effective amount of runoff would be treated by this feature.

Figure 26 – Biofilter from Main Street Safety Improvements Project in Manville



[31] NJDOT. (2017). *2017 State of New Jersey Complete Streets Design Guide.*

Multi-use Path on West Side of Finderne Avenue

During the RSA, bike traffic was observed using the Finderne Avenue corridor for movements to and from the south (Manville). Although a bike route was signed over the railroad overpass and up to Bridgewater Avenue, little infrastructure and delineation was provided to bicycle traffic. Issues noted, like 4'-sidewalks with vegetative overgrowth, asphalt sidewalk areas without striping for active modes, and large curb cuts and unstriped driveway/street crossings (Central Avenue & Finderne Avenue), do not inform drivers of this important intercity travel route for pedestrians and cyclists. Although right-of-way is limited, this route should consist of striped asphalt paving, be widened to the extent possible for opposing cyclist traffic and should have appropriate striping and signing at intersections (Central Avenue, South Avenue, etc.; see **Figure 27**) to raise driver awareness of cyclists and pedestrians crossing driveways and intersections on the west side of Finderne Avenue.

Figure 27 – Multi-use Path Crossing Striping/Signing in Middle Township[32]

[32] NJDOT / FHWA. (2017). Cape May County: 2017 CS. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=Ecg2vAe_2K0.

VII. Conclusion

This RSA Report seeks to describe the process undertaken by the County to investigate potential traffic safety issues along the Main Street/Finderne Avenue corridor, from 100' north of the South Avenue intersection at MP 29.60 to the Chimney Rock Road intersection at MP 30.60, located in Bridgewater Township. From survey of prior County, municipal, or regional studies to public and stakeholder outreach conducted as part of this study to the crash data that was reviewed report-by-report to the observations made during in-field audits, potential concerns were observed and recorded, not only for corridor-wide issues, but for location-specific issues.

In order to address these potential concerns, discussions were held with the RSA team and County Engineering to develop a list of tasks to improve traffic safety on the corridor, which are codified in the Implementation Matrix (Chapter VI, Subsection A) in this report. To assist the responsible jurisdictions (whether municipal, County, or separate agency) to schedule and prioritize these improvements, such were classified by anticipated timeline and cost magnitude. The County should share the recommendations with all responsible jurisdictions to provide multiple potential avenues for implementation.

While the recommendations in the Implementation Matrix are centered around the engineering (and associated maintenance) of roadway features, changes to hard infrastructure alone will fall shy of the benefit that would be seen by implementing the 5E's of highway safety[33]:

- Engineering: highway design, traffic, maintenance, operations, and planning professionals;
- Enforcement: State and local law enforcement agencies;
- Education: communication professionals, educators, and citizen advocacy groups;
- Emergency response: first responders, paramedics, fire, and rescue; and,
- Equity: prioritizing the safety of vulnerable roadway users.

This approach recognizes a shared responsibility across numerous professions to see improved benefits in corridor crash performance, beyond the anticipated reduction in crashes with the implementation of proven crash countermeasures. RideWise, law enforcement, and EMS are encouraged to continue their efforts in educating the local driving population, holding driving behaviors accountable to Title 39, improving the response times to severe crash incidents, and reaching underserved communities with these safety strategies.

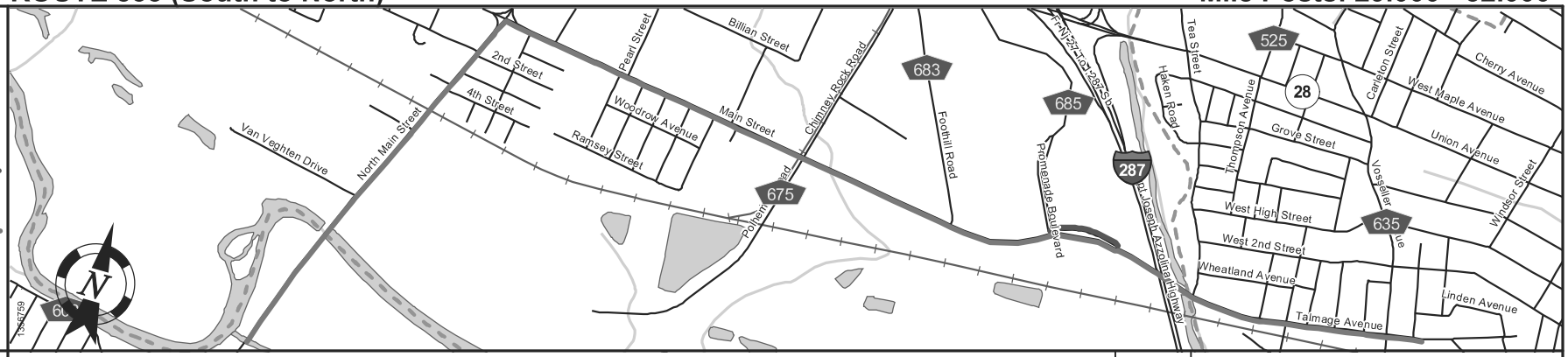
[33] Adapted from FHWA, https://safety.fhwa.dot.gov/hsip/resources/fhwasa1102/flyr3_in.cfm

Appendix A

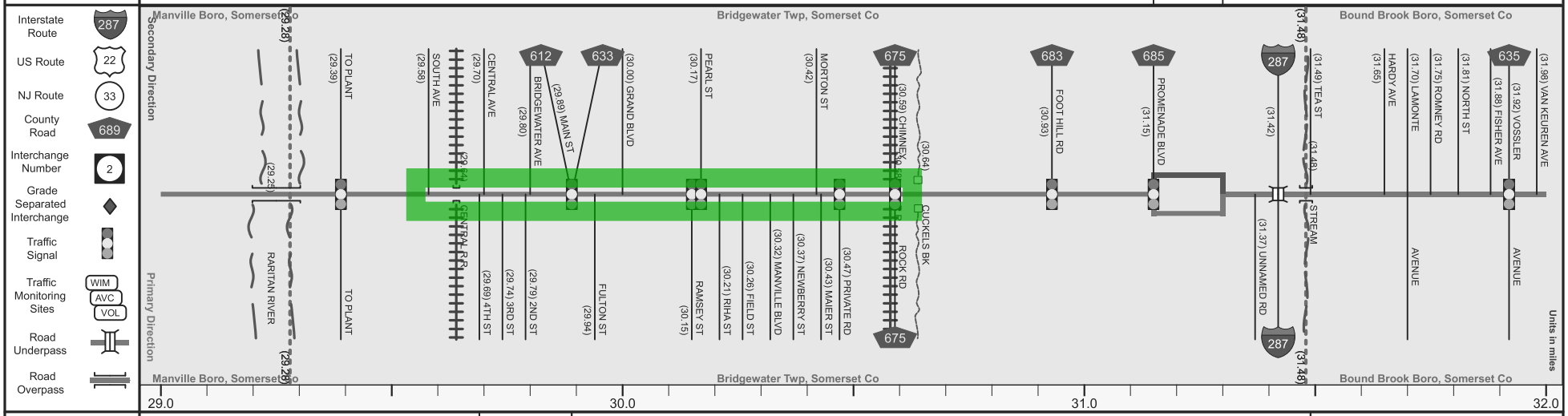
Straight Line Diagram

ROUTE 533 (South to North)

Mile Posts: 29.000 - 32.000



Pavement			24		
Shoulder			0		
Number of Lanes			2		
Speed Limit			45		
Street Name			Main Street		



Street Name	North Main Street	Finderne Avenue	Main Street		Talmage Avenue
Jurisdiction	County				
Functional Class	Urban Minor Arterial				
Federal Aid - NHS Sy	STP				
Control Section					
Speed Limit	45	40	45	35	30
Number of Lanes	4			2	
Med. Type	None		Curbed	None	
Med. Width	0		6	0	
Pavement	48	60	48	24 / 48	30
Shoulder	6	1		0	
Traffic Volume	16,977 (2016)				10,644 (2016)
Traffic Sta. ID	91816				91813
Structure No.	18G0702	1860159	18G0703	1812160	18H0705
Enlarged Views					

Page Created: March, 2019

SRI = 00000533__

Date last inventoried: November 2012

Appendix B

Traffic Data

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 06/04/2019 to 06/10/2019

Site names: 091816,Main Street-30.23,00000533__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: Bet Field St and Pearl St

Seasonal Factor Grp: rg3_4U
Daily Factor Grp: rg3_4U
Axle Factor Grp: rg3_4U
Growth Factor Grp: rg3_4U

	Sun, Jun 2, 2019			Mon, Jun 3, 2019			Tue, Jun 4, 2019			Wed, Jun 5, 2019			Thu, Jun 6, 2019			Fri, Jun 7, 2019			Sat, Jun 8, 2019		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00							68	30	38	96	51	45	86	42	44	98	51	47	225	105	120
01:00							39	14	25	52	28	24	62	27	35	45	20	25	108	41	67
02:00							34	22	12	37	21	16	47	29	18	36	21	15	87	37	50
03:00							40	26	14	32	19	13	50	29	21	42	25	17	55	29	26
04:00							115	81	34	95	61	34	99	64	35	98	67	31	76	47	29
05:00							286	162	124	293	170	123	285	170	115	290	170	120	138	88	50
06:00							756	414	342	767	409	358	738	402	336	746	402	344	366	183	183
07:00							1,124	623	501	1,133	624	509	1,155	615	540	1,126	608	518	632	327	305
08:00							1,237	608	629	1,296	632	664	1,273	618	655	1,172	582	590	745	369	376
09:00							1,086	544	542	1,095	573	522	1,105	528	577	1,037	523	514	1,114	621	493
10:00							1,168	574	594	1,113	548	565	1,215	603	612	1,150	586	564	1,446	734	712
11:00							1,210	532	678	1,264	600	664	1,294	644	650	1,318	636	682	1,594	742	852
12:00							1,441	667	774	1,384	642	742	1,448	672	776	1,487	665	822	1,667	742	925
13:00							1,337	620	717	1,470	616	854	1,376	623	753	1,569	693	876	1,685	735	950
14:00							1,451	637	814	1,395	601	794	1,403	668	735	1,666	718	948	1,508	693	815
15:00							1,684	753	931	1,571	701	870	1,582	695	887	1,986	801	1,185	1,437	637	800
16:00							1,846	846	1,000	1,885	854	1,031	1,866	840	1,026	2,079	961	1,118	1,521	698	823
17:00							1,976	922	1,054	2,042	929	1,113	1,905	890	1,015	2,048	963	1,085	1,389	637	752
18:00							1,620	714	906	1,644	702	942	1,804	817	987	1,893	888	1,005	1,289	607	682
19:00							1,356	596	760	1,264	564	700	1,439	608	831	1,571	677	894	1,022	498	524
20:00							1,012	418	594	983	406	577	1,028	428	600	1,216	493	723	886	416	470
21:00							690	265	425	700	289	411	760	296	464	1,007	383	624	917	516	401
22:00							364	155	209	322	141	181	480	202	278	746	246	500	751	378	373
23:00							170	79	91	205	83	122	192	85	107	354	154	200	408	181	227
Total							22,110	10,302	11,808	22,138	10,264	11,874	22,692	10,595	12,097	24,780	11,333	13,447	21,066	10,061	11,005
AM Peak Vol							1,237	623	678	1,296	632	664	1,294	644	655	1,318	636	682	1,594	742	852
AM Peak Fct							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AM Peak Hr							8: 00	7: 00	11: 00	8: 00	8: 00	8: 00	11: 00	11: 00	8: 00	11: 00	11: 00	11: 00	11: 00	11: 00	11: 00
PM Peak Vol							1,976	922	1,054	2,042	929	1,113	1,905	890	1,026	2,079	963	1,185	1,685	742	950
PM Peak Fct							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PM Peak Hr							17: 00	17: 00	17: 00	17: 00	17: 00	17: 00	17: 00	17: 00	16: 00	16: 00	17: 00	15: 00	13: 00	12: 00	13: 00
Seasonal Fct							.945	.945	.945	.945	.945	.945	.945	.945	.945	.945	.945	.945	.945	.945	.945
Daily Fct							.943	.943	.943	.945	.945	.945	.928	.928	.928	.887	.887	.887	1.132	1.132	1.132
Axle Fct							.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000

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ROAD AADT 19,973 NDIR AADT 10,648 PDIR AADT 9,325

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 06/04/2019 to 06/10/2019

Site names: 091816,Main Street-30.23,00000533__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: Bet Field St and Pearl St

Seasonal Factor Grp: rg3_4U
Daily Factor Grp: rg3_4U
Axle Factor Grp: rg3_4U
Growth Factor Grp: rg3_4U

	Sun, Jun 9, 2019			Mon, Jun 10, 2019			Tue, Jun 11, 2019			Wed, Jun 12, 2019			Thu, Jun 13, 2019			Fri, Jun 14, 2019			Sat, Jun 15, 2019		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00	173	79	94	80	34	46															
01:00	136	47	89	49	16	33															
02:00	109	43	66	46	25	21															
03:00	39	16	23	32	20	12															
04:00	48	26	22	93	57	36															
05:00	77	47	30	259	160	99															
06:00	125	74	51	659	370	289															
07:00	256	122	134	1,125	606	519															
08:00	424	225	199	1,206	605	601															
09:00	711	397	314	1,053	537	516															
10:00	1,190	678	512	1,085	530	555															
11:00	1,479	773	706	1,205	612	593															
12:00	1,552	779	773	1,366	615	751															
13:00	1,562	728	834	1,426	666	760															
14:00	1,537	694	843	1,424	600	824															
15:00	1,489	629	860	1,669	744	925															
16:00	1,494	586	908	1,896	869	1,027															
17:00	1,263	561	702	1,934	865	1,069															
18:00	985	396	589	1,526	643	883															
19:00	849	411	438	1,125	450	675															
20:00	642	289	353	753	295	458															
21:00	449	217	232	458	190	268															
22:00	288	144	144	261	109	152															
23:00	136	66	70	145	55	90															
Total	17,013	8,027	8,986	20,875	9,673	11,202															
AM Peak Vol	1,479	773	706	1,206	612	601															
AM Peak Fct	1	1	1	1	1	1															
AM Peak Hr	11: 00	11: 00	11: 00	8: 00	11: 00	8: 00															
PM Peak Vol	1,562	779	908	1,934	869	1,069															
PM Peak Fct	1	1	1	1	1	1															
PM Peak Hr	13: 00	12: 00	16: 00	17: 00	16: 00	17: 00															
Seasonal Fct	.945	.945	.945	.945	.945	.945															
Daily Fct	1.322	1.322	1.322	.981	.981	.981															
Axle Fct	.488	.488	.488	.488	.488	.488															
Pulse Fct	2.000	2.000	2.000	2.000	2.000	2.000															

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ROAD AADT 19,973 NDIR AADT 10,648 PDIR AADT 9,325

Appendix C

Excerpts from Prior Studies

Wallace House & Old Dutch Parsonage Historic Site

Located about eight miles south of the Vanderveer House the Wallace House was built in 1776 by John Wallace a Philadelphia fabric merchant. It was General Washington's headquarters from December 1778 to June 1779 when the Continental Army was stationed at Middlebrook. The House maintains its 18th-century appearance and has been fully restored.

Across the street and built in 1751, the Georgian style Old Dutch Parsonage in Somerville was built for Reverend John Frelinghuysen. Later residing in the parsonage was Reverend Jacob Hardenbergh, who helped establish Queen's College, now known as Rutgers University. Hardenbergh served as the college's first president and also served in the Provincial Congress of New Jersey during the Revolutionary War.

The Wallace House & Old Dutch Parsonage Historic Site is a State-operated historic site and is located on Washington Place, in Somerville. Washington Place is a residential street situated between U.S. 206 and NJ TRANSIT's Raritan Valley Line.

Existing Access to the Wallace House is via Somerset Street (CR 626) or two lightly traveled residential streets, South Middaugh Street and Washington Place. The Wallace House is also a five-minute walk (about one quarter mile) along Somerset Street from the Somerville Train Station. Currently none of these roadways includes existing designated bicycle facilities.

Potential Improvements include several new facilities and amenities to supplement the existing access:

- Sidepath along U.S. 202/206 to provide north-south interconnect to Somerville via Mountain Avenue and Peters Brook trails, and create connections to the Wallace House
- Connections to the west (Raritan Borough) and south via bike lane on Somerset Street (CR 567) and shared use path on the Somerville Landfill redevelopment site
- Regional east-west connectivity includes bike lanes, sidepath, and shared lane segments along Old York Road (Raritan), Somerset Street (Raritan/Somerville), Veterans Memorial Drive (Somerville), and Main Street (Somerville/ Bridgewater) to Talmadge Avenue/Main Street (Bound Brook) to Elizabeth Avenue (South Bound Brook)
- Alternative east-west connectivity would be provided by linking low-stress routes south of Main Street (Somerville) using sidepath segments along local streets and through off-road properties and parks between the Peters Brook Greenway Finderne Avenue, and Van Veghten House
- Extension of the Raritan River Greenway in Somerville, Bridgewater, and Manville would provide additional off-road connections between Raritan, Peters Brook Greenway, and Van Veghten House

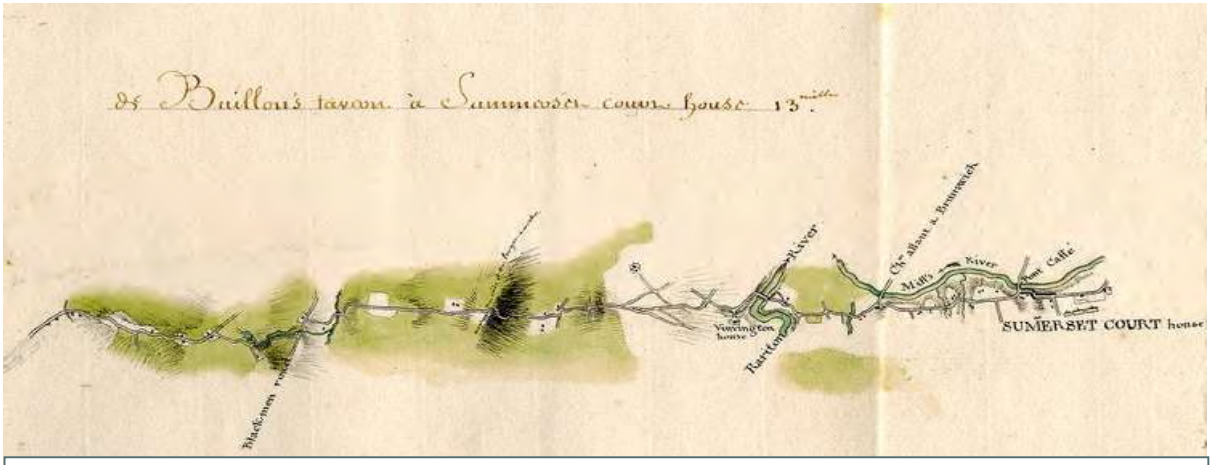
Derrick Van Veghten House

The Derrick Van Veghten House is about three miles east of the Wallace House & Old Dutch Parsonage and about one mile east of the Somerville NJ TRANSIT station. Built in 1725, the Van Veghten House in Bridgewater Township, served as the headquarters for Quartermaster General Nathanael Greene during the Middlebrook Cantonment. Derrick Van Veghten was a member of the Colonial Assembly and the County Commissioner of Highways. The house is now the headquarters of the Somerset County Historical Society

Existing Access to the Van Veghten House is limited to Finderne Avenue, a heavily-traveled and high-stress four-lane roadway that connects Somerville and Bridgewater to Manville over the Raritan River. Finderne Avenue has limited shoulders and a sidewalk along the southbound lanes only, posted speed limits of 40 and 45 mph, and also provides access to numerous industrial and commercial sites. [vi]

Potential Improvements include several new facilities (Figure 3-8):

- Regional east-west connectivity would be created by the interconnected corridor that includes bike lanes along Veterans Memorial Drive (Somerville) and Main Street (Somerville/ Bridgewater)
- Alternative east-west connectivity would be provided by linking low-stress routes south of Main Street (Somerville) using sidepath segments along local streets and through off-road properties and parks between the Peters Brook Greenway Finderne Avenue, and Van Veghten House
- Extending the Raritan River Greenway in Somerville, Bridgewater, and Manville would provide additional off-road connections between Raritan, Peters Brook Greenway, and Van Veghten House



This 1780 map documents a day's march of thirteen miles by Continental Army Troops. A major obstacle was the long and steep climb over Second Watchung Mountain, north of today's Martinsville, continuing down into the Raritan Valley via Steele's Gap, still known today, and passing by the Derrick Van Veghten House in Bridgewater Township.

Its unique confluence of access to residential communities and employment sites, and host to recreation, tourism, history, and numerous downtown destinations, makes the Raritan River ideally suited to the development of an expansive greenway and trail system.

Completed sections of the Raritan River Greenway include segments in Bridgewater, Raritan, Somerville, and Manville. Development and completion of the overall Raritan River Greenway, is a priority for Somerset County.

Existing Access and facilities along the Raritan River Greenway are fragmented

- The longest existing facility is a segment about 3 miles long in Bridgewater and Raritan, connecting through Duke Island Park to Old York Road in Raritan. Additional access in Raritan is provided at Nevius Street. Busky Lane at Orlando Drive has access to the Raritan River, with a crossing under U.S. Route 206 to Somerville near South Bridge Street.
- A gap is present between Somerville and Manville, where a short trail segment is provided within Dukes Parkway Park, adjacent to Duke Parkway East and North Main Street.
- To the east of Dukes Parkway Park, no further existing sections of the Raritan River Greenway are currently in place. East of the confluence with the Millstone River, the D&R Canal Towpath is located between the Raritan River and D&R Canal waterways, and fully separated from the adjacent communities. In this area, the sole access point to the Raritan River and East Coast Greenway/D&R Canal Towpath is limited to the Queen's Bridge crossing between Bound Brook and South Bound Brook.
- In South Bound Brook, the Staats House at Von Steuben Lane is located adjacent to the D&R Canal but lacks direct access to the Canal Towpath.

Potential Improvements to the Raritan River Greenway include (Figure 3-10):

- Bike lanes along Old York Road (CR 567)/Orlando Drive to enhance east-west connectivity through Raritan and to the Raritan River Greenway
- Enhanced wayfinding along the Peters Brook and Raritan River Greenways alignments with directional signage specific to both Somerville and Duke Farms destinations
- East-west connectivity would be provided by linking low-stress routes south of Main Street (Somerville) using local streets and off-road properties and parks between the Peters Brook Greenway and Van Veghten House and Finderne Avenue
- Extension of the Raritan River Greenway in Somerville, Bridgewater, and Manville would provide additional off-road connections between Raritan, Peters Brook Greenway, and Van Veghten House

Summary of Public Comments

	Linkages and Access	Bicyclist	Pedestrian	Greenway
Improvements to commercial and residential codes will help increase the amount of stormwater capture and minimize flooding				•
Bridgewater Township Specific				
Downtown linkages in Bridgewater within the Bridgewater Commons area.	•	•	•	
Need better bike access across Route 22 (N. Bridge Street).		•		
Improve pedestrian access on Gaston Avenue Bridge over Route 22.			•	
Sidewalk needed along Route 28 between Country Club Road and the Somerville Circle.			•	
Pedestrian crossing needed to connect strip mall along Prince Rogers Avenue to Ballpark.	•		•	
Access for The Village at Bridgewater Commons Shopping Center.	•	•	•	
Access to County library located along Vogt Drive from surrounding neighborhoods.	•			
Sidewalk needed along Foothill Road between E. Main Street and Route 28.			•	
Path/sidewalk needed to connect Bound Brook neighborhoods to Bridgewater Promenade.	•	•	•	
Road diet and bike lanes needed along Main Street between Finderne Avenue and Bound Brook border.		•		
Add bike lanes to Milltown Rd.		•		
Add bike lanes/overpass over Rt. 22 at Milltown Rd.		•		
Implement signs for bike crossing at Old York Road by the canal and Duke Park Path.		•		
Provide safe access to Duke Island Park from Bradley Gardens.	•	•	•	
Sidewalk needed in Prince Rodgers Shopping area (North Bridge).			•	
Sidewalk needed on N. Bridge St. between Wight Street and the Library.			•	
Extend Greenway to Southside fields & Torpey fields.	•			•
There is a visibility issue along N. Bridge Street; narrow shoulders.		•	•	

Summary of Public Comments

	Linkages and Access	Bicyclist	Pedestrian	Greenway
Woodlawn Avenue shoulders are bad/non-existent; the road is fairly wide; sports teams (cross country) use it for practice.		•	•	
Implement share the road signs along Garretson Rd. and County Club Rd.		•		
Bicyclists often use Country Club Rd. to avoid navigating the Rt. 202/206 circle and to reach attractors such as Duke Island.		•		
Install bicycle racks at Somerset Shopping Center.		•		
Remove physical barriers along Rt. 22 (students must walk behind buildings, over curbs and green spaces that physically separate businesses during lunch periods).			•	
Finderne Ave. is too narrow for cyclists.		•		
Develop access to River south on Wyeth property.	•	•	•	
Hazardous crossings along Route 202 at the Somerville Circle, 1st Avenue/Country Club Road, and the Ortho Office Park.		•	•	
Hazardous crossings along Country Club Road at Route 28.		•	•	
Garretson Road, from Route 202/206 to Route 22, is a corridor for improvement.	•	•	•	
Desired connection from Vanderhaven Farms to North Branch Park, Duke Island Park, the Bridgewater Commons Area, and Bridgewater Towne Center (Wegman's).	•	•	•	
Desired connection from the Bridgewater Commons Area to Washington Valley Park.	•	•		
Desired connection from the Regional Center to Raritan Valley Community College along Route 28.	•	•		
Desired connection from Bridgewater-Raritan High School to the North Bridge Street area (Municipal Complex).	•	•	•	
Desired connection from Somerville Shopping Center to the Bridgewater Commons area.	•	•	•	
Missing sidewalks/sidewalk gaps along Milltown Road, Vanderveer Road, Commons Way, Route 28 and Country Club Road.			•	
Missing sidewalk/sidewalk gaps along Woodlawn Avenue from the 202/206 bridge to the intersection of Somerset Avenue			•	

Summary of Public Comments

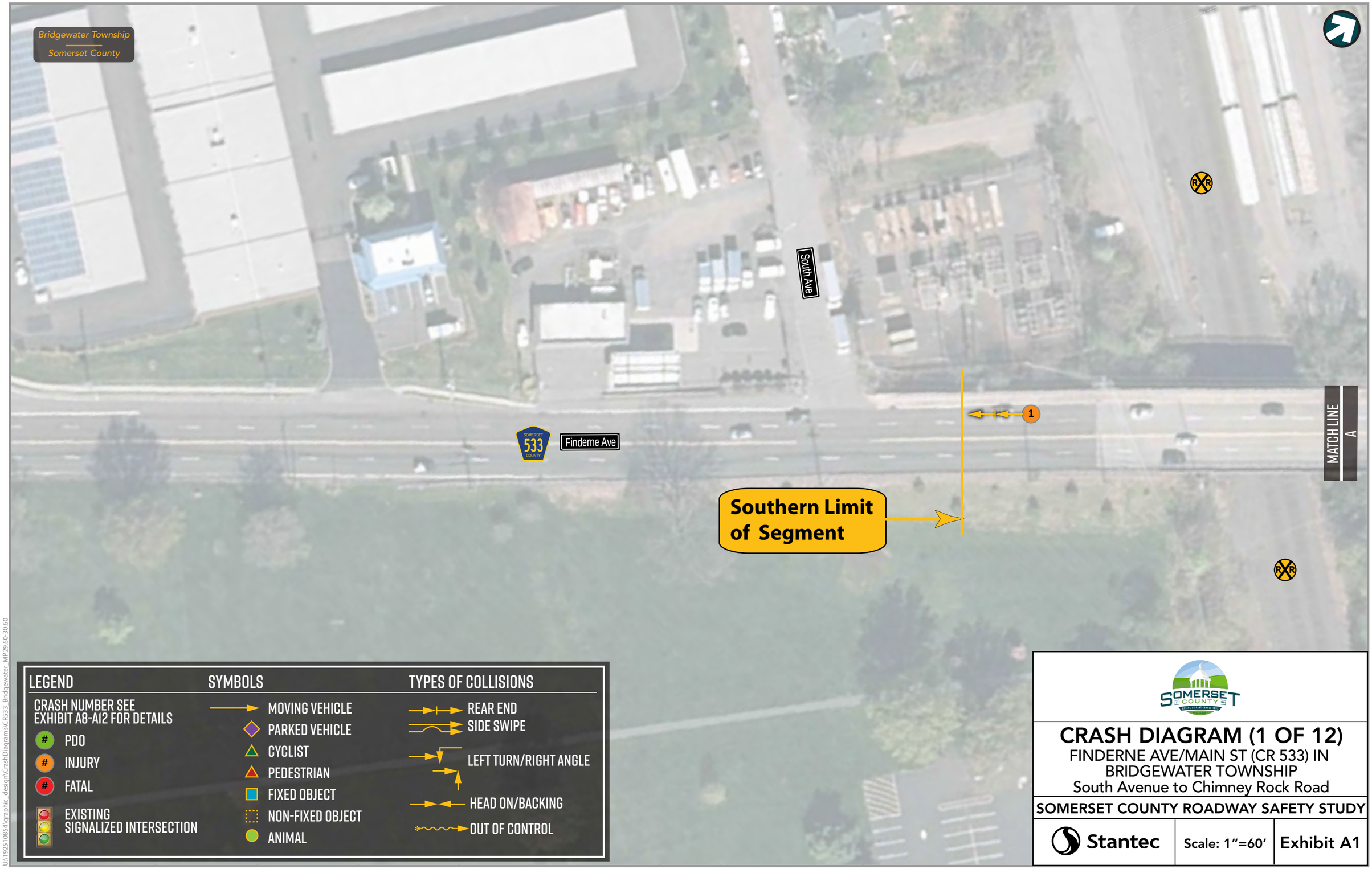
	Linkages and Access	Bicyclist	Pedestrian	Greenway
Missing sidewalk/sidewalk gaps along Foothill Road from Finderne Avenue to North Bridge Street			•	
Extend the Peters Brook Greenway to cross Route 202 and Route 22.				•
Formalize an existing bicycle and pedestrian "cut through" to access the Somerville Shopping Center from the north.	•	•	•	
Enhance the Milltown Road underpass (Raritan Valley Line) and an existing "cattle underpass" for bicyclists and pedestrians to access North Branch Park.	•	•	•	
Sidewalks needed along Downey Road to make a desired connection from Crossroad Development to Bridgewater Municipal Building	•		•	
Main Street, east of Finderne Avenue, needs designated bicycle facilities as it is an important bicycle route and there are currently no safe alternatives to/from Bound Brook.	•	•		
Main Street, east of Finderne Avenue, should undergo a "road diet" to accommodate bicyclist traffic as four lanes are not warranted (even at rush hour) and it is a critical connector for cyclists within the entire Somerset County region.	•	•		
The Conceptual Greenway System should be extended to connect to the existing pedestrian bridge over Route 22 via a bicycle and pedestrian trail	•	•	•	•
Somerville Borough Specific				
Provide pedestrian-scale lighting for municipal streets.			•	
Consider traffic calming measures at the Somerville Circle, such as increasing the curvature to reduce speeds and moving traffic light(s).		•	•	
Hazardous crossings along West End Avenue/Main Street/Route 28 at Grove Street, Bridge Street and Mountain Avenue.			•	
Hazardous crossing along Bridge Street at Wilmer Street (near Somerville High School).			•	
Hazardous crossing along High Street at Eastern Avenue.			•	
Hazardous crossing along East Main Street at Finderne Avenue.			•	
Improve pedestrian access on Gaston Avenue Bridge over Route 22.			•	

Summary of Public Comments

	Linkages and Access	Bicyclist	Pedestrian	Greenway
Eastern Avenue, from Route 28 to Main Street, is a corridor for improvement.		•	•	
Grove Street, from Route 22 to Main Street, is a corridor for improvement.		•	•	
Add a bike lane on CR 533/Main Street (connect Somerville to Bridgewater Promenade).		•		
Create Greenway trails linking Somerville Landfill Development to Greenway and downtown destinations.	•	•	•	•
Complete northern portion of Peters Brook Greenway (from 202/206 to Bridgewater High School).	•	•	•	•
Complete Peters Brook Network, especially crossing Route 202/206.		•	•	•
Improve walking/bicycling access within the Somerville Circle.	•	•	•	
Improve pedestrian safety crossing at intersection of E. High St. and Park Ave.			•	
Set up maintenance program for the Peters Brook Trail.				•
Develop safe routes for students to take to the County Library from the Somerville High School. Currently there is no safe path to travel, which discourages students to use the library.	•	•	•	
Install bike racks in downtown Somerville.		•		
Improve sections of Peters Brook Greenway in Somerville Borough; sandy section between Cliff to Williams Street makes it hard to ride a bike, walk or push a baby carriage.				•
Missing sidewalks/sidewalk gaps along Main Street, northbound between Adamsville Road and Finderne Avenue and between Finderne Avenue and Chimney Rock Road.			•	
Blocked sidewalk at South Bridge Street and Route 206.			•	
Consider creating a trail along an unused railway corridor crossing Route 206 into Duke Farms.		•	•	•
Many bicyclists use the sidewalks along Main Street/Route 28 between Mountain Avenue and Grove Street. Bicyclist education needed.		•		

Appendix D

Collision Diagrams



LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (1 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec	Scale: 1"=60'	Exhibit A1

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Bridgewater Township
Somerset County

Central Ave
Bridgewater Ave
Finderne Ave
Finderne Ave
4th St
3rd St
2nd St
MATCH LINE A
MATCH LINE B

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (2 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec	Scale: 1"=60'	Exhibit A2

U:\192510854\graphic_design\CrashDiagrams\CR533_Bridgewater_MP29.60-30.60

Bridgewater Township
Somerset County

SOMERSET 612 COUNTY
Main St

SOMERSET 533 COUNTY
Finderne Ave

SOMERSET 633 COUNTY
Finderne Ave

SOMERSET 533 COUNTY
Main St

MATCH LINE B

MATCH LINE C

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (3 OF 3)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A3

U:\192510854\graphic_design\CrashDiagrams\CR533_Bridgewater_MP29.60-30.60

Bridgewater Township
Somerset County

Grand Blvd

Main St

Fulton Ave

Ramsey St

MATCH LINE C

MATCH LINE D

130 143 135 134 138 144 145 149 150 154 153 136 137 41 147 148 151 155 152 139 140 141 142

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (4 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A4

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Bridgewater Township
Somerset County

MATCH LINE D

MATCH LINE E

Pearl St

Main St

Main St

Ramsey St

Rifta St

Field St

156 157 160 165 166 158 159 161 162 163 164 167 168 169 170 172

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL

EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (5 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A5

U:\192510854\graphic_design\CrashDiagrams\CR533_Bridgewater_MP29.60-30.60

Bridgewater Township
Somerset County

MATCH LINE E

MATCH LINE F

Main St

Morton St

Manville Blvd

Newberry St

171
173
176
175
178
179
174

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL

EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (6 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A6

U:\192510854\graphic_design\CrashDiagrams\CR533_Bridgewater_MP29.60-30.60

Bridgewater Township
Somerset County

MATCH LINE F

SOMERSET 533 COUNTY
Main St

SOMERSET 675 COUNTY
Chimney Rock Rd

177 180 181 182 184 185 186 187 188 189 190 191 192 195 193 194 196 197 198 199 200 201 183

Northern Limit of Segment

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (7 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec	Scale: 1"=60'	Exhibit A7

U:\192510854\graphic_design\CrashDiagrams\CR533_Bridgewater_MP29.60-30.60

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
1	06/19/2017	12:19 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
2	01/05/2016	11:24 AM	Property Damage Only	0	Fixed Object	Daylight	Dry
3	04/13/2016	03:08 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
4	03/11/2017	11:21 PM	Injury	1	Opposite Direction (Head on, Angular)	Dark, Street lights on, spot lighting	Dry
5	05/06/2017	03:56 PM	Property Damage Only	0	Right Angle	Daylight	Dry
6	01/30/2017	03:33 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
7	07/26/2018	10:14 AM	Injury	1	Right Angle	Daylight	Dry
8	08/01/2018	03:17 PM	Injury	2	Right Angle	Daylight	Dry
9	10/27/2017	07:17 PM	Property Damage Only	0	Opposite Direction (Side Swipe)	Dark, Street lights on, spot lighting	Dry
10	01/25/2016	01:07 PM	Property Damage Only	0	Right Angle	Daylight	Slush
11	03/24/2016	03:29 PM	Property Damage Only	0	Right Angle	Daylight	Dry
12	07/06/2016	04:34 PM	Property Damage Only	0	Right Angle	Daylight	Dry
13	12/28/2016	09:43 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
14	07/31/2016	09:53 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, spot lighting	Wet
15	07/20/2018	01:35 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
16	01/07/2016	05:34 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, continuous lighting	Dry
17	07/01/2016	05:26 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
18	12/13/2016	07:34 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, continuous lighting	Dry
19	05/25/2018	09:53 AM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
20	11/10/2017	02:52 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
21	10/12/2018	11:11 AM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
22	02/14/2017	04:25 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
23	10/12/2018	10:36 AM	Fatal	0	Fixed Object	Daylight	Dry
24	05/15/2016	02:16 PM	Property Damage Only	0	Right Angle	Daylight	Dry
25	06/09/2018	03:01 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
26	08/03/2018	09:40 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
27	06/16/2016	03:40 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
28	07/24/2017	05:15 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
29	06/02/2016	05:04 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
30	08/02/2017	05:58 PM	Injury	1	Right Angle	Daylight	Wet
31	03/29/2017	12:14 PM	Property Damage Only	0	Right Angle	Daylight	Dry
32	08/07/2018	04:00 PM	Property Damage Only	0	Right Angle	Daylight	Dry
33	03/17/2016	03:16 AM	Property Damage Only	0	Right Angle	Dawn	Dry
34	11/21/2017	02:53 PM	Injury	2	Same Direction (Rear-End)	Daylight	Dry
35	08/13/2016	10:09 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
36	05/03/2018	05:10 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
37	05/14/2018	03:54 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
38	08/05/2016	12:54 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
39	11/15/2017	05:47 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
40	04/13/2015	03:39 PM	Injury	1	Pedalcyclist	Daylight	Dry
41	08/29/2014	03:16 PM	Injury	1	Pedalcyclist	Daylight	Dry
42	02/18/2016	06:08 PM	Property Damage Only	0	Pedalcyclist	Dark, Street lights on, continuous lighting	Dry
43	01/15/2016	12:28 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
44	11/15/2018	04:58 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Snowy
45	09/30/2018	04:42 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry

CRASH DIAGRAM (8 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec	Scale: N.T.S	Exhibit A8

U:\192510854\graphic_design\CrashDiagrams\CR533_Bridgewater_MP29.60-30.60

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
46	09/07/2016	11:47 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
47	11/09/2015	02:07 PM	Injury	1	Pedalcyclist	Daylight	Dry
48	11/05/2018	06:00 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Wet
49	10/15/2018	02:22 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
50	01/27/2016	03:09 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
51	09/22/2016	06:32 AM	Injury	1	Same Direction (Side Swipe)	Dawn	Dry
52	11/25/2014	08:34 PM	Injury	1	Pedestrian	Dark, Street lights on, spot lighting	Dry
53	08/11/2017	11:49 AM	Property Damage Only	0	Right Angle	Daylight	Dry
54	06/20/2016	09:56 AM	Property Damage Only	0	Right Angle	Daylight	Dry
55	09/17/2017	04:56 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
56	01/02/2016	04:09 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
57	10/08/2016	03:10 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
58	10/05/2016	09:00 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
59	01/03/2016	08:14 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, continuous lighting	Dry
60	03/30/2018	09:02 AM	Injury	1	Backing	Daylight	Dry
61	12/14/2016	05:07 PM	Property Damage Only	0	Backing	Dark, Street lights on, continuous lighting	Dry
62	03/24/2017	06:26 AM	Property Damage Only	0	Fixed Object	Dawn	Dry
63	01/22/2018	04:18 PM	Injury	1	Left Turn/U-turn	Daylight	Dry
64	02/26/2016	05:47 PM	Injury	4	Left Turn/U-turn	Dusk	Dry
65	11/25/2016	07:13 PM	Injury	4	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
66	08/25/2017	10:44 AM	Injury	3	Left Turn/U-turn	Daylight	Dry
67	12/08/2017	07:15 PM	Injury	3	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
68	12/19/2017	10:39 PM	Injury	2	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
69	12/22/2017	05:31 PM	Injury	1	Left Turn/U-turn	Dark, Street lights on, spot lighting	Dry
70	01/08/2016	01:00 PM	Injury	1	Left Turn/U-turn	Daylight	Dry
71	02/04/2016	06:17 PM	Injury	1	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
72	02/25/2016	06:39 PM	Injury	2	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
73	05/14/2016	09:14 AM	Injury	1	Left Turn/U-turn	Daylight	Dry
74	11/22/2016	04:42 PM	Injury	1	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
75	06/06/2017	01:46 PM	Injury	2	Left Turn/U-turn	Daylight	Dry
76	09/04/2018	09:08 PM	Injury	1	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
77	10/09/2018	09:45 PM	Injury	1	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
78	05/17/2016	04:27 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Wet
79	02/16/2018	08:38 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
80	01/05/2016	05:40 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, spot lighting	Dry
81	02/03/2016	06:44 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Wet
82	09/06/2017	03:49 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
83	10/11/2017	08:36 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
84	11/19/2017	05:12 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
85	01/18/2018	11:52 AM	Injury	3	Left Turn/U-turn	Daylight	Dry
86	12/17/2018	02:53 PM	Injury	1	Opposite Direction (Head on, Angular)	Daylight	Dry
87	08/24/2016	06:29 PM	Injury	1	Pedalcyclist	Daylight	Dry
88	06/30/2017	04:40 PM	Injury	1	Pedalcyclist	Daylight	Dry
89	03/14/2015	04:52 PM	Injury	1	Pedestrian	Daylight	Wet
90	06/29/2015	10:51 PM	Injury	1	Pedestrian	Dark, Street lights on, continuous lighting	Dry

CRASH DIAGRAM (9 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S | Exhibit A9

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
91	04/21/2017	05:49 AM	Injury	2	Right Angle	Dawn	Wet
92	05/27/2018	02:55 PM	Injury	2	Right Angle	Daylight	Dry
93	06/15/2018	11:22 AM	Injury	1	Left Turn/U-turn	Daylight	Dry
94	02/02/2017	02:39 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
95	01/27/2016	02:30 PM	Injury	3	Same Direction (Rear-End)	Daylight	Dry
96	07/20/2017	10:27 AM	Injury	2	Same Direction (Rear-End)	Daylight	Dry
97	08/05/2017	06:51 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
98	11/02/2016	01:02 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
99	07/14/2017	07:48 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
100	07/24/2017	01:32 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
101	02/20/2018	08:41 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
102	06/28/2018	03:42 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
103	01/16/2016	10:14 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
104	11/02/2016	04:49 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
105	03/10/2016	02:30 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
106	10/27/2016	03:18 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
107	07/10/2017	07:53 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
108	03/05/2018	07:59 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, spot lighting	Dry
109	05/25/2018	11:48 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
110	04/16/2016	01:10 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
111	05/06/2017	08:38 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, spot lighting	Dry
112	07/31/2017	05:18 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
113	10/15/2017	05:29 PM	Property Damage Only	0	Same Direction (Rear-End)	Dusk	Dry
114	08/03/2016	06:12 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
115	03/09/2017	08:37 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
116	07/28/2017	03:45 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
117	08/08/2018	08:57 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, spot lighting	Dry
118	10/10/2018	11:53 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
119	10/07/2016	07:34 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, continuous lighting	Dry
120	09/23/2017	07:00 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
121	09/06/2016	10:19 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
122	01/29/2016	01:44 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
123	09/12/2016	01:23 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
124	12/23/2016	02:25 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
125	09/15/2018	10:54 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
126	02/14/2016	10:25 AM	Injury	1	Pedestrian	Daylight	Dry
127	03/06/2018	07:32 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
128	11/02/2016	07:09 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
129	10/18/2017	07:44 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
130	04/11/2016	08:32 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Wet
131	06/09/2017	03:51 PM	Injury	3	Left Turn/U-turn	Daylight	Dry
132	05/06/2016	02:44 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
133	01/04/2017	05:44 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, spot lighting	Dry
134	12/22/2017	02:43 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
135	02/28/2017	02:15 PM	Property Damage Only	0	Backing	Daylight	Dry

CRASH DIAGRAM (10 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S | Exhibit A10

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
136	12/22/2017	05:54 PM	Injury	2	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
137	04/09/2016	02:33 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Wet
138	12/05/2014	05:40 PM	Injury	1	Pedestrian	Dark, Street lights on, continuous lighting	Wet
139	11/15/2017	02:15 PM	Injury	2	Right Angle	Daylight	Dry
140	11/01/2016	08:11 AM	Property Damage Only	0	Right Angle	Daylight	Dry
141	10/18/2017	08:10 AM	Property Damage Only	0	Right Angle	Daylight	Dry
142	06/21/2018	06:45 PM	Property Damage Only	0	Right Angle	Daylight	Dry
143	03/07/2016	06:21 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, spot lighting	Dry
144	12/29/2017	11:56 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
145	02/17/2017	05:10 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
146	07/24/2018	09:03 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
147	05/11/2017	09:55 AM	Property Damage Only	0	Backing	Daylight	Dry
148	04/11/2016	05:28 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
149	12/21/2016	04:21 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
150	05/07/2018	07:40 AM	Property Damage Only	0	Backing	Daylight	Dry
151	10/22/2018	08:14 AM	Injury	3	Same Direction (Rear-End)	Daylight	Dry
152	10/30/2018	08:01 PM	Fatal	0	Fixed Object	Dark, Street lights on, spot lighting	Dry
153	07/25/2016	07:08 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Wet
154	05/19/2016	04:48 PM	Injury	1	Same Direction (Side Swipe)	Daylight	Dry
155	10/07/2016	02:44 PM	Injury	2	Same Direction (Rear-End)	Daylight	Dry
156	04/17/2017	08:41 AM	Property Damage Only	0	Fixed Object	Daylight	Dry
157	08/28/2018	05:56 PM	Injury	2	Left Turn/U-turn	Daylight	Dry
158	04/05/2017	06:25 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
159	09/15/2018	07:35 AM	Property Damage Only	0	Right Angle	Daylight	Dry
160	05/19/2016	06:47 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
161	02/25/2016	04:03 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
162	03/09/2017	09:25 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
163	09/06/2018	06:40 PM	Injury	1	Left Turn/U-turn	Daylight	Wet
164	08/03/2018	09:49 AM	Injury	1	Right Angle	Daylight	Dry
165	12/12/2016	07:15 AM	Injury	1	Same Direction (Rear-End)	Daylight	Wet
166	02/23/2017	12:34 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
167	12/02/2018	05:32 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Wet
168	09/24/2016	05:48 AM	Injury	1	Left Turn/U-turn	Dark, Street lights on, spot lighting	Dry
169	10/07/2016	05:50 AM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, spot lighting	Dry
170	10/12/2017	06:48 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, spot lighting	Dry
171	09/06/2017	01:11 PM	Injury	1	Right Angle	Daylight	Wet
172	08/14/2017	05:33 PM	Injury	1	Same Direction (Side Swipe)	Daylight	Dry
173	10/23/2018	11:18 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
174	11/27/2016	12:20 AM	Property Damage Only	0	Backing	Dark, Street lights on, spot lighting	Dry
175	02/21/2018	01:03 PM	Injury	1	Left Turn/U-turn	Daylight	Dry
176	04/25/2018	12:10 PM	Property Damage Only	0	Right Angle	Daylight	Wet
177	03/07/2018	05:47 AM	Injury	1	Fixed Object	Dark, No Street lights	Wet
178	12/14/2018	06:21 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Wet
179	09/12/2018	12:42 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
180	06/15/2016	09:46 AM	Injury	2	Same Direction (Rear-End)	Daylight	Dry

CRASH DIAGRAM (11 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S | Exhibit A11

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
181	03/17/2017	09:25 PM	Property Damage Only	0	Backing	Daylight	Dry
182	11/02/2017	07:40 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
183	03/12/2018	05:35 PM	Property Damage Only	0	Opposite Direction (Side Swipe)	Dusk	Wet
184	09/04/2018	02:12 PM	Property Damage Only	0	Other	Daylight	Dry
185	02/26/2016	09:41 PM	Property Damage Only	0	Animal	Dark, Street lights on, continuous lighting	Dry
186	02/21/2017	01:12 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
187	10/22/2017	03:47 PM	Property Damage Only	0	Fixed Object	Daylight	Dry
188	03/15/2018	09:33 AM	Injury	1	Left Turn/U-turn	Daylight	Dry
189	02/04/2016	09:20 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Wet
190	09/23/2016	07:20 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Wet
191	05/27/2017	12:38 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
192	01/27/2016	07:26 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, spot lighting	Dry
193	10/06/2016	04:09 PM	Injury	1	Overturn	Daylight	Dry
194	09/19/2018	04:06 PM	Injury	1	Pedalcyclist	Daylight	Dry
195	12/07/2018	06:17 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
196	02/12/2016	02:02 PM	Property Damage Only	0	Right Angle	-	Dry
197	09/18/2018	08:38 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
198	06/09/2018	03:18 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
199	08/22/2018	04:17 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
200	06/06/2017	12:30 PM	Injury	1	Same Direction (Side Swipe)	Daylight	Wet
201	05/22/2018	04:48 PM	Injury	1	Same Direction (Side Swipe)	Daylight	Wet

CRASH DIAGRAM (12 OF 12)

FINDERNE AVE/MAIN ST (CR 533) IN BRIDGEWATER TOWNSHIP
South Avenue to Chimney Rock Road

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S | **Exhibit A12**

Appendix E

Audit Team

Bridgewater - April 6th

Group 1 Pairs - Northern Section

Matthew Maher, Stantec

Tim Medina, Stantec

Ryan Walsh, FHI

Adam Bradford, Somerset County

Alicia Meyers, Somerset County

Fire Chief Michael Jannone

Robert Sutton, Somerset County Transportation

Pat Marotto, Somerset County

Jon Dugan, RideWise

Group 2 Pairs - Southern Section

Kati DiRaimondo, Stantec

Michael Ahillen, FHI

Kenneth Wedeen, Somerset County

Walter Lane, Somerset County

J Greco, Traffic Safety Officer

Virgilio Tan, NJDOT

Richard Shimp, Public Works Superintendent

William H Burr Township Engineer

Appendix F

Pre-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Pre-Audit,
Bridgewater Corridor
April 6, 2021

Bridgewater Township Pre-Audit Meeting

Introduction – Audit Team

- ***Funded by NJTPA***
- **Somerset County**
  - **Engineering and Planning**
  - **Board of County Commissioners**
  - **RideWise**
- **Bridgewater Township**
  - **Township Administration**
  - **Engineering and Planning**
  - **Public Works**
  - **Police and Fire Prevention**
- **NJDOT**
- **Stantec Consulting Services, Inc.**
- **FHI Studio**

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2-4 PM, Today
In-Field Road Safety Audit

Noon Tomorrow
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Today

Share Observations
Discuss Potential Improvements
10:00 AM, Tomorrow

Project Background

- **County initiatives for traffic safety**
- **Recommendations from RSAs to inform future…**
  - Studies
  - Improvements
  - Applications for funding

What is a Road Safety Audit (RSA)?

EVALUATION BY INDEPENDENT TEAM

IDENTIFIES CRASH TRENDS/CAUSES

PROPOSES POTENTIAL SAFETY IMPROVEMENTS

Steps of an RSA

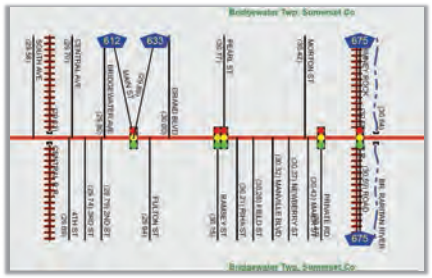
01	02	03	04	05	06	07	08
Select	Assemble	Conduct	Perform	Follow Up	Report	Present	Finalize
•Select Corridors with Stakeholder & Public Input	•Assemble RSA Team for Corridor	•Conduct Start-Up Meeting	•Perform In-Field Review	•Follow-Up on Observations •RSA De-Brief	•Report Findings •Analyze Findings	•Present Report to County	•Finalize RSA Report •County Responds

Pre-Audit Site Visit Post-Audit

Existing Conditions Data

Project Area

- Urban minor arterial
- 11′ - 12′ undivided travel lanes
- ~20,000 AADT
- Posted 40 mph speed limit



Land Use

Industrial/Manufacturing zones

Single/Multi-family detached residential area

Commercial neighborhood businesses

Six County shuttle lines

- Hillsborough to Bedminster (3)
- Branchburg to New Brunswick (1)
- Bound Brook to Somerville (2)

Redevelopment

- K9 Resorts Day Care & Luxury Hotel Bridgewater
- Eden Wood Realty, 220-unit apartment complex

Existing Conditions Feedback

- Relatively high share of truck traffic
- Aggressive driving behavior observed
- Difficulty for traffic turning onto Main Street
- Lack of pedestrian crossing locations
- Ponding on the corridor observed during rain
- Low lighting for peds/cyclists (cyclists sharing road)
- Parking lots, numerous curb cuts, lack of street trees
- Cut-through traffic in neighborhood SE of corridor
- Vehicular-centric environment at Finderne Avenue & Main Street

Safety Measures

FHWA Proven Safety Measures

Study-Focused Safety Measures

- Lighting
- Leading Pedestrian Intervals (LPI)
- Curb Extensions/ Bus Bulbs
- High Visibility Crosswalks
- Daylighting Crosswalks
- Turn Restrictions

Study-Focused Safety Measures

- Walkways for Sidewalk Gaps
- Bike Lanes
- Green Stormwater Infrastructure
- Dedicated Turn Lanes
- Lane Width Reduction/Road Diet

Safety Measures Feedback

- **Lighting:**
  - Crashes occurring at night; light positioning needs improvement
  - Pedestrian/residential lighting important
- **Curb Extensions/ Bus Bulbs:**
  - Finderne/Main intersection prime candidate
  - Truck turning radii at Finderne/Main should be considered
- **Daylighting and Crosswalks:**
  - Crosswalks/utilities should be highlighted at all locations
- **Walkways for Sidewalk Gaps:**
  - Consolidate driveways to improve sidewalk continuity
  - Sidewalk maintenance concerns

Safety Measures Feedback, cont'd

- **Dedicated Turn Lanes:**
  - Dedicated left turn or roundabout considered for Chimney Rock Road
  - Interest for center turn lanes
- **Leading Pedestrian Intervals (LPI):**
  - Suggestion for LPI at Finderne/Main intersection
  - Public education for motorists is key
- **High Visibility Crosswalks:**
  - No existing high visibility crosswalks; good opportunity for placemaking
  - High visibility crosswalks can result in conflict reduction
- **Bike Lanes:**
  - Participants support bike lanes provided there is enough space
  - Bike and heavy truck traffic are a concern

Safety Measures Feedback, cont'd

- **Lane Width Reduction/Road Diet:**
  - Lane width reductions are appropriate in this area
- **Additional Comments:**
  - Safety improvements included…
  - Backplates at signals to improve nighttime/bad weather visibility
  - Park on the northwest corner of Finderne/Main could be improved

Public/ Stakeholder Improvement Feedback

Safety Measure	Effectiveness (1= not effective; 10= very effective)	Ease of Implementation (1=hard; 10= easy)
Lighting	10	2
Curb Extensions/Bus Bulbs	4	2
Daylighting and Crosswalks	10	10
Walkways for Sidewalk Gaps	10	2
Dedicated Turn Lanes	8	2
Leading Pedestrian Intervals (LPI)	10	10
High Visibility Crosswalks	10	10
Turn Restrictions	8	5
Bike Lanes	8	9
Lane Width Reduction/Road Diet	10	9

Crash Data

Crash Data - Statistics

- **All Crashes 2016-2018**
  - **201 Total Crashes**
  - **Overrepresentations:**
    - **Injury**
    - **Left Turn & Sideswipe**
- **Pedestrian Crashes 2014-2018**
  - **5 Total Crashes**

NJTPA Network Screening List (NSL) Crash Ranking

Overall Crash Data

Intersections

- #**1st** Main/Finderne
- #**77th** Chimney Rock Road

Corridor Segments

- #**4th** MP 29.27-30.27

Pedestrian/Bike Crash Data

Intersections

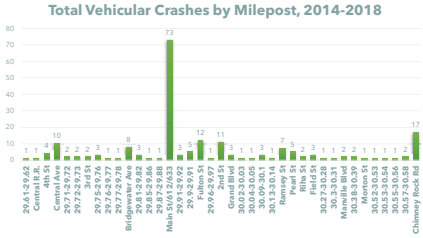
- #**11th** Main/Finderne
- #**72nd** Bridgewater Avenue *(tie)*
- #**72nd** Fulton Avenue *(tie)*

Corridor Segments

- #**18th** MP 29.60-30.60

Bridgewater Township - Histogram

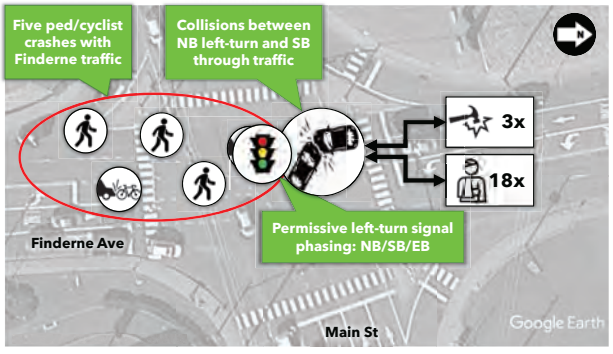
Total Vehicular Crashes by Milepost, 2014-2018



- **3x Left/U-turn** collisions
- **2x Sideswipe** collisions
- **63%** @ Finderne/Main **Left Turn** or **Rear-End** crashes

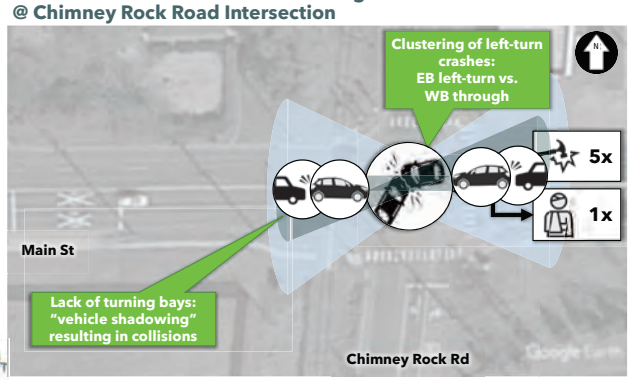
Crash Trends

Finderne Avenue/Main Street in Bridgewater @ Finderne/Main Intersection



Crash Trends

Finderne Avenue/Main Street in Bridgewater @ Chimney Rock Road Intersection



Conducting the Audit

Guidelines & Safety

Be Observant & Alert
- Vehicles
- Wet Surfaces

Be Seen
- Face Traffic
- Avoid Sudden Movements
- Stick to Sidewalks

Be Respectful
- Traffic (Vehicular, Pedestrian, Cyclist)
- Motorists
- Property

PPE
- High Visibility Vest
- Proper Face Coverings
- Social Distancing (1 occupant/veh.)

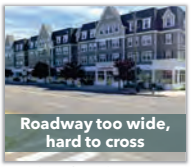
What to Bring/Wear to the Field

COMFORTABLE CLOSED SHOES	WEATHER CONSCIOUS	HIGH VISIBILITY VESTS	DOCUMENTING MATERIAL
		• Bring your own	• Smartphone • Pen/Pencil • Paper/notepad

What to Look for - Audit Form

What to Look for - Photos

What to Look for - Photos



How to Record Observations

- Photograph
- Pen/Pencil Paper
- Video
- Mobile Device
- Mental

BE SPECIFIC!!!

Agenda: Schedule of Activities

10:00 AM, Today
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Noon Tomorrow
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Today

Share Observations
Discuss Potential Improvements
10:00 AM, Tomorrow

Questions?

Appendix G

Post-Audit Survey

Participant Survey - Average Scores

As you near the end of the audit, rate how the following items impact your level of comfort.
(1: makes me uncomfortable; 4: makes me comfortable; N/A: issue does not exist along this corridor)

Category	Item	Bridgewater	Franklin	Millstone	North Plainfield	Raritan
Corridor Identity	**Average**	**2.3**	**2.4**	**2.7**	**3.2**	**2.7**
Corridor Identity	Activities and uses	2.3	2.6	3.0	3.2	2.5
Corridor Identity	Condition of buildings	2.6	2.3	3.0	3.3	2.5
Corridor Identity	Perception of personal safety	1.9	2.4	2.0	3.0	3.0
Crossings	**Average**	**2.2**	**2.3**	**2.3**	**2.3**	**2.4**
Crossings	Crossing guards	2.5	3.0	-	2.7	3.0
Crossings	Missing or inoperable pedestrian/audible signal	1.9	2.0	2.0	3.0	3.5
Crossings	Pedestrian signal crossing time	2.7	3.0	3.0	2.6	2.6
Crossings	Poorly marked or missing crosswalk	1.7	1.6	1.7	1.7	2.3
Crossings	Presence of curb ramps for strollers/wheelchairs	1.7	1.9	1.0	1.9	2.3
Crossings	View of traffic is blocked	2.0	2.6	2.3	2.1	1.6
Crossings	Wait time for pedestrian signal	2.9	2.8	3.0	2.8	2.4
Pedestrian-Vehicle Interactions	**Average**	**1.6**	**2.1**	**1.9**	**2.8**	**2.5**
Pedestrian-Vehicle Interactions	Amount of traffic	1.7	2.1	2.3	3.0	2.6
Pedestrian-Vehicle Interactions	Bicycling on the sidewalk	1.3	4.0	2.0	2.1	2.9
Pedestrian-Vehicle Interactions	Driver behavior (distracted, did not yield to pedestrians, etc.)	2.1	2.0	2.7	3.0	2.1
Pedestrian-Vehicle Interactions	Noise level due to auto traffic	1.2	2.0	1.3	2.9	2.1
Pedestrian-Vehicle Interactions	Presence of trucks or large vehicles	1.7	2.0	1.7	2.8	2.8
Pedestrian-Vehicle Interactions	Speed of traffic	1.4	2.1	1.3	2.5	2.5
Sidewalk/Roadway Condition	**Average**	**2.3**	**2.7**	**2.6**	**2.6**	**2.9**
Sidewalk/Roadway Condition	Areas on roadway with poor drainage	3.1	2.9	2.5	3.0	2.6
Sidewalk/Roadway Condition	Areas on sidewalk with poor drainage	3.0	2.8	2.0	2.9	2.6
Sidewalk/Roadway Condition	Buffer area between sidewalk and traffic	1.5	2.4	2.3	2.5	3.1
Sidewalk/Roadway Condition	Guide rails/protection systems	2.0	3.3	3.0	2.3	2.5
Sidewalk/Roadway Condition	Intersection configuration	2.1	2.7	3.0	2.8	2.7
Sidewalk/Roadway Condition	Obstacles blocking sidewalk (utilities/trees)	2.9	2.5	3.0	2.6	2.9
Sidewalk/Roadway Condition	Roadway condition	2.8	3.1	2.7	3.0	3.3
Sidewalk/Roadway Condition	Roadway width	2.2	2.8	3.0	3.0	3.3
Sidewalk/Roadway Condition	Sidewalk condition	1.9	2.3	1.7	1.8	2.9
Sidewalk/Roadway Condition	Sidewalk width	2.2	2.6	2.7	2.4	3.1
Streetscape Amenities	**Average**	**2.0**	**2.5**	**3.2**	**2.5**	**3.2**
Streetscape Amenities	Benches or places to rest, trash cans	1.5	2.8	N/A	1.1	3.8
Streetscape Amenities	Lighting (for pedestrians)	1.9	2.0	3.0	2.4	3.7
Streetscape Amenities	Lighting (for vehicles)	2.4	2.5	2.7	2.9	2.7
Streetscape Amenities	Presence of directional/regulatory signage	2.4	2.3	3.7	2.8	2.7
Streetscape Amenities	Street trees and landscaping	1.9	3.0	3.5	2.9	3.2

Appendix H

Post-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Post-Audit,
Bridgewater Corridor
April 8, 2021

Bridgewater Township Post-Audit Meeting

Agenda: Schedule of Activities

10:00 AM, Yesterday
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Yesterday
In-Field Road Safety Audit

Noon Today
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Yesterday

Share Observations
Discuss Potential Improvements
10:00 AM, Today

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

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Field Photography/Videos

Field Photography/Videos

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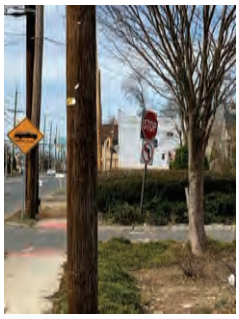
Field Photography/Videos

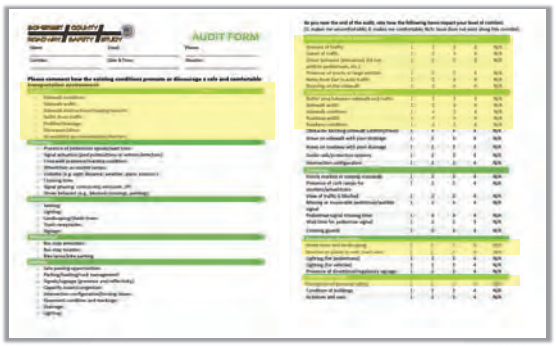


Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Prompt List Discussion



"What operational/safety issues did you note on the corridor?"

"What makes travel on the corridor difficult ?"

- For drivers?
- For non-drivers?
- For people with disabilities?
- For families with small children?
- For transit riders?

"What pedestrian/cyclist connectivity issues were observed?"

Recommendations Discussion

"WHAT SAFETY IMPROVEMENTS DO YOU PROPOSE FOR REDUCING CRASHES?"

"WHAT IS YOUR VISION FOR THE CORRIDOR? HOW SHOULD IT LOOK IN 10 YEARS?"

"WHAT ARE THE SHORT-TERM CHANGES THAT COULD BE MADE NOW?"

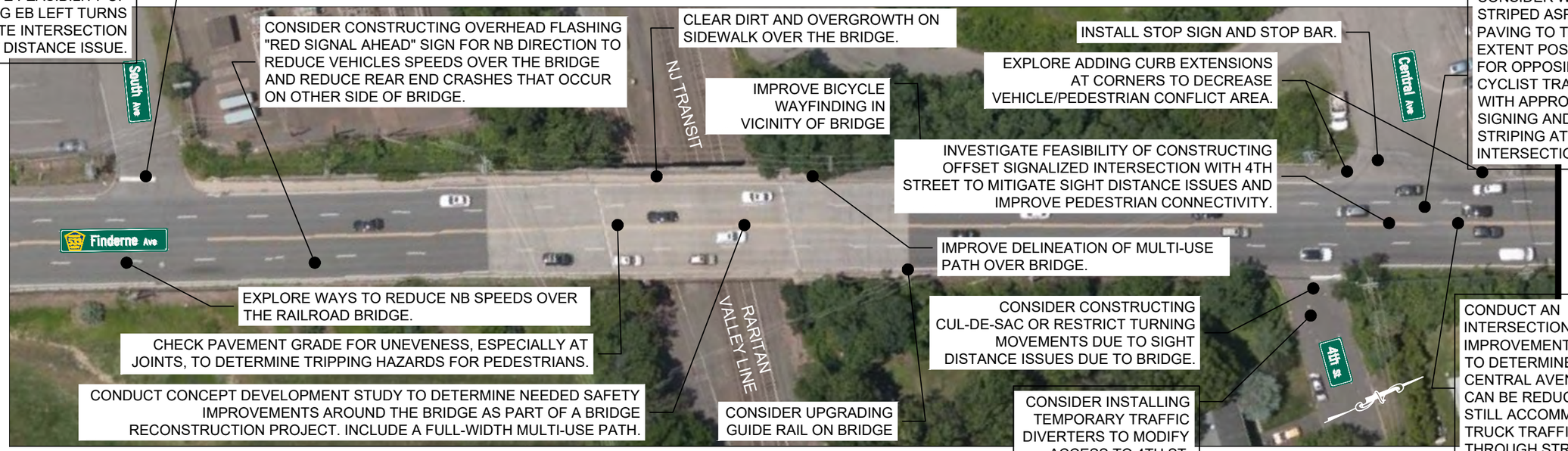
Next Steps

- Produce RSA Reports
- Implementation Matrix
- Final Study Report
- Conduct Follow-Up Public/TAC Meetings

Extra Slides

Appendix I

Recommendations from Implementation Matrix



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ORIGINAL SHEET - ANSI B

July, 2021
192510854

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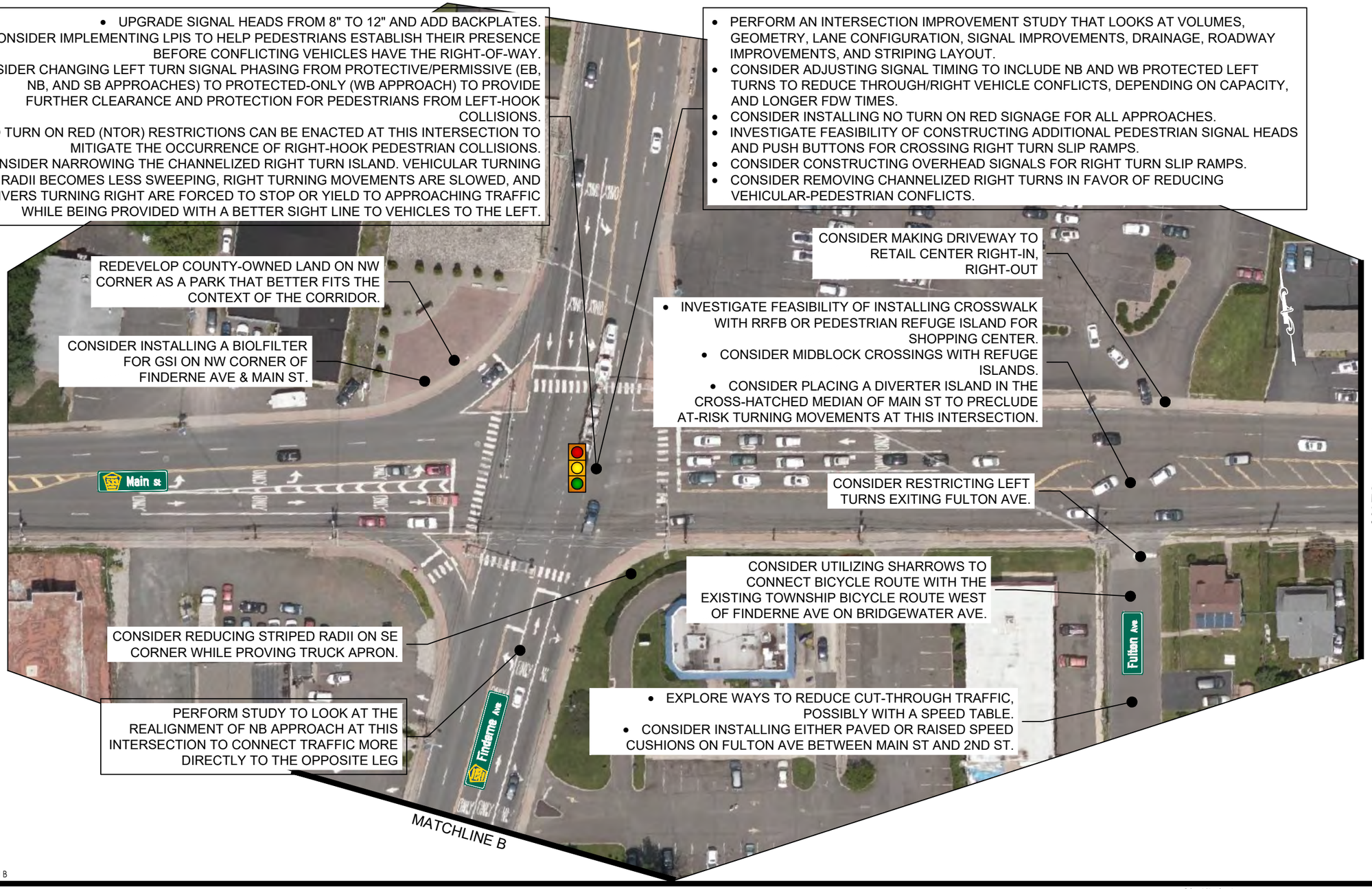
www.stantec.com

Client/Project
Somerset County/ NJTPA
Somerset County Roadway Safety Study
Finderne Avenue/ Main Street (CR 533)

Sheet No.
1 of 5

Title
Bridgewater Twp RSA Recommendations
Scale: 1" = 60'



- UPGRADE SIGNAL HEADS FROM 8" TO 12" AND ADD BACKPLATES.
- CONSIDER IMPLEMENTING LPIS TO HELP PEDESTRIANS ESTABLISH THEIR PRESENCE BEFORE CONFLICTING VEHICLES HAVE THE RIGHT-OF-WAY.
- CONSIDER CHANGING LEFT TURN SIGNAL PHASING FROM PROTECTIVE/PERMISSIVE (EB, NB, AND SB APPROACHES) TO PROTECTED-ONLY (WB APPROACH) TO PROVIDE FURTHER CLEARANCE AND PROTECTION FOR PEDESTRIANS FROM LEFT-HOOK COLLISIONS.
- NO TURN ON RED (NTOR) RESTRICTIONS CAN BE ENACTED AT THIS INTERSECTION TO MITIGATE THE OCCURRENCE OF RIGHT-HOOK PEDESTRIAN COLLISIONS.
- CONSIDER NARROWING THE CHANNELIZED RIGHT TURN ISLAND. VEHICULAR TURNING RADII BECOMES LESS SWEEPING, RIGHT TURNING MOVEMENTS ARE SLOWED, AND DRIVERS TURNING RIGHT ARE FORCED TO STOP OR YIELD TO APPROACHING TRAFFIC WHILE BEING PROVIDED WITH A BETTER SIGHT LINE TO VEHICLES TO THE LEFT.

- PERFORM AN INTERSECTION IMPROVEMENT STUDY THAT LOOKS AT VOLUMES, GEOMETRY, LANE CONFIGURATION, SIGNAL IMPROVEMENTS, DRAINAGE, ROADWAY IMPROVEMENTS, AND STRIPING LAYOUT.
- CONSIDER ADJUSTING SIGNAL TIMING TO INCLUDE NB AND WB PROTECTED LEFT TURNS TO REDUCE THROUGH/RIGHT VEHICLE CONFLICTS, DEPENDING ON CAPACITY, AND LONGER FDW TIMES.
- CONSIDER INSTALLING NO TURN ON RED SIGNAGE FOR ALL APPROACHES.
- INVESTIGATE FEASIBILITY OF CONSTRUCTING ADDITIONAL PEDESTRIAN SIGNAL HEADS AND PUSH BUTTONS FOR CROSSING RIGHT TURN SLIP RAMPS.
- CONSIDER CONSTRUCTING OVERHEAD SIGNALS FOR RIGHT TURN SLIP RAMPS.
- CONSIDER REMOVING CHANNELIZED RIGHT TURNS IN FAVOR OF REDUCING VEHICULAR-PEDESTRIAN CONFLICTS.

REDEVELOP COUNTY-OWNED LAND ON NW CORNER AS A PARK THAT BETTER FITS THE CONTEXT OF THE CORRIDOR.

CONSIDER INSTALLING A BIOLFILTER FOR GSI ON NW CORNER OF FINDERNE AVE & MAIN ST.

CONSIDER MAKING DRIVEWAY TO RETAIL CENTER RIGHT-IN, RIGHT-OUT

- INVESTIGATE FEASIBILITY OF INSTALLING CROSSWALK WITH RRFB OR PEDESTRIAN REFUGE ISLAND FOR SHOPPING CENTER.
- CONSIDER MIDBLOCK CROSSINGS WITH REFUGE ISLANDS.
- CONSIDER PLACING A DIVERTER ISLAND IN THE CROSS-HATCHED MEDIAN OF MAIN ST TO PRECLUDE AT-RISK TURNING MOVEMENTS AT THIS INTERSECTION.

CONSIDER RESTRICTING LEFT TURNS EXITING FULTON AVE.

CONSIDER UTILIZING SHARROWS TO CONNECT BICYCLE ROUTE WITH THE EXISTING TOWNSHIP BICYCLE ROUTE WEST OF FINDERNE AVE ON BRIDGEWATER AVE.

CONSIDER REDUCING STRIPED RADII ON SE CORNER WHILE PROVING TRUCK APRON.

PERFORM STUDY TO LOOK AT THE REALIGNMENT OF NB APPROACH AT THIS INTERSECTION TO CONNECT TRAFFIC MORE DIRECTLY TO THE OPPOSITE LEG

- EXPLORE WAYS TO REDUCE CUT-THROUGH TRAFFIC, POSSIBLY WITH A SPEED TABLE.
- CONSIDER INSTALLING EITHER PAVED OR RAISED SPEED CUSHIONS ON FULTON AVE BETWEEN MAIN ST AND 2ND ST.

MATCHLINE B

MATCHLINE C

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Sheet No.
2 of 5

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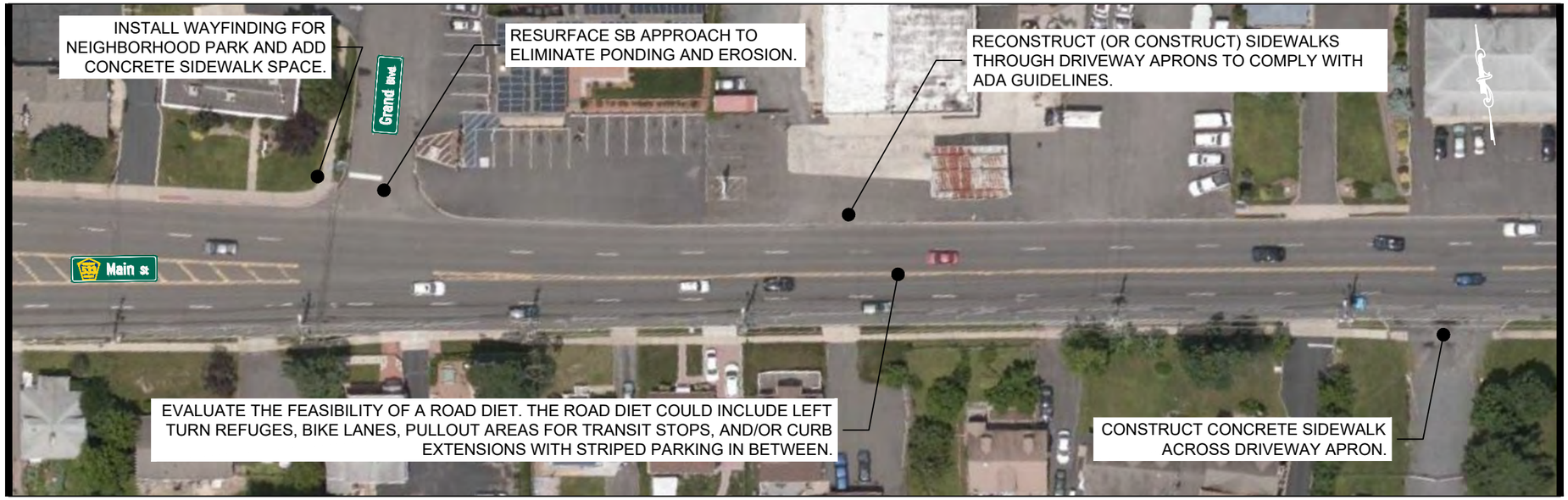

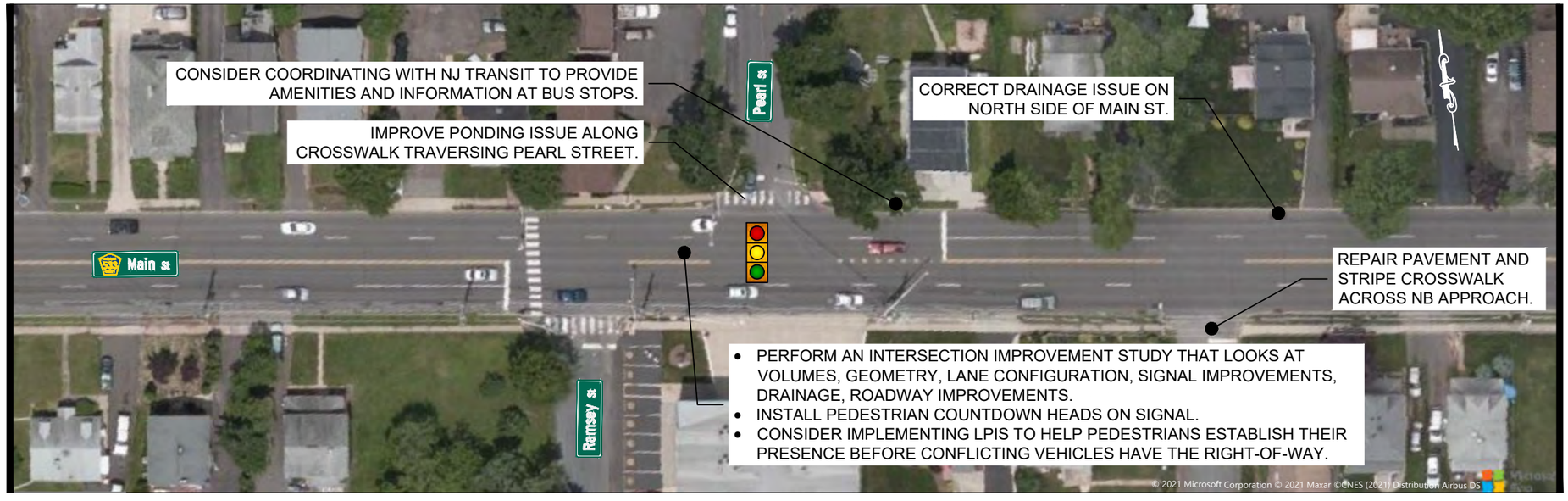

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3 of 5

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Sheet No.
5 of 5

Title
Bridgewater Twp RSA Recommendations
Scale: 1" = 60'

Appendix J

Road Owner Response

Somerset County Response to the Finderne Avenue/Main Street (CR 533) in Bridgewater Township Road Safety Audit (owner's response)

Somerset County agrees with the recommendations of the Road Safety Audit. The County strives to make our roads safer for all users and is willing to investigate any recommendations that can assist in achieving that goal. Our agreement with the assessment should in no way be perceived as a commitment to the implementation of such suggestions. The following general points should be noted:

- Somerset County does not maintain or inspect sidewalks, street lighting, landscaping, or parking facilities along county roadways. That responsibility lies with the municipality or property owner.
- Some recommendations may not be warranted or feasible due to engineering or fiscal constraints. Additional analysis is necessary.

Somerset County Roadway Safety Study
Subregional Project

ROAD SAFETY AUDIT REPORT

FRANKLIN BOULEVARD IN FRANKLIN TOWNSHIP

NJTPA

SOMERSET COUNTY

November 2021

Executive Summary

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has conducted the Somerset County Roadway Corridor Safety Analysis study. The study will advance the County's efforts to address pedestrian, bicycle, and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. This RSA report has been prepared for the Franklin Boulevard corridor (Somerset County Route 617, CR 617), from New Jersey State Route 27 (Route 27) at MP 0.0 to Belmar Street at MP 1.0, in Franklin Township. According to the compiled crash data, 214 crashes occurred on the 1-mile segment analysis area during the 3-year vehicle and 5-year pedestrian crash analysis period.

The pre-audit meeting was held at 10:00 AM via video conferencing on Thursday, March 25th, 2021, on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. Participants were paired off with each other to walk halves of the corridor. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as safety measures to address potential safety concerns. On the following day (Friday, March 26th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit to discuss each potential safety concern, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study.

Discussions from the RSA process helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report, which serves as a record of items discussed during the post-audit meeting. Major findings (or recommendations) from these discussions included:

- Mountable curbs at Route 27 and Hamilton Street intersections to balance ped safety and truck usage;
- Implementation of sidewalk/lighting from Route 27 to Fuller Street for improved pedestrian connections;
- New sidewalks, with narrowing of curb cuts, on east side of corridor from Frank Street to Hamilton Street;
- Speed humps on Ellen Street to discourage cut-through traffic around Hamilton Street intersection;
- Changes to lane alignments, setbacks, and signal/utility poles at Hamilton Street intersection;
- Additional striping on the existing bike lane (buffer/text) north of Hamilton Street; and,
- Refresh of striping/signing/crossings and improved sidewalks on approach to Hillcrest Elementary.

A key recommendation from this RSA was to investigate the feasibility of a road diet with bike lanes on Franklin Boulevard from Route 27 to Hamilton Street, as recommended by prior County studies. Since Franklin Boulevard has an AADT of 16,000, thorough intersection-by-intersection capacity analysis, design, administrative approval, and public vetting is needed to ensure the efficacy and success of the road diet. Since the curb-to-curb cartway width is limited at approximately 44' to 46', bike lanes would not be able to have a buffer and could be of substandard width. An alternate option to dedicating shoulder width available from the road diet to bicycle travel would be to restrict use of shoulders by parked vehicles and to provide curb extensions (in line with shoulder widths) at intersections to reduce pedestrian crossing distance.

Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process and are meant to be a record of ideas discussed. As these recommendations are considered for advancement into either a Concept Development (CD) study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices.

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I. Introduction

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has conducted the Somerset County Roadway Corridor Safety Analysis study. The study will advance New Jersey's efforts to address pedestrian/bicycle and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. One of the locations that have been selected is the Franklin Boulevard corridor (Somerset County Route 617, CR 617), from New Jersey State Route 27 (Route 27) at MP 0.0 to Belmar Street at MP 1.0, in Franklin Township.

The purpose of this RSA Report is to detail the site selection, road/multimodal inventory, land use investigation, crash data collection, crash analysis efforts, post/pre-audit meetings, and in-field RSA investigation conducted for the Franklin Boulevard corridor. Flowing from this RSA is a list of potential recommendations proposed to improve safety. These recommendations were based on the investigated crash data, as well as recommendations made during the in-field RSA and post-audit meeting. This introduction serves to provide background on selection of the investigated corridor and covers the logistics of the RSA process that was performed. This RSA report also seeks to provide sample figures of improvements and crash countermeasures that could be considered as the County, or municipality, seeks to move forward on its Concept Development (CD) and/or Local Safety Program grant (or other funding) application. Please note, in applying these ideas to the corridor, design of such improvements, conceptual or otherwise, is the responsibility of the designated jurisdiction as is standard RSA practice.

A. Site Selection

Selection of the Franklin Boulevard corridor was based on a rigorous process which started with a list of top crash segments for the County from NJTPA's Network Screening Lists (NSL)[1] and used supporting collision data, equity data, recommendations from prior studies, and public/stakeholder input to develop a shortlist of top crash segments. Segments with recently constructed safety improvements or locations undergoing study/design were identified through discussions with County Engineering and removed from this shortlist to target segments not currently being considered. The remaining locations were further prioritized and ranked with more recent crash severity and frequency data (old crash data from NSL superseded with more recent crash data from Safety Voyager), traffic volume data from NJTPA's regional travel demand model (NJRTM-E), and environmental justice data from NJTPA.

Input on these top crash locations was obtained through the Public Involvement Plan for this project, which included gathering information from the public via a virtual mapping tool and project email address and gathering information from a Technical Advisory Committee (TAC)[2] via an initial virtual meeting conducted in August 2020. Based upon public and stakeholder input, the following (5) segment locations (including the segment being studied in this report) were selected to be advanced for RSA review:

1. Finderne Avenue/Main Street (CR 533) in Bridgewater Township, MP 29.60-30.60
2. Franklin Boulevard (CR 617) in Franklin Township, MP 0.00-1.00
3. Somerset Street (CR 626) in Raritan Borough, MP 0.00-0.67
4. Greenbrook Road (CR 636) in North Plainfield Borough, MP 0.70-1.97
5. Main Street (CR 533) in Millstone Borough, MP 25.14-25.87

Franklin Boulevard was selected based on the relatively high crash frequency on this corridor, equity data, and pedestrian/cyclist crash frequency. Furthermore, this location was identified within the *Supporting Priority*

[1] https://www.njtpa.org/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/Local-Safety-Program/Network-Screening-Lists.aspx Top crash segment lists on this webpage are based upon a programmatic analysis of statewide locations utilizing 2014-2018 crash data.
[2] Stakeholders on the TAC include NJDOT, NJ TRANSIT, FHWA, RideWise, AARP, Vorhees Transportation Center, and various County advocates.

Investment in Somerset County, Phase III (2017) study, which proposed a road diet and/or speed reduction on Franklin Boulevard between Route 27 and Lewis Avenue. **Table 1** shows the selected segment, or intersections, that qualified as one of the top 100 crash locations[1] in the County based on either overall crash data for the years of 2016 through 2018 or pedestrian/cyclist crash data for the years of 2014 through 2018 as listed on the NSLs.

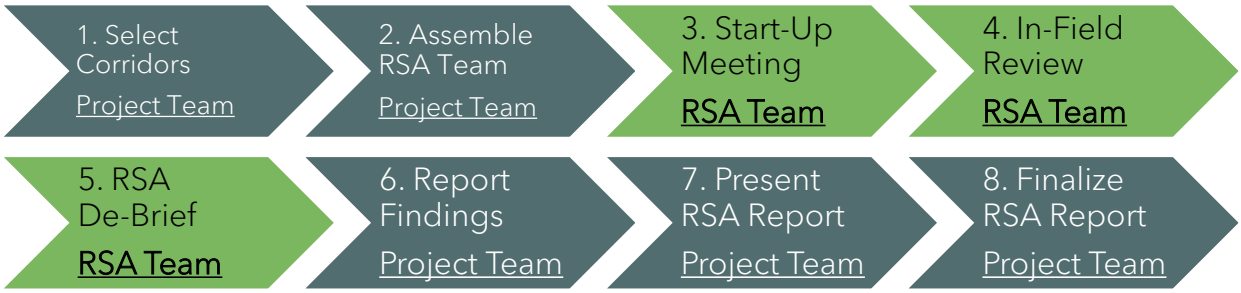
Table 1 – Franklin Boulevard NJTPA 2019 NSL Rankings for Somerset County

Corridor Segments Overall Crash Data	Corridor Segments Ped/Bike Crash Data	Intersection Locations Overall Crash Data	Intersection Locations Ped/Bike Crash Data
#11, MP 0.0-1.0	#34, MP 0.2-1.2	Hamilton St (#7)	Hamilton St (#13)
		Fuller St (#46)	Norma Avenue (#36)
		Pine St (#85)	Viking Avenue (#76)

B. What is a Road Safety Audit (RSA)?

An RSA is a formal safety performance examination of an existing or future road or intersection by a multi-disciplinary audit team, including public works, law enforcement, emergency medical services, engineering, planning, and advocacy staff. It qualitatively estimates and reports on existing and potential road safety issues and identifies opportunities for improvements in safety for all road users. RSAs can be used on any size project, from minor maintenance to mega-projects, and can be conducted on facilities with a history of crashes during the design phase of a new roadway or planned upgrade. RSAs consider all road users, account for human factors and road user capabilities, are documented in a formal report, and require a formal response from the road owner. **Figure 1** shows the steps employed by the County to complete the RSA, as informed by the Federal Highway Administration's (FHWA's) RSA process. The steps that traditionally consist of an in-field review of conditions with an RSA team are highlighted in green in **Figure 1**.

Figure 1 – Eight-Step RSA Process as Adopted from FHWA RSA Process



The RSA program is conducted to identify potential countermeasures for roadway segments demonstrating a history of, or potential for, a high frequency of crashes, or an identifiable pattern of crash types. Recommendations range from low-cost, quick-turnaround safety improvements to more complex strategies, which are all codified in this report within an Implementation Matrix, categorizing improvements by timeline, cost, and jurisdiction. Implementation of improvement strategies identified through this process may be eligible for Local Federal Aid Safety Funds. Because the RSA process is adaptable to local needs and conditions, recommendations can be implemented incrementally as time and resources permit. Please note that the RSA process does not include the design or thorough evaluation of improvements that are being considered, conceptual or otherwise. Following the eighth and final step of the RSA process, it will be incumbent for the designated jurisdiction to start to evaluate and design the potential improvements presented herein, as is standard RSA practice.

At the request of NJTPA, RSAs originally planned for Fall 2020 were postponed to Spring 2021 due to the COVID-19 pandemic. In addition to postponement, the County took additional steps to safely conduct this

RSA. Both the start-up meeting and RSA de-brief (steps #3 and #5 shown in **Figure 1**), which are traditionally conducted in-person, were conducted virtually via video conferencing to reduce the exposure and potential risk of disease transmission. Furthermore, the essential step of in-field review was conducted in a socially distanced manner with participants paired off in groups spaced more than six feet apart from each other. All in-field RSA participants were masked for the entire duration of the field visit to further reduce the risk of disease transmission. Through this process, the post-audit "de-brief" meeting benefitted from being held virtually after the day on which the in-field review was conducted.

Some notable benefits produced by a virtual post-audit included:

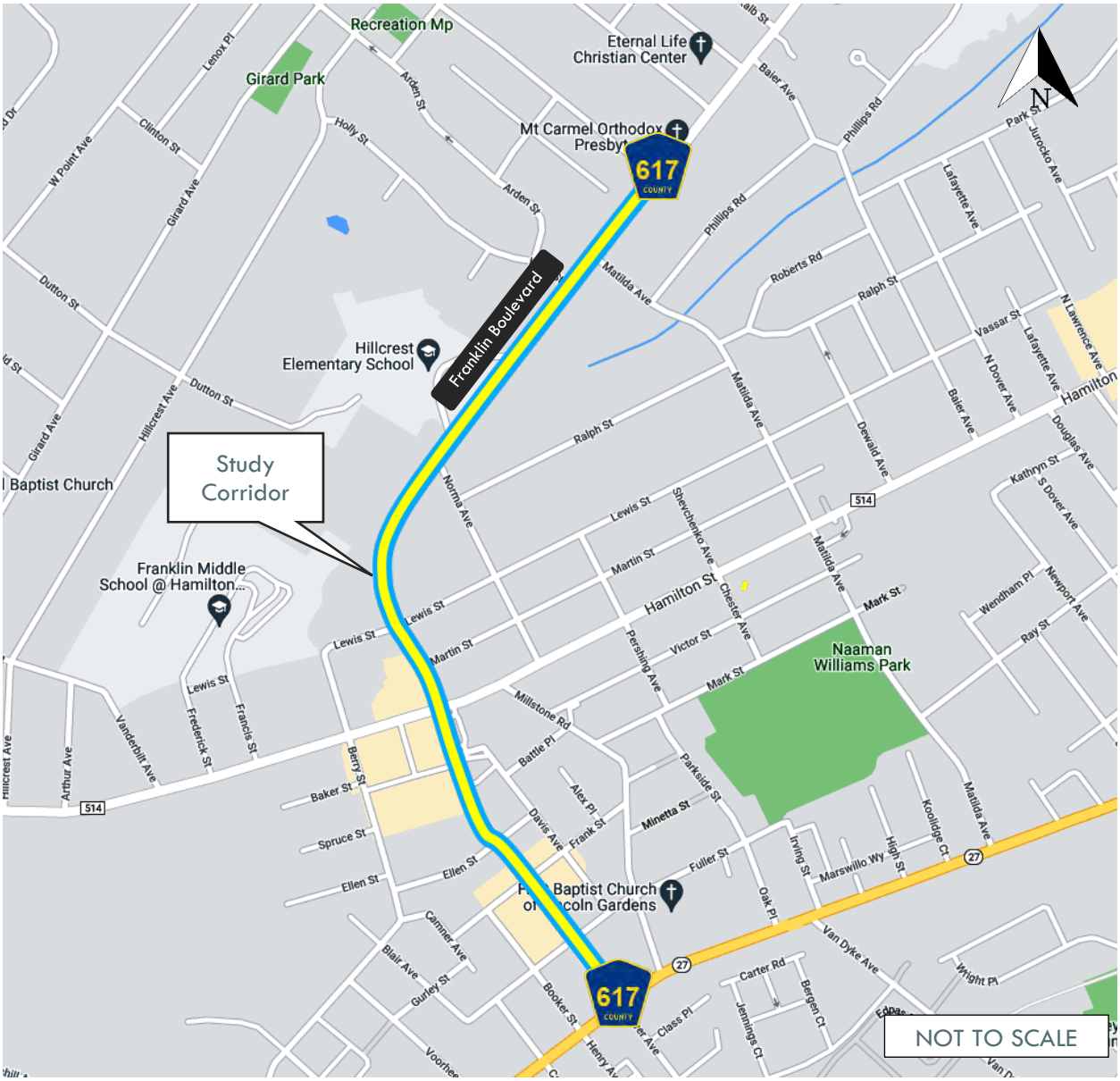
- Additional time for participants to share photos, videos, and scans of their observations;
- Available screensharing for quick review and consensus of RSA observations;
- An involved discussion of the observations and recommendations was well established by the wide audience of stakeholders;
- Additional time for participants to process their observations and organize their thoughts for discussion.

II. Corridor Description & Analysis

A. Study Location

The study area consists of one mile of CR 617 (Franklin Boulevard) extending from the municipal/County border with New Brunswick City/Middlesex County at the intersection with Route 27 at MP 0.0 to a few hundred feet south of the intersection with Belmar Street at MP 1.0 (**Figure 2**). A straight line diagram of the corridor is provided in **Appendix A**. The identified segment is in the Township of Franklin in the County of Somerset. Franklin Boulevard transitions from a more urban land use context with dense mixed-use zoning and commercial zoning on the southern end to a more suburban land use context with apartment complexes, single-family detached housing, churches, and schools on the northern end.

Figure 2 – Study Area Location Map



Major vehicle and pedestrian trip generators on this corridor include Hillcrest Elementary School and The Arbors at Franklin Township at the northern end of the corridor and the DeForest B. Soaries Jr. Senior

Complex, strip malls, and mixed-use residential housing (including Franklin Boulevard Commons) at the southern end of the corridor. Of note, the section of Franklin Boulevard that intersects Hamilton Street is part of the Hamilton Street Special Improvement District (SID) and has been identified as a Priority Growth Investment Area (PGIA) by the County. Hamilton Street (CR 514), from Franklin Boulevard to the border with the City of New Brunswick is also part of a NJTPA Local Safety Program grant currently under design.

B. Roadway and Intersection Characteristics

Franklin Boulevard is classified by the New Jersey Department of Transportation (NJDOT) as an urban minor arterial and has a posted speed of 40 mph with an advisory school posted speed signing of 25 mph in the vicinity of Hillcrest Elementary School, which flashes when school is in session. The corridor study section between Route 27 and Hamilton Street generally consists of four 10'-11' travel lanes (two in each direction) undivided with no shoulders on either side. From Hamilton Street to the north, the road generally consists of two 11' travel lanes (one in each direction) with a 9' shoulder in each direction signed for bicycle usage. There is no on-street parking provided. There are two signalized and twelve unsignalized intersections along the corridor.

C. Existing Bicycle/Pedestrian Accommodations

For the most part, sidewalks are generally available along at least one side of the road and consist of both bituminous and concrete paving and greatly vary in width. One gap in sidewalk continuity on both sides of the road was noted to exist between Route 27 and Fuller Street on the southernmost block of the corridor; worn paths along the side of the road here indicate pedestrian and cyclist traffic here. Just north of this block, there are both coverage and gaps in the sidewalk on the east and west sides of the road; however, Franklin Boulevard lacks crosswalks and curb ramps to facilitate continuity of ADA-compliant paths. Sidewalk south of Hamilton Street is also interrupted by numerous wide driveway curb cuts, which increase pedestrian exposure to potential vehicle conflicts.

North of Hamilton Street, better sidewalk continuity, more frequent pedestrian curb ramps, and more frequent side/main street crosswalks are provided. Furthermore, a 9' shoulder is signed to allow bicycle usage. Despite this, the lack of street space provided for cyclists south of Hamilton Street and the relatively high travel speeds and traffic volumes on the road in general, Franklin Boulevard was classified in the recent *WalkBikeHike* (2019) study as having a Bicycle Level of Traffic Stress of 4, which is representative of cycling travel conditions that are comfortable to the most risk-tolerant riders.

Traffic signs alert drivers to potential school crossings during school arrival and dismissal times. A review of Google Streetview images from September 2019 shows vegetative overgrowth on sidewalks on the east side of the road in the vicinity of Norma Avenue, greatly narrowing the traversable width of the sidewalk. Sidewalk coverage is provided on the west side of the road north of Norma Avenue, which then switches over to the east side of the road at the Holly Street intersection via a signed striped continental crosswalk. Sidewalk coverage on the east side of the road continues to the northern end of the segment.

D. Traffic Volumes

According to traffic data available from NJDOT[3] count stations #111815 and 111816, Average Annual Daily Traffic (AADT) on Franklin Boulevard can range from approximately 12,000 to 16,000 vehicles per day. Supporting count data from NJDOT is provided in **Appendix B**. This figure is supported by traffic volume estimates from NJTPA's NJRTM-E travel demand model, which provides an AADT estimate of 15,000 based upon 2020 pre-COVID-19 conditions.

[3] AADT data obtained from https://www.njtms.org/map/.

E. Transit Service[4]

There are no transit services on this section of Franklin Boulevard. The NJ TRANSIT Jersey Avenue Train Station with Northeast Corridor Line service is located approximately one mile southeast of the Franklin Boulevard corridor. The corridor is more directly served by the County's CAT 1R bus service (which runs from New Brunswick to Branchburg/Raritan Valley Community College, while also running through Somerville, Bound Brook, South Bound Brook, and Franklin) near the Hamilton Street intersection via a bus stop at the Franklin Court strip mall located in the southwest quadrant of the Hamilton Street intersection (MP 0.34).

Although a nearside (that is, in advance of the intersection) bus stop with shelter and trash can amenities is located on the eastbound side of Hamilton Street at the intersection with Franklin Boulevard and is signed as having Suburban Transit bus service, current Suburban Transit bus service schedules and Google Maps transit data show that this bus service has relocated from the Hamilton Street corridor to the Route 27 (Somerset Street) corridor. Suburban Transit bus service on Route 27 has an inbound (that is, bound for New York City) nearside bus stop located at its intersection with Franklin Street, with the corresponding outbound bus stop located approximately one block (400') to the east. Suburban Transit Line 100 services these bus stops with weekday service between Princeton and the Port Authority Bus Terminal in New York City with hourly headways during AM and PM peak periods. The New Brunswick Park and Ride, located approximately ¼-mile to the east along Route 27 near Matilda Avenue, has additional Suburban Transit service, including Lines 100, 500, and 600, all providing service to different commuter destinations throughout New York City.

F. Community Profile

Population and income characteristics from the American Community Survey (ACS), an update to the 2010 Census performed by the U.S. Census Bureau, were used to identify Environmental Justice populations. The latest ACS for this study area is a five-year estimate from 2015 through 2019 for County Census Tracts 532 and 533. A summary of the demographics is listed in **Table 2**. The Equity Analysis conducted for the Somerset County Roadway Corridor Safety Analysis highlighted this corridor as an Environmental Justice focus area based upon the share of minority residents living within a ¼-mile buffer of the corridor.

Table 2 – Franklin Boulevard RSA Study Area Demographics

Characteristic		Census Tract Average	County Average
Below Poverty Level[5]		15.2%	5.1%
Race/ Ethnicity[6]	White	30.6%	66.3%
	Asian American	8.1%	17.7%
	Black or African American	46.4%	9.7%
	American Indian/Alaskan	1.0%	0.3%
	Other	13.9%	6.0%
	Hispanic/Latino (Ethnicity)	32.1%	14.7%
Limited English Proficiency (LEP)[7]		2.8%	4.4%
Use Public Transportation[8]		4.9%	5.3%
Zero Vehicle Households[7]		2.0%	2.1%

Although nearby transit service is available, the study area population is very car-dependent compared to the County average due to limited nearby transit service. Furthermore, lack of sidewalk connectivity towards the southern end of the corridor to Route 27 may discourage access to available transit to New York City.

[4] Information as of Winter 2020.
[5] 2019: ACS 5-Year Estimates Data Profiles, TableID S1701, "Poverty Status in the Last 12 Months"
[6] 2019: ACS 5-Year Estimates Data Profiles, TableID DP05, "ACS Demographic and Housing Estimates"
[7] 2019: ACS 5-Year Estimates Data Profiles, TableID S1602, "Limited English-Speaking Households"
[8] 2019: ACS 5-Year Estimates Data Profiles, TableID S0802, "Means of Transportation to Work by Selected Characteristics"

G. Redevelopment

Franklin Boulevard travels through the Hamilton Street Special Improvement District, identified by the County as a Priority Growth Investment Area (PGIA) in the *Supporting Priority Investment in Somerset County Phase III Study* dated June 2017. The goal of this study was to identify land use and transportation improvements to support redevelopment and targeted growth. The study identified, screened, and evaluated candidate locations and proposed a series of pilot sites to serve as templates for the redevelopment of other sites.
Properties on the segment of Franklin Boulevard within the PGIA (between Route 27 and Norma Avenue) are anticipated to be redeveloped to include more mixed-use, multi-story buildings. Due to its proximity and convenient access to New Brunswick, the transportation improvements in the Phase III Study focused on multimodal mobility, such as expanded bus service and enhanced pedestrian and bicyclist connectivity. Significant applications for the redevelopment of land on this section of Franklin Boulevard in the PGIA include the following:

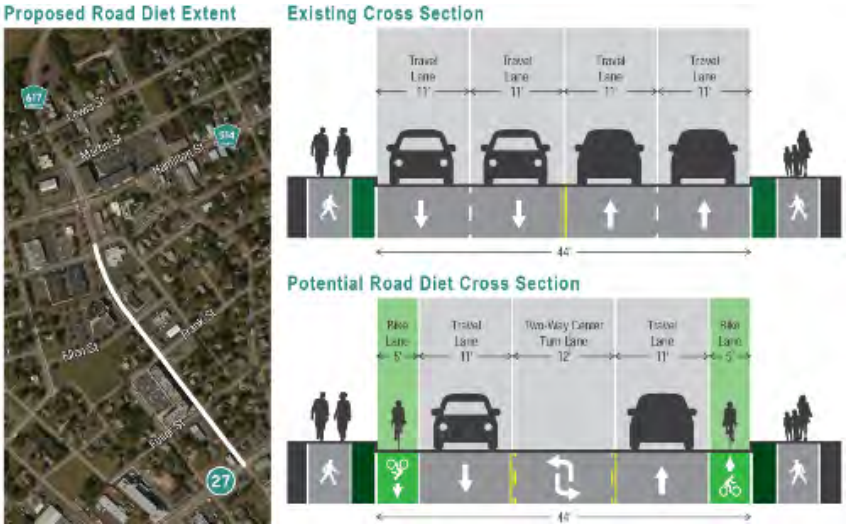
- 52 Norma Avenue (Block 234, Lots 2 and 8) – Two-story apartment building with eight one-bedroom units – approved by County Planning
- 610 Franklin Boulevard (Block 233, Various Lots) – Four-story mixed-use building to include eight one-bedroom and six two-bedroom units and 23,000 SF of office space – approved by County Planning
- 602 Franklin Boulevard/515 Lewis Avenue (Blocks 233/234, Various Lots) – Conversion of former a post office building to a school property – application is on hold
- 600 Franklin Boulevard (Block 234, Lot 1) – Repopulation of abandoned office space with medical office/research space – approved by County Planning
- Southeast corner of Norma & Franklin intersection (Block 234, Lots 3 through 7) – Proposed major residential subdivision – approved by County Planning

Located along Franklin Boulevard to the north of the PGIA, there are also two residential redevelopment applications, including a subdivided lot at the Mt. Carmel Orthodox Presbyterian Church (350 Franklin Boulevard, approved by County Planning) and a 28-unit townhouse complex (453-455 Franklin Boulevard, approval withheld).

H. Proposed Improvements from Previous Studies

The *WalkBikeHike* (2019) and *Supporting Priority Investment in Somerset County Phase III Study* (2017) studies recommend implementing a road diet on Franklin Boulevard between Route 27 and Lewis Avenue (**Figure 3**) to reduce vehicle speeds and minimize pedestrian-vehicle conflict exposure. A high-level investigation of the road diet concept was made within the Phase III study with initial capacity analysis showing that existing Levels of service could be maintained with signal timing adjustments. The intersection at Hamilton Street would maintain the existing configuration with a northbound left-turn lane extending approximately to Field Street. At Route 27, the southbound left-turn lane would extend at least 150' to accommodate typical vehicle queues. However, the study recommended that further investigation be performed in coordination with the municipality, local stakeholders, and NJDOT.

Figure 3 – Franklin Boulevard Road Diet Concept from Phase III Study



Other improvement considerations on Franklin Boulevard from the Phase III Study included the following:

- Investigate lowering the speed limit between Route 27 and Lewis Avenue (currently 40 mph); and,
- Fill sidewalk gaps between Ellen Street and Frank Street and between Fuller Street and Route 27.

Furthermore, the study also proposed a bicycle boulevard along Lewis Street, which would run parallel to Hamilton Street and would intersect Franklin Boulevard with improved pedestrian crossings, wider sidewalks, and enhanced streetscaping. Pertinent excerpts from these studies, and associated improvements, are provided in **Appendix C**.

I. Public Meeting #1

On Thursday, November 12, 2020, the first public meeting for this project was held via Zoom conferencing to obtain feedback for the five locations selected for RSA review. Email blasts, advertisements, and social media notifications were provided in advance of the meeting. This meeting introduced the project team, who provided an overview of the study, stating the purpose and need. Crash statistics on County jurisdiction roadways were reviewed, showing a steady increase of crashes over the past ten years. The Consultant Team explained the RSA process and the technical analysis used in the development of the shortlist of corridors. Due to the pandemic, virtual or socially distanced options for conducting the RSA process were discussed.

The Consultant Team explained the study's Public Involvement Plan (PIP), an iterative process designed to collect feedback and input. The opportunities to collaborate on the PIP were virtual, including public meetings and comments received through the project website and project email. The Consultant Team then discussed the process of selecting the five corridors. The selection process was based on screenings for top crash locations, evaluation of equity data, and public/stakeholder input obtained from the initial virtual mapping outreach conducted in Fall 2020. The virtual mapping tool allowed users to pin comments on areas of concern on a virtual map.

As part of the PIP, the public meeting included an opportunity to hear from attendees on comments specific to each corridor selected for RSA review by splitting the overall meeting into breakout rooms. The group in the Franklin Boulevard breakout room discussed various concerns and suggestions regarding traffic calming and pedestrian safety. Comments received were as follows:

- The intersection of Franklin Boulevard and Belmar Street needs pedestrian crossing control for church access as the roadway is busy during peak times.
    - Traffic control and a pedestrian signal crossing is needed at the intersection of Franklin Boulevard and Matilda Avenue.
    - Concern with bike lane as it is a challenge to incorporate with existing left turning lanes
- At the intersection of Hamilton Street and Franklin Boulevard:
    - Vehicles moving southbound are aggressive, and there is heavy traffic from the parking lots servicing the shopping center.
    - Cars are not adhering to traffic signals by using the connecting Lewis Street to avoid the signal at Hamilton Street.
    - Tractor-trailers and other heavy vehicles turning onto Hamilton Street make passenger vehicular movement difficult.
    - Suggestion to pull left-turn bay back to make more room for right-turning vehicles
- Vehicles are slower, making it easier to exit from the Walgreens parking lot; drivers moving eastbound give way to vehicles wanting to go westbound on Hamilton Street. However, the queue from eastbound traffic blocks drivers' views as they are trying to make a left onto Hamilton Street
- On Berry Street, there is a speed issue; there is easier access for exiting, but there are faster moving vehicles on Hamilton Street.
- Vehicles are using Berry Street to bypass traffic signals.
- The intersection of Franklin Boulevard and Frank Street is missing a crosswalk, and there is heavy foot traffic at the intersection, with fast-moving vehicles.
- At the intersection of Franklin Boulevard and Rt. 27:
    - The southbound Franklin Boulevard left-turn bay does not provide enough room for westbound right-turning trucks.
    - For all approaches, a right-turn on the red restriction should be evaluated.

J. Technical Advisory Committee Meeting #2

Following an August 2020 meeting with the TAC (Technical Advisory Committee) to select the five corridor locations for further review the County held the second TAC meeting in February 2021. This meeting consisted of a 45-minute presentation followed by interactive breakout rooms with discussion centered around the corridors selected for further review. The presentation included the following topics: project background, summary of selected corridors, description of potential safety measures, and a discussion of demonstration projects.

A breakout room was dedicated solely to the discussion of potential safety measures to be implemented in response to potential safety concerns on the Franklin Boulevard corridor in Franklin Township Participants were asked to review the ten safety measures discussed during the presentation. They were then asked to rate the effectiveness and ease of implementation of each safety measure based on their own opinion/perspective. Participants were also asked to identify specific areas within each corridor that were areas of concern.

Table 3 contains a summary of those ratings and discussions for each safety measure, along with additional comments made toward each safety measure.

Table 3 – Perceived Effectiveness and Ease of Implementation for Various Safety Measures

Safety Measure	Effectiveness (1= not effective; 10= very effective)	Ease of Implementation (1=easy; 10= hard)
Lighting	8	3
Curb Extensions/Bus Bulbs	10	10
Daylighting[9] and Crosswalks	10	1
Walkways for Sidewalk Gaps	10	3
Dedicated Turn Lanes	10	5
Leading Pedestrian Intervals (LPI)	10	1
High Visibility Crosswalks	10	1
Turn Restrictions	5	5
Bike Lanes	0	1
Lane Width Reduction/Road Diet	10	1

Breakout Group Additional Comments:

- Lighting:
  - Participants agree that illuminated crosswalks help prevent crashes.
  - Lighting can be a maintenance issue. Participants did not see an issue with adding more lighting, in addition to residential windows facing roadway and commercial property lighting, to improve security along the corridor.
- Curb Extensions/Bus Bulbs:
  - Curb extensions are hard to implement and would need to be strategic to reap benefits.
- Walkways for Sidewalks Gaps:
  - Heavily traveled corridors should have consistent sidewalks.
  - ADA compliance is key.
  - There are some sidewalk gaps noticed from aerial views.
- High Visibility Crosswalks:
  - The corridor does have some intersections without crosswalks.
  - There may be issues with adding crosswalks in this area (i.e., County feels intersection is unsafe to implement a crossing).
- Dedicated Turn Lanes:
  - Dedicated turn lanes already exist at the two major intersections of this corridor.
  - Feasibility is also contingent upon ROW.
  - Signal phasing for dedicated turn lanes, in addition to LPIs, takes time away from through vehicles.
- Leading Pedestrian Intervals (LPI):
  - The County is willing to consider use of LPIs if vehicles delay, and queuing does not significantly increase.
  - LPIs are beneficial for school crossings.
- High Visibility Crosswalks:
  - High visibility crosswalk retroreflective paint is more costly than regular paint.
  - Maintenance is an issue.
- Turn Restrictions:
  - No turn on red restrictions is effective.
  - There does not seem to be places to divert traffic for left turns prohibitions along the corridor.
  - There could be pushback with diverting traffic near Route 27. Limiting movements onto state roadways requires NJDOT coordination. State would also need to control signing.

[9] Daylighting is the act of restricting parked or standing vehicles through striping or curbing to improve sight distance at crosswalks or intersections.

- Bike Lanes:
    - Participants believed if there are cyclists, as well as room for lanes, a road diet with bike lanes can be effective.
    - Since the AADT is relatively high on the corridor, it is viewed that a bike buffer would need to be accommodated.
- Lane Width Reduction/ Road Diet:
    - Road diets are hard to implement given the AADT.
    - Road diet improvement plans are under design for the intersecting Route 27 (Somerset Street) corridor.

K. Technical Advisory Committee Meeting #3

Following the RSAs in Spring 2021 and authoring of the draft RSA reports and accompanying recommendations soon thereafter, the County held the third and final TAC meeting for the study in August 2021. The virtual meeting format consisted of a 45-minute presentation with interactive breakout rooms. The presentation included the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into five breakout rooms, one for each of the selected corridors. Each breakout room discussed a specific set of recommendations pertaining to that corridor. Participants were asked to provide their general reactions to the proposed recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed. The topic of discussion for the breakout room specific to the Franklin Township RSA was the road diet proposed for the Franklin Boulevard corridor, between Route 27 and Hamilton Street. Provided below is participant feedback received on this specific proposed safety measure:

- All participants seemed to support the idea of a road diet between Route 27 and Hamilton Street.
- Capacity analysis is key to testing the feasibility of the road diet. In particular, queueing lengths at intersections will be important to designing appropriate turning bay lengths.
- NJDOT participant noted that the nearby Concept Development study is exploring road diet options on Route 27. Same participant noted the improvement is connected to a Crash Modification Factor proven to tie the benefit to a specific reduction in crashes.
- Truck turning movements at the intersections on either end of the road diet should be evaluated so that the realignment of lanes as part of the road diet can be positioned to minimize the occurrence of trucks driving over the nearby intersection corners, as is happening now.
- If this road diet results in bike lanes, connections to bike lanes north of Hamilton Street and other biking facilities/roadways via sharrows and/or bike lanes must be designed and could need to be accommodated via travel lane realignment.
- As part of the road diet project, sidewalk rehabilitation and sidewalk gaps should be addressed.
- How the road diet, and two-way left-turn lanes, ties into existing business on either side of the road should be considered.

Additional comments were received during the breakout room (not pertaining to the road diet):

- Lighting just north of the Route 27 intersection was noted to be relatively dim.
- Other improvements that could be implemented along with the road diet include curb extensions, refuge islands, etc., which can be accomplished by implementing the road diet.

L. Public Meeting #2

On Wednesday, September 29, 2021, from 7:00 PM to 9:00 PM, Somerset County held the second and final public meeting for the study. The virtual meeting format consisted of a 45-minute presentation touching on the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into seven breakout rooms, one for each of the selected corridors, one for county-wide general transportation comments and suggestions, and one for Spanish speakers. Much like at the third TAC meeting, participants were asked to provide their general reactions to the proposed road diet recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed. Provided below is participant feedback received on this specific proposed safety measure:

- In general, participants supported the idea of implementing a road diet south of Hamilton Street.
- Participants agreed that corridor speeds would benefit from a road diet.
- Concerns were expressed to address same issues experienced south of Hamilton Street for the northern end of the corridor.

Additional comments were received during the breakout room (not pertaining to the particular road diet in question):

- Speeding between Hamilton Street and Hillcrest Elementary comprised the bulk of discussion.
- Participants shared ideas to address the speeding issues north of Hamilton Street (e.g., feedback signs, curb extensions, etc.).
- Participants perceive that Franklin Boulevard carries a relatively high volume of truck traffic.

III. Crash Findings

The analysis used to support the RSA process incorporated a data-driven effort to utilize reportable crash information resulting in any combination of fatality, injury, or property damage. The datasets used for this analysis are sourced from local law enforcement responses to reported vehicular crashes. These on-scene responses subsequently translate to official law enforcement generated reports. Concurrently, the individual reports are aggregated to render serviceable crash information. To be entirely inclusive in obtaining complete crash information, the data was accumulated using three distinct resources: NJDOT's Safety Voyager[10], New Jersey Division of Highway Traffic Safety (NJDHTS) Numetrics[11], and the NJDOT raw crash tables[12]. The three sources were compared against each of the other obtained sources to allow for duplicate records to be discarded and all distinct records to be included with the goal of producing a complete and comprehensive representation of the crashes within the extents of the corridor.

The datasets were obtained for a three-year analysis period from the beginning of January 2016 through the end of December 2018 for vehicle-vehicle crash incidents and from the beginning of January 2014 through the end of December 2018 for vehicle-pedestrian/cyclist crash incidents. According to the compiled crash data, 214 crashes occurred within the one-mile segment analysis area during the analysis period. The following evaluation breaks down crash attributes as a percentage of the total crashes to achieve a stronger understanding of the localized trends compared to County roadway systems crash performance. Furthermore, all crashes along this segment were mapped onto collision diagrams, which can be found in **Appendix D**, providing a quick spatial overview of crash clustering patterns.

In reviewing the crash data, the following crash clusters and prevailing safety issues were noted:

- At the Somerset Street intersection
  - Numerous fixed object collisions on NW intersection corner with pedestrian signal pole
  - Numerous sideswipe collisions on SB narrow lanes approach to intersection
  - Crashes on SB Route 27 including rear ends and crashes with left turn and cross-street traffic
- Crashes between NB traffic and traffic trying to turn on from Fuller Street
- At the Hamilton Street intersection
  - Heavy volume of rear end collisions on EB approach to intersection
  - Crashes between EB queue to intersection and vehicles looking to turn out of strip mall
  - Significant amount of right angle and left-turn collisions involving EB traffic
  - Numerous crashes at this intersection involving pedestrian and cyclist traffic (half on east crosswalk)
  - Numerous fixed object collisions with signal pole on SE intersection corner
  - Numerous sideswipe collisions just south of intersection, both same and opposite directions
- NB and SB rear end collisions and cyclist crash clustered in front of Hillcrest Elementary driveway
- Numerous struck parked vehicle and fixed object collisions at Matilda Avenue intersection

A. Temporal Trends

Sorting the crashes by month reveals that the study segment experiences increased crashes during the Fall/Winter month from October thru February. The Spring/Summer months from March thru September show lower frequencies. During the seven (7) months of January, February, March, May, June, October, and November, the study corridor experiences higher crash frequencies than the County-wide average. Notably, February experiences more crashes than the County-wide average (7.0% vs. 11.0%), as shown highlighted in yellow in **Figure 4**. **Figure 5** highlights the crash percent distributions by day of the week. Midday, between 12:00 PM and 2:00 PM, reveals higher crash percentages than the County-wide average, as shown

[10] https://www.njvoyager.org/App/
[11] https://www.numetric.com/
[12] https://www.state.nj.us/transportation/refdata/accident/rawdata01-current.shtm

highlighted in yellow in **Figure 6.** More specifically, the 2:00 PM hour has crash frequencies almost double the County-wide average, 10.6% local distribution versus a 6.4% County-wide distribution. This higher percentage can relate to the presence of schools along the study corridor, most notably the Hillcrest Elementary School at the northern end of the corridor. A closer look at the crash data reveals that ten crashes occurred near this school, with three crashes specifically involving vehicles entering/exiting the school driveway.

Figure 4 – Vehicular Crashes, Percent Distribution by Month

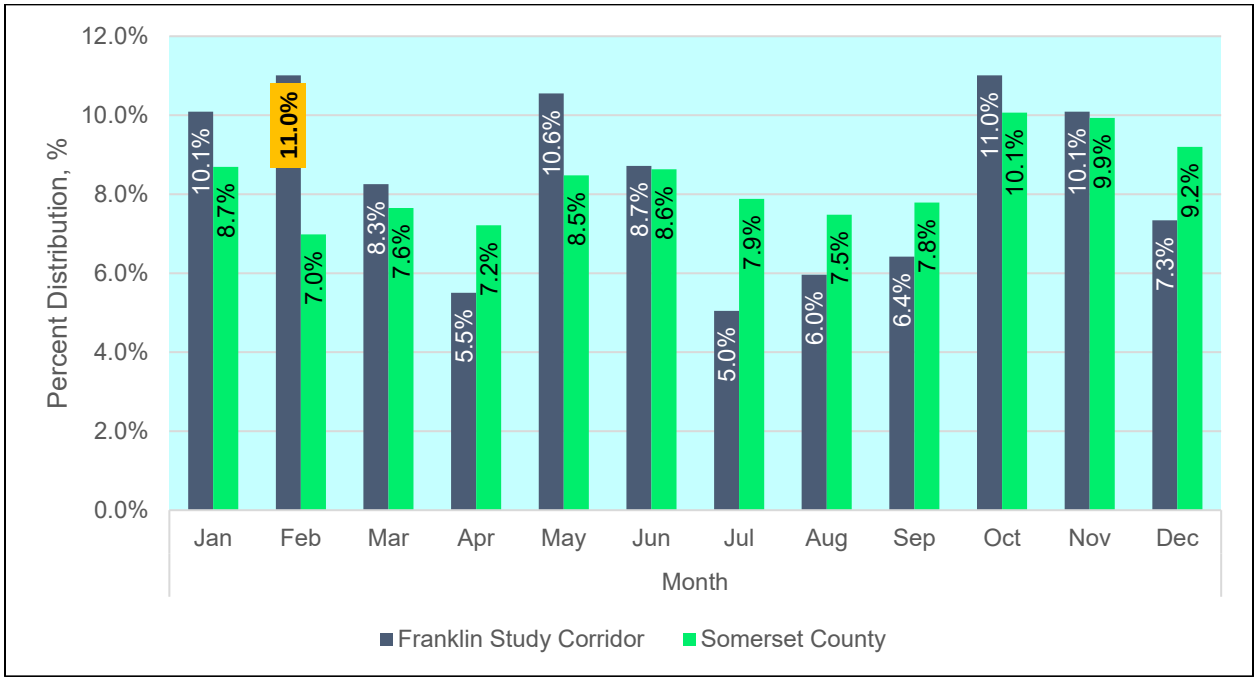


Figure 5 – Vehicular Crashes, Percent Distribution by Day

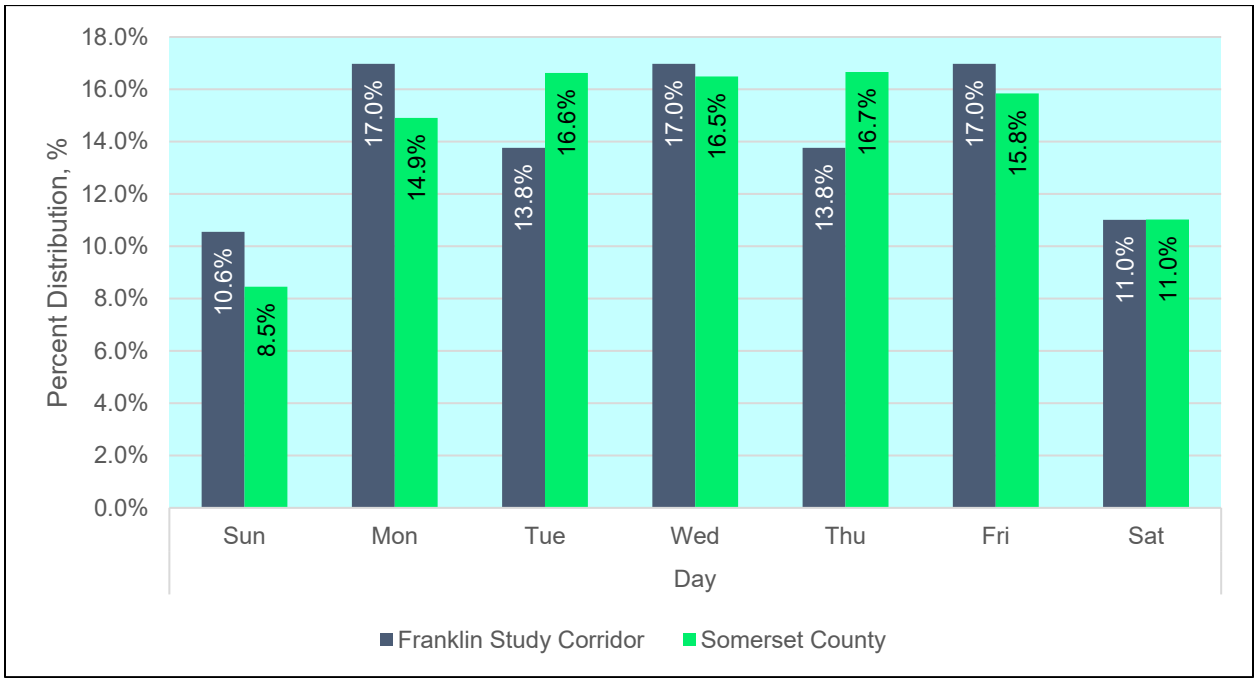
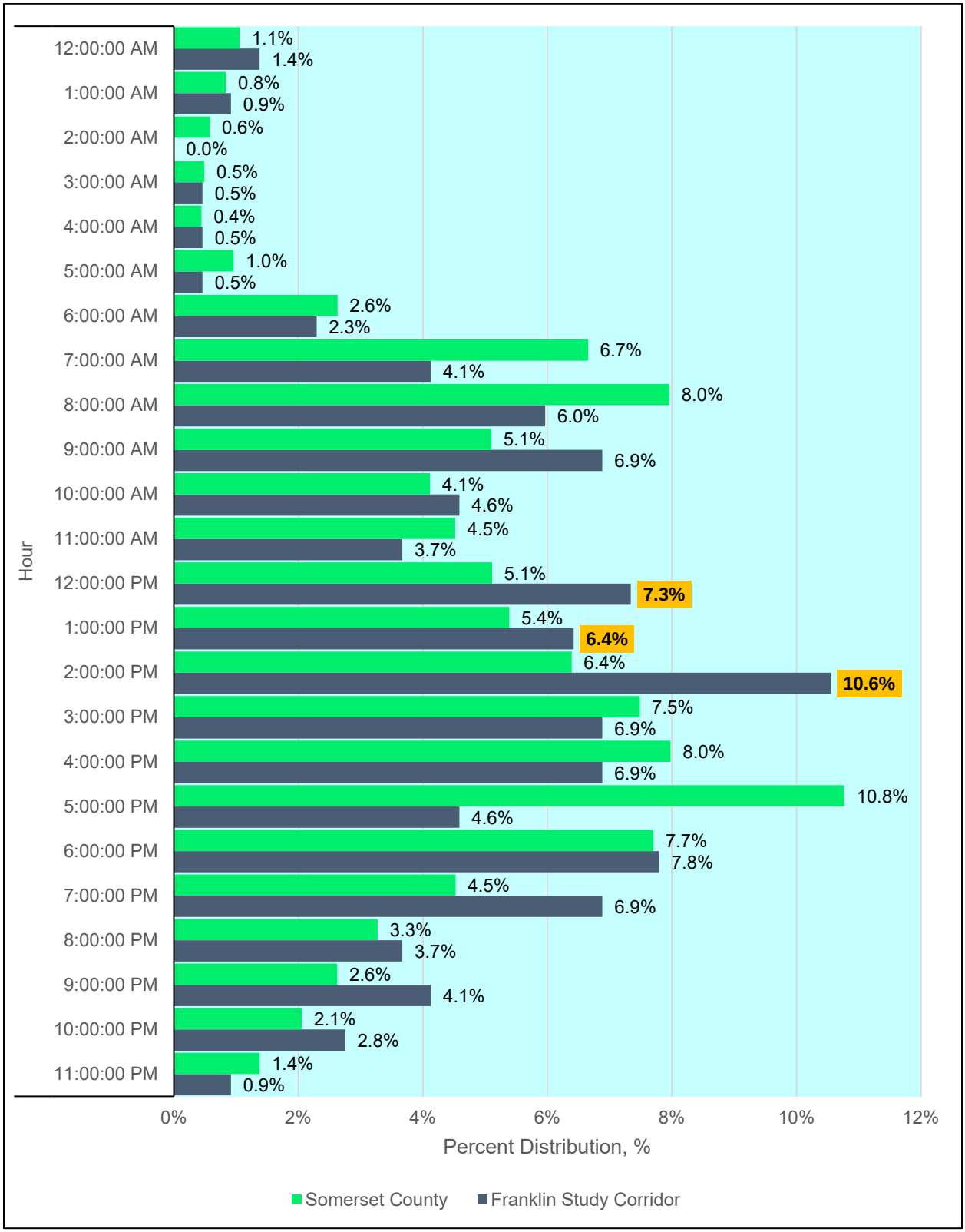


Figure 6 – Vehicular Crashes, Percent Distribution by Hour



B. Collision Types

Fifty-six rear end and 60 right angle crashes make up more than 53% of the crash distribution along the study segment, shown highlighted in yellow in **Figure 7**. Rear end crashes on the corridor occur approximately 10% less frequently than County-wide rear end crashes. Right angle crashes, however, are more frequent within the study segment than the County. Pedestrian-involved crashes on the study segment occur at a considerably higher frequency than the County, almost four times as frequent (0.8% County-wide vs. 4.1% CR 617) highlighted in yellow in **Figure 7**. This is perhaps correlated to the fact that the study segment lies in a more heavily urbanized area. **Figure 7**, and **Table 4**, provide a breakdown of crash types for the study segment.

Figure 7 – Vehicular Crashes, Percent Distribution by Crash Type

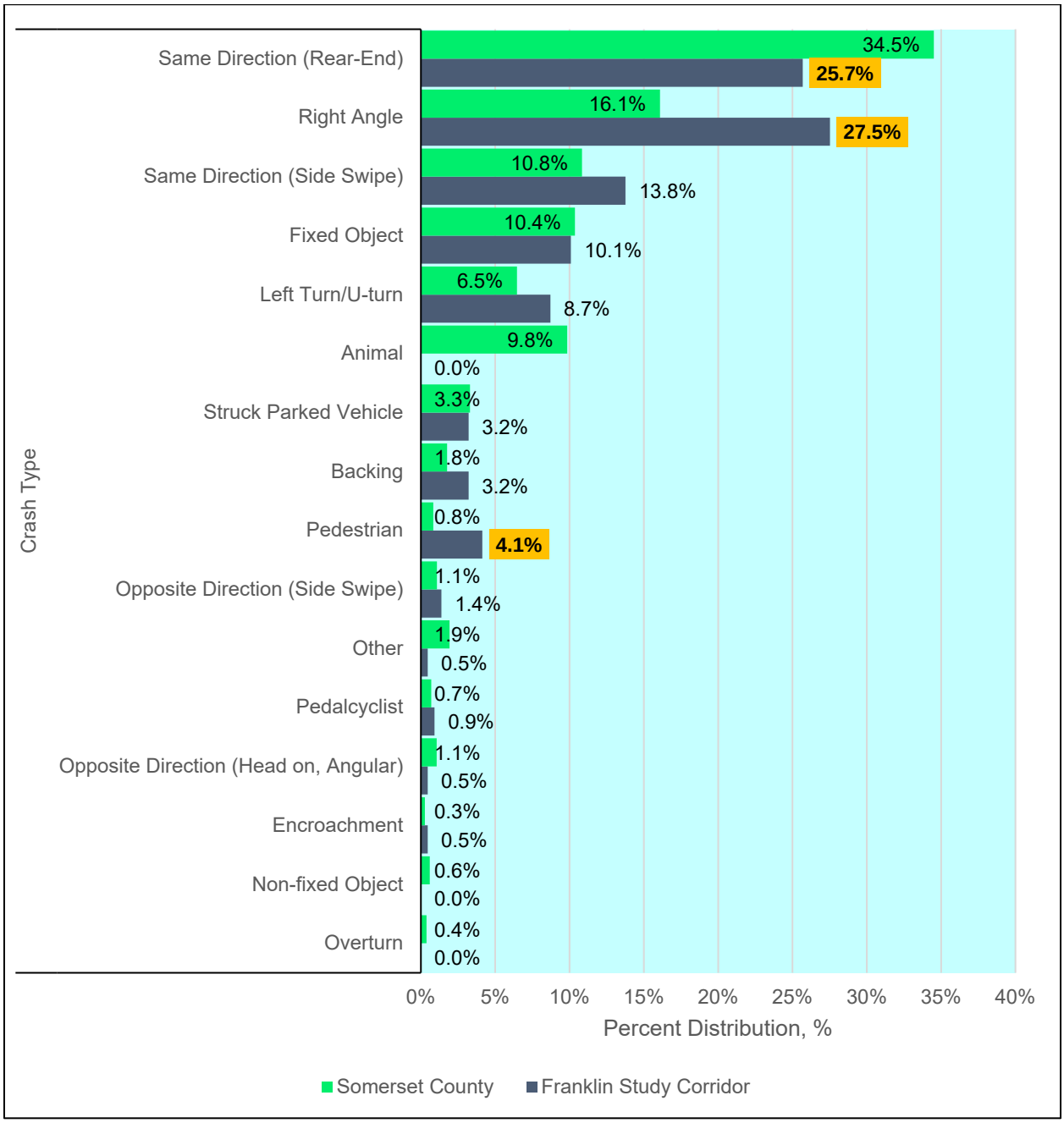


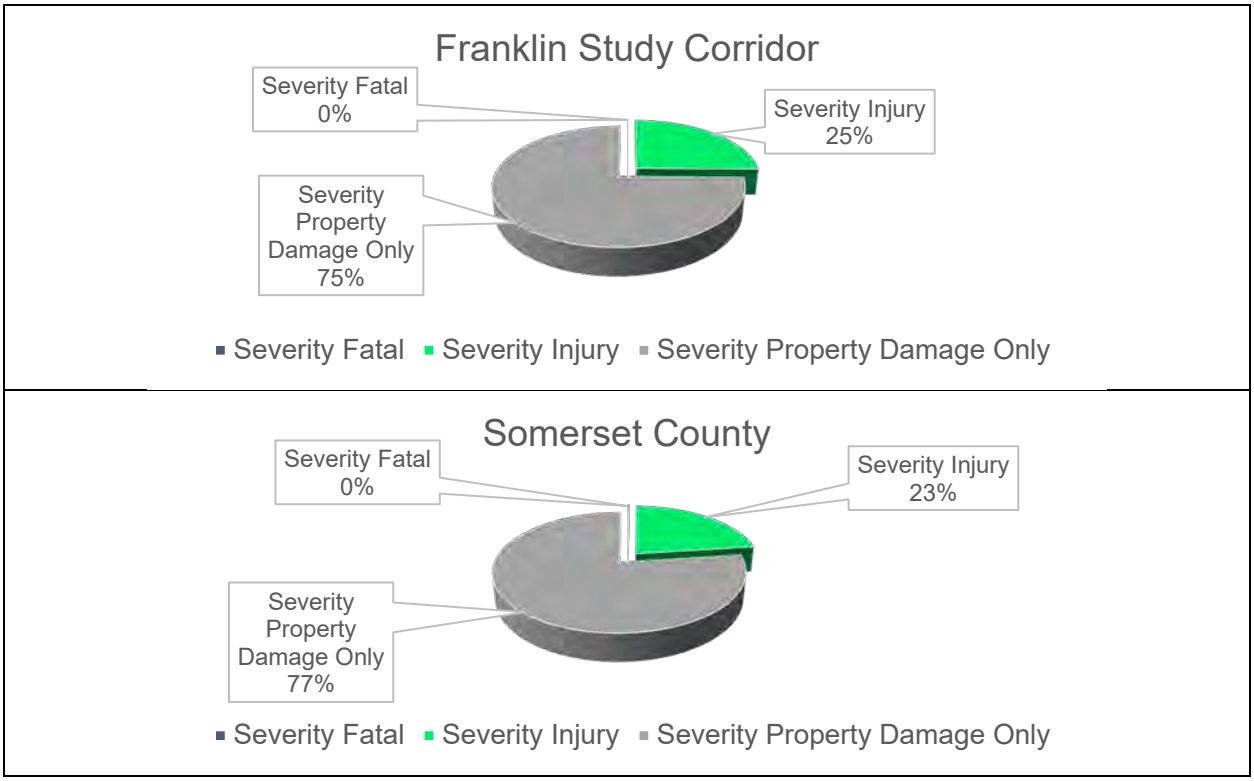
Table 4 – Vehicular Crashes by Type

Crash Type	Total
Backing	7
Encroachment	1
Fixed Object	22
Left Turn/U-turn	19
Opposite Direction (Head on, Angular)	1
Opposite Direction (Side Swipe)	3
Other	1
Pedalcyclist	2
Pedestrians	5
Right Angle	60
Same Direction (Rear-End)	56
Same Direction (Side Swipe)	30
Struck Parked Vehicle	7
Total	214

C. *Crash Severity*

The study segment generally conforms to the County's trends when considering the percent distribution of crash severity. However, data shows a slight increase in crashes resulting in injuries rather than property damage only when compared to the County. The analysis period saw no fatalities along the selected roadway study segment (**Figure 8**).

Figure 8 – Crash Severity



D. Roadway Surface & Light Condition

Crashes occurred more frequently during wet driving conditions on the study segment than the County-wide average. Wet road-related crashes are the second most overrepresented roadway surface condition during crashes, 21.6%, approximately 5% more as frequent as the County-wide average, 16.1% (highlighted in yellow in **Figure 9**).

Figure 9 – Vehicular Crashes, Percent Distribution by Surface Condition

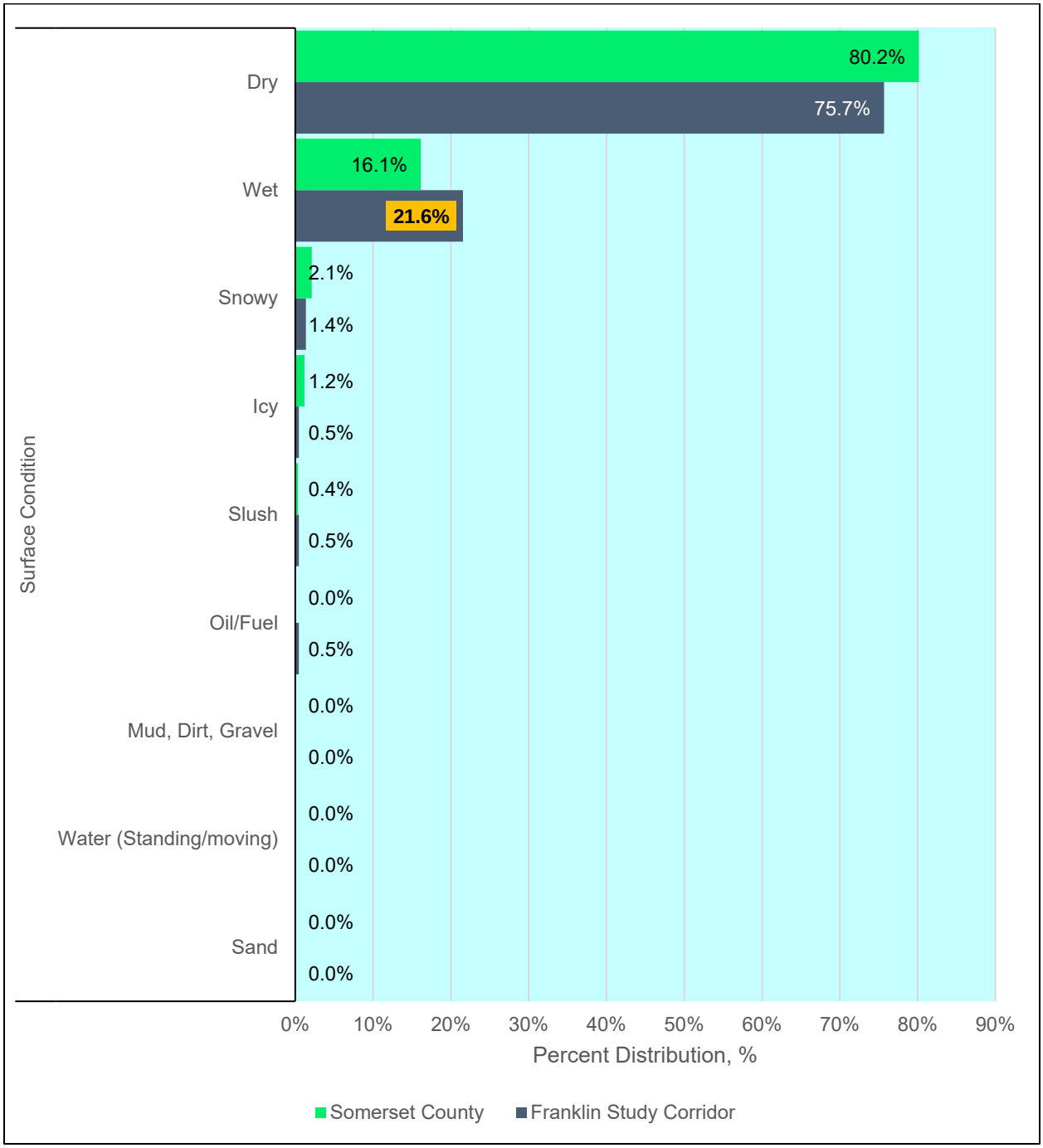
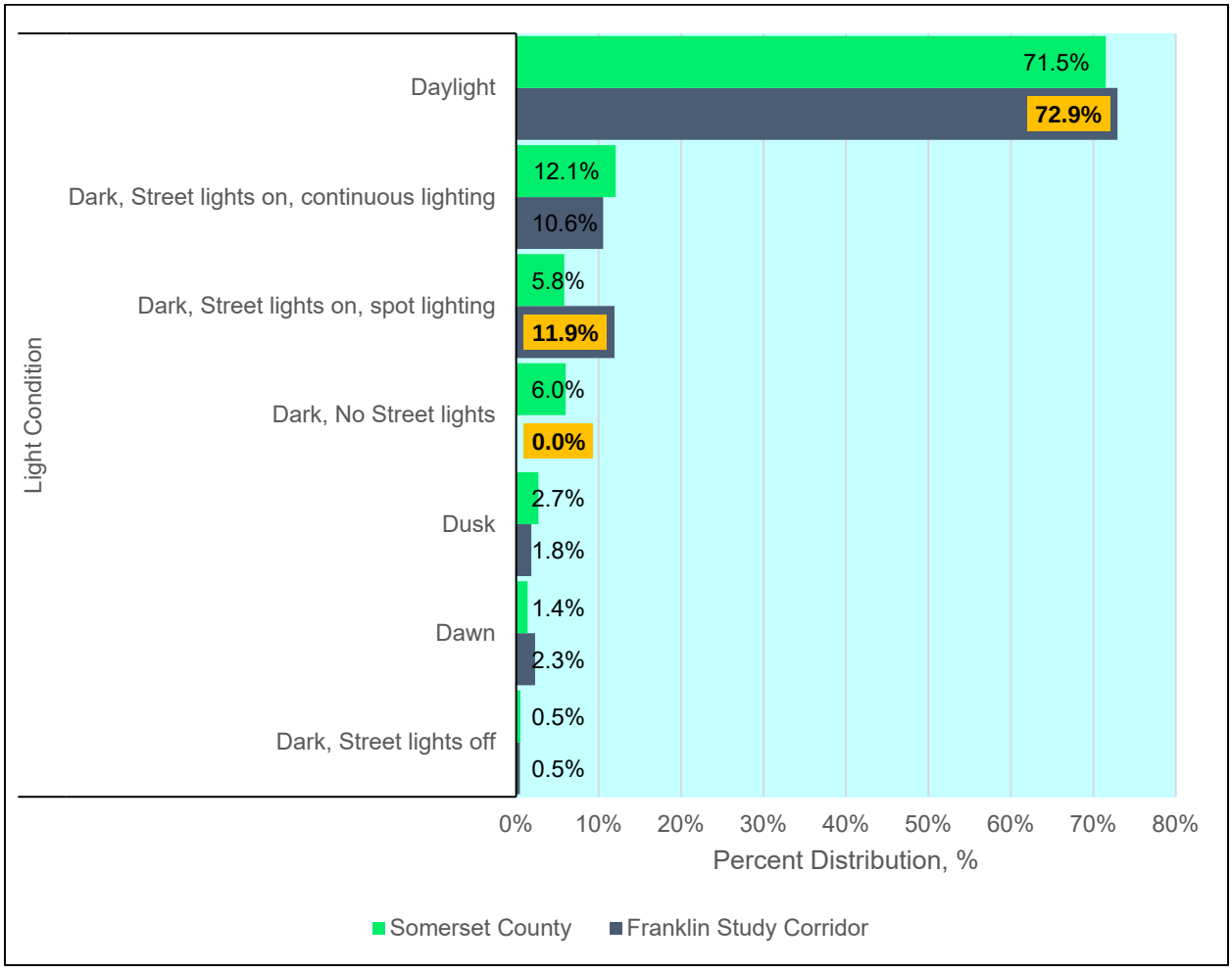


Figure 10 – Vehicular Crashes, Percent Distribution by Light Condition



Approximately 72.9% of crashes on the study segment occurred during daylight conditions. This is slightly higher than the County-wide average of 71.5%. Crashes occurring during "dark, street lights on, spot lighting" is noticeably higher than the County average, occurring more than double the frequency of 11.9% on the study segment corridor versus the 5.8% for the County. This may be due to the relatively-lit/developed nature of the study segment's streetscape, as evidenced by a 0% for "dark, no streetlights" (shown highlighted in yellow in **Figure 10**).

E. Location

Crash visualization using the histogram, grouped in 0.01-mile segments, is provided in **Figure 11**. This chart indicates that the signalized intersections of Somerset Street and Hamilton Street experience the highest recurrence rate of crashes along the study segment (as shown highlighted in yellow in **Figure 11**). The crashes at these two locations account for 50% of all crashes. Fuller & Matilda Streets equally present the highest crash totals at unsignalized intersections with fourteen (14) crashes at each location (as shown highlighted in yellow in **Figure 11**). A three-dimensional representation of this crash histogram for the 2016 through 2020 timeframe, imposed onto a map of the study area, is shown on **Figure 12**.

Figure 11 – Vehicular Crashes by Milepost

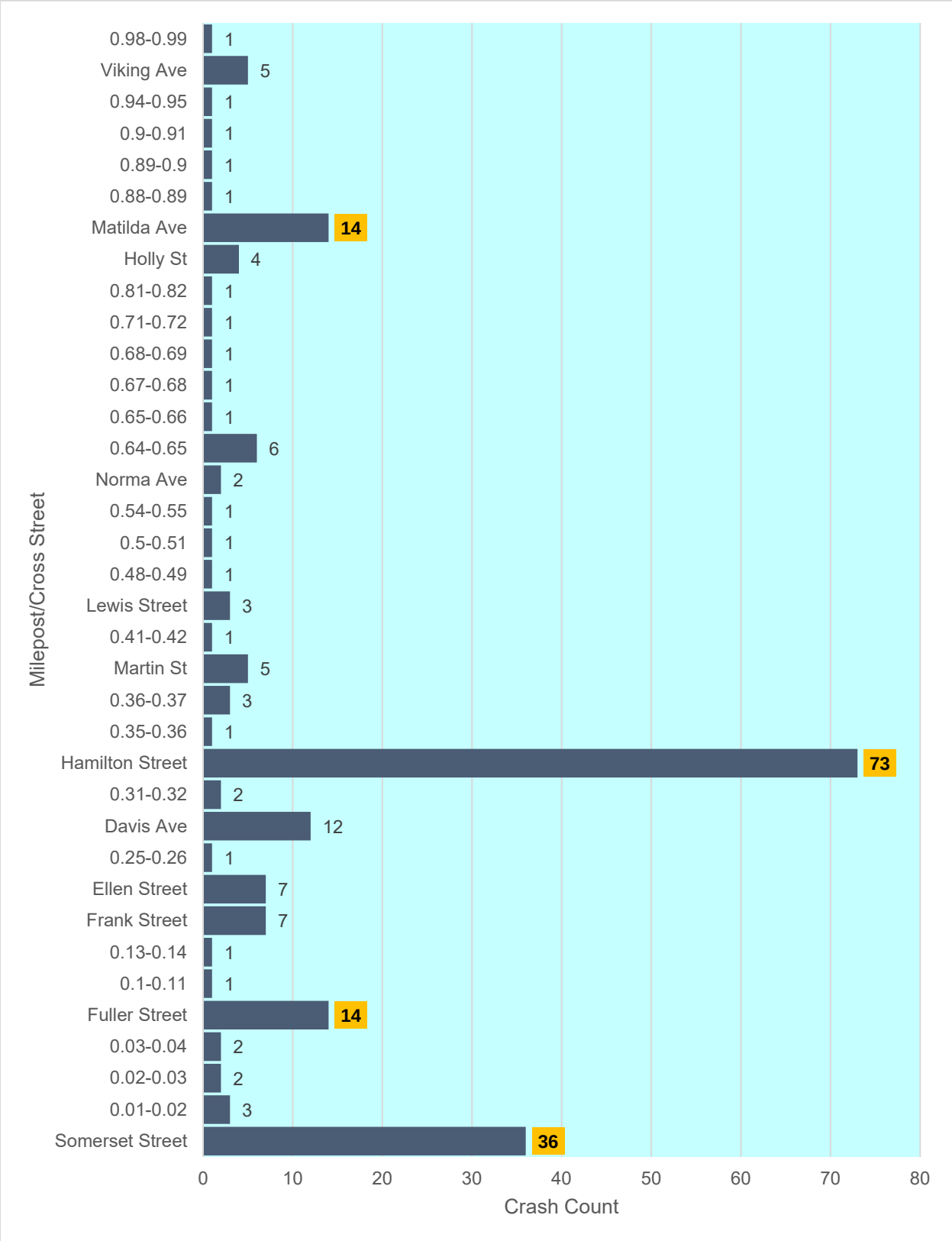
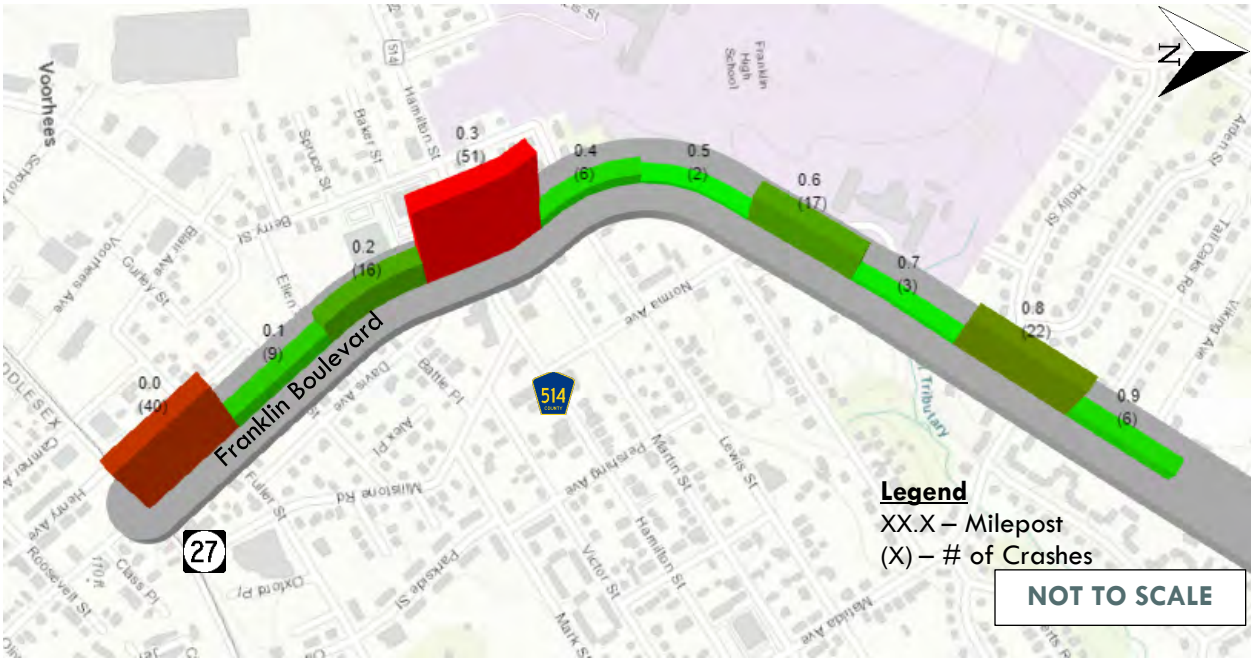


Figure 12 – Visual Estimation of 5-Year (2016 - 2020) Crash History Obtained from Safety Voyager [13]



F. Age of Those Involved

Driver-, occupant-, and pedestrian-involved data was also accessible from the NJDOT crash tables. A normal distribution table was developed (**Figure 13**) utilizing the age data provided by NJDOT. Amongst the 196 crashes reported, the average person(s) involved age was determined to be approximately 37 years old. Approximately 68% of person(s) involved were between the ages of 19 and 55 years old. **Table 5** outlines the percent distribution of the age(s) of those involved in the vehicular crashes, grouped by ten years of age. Data from the table indicates that crashes with drivers between the ages of 16 and 45 years old occur with a higher frequency on the study segment than the County average for the same age groups. Ages 16-25 account for the highest frequency of those involved at 24.4%, marginally higher than the County average of 23.1%.

[13] Five-year crash totals shown on histogram from Safety Voyager may vary from crash report data obtained from municipality's police department and do not include crashes recorded as occurring on side street approaches, which are included in the record of analyzed collected crash data.

Figure 13 – Histogram of Age(s) Involved

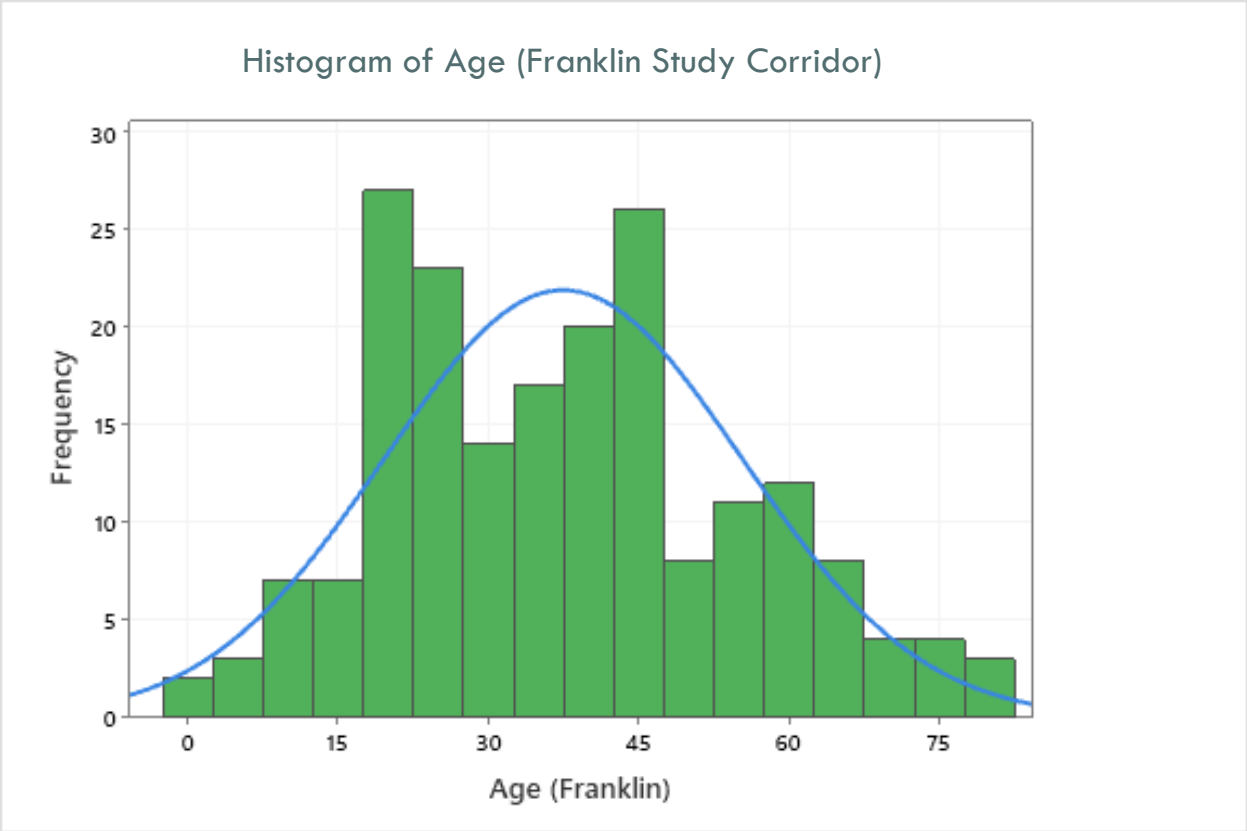


Table 5 – Age(s) Involved, percent distribution

Age Involved	Franklin Township Study Corridor	Somerset County
Under 16	6.6%	7.9%
16-25	24.4%	23.1%
26-35	17.3%	16.9%
36-45	19.3%	15.8%
46-55	14.7%	16.7%
56-65	11.7%	11.3%
66-75	4.1%	5.1%
76-85	2.0%	2.5%
86-95	0.0%	0.7%
96-105	0.0%	0.0%
106-116	0.0%	0.0%

IV. RSA Logistics

All data previously discussed in this report was used to inform the RSA conducted on this corridor. All participants involved in this RSA, whether in attendance during the pre-audit meeting, in-field review, and/or post-audit meeting, are listed in **Appendix E**. The pre-audit meeting was held at 10:00 AM via video conferencing on Thursday, March 25th, 2021, on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The PowerPoint used to facilitate this discussion is provided in **Appendix F**.

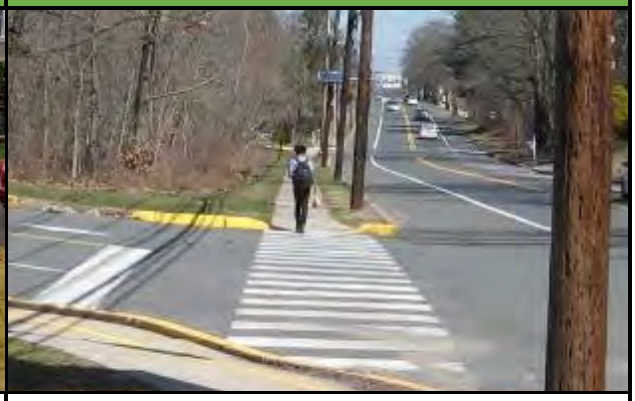
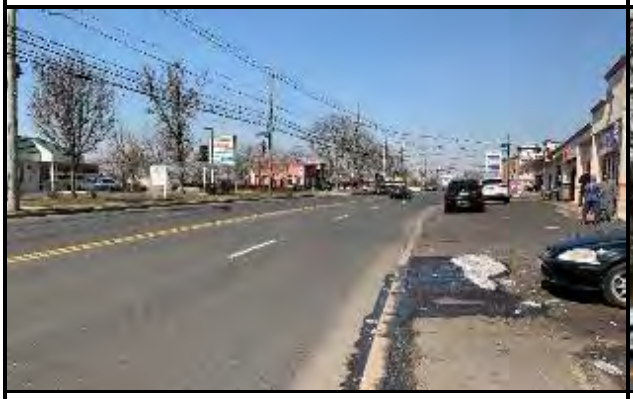
The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. The audit team met in a social-distanced manner, while masked, in the parking lot behind Somerset County Social Services building for a flipbook RSA orientation presentation to reiterate the ground rules of the audit. Upon conclusion of the orientation, participants were paired off with each other to walk halves of the corridor, seeking to pair each Somerset County Roadway Safety Study project team member (whether with the County or Consultant team) with each of the stakeholders. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as potential safety measures to address potential safety concerns. After walking the corridor, the RSA team met back in the parking lot to share overall thoughts on the corridor and fill out a survey on corridor identity, crossings, pedestrian-vehicle interactions, sidewalk and roadway conditions, and streetscape amenities, the answers of which were compiled and are averaged in **Appendix G**. Based on survey results, the corridor had the following perceived concerns:

- Faded or missing crosswalk
- Lack of curb ramps for strollers/wheelchairs

On the following day (Friday, March 26th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit, some of which are presented in the following section, to discuss each observation, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study. This discussion helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report. The PowerPoint used to facilitate this discussion is provided in **Appendix H**.

V. Identified Issues & Observations

This section depicts a sampling of overall issues identified during the RSA. Please refer to the Implementation Matrix in the following section of the report for a comprehensive list of identified corridor issues.

Pedestrian & Cyclist	Pedestrian & Cyclist
	
Crossing at Viking Avenue lacks pedestrian curb ramps	Crossing at Hillcrest Elementary requires ADA-compliance upgrades
	
Discontinuous sidewalk near Matilda Avenue	Sparsely located bike lane signing and striping, bike lane mistaken as vehiciular shoulder
	
Sidewalk south of Franklin Boulevard often interrupted by wide asphalt curb cuts and parked/standing vehicles encroaching on pedestrian paths of travel	Pedestrian crossing signage may need upgrade to fluorescent style. Sign positioning also obstructs bike lane signage

Operations & Visibility	Maintenance
	
Heavy vehicles are forced to make wide right turns onto Somerset Street due to close proximity of corner building thus encroaching onto Somerset Street left turn lane onto Franklin Boulevard	Sidewalk near Norma Avenue requires maintenance due to overgrowth and sediment runoff covering close to 30% of the pedestrian space.
	
Trees near Matilda Avenue limit sight distance of approaching vehicles for vehicles exiting apartment complex	Ponding occuring near Ellen Street. Crossing is also lacking curb ramps and ADA-compliance
	
Worn pedestrian signing at the Franklin Boulevard and Hamilton Street intersection. Pedestrian push button at the NE corner is not functioning	Uneven sidewalk pose pedestrian tripping hazards. Sidewalk needs replacement

VI. Findings & Recommendations

This section summarizes the site-specific and corridor-wide safety issues, potential strategies, and recommendations to improve safety. An Implementation Matrix is provided that summarizes the recommendations and provides qualitative information on time frame, cost, and responsible jurisdiction. Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process and are meant to be a record of ideas discussed. Symbols used in the Implementation Matrix are defined in **Table 6** as follows:

Table 6 – Legend of Symbols in Implementation Matrix

Symbol	Meaning	Definition
$	Low cost	Could be accomplished through maintenance
$$	Medium cost	May require some engineering or design and funding may be readily available
$$$	High cost	Longer term; may require full engineering, ROW acquisition, and new funding
🕐	Short term	Could be accomplished within 1 year
🕐🕐	Medium term	Could be accomplished in 1 to 3 years; may require some engineering
🕐🕐🕐	Long term	Could be accomplished in 3 years or more; may require full engineering

A. Implementation Matrix

The following represents the specific findings and recommendations made by the interdisciplinary RSA team, which were subsequently evaluated via discussions with County Engineering on Wednesday, June 2nd, 2021, and Thursday, June 3rd, 2021. As these recommendations are considered for advancement into either a CD study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices. Corridor-wide recommendations, requiring a review of all important applicable infrastructure along the corridor pertinent to these specific topics, are provided in **Table 7**. Further defined recommendations at specific intersection or mid-block locations are provided in **Table 8**. **Recommendations bolded within the Implementation Matrix below feature one of the twenty Proven Safety Countermeasures from the FHWA[14], which means that the recommendation is shown to have a significant safety benefit as proven by substantial traffic safety research.** These recommendations are tied to Crash Modification Factors (CMFs) showing a substantial reduction in crashes, as well as research documented on the Crash Modification Factor Clearinghouse website that has a high-quality ranking. This high ranking indicates the quality of study design, sample size, statistical methodology, statistical significance, etc. for the research backing each CMF. Mapping of location-specific proposed recommendations is provided in **Appendix I**.

Table 7 – Corridor-Wide Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
Bicycle				
1	Install bike lane pavement markings to supplement signs.	$$	🕐	County
2	Determine if inlets have bicycle-safe grates and replace if necessary.	$	🕐🕐	County

[14] https://safety.fhwa.dot.gov/provencountermeasures/

No.	Recommendation	Cost	Time Frame	Jurisdiction
3	Consider Biking Bus event to incentivize the use of improved cycling facilities on the corridor. See Biking Bus discussion under **Demonstration Project** section of this chapter.	$	🕐	Municipality/ School District
Operations				
4	Stripe crosswalks and stop bars on side streets to connect pedestrian ROW. Evaluate sight distance at all side street approaches and use easements/trimming to improve sight lines if necessary.	$	🕐	County/ Municipality
Pedestrian				
5	Conduct a sidewalk assessment to determine the extent of sidewalk that needs to be replaced, repaired, and constructed.	$$	🕐	Municipality
6	Perform curb ramp assessment to determine the number of curb ramps that need to be replaced, repaired, and constructed.	$$	🕐	County/ Municipality
7	Consider RRFB at School crossings on Franklin Boulevard to facilitate students walking along key travel routes	$$	🕐	Municipality
8	Consider implementing messages striped on the pavement, like "SCHOOL" and "SLOW" to better catch the cone of vision for drivers passing the school.	$	🕐	County
9	Consider wider crosswalk bars to better alert drivers to potential crossing pedestrian traffic.	$	🕐	County
Maintenance				
10	Perform maintenance to clear overgrowth and debris on sidewalks and curb ramps.	$	🕐	Municipality

Table 8 – Location-Specific Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
KEY STUDY RECOMMENDATION – Road Diet between Somerset Street and Hamilton Street				
11	Investigate design and implementation of a road diet. Options include 1) bike lanes and one travel lane in each direction with a median two-way left turn lane or 2) shoulders (with parking restricted) and one travel lane in each direction with a median two-way left turn lane. It should be noted that other studies have determined a road diet to be feasible.	$$	🕐🕐🕐	County
Somerset Street/NJ 27				
12	Coordinate with NJDOT during Route 27 road diet concept development study to recommend County-proposed improvements at intersection, including potential road diet on Franklin Blvd approach. These improvements could include LPIs, NO TURN ON RED signage on all approaches, high-visibility crosswalks, and new lighting.	$	🕐🕐	State
13	Recommend GSI treatments in NE quadrant of intersection if travel lanes are realigned and curb extensions installed during the road diet.	$	🕐🕐	State

No.	Recommendation	Cost	Time Frame	Jurisdiction
14	Recommend increasing intersection corner curb radii to accommodate truck turning movements. Realignment of SB Franklin Boulevard travel lanes towards the center of the roadway via a road diet would also better accommodate SB truck turning movements.	$	🕐🕐	State
15	Access to/from property on NW corner of intersection should be reevaluated when property is redeveloped.	$	🕐🕐🕐	State
16	Consider incorporating concrete mountable curbs to accommodate the large sweeping truck turning movements, mitigating the instances of pedestrian space encroachment and encroachment into the opposing lane of travel.	$$	🕐🕐	State
Between Somerset Street and Fuller Street				
17	Construct sidewalk on SB side of roadway as part of nearby redevelopment.	$$$	🕐🕐🕐	Municipality/ Utility companies
18	Consider coordinating with utility company to install more utility pole-mounted lighting.	$	🕐	Municipality
19	Clear overgrowth obstructing speed limit sign.	$	🕐	County
Fuller Street				
20	Consider restricting left turns to reduce number of left turn collisions at this intersection	$	🕐	County/ Municipality
Between Fuller Street and Frank Street				
21	Add street furniture on the west sidewalk for Franklin Boulevard. Also, Township should put policies into place to incentivize occupancy of first floor businesses at 727 Franklin Boulevard to improve the appearance of side street land uses and create more of a downtown feel.	$	🕐🕐	Municipality
Frank Street				
22	Relocate ONE WAY sign on NW corner to make more visible to NB traffic.	$	🕐	County
23	Consider reducing curb radii to shorten crossing on east side.	$$	🕐🕐	County
24	Stripe crosswalk across Franklin Blvd to connect SW and SE corners and provide continuous pedestrian ROW on southern end (only end with sidewalk on both sides)	$$	🕐🕐	County
Ellen Street				
25	Consider installing speed humps or tables to slow down cut-through traffic from Berry Street	$$	🕐	Municipality
26	Stripe stop bar.	$	🕐	Municipality
27	Stripe crosswalks and construct curb ramps.	$	🕐	Municipality
28	Investigate completing missing sidewalk south of the intersection.	$$$	🕐🕐🕐	County
Between Ellen Street and Hamilton Street				
29	Restrict parking in sidewalk areas.	$	🕐	Municipality
30	Coordinate with gas station property owner to construct a buffer between pumps and curb, such as landscaping, to provide a separation between vehicle usage and pedestrian ROW.	$	🕐🕐	Municipality/ Property owner

No.	Recommendation	Cost	Time Frame	Jurisdiction
31	Coordinate with car wash property owner to construct ADA-compliant sidewalk through steep driveway apron.	$	🕐🕐	Municipality/ Property owner
32	Construct and/or redefine sidewalk on NB side of roadway.	$$	🕐🕐	Municipality
33	Explore restricting left turns out of car wash driveway due to roadway curvature.	$$	🕐🕐	County
Field Street				
34	Stripe stop bar.	$	🕐	Municipality
35	Stripe crosswalks and construct curb ramps.	$	🕐	County/ Municipality
Between Field Street and Hamilton Street				
36	Investigate the feasibility of installing a mid-block crossing to the shopping center as part of the road diet (Location TBD).	$$	🕐🕐🕐	County
Hamilton Street				
37	Conduct a traffic study to determine capacity issues, evaluate if they can be mitigated through signal retiming and rephasing.	$$	🕐🕐	County
38	Evaluate existing signal timing to determine if LPIs can be accommodated with changes in signal phasing, if flashing don't walk time accommodates 3.5 ft/s[15], and if turns on red can be restricted. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$$	🕐🕐🕐	County
39	Consider increasing all corner curb radii to at least 30' for trucks. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$$$	🕐🕐🕐	County
40	Since many children cross at this intersection to get to school, consider applying for Safe Routes to School funding to make necessary safety improvements. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$$	🕐🕐🕐	RideWise
41	Install missing lane use sign on NB approach.	$	🕐	County
42	Install missing overhead Hamilton Street mast arm sign.	$	🕐	County
43	Install SPEED LIMIT sign in the SB direction.	$	🕐	County
44	Upgrade all push buttons. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$	🕐🕐🕐	County
45	Evaluate if left turn lane stop bars can be pushed back to accommodate truck right turns on all approaches. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$	🕐🕐🕐	County
46	Realign WB approach lanes to make receiving lanes narrower.	$	🕐🕐🕐	County
47	Install backplates on signal heads if traffic signal poles and mast arms will be replaced with steel equipment. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$	🕐🕐🕐	County

[15] 3.5 ft/s (3.5 feet per second) refers to the typical pedestrian walking pace/speed

No.	Recommendation	Cost	Time Frame	Jurisdiction
48	Coordinate with utility companies to relocate utility pole on SW corner. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$$$	🕐🕐🕐	Municipality/ Utility companies
49	Install "DO NOT BLOCK THE BOX" at Shopping Center Driveway. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$	🕐🕐🕐	County
50	Relocate or construct new signal poles on SE/SW quadrants of intersection due to collisions with trucks. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$$$	🕐🕐🕐	County
51	Coordinate with gas station property owner to evaluate if access can be modified. Hamilton Street Local Safety grant awarded. Project scheduled for 2022.	$$	🕐🕐🕐	County
Between Martin Street and Lewis Street				
52	Formalize striping for bike lane with 3' buffer. Bike lanes should also have bike symbols spaced at least 200' apart	$$	🕐	County
53	Reconstruct curb in northbound direction.	$$	🕐🕐	County
54	Explore why trucks encroach on double yellow striping.	$$	🕐🕐	County
55	Remove redundant NO PARKING sign.	$	🕐🕐	County
Lewis Street				
56	Construct RRFB (Rectangular Rapid Flashing Beason) crossing at Lewis to accommodate pedestrian activity	$$	🕐🕐	County/ Municipality
Curve between Lewis Street and Norma Avenue				
57	Add wayfinding to path that goes to high school.	$	🕐	County/ Municipality
58	Investigate if guy wire on SB sidewalk is conflicting with pedestrian space and consider coordinating with utility company to relocate it.	$$	🕐🕐	Municipality
59	Replace old school crossing sign with new fluorescent yellow-green sign and add AHEAD plaque underneath.	$	🕐	County
60	Explore options to install a timer or remote control on flashing school signal.	$	🕐🕐	Municipality
61	Install wayfinding signage for elementary school.	$	🕐	County
62	Township should permanently remove weed intrusion issues by reconstructing NB sidewalk and adding buffer grass strip.	$$	🕐🕐	Municipality
Norma Avenue				
63	Consider installing an RRFB (per NJDOT). RRFB would require Township maintenance.	$$$	🕐🕐🕐	County/ Municipality
64	Clear overgrowth and debris from sidewalk and curb ramps.	$	🕐	Municipality
65	Investigate relocating the crosswalk or use daylighting to add traffic calming and pedestrian visibility.	$	🕐	County
66	Explore ways to mitigate limited intersection sight distance. Consider clearing overgrowth on SE corner.	$	🕐	County
67	Install fluorescent yellow-green school crossing sign (S1-1) with a diagonal downward-pointing arrow plaque on left side of roadway in SB direction.	$	🕐	County
68	Remove existing NB school crossing signs. Install new fluorescent yellow-green S1-1 signs with diagonal downward-pointing arrow plaques on new posts before crosswalk in the NB direction.	$	🕐	County

No.	Recommendation	Cost	Time Frame	Jurisdiction
69	Remove existing SB school crossing sign on right side of roadway and replace with new fluorescent yellow-green S1-1 sign with a diagonal downward-pointing arrow.	$	🕐	County
70	Consider lengthening crosswalk stripes and adding pedestrian paddle(s), increasing the prominence of the crosswalk.	$	🕐	County/ Municipality
Hillcrest School				
71	Replace curb ramps at driveways to eliminate ponding issue.	$	🕐	Municipality
72	Explore ways to reduce crossing lengths at driveways. This could include short-term striped curb extensions and/or long-term driveway realignment.	$$	🕐🕐	County/ Municipality
73	Replace STOP sign and other signs within vicinity of school driveway on a breakaway post and at least 84" above ground level.	$	🕐	County/ Municipality
74	Explore ways to keep buses from driving over curb, including daylighting and/or striped curb extensions.	$$	🕐🕐	County/ Municipality
75	Replace post-mounted SCHOOL SPEED LIMIT sign on SB approach to driveway.	$	🕐	County
76	Perform a speed study along Franklin Boulevard through this area when speed advisory signs are lit as well as unlit.	$$	🕐	County
Holly Street				
77	Replace school crossing signs (S1-1) with new fluorescent yellow-green signs and diagonal downward-pointing arrows.	$	🕐	County
78	Consider daylighting and/or additional lighting for this crosswalk.	$$	🕐🕐	County/ Municipality
Between Holly Street and Matilda Avenue				
79	Remove trees that pose continuous sidewalk heaving problems and that block sight distance at apartment complex driveway.	$$	🕐🕐	County/ Municipality
80	Construct sidewalk on SB side of roadway to complete pedestrian connections.	$$	🕐🕐	Municipality
Matilda Avenue				
81	Install an RRFB to provide crossing opportunities when traffic volume is high, especially during times when there is high church activity.	$$$	🕐🕐🕐	County/ Municipality
82	Consider installing advance S1-1 signs for crosswalks at locations where trees compromise visibility.	$	🕐	County
83	Post R4-11 "BIKE MAY USE FULL LANE" sign on Franklin Boulevard NB where bike lane drops off.	$	🕐	County

B. Road Owner Response

An essential final step of the RSA process (see **Figure 1**) is a response from the roadway owner, which provides accountability between the funding body and the participating jurisdiction who acknowledges the findings within the RSA and their planned steps to improve safety. In responding to the RSA's findings, the road owner, in this case the County, must weigh the safety benefits posed by the recommendations within this report against the available resources to implement such improvements to make an informed decision. Because the audit process generated a long and wide-ranging list of improvements, the road owner is expected to implement these recommended improvements as time and funds allow in coordination with other projects and priorities.

Somerset County delivered their response following the finalization of the findings and recommendations table (see **Appendix J**). While the County has overseen this RSA process, by no means should this report be considered as a commitment to address some or all concerns and implement some or all improvements listed within this report. All potential recommendations must be fully studied. It is acknowledged that some recommendations may not be feasible.

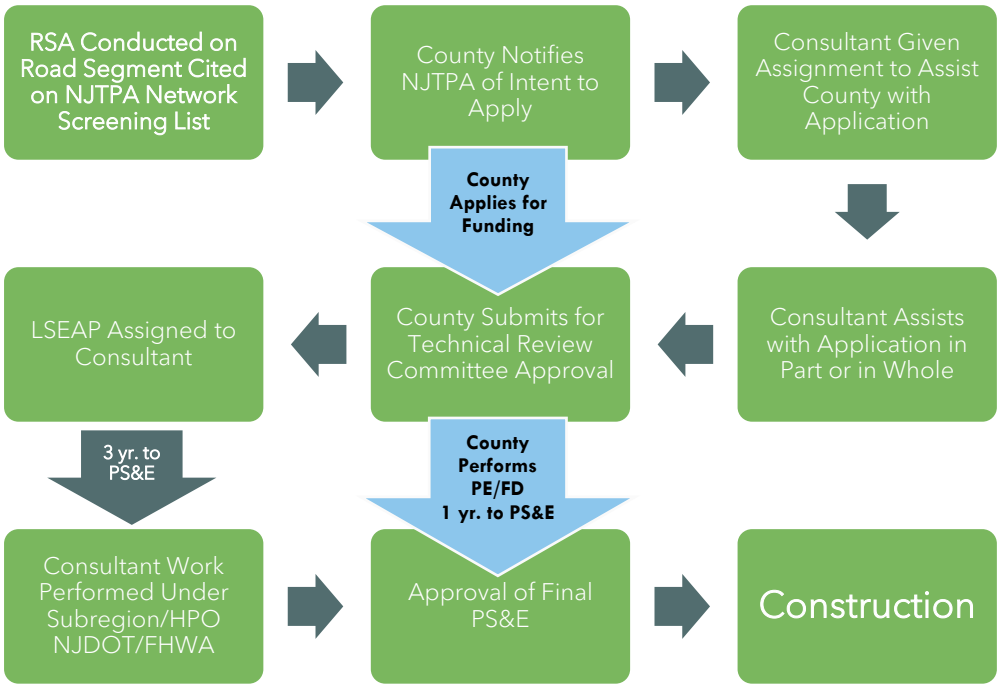
C. *Potential External Funding Sources*

Local Safety Program

The County has previously used RSAs as a "launching pad" for pursuing funding for corridor safety improvement projects, such as Main Street in Manville and Hamilton Street in Franklin, via the Local Safety Program (LSP) offered through NJTPA. Should the County desire to pursue funding of safety improvements on this corridor, the RSA can help to scope the specific safety improvements to be conceptualized and designed for eventual funding and construction. A simplified flowchart of the LSP application process from RSA to construction is shown in **Figure 14**.

The RSA can also be appended to Section 4 of the funding application[16] submitted to NJTPA as a further substantiation and documentation of the understanding of the existing concerns and proposed safety measures. This application, which also requests information on scope, location ranking, HSM analyses, estimated costs, and environmental impacts, may be filled out by the County itself or with assistance from a consultant designated by NJTPA. Pending determination of eligibility by NJTPA's Technical Review Committee, the County can choose to either perform the Preliminary Engineering and Final Design work in-house or obtain assistance for such work through NJTPA's Local Safety Engineering Assistance Program. It should be noted that implementation of improvements through the LSP often takes around five to six years from corridor selection to construction. If faster implementation is desired, County, and municipal operating and capital budgets could be relied upon if internal funding is available.

Figure 14 – Project Development Process for Local Safety Program after RSA Completion



[16] Application for FY 2020 provided here: https://www.njtpa.org/NJTPA/media/Documents/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/FY-2020-LSHRRRP-Application-Rev_191003.doc?ext=.doc

Transportation Alternatives Program

The purpose of the Transportation Alternatives Set-Aside Program (TA Set-Aside) federal grant initiative is to support the construction of "non-traditional" surface transportation projects, which typically involves the designing of infrastructure for active modes such as pedestrians, cyclists, and other non-motorized forms of travel. Supported projects can also have elements that bolster the recreational, historic, cultural, or environmental assets of the project area. Grant funding for a given project can range from $150,000 to $1,000,000. The amount of funding is determined on a project-by-project basis with award of prior grant money, and successful execution of prior funded projects, playing a factor. The County would not be prohibited from applying for both Safe Routes to School and TA Set-Aside funding at the same time.

TA Set-Aside lists the following activities that are eligible for funding under its "Pedestrian/Bicycle Facilities" and "Community Improvement" categories:

- New/reconstructed sidewalks/curb ramps;
- Bike lane striping;
- Wide paved shoulders;
- Bike parking and bus racks;
- New or reconstructed off-road trails;
- Bike/pedestrian bridges and underpasses;
- Lighting;
- Historic sidewalk paving;
- Benches;
- Planting containers;
- Decorative walls; and,
- Walkways.

The recommendations within the Implementation Matrix touch on many of the prior elements listed. To best position itself to attain approval for funding, the applying jurisdiction, whether County or municipal, should pass a resolution of support showing the commitment of maintenance of the proposed complete streets elements. Furthermore, the applicant should have data supporting that the implementation of similar improvements elsewhere within its jurisdiction has resulted in the increase of non-motorized transportation, the stimulus of economic activity, and the improvement in quality of life. A handbook summarizing the process of applying for these funds can be found at NJDOT Local Aid website[17].

Safe Routes to School (SRTS)

SRTS is a federally funded application program established to assist County, municipalities, school districts, and individual schools with programmed reimbursements for the implementation of improvements that would:

- Enable/encourage children in grades K-8, including those with disabilities, to walk/bicycle to school;
- Make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age; and,
- Facilitate the planning, development and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption and air pollution in the vicinity of schools.

Such improvements can include the construction of hard infrastructure, such as bridging sidewalk gaps, providing new crosswalks, specifying traffic control for new school crossing movements (signals, RRFBs, etc.), proposing new traffic calming devices, and implementing bike lanes or other bike facilities to encourage alternate modes of travel to school. Design assistance programs are also provided for the applicant to work with a NJDOT-selected consultant to design such infrastructure improvements. Funding can also be used for non-infrastructure events and services, such as walking school buses, traffic safety lessons, increased enforcement, etc. A handbook specifying the application process for SRTS FY 2022 funding can be found on NJDOT's SRTS website[18]. Webinars are also available to learn more about the program.

[17] https://njdotlocalaidrc.com/perch/resources/Uploads/2020-ta-set-aside-handbook-8-12-20.pdf
[18] https://www.njdotlocalaidrc.com/perch/resources/Uploads/2022-srts-handbook-06-10-2021.pdf

D. Demonstration Project

Demonstration projects are where an example improvement is completed for a selected corridor with foresight to prepare for larger rollouts. The improvement(s) should highlight the concept and illustrate the benefits of RSAs and how RSAs may improve the overall level of safety for the road users. The selected demonstration projects should be of strategic importance, and which is representative of the general safety theme suggested for the selected corridor.

To incentivize the use of improved cycling facilities on the corridor, especially by those attending school, it is recommended that aforementioned upgrades be followed by a Biking Bus event. Hillcrest Elementary School and Franklin Middle School would organize a one-day Biking Bus event overseen by local law enforcement to encourage students and parents alike to ride their bike to school on seasonable days. A similar successful event was organized in Ocean City and is depicted in **Figure 15**.

Figure 15 – Biking Bus Event in Ocean City, New Jersey[19]

E. Visualization of Potential Safety Measures

Table 7 and **Table 8**). Visualizations of these safety measures, along with accompanying descriptions on how these ideas seek to improve safety for vehicular, pedestrian, and cyclist travel, are adapted from the following publications:

- *New Jersey Pedestrian and Bicycle Resource Center* video library, 2021[20]
- *Cross County Connection TMA* video library, 2021[21]
- *NJDOT Technology Transfer* video library, 2021[22]
- *NJDOT Safe Routes to School* video library, 2021[23]
- *2017 State of New Jersey Complete Streets Design Guide*, NJDOT, 2017
- *Proven Safety Countermeasures*, FHWA, 2017
- *Small Town and Rural Multimodal Networks*, FHWA, 2016
- *Separated Bike Lane Planning and Design Guide*, FHWA, 2015
- *New Jersey School Zone Design Guide*, NJDOT, 2014
- *Urban Bikeway Design Guide 2nd Edition*, National Association of City Transportation Officials, 2014
- *Urban Street Design Guide*, National Association of City Transportation Officials, 2012

Key Study Recommendation – Road Diet, from Route 27 to Hamilton Street

As recommended in the *WalkBikeHike* (2019) and *Supporting Priority Investment in Somerset County Phase III Study* (2017, **Figure 3**), the County could consider a redesign of Franklin Boulevard from two travel lanes in each direction to one travel lane and one bike lane in each direction with a two-way left turn lane. Since

[19] Safe Routes NJ. (2018). Ocean City Biking School Bus. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=Cb_4bWYFR9s.
[20] https://www.youtube.com/channel/UCMsSU487ZPfaOAjcC7K8_SQ
[21] https://www.youtube.com/channel/UC5C0fODzuDqT9ycKMYv0C3Q
[22] https://www.youtube.com/channel/UC-L3YfqzFHcuDw6aI7wDrJQ
[23] https://www.youtube.com/channel/UCjlvrPjwNZ97MkX5lRol4ow

Franklin Boulevard has an AADT of 16,000, thorough intersection-by-intersection capacity analysis, design, administrative approval, and public vetting is needed to ensure the efficacy and success of the road diet. A four-lane to three-lane road diet, where properly implemented, could result in a 19-47%[24] reduction in total crashes. Standard types of crashes on a four-lane section of roadway such as Franklin Boulevard include "ghosting" right angle crashes (where left turn vehicles cannot see an approaching vehicle in the right lane due to a stopped opposing left turn vehicle) and "lane shopping" crashes where vehicles jump from left lane to right lane and back to aggressively pass slower vehicles. A similar improvement designed within a similar roadway width is depicted in **Figure 16**.

Since the curb-to-curb cartway width is limited at approximately 44' to 46', bike lanes would not be able to have a buffer and could be of substandard width. An alternate option to dedicating shoulder width available from the road diet to bicycle travel would be to restrict use of shoulders by parked vehicles and to provide curb extensions (in line with shoulder widths) at intersections to reduce pedestrian crossing distance, as depicted in **Figure 17**.

Figure 16 – Passaic County Road Diet in Wayne Township[25]

Figure 17 – Alternate Road Diet Option with Shoulders Transitioning to Curb Extensions at Intersections

Alternate Road Diet Option without Bike Lane, Facing North between Frank Street and Fuller Street

[24] FHWA. (2017). Proven Safety Countermeasures. https://safety.fhwa.dot.gov/provencountermeasures/.
[25] NJDOT / FHWA / Rutgers. (2015). 2015 CS Passaic County. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=_BAqvIRwjfM.

Bike Lane Buffer, from Hamilton Street to Viking Avenue

North of Hamilton Street, a bike lane is provided on Franklin Boulevard, albeit with limited signing and no striping indicating bicycle usage only. It is proposed that striping be made more prominent with bicycle text striped at regular intervals and intersection locations (**Figure 18** – Buffered Bicycle Lanes in the City of Camden
). During the RSA, it was also noted that, just past the northern limit of the study corridor at Belmar Street, the bike lanes in each direction dropped off for the roadway to accommodate a two-way left turn lane within the cartway width. To provide continuity of bicycle travel, it is recommended that a "BIKE MAY USE FULL LANE" sign be posted on Franklin Boulevard on segments where the bike lane ends (**Figure 19**).

Figure 18 – Buffered Bicycle Lanes in the City of Camden[26]

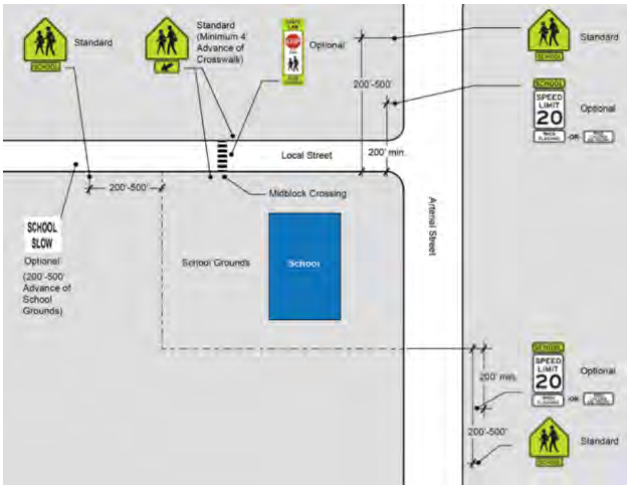
Figure 19 – MUTCD Sign R4-11

School Signing on Franklin Boulevard

School signing and striping on Franklin Boulevard on approach to Hillcrest Elementary School, and on the school grounds itself needs upgrade to MUTCD standards (sign mounting height, fluorescent yellow-green signing, etc.) and state signing practices. While the overhead flashing beacon provided for both directions of travel helps alert roadway users on Franklin Boulevard of crosswalk traffic during school arrival and dismissal periods, more clear and consistent messaging is needed at street-level. Although not current typical County practice, optional messages striped on the pavement, like "SCHOOL" and "SLOW," could be considered to better catch the cone of vision for drivers passing the school. Wider crosswalk bars also better alert drivers to potential crossing pedestrian traffic. For the re-signing and re-striping of school advisory messages on Franklin Boulevard, the designer should refer to NJDOT's *New Jersey School Zone Design Guide* (2014, key figure shown on **Figure 20**) and the MUTCD for best practices.

[26] NJDOT / FHWA / Rutgers. (2015). 2015 CS Camden. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=lo1oB6vrlRE.

Figure 20 – Figure from New Jersey School Zone Design Guide Showing Signing Placement



Mountable Curbs at Intersections with Route 27 and Hamilton Street

Conceptual design of improvements at Franklin Boulevard intersections with Route 27 and Hamilton Street are underway with NJDOT redesigning the Route 27 (Somerset Street) corridor for a road diet and the County redesigning Hamilton Street, incorporating various safety improvements. In addition to these improvement projects, due to the heavy truck turning movements at these intersections and numerous curb overruns (especially in the northwest corner of both intersections), it is recommended that concrete mountable curbs (**Figure 21**) be considered for the redesigns of both intersections to accommodate the large sweeping truck turning movements at these heavily traveled intersections, mitigating the instances of pedestrian space encroachment and encroachment into the opposing lane of travel. These curbs also allow the designer to tighten turning radii for general passenger car traffic, slowing turning speeds and mitigating the risk of pedestrian-vehicle conflicts and collisions. Should a road diet be achieved at the intersection with Route 27, the additional lateral space provided between the curb and southbound travel lane via the bike lane would mitigate the occurrence of pedestrian space and opposing traffic encroachments for the truck turning movements from Franklin Boulevard southbound onto Route 27 southbound.

Figure 21 – Mountable Concrete Curbs in Portland Oregon[27]

New development projects within this Priority Growth Investment Area (see Phase III study) on the southern end of the corridor, such as 727 Franklin Boulevard between Fuller Street and Frank Street, should specify the design of similar buildings with parking provided behind storefront areas and storefront areas adjacent to the street and sidewalk, which helps drivers to slow vehicle speeds with visual queues of a downtown neighborhood feel. It was noticed, however, that many businesses at 727 Franklin Boulevard were empty and lacked street furniture outside the store front, which made the businesses feel less "engaging" with the

[27] NJDOT. (2017). *2017 State of New Jersey Complete Streets Design Guide.*

street traffic. The Township should consider the addition of street furniture (**Figure 22**) in front of this and other new developments to help provide more of a downtown street feel on Franklin Boulevard. Additional striped crossing locations traversing Franklin Boulevard unlocked by a potential road diet would also help achieve this traffic calming effect.

Figure 22 – Street Furniture in Downtown Haddonfield

Speed Humps on Berry Street and Ellen Street

Cut-through traffic was observed to occur on Berry Street and Ellen Street, with vehicles bypassing peak hour congestion at the intersection with Hamilton Street to the southwest. Speed humps (
Figure 23), combined with turning restrictions could help to discourage this cut-through traffic activity. Speed humps can be designed to slow an average vehicle's wheelbase width yet can also allow for bicyclists and larger emergency vehicles, such as firetrucks, to move along the street unimpeded.

Figure 23 – Sample Speed Humps from NACTO[28]

[28] Figure from National Association of City Transportation Officials. (2012). *Urban Street Design Guide*.

VII. Conclusion

This RSA Report seeks to describe the process undertaken by the County to investigate potential traffic safety issues along the Franklin Boulevard corridor, extending from the municipal/County border with New Brunswick City/Middlesex County at the intersection with Route 27 at MP 0.0 to a few hundred feet south of the intersection with Belmar Street at MP 1.0, located in Franklin Township. From survey of prior County, municipal, or regional studies to public and stakeholder outreach conducted as part of this study to the crash data that was reviewed report-by-report to the observations made during in-field audits, potential concerns were observed and recorded, not only for corridor-wide issues, but for location-specific issues.

In order to address these potential concerns, discussions were held with the RSA team and County Engineering to develop a list of tasks to improve traffic safety on the corridor, which are codified in the Implementation Matrix (Chapter VI, Subsection A) in this report. To assist the responsible jurisdictions (whether municipal, County, or separate agency) to schedule and prioritize these improvements, such were classified by anticipated timeline and cost magnitude. It is encouraged that the improvement recommendations are shared with all responsible jurisdictions to increase the benefits to be seen from the recommendations in this report.

While the recommendations in the Implementation Matrix are centered around the engineering (and associated maintenance) of roadway features, changes to hard infrastructure alone will fall shy of the benefit that would be seen by implementing the 5E's of highway safety[29]:

- Engineering: highway design, traffic, maintenance, operations, and planning professionals;
- Enforcement: State and local law enforcement agencies;
- Education: communication professionals, educators, and citizen advocacy groups;
- Emergency response: first responders, paramedics, fire, and rescue; and,
- Equity: prioritizing the safety of vulnerable roadway users.

This approach recognizes a shared responsibility across numerous professions to see improved benefits in corridor crash performance, beyond the anticipated reduction in crashes with the implementation of proven crash countermeasures. RideWise (the County's TMA), law enforcement, and EMS are encouraged to continue their efforts in educating the local driving population, holding driving behaviors accountable to Title 39, improving the response times to severe crash incidents, and reaching underserved communities with these safety strategies.

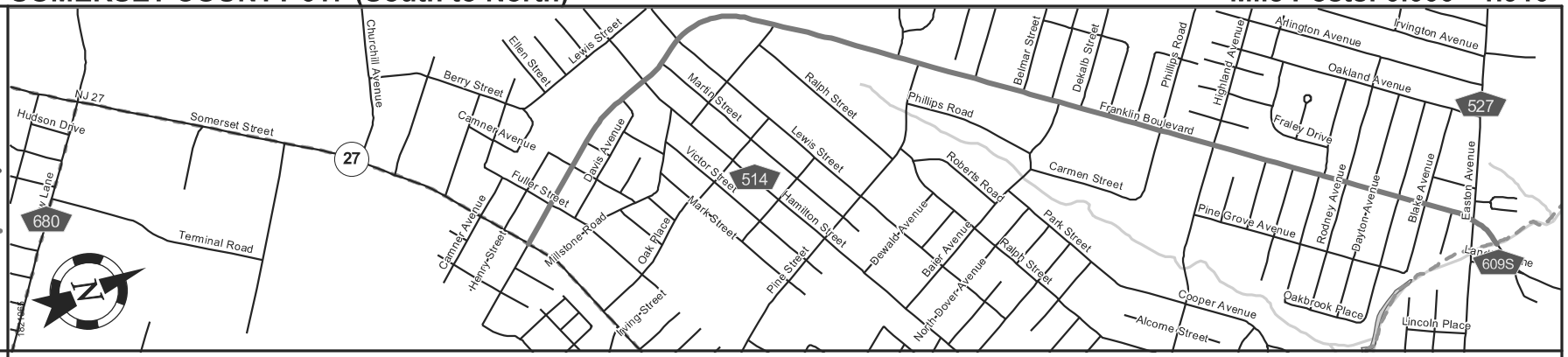
[29] Adapted from FHWA, https://safety.fhwa.dot.gov/hsip/resources/fhwasa1102/flyr3_in.cfm

Appendix A

Straight Line Diagram

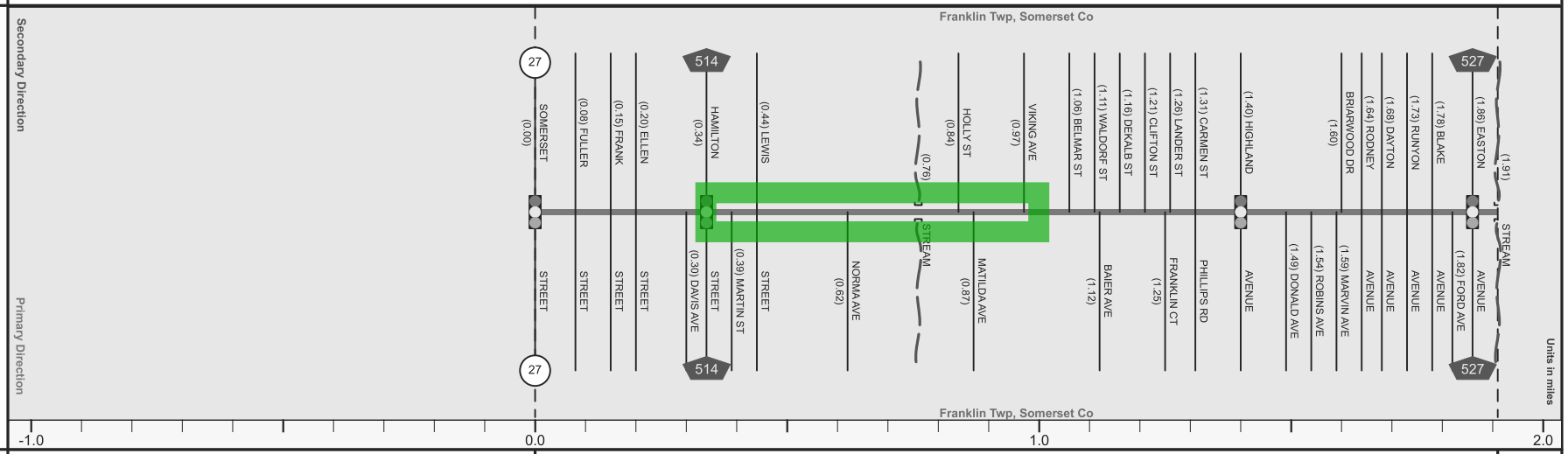
SOMERSET COUNTY 617 (South to North)

Mile Posts: 0.000 - 1.910



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	

Interstate Route 287 · US Route 22 · NJ Route 33 · County Road 689 · Interchange Number 2 · Grade Separated Interchange · Traffic Signal · Traffic Monitoring Sites WIM AVC VOL · Road Underpass · Road Overpass



Street Name		Franklin Boulevard	
Jurisdiction		County	
Functional Class		Urban Minor Arterial	
Federal Aid - NHS Sy		STP	Urban Principal Arterial
Control Section			
Speed Limit		40	
Number of Lanes	4	2	
Med. Type		None	
Med. Width		0	
Pavement	40	24	28
Shoulder	0	4	
Traffic Volume	12,782 (2018)	15,888 (2017)	
Traffic Sta. ID	111815	111816	
Structure No.			1238168
Enlarged Views			

Begin Somerset County 617 MP=0

End Somerset County 617 MP=1.91

SRI = 18000617__

Date last inventoried: July 2011

Page Created: March, 2019

Appendix B

Traffic Data

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 07/10/2018 to 07/12/2018

Site names: 111815,FRANKLIN BLVD-.27,18000617__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET ELLEN ST DAVIS AVE

Seasonal Factor Grp: rg3_4U
Daily Factor Grp: rg3_4U
Axle Factor Grp: rg3_4U
Growth Factor Grp: rg3_4U

	Sun, Jul 8, 2018			Mon, Jul 9, 2018			Tue, Jul 10, 2018			Wed, Jul 11, 2018			Thu, Jul 12, 2018			Fri, Jul 13, 2018			Sat, Jul 14, 2018		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00										116	81	35	137	76	61						
01:00										94	45	49	102	40	62						
02:00										43	18	25	66	24	42						
03:00										47	27	20	50	27	23						
04:00										89	47	42	90	58	32						
05:00										211	130	81	166	119	47						
06:00										500	297	203	453	325	128						
07:00										812	388	424	723	401	322						
08:00										859	417	442	841	405	436						
09:00										823	378	445	816	356	460						
10:00							697	341	356	723	345	378									
11:00							775	437	338	762	377	385									
12:00							836	448	388	872	490	382									
13:00							932	475	457	858	440	418									
14:00							869	441	428	878	435	443									
15:00							960	500	460	968	500	468									
16:00							1,086	588	498	1,018	571	447									
17:00							1,042	539	503	1,086	635	451									
18:00							930	474	456	995	482	513									
19:00							824	427	397	840	435	405									
20:00							672	341	331	707	338	369									
21:00							520	263	257	597	269	328									
22:00							414	212	202	439	204	235									
23:00							255	113	142	340	165	175									
Total							10,812	5,599	5,213	14,677	7,514	7,163	3,444	1,831	1,613						
AM Peak Vol										889	417	487									
AM Peak Fct										.979	.923	.951									
AM Peak Hr							:	:	:	8: 30	8: 00	8: 30									
PM Peak Vol							1,086	588	513	1,090	635	513									
PM Peak Fct							.933	.942	.812	.966	.951	.897									
PM Peak Hr							16: 00	16: 00	17: 30	17: 30	17: 00	18: 00									
Seasonal Fct							.972	.972	.972	.972	.972	.972	.972	.972	.972						
Daily Fct							.970	.970	.970	.912	.912	.912	.924	.924	.924						
Axle Fct							.486	.486	.486	.486	.486	.486	.486	.486	.486						
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000						

Created 08/31/2018 3:39 PM

ROAD AADT 12,782 NDIR AADT 6,179 PDIR AADT 6,603

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 07/10/2018 to 07/12/2018

Site names: 111815,FRANKLIN BLVD-.27,18000617__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET ELLEN ST DAVIS AVE

Seasonal Factor Grp: rg3_4U
Daily Factor Grp: rg3_4U
Axle Factor Grp: rg3_4U
Growth Factor Grp: rg3_4U

	Sun, Jul 8, 2018			Mon, Jul 9, 2018			Tue, Jul 10, 2018			Wed, Jul 11, 2018			Thu, Jul 12, 2018			Fri, Jul 13, 2018			Sat, Jul 14, 2018		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00										116	81	35	137	76	61						
01:00										94	45	49	102	40	62						
02:00										43	18	25	66	24	42						
03:00										47	27	20	50	27	23						
04:00										89	47	42	90	58	32						
05:00										211	130	81	166	119	47						
06:00										500	297	203	453	325	128						
07:00										812	388	424	723	401	322						
08:00										859	417	442	841	405	436						
09:00										823	378	445	816	356	460						
10:00							697	341	356	723	345	378									
11:00							775	437	338	762	377	385									
12:00							836	448	388	872	490	382									
13:00							932	475	457	858	440	418									
14:00							869	441	428	878	435	443									
15:00							960	500	460	968	500	468									
16:00							1,086	588	498	1,018	571	447									
17:00							1,042	539	503	1,086	635	451									
18:00							930	474	456	995	482	513									
19:00							824	427	397	840	435	405									
20:00							672	341	331	707	338	369									
21:00							520	263	257	597	269	328									
22:00							414	212	202	439	204	235									
23:00							255	113	142	340	165	175									
Total							10,812	5,599	5,213	14,677	7,514	7,163	3,444	1,831	1,613						
AM Peak Vol										889	417	487									
AM Peak Fct										.979	.923	.951									
AM Peak Hr							:	:	:	8: 30	8: 00	8: 30									
PM Peak Vol							1,086	588	513	1,090	635	513									
PM Peak Fct							.933	.942	.812	.966	.951	.897									
PM Peak Hr							16: 00	16: 00	17: 30	17: 30	17: 00	18: 00									
Seasonal Fct							.972	.972	.972	.972	.972	.972	.972	.972	.972						
Daily Fct							.970	.970	.970	.912	.912	.912	.924	.924	.924						
Axle Fct							.486	.486	.486	.486	.486	.486	.486	.486	.486						
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000						

Created 08/31/2018 3:39 PM

ROAD AADT 12,782 NDIR AADT 6,179 PDIR AADT 6,603

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 11/07/2017 to 11/13/2017

Site names: 111816,Franklin Boulevard-.99,18000617__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET VIKING AVE BELMAR ST

Seasonal Factor Grp: rg3_4U
Daily Factor Grp: rg3_4U
Axle Factor Grp: rg3_4U
Growth Factor Grp: rg3_4U

	Sun, Nov 5, 2017			Mon, Nov 6, 2017			Tue, Nov 7, 2017			Wed, Nov 8, 2017			Thu, Nov 9, 2017			Fri, Nov 10, 2017			Sat, Nov 11, 2017		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00							126	56	70	107	48	59	157	66	91	175	88	87	258	133	125
01:00							70	26	44	86	41	45	77	35	42	93	46	47	155	70	85
02:00							56	31	25	55	27	28	52	28	24	92	44	48	113	53	60
03:00							77	43	34	72	35	37	88	44	44	85	40	45	97	50	47
04:00							162	83	79	145	70	75	160	81	79	146	68	78	108	56	52
05:00							332	186	146	349	185	164	363	192	171	309	169	140	118	61	57
06:00							802	410	392	780	413	367	684	394	290	638	353	285	271	156	115
07:00							1,188	611	577	1,184	608	576	980	521	459	889	486	403	384	221	163
08:00							1,198	624	574	1,135	577	558	1,032	533	499	946	514	432	521	270	251
09:00							998	485	513	976	526	450	1,009	540	469	914	480	434	793	398	395
10:00							842	424	418	907	477	430	863	437	426	913	474	439	854	425	429
11:00							856	424	432	822	448	374	946	513	433	883	482	401	911	464	447
12:00							866	462	404	866	480	386	997	504	493	940	501	439	1,018	562	456
13:00							963	509	454	962	510	452	953	509	444	1,055	521	534	881	461	420
14:00							1,114	579	535	1,156	598	558	1,055	521	534	1,057	561	496	960	495	465
15:00							1,273	691	582	1,313	701	612	1,121	603	518	1,092	554	538	953	495	458
16:00							1,325	673	652	1,347	729	618	1,239	659	580	1,233	608	625	928	450	478
17:00							1,249	653	596	1,315	674	641	1,274	634	640	1,219	665	554	847	400	447
18:00							1,030	480	550	1,151	556	595	1,136	543	593	1,148	571	577	807	407	400
19:00							795	359	436	915	450	465	857	423	434	899	444	455	675	334	341
20:00							586	281	305	659	326	333	700	339	361	691	334	357	591	287	304
21:00							486	213	273	584	269	315	558	247	311	706	365	341	536	284	252
22:00							377	194	183	423	207	216	446	221	225	593	336	257	530	285	245
23:00							261	113	148	287	124	163	303	148	155	374	165	209	415	211	204
Total							17,032	8,610	8,422	17,596	9,079	8,517	17,050	8,735	8,315	17,090	8,869	8,221	13,724	7,028	6,696
AM Peak Vol							1,198	624	577	1,184	608	576	1,032	540	499	946	514	439	911	464	447
AM Peak Fct							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AM Peak Hr							8: 00	8: 00	7: 00	7: 00	7: 00	7: 00	8: 00	9: 00	8: 00	8: 00	8: 00	10: 00	11: 00	11: 00	11: 00
PM Peak Vol							1,325	691	652	1,347	729	641	1,274	659	640	1,233	665	625	1,018	562	478
PM Peak Fct							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PM Peak Hr							16: 00	15: 00	16: 00	16: 00	16: 00	17: 00	17: 00	16: 00	17: 00	16: 00	17: 00	16: 00	12: 00	12: 00	16: 00
Seasonal Fct							1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019	1.019
Daily Fct							.940	.940	.940	.905	.905	.905	.962	.962	.962	.939	.939	.939	1.094	1.094	1.094
Axle Fct							.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488	.488
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 11/07/2017 to 11/13/2017

Site names: 111816,Franklin Boulevard-.99,18000617__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET VIKING AVE BELMAR ST

Seasonal Factor Grp: rg3_4U
Daily Factor Grp: rg3_4U
Axle Factor Grp: rg3_4U
Growth Factor Grp: rg3_4U

	Sun, Nov 12, 2017			Mon, Nov 13, 2017			Tue, Nov 14, 2017			Wed, Nov 15, 2017			Thu, Nov 16, 2017			Fri, Nov 17, 2017			Sat, Nov 18, 2017		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00	242	123	119	99	51	48															
01:00	165	66	99	52	29	23															
02:00	150	71	79	51	17	34															
03:00	86	40	46	69	34	35															
04:00	65	31	34	143	72	71															
05:00	76	39	37	340	193	147															
06:00	178	106	72	688	355	333															
07:00	237	119	118	1,134	549	585															
08:00	470	201	269	1,144	599	545															
09:00	592	280	312	964	516	448															
10:00	689	378	311	877	447	430															
11:00	870	502	368	779	428	351															
12:00	891	419	472	869	460	409															
13:00	881	479	402	975	517	458															
14:00	889	480	409	1,124	586	538															
15:00	842	411	431	1,295	722	573															
16:00	902	466	436	1,279	706	573															
17:00	762	407	355	1,263	669	594															
18:00	675	340	335	1,117	589	528															
19:00	640	308	332	766	385	381															
20:00	614	321	293	656	314	342															
21:00	423	191	232	515	216	299															
22:00	314	132	182	377	192	185															
23:00	223	103	120	289	125	164															
Total	11,876	6,013	5,863	16,865	8,771	8,094															
AM Peak Vol	870	502	368	1,144	599	585															
AM Peak Fct	1	1	1	1	1	1															
AM Peak Hr	11: 00	11: 00	11: 00	8: 00	8: 00	7: 00															
PM Peak Vol	902	480	472	1,295	722	594															
PM Peak Fct	1	1	1	1	1	1															
PM Peak Hr	16: 00	14: 00	12: 00	15: 00	15: 00	17: 00															
Seasonal Fct	1.019	1.019	1.019	1.019	1.019	1.019															
Daily Fct	1.344	1.344	1.344	.960	.960	.960															
Axle Fct	.488	.488	.488	.488	.488	.488															
Pulse Fct	2.000	2.000	2.000	2.000	2.000	2.000															

Appendix C

Excerpts from Prior Studies

Improvement	Order of Magnitude Cost (Est.)	Time Frame	Potential Partners
Hamilton Street / Renaissance Redevelopment PGIA			
Hamilton Street Corridor			
Install bus stop signage	Low	Short	County
Promote findings of the Strategic Zoning and Economic Development Recommendations Study	Low	Short	Town / County
Investigate shared-lane markings connecting to existing markings in New Brunswick	Low	Med	Town / County
Repair deteriorating and / or heaved sidewalk sections	Low	Med	Town / County
Widen sidewalk (min. 10 ft) in front of commercial properties	Low	Long	Town / Developer
Enhance pedestrian crossings with curb extensions and integrate green stormwater features into curb extensions	Low	Long	Town / County / Developer
Upgrade traffic signal equipment to include pedestrian signal heads and countdown timers	Low	Long	County
Install high-visibility crosswalks and ADA compliant curb ramps at unmarked crossings	Low	Long	County / Developer
Investigate opportunities to incorporate bicycle parking into streetscape and require bicycle parking for new developments	Low	Long	Town / County / Developer
Investigate opportunities to expand transit access along the corridor, such as NJ TRANSIT and/or Rutgers University bus service	Low	Long	County / NJ TRANSIT / Rutgers / Town
Lewis Street Bicycle Boulevard			
Install wayfinding signage and bicycle boulevard pavement markings	Low	Med	Town
Install a multi-use path between Francis Street and Berry Street	Low	Long	Town
Provide marked crossings and median islands on Franklin Boulevard	Low	Long	County / Town

Improvement	Order of Magnitude Cost (Est.)	Time Frame	Potential Partners
Install contraflow bicycle lane on Lewis Street between Franklin Boulevard and Norma Avenue	Low	Long	Town
Investigate opportunity to install bicycle boulevard behind the Nora Shopping Center	Low	Long	Town / Developer
Enhanced Multimodal Connectivity			
Adopt Complete Streets policy	Low	Short	Town
Investigate opportunities to enhance bike/ped connectivity between Franklin and New Brunswick with bike/ped-only, prefabricated structures crossing over Mile Run Creek	Low	Long	Towns
Provide bike/ped connections on Burns Street between Jurocko Avenue and North Lawrence Avenue and Winslow Avenue and Miller Avenue	Low	Long	Town
Provide bike/ped connection from Eugene Avenue and Victor Street to the rear and side, respectively, of the Hamilton Street Center shopping plaza	Low	Long	Town / Property Owner / Developer
Investigate opportunities to utilize the Mile Run Creek as a greenway	Low	Long	Town
Franklin Boulevard			
Investigate lowering the speed limit between NJ 27 and Lewis Avenue (currently 40 mph)	Low	Med	County / Town
Fill sidewalk gaps between Ellen Street and Frank Street, and between Fuller Street and NJ 27	Low	Long	Town
Investigate a road diet between Hamilton Street and NJ 27	Low	Long	County / Town / NJDOT

NOTE:

Order of Magnitude Cost tiers:
- Low: <$5M
- Medium: $5M - $25M
- High: >$25M

Time Frame tiers:
- Short: <3 year
- Med: 3-8 years
- Long: >8 years

Appendix D

Collision Diagrams

New Brunswick City
Middlesex County

Franklin Township
Somerset County

New Brunswick City

Franklin Township

27

Somerset St

Oliver Ave

24 32

3-8

63 33

28 34 36

37 38

39

18-23

15 16 17

14

1,2,42

11-13

9-10

25-27,29,30

31

35

SOMERSET 617 COUNTY

Franklin Blvd

40 41 43

MATCH LINE A

Southern Limit of Segment

Somerset St

27

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (1 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A1

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Franklin Township
Somerset County

Fuller St
Frank St
Ellen St
Franklin Blvd
SOMERSET 617 COUNTY

MATCH LINE A
MATCH LINE B

44 58 57 56 55 59 45 50 46 51 47 52 48 53 49 54
66 65 61 62 63 64 60
72 73 68 71 69

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (2 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A2

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Franklin Township
Somerset County

MATCH LINE B

MATCH LINE C

Franklin Blvd

Hamilton St

Field St

SOMERSET 514 COUNTY

SOMERSET 617 COUNTY

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (3 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A3

U:\192510854\graphic_design\CrashDiagrams\CR533_Millstone_mp25.14-25.87

Franklin Township
Somerset County

Lewis St

Lewis St

ONE WAY

Martin St

Franklin Blvd

SOMERSET 617 COUNTY

MATCH LINE C

Franklin Blvd

SOMERSET 617 COUNTY

MATCH LINE D

167

174

172

173

175

176

177

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (4 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A4

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Franklin Township
Somerset County

MATCH LINE D

MATCH LINE E

Franklin Blvd

Norma Ave

ONE WAY

186
180
187
182
185
179
183
184
181
188
189
178

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (5 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A5

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Franklin Township
Somerset County

Holly St

MATCH LINE E

MATCH LINE F

Franklin Blvd

Franklin Blvd

Matilda Ave

190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL

EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (6 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A6

U:\119251085A\graphic_design\CrashDiagrams\CR533_Millstone_mp25.14-25.87

Franklin Township
Somerset County

Viking Ave

Belmar St

MATCH LINE F

SOMERSET 617 COUNTY Franklin Blvd

212

216

217

218

213

214

215

SOMERSET 617 COUNTY Franklin Blvd

Northern Limit of Segment

LEGEND

CRASH NUMBER SEE EXHIBIT A8-AI2 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (7 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A7

U:\192510854\graphic_design\CrashDiagrams\CR533_Millstone_mp25.14-25.87

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
1	09/12/2018	02:20 PM	Property Damage Only	0	Backing	Daylight	Wet
2	01/14/2018	10:50 PM	Property Damage Only	0	Encroachment	Dark, Street lights on, continuous lighting	Dry
3	01/22/2016	07:11 AM	Property Damage Only	0	Fixed Object	Daylight	Dry
4	01/29/2016	09:54 AM	Property Damage Only	0	Fixed Object	Daylight	Dry
5	02/02/2016	06:16 AM	Property Damage Only	0	Fixed Object	Dawn	Dry
6	12/21/2016	02:39 PM	Property Damage Only	0	Fixed Object	Daylight	Dry
7	11/01/2017	01:10 PM	Property Damage Only	0	Fixed Object	Daylight	Dry
8	02/03/2017	12:56 PM	Property Damage Only	0	Fixed Object	Daylight	Dry
9	08/03/2017	10:04 PM	Injury	2	Left Turn/U-turn	Dark, Street lights on, spot lighting	Wet
10	12/05/2016	07:05 PM	Injury	5	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
11	02/13/2017	04:39 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
12	10/07/2017	10:52 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
13	11/13/2018	10:04 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Wet
14	01/24/2017	09:23 PM	Injury	1	Pedestrian	Dark, Street lights on, spot lighting	Wet
15	10/10/2018	09:21 PM	Injury	1	Right Angle	Dark, Street lights on, continuous lighting	Dry
16	11/22/2018	01:56 PM	Injury	3	Right Angle	Daylight	Dry
17	03/31/2016	11:00 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, spot lighting	Wet
18	10/11/2016	12:30 PM	Property Damage Only	0	Right Angle	Daylight	Dry
19	11/16/2016	06:27 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
20	02/17/2017	05:22 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, spot lighting	Dry
21	04/12/2017	12:36 PM	Property Damage Only	0	Right Angle	Daylight	Dry
22	08/26/2017	03:15 PM	Property Damage Only	0	Right Angle	Daylight	Dry
23	10/08/2017	10:28 AM	Property Damage Only	0	Right Angle	Daylight	Wet
24	02/12/2016	01:17 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
25	10/19/2016	08:32 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
26	02/04/2017	01:37 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
27	02/04/2018	07:59 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Wet
28	01/29/2018	04:44 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
29	09/30/2016	06:40 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Wet
30	09/30/2016	10:08 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Wet
31	05/28/2017	09:48 PM	Injury	2	Same Direction (Side Swipe)	Dark, Street lights on, continuous lighting	Wet
32	05/16/2016	07:26 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
33	01/28/2016	08:00 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
34	02/09/2018	02:55 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
35	12/15/2018	11:03 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
36	03/09/2018	06:19 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, spot lighting	Dry
37	02/11/2017	12:36 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
38	10/21/2016	05:10 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
39	02/06/2017	02:57 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
40	04/20/2016	08:48 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
41	11/19/2017	12:09 PM	Property Damage Only	0	Right Angle	Daylight	Dry
42	08/12/2016	12:38 PM	Property Damage Only	0	Backing	Daylight	Dry
43	02/14/2017	09:18 AM	Property Damage Only	0	Right Angle	Daylight	Dry
44	05/10/2017	08:21 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
45	04/10/2016	11:14 AM	Injury	1	Right Angle	Daylight	Dry

CRASH DIAGRAM (8 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A8

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
46	11/26/2017	01:31 PM	Injury	3	Right Angle	Daylight	Dry
47	03/07/2017	02:51 PM	Property Damage Only	0	Right Angle	Daylight	Wet
48	01/11/2016	05:08 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, spot lighting	Dry
49	12/11/2016	06:58 AM	Property Damage Only	0	Right Angle	Dawn	Dry
50	05/22/2017	07:20 AM	Property Damage Only	0	Right Angle	Daylight	Wet
51	03/08/2016	02:06 PM	Property Damage Only	0	Right Angle	Daylight	Dry
52	02/27/2017	12:33 PM	Property Damage Only	0	Right Angle	Daylight	Dry
53	11/03/2017	05:26 PM	Property Damage Only	0	Right Angle	Daylight	Dry
54	09/05/2018	08:44 AM	Property Damage Only	0	Right Angle	Daylight	Dry
55	02/05/2016	09:43 AM	Injury	1	Same Direction (Rear-End)	Daylight	Slush
56	01/03/2018	08:36 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
57	11/12/2018	05:22 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
58	06/07/2018	09:55 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
59	11/15/2018	01:42 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Snowy
60	03/27/2017	08:51 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Wet
61	02/28/2016	09:56 AM	Injury	1	Right Angle	Daylight	Dry
62	08/05/2018	03:43 PM	Injury	1	Right Angle	Daylight	Dry
63	08/21/2017	07:41 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
64	06/21/2018	06:26 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
65	01/29/2016	02:10 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
66	10/02/2016	05:39 AM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, spot lighting	Wet
67	09/29/2015	07:28 AM	Injury	1	Pedestrian	Daylight	Dry
68	09/27/2017	02:48 PM	Injury	1	Pedestrian	Daylight	Dry
69	09/29/2017	02:46 PM	Injury	2	Right Angle	Daylight	Dry
70	05/28/2016	02:02 PM	Property Damage Only	0	Right Angle	Daylight	Dry
71	11/11/2016	08:03 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, spot lighting	Dry
72	02/16/2018	12:02 AM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Wet
73	12/21/2018	08:38 PM	Injury	1	Same Direction (Side Swipe)	Dark, Street lights on, spot lighting	Wet
74	05/14/2016	04:17 AM	Property Damage Only	0	Fixed Object	Dark, Street lights on, spot lighting	Wet
75	10/21/2018	12:50 AM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Wet
76	06/28/2017	11:54 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
77	05/26/2017	01:04 AM	Property Damage Only	0	Fixed Object	Dark, Street lights on, spot lighting	Wet
78	04/03/2018	06:16 PM	Property Damage Only	0	Fixed Object	Daylight	Wet
79	06/13/2016	11:03 AM	Injury	1	Pedestrian	Daylight	Dry
80	04/23/2018	09:14 PM	Injury	1	Pedestrian	Dark, Street lights on, spot lighting	Dry
81	01/14/2016	06:20 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
82	05/09/2018	09:41 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, spot lighting	Dry
83	12/01/2016	02:10 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
84	10/21/2016	03:16 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
85	01/25/2018	12:15 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
86	10/17/2018	04:12 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
87	03/20/2017	07:07 PM	Injury	1	Left Turn/U-turn	Dark, Street lights on, spot lighting	Dry
88	01/30/2016	01:43 PM	Injury	1	Right Angle	Daylight	Dry
89	05/01/2018	03:29 PM	Property Damage Only	0	opposite direction (side swipe)	Daylight	Dry
90	04/06/2016	02:56 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry

CRASH DIAGRAM (9 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A9

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
91	03/24/2017	08:00 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
92	03/27/2017	11:51 AM	Property Damage Only	0	Backing	Daylight	Wet
93	10/29/2018	06:08 PM	Property Damage Only	0	Backing	Dark, Street lights on, continuous lighting	Dry
94	12/15/2018	08:42 PM	Property Damage Only	0	Backing	Dark, Street lights on, spot lighting	Wet
95	03/14/2016	04:18 PM	Property Damage Only	0	Fixed Object	Daylight	Wet
96	06/05/2018	07:39 PM	Property Damage Only	0	Fixed Object	Daylight	Oil/Fuel
97	01/14/2016	02:01 PM	Property Damage Only	0	Fixed Object	Daylight	Dry
98	10/18/2018	04:09 PM	Property Damage Only	0	Fixed Object	Daylight	Dry
99	12/23/2018	04:36 PM	Injury	1	Left Turn/U-turn	Dusk	Dry
100	01/12/2016	02:17 PM	Injury	1	Left Turn/U-turn	Daylight	Dry
101	02/07/2016	06:14 AM	Injury	2	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Dry
102	01/26/2018	07:35 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, spot lighting	Dry
103	03/10/2018	12:29 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
104	06/02/2018	10:33 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
105	12/09/2018	10:02 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
106	08/04/2016	09:09 AM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
107	02/16/2018	08:30 AM	Property Damage Only	0	Opposite Direction (Head on, Angular)	Daylight	Dry
108	12/21/2016	08:41 AM	Property Damage Only	0	Opposite Direction (Side Swipe)	Daylight	Dry
109	10/06/2015	07:01 PM	Injury	1	Pedestrian	Dusk	Dry
110	12/09/2015	06:25 PM	Injury	1	Pedestrian	Dark, Street lights on, spot lighting	Dry
111	11/13/2016	03:56 PM	Injury	1	Pedestrian	Daylight	Dry
112	08/11/2018	09:35 PM	Injury	1	Pedestrian	Dark, Street lights on, spot lighting	Wet
113	05/06/2016	03:37 PM	Injury	1	Right Angle	Daylight	Wet
114	06/07/2016	06:04 PM	Injury	1	Right Angle	Daylight	Dry
115	05/25/2018	06:28 PM	Injury	1	Right Angle	Daylight	Dry
116	03/15/2017	12:52 PM	Injury	1	Right Angle	Daylight	Wet
117	06/30/2018	02:27 PM	Injury	1	Right Angle	Daylight	Dry
118	05/04/2016	01:54 PM	Injury	1	Right Angle	Daylight	Wet
119	03/09/2016	06:39 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
120	05/04/2016	06:17 PM	Property Damage Only	0	Right Angle	Daylight	Wet
121	10/13/2016	09:56 AM	Property Damage Only	0	Right Angle	Daylight	Dry
122	06/22/2017	12:28 PM	Property Damage Only	0	Right Angle	Daylight	Dry
123	09/07/2017	04:06 PM	Property Damage Only	0	Right Angle	Daylight	Dry
124	02/22/2018	12:20 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Wet
125	07/10/2018	09:49 AM	Property Damage Only	0	Right Angle	Daylight	Dry
126	05/07/2018	02:39 PM	Property Damage Only	0	Right Angle	Daylight	Dry
127	12/21/2018	01:27 PM	Property Damage Only	0	Right Angle	Daylight	Wet
128	05/01/2016	10:35 AM	Property Damage Only	0	Right Angle	Daylight	Wet
129	11/21/2017	06:10 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
130	01/25/2016	03:01 PM	Property Damage Only	0	Right Angle	Daylight	Wet
131	11/06/2017	08:16 AM	Property Damage Only	0	Right Angle	Daylight	Dry
132	08/29/2018	07:31 PM	Property Damage Only	0	Right Angle	Daylight	Dry
133	03/29/2016	06:17 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
134	10/19/2016	02:52 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
135	05/09/2018	05:55 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry

CRASH DIAGRAM (10 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A10

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
136	07/09/2018	12:54 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
137	07/11/2018	05:06 PM	Injury	2	Same Direction (Rear-End)	Daylight	Dry
138	02/25/2016	08:08 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
139	07/20/2016	05:45 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
140	11/11/2016	06:31 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
141	01/17/2017	03:21 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
142	01/23/2017	09:16 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
143	04/24/2017	10:12 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
144	09/13/2017	03:50 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
145	02/12/2016	07:32 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
146	02/13/2018	11:08 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
147	07/10/2018	07:22 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
148	02/08/2016	01:02 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
149	12/12/2016	08:17 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
150	02/09/2016	03:11 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
151	08/26/2016	07:42 PM	Property Damage Only	0	Same Direction (Rear-End)	Dusk	Dry
152	06/06/2017	11:51 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
153	11/01/2018	04:17 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
154	11/05/2018	07:26 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
155	06/23/2017	06:27 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
156	10/22/2017	09:40 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
157	05/16/2017	09:17 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, spot lighting	Dry
158	07/16/2017	12:30 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
159	10/11/2017	10:21 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
160	11/02/2018	04:24 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
161	07/17/2018	03:20 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Wet
162	01/04/2016	02:15 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
163	08/28/2018	06:29 PM	Injury	1	Backing	Daylight	Dry
164	05/07/2016	02:57 PM	Injury	2	Opposite Direction (Side Swipe)	Daylight	Dry
165	10/09/2017	05:23 PM	Injury	1	Right Angle	Daylight	Dry
166	07/01/2018	10:55 AM	Property Damage Only	0	Right Angle	Daylight	Dry
167	01/19/2016	11:03 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
168	05/06/2016	03:21 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
169	09/12/2017	02:45 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
170	10/31/2018	07:50 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
171	10/16/2017	02:49 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
172	08/22/2016	05:35 PM	Injury	1	Left Turn/U-turn	Daylight	Dry
173	03/07/2018	08:27 PM	Property Damage Only	0	Opposite Direction (Side Swipe)	Dark, Street lights on, spot lighting	Snowy
174	11/24/2016	03:30 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
175	03/07/2018	01:50 PM	Property Damage Only	0	Right Angle	Daylight	Snowy
176	12/31/2016	01:28 AM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Dry
177	09/25/2017	01:18 PM	Injury	1	Fixed Object	Daylight	Dry
178	12/09/2017	04:54 PM	Property Damage Only	0	Fixed Object	Dark, Street lights on, spot lighting	Icy
179	07/27/2016	07:17 PM	Injury	1	Pedalcyclist	Daylight	Dry
180	06/07/2016	08:56 AM	Injury	1	Right Angle	Daylight	Dry

CRASH DIAGRAM (11 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A11

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
181	08/17/2017	06:13 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
182	06/22/2016	09:09 PM	Injury	1	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
183	11/05/2018	09:56 AM	Injury	1	Same Direction (Rear-End)	Daylight	Wet
184	09/30/2016	07:14 AM	Property Damage Only	0	Same Direction (Rear-End)	Dawn	Wet
185	10/12/2017	07:18 AM	Property Damage Only	0	Same Direction (Rear-End)	Dawn	Wet
186	11/09/2016	09:00 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
187	03/30/2017	04:18 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
188	03/27/2017	04:45 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
189	11/30/2017	12:16 PM	Injury	1	Other	Daylight	Dry
190	04/08/2017	10:10 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, spot lighting	Dry
191	04/30/2016	12:17 AM	Injury	1	Right Angle	Dark, Street lights on, spot lighting	Dry
192	07/21/2016	09:07 AM	Property Damage Only	0	Right Angle	Daylight	Dry
193	07/23/2016	09:01 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights off	Dry
194	10/01/2018	09:33 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
195	09/02/2016	03:48 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
196	12/20/2018	02:21 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Wet
197	05/13/2017	11:59 AM	Injury	2	Right Angle	Daylight	Wet
198	06/02/2017	04:35 PM	Property Damage Only	0	Right Angle	Daylight	Dry
199	06/28/2018	04:35 PM	Property Damage Only	0	Right Angle	Daylight	Dry
200	05/14/2018	03:34 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
201	05/22/2018	04:38 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
202	11/23/2016	12:58 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
203	06/16/2016	07:20 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
204	08/19/2017	07:02 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
205	04/10/2016	07:11 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dusk	Dry
206	09/12/2016	02:55 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
207	06/23/2016	10:13 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
208	01/01/2018	09:35 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
209	01/31/2017	10:51 PM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, spot lighting	Dry
210	06/05/2016	08:05 PM	Property Damage Only	0	Fixed Object	Daylight	Wet
211	06/01/2018	08:53 PM	Injury	1	Fixed Object	Dark, Street lights on, continuous lighting	Dry
212	10/05/2017	01:47 PM	Injury	1	Left Turn/U-turn	Daylight	Dry
213	02/10/2018	03:57 AM	Injury	1	Fixed Object	Dark, Street lights on, spot lighting	Dry
214	10/03/2018	10:11 PM	Injury	1	Fixed Object	Dark, Street lights on, spot lighting	Dry
215	05/05/2018	06:27 AM	Property Damage Only	0	Fixed Object	Dawn	Dry
216	04/24/2015	07:09 PM	Injury	1	Pedalcyclist	Daylight	Dry
217	04/24/2016	01:34 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
218	03/05/2016	08:22 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry

CRASH DIAGRAM (12 OF 12)

FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A12

Appendix E

Audit Team

Franklin - March 25th

Group 1 Pairs - Northern Section

Matthew Maher, Stantec	Officer Jose Jaime, Franklin Township
Tim Medina, Stantec	Mark Healey, Planning Director
Ryan Walsh, FHI	Vincent Dominach, Economic Development
Adam Bradford, Somerset County	Pat Marotto, Somerset County
Victor Owuso, Somerset County	

Group 2 Pairs - Southern Section

Kati DiRaimondo, Stantec	Officer Sgt James Raics, Franklin Township
Michael Ahillen, FHI	Robert Vornlocker, Township Administrator
Kenneth Wedeen, Somerset County	Virgilio Tan, NJDOT
Walter Lane, Somerset County	Jon Dugan, RideWise

Appendix F

Pre-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Pre-Audit,
Franklin Corridor
March 25, 2021

Franklin Township Pre-Audit Meeting

Introduction – Audit Team

- ***Funded by NJTPA***
- **Somerset County**
  - **Engineering and Planning**
  - **Board of County Commissioners**
  - **RideWise**
- **Franklin Township**
  - **Township Administrator**
  - **Police**
  - **Planning**
  - **Economic Development**
- **NJDOT**
- **Stantec Consulting Services, Inc.**
- **FHI Studio**

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Today
In-Field Road Safety Audit

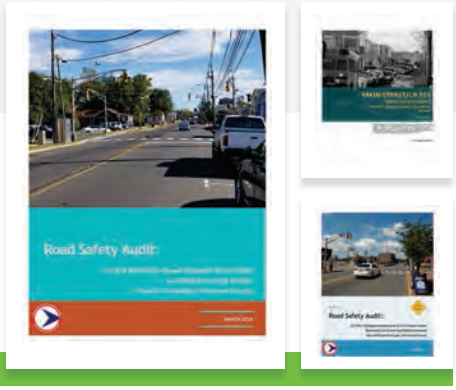
Noon Tomorrow
Adjourn

11:00 AM, Today
Pre-Audit Meeting Adjourn

10:00 AM, Tomorrow
Share Observations
Discuss Potential Improvements

Project Background

- **County initiatives for traffic safety**
- **Recommendations from RSAs to inform future…**
  - Studies
  - Improvements
  - Applications for funding



What is a Road Safety Audit (RSA)?

EVALUATION BY INDEPENDENT TEAM

IDENTIFIES CRASH TRENDS/CAUSES

PROPOSES POTENTIAL SAFETY IMPROVEMENTS

Steps of an RSA

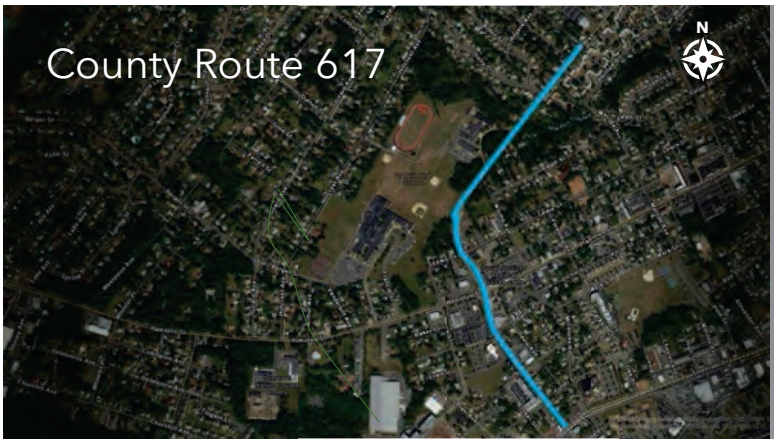
01	02	03	04	05	06	07	08
Select	Assemble	Conduct	Perform	Follow Up	Report	Present	Finalize
•Select Corridors with Stakeholder & Public Input	•Assemble RSA Team for Corridor	•Conduct Start-Up Meeting	•Perform In-Field Review	•Follow-Up on Observations •RSA De-Brief	•Report Findings •Analyze Findings	•Present Report to County	•Finalize RSA Report •County Responds

Pre-Audit Site Visit Post-Audit

Existing Conditions Data

Project Area

- Urban minor arterial
- 10′ - 11′ travel lanes, two in each direction at southern end
- ~12,000-16,000 AADT
- Posted 40 mph speed limit
- Posted advisory 25 mph near Hillcrest Elementary



Land Use

Mixed-use and Commercial zoning areas

Suburban land-use (e.g., single-family homes, shopping/retail, churches, schools)

Transit

- County Shuttle - New Brunswick to Branchburg/RVCC
- Suburban Transit – Princeton to NYC (bus stop 400′ east of CR 617)

Redevelopment

- 52 Norma Avenue – Two story apartment building
- 610 Franklin Blvd – Four-story mixed-use building
- 602 Franklin Blvd – Mixed-used conversion to school property
- 600 Franklin Blvd – Repopulation of abandoned office space
- SE corner of Norma & Franklin – Major residential subdivision

Existing Conditions Feedback

- Belmar Street: Pedestrian crossing activity during church
- Matilda Avenue: Lacks traffic control/pedestrian crossing
- Issues noted at Hamilton Street:
  - Nearby streets utilized by cut-through traffic
  - Difficulty turning onto Hamilton from nearby retail
  - Truck turning movements
  - Heavy traffic to/from Franklin Court Shopping Center
- Frank St: Missing crosswalks
- Route 27: Wide truck turning movements cross into oncoming traffic
- Lack of pedestrian connectivity on southern end of corridor

Safety Measures

FHWA Proven Safety Measures

Study-Focused Safety Measures

- Lighting
- Curb Extensions/ Bus Bulbs
- Daylighting Crosswalks
- Walkways for Sidewalk Gaps
- Dedicated Turn Lanes
- Leading Pedestrian Intervals (LPI)
- High Visibility Crosswalks
- Turn Restrictions
- Bike Lanes
- Lane Width Reduction/Road Diet

Safety Measures Feedback

- **Lighting:**
  - Desire for more lighting, but lighting can be a maintenance issue.
- **Curb Extensions/Bus Bulbs:**
  - Curb extensions would hard to implement and need to be strategic.
- **Walkways for Sidewalks Gaps:**
  - There are some sidewalk gaps along corridor.
  - ADA compliance is key.
- **High Visibility Crosswalks:**
  - Intersections lack crosswalks; however, crosswalks make users more complacent.
- **Dedicated Turn Lanes:**
  - Dedicated turn lanes already exist at the two major intersections of this corridor.
  - Feasibility is contingent upon ROW acquisition, if necessary.

Safety Measures Feedback, cont'd

- **Leading Pedestrian Intervals (LPI):**
  - LPIs are beneficial for locations where students are crossing.
- **High Visibility Crosswalks:**
  - High visibility crosswalk retroreflective paint is more costly than regular paint.
- **Turn Restrictions:**
  - There does not seem to be places to divert traffic for turn restrictions.
  - Limiting movements onto Route 27 requires NJDOT coordination.
- **Bike Lanes:**
  - High AADT on this corridor, plus bike buffer would be needed.
- **Lane Width Reduction/Road Diet:**
  - Improvement plans are in the works on Hamilton Street.

Public/ Stakeholder Improvement Feedback

Safety Measure	Effectiveness (1= not effective; 10= very effective)	Ease of Implementation (1=easy; 10= hard)
Lighting	8	3
Curb Extensions/Bus Bulbs	10	10
Daylighting and Crosswalks	10	0
Walkways for Sidewalk Gaps	10	8
Dedicated Turn Lanes	10	5
Leading Pedestrian Intervals (LPI)	10	10
High Visibility Crosswalks	10	0
Turn Restrictions	5	5
Bike Lanes	0	10
Lane Width Reduction/Road Diet	10	10

Crash Data

Crash Data - Statistics

- **All Crashes 2016-2018**
  - **214 Total Crashes**
  - **Overrepresentations:**
    - **Right Angle collisions**
    - **Wet weather**
- **Pedestrian Crashes 2014-2018**
  - **9 Total Crashes**

Somerset County Roadway Safety Study

NJTPA Network Screening List (NSL) Crash Ranking

Overall Crash Data

Intersections

- **#7th** Hamilton Street
- **#46th** Fuller Street
- **#85th** Pine Street

Corridor Segments

- **#11th** MP 0.00 – 1.00

Pedestrian/Bike Crash Data

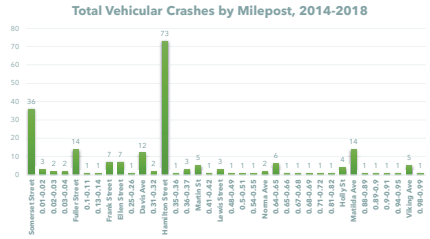
Intersections

- **#13th** Hamilton Street
- **#36th** Norma Avenue
- **#76th** Viking Avenue

Corridor Segments

- **#34th** MP 0.20 - 1.20

Franklin Township - Histogram

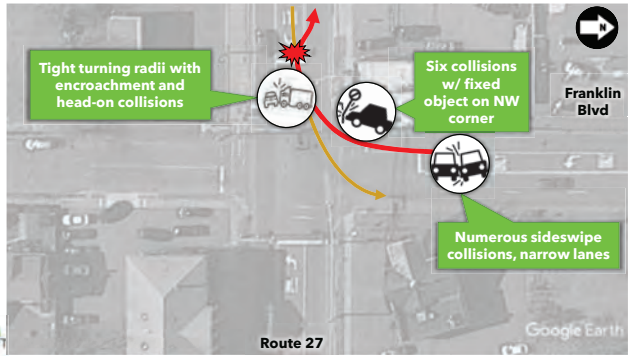


- **2x Right Angle** collisions
- Elevated frequency of wet weather
- **More than half *(58%)*** of crashes at **Hamilton Street** are due to **Right Angle** or **Rear-End** crashes. The highest concentration of these crashes originate from the WB approach

Somerset County Roadway Safety Study

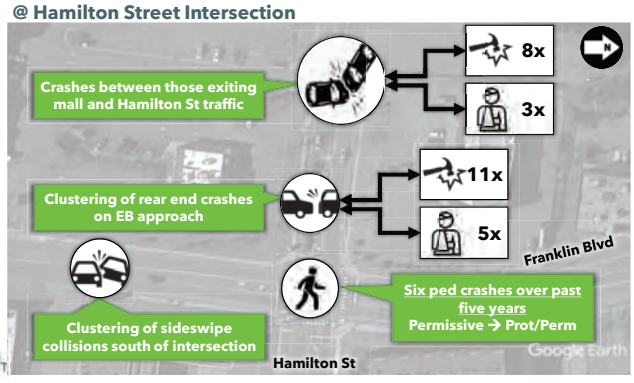
Crash Trends

Franklin Blvd in Franklin @ NJ Route 27 Intersection



Crash Trends

Franklin Blvd in Franklin @ Hamilton Street Intersection



Conducting the Audit

Guidelines & Safety

Be Observant & Alert
- Vehicles
- Wet Surfaces

Be Seen
- Face Traffic
- Avoid Sudden Movements
- Stick to Sidewalks

Be Respectful
- Traffic (Vehicular, Pedestrian, Cyclist)
- Motorists
- Property

PPE
- High Visibility Vest
- Proper Face Coverings
- Social Distancing (1 occupant/veh.)

What to Bring/Wear to the Field

COMFORTABLE CLOSED SHOES

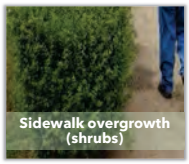
WEATHER CONSCIOUS

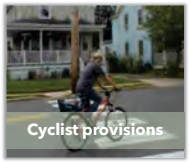
HIGH VISIBILITY VESTS
- Bring your own

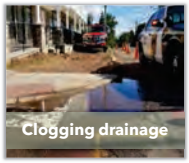
DOCUMENTING MATERIAL
- Smartphone
- Pen/Pencil
- Paper/notepad

What to Look for - Photos

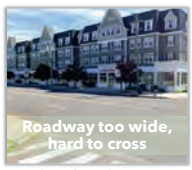
What to Look for - Photos







What to Look for - Photos



How to Record Observations

- Photograph
- Pen/Pencil Paper
- Video
- Mobile Device
- Mental

BE SPECIFIC!!!

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Today
In-Field Road Safety Audit

Noon Tomorrow
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Today

Share Observations
Discuss Potential Improvements
10:00 AM, Tomorrow

Participant	Group
Matthew Maher / Officer Jose Jaime	N
Tim Medina / Mark Healey	N
Ryan Walsh / Vincent Dominach	N
Adam Bradford / Pat Marotto	N
Kati DiRaimondo / Officer Jim Raics	S
Michael Ahillen / Robert Vornlocker	S
Kenneth Wedeen / Victor Owuso	S
Walter Lane / Jon Dugan	S

Questions?

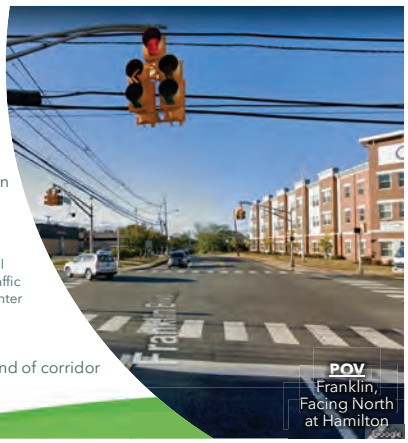
Extra Slides

Franklin Blvd

Route 27 to Belmar St
1.00 mile in Franklin Twp.

Summary of Feedback

- Belmar Street: Pedestrian crossing activity during church
- Matilda Avenue: Lacks traffic control/pedestrian crossing
- Issues noted at Hamilton Street:
  - Nearby streets utilized by cut-through traffic
  - Difficulty turning onto Hamilton from nearby retail
  - Truck turning movements cross into oncoming traffic
  - Heavy traffic to/from Franklin Court Shopping Center
- Frank Street: Missing crosswalks
- Route 27: Wide truck turning movements
- Lack of pedestrian connectivity on southern end of corridor



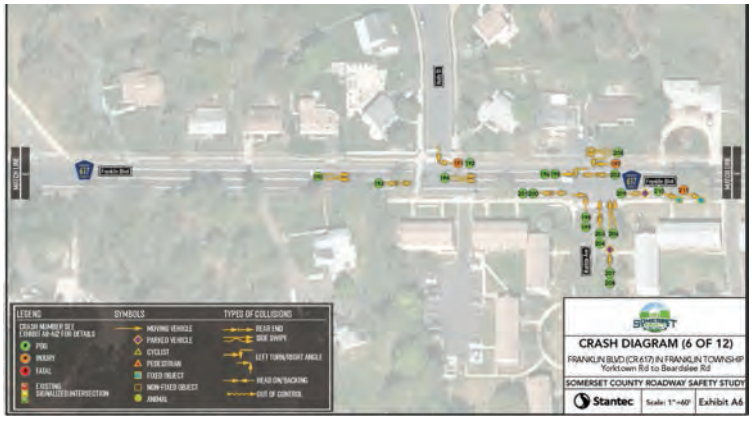
POV
Franklin, Facing North at Hamilton

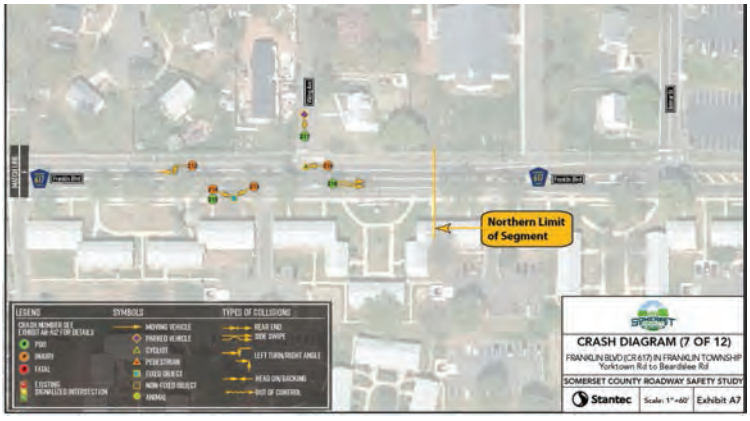

LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (2 OF 12)
FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A2


LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (3 OF 12)
FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A3


LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (4 OF 12)
FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A4


LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (5 OF 12)
FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A5


LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (6 OF 12)
FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A6


Northern Limit of Segment
LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (7 OF 12)
FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A7

Appendix G

Post-Audit Survey

Participant Survey - Average Scores

As you near the end of the audit, rate how the following items impact your level of comfort.
(1: makes me uncomfortable; 4: makes me comfortable; N/A: issue does not exist along this corridor)

Category	Item	Bridgewater	Franklin	Millstone	North Plainfield	Raritan
Corridor Identity	**Average**	**2.3**	**2.4**	**2.7**	**3.2**	**2.7**
Corridor Identity	Activities and uses	2.3	2.6	3.0	3.2	2.5
Corridor Identity	Condition of buildings	2.6	2.3	3.0	3.3	2.5
Corridor Identity	Perception of personal safety	1.9	2.4	2.0	3.0	3.0
Crossings	**Average**	**2.2**	**2.3**	**2.3**	**2.3**	**2.4**
Crossings	Crossing guards	2.5	3.0	-	2.7	3.0
Crossings	Missing or inoperable pedestrian/audible signal	1.9	2.0	2.0	3.0	3.5
Crossings	Pedestrian signal crossing time	2.7	3.0	3.0	2.6	2.6
Crossings	Poorly marked or missing crosswalk	1.7	1.6	1.7	1.7	2.3
Crossings	Presence of curb ramps for strollers/wheelchairs	1.7	1.9	1.0	1.9	2.3
Crossings	View of traffic is blocked	2.0	2.6	2.3	2.1	1.6
Crossings	Wait time for pedestrian signal	2.9	2.8	3.0	2.8	2.4
Pedestrian-Vehicle Interactions	**Average**	**1.6**	**2.1**	**1.9**	**2.8**	**2.5**
Pedestrian-Vehicle Interactions	Amount of traffic	1.7	2.1	2.3	3.0	2.6
Pedestrian-Vehicle Interactions	Bicycling on the sidewalk	1.3	4.0	2.0	2.1	2.9
Pedestrian-Vehicle Interactions	Driver behavior (distracted, did not yield to pedestrians, etc.)	2.1	2.0	2.7	3.0	2.1
Pedestrian-Vehicle Interactions	Noise level due to auto traffic	1.2	2.0	1.3	2.9	2.1
Pedestrian-Vehicle Interactions	Presence of trucks or large vehicles	1.7	2.0	1.7	2.8	2.8
Pedestrian-Vehicle Interactions	Speed of traffic	1.4	2.1	1.3	2.5	2.5
Sidewalk/Roadway Condition	**Average**	**2.3**	**2.7**	**2.6**	**2.6**	**2.9**
Sidewalk/Roadway Condition	Areas on roadway with poor drainage	3.1	2.9	2.5	3.0	2.6
Sidewalk/Roadway Condition	Areas on sidewalk with poor drainage	3.0	2.8	2.0	2.9	2.6
Sidewalk/Roadway Condition	Buffer area between sidewalk and traffic	1.5	2.4	2.3	2.5	3.1
Sidewalk/Roadway Condition	Guide rails/protection systems	2.0	3.3	3.0	2.3	2.5
Sidewalk/Roadway Condition	Intersection configuration	2.1	2.7	3.0	2.8	2.7
Sidewalk/Roadway Condition	Obstacles blocking sidewalk (utilities/trees)	2.9	2.5	3.0	2.6	2.9
Sidewalk/Roadway Condition	Roadway condition	2.8	3.1	2.7	3.0	3.3
Sidewalk/Roadway Condition	Roadway width	2.2	2.8	3.0	3.0	3.3
Sidewalk/Roadway Condition	Sidewalk condition	1.9	2.3	1.7	1.8	2.9
Sidewalk/Roadway Condition	Sidewalk width	2.2	2.6	2.7	2.4	3.1
Streetscape Amenities	**Average**	**2.0**	**2.5**	**3.2**	**2.5**	**3.2**
Streetscape Amenities	Benches or places to rest, trash cans	1.5	2.8	N/A	1.1	3.8
Streetscape Amenities	Lighting (for pedestrians)	1.9	2.0	3.0	2.4	3.7
Streetscape Amenities	Lighting (for vehicles)	2.4	2.5	2.7	2.9	2.7
Streetscape Amenities	Presence of directional/regulatory signage	2.4	2.3	3.7	2.8	2.7
Streetscape Amenities	Street trees and landscaping	1.9	3.0	3.5	2.9	3.2

Appendix H

Post-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Post-Audit,
Franklin Corridor
March 26, 2021

Franklin Township Post-Audit Meeting

Agenda: Schedule of Activities

10:00 AM, Yesterday
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Yesterday
In-Field Road Safety Audit

Noon Today
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Yesterday

Share Observations
Discuss Potential Improvements
10:00 AM, Today

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

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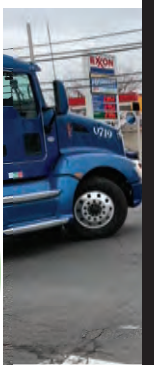
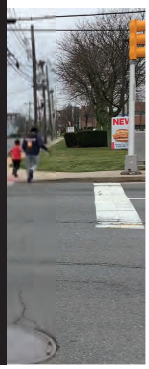
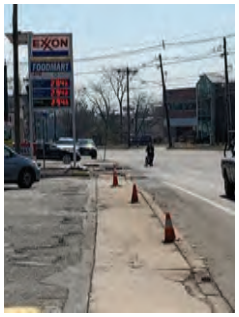




Field Photography/Videos



Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

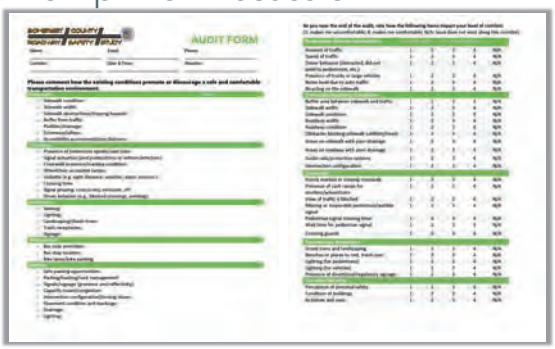
Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Field Photography/Videos

Prompt List Discussion



"What operational/safety issues did you note on the corridor?"

"What makes travel on the corridor difficult ?"

- For drivers?
- For non-drivers?
- For people with disabilities?
- For families with small children?
- For transit riders?

"What pedestrian/cyclist connectivity issues were observed?"

Recommendations Discussion

"WHAT SAFETY IMPROVEMENTS DO YOU PROPOSE FOR REDUCING CRASHES?"

"WHAT IS YOUR VISION FOR THE CORRIDOR? HOW SHOULD IT LOOK IN 10 YEARS?"

"WHAT ARE THE SHORT-TERM CHANGES THAT COULD BE MADE NOW?"

Next Steps

- Produce RSA Reports
- Implementation Matrix
- Final Study Report
- Conduct Follow-Up Public/TAC Meetings

Extra Slides

Franklin Blvd

Route 27 to Belmar St
1.00 mile in Franklin Twp.

Summary of Feedback

- Belmar St: Ped crossing activity during church
- Matilda Ave: Lacks traffic control/ped crossing
- Issues noted at Hamilton Street:
  - Nearby streets utilized by cut-through traffic
  - Difficulty turning onto Hamilton from nearby retail
  - Truck turning movements cross into oncoming traffic
  - Heavy traffic to/from Franklin Court Shopping Center
- Frank St: Missing crosswalks
- Route 27: Wide truck turning movements
- Lack of ped connectivity on southern end of corridor


LEGEND
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CRASH DIAGRAM (3 OF 12)
FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A3


LEGEND
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Stantec
Exhibit A4


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Stantec
Exhibit A5


LEGEND
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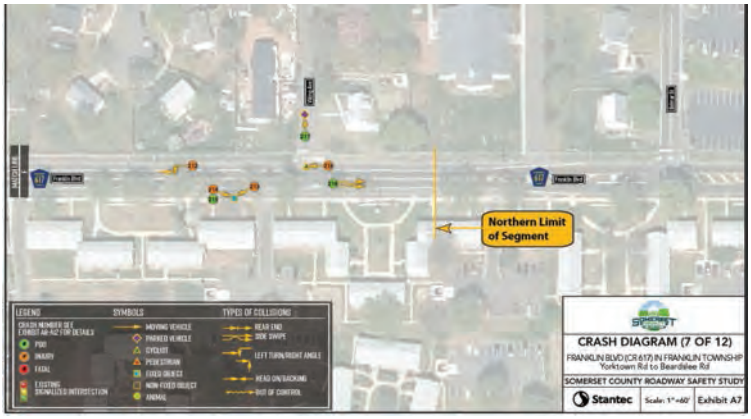
Stantec
Exhibit A6


Northern Limit of Segment
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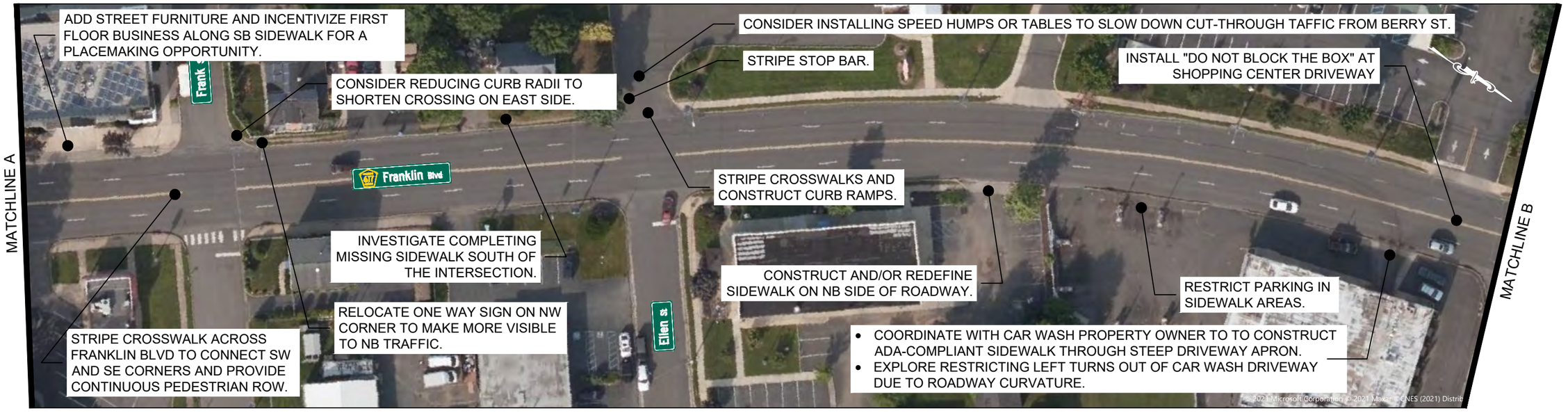
FRANKLIN BLVD (CR 617) IN FRANKLIN TOWNSHIP
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A7

Appendix I

Recommendations from Implementation Matrix



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ORIGINAL SHEET - ANSI B

July, 2021
192510854

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Client/Project
Somerset County/ NJTPA
Somerset County Roadway Safety Study
Franklin Boulevard (CR 617)

Sheet No.
1 of 4

Title
RSA Recommendations
Scale: 1" = 60'

- CONDUCT A TRAFFIC STUDY TO DETERMINE CAPACITY ISSUES AND EVALUATE IF THEY CAN BE MITIGATED THROUGH SIGNAL RETIMING AND REPHASING.
- EVALUATE EXISTING SIGNAL TIMING TO DETERMINE IF LPIS CAN BE ACCOMMODATED WITH CHANGES IN SIGNAL PHASING, IF FLASHING DON'T WALK TIME ACCOMMODATES 3.5FPS, AND IF TURNS ON RED CAN BE RESTRICTED.
- CONSIDER INCREASING ALL CORNER CURB RADII TO AT LEAST 30' FOR TRUCKS.
- SINCE MANY CHILDREN CROSS AT THIS INTERSECTION TO GET TO SCHOOL, CONSIDER APPLYING FOR SAFE ROUTES TO SCHOOL FUNDING TO MAKE NECESSARY SAFETY IMPROVEMENTS., UPGRADE ALL PUSH BUTTONS.
- EVALUATE IF LEFT TURN LANE STOP BARS CAN BE PUSHED BACK TO ACCOMMODATE TRUCK RIGHT TURNS ON ALL APPROACHES.
- PERFORM AN INTERSECTION IMPROVEMENT STUDY THAT LOOKS AT VOLUMES, GEOMETRY, LANE CONFIGURATION, SIGNAL IMPROVEMENTS, DRAINAGE, ROADWAY IMPROVEMENTS.
- INSTALL BACKPLATES ON SIGNAL HEADS IF TRAFFIC SIGNAL POLES AND MAST ARMS WILL BE REPLACED WITH STEEL EQUIPMENT.
- UPGRADE ALL PUSH BUTTONS.

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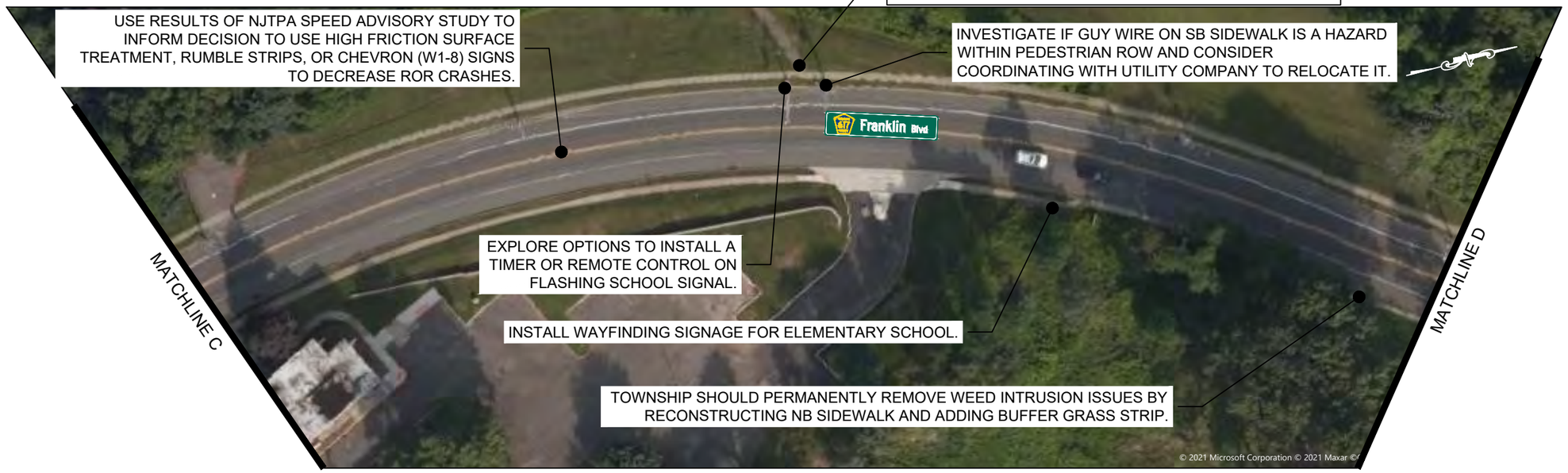
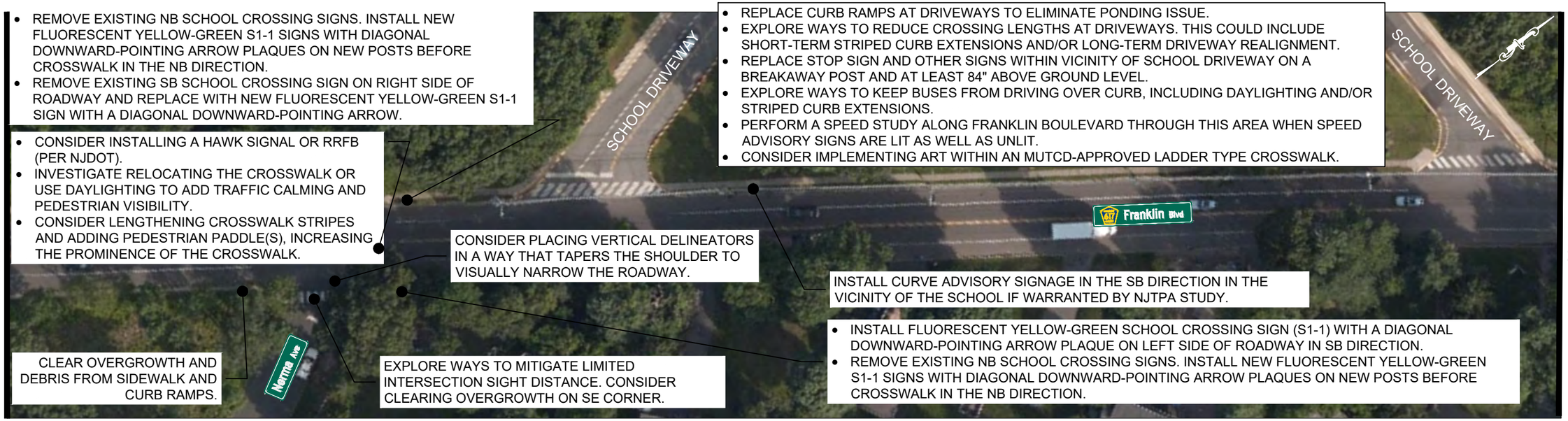
Franklin Boulevard (CR 617)

Sheet No.
2 of 4

Title
RSA Recommendations
Scale: 1" = 60'





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SOMERSET COUNTY ESTD 1688 MAKING VIBRANT CONNECTIONS NEW JERSEY

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Somerset County/ NJTPA
Somerset County Roadway Safety Study
Franklin Boulevard (CR 617)

Sheet No.
3 of 4

Title
RSA Recommendations
Scale: 1" = 60'

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Client/Project
Somerset County/ NJTPA
Somerset County Roadway Safety Study
Franklin Boulevard (CR 617)

Sheet No.
4 of 4

Title
RSA Recommendations
Scale: 1" = 60'

Appendix J

Road Owner Response

Somerset County Response to the Franklin Boulevard (CR 617) in Franklin Township Road Safety Audit (owner's response)

Somerset County agrees with the recommendations of the Road Safety Audit. The County strives to make our roads safer for all users and is willing to investigate any recommendations that can assist in achieving that goal. Our agreement with the assessment should in no way be perceived as a commitment to the implementation of such suggestions. The following general points should be noted:

- Somerset County does not maintain or inspect sidewalks, street lighting, landscaping, or parking facilities along county roadways. That responsibility lies with the municipality or property owner.
- Some recommendations may not be warranted or feasible due to engineering or fiscal constraints. Additional analysis is necessary.

Somerset County Roadway Safety Study
Subregional Project

ROAD SAFETY AUDIT REPORT

MAIN STREET IN MILLSTONE BOROUGH

NJTPA

SOMERSET COUNTY

November 2021

Executive Summary

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has conducted the Somerset County Roadway Corridor Safety Analysis study. The study will advance the County's efforts to address pedestrian, bicycle, and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. This RSA report has been prepared for the Main Street corridor (Somerset County Route 533, CR 533), from Yorktown Road at MP 25.14 to the Hillsborough Township municipal line at the Beardslee Terrace intersection at MP 25.81, in Millstone Borough. According to the compiled crash data, 35 crashes occurred on the 1-mile segment analysis area during the 3-year vehicle and 5-year pedestrian crash analysis period.

The pre-audit meeting was held at 10:00 AM via video conferencing on Tuesday, March 23rd, 2021, on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. Participants were paired off with each other to walk halves of the corridor. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as safety measures to address potential safety concerns. On the following day (Wednesday, March 24th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit to discuss each potential safety concern, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study.

Discussions from the RSA process helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report, which serves as a record of items discussed during the post-audit meeting. Major findings (or recommendations) from these discussions included:

- Systematic maintenance of paver-style sidewalk along corridor;
- New or improved stop bar and stop sign placement on side street approaches to Main Street;
- Edge line revisions, or curb extensions, to slow turning movements at Amwell Road (CR 650);
- Speed humps on River Street to mitigate cut-through traffic around Amwell Road (CR 514) signal;
- Improvement of historic site wayfinding to mitigate driver confusion and circuitous travel; and,
- SafetyEdge paving equipment for future resurfacing projects near pavement drop-off areas.

A key recommendation from this RSA was to improve pedestrian infrastructure along Main Street. While this includes LPIs, curb extensions, and continued maintenance of sidewalk, a crucial component of pedestrian connectivity within the Borough would be bridging the gap in sidewalk that exists along Main Street between Amwell Road (CR 514) and North River Street. The Borough is currently seeking to acquire the needed right-of-way for this improvement via redevelopment or acquisition of a vacant residential property located off the east side of Main Street. The Borough commented that State intervention would likely be needed to obtain property, or an easement, to construct this new sidewalk along the east side of Main Street to connect existing sidewalk to the north and south due to municipality's need for additional funding. Currently, pedestrians either walk along the shoulder on Main Street, or utilize the sidewalks along North River Street and Amwell Road (CR 514) to make this connection.

Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process and are meant to be a record of ideas discussed. As these recommendations are considered for advancement into either a Concept Development (CD) study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices.

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I. Introduction

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has conducted the Somerset County Roadway Corridor Safety Analysis study. The study will advance New Jersey's efforts to address pedestrian/bicycle and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. One of the locations that have been selected is the Main Street corridor (Somerset County Route 533, CR 533), from Yorktown Road at MP 25.14 to the Hillsborough Township municipal line at the Beardslee Terrace intersection at MP 25.81, in Millstone Borough.

The purpose of this RSA Report is to detail the site selection, road/multimodal inventory, land use investigation, crash data collection, crash analysis efforts, post/pre-audit meetings, and in-field RSA investigation conducted for the Main Street corridor. Flowing from this RSA is a list of potential recommendations proposed to improve safety. These recommendations were based on the investigated crash data, as well as recommendations made during the in-field RSA and post-audit meeting. This introduction serves to provide background on selection of the investigated corridor and covers the logistics of the RSA process that was performed. This RSA report also seeks to provide sample figures of improvements and crash countermeasures that could be considered as the County, or municipality, seeks to move forward on its Concept Development (CD) and/or Local Safety Program grant (or other funding) application. Please note, in applying these ideas to the corridor, design of such improvements, conceptual or otherwise, is the responsibility of the designated jurisdiction as is standard RSA practice.

A. Site Selection

Selection of the Main Street corridor was based on a rigorous process which started with a list of top crash segments for the County from the NJTPA's Network Screening Lists (NSL)[1] and used supporting collision data, equity data, recommendations from prior studies, and public/stakeholder input to develop a shortlist of top crash segments. Segments with recently constructed safety improvements or locations undergoing study/design were identified through discussions with County Engineering and removed from this shortlist to target segments not currently being considered. The remaining locations were further prioritized and ranked with more recent crash severity and frequency data (old crash data from NSL superseded with more recent crash data from Safety Voyager), traffic volume data from the NJTPA's regional travel demand model (NJRTM-E), and environmental justice data from the NJTPA.

Input on these top crash locations was obtained through the Public Involvement Plan for this project, which included gathering information from the public via a virtual mapping tool and gathering information from a Technical Advisory Committee (TAC)[2] via an initial virtual meeting conducted in August 2020. Based upon public and stakeholder input, the following five segment locations (including the segment being studied in this report) were selected to be advanced for RSA review:

1. Finderne Avenue/Main Street (CR 533) in Bridgewater Township, MP 29.60-30.60
2. Franklin Boulevard (CR 617) in Franklin Township, MP 0.00-1.00
3. Somerset Street (CR 626) in Raritan Borough, MP 0.00-0.67
4. Greenbrook Road (CR 636) in North Plainfield Borough, MP 0.70-1.97
5. Main Street (CR 533) in Millstone Borough, MP 25.14-25.87

[1] https://www.njtpa.org/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/Local-Safety-Program/Network-Screening-Lists.aspx Top crash segment lists on this webpage are based upon a programmatic analysis of statewide locations utilizing 2014-2018 crash data.
[2] Stakeholders on the TAC include NJDOT, NJ TRANSIT, FHWA, RideWise, AARP, Vorhees Transportation Center, and various County advocates.

Main Street is included in this list primarily due to the relatively high crash frequency on this corridor and recommendations from previous studies. This corridor was identified within the *WalkBikeHike* (2019) and *Supporting Priority Investment in Somerset County, Phase III* (2017) studies that needs improved facilities for pedestrian and cyclist connectivity. **Table 1** shows the portions of the selected segment, or intersections, that qualified as one of the top 100 crash locations[1] in the County based on either overall crash data for the years of 2016 through 2018 or pedestrian/cyclist crash data for the years of 2014 through 2018 as listed on the NSLs.

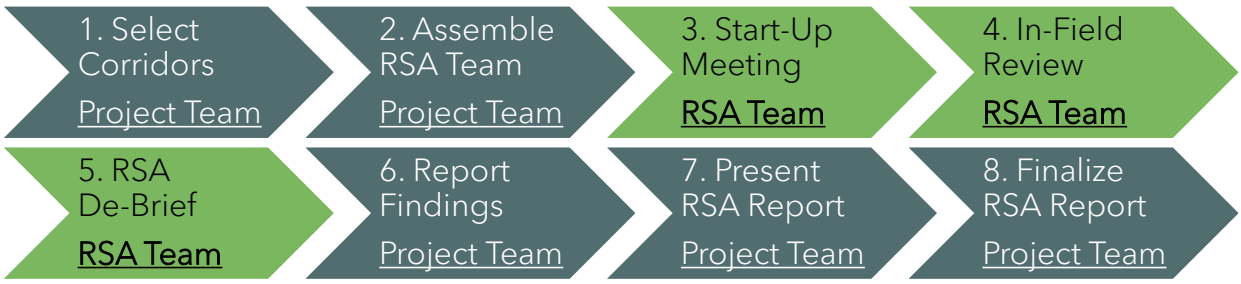
Table 1 – Main Street NJTPA 2019 NSL Rankings for Somerset County

Corridor Segments Overall Crash Data	Corridor Segments Ped/Bike Crash Data	Intersection Locations Overall Crash Data	Intersection Locations Ped/Bike Crash Data
None	None	Amwell Road (#80)	None

B. What is a Road Safety Audit (RSA)?

An RSA is a formal safety performance examination of an existing or future road or intersection by a multi-disciplinary audit team, including public works, law enforcement, emergency medical services, engineering, planning, and advocacy staff. It qualitatively estimates and reports on existing and potential road safety issues and identifies opportunities for improvements in safety for all road users. RSAs can be used on any size project, from minor maintenance to mega-projects, and can be conducted on facilities with a history of crashes or during the design phase of a new roadway or planned upgrade. RSAs consider all road users, account for human factors and road user capabilities, are documented in a formal report, and require a formal response from the road owner. **Figure 1** shows the steps employed by the County to complete the RSA, as informed by the Federal Highway Administration's (FHWA's) RSA process. The steps that traditionally consist of an in-field review of conditions with an RSA team are highlighted in green in Figure 1.

Figure 1 – Eight-Step RSA Process as Adopted from FHWA RSA Process



The RSA program is conducted to identify potential countermeasures for roadway segments demonstrating a history of, or potential for, a high frequency of crashes or an identifiable pattern of crash types. Recommendations range from low-cost, quick-turnaround safety improvements to more complex strategies, which are all codified in this report within an Implementation Matrix, categorizing improvements by timeline, cost, and jurisdiction. Implementation of improvement strategies identified through this process may be eligible for Local Federal Aid Safety Funds. Because the RSA process is adaptable to local needs and conditions, recommendations can be implemented incrementally as time and resources permit. Please note that the RSA process does not include the design or thorough evaluation of improvements that are being considered, conceptual or otherwise. Following the eighth and final step of the RSA process, it will be incumbent for the designated jurisdiction to start to evaluate and design the potential improvements presented herein, as is standard RSA practice.

At the request of the NJTPA, RSAs originally planned for Fall 2020 were postponed to Spring 2021 due to the COVID-19 pandemic. In addition to postponement, the County took additional steps to safely conduct this RSA. Both the start-up meeting and RSA de-brief (steps #3 and #5 shown in **Figure 1**), which are

traditionally conducted in-person, were conducted virtually via video conferencing to reduce the exposure and potential risk of disease transmission. Furthermore, the essential step of in-field review was conducted in a socially-distanced manner with participants paired off in groups spaced more than six feet apart from each other. All in-field RSA participants were masked for the entire duration of the field visit to further reduce disease transmission. Through this process, the post-audit "de-brief" meeting benefitted from being held virtually after the day on which the in-field review was conducted.

Some notable benefits produced by a virtual post-audit included:

- Additional time for participants to share photos, videos, and scans of their observations;
- Available screensharing for quick review and consensus of RSA observations;
- An involved discussion of the observations and recommendations was well established by the wide audience of stakeholders;
- Additional time for participants to process their observations and organize their thoughts for discussion.

II. Corridor Description & Analysis

A. *Study Location*

The study area consists of 0.67 miles of Main Street (CR 533) extending from the intersection with Yorktown Road at MP 25.14 to the municipal border with Hillsborough Township at the intersection with Beardslee Terrace at MP 25.81 (Figure 2). A straight-line diagram of the corridor is provided in **Appendix A**. The identified segment is in the Borough of Millstone in the County of Somerset. Main Street travels through the Borough's Historic District at the center of the study corridor in the vicinity of its intersections with Amwell Road (CR 514 and CR 650). This district contains multiple 18th-century buildings and is listed on the National Register of Historic Places. There are also commercial uses within the historic district at the intersection of Amwell Road (CR 514) & Main Street. Land adjacent to Main Street on the northern and southern ends of the study corridor consists primarily of residential uses and open space. Primary vehicle and pedestrian trip generators on this corridor include the Hillsborough Reformed Church at the Amwell Road (CR 650) intersection and the commercial uses in the vicinity of the Amwell Road (CR 514) intersection. The area surrounding the corridor segment has been designated as the "Millstone Village Center" Local Priority Area (LPA) by the County in its 2017 *Supporting Priority Investment in Somerset County, Phase III* study.

Figure 2 – Study Area Location Map

B. *Roadway and Intersection Characteristics*

Main Street is classified by the New Jersey Department of Transportation (NJDOT) as an urban minor arterial and urban collector north and south of the Amwell Road (CR 514) intersection, respectively, with a posted

speed of 35 mph. There is a horizontal curve at each end of the corridor segment with a posted advisory speed of 30 mph at the southern end and 25 mph at the northern end. The corridor consists of two 11'-12' travel lanes (one in each direction) undivided. Shoulder widths vary from one to eight feet on each side of the road with parking permitted where shoulder width allows, including on the southbound side of the roadway in the vicinity of intersections with Amwell Road (CR 650) and Yorktown Road and on the northbound side of the roadway in the vicinity of the Beardslee Terrace intersection. There are one signalized and seven unsignalized intersections along the corridor. Northbound and southbound left-turn bays are provided at the signalized intersection with Amwell Road (CR 514).

C. *Existing Bicycle/Pedestrian Accommodations*

Sidewalks are generally provided on the northbound side of Main Street north of Amwell Road (CR 514) and on the southbound side south of Amwell Road (CR 514). Gaps in sidewalk coverage exist between the North River Street and Amwell Road (CR 514) intersections and between the Amwell Road (CR 650) and Yorktown Road intersections. Sidewalks mainly consist of pavers, apart from the concrete sidewalk provided south of Amwell Road (CR 650) and are five feet in width or less. At some locations, sidewalks have become overgrown, effectively narrowing the width of the sidewalk. No on-road provisions are made for cyclists within the study corridor. However, publicly-available biking activity data[3] suggest that Main Street is heavily utilized by cyclists due to biking facilities on the D&R Canal Towpath.

D. *Traffic Volumes*

According to traffic data available from NJDOT[4] count station #091818, Average Annual Daily Traffic (AADT) on Main Street is approximately 8,000 vehicles per day. Supporting count data from NJDOT is provided in **Appendix B**. The NJTPA's NJRTM-E travel demand model provides an AADT estimate of 9,000 based upon 2020 pre-COVID-19 conditions.

E. *Transit Service*

There are no transit services on this section of Main Street. The NJ TRANSIT Bridgewater Train Station with Raritan Valley Line service is approximately a 10-minute drive north of the study corridor. The County owns a parcel of land on the southwest quadrant of the Amwell Road (CR 514) intersection, noted in the *Millstone Borough Master Plan* (2017) as the "Somerset County Garage property," which appears to be either a park-and-ride lot or overflow parking for adjacent land use.

F. *Community Profile*

Population and income characteristics from the American Community Survey (ACS), an update to the 2010 Census performed by the U.S. Census Bureau, were used to identify Environmental Justice populations. The latest ACS for this study area is a five-year estimate from 2015 through 2019 for County Census Tract 538.01. A summary of the demographics is listed in **Table 2**. Study area demographics show that there are fewer zero vehicle households and fewer people commuting to work via transit when compared to the County average, perhaps due to the lack of available nearby transit options.

Table 2 – Main Street RSA Study Area Demographics

Characteristic		Census Tract Average	County Average
Below Poverty Level[5]		4.8 percent	5.1 percent
Race/ Ethnicity[6]	White	91.0 percent	66.3 percent
	Asian American	3.6 percent	17.7 percent
	Black or African American	1.6 percent	9.7 percent

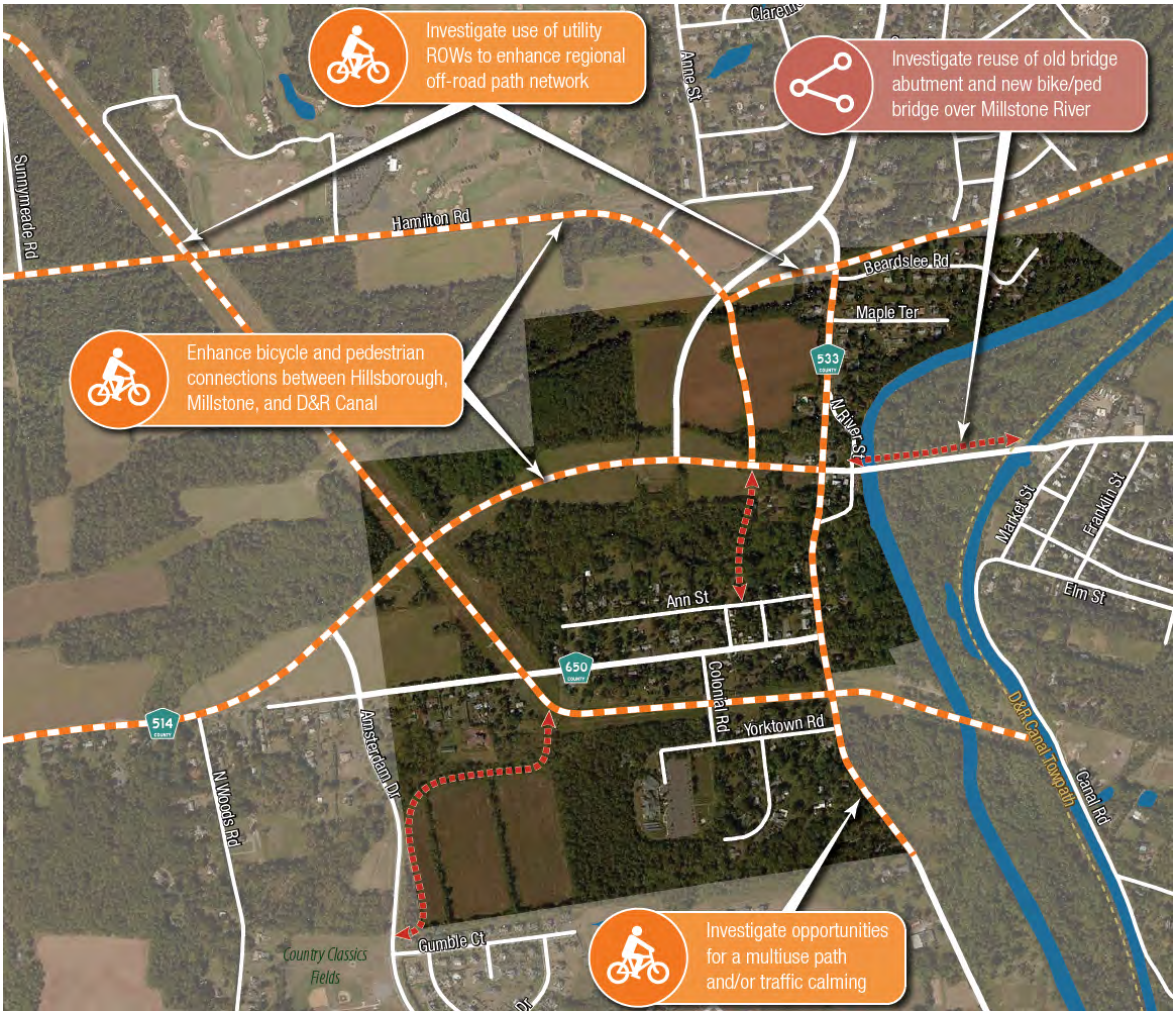
[3] Biking activity data from https://www.strava.com/heatmap.
[4] AADT data obtained from https://www.njtms.org/map/.
[5] 2019: ACS 5-Year Estimates Data Profiles, TableID S1701, "Poverty Status in the Last 12 Months"
[6] 2019: ACS 5-Year Estimates Data Profiles, TableID DP05, "ACS Demographic and Housing Estimates"

Characteristic		Census Tract Average	County Average
	American Indian/Alaskan	0.0 percent	0.3 percent
	Other	3.8 percent	6.0 percent
	Hispanic/Latino (Ethnicity)	8.0 percent	14.7 percent
Limited English Proficiency (LEP)[7]		2.6 percent	4.4 percent
Use Public Transportation[8]		2.8 percent	5.3 percent
Zero Vehicle Households[7]		0.0 percent	2.1 percent

G. Redevelopment

The area surrounding the corridor segment has been designated as a Local Priority Area (LPA) by the County in its 2017 *Supporting Priority Investment in Somerset County, Phase III* study. The Phase III study noted that this area is a very auto-centric environment and that multimodal mobility improvements can help to support tourism and recreation opportunities in the Borough. An overview of mobility improvements from the Phase III study is shown in **Figure 3.**

Figure 3 – Multimodal Recommendations from Phase III Study



[7] 2019: ACS 5-Year Estimates Data Profiles, TableID S1602, "Limited English-Speaking Households"
[8] 2019: ACS 5-Year Estimates Data Profiles, TableID S0802, "Means of Transportation to Work by Selected Characteristics"

Redevelopment applications on Main Street have mainly consisted of minor subdivisions, lot line adjustments, and changes to parking. There are no major applications currently pending along Main Street, according to data delivered by County Planning.

H. Proposed Improvements from Previous Studies

Previously-proposed transportation improvements on or near the Main Street corridor include the following from the Phase III study (some of which are depicted above in **Figure 3**):

- Investigate a potential multiuse path on Amwell Road (CR 514);
- Install a multiuse path connecting Ann Street Park to Amwell Road (CR 514);
- Install a multiuse path connecting the proposed path along the utility ROW to existing bicycle lanes on Amsterdam Road and County Classics Fields;
- Install a wayfinding signing system for all modes of traffic to support County tourism;
- Investigate opportunities to enhance bicycle and pedestrian mobility along Main Street/River Street;
- Investigate potential multiuse path on Hamilton Road and within County-owned tract located north of Amwell Road (CR 514) and east of the CR 533 Bypass;
- Investigate opportunities for a bicycle and pedestrian crossing of the Millstone River and D&R Canal parallel to Amwell Road (CR 514), reusing an existing bridge abutment on North River Street;
- Investigate opportunities to utilize pipeline ROW for multiuse path north of Millstone village; and,
- Investigate opportunities to utilize aerial utility ROW for off-road multiuse path, providing a connection to Hillsborough at the Promenade and a crossing of the Millstone River to the D&R Canal Towpath south of Millstone village.

Pertinent excerpts from these studies, and associated improvements, are provided in **Appendix C**.

I. Public Meeting #1

On Thursday, November 12, 2020, the first public meeting for this project was held via Zoom conferencing to obtain feedback for the five locations selected for RSA review. Email blasts, advertisements, and social media notifications were provided in advance of the meeting. This meeting introduced the project team, who provided an overview of the study, stating the purpose and need. Statistics of crashes on County jurisdiction roadways were reviewed, showing a steady increase of crashes over the past ten years. The Consultant Team explained the RSA process and the technical analysis used in the development of the shortlist of corridors. Due to the pandemic, virtual or socially distanced options for conducting the RSA process were discussed.

The Consultant Team then explained the study's Public Involvement Plan (PIP), an iterative process designed to collect feedback and input. The opportunities to collaborate on the PIP were virtual, including public meetings and comments received through the project website and project email. The Consultant Team then explained the process of selecting the five corridors, which was based on County roadway screenings for top crash locations, evaluation of equity data, and public/stakeholder input obtained from the initial virtual mapping outreach conducted in Fall 2020. The virtual mapping tool allowed users to pin comments on areas of concern on a virtual map.

As part of the PIP, the public meeting included an opportunity to hear from attendees on comments specific to each corridor selected for RSA review by splitting the overall meeting into breakout rooms. The group in the Main Street breakout room discussed various concerns and suggestions regarding pedestrian and cyclist safety and connectivity. Comments received were as follows:

- Add a speed bump in addition to reducing the speed limit
- Add a crosswalk as this is a residential neighborhood and is dangerous for pedestrians and animals
- There is heavy truck traffic on this roadway

- Areas of corridor may need additional lighting
- There is a blind curve or driveway that makes speeding cars dangerous

J. Technical Advisory Committee Meeting #2

Following an August 2020 meeting with the TAC (Technical Advisory Committee) to select the five corridor locations for further review Somerset County held the second TAC meeting in February 2021. This meeting consisted of a 45-minute presentation followed by interactive breakout rooms with discussion centered around the corridors selected for further review. The presentation included the following topics: project background, summary of selected corridors, description of potential safety measures, and a discussion of demonstration projects.

A breakout room was dedicated solely to the discussion of potential safety measures to be implemented in response to potential safety issues on the Main Street corridor in Millstone Borough Participants were asked to review the ten safety measures discussed during the presentation. They were then asked to rate the effectiveness and ease of implementation of each safety measure based on their own opinion/perspective. Participants were also asked to identify specific areas within each corridor that were areas of concern.

Table 3 contains a summary of those ratings and discussions for each safety measure, along with additional comments made toward each safety measure.

Table 3 – Perceived Effectiveness and Ease of Implementation for Various Safety Measures

Safety Measure	Effectiveness (1= not effective; 10= very effective)	Ease of Implementation (1=easy; 10= hard)
Lighting	3	5
Curb Extensions/Bus Bulbs	5	5
Daylighting[9] and Crosswalks	5	5
Walkways for Sidewalk Gaps	8	5
Dedicated Turn Lanes	1	1
Leading Pedestrian Intervals (LPI)	2	1
High Visibility Crosswalks	6	-
Turn Restrictions	5	-
Bike Lanes	5	8
Lane Width Reduction/Road Diet	-	-

Breakout Group Additional Comments:

- Lighting:
  - Sun glare is an issue in the PM heading west approaching the Main Street intersection on Amwell Road.
  - The Main Street/Amwell Road intersection is illuminated well, but the approaches need more illumination.
  - Tree canopies obstructing lighting. Millstone is working with PSEG to evaluate system upgrades.
  - CR 514 is missing lighting between Main Street and Somerset Courthouse Rd.
  - Illumination low on Main Street near Yorktown Road and the adjacent curve.
  - Lighting would likely only result in marginal safety improvements. The focus for Main Street should be to reduce speeds.
  - PSEG won't upgrade lighting unless there is a failure.

[9] Daylighting is the act of restricting parked or standing vehicles through striping or curbing to improve sight distance at crosswalks or intersections.

- Curb Extension/Bus Bulbs:
  - Curb extensions could be beneficial but not sure where it might fit because there are no shoulders in most areas.
  - Concern whether curb extensions would impact the ability to provide bike lanes. There is bicycle traffic especially on weekends and bike lanes would be good to have if they can fit within the ROW somehow.
- Walkways for Sidewalk Gaps:
  - Need to fill in gaps in sidewalk, including along CR 514 northbound after liquor store. However, sidewalks may pose ROW challenges.
  - Weekend church activity - significant increase because of temporary population in Millstone. Some people walk to church.
- Dedicated Turn Lanes:
  - Dedicated turn lanes were considered not applicable to this study area, but the County should evaluate signal timing and length of turn arrows. They are too short, and people extend the left-turns after the signal turns yellow and red.
- Leading Pedestrian Intervals (LPI):
  - There are only sporadic pedestrian volumes in the area; therefore, LPIs may not be as effective here.
  - NJDOT is providing LPIs at many locations. For intersections with protected/permissive left-turns, the LPI can be pedestrian activated.
  - Would need to evaluate LPI impact to vehicular movements.
- High Visibility Crosswalks:
  - A new midblock crosswalk should be considered at South River Street to provide a crossing for the proposed new trail. However, visibility of the crossing, as well as ways to encourage compliance, like rectangular rapid flashing beacons, should be considered.
  - Improve crosswalks wherever possible.
- Bike Lanes:
  - There are a lot of bikes on the weekends, but not a lot of bike crashes.
  - Bike lanes might be hard to implement due to narrow lanes and narrow or non-existing shoulders.
- Lane Width Reduction/ Road Diet:
  - This corridor was believed to have no road diet potential.
- Additional Comments:
  - Trucks should be directed around Millstone.

A. Technical Advisory Committee Meeting #3

Following the RSAs in Spring 2021 and authoring of the draft RSA reports and accompanying recommendations soon thereafter, the County held the third and final TAC meeting for the study in August 2021. The virtual meeting format consisted of a 45-minute presentation with interactive breakout rooms. The presentation included the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into five breakout rooms, one for each of the selected corridors. Each breakout room discussed a specific set of recommendations pertaining to that corridor. Millstone Borough RSA breakout room participants were asked to provide their feedback on the general lack of pedestrian connectivity along Main Street. Potential improvements to accomplish Borough walkability were also discussed. Provided below is participant feedback received on this topic:

- A participant noted that when the realignment of Amwell Road (CR 514) Bypass was constructed a few decades ago, it felt like the Borough became divided (north side vs. south side), creating a barrier for walkability.

- It was mentioned that the Borough has a master plan that incorporates pedestrian safety improvements, such as maintenance of sidewalks.
- It was noted that residents of the Borough are typically in favor of safety improvement projects, such as the construction of the sidewalk gap between Amwell Road (CR 514) and North River Street. However, coordination to construct these improvements on their private property can be a challenge.

Additional comments were received during the breakout room (not pertaining to pedestrian connectivity):

- Funding for these types of improvements is a concern. The cost of desired projects is large when compared to the population and tax revenue of the Borough. Therefore, the Borough must seek other funding such as County, State, or Federal funds to offset these costs. Sometimes, just the permitting fees can cost as much as the rest of the project. The Borough is currently applying for one such grant.
- A participant noted that speeding along Main Street is a concern, especially through town.

B. Public Meeting #2

On Wednesday, September 29, 2021, from 7:00 PM to 9:00 PM, Somerset County held the second and final public meeting for the study. The virtual meeting format consisted of a 45-minute presentation touching on the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into seven breakout rooms, one for each of the selected corridors, one for county-wide general transportation comments and suggestions, and one for Spanish speakers. Participants in the Millstone Borough breakout room were asked to provide their general reactions to the proposed recommendations for pedestrian infrastructure, such as LPIs, curb extensions, continued maintenance of sidewalk, and (most importantly) bridging the gap in sidewalk that exists along Main Street between Amwell Road (CR 514) and North River Street. Potential barriers or other ways to accomplish study goals were also discussed. Provided below is participant feedback received on this during this breakout room session:

- Attendees were very concerned about speeding along the corridor and felt that, although traffic calming measures are recommended as part of this study, the proposed recommendations would not directly address these concerns, as speed limit reductions and speed humps would.
- Attendees expressed that they wanted to see improvements such as a decrease in the speed limit, speed humps, raised crosswalks, and/or a raised intersection at Amwell Road (CR 514) and Main Street instead.
- Attendee discussed possibility of advocating for truck traffic diversion in the future.

While County Engineering has determined that raised intersections or speed humps are not appropriate for roadway with the daily and hourly volume profile of Main Street, additional study will be undertaken as part of the upcoming *Somerset County Master Plan Circulation Element* to investigate alternate truck routes, such as the nearby completed Route 206 Bypass, to siphon truck traffic away from the Borough.

III. Crash Findings

The analysis used to support the RSA process incorporated a data-driven effort to utilize reportable crash information resulting in any combination of fatality, injury, or property damage. The datasets used for this analysis are sourced from local law enforcement responses to reported vehicular crashes. These on-scene responses subsequently translate to official law enforcement generated reports. Concurrently, the individual reports are aggregated to render serviceable crash information. To be entirely inclusive in obtaining complete crash information, the data was accumulated using three distinct resources: NJDOT's Safety Voyager[10], New Jersey Division of Highway Traffic Safety (NJDHTS) Numetrics[11], and the NJDOT raw crash tables[12]. The three sources were compared against each of the other obtained sources to allow for duplicate records to be discarded and all distinct records to be included with the goal of producing a complete and comprehensive representation of the crashes within the boundaries of the corridor.

The datasets were obtained for a three-year analysis period from the beginning of January 2016 through the end of December 2018 for vehicle-vehicle crash incidents and from the beginning of January 2014 through the end of December 2018 for vehicle-pedestrian/cyclist crash incidents. According to the compiled crash data, 35 crashes occurred on the 0.67-mile segment analysis area during the analysis period. The following evaluation breaks down crash attributes as a percentage of the total crashes to achieve a stronger understanding of the localized trends compared to County roadway systems crash performance. Furthermore, all crashes along this segment were mapped onto collision diagrams, which can be found in **Appendix D**, providing a quick spatial overview of crash clustering patterns.

In reviewing the crash data, crash clusters and prevailing safety issues were mainly noted at the intersection with Amwell Road (CR 514) as follows:

- Clustering of rear end collisions on the NB, EB, and WB approaches to the intersection
- Struck fixed objects on the NW and SE corners of the intersection
- Two animal crashes occurring just south of the intersection

A. Temporal Trends

Sorting the crashes by month reveals that the study segment experienced the greatest crash frequency from January through February. The Spring/Summer months from April through September show lower frequencies. During the five (5) months of January, February, May, August, and October, the corridor experienced higher crash frequencies than the County-wide average. Notably, August experienced a higher share of crashes than the County-wide average (7.5 percent vs. 20.0 percent), as shown highlighted in yellow in **Figure 4**.

Figure 5 highlights the crash percent distributions by day of the week. Corridor data shows crash frequencies were higher than the County average for five (5) days of the week. Sundays, highlighted in yellow in **Figure 5**, have a 14.3 percent corridor frequency rate compared to only 8.5 percent at the County-wide level, a 77 percent increase, perhaps related to weekend recreational travel. Mornings, between 7:00 AM and 9:00 AM, reveal higher crash frequencies than the County-wide average, as shown highlighted in yellow in **Figure 6**. More specifically, the 7:00 AM and 9:00 AM hours have crash frequencies more than double the County-wide.

[10] https://www.njvoyager.org/App/
[11] https://www.numetric.com/
[12] https://www.state.nj.us/transportation/refdata/accident/rawdata01-current.shtm

Figure 4 – Vehicular Crashes, Percent Distribution by Month

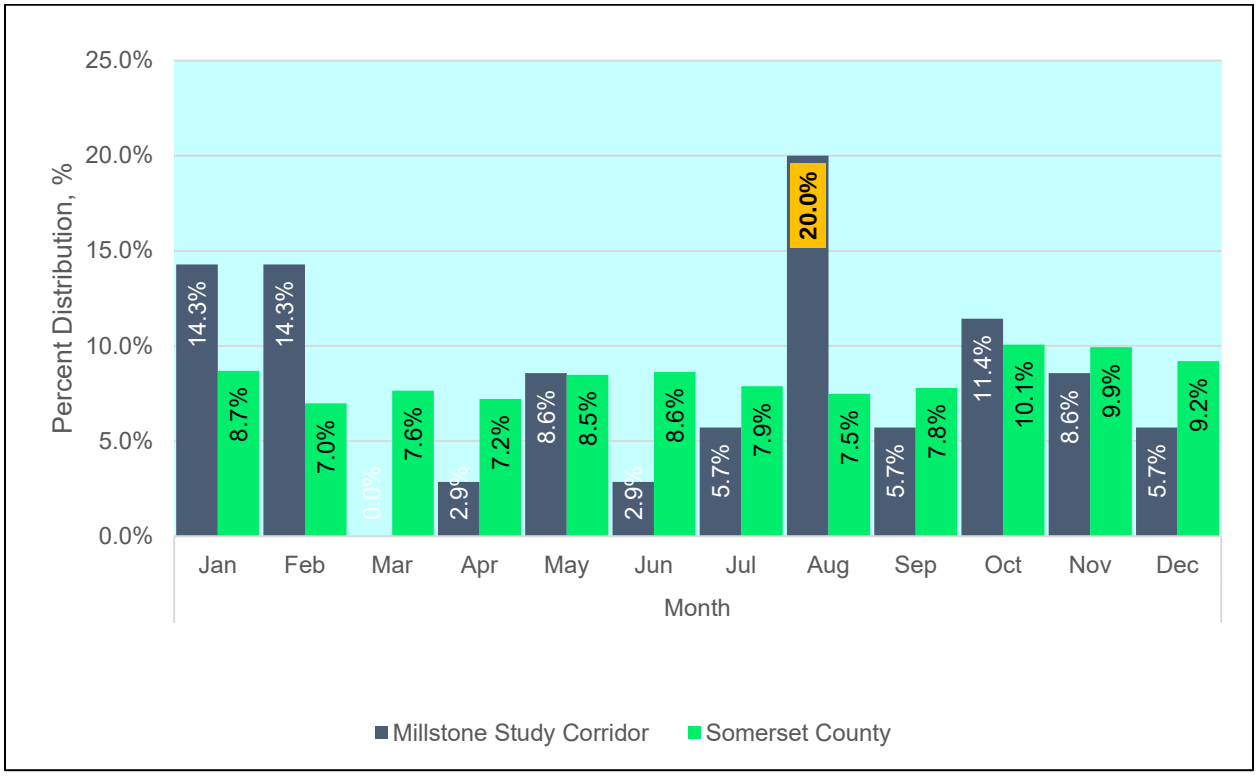


Figure 5 – Vehicular Crashes, Percent Distribution by Day

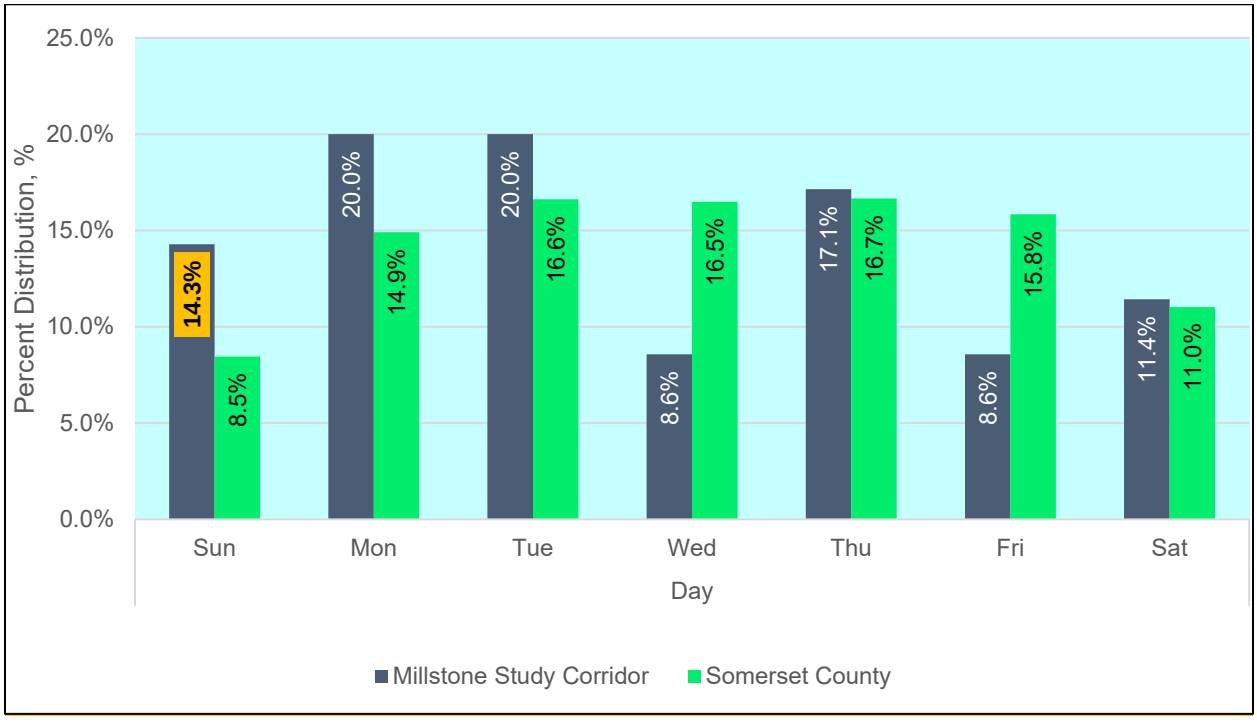
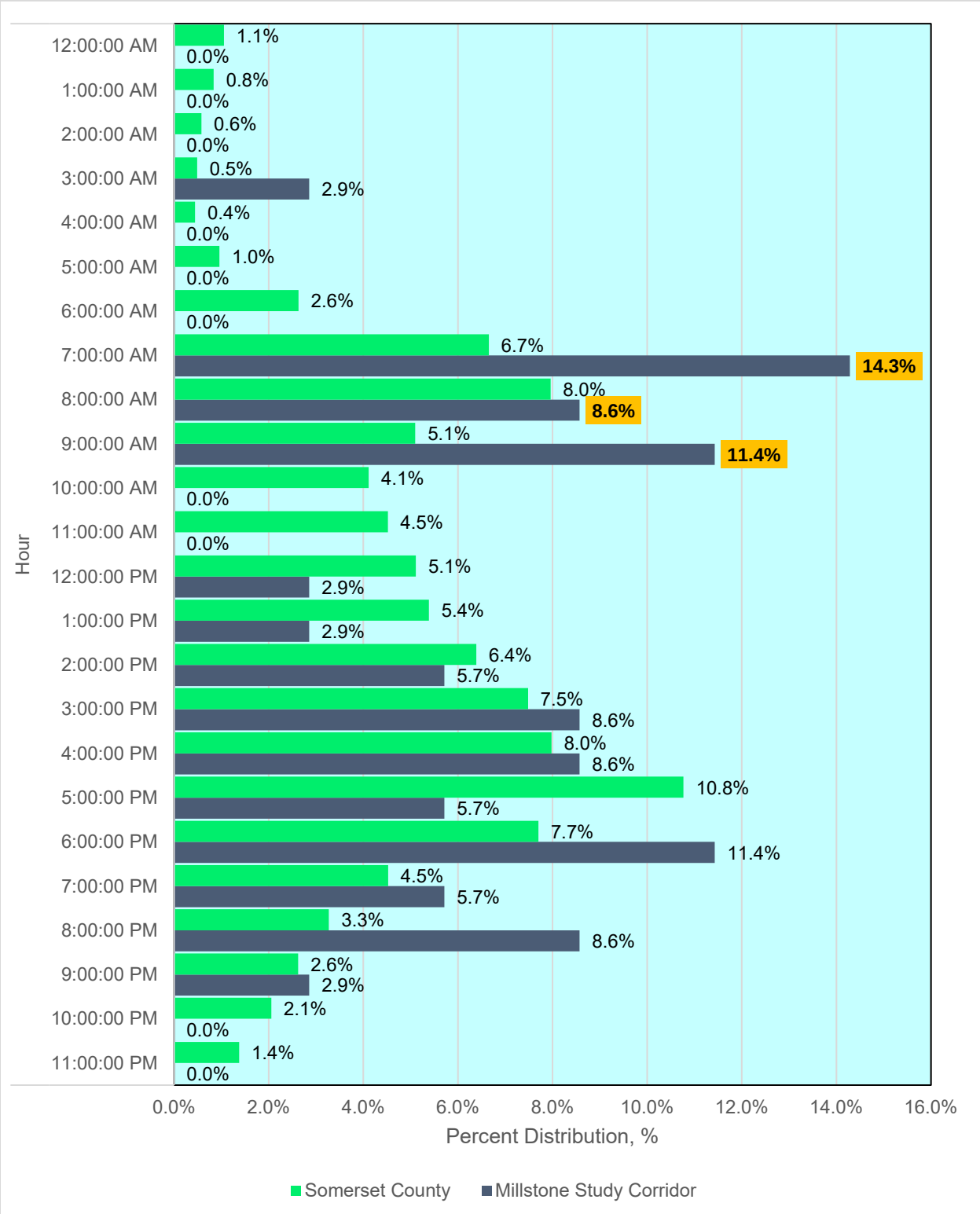


Figure 6 – Vehicular Crashes, Percent Distribution by Hour



B. Collision Types

Seventeen rear end crashes make up approximately 49 percent of the crash distribution along the study segment, shown highlighted in yellow in **Figure 7**. Most rear end crashes are occurring at the intersection of Main Street and Amwell Road. These crashes can possibly be attributed to congestion approaching the signal or glare issues. Rear end crashes on the corridor occur approximately 11 percent more frequently than County-wide rear end crashes. The frequency of fixed object crashes is higher on the corridor than the County, representing 14.3 percent of crashes (highlighted in yellow in **Figure 7**). Number of crashes by type are shown in **Table** 4.

Figure 7 – Vehicular Crashes, Percent Distribution by Crash Type

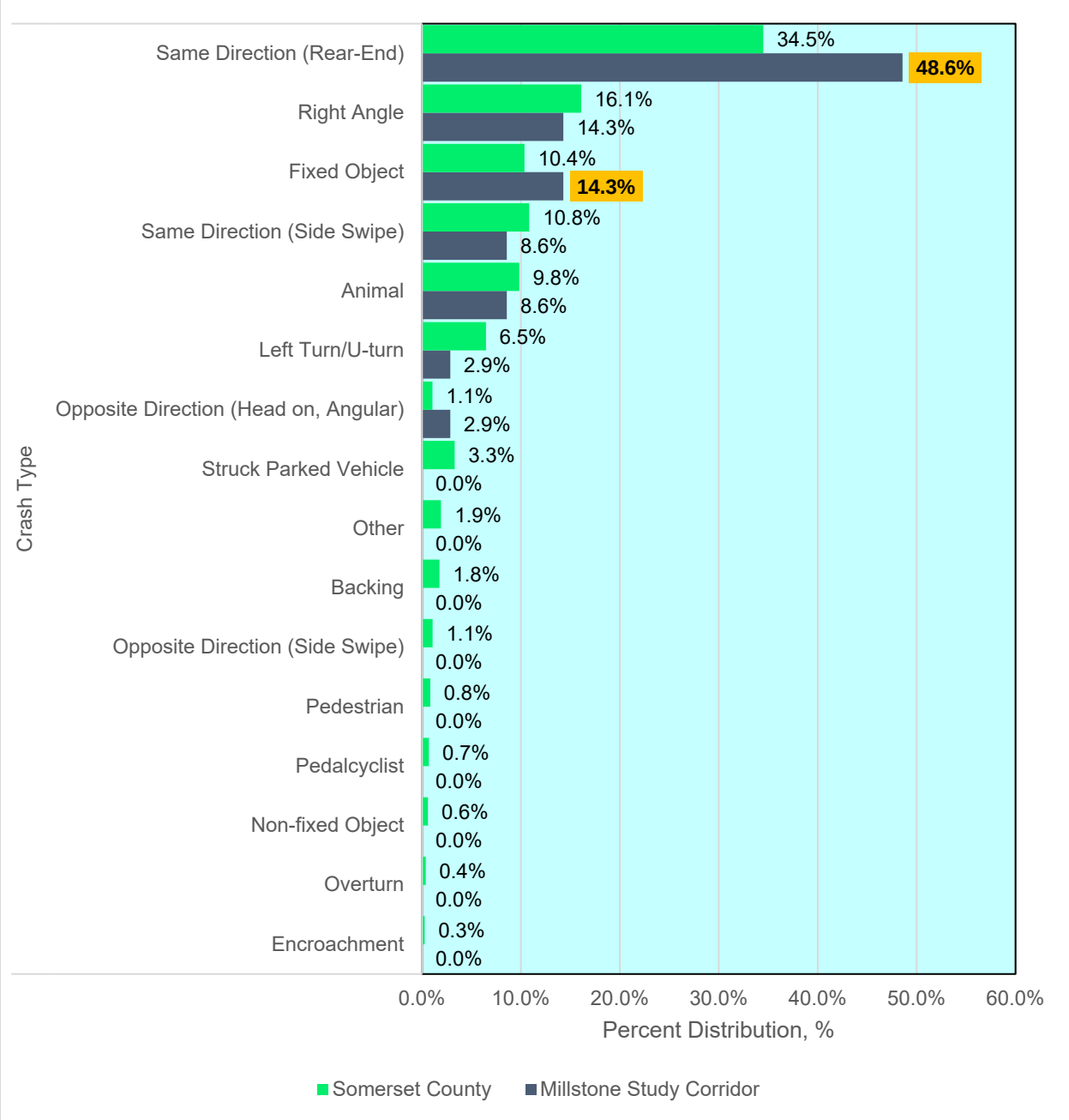


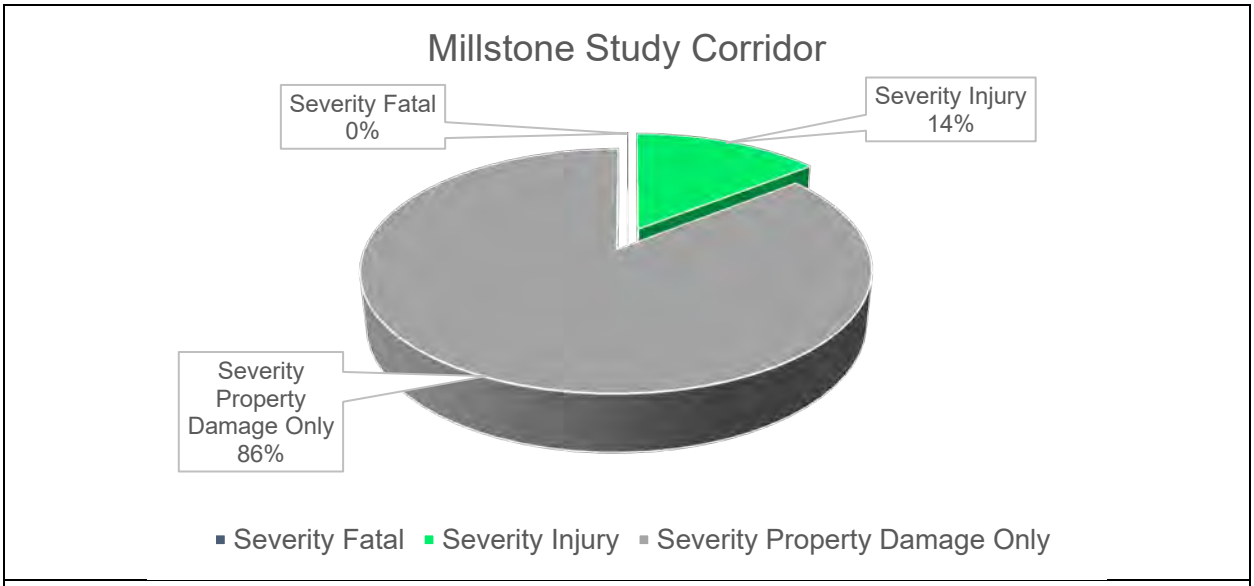
Table 4 – Vehicular Crashes by Type

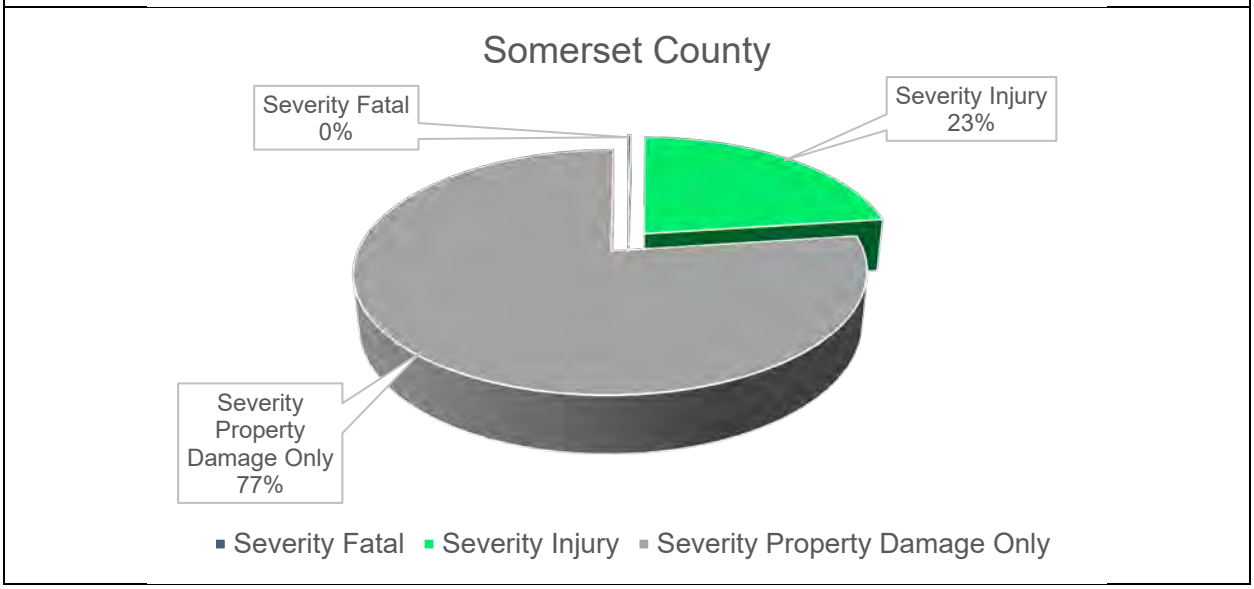
Crash Type	Total
Animal	3
Fixed Object	5
Left Turn/U-turn	1
Opposite Direction (Head on, Angular)	1
Right Angle	5
Same Direction (Rear-End)	17
Same Direction (Side Swipe)	3
Total	35

C. *Crash Severity*

Data in **Figure 8** shows a slight decrease in crashes resulting in injuries rather than property damage only when compared to the County. The analysis period saw no fatalities along the selected roadway segment.

Figure 8 – Vehicular Crashes, Percent Distribution by Severity





D. Roadway Surface & Light Condition

Crashes occurred more frequently during wet and dry driving conditions on the study corridor than County-wide. Wet road-related crashes are the second most overrepresented roadway surface condition during crashes at 17.2 percent, which is approximately 1 percent more frequent than the County-wide average at 16.1 percent (highlighted in yellow in **Figure 9**).

Figure 9 – Vehicular Crashes, Percent Distribution by Surface Condition

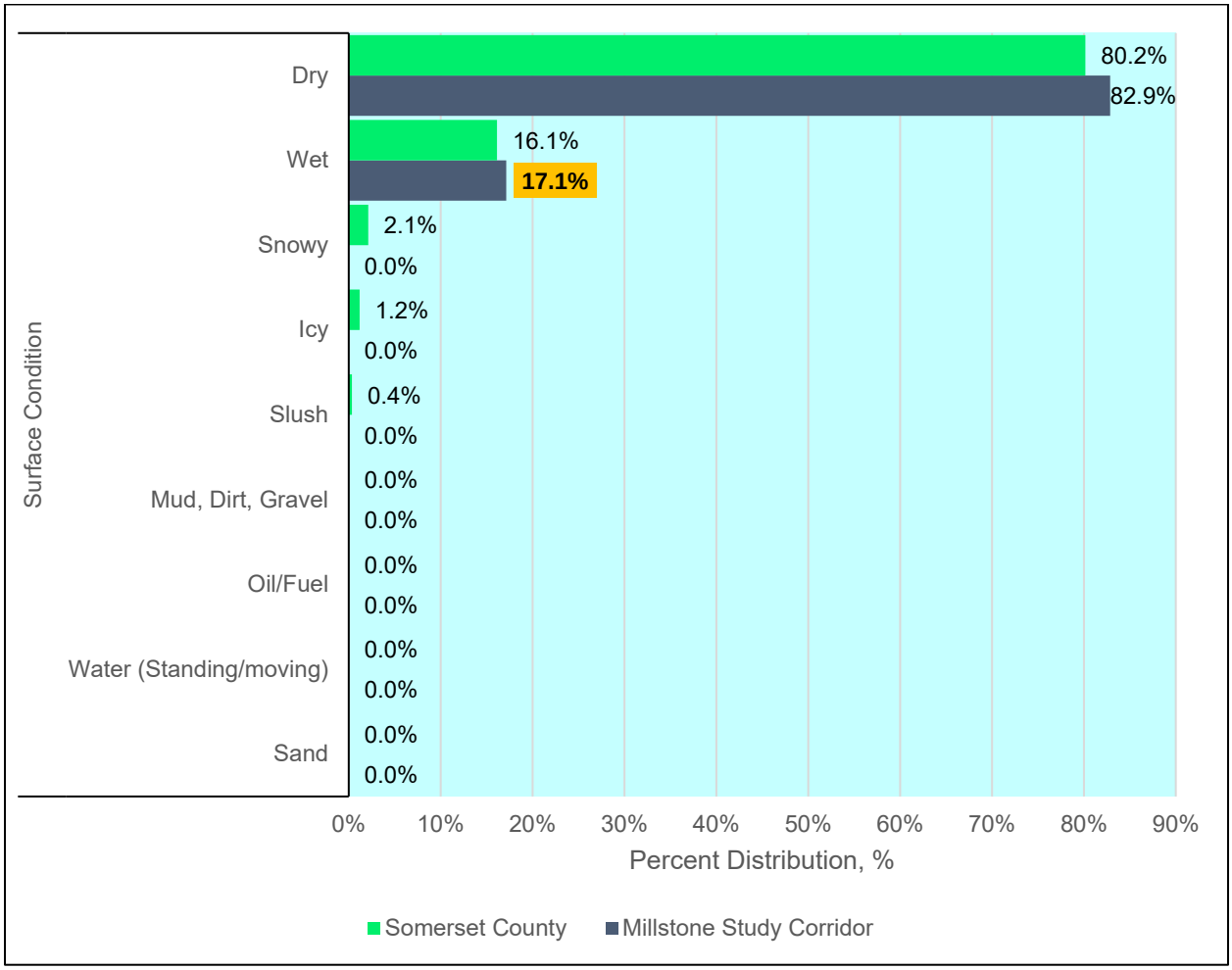
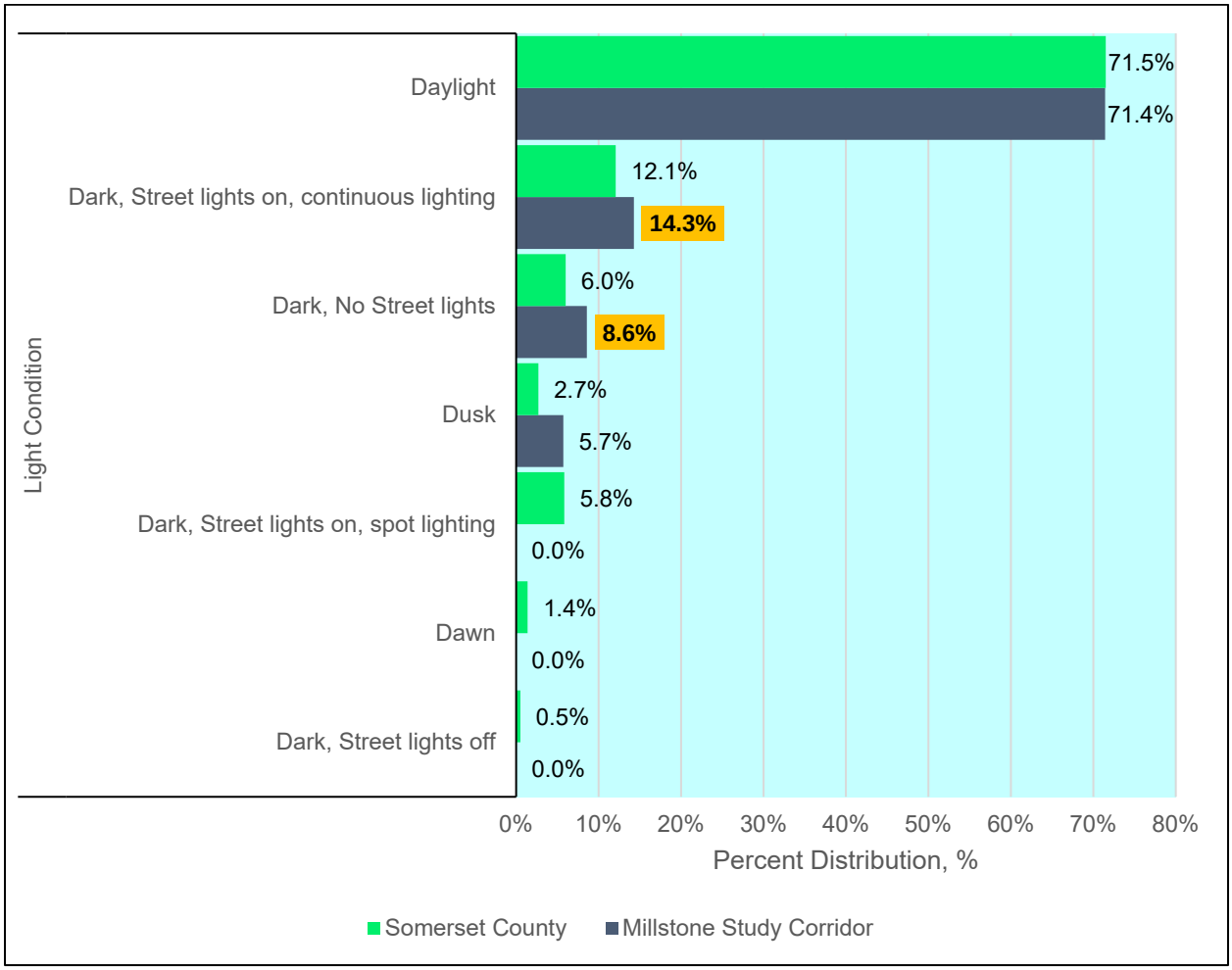


Figure 10 – Vehicular Crashes, Percent Distribution by Light Condition



Approximately 71.4 percent of crashes on the study segment occurred during daylight conditions, similar to the County-wide average of 71.5 percent. Crashes occurring during "Dark, Street lights on, continuous lighting" and "Dark, No Street lights" are higher than the County averages (highlighted in yellow in **Figure 10**). Dusk crashes were also over twice the share of County-wide crashes, suggest an issue with sun glare for vehicles on the westbound and eastbound Amwell Road (CR 514) approaches to Main Street.

E. Location

Crash visualization using the histogram, grouped in 0.01-mile segments indicates that the signalized intersection of Amwell Road (CR 514), highlighted in yellow, experienced the highest occurrence rate of crashes along the study segment corridor (**Figure 11**). These crashes at this location account for 63 percent of all crashes. A three-dimensional representation of this crash histogram for the 2016 through 2020 timeframe, imposed onto a map of the study area, is shown on **Figure 12**.

Figure 11 – Vehicular Crash Totals by Milepost

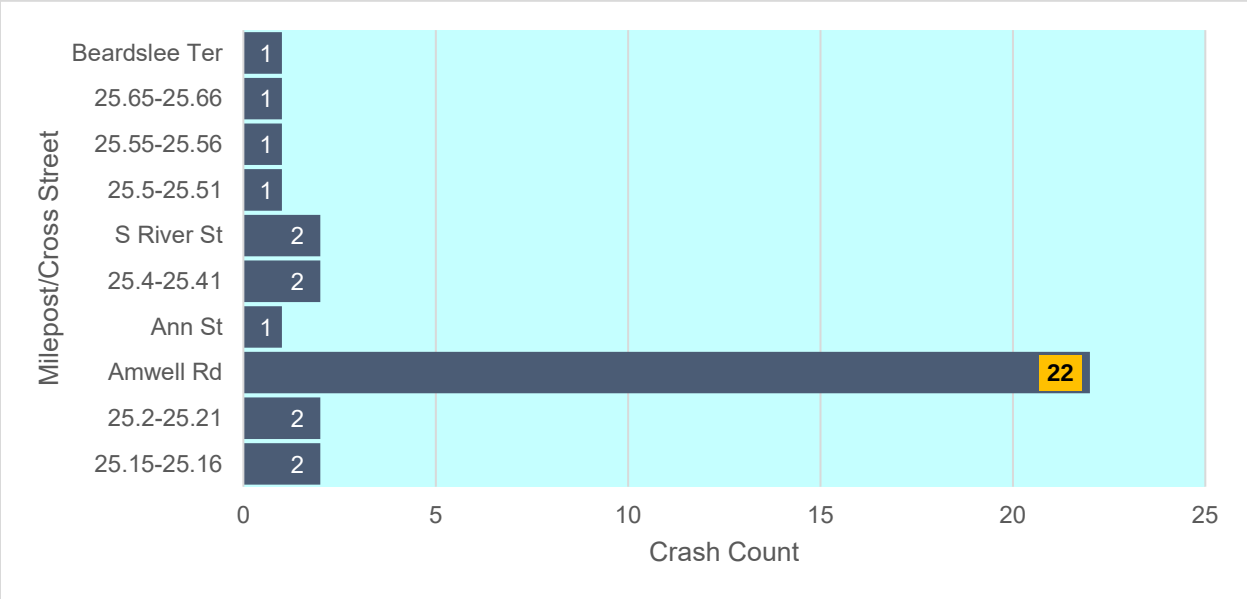


Figure 12 – Visual Estimation of 5-Year (2016 - 2020) Crash History Obtained from Safety Voyager [13]

[13] Five-year crash totals shown on histogram from Safety Voyager may vary from crash report data obtained from municipality's police department and do not include crashes recorded as occurring on side street approaches, which are included in the record of analyzed collected crash data.

F. Age of Those Involved

Driver-, occupant-, and pedestrian-involved data was also accessible from the NJDOT crash tables. A normal distribution table was developed (**Figure 13**) utilizing the age data provided by NJDOT. Amongst the twenty-eight crashes reported, the average person(s) involved age was determined to be approximately 39 years old. Approximately 68 percent of person(s) involved were between the ages of 24 and 54 years old. **Table 5** outlines the percent distribution of the age(s) of those involved in the vehicular crashes, grouped by ten years of age. Data from the table indicates that crashes with drivers between the ages of 46- and 55-years old account for the highest frequency of those involved at 26.3 percent, 10 percent more than the County average of 16.7 percent for the same age group.

Figure 13 – Histogram of Age(s) Involved

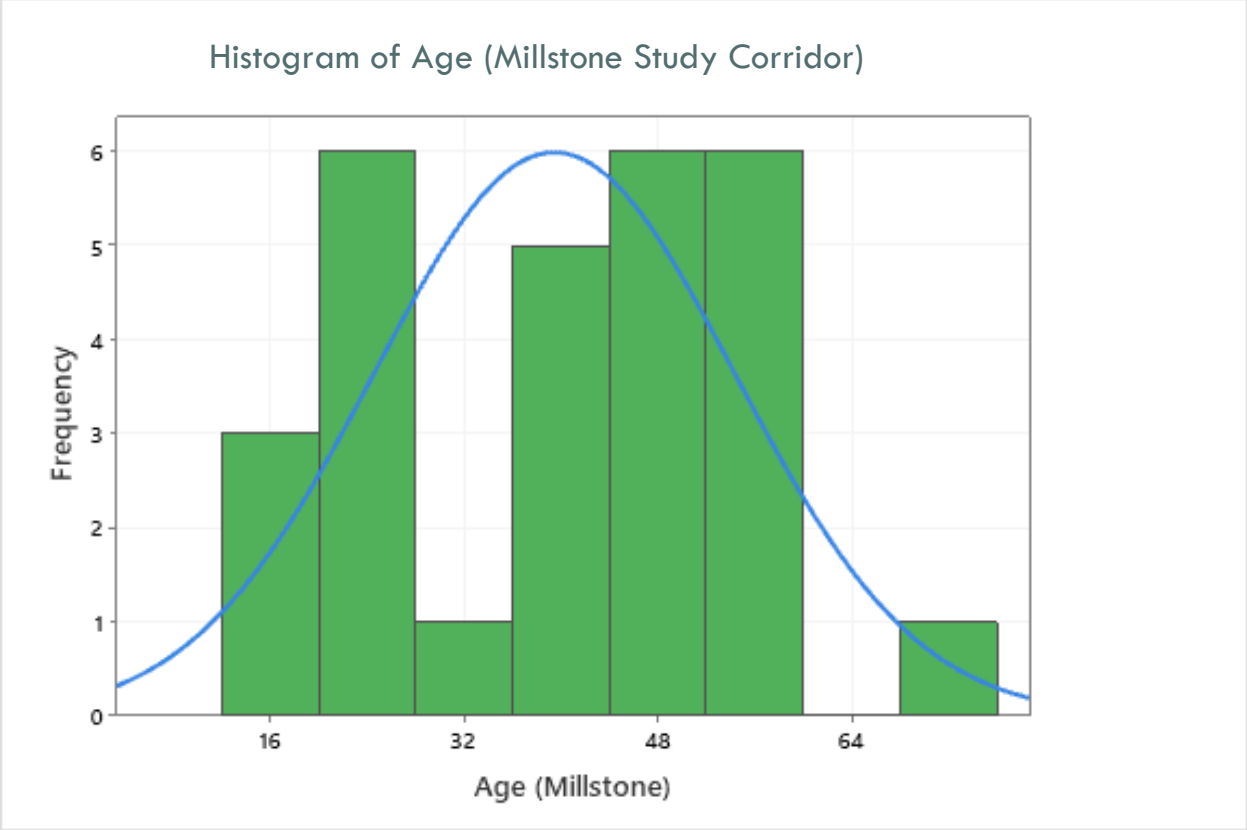


Table 5 – Age(s) Involved, percent distribution

Age Involved	Millstone Borough Study Corridor	Somerset County
Under 16	5.3%	7.9%
16-25	26.3%	23.1%
26-35	10.5%	16.9%
36-45	18.4%	15.8%
46-55	26.3%	16.7%
56-65	7.9%	11.3%
66-75	5.3%	5.1%
76-85	0.0%	2.5%
86-95	0.0%	0.7%
96-105	0.0%	0.0%
106-116	0.0%	0.0%

IV. RSA Logistics

All data previously discussed in this report was used to inform the RSA conducted on this corridor. All participants involved in this RSA, whether in attendance during the pre-audit meeting, in-field review, and/or post-audit meeting, are listed in **Appendix E**. The pre-audit meeting was held at 10:00 AM via video conferencing on Tuesday, March 23rd, 2021, on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The PowerPoint used to facilitate this discussion is provided in **Appendix F**.

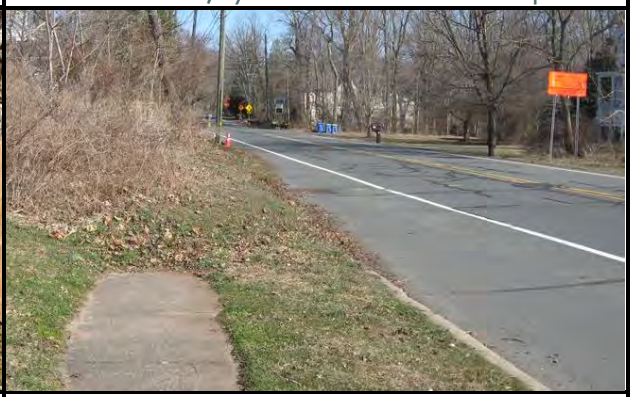
The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. The audit team met in a social-distanced manner, while masked, in the parking lot of the Millstone Borough Hall for a flipbook RSA orientation presentation to reiterate the ground rules of the audit. Upon conclusion of the orientation, participants were paired off with each other to walk halves of the corridor, seeking to pair each Somerset County Roadway Safety Study project team member (whether with the County or Consultant team) with each of the stakeholders. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as potential safety measures to address potential safety concerns. After walking the corridor, the RSA team met back in the parking lot to share overall thoughts on the corridor and fill out a survey on corridor identity, crossings, pedestrian-vehicle interactions, sidewalk and roadway conditions, and streetscape amenities, the answers of which were compiled and are averaged in **Appendix G**. Based on survey results, the corridor had the following perceived concerns:

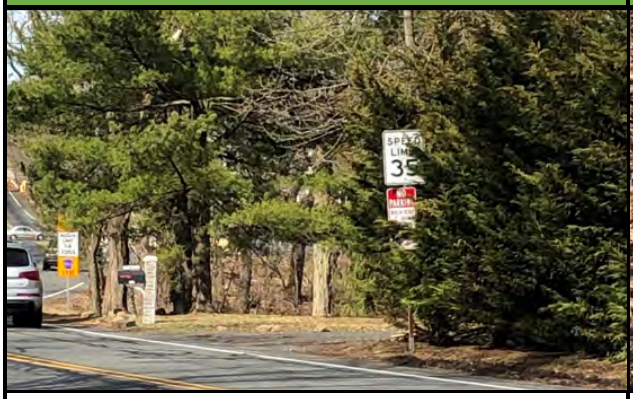
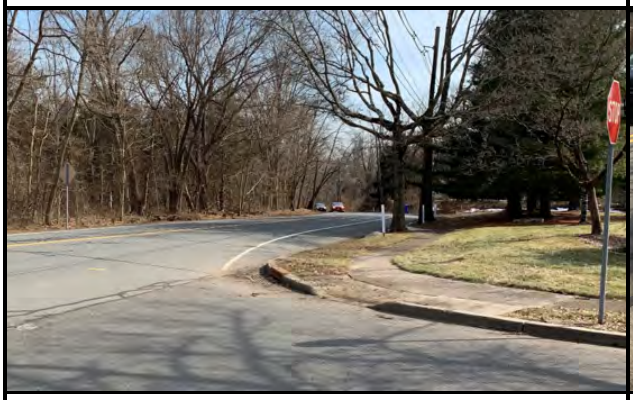
- Overall pedestrian-vehicle interactions, particularly due to vehicle speed and noise level;
- Presence of trucks or large vehicles

On the following day (Wednesday, March 24th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit, some of which are presented in the following section, to discuss each observation, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study. This discussion helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report. The PowerPoint used to facilitate this discussion is provided in **Appendix H**.

V. Identified Issues & Observations

This section depicts a sampling of overall issues identified during the RSA. Please refer to the Implementation Matrix in the following section of the report for a comprehensive list of identified corridor issues.

Pedestrian & Cyclist	Pedestrian & Cyclist
	
Intersection of Amwell Road and Main Street need ADA-compliance upgrade	Drainage grates should be replaced with bicycle-safe drainage grates
	
Wheelchair access point is overlooked due to faded signing and striping near Ann Street	Main Street lacks space to accommodate bike lanes. Therefore, cyclists share vehicle roadspace
	
Main Street north of Amwell road lacks sidewalk and safe pedestrian access. Roadway edge also has severe drop-offs	Sidewalk lacks continuity.

Operations & Visibility	Maintenance
	
Branches obstructing signage along Main Street	Brick paver sidewalks are in need of reset and repair
	
Yorktown Road lacks stop bar. Sight distance of vehicles heading Main Street NB can cause issues	Sidewalks along Main Street lacking maintenance and filled with debris
	
Older signals at Amwell and Main Street lacking countdown pedestrian countdown.	Old signage that requires removal or bagging to avoid motorists' confusion

VI. Findings & Recommendations

This section summarizes the site-specific and corridor-wide safety issues, potential strategies, and recommendations to improve safety. An Implementation Matrix is provided that summarizes the recommendations and provides qualitative information on time frame, cost, and responsible jurisdiction. Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process and are meant to be a record of ideas discussed. Symbols used in the Implementation Matrix are defined in **Table 6** as follows:

Table 6 – Legend of Symbols in Implementation Matrix

Symbol	Meaning	Definition
$	Low cost	Could be accomplished through maintenance
$$	Medium cost	May require some engineering or design and funding may be readily available
$$$	High cost	Longer term; may require full engineering, ROW acquisition, and new funding
🕐	Short term	Could be accomplished within 1 year
🕐🕐	Medium term	Could be accomplished in 1 to 3 years; may require some engineering
🕐🕐🕐	Long term	Could be accomplished in 3 years or more; may require full engineering

A. Implementation Matrix

The following represents the specific findings and recommendations made by the interdisciplinary RSA team, which were subsequently evaluated via discussions with County Engineering on Wednesday, June 2nd, 2021, and Thursday, June 3rd, 2021. As these recommendations are considered for advancement into either a CD study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices. Corridor-wide recommendations, requiring a review of all important applicable infrastructure along the corridor pertinent to these specific topics, are provided in **Table 7**. Further defined recommendations at specific intersection or mid-block locations are provided in **Table 8**. **Recommendations bolded within the Implementation Matrix below feature one of the twenty Proven Safety Countermeasures from the FHWA, which means that the recommendation is shown to have a significant safety benefit as proven by substantial traffic safety research.** These recommendations are tied to Crash Modification Factors (CMFs) showing a substantial reduction in crashes, as well as research documented on the Crash Modification Factor Clearinghouse website that has a high-quality ranking. This high ranking indicates the quality of study design, sample size, statistical methodology, statistical significance, etc. for the research backing each CMF. Mapping of proposed location-specific recommendations is provided in **Appendix I**.

Table 7 – Corridor-Wide Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
Bicycle				
1	Evaluate if existing inlets need bicycle-safe grates and replace as necessary.	$	🕐🕐	County
Education				
2	Consider sidewalk, crosswalk, multimodal education campaign and code enforcement.	$	🕐	Municipality
3	Improve wayfinding and signage for historic sites to reduce time vehicles circulate to find destinations.	$$	🕐🕐	County

No.	Recommendation	Cost	Time Frame	Jurisdiction
Maintenance				
4	Perform maintenance to clear overgrowth and debris on sidewalks and curb ramps.	$	🕐	Municipality
5	Coordinate with utility company to schedule regular street light bulb replacement.	$	🕐	Municipality
Operations				
6	**Perform a speed study along the corridor to determine the specific segments experiencing excessive speeds to recommend targeted traffic calming strategies. Also, investigate signed truck routes directing traffic away from the Borough to further calm traffic along Main Street (to be further investigated as part of the *Somerset County Master Plan Circulation Element*).**	**$**	🕐🕐	**County**
7	**Stripe (or restripe) crosswalks and stop bars on side streets to connect pedestrian ROW.**	**$**	🕐	**County/ Municipality**
8	Develop Borough-wide TMP[14] for yard sale event that's held the first week of June. Should be issued as a technical memo by the Borough.	$$	🕐	Municipality
9	**Investigate installing a low-cost "shoe" on paving equipment to extrude new pavement to create a gentler pavement edge slope at existing pavement drop-off locations to assist vehicles in recovering after running off the right side of the road.**	**$**	🕐🕐🕐	**County**
Pedestrian				
10	Conduct a sidewalk assessment to determine the extent of sidewalk that needs to be replaced, repaired, and constructed.	$$	🕐🕐	County/ Municipality
11	Perform curb ramp assessment to determine the number of curb ramps that need to be replaced, repaired, and constructed.	$$	🕐🕐	County/ Municipality
12	Investigate pedestrian-scale lighting options along the corridor.	$$	🕐	Municipality

Table 8 – Location-Specific Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
KEY STUDY RECOMMENDATION – Amwell Road (CR 514) to N River Street				
13	**Acquire property off east side of Main Street and install missing sidewalk link on east side of roadway.**	**$$$**	🕐🕐🕐	**Municipality**
Curve South of Yorktown Road				
14	**Install chevron (W1-8) signage with reflective strips on each post in both directions around curve.**	**$**	🕐🕐	**County**
15	Install raised pavement markers in both directions around curve.	$	🕐🕐	County
16	**Consider applying a high friction surface treatment to pavement around curve.**	**$$**	🕐🕐	**County**
Yorktown Road				
17	Install W1-7 (double arrow) warning sign facing the Yorktown Road approach.	$	🕐	Municipality
18	Stripe a stop bar across Yorktown Road.	$	🕐	Municipality
19	Explore solutions to mitigate limited intersection sight distance issues.	$	🕐	Municipality

[14] TMP is a document that details the way activities in the road corridor will be carried out, so they minimize inconvenience and help ensure road users and workers remain as safe as possible.

No.	Recommendation	Cost	Time Frame	Jurisdiction
20	Keep construction signage bagged when not in use and remove signs when project is complete.	$	🕐	Municipality
Amwell Road (CR 650)				
21	Install second pedestrian crossing sign (W11-2) with diagonal downward-pointing arrow for crosswalk on left side of roadway.	$	🕐	County
22	Consider striping or hardscaping curb extensions to shorten crosswalk.	$	🕐🕐	County
23	Revise edge line striping to encompass parking on WB approach.	$	🕐🕐	County
24	Consider connecting the shoulder lines via a tighter radii striped curve to convey a lower speed turning movement to the driver	$	🕐🕐	County
25	Consider installing curb extensions with planting beds that can act as a receptacle of stormwater runoff flowing down the hill from Amwell Road (CR 650) to filter the water before discharged to the Millstone River.	$$$	🕐🕐🕐	County/ Municipality
Ann Street				
26	Stripe stop bar across Ann Street approach.	$	🕐	Municipality
27	Install W1-7 (double arrow) warning sign facing the Ann St approach.	$	🕐	County
Between Ann Street and S River Street				
28	Prune tree to unobstruct speed limit sign in NB direction.	$	🕐	County
S River Street				
29	Consider implementing turn restrictions to limit bypass traffic down this side street.	$	🕐	Municipality
Amwell Road (CR 514)				
30	Conduct a traffic study to determine capacity issues, especially for NB left turn, and evaluate if they can be mitigated through signal retiming and rephasing, including lead lefts.	$$	🕐🕐	County
31	Install new push buttons and relocate those that are higher than 48" from ground level.	$	🕐🕐	County
32	Install new countdown pedestrian signal heads.	$	🕐🕐	County
33	Consider full signal replacement at this intersection as existing signal equipment has reached the end of its useful service life. Include FD/EMS pre-emption and backplates if possible.	$$$	🕐🕐	County
34	Consider expanding parking lot on SW corner and relocating access to Amwell Road to encourage pedestrians to use crosswalk at signal to access businesses.	$$	🕐	County
35	**Coordinate with gas station property owner to improve site circulation, parking, and width and location of access driveways to provide safer interaction with intersection operations. Will need planning board application.**	**$$**	🕐🕐🕐	**Municipality**
36	Coordinate with gas station property owner to relocate gas station sign to eliminate sign clutter.	$$	🕐🕐🕐	Municipality
37	Perform photometric analysis to provide better lighting for pedestrians.	$$	🕐🕐	County/ Municipality
38	**Consider implementing LPIs for some or all crosswalks.**	**$**	🕐🕐	**County**
39	Consider enacting No Turn on Red (NTOR) restrictions to mitigate the occurrence of right-hook pedestrian collisions.	$	🕐🕐	County

No.	Recommendation	Cost	Time Frame	Jurisdiction
Between N River Street and Amwell Road (CR 514)				
40	Refresh edge line striping.	$	🕐🕐	County
41	Consider high friction surface treatment on roadway for downhill (SB) direction.	$$	🕐🕐🕐	County
42	**Investigate techniques to address significant pavement edge drop-off by targeting soil erosion in the NB direction, including FHWA Safety Edge treatment.**	**$$**	🕐🕐	**County**
N River St				
43	Stripe stop bar on side street approach.	$	🕐	Municipality
44	**Consider implementing turn restrictions and/or constructing speed humps to limit bypass traffic down this side street, including no right turn in the NB direction and no left turn in the SB direction.**	**$**	🕐	**Municipality**
Maple Terrace				
45	Relocate DEAD END sign (behind STOP sign) to separate signpost on right side of roadway.	$	🕐	County
46	Stripe stop bar across Maple Terrace approach.	$	🕐	Municipality
47	Install W1-7 (double arrow) warning sign facing the side street.	$	🕐	County
Between Maple Terrace and Beardslee Road				
48	Coordinate with utility companies to relocate two utility poles close to roadway.	$	🕐🕐🕐	County/ Municipality
49	Realign sidewalk to provide grass buffer.	$$$	🕐🕐	Municipality
Beardslee Road				
50	Stripe a stop bar across Beardslee Road and relocate STOP sign to the stop bar.	$	🕐	Municipality
51	Evaluate intersection sight distance from Beardslee Road and determine if mitigation is required.	$$	🕐	Municipality
52	Consider striping curb extensions to shorten crossing across Beardslee Road.	$	🕐	Municipality

B. Road Owner Response

An essential final step of the RSA process is a response from the roadway owner, which provides accountability between the funding body and the participating jurisdiction who acknowledges the findings within the RSA and their planned steps to address concerns. In responding to the RSA's findings, the road owner, in this case the County, must weigh the safety benefits posed by the recommendations within this report against the available resources to implement such improvements to make an informed decision. Because the audit process generated a long and wide-ranging list of improvements, the road owner is expected to implement these recommended improvements as time and funds allow in coordination with other projects and priorities.

Somerset County delivered their response following the finalization of the findings and recommendations table (see **Appendix J**). However, while the County has overseen this RSA process, by no means should this report be considered as a commitment to address some or all concerns and implement some or all improvements listed within this report. All potential recommendations must be fully studied. It is acknowledged that some recommendations may not be feasible.

C. Potential External Funding Sources

Transportation Alternatives Program

The County and the Borough are encouraged to apply for funding through the Transportation Alternatives Set-Aside Program (TA Set-Aside) federal grant program, especially since the relatively low safety score ranking for the corridor segment and corridor intersections on the NSL may make application competitiveness "out-of-reach" to procure funding through the NJTPA's Local Safety Program (https://www.njtpa.org/lsp.aspx). The purpose of the TA Set-Aside federal grant initiative is to support the construction of "non-traditional" surface transportation projects, which typically involves the designing of infrastructure for active modes such as pedestrians, cyclists, and other non-motorized forms of travel. Supported projects can also have elements that bolster the recreational, historic, cultural, or environmental assets of the project area. Grant funding for a given project can range from $150,000 to $1,000,000. The amount of funding is determined on a project-by-project basis with award of prior grant money, and successful execution of prior funded projects, playing a factor. The County would not be prohibited from applying for both Safe Routes to School and TA Set-Aside funding at the same time.

TA Set-Aside lists the following activities that are eligible for funding under its "Pedestrian/Bicycle Facilities" and "Community Improvement" categories:

- New/reconstructed sidewalks/curb ramps;
- Bike lane striping;
- Wide paved shoulders;
- Bike parking and bus racks;
- New or reconstructed off-road trails;
- Bike/pedestrian bridges and underpasses;
- Lighting;
- Historic sidewalk paving;
- Benches;
- Planting containers;
- Decorative walls; and,
- Walkways.

The recommendations within the Implementation Matrix touch on many of the prior elements listed. To best position itself to attain approval for funding, the applying jurisdiction, whether County or municipal, should pass a resolution of support showing the commitment of maintenance of the proposed complete streets elements. Furthermore, the applicant should have data supporting that the implementation of similar improvements elsewhere within its jurisdiction has resulted in the increase of non-motorized transportation, the stimulus of economic activity, and the improvement in quality of life. A handbook summarizing the process of applying for these funds can be found at NJDOT Local Aid website[15].

D. Demonstration Project

Demonstration projects are where an example improvement is completed for a selected corridor with foresight to prepare for larger rollouts. The improvement(s) should highlight the concept and illustrate the benefits of RSAs and how RSAs may improve the overall level of safety for the road users. The selected demonstration projects should be of strategic importance, and which is representative of the general safety theme suggested for the selected corridor.

A potential demonstration project in this corridor could work to improve the pedestrian wayfinding. As a historic community with several noteworthy destinations, wayfinding could help visitors find these historic buildings. Moreover, historical information signage could help educate passersby about the Revolutionary War events in Millstone and build an even stronger sense of place. (**Figure 14**).

[15] https://njdotlocalaidrc.com/perch/resources/Uploads/2020-ta-set-aside-handbook-8-12-20.pdf

Figure 14 – Temporary Wayfinding Signing in Jersey City

E. Visualization of Potential Safety Measures

Provided in this section of the report are visualizations of some of the larger reaching proposed safety measures on the corridor in the Implementation Matrix (**Table 7** and **Table 8**). Visualizations of these safety measures, along with accompanying descriptions on how these ideas seek to improve safety for vehicular, pedestrian, and cyclist travel, are adapted from the following publications:

- *New Jersey Pedestrian and Bicycle Resource Center* video library, 2021[16]
- *Cross County Connection TMA* video library, 2021[17]
- *NJDOT Technology Transfer* video library, 2021[18]
- *NJDOT Safe Routes to School* video library, 2021[19]
- *2017 State of New Jersey Complete Streets Design Guide*, NJDOT, 2017
- *Proven Safety Countermeasures*, FHWA, 2017
- *Small Town and Rural Multimodal Networks*, FHWA, 2016
- *Separated Bike Lane Planning and Design Guide*, FHWA, 2015
- *New Jersey School Zone Design Guide*, NJDOT, 2014
- *Urban Bikeway Design Guide 2nd Edition*, National Association of City Transportation Officials, 2014
- *Urban Street Design Guide*, National Association of City Transportation Officials, 2012

Key Study Recommendation – Closing Gap in Sidewalk Connectivity, N River to Amwell (CR 514)

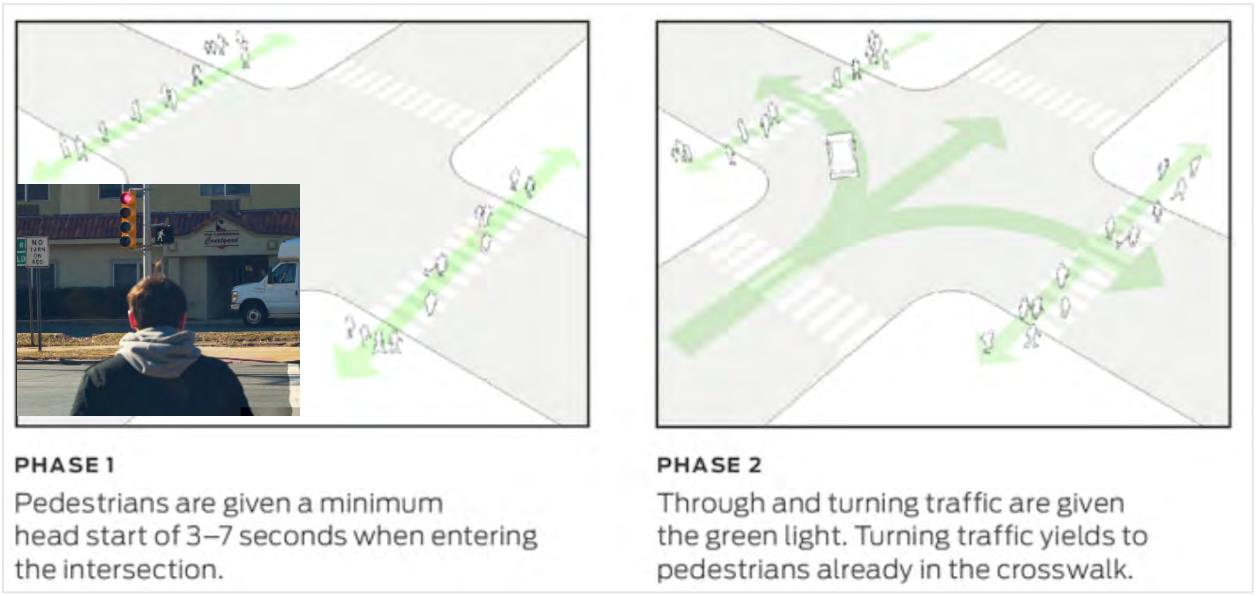
The Borough is currently seeking to close the gap in sidewalk coverage between Amwell Road (CR 514) and North River Street through the redevelopment or acquisition of a vacant residential property located off the east side of Main Street. The Borough commented that State intervention would likely be needed to obtain property, or an easement, to construct this new sidewalk along the east side of Main Street to connect existing

[16] https://www.youtube.com/channel/UCMsSU487ZPfaOAjcC7K8_SQ
[17] https://www.youtube.com/channel/UC5C0fODzuDqT9ycKMYv0C3Q
[18] https://www.youtube.com/channel/UC-L3YfqzFHcuDw6aI7wDrJQ
[19] https://www.youtube.com/channel/UCjlvrPjwNZ97MkX5lRol4ow

sidewalk to the north and south. Currently, pedestrians either walk along the shoulder on Main Street, or utilize the sidewalks along North River Street and Amwell Road (CR 514) to make this connection.

Leading Pedestrian Intervals (LPIs) & Signal Phasing at Amwell Road (CR 514) Intersection
LPIs are a low-cost, effective way to help pedestrians establish their presence at signalized crossing locations before conflicting vehicles have the right-of-way (**Figure 15**). This is one of FHWA's Proven Safety Countermeasures, boasting an approximate reduction of 13 percent[20] of pedestrian-vehicle crashes with proper implementation. Signal phasing and vehicular capacity are noted to be barriers to implementation. Currently, lead left phasing only allows LPI implementation on northern and western crosswalks.

Figure 15 – Leading Pedestrian Interval (from NACTO and Lakewood Township)[21]



By changing lead left to lag left phasing[22], however, LPIs could be implemented for all crosswalks at the signalized intersection. However, lag left phasing may result in driver confusion and additional congestion. In addition to LPIs, No Turn on Red (NTOR) restrictions can be enacted at this intersection to mitigate the occurrence of right-hook pedestrian collisions. The County should perform a capacity analysis of the intersection to see if lag left phasing and LPIs could be accommodated within existing intersection capacity.

Safety Edge, North of Amwell Road (CR 514) Intersection
During field observations, it was noted that both sides of Main Street on the section between Amwell Road (CR 514) and North River Street have abrupt pavement drop-offs due to stormwater runoff. These drop-off areas can result in severe run-off-road collisions where a vehicle's right set of tires can get caught in the rut created by the drop-off on the side of the road. When over-correcting to pull back onto the road, a driver may accelerate into the opposing lane of traffic, or off the other side of the road, resulting in high speed head-on or fixed object collisions. Although analyzed crash history has not substantiated the occurrence of such a crash, when re-paving Main Street, the County could investigate a low-cost "shoe" installed on paving equipment to extrude new pavement to create a gentler pavement edge slope at existing pavement drop-off locations to assist vehicles in recovering after running off the right side of the road (**Figure 16**).

[20] FHWA. (2017). Proven Safety Countermeasures. https://safety.fhwa.dot.gov/provencountermeasures/.
[21] Figure from National Association of City Transportation Officials. (2012). *Urban Street Design Guide*. Photo from NJDOT Technology Transfer. (2019). *What is an LPI?* YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=xk8hn7rdHds.
[22] Left turn in one direction gets the green arrow before the opposing thru traffic gets the green ball, but the left turn in the other direction gets the green arrow afterwards.

Figure 16 – Safety Edge Paving Example[23]

Speed Humps on River Street

At the Township's discretion, either paved or raised speed humps could be installed on North and South River Street to discourage cut-through traffic looking to bypass brief periods of congestion at the Amwell Road (CR 514) intersection. Speed humps can be designed to slow an average vehicle's wheelbase width yet can also allow for bicyclists and larger emergency vehicles, such as firetrucks, to move along the street unimpeded (**Figure 17**).

[23] From https://www.forconstructionpros.com/asphalt/article/12143665/the-safety-edge-difference.

Figure 17 – Sample Speed Humps from NACTO[24]

Striping Modifications or Curb Extensions at Amwell Road (CR 650) Intersection

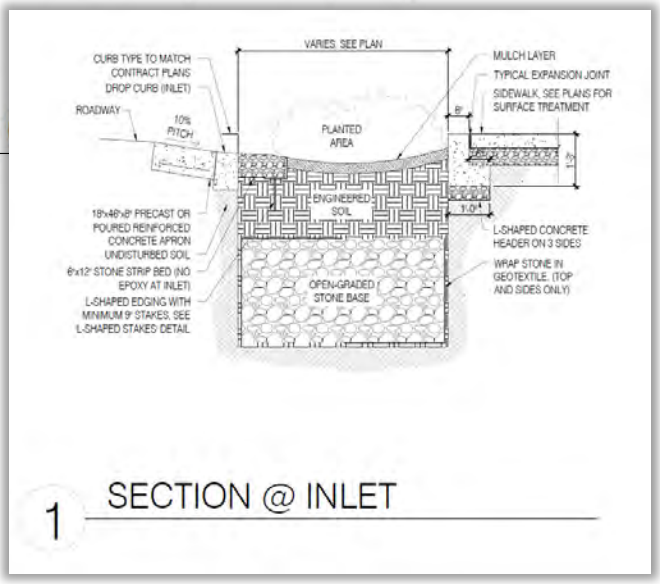
Before construction of the Amwell Road Bypass in the late 90's, CR 650 was the major east-west through route in the Borough serving both passenger car and heavy vehicle traffic. As such, the Amwell Road & Main Street intersection was designed to accommodate heavy vehicle movements. Today, however, this section of Amwell Road has been bypassed and primarily serves vehicles going to/from local residences. This intersection still accommodates large sweeping turning movements, particularly from southbound Main Street to westbound Amwell Road (CR 650) due to large curb radii and shoulders serving as parking areas. Cars can take advantage of these wide sweeping radii for high-speed turning movements. At this location, the County can implement traffic calming on the corners of this intersection, ranging from…

- Connecting the shoulder lines through the intersection between both roadways via a tighter radii striped curve to convey a lower speed turning movement to the driver; or,
- Constructing curb extensions on the northwest and southwest corners of the intersection to shorten crosswalk lengths and provide Green Stormwater Infrastructure (GSI) opportunities.

In addition to shortening crossing distances, curb extensions with planting beds can act as a receptacle of stormwater runoff flowing down the hill from Amwell Road (CR 650) to filter the water before discharged to the Millstone River. Details for a infiltration planter GSI treatment that could be done within a curb extension are included in **Figure 18** on the next page. It should be noted that such a feature would need to be maintained by the Borough. The County should coordinate with the Borough to determine if the needed resources are available to maintain any proposed GSI feature.

[24] Figure from National Association of City Transportation Officials. (2012). *Urban Street Design Guide*.

Figure 18 – Millburn Township Curb Extensions with Infiltration Planters, Details Included[25]



[25] NJDOT / FHWA. (2017). Millburn Township,: 2017 CS. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=XjRPx5YhwoU.

VII. Conclusion

This RSA Report seeks to describe the process undertaken by the County to investigate potential traffic safety issues along the Main Street corridor, from the intersection with Yorktown Road at MP 25.14 to the municipal border with Hillsborough Township at the intersection with Beardslee Terrace at MP 25.81, located in Millstone Borough. From survey of prior County, municipal, or regional studies to public and stakeholder outreach conducted as part of this study to the crash data that was reviewed report-by-report to the observations made during in-field audits, potential concerns were observed and recorded, not only for corridor-wide issues, but for location-specific issues.

In order to address these potential concerns, discussions were held with the RSA team and County Engineering to develop a list of tasks to improve traffic safety on the corridor, which are codified in the Implementation Matrix (Chapter VI, Subsection A) in this report. To assist the responsible jurisdictions (whether municipal, County, or separate agency) to schedule and prioritize these improvements, such were classified by anticipated timeline and cost magnitude. It is encouraged that the improvement recommendations are shared with all responsible jurisdictions to increase the benefits to be seen from the recommendations in this report.

While the recommendations in the Implementation Matrix are centered around the engineering (and associated maintenance) of roadway features, changes to hard infrastructure alone will fall shy of the benefit that would be seen by implementing the 5E's of highway safety[26]:

- Engineering: highway design, traffic, maintenance, operations, and planning professionals;
- Enforcement: State and local law enforcement agencies;
- Education: communication professionals, educators, and citizen advocacy groups;
- Emergency response: first responders, paramedics, fire, and rescue; and,
- Equity: prioritizing the safety of vulnerable roadway users.

This approach recognizes a shared responsibility across numerous professions to see improved benefits in corridor crash performance, beyond the anticipated reduction in crashes with the implementation of proven crash countermeasures. RideWise (the County's TMA), law enforcement, and EMS are encouraged to continue their efforts in educating the local driving population, holding driving behaviors accountable to Title 39, improving the response times to severe crash incidents, and reaching underserved communities with these safety strategies.

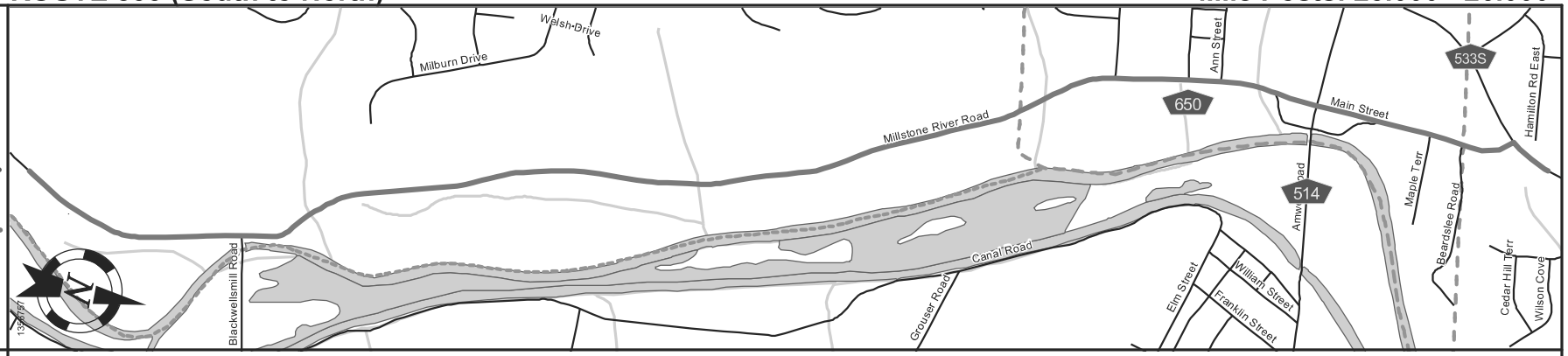
[26] Adapted from FHWA, https://safety.fhwa.dot.gov/hsip/resources/fhwasa1102/flyr3_in.cfm

Appendix A

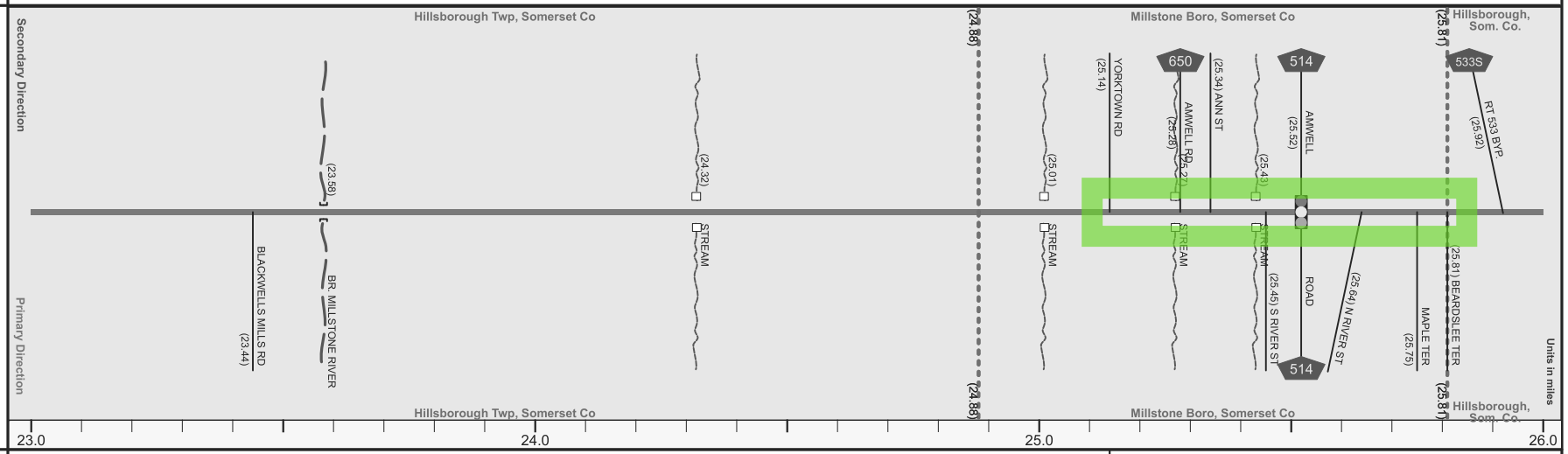
Straight Line Diagram

ROUTE 533 (South to North)

Mile Posts: 23.000 - 26.000



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



Street Name	Millstone River Road | Main Street
Jurisdiction	County
Functional Class	Urban Major Collector | Urban Minor Arterial
Federal Aid - NHS Sy	STP
Control Section	
Speed Limit	45 | 35
Number of Lanes	2
Med. Type	None
Med. Width	0
Pavement	24
Shoulder	1 | 2 | 4 | 6
Traffic Volume	8,294 (2016)
Traffic Sta. ID	91818
Structure No.	
Enlarged Views	

SRI = 00000533__

Date last inventoried: November 2012

Page Created: March, 2019

Appendix B

Traffic Data

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 08/14/2019 to 08/20/2019

Site names:	091818,Millstone River Road-25.02,00000533__	Seasonal Factor Grp:	rg3_5U
County:	SOMERSET	Daily Factor Grp:	rg3_5U
Funct Class:	Urban Major Collector	Axle Factor Grp:	rg3_5U
Location:	Between Blackswell Mills Road and Yorktown Road	Growth Factor Grp:	rg3_5U

	Sun, Aug 11, 2019			Mon, Aug 12, 2019			Tue, Aug 13, 2019			Wed, Aug 14, 2019			Thu, Aug 15, 2019			Fri, Aug 16, 2019			Sat, Aug 17, 2019		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00										39	20	19	29	18	11	41	16	25	65	22	43
01:00										12	6	6	15	6	9	20	11	9	34	18	16
02:00										9	4	5	8	2	6	12	7	5	28	16	12
03:00										16	6	10	12	6	6	16	7	9	8	4	4
04:00										26	16	10	23	11	12	22	11	11	24	9	15
05:00										104	58	46	118	66	52	130	69	61	46	24	22
06:00										375	204	171	360	202	158	326	174	152	122	70	52
07:00										778	477	301	790	476	314	687	391	296	181	103	78
08:00										781	447	334	851	491	360	663	380	283	270	151	119
09:00										543	340	203	565	346	219	492	285	207	346	174	172
10:00										358	187	171	395	229	166	416	227	189	363	187	176
11:00										354	194	160	370	195	175	382	214	168	362	204	158
12:00										394	201	193	400	193	207	414	201	213	376	201	175
13:00										392	208	184	424	224	200	439	203	236	425	206	219
14:00										445	213	232	477	246	231	513	272	241	403	220	183
15:00										607	275	332	580	283	297	632	310	322	400	201	199
16:00										934	414	520	853	406	447	819	409	410	404	205	199
17:00										1,038	407	631	938	391	547	797	334	463	405	205	200
18:00										680	256	424	721	317	404	580	266	314	358	184	174
19:00										393	172	221	386	171	215	334	176	158	280	143	137
20:00										274	115	159	266	113	153	275	131	144	257	112	145
21:00										184	81	103	210	76	134	209	99	110	186	87	99
22:00										102	54	48	132	53	79	154	77	77	166	86	80
23:00										61	24	37	67	34	33	119	60	59	113	54	59
Total										8,899	4,379	4,520	8,990	4,555	4,435	8,492	4,330	4,162	5,622	2,886	2,736
AM Peak Vol										781	477	334	851	491	360	687	391	296	363	204	176
AM Peak Fct										1	1	1	1	1	1	1	1	1	1	1	1
AM Peak Hr										8: 00	7: 00	8: 00	8: 00	8: 00	8: 00	7: 00	7: 00	7: 00	10: 00	11: 00	10: 00
PM Peak Vol										1,038	414	631	938	406	547	819	409	463	425	220	219
PM Peak Fct										1	1	1	1	1	1	1	1	1	1	1	1
PM Peak Hr										17: 00	16: 00	17: 00	17: 00	16: 00	17: 00	16: 00	16: 00	17: 00	13: 00	14: 00	13: 00
Seasonal Fct										1.018	1.018	1.018	1.018	1.018	1.018	1.018	1.018	1.018	1.018	1.018	1.018
Daily Fct										.904	.904	.904	.896	.896	.896	.925	.925	.925	1.227	1.227	1.227
Axle Fct										.495	.495	.495	.495	.495	.495	.495	.495	.495	.495	.495	.495
Pulse Fct										2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000

Created 10/24/2019 3:13 PM ROAD AADT 7,548 NDIR AADT 3,804 PDIR AADT 3,744

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 08/14/2019 to 08/20/2019

Site names:	091818,Millstone River Road-25.02,00000533__	Seasonal Factor Grp:	rg3_5U
County:	SOMERSET	Daily Factor Grp:	rg3_5U
Funct Class:	Urban Major Collector	Axle Factor Grp:	rg3_5U
Location:	Between Blackswell Mills Road and Yorktown Road	Growth Factor Grp:	rg3_5U

	Sun, Aug 18, 2019			Mon, Aug 19, 2019			Tue, Aug 20, 2019			Wed, Aug 21, 2019			Thu, Aug 22, 2019			Fri, Aug 23, 2019			Sat, Aug 24, 2019		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00	42	18	24	34	14	20	24	17	7												
01:00	36	21	15	14	5	9	7	0	7												
02:00	26	12	14	5	2	3	5	4	1												
03:00	22	11	11	10	6	4	6	2	4												
04:00	12	7	5	24	12	12	29	15	14												
05:00	39	20	19	101	52	49	104	50	54												
06:00	78	46	32	373	216	157	364	208	156												
07:00	107	55	52	753	435	318	780	444	336												
08:00	197	109	88	752	444	308	791	463	328												
09:00	250	146	104	457	262	195	435	231	204												
10:00	320	154	166	262	99	163	238	89	149												
11:00	356	200	156	288	110	178	234	108	126												
12:00	433	205	228	266	93	173	282	102	180												
13:00	327	152	175	289	99	190	297	100	197												
14:00	367	196	171	405	170	235	325	107	218												
15:00	354	159	195	490	237	253	535	234	301												
16:00	299	160	139	752	353	399	846	404	442												
17:00	369	196	173	960	390	570	969	386	583												
18:00	304	153	151	608	242	366	691	280	411												
19:00	284	136	148	359	163	196	355	160	195												
20:00	193	102	91	206	93	113	251	115	136												
21:00	111	61	50	128	58	70	151	73	78												
22:00	82	41	41	96	47	49	105	59	46												
23:00	56	27	29	65	26	39	59	32	27												
Total	4,664	2,387	2,277	7,697	3,628	4,069	7,883	3,683	4,200												
AM Peak Vol	356	200	166	753	444	318	791	463	336												
AM Peak Fct	1	1	1	1	1	1	1	1	1												
AM Peak Hr	11: 00	11: 00	10: 00	7: 00	8: 00	7: 00	8: 00	8: 00	7: 00												
PM Peak Vol	433	205	228	960	390	570	969	404	583												
PM Peak Fct	1	1	1	1	1	1	1	1	1												
PM Peak Hr	12: 00	12: 00	12: 00	17: 00	17: 00	17: 00	17: 00	16: 00	17: 00												
Seasonal Fct	1.018	1.018	1.018	1.018	1.018	1.018	1.018	1.018	1.018												
Daily Fct	1.500	1.500	1.500	.964	.964	.964	.915	.915	.915												
Axle Fct	.495	.495	.495	.495	.495	.495	.495	.495	.495												
Pulse Fct	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000												

Appendix C

Excerpts from Prior Studies

- Install pedestrian-scale lighting, extending the existing pedestrian scale lighting near the Tea Street intersection and farther east on the Main Street segment of CR 533. Lighting could be installed either on existing utility poles or as freestanding fixtures. If the latter option is pursued, attachments for planters would add opportunities to incorporate seasonal vegetation
- Integrate public access, seating, and other streetscape amenities into any future green infrastructure improvements along Talmadge Avenue between Tea Street and La Monte Avenue
- Introduce new street trees along Talmadge Avenue to enhance the streetscape
- Identify opportunities to incorporate green spaces and green infrastructure on the westbound side of Talmadge Avenue, east of Tea Street
- Investigate wayfinding and directional signing elements at key approaches and decision points from the west to divert regional and heavy truck traffic to more appropriate routes
- Investigate additional street design elements to discourage through travel by heavy trucks

Main Street Pedestrian Improvements

Several strategies seek to improve pedestrian access and linkages between Bound Brook and South Bound Brook.

- Investigate installation of a speed table on Main Street at the intersection of Van Horne Plaza and Hamilton Street, improving pedestrian connectivity to the train station and calming traffic
- Investigate addition of a mid-block crossing of Main Street (CR 527) at Railroad Avenue, including continental striping and a rectangular rapid flashing beacon (RRFB) to improve visibility. The crossing would:
  - » Provide a more direct connection between the self-storage property and the Meridian Apartments, whose residents utilize the site for parking. Pedestrians traveling between the two locations are currently required to make three crossings around the Main Street/ Bolmer Boulevard roundabout
  - » Link the self-storage site (future Borough kayak/canoe storage area) to the historic stone bridge site and future kayak/canoe put-in area under the Queen's Bridge
- Collaborate with South Bound Brook Borough, Somerset County, NJDOT, the D&R Canal Commission, and other stakeholders to advance pedestrian improvements on the historic Queens Bridge and surrounding paths, better linking the downtowns of Bound Brook and South Bound Brook. Improvements include:
  - » New pedestrian path on the Canal Bridge
  - » New pedestrian lighting along the D&R Canal Towpath
  - » New historic signage and wayfinding
  - » Restoration of the historic Canal Bridge swing mechanism
  - » Pedestrian-activated rectangular rapid flashing (RRFB) beacon where the D&R Canal Towpath traverses Queens Bridge

Improvement	Order of Magnitude Cost (Est.)	Time Frame	Potential Partners
Main Street / Queens Bridge Improvements			
Investigate addition of a mid-block crossing of Main Street (CR 527) at the south side of Railroad Avenue, including continental striping and a rectangular rapid flashing beacon (RRFB)	Low	Med	Borough / County
Advance package of pedestrian improvements on the historic Queens Bridge and surrounding paths	High	Long	Borough / Bound Brook / Borough / County / NJDOT / D&R Canal Commission
Investigate installation of a speed table at the intersection of Main Street with Hamilton Street / Van Horne Plaza	Low	Long	Borough / County / NJ Transit
Train Station Access Improvements			
Address multimodal and ADA accessibility to train station from both Bound Brook and neighboring South Bound Brook	Low	Short	Borough / NJ TRANSIT
Investigate opportunities to implement a bike depot at the Bound Brook train station	Low	Short	Borough / NJ TRANSIT / NJ Bike and Walk Coalition
Integrate future station options with planned NJ Transit parking lot upgrades	High	Long	NJ TRANSIT / Borough
Rehabilitate the historic train station to serve rail commuters and serve as an anchor for transit oriented development in the downtown	High	Long	Borough / NJ TRANSIT / Developer
Investigate potential for West Main Street access to train station area including kiss-and-ride	Med	Long	Borough / NJ TRANSIT

NOTE:

Order of Magnitude Cost tiers:

- Low: <$5M
- Medium: $5M - $25M
- High: >$25M

Time Frame tiers:

- Short: <3 year
- Med: 3-8 years
- Long: >8 years

Appendix D

Collision Diagrams

Millstone Borough
Somerset County

Yorktown Rd

Southern Limit of Segment

3

SOMERSET 533 COUNTY
Main St

MATCH LINE A

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A6 FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

SOMERSET COUNTY

CRASH DIAGRAM (1 OF 6)

MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec	Scale: 1"=60'	Exhibit A1

U:\192510854\graphic_design\CrashDiagrams\CR533_Millstone_mp25.14-25.87

Millstone Borough
Somerset County

Amwell Rd

Ann St

Main St

MATCH LINE A

MATCH LINE B

4

28

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A6 FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (2 OF 6)

MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A2

U:\192510854\graphic_design\CrashDiagrams\CR533_Millstone_mp25.14-25.87

Millstone Borough
Somerset County

MATCH LINE B

MATCH LINE C

SOMERSET 533 COUNTY
Main St

SOMERSET 514 COUNTY
Amwell Rd

S River St

31 30 29 33 32 5 21 20 19 14 26 6 10 18 17 16 15 7 23 24 25 8 11 12 13 9 22 27

LEGEND

CRASH NUMBER SEE EXHIBIT A6 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (3 OF 6)

MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec	Scale: 1"=60'	Exhibit A3

U:\192510854\graphic_design\CrashDiagrams\CR533_Millstone_mp25.14-25.87

Millstone Borough
Somerset County

MATCH LINE C

MATCH LINE D

SOMERSET 533 COUNTY Main St

SOMERSET 533 COUNTY Main St

34

N River Rd

Maple Terrace

LEGEND

CRASH NUMBER SEE EXHIBIT A6 FOR DETAILS

- # PDO
- # INJURY
- # FATAL

EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (4 OF 6)

MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec	Scale: 1"=60'	Exhibit A4

U:\192510854\graphic_design\CrashDiagrams\CR533_Millstone_mp25.14-25.87

Millstone Borough
Somerset County

Hillsborough Township
Millstone Borough

Somerset Courthouse Rd

Millstone River Rd

Main St

Main St

MATCH LINE D

Maple Terrace

Beardslee Rd

35

2

1

Northern Limit of Segment

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A6 FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (5 OF 6)

MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A5

U:\119251085\graphic_design\CrashDiagrams\CR533_Millstone_mp25.14-25.87

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
1	01/03/2017	09:55 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
2	02/04/2018	09:44 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
3	02/26/2017	08:12 PM	Property Damage Only	0	Animal	Dark, Street lights on, continuous lighting	Dry
4	01/05/2017	09:53 PM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Dry
5	01/03/2016	07:17 PM	Property Damage Only	0	Animal	Dark, No Street lights	Dry
6	01/30/2017	05:14 PM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Dry
7	12/27/2016	03:00 AM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Wet
8	09/10/2016	03:04 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
9	10/12/2016	08:47 AM	Injury	1	Opposite Direction (Head on, Angular)	Daylight	Dry
10	02/12/2016	02:50 PM	Injury	2	Right Angle	Daylight	Dry
11	05/21/2017	01:02 PM	Property Damage Only	0	Right Angle	Daylight	Dry
12	09/28/2017	06:46 PM	Property Damage Only	0	Right Angle	Daylight	Dry
13	11/18/2016	03:35 PM	Property Damage Only	0	Right Angle	Daylight	Dry
14	08/13/2016	08:40 PM	Injury	2	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
15	04/04/2016	07:01 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
16	05/01/2018	07:55 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
17	10/01/2018	06:21 PM	Property Damage Only	0	Same Direction (Rear-End)	Dusk	Dry
18	10/29/2018	08:08 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
19	08/30/2016	04:48 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
20	02/24/2016	04:27 PM	Property Damage Only	0	Same Direction (Rear-End)	Dusk	Wet
21	07/27/2018	03:44 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
22	01/16/2018	09:52 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
23	12/04/2017	07:29 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, No Street lights	Dry
24	07/26/2018	02:43 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
25	08/03/2017	06:16 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
26	08/03/2017	07:31 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
27	08/02/2018	04:36 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
28	08/13/2017	06:05 PM	Injury	1	Fixed Object	Daylight	Dry
29	11/28/2016	07:11 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
30	11/14/2018	08:37 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
31	06/19/2018	05:59 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
32	08/26/2017	08:46 PM	Property Damage Only	0	Animal	Dark, No Street lights	Dry
33	05/02/2016	09:25 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
34	10/01/2016	12:05 PM	Property Damage Only	0	Fixed Object	Daylight	Wet
35	02/14/2017	07:10 AM	Property Damage Only	0	Right Angle	Daylight	Dry

CRASH DIAGRAM (6 OF 6)

MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A6

Appendix E

Audit Team

Millstone - March 23rd

Group 1 Pairs - Northern Section

Matthew Maher, Stantec	Raymond Heck, Mayor
Tim Medina, Stantec	Marilynn Kampo, East Millstone First Aid Squad - President
Jessica Ortiz, FHI	Pat Marotto, Somerset County
Adam Bradford, Somerset County	Virgilio Tan, NJDOT
Matthew Loper, Somerset County	

Group 2 Pairs - Southern Section

Kati DiRaimondo, Stantec	Christine Van Deursen, East Millstone First Aid Squad - Chief
Michael Ahillen, FHI	Jon Dugan, RideWise
Kenneth Wedeen, Somerset County	Pastor Fred Miller Hillsborough Reformed Church
Walter Lane, Somerset County	Portia Orton, Historic District Commission Chairperson

Appendix F

Pre-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Pre-Audit,
Millstone Corridor
March 23, 2021

Millstone Borough Pre-Audit Meeting

Introduction – Audit Team

- ***Funded by NJTPA***
- **Somerset County**
  - **Engineering and Planning**
  - **Board of County Commissioners**
  - **Ridewise**
- **Millstone Borough**
  - **Engineering and Planning**
  - **Police and Fire Prevention**
  - **HDC**
  - **HRC**
- **NJDOT**
- **Stantec Consulting Services, Inc.**
- **FHI Studio**

Stantec

FHI studio

NJTPA
NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

SOMERSET COUNTY

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Today
In-Field Road Safety Audit

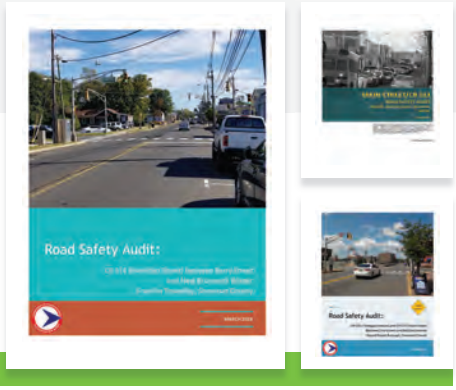
Noon Tomorrow
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Today

Share Observations
Discuss Potential Improvements
10:00 AM, Tomorrow

Project Background

- **County initiatives for traffic safety**
- **Recommendations from RSAs to inform future…**
  - Studies
  - Improvements
  - Applications for funding



What is a Road Safety Audit (RSA)?

EVALUATION BY INDEPENDENT TEAM

IDENTIFIES CRASH TRENDS/CAUSES

PROPOSES POTENTIAL SAFETY IMPROVEMENTS

Steps of an RSA

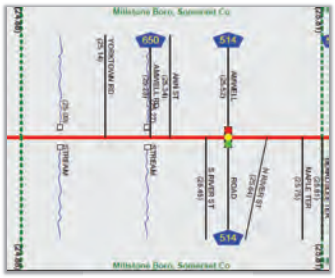
01	02	03	04	05	06	07	08
Select	Assemble	Conduct	Perform	Follow Up	Report	Present	Finalize
•Select Corridors with Stakeholder & Public Input	•Assemble RSA Team for Corridor	•Conduct Start-Up Meeting	•Perform In-Field Review	•Follow-Up on Observations •RSA De-Brief	•Report Findings •Analyze Findings	•Present Report to County	•Finalize RSA Report •County Responds

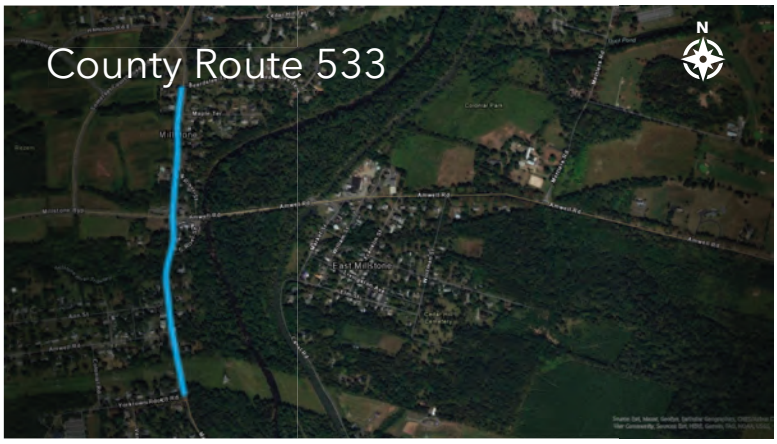
Pre-Audit Site Visit Post-Audit

Safety Measures

Project Area

- Urban minor arterial
- Horizontal curves at each end of the corridor segment
- 11′ - 12′ undivided travel lanes
- ~8,000 AADT
- Posted 35 mph speed limit





Land Use & Demographics

- Residential & open spaces
- Historic district; National Register 18th century buildings
- Commercial zones
- No transit services
- Redevelopment
  - Currently no major applications pending
  - Minor subdivisions
  - Lot line adjustments
  - Parking changes

Existing Conditions Feedback

- Poor lighting on the corridor
- Perception of high truck traffic
- Perception of speeding on corridor
- Curvature/foliage inhibit sight distance
- Stripe crosswalks at additional locations

FHWA Proven Safety Measures

Study-Focused Safety Measures

- Lighting
- Curb Extensions/ Bus Bulbs
- Daylighting Crosswalks
- Walkways for Sidewalk Gaps
- Dedicated Turn Lanes
- Leading Pedestrian Intervals (LPI)
- High Visibility Crosswalks
- Turn Restrictions
- Bike Lanes
- Lane Width Reduction/Road Diet

Safety Measures Feedback

- **Lighting:**
  - Sun glare is an issue in the PM heading west.
  - Approaches need more illumination.
  - Tree canopies obstruct lighting.
  - CR 514 missing lighting between Main St and Somerset Courthouse Rd
  - Illumination low near Yorktown Rd - adjacent curve.
  - PSEG only addresses equipment service failures.
- **Curb Extension/Bus Bulbs:**
  - Beneficial but space is an issue.
  - Impacts to bike lanes; increased bicycle traffic on weekends.
- **Walkways for Sidewalk Gaps:**
  - Sidewalk gaps NB. ROW challenges.
  - Weekend church activity.
- **Dedicated Turn Lanes:**
  - Considered not applicable.

Safety Measures Feedback, cont'd

- **Leading Pedestrian Intervals (LPI):**
  - LPIs may not be as effective due to irregular pedestrian traffic patterns.
  - Suggestion for pedestrian-activated LPI.
- **High Visibility Crosswalks:**
  - Considering crosswalk at South River.
  - Planned new trail.
- **Bike Lanes:**
  - Increased bicycle traffic on weekends.
  - Narrow lanes/shoulders make for difficult implementation.
- **Lane Width Reduction / Road Diet:**
  - Considered not applicable.
- **Additional Comments:**
  - Direct trucks outside of Millstone.

Public/ Stakeholder Improvement Feedback

Safety Measure	Effectiveness (1= not effective; 10= very effective)	Ease of Implementation (1=easy; 10= hard)
Lighting	3	5
Curb Extensions/Bus Bulbs	5	5
Daylighting and Crosswalks	5	5
Walkways for Sidewalk Gaps	8	5
Dedicated Turn Lanes	1	1
Leading Pedestrian Intervals (LPI)	2	1
High Visibility Crosswalks	6	-
Turn Restrictions	5	-
Bike Lanes	5	8
Lane Width Reduction/Road Diet	-	-

Crash Data

Crash Data - Statistics

- **All Crashes 2016-2018**
  - **35 Total Crashes**
  - **Overrepresentations:**
    - **Same Direction (Rear-end)**
    - **AM peak period**
- **Pedestrian Crashes 2014-2018**
  - **0 Total Crashes**

NJTPA Network Screening List (NSL) Crash Ranking

Overall Crash Data

Intersections

#80th Amwell Road

Corridor Segments

Not ranked

Pedestrian/Bike Crash Data

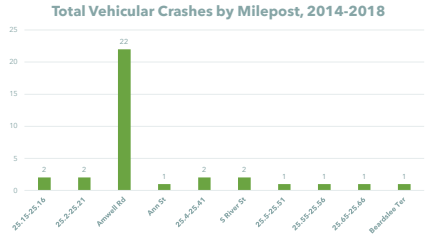
Intersections

Not ranked

Corridor Segments

Not ranked

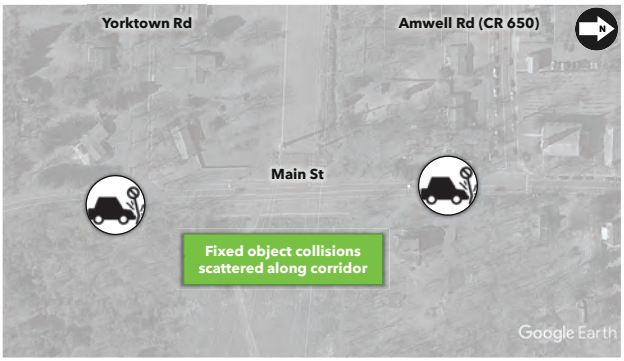
Millstone Bororough - Histogram



- **Rear-End** collision types account for almost **half** of all crashes on the corridor (***48%***)
- **AM peak period** experiences **higher crash** frequency
- **More than half (55%)** of the crashes at **Amwell Rd** are **Rear-End** crashes

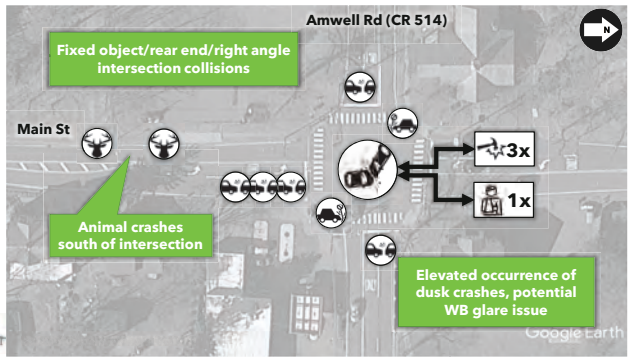
Crash Trends

Main Street in Millstone @ Amwell Road (CR 650) Intersection



Crash Trends

Main Street in Millstone @ Amwell Road (CR 514) Intersection



Conducting the Audit

Guidelines & Safety

Be Observant & Alert
- Vehicles
- Wet Surfaces

Be Seen
- Face Traffic
- Avoid Sudden Movements
- Stick to Sidewalks

Be Respectful
- Traffic (Vehicular, Pedestrian, Cyclist)
- Motorists
- Property

PPE
- High Visibility Vest
- Proper Face Coverings
- Social Distancing (1 occupant/veh.)

What to Bring/Wear to the Field

COMFORTABLE CLOSED SHOES

WEATHER CONSCIOUS

HIGH VISIBILITY VESTS

- Bring your own

DOCUMENTING MATERIAL

- Smartphone
- Pen/Pencil
- Paper/notepad

What to Look for - Photos

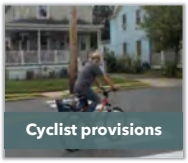
What to Look for - Photos

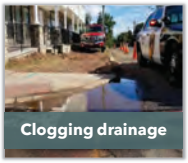

Sidewalk trip hazards


Sign visibility blocked by trees


Sidewalk overgrowth (shrubs)


Non-standard signal equipment


Cyclist provisions

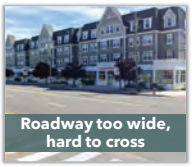

Clogging drainage

What to Look for - Photos


No curb ramp/crosswalk present


Faded striping/Non-compliant curb ramps


Driveway aprons too wide, lack ADA


Roadway too wide, hard to cross


Traffic calming at curve/intersection

How to Record Observations

- Photograph
- Pen/Pencil Paper
- Video
- Mobile Device
- Mental

BE SPECIFIC!!!

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Today
In-Field Road Safety Audit

Noon Tomorrow
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Today

Share Observations
Discuss Potential Improvements
10:00 AM, Tomorrow

Participant	Group
Matthew Maher / Raymond Heck	N
Tim Medina / Marilynn Kampo	N
Jessica Oritz / Pat Marotto	N
Adam Bradford / Matthew Loper	N
	N
Kati DiRaimondo	S
Michael Ahillen / Jon Dugan	S
Ken Wedeen / Pastor Fred Miller	S
Walter Lane / Pat Morris	S

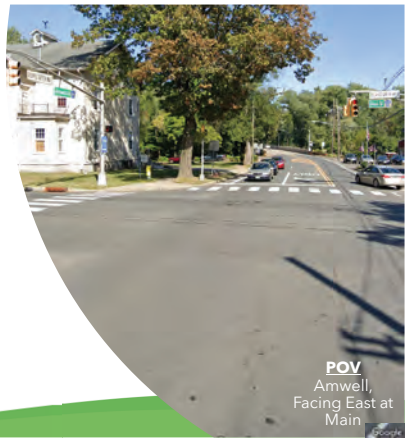
Questions?

Extra Slides

Main St
Yorktown Rd to Beardslee Rd
0.67 miles in Millstone Boro

Summary of Feedback

- Poor lighting on the corridor
- Perception of high truck traffic
- Perception of speeding on corridor
- Curvature/foliage inhibit sight distance
- Stripe crosswalks at additional locations



POV
Amwell, Facing East at Main

CRASH DIAGRAM (3 OF 6)
MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec | Scale: 1"=60' | Exhibit A3

CRASH DIAGRAM (4 OF 6)
MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec | Scale: 1"=60' | Exhibit A4

CRASH DIAGRAM (5 OF 6)
MAIN ST (CR 533) IN MILLSTONE BOROUGH
Yorktown Rd to Beardslee Rd
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec | Scale: 1"=60' | Exhibit A5

Appendix G

Post-Audit Survey

Participant Survey - Average Scores

As you near the end of the audit, rate how the following items impact your level of comfort.
(1: makes me uncomfortable; 4: makes me comfortable; N/A: issue does not exist along this corridor)

Category	Item	Bridgewater	Franklin	Millstone	North Plainfield	Raritan
Corridor Identity	**Average**	**2.3**	**2.4**	**2.7**	**3.2**	**2.7**
Corridor Identity	Activities and uses	2.3	2.6	3.0	3.2	2.5
Corridor Identity	Condition of buildings	2.6	2.3	3.0	3.3	2.5
Corridor Identity	Perception of personal safety	1.9	2.4	2.0	3.0	3.0
Crossings	**Average**	**2.2**	**2.3**	**2.3**	**2.3**	**2.4**
Crossings	Crossing guards	2.5	3.0	-	2.7	3.0
Crossings	Missing or inoperable pedestrian/audible signal	1.9	2.0	2.0	3.0	3.5
Crossings	Pedestrian signal crossing time	2.7	3.0	3.0	2.6	2.6
Crossings	Poorly marked or missing crosswalk	1.7	1.6	1.7	1.7	2.3
Crossings	Presence of curb ramps for strollers/wheelchairs	1.7	1.9	1.0	1.9	2.3
Crossings	View of traffic is blocked	2.0	2.6	2.3	2.1	1.6
Crossings	Wait time for pedestrian signal	2.9	2.8	3.0	2.8	2.4
Pedestrian-Vehicle Interactions	**Average**	**1.6**	**2.1**	**1.9**	**2.8**	**2.5**
Pedestrian-Vehicle Interactions	Amount of traffic	1.7	2.1	2.3	3.0	2.6
Pedestrian-Vehicle Interactions	Bicycling on the sidewalk	1.3	4.0	2.0	2.1	2.9
Pedestrian-Vehicle Interactions	Driver behavior (distracted, did not yield to pedestrians, etc.)	2.1	2.0	2.7	3.0	2.1
Pedestrian-Vehicle Interactions	Noise level due to auto traffic	1.2	2.0	1.3	2.9	2.1
Pedestrian-Vehicle Interactions	Presence of trucks or large vehicles	1.7	2.0	1.7	2.8	2.8
Pedestrian-Vehicle Interactions	Speed of traffic	1.4	2.1	1.3	2.5	2.5
Sidewalk/Roadway Condition	**Average**	**2.3**	**2.7**	**2.6**	**2.6**	**2.9**
Sidewalk/Roadway Condition	Areas on roadway with poor drainage	3.1	2.9	2.5	3.0	2.6
Sidewalk/Roadway Condition	Areas on sidewalk with poor drainage	3.0	2.8	2.0	2.9	2.6
Sidewalk/Roadway Condition	Buffer area between sidewalk and traffic	1.5	2.4	2.3	2.5	3.1
Sidewalk/Roadway Condition	Guide rails/protection systems	2.0	3.3	3.0	2.3	2.5
Sidewalk/Roadway Condition	Intersection configuration	2.1	2.7	3.0	2.8	2.7
Sidewalk/Roadway Condition	Obstacles blocking sidewalk (utilities/trees)	2.9	2.5	3.0	2.6	2.9
Sidewalk/Roadway Condition	Roadway condition	2.8	3.1	2.7	3.0	3.3
Sidewalk/Roadway Condition	Roadway width	2.2	2.8	3.0	3.0	3.3
Sidewalk/Roadway Condition	Sidewalk condition	1.9	2.3	1.7	1.8	2.9
Sidewalk/Roadway Condition	Sidewalk width	2.2	2.6	2.7	2.4	3.1
Streetscape Amenities	**Average**	**2.0**	**2.5**	**3.2**	**2.5**	**3.2**
Streetscape Amenities	Benches or places to rest, trash cans	1.5	2.8	N/A	1.1	3.8
Streetscape Amenities	Lighting (for pedestrians)	1.9	2.0	3.0	2.4	3.7
Streetscape Amenities	Lighting (for vehicles)	2.4	2.5	2.7	2.9	2.7
Streetscape Amenities	Presence of directional/regulatory signage	2.4	2.3	3.7	2.8	2.7
Streetscape Amenities	Street trees and landscaping	1.9	3.0	3.5	2.9	3.2

Appendix H

Post-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Post-Audit,
Millstone Corridor
March 24, 2021

Millstone Borough Post-Audit Meeting

Agenda: Schedule of Activities

10:00 AM, Yesterday
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Yesterday
In-Field Road Safety Audit

Noon Today
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Yesterday

Share Observations
Discuss Potential Improvements
10:00 AM, Today

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

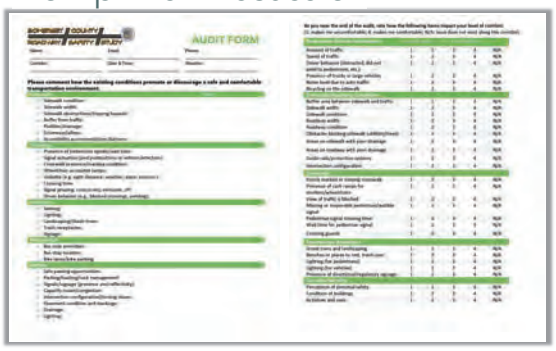
Field Photography

Field Photography

Field Photography

Field Photography

Prompt List Discussion



"What operational/safety issues did you note on the corridor?"

"What makes travel on the corridor difficult ?"

- For drivers?
- For non-drivers?
- For people with disabilities?
- For families with small children?
- For transit riders?

"What pedestrian/cyclist connectivity issues were observed?"

Recommendations Discussion

"WHAT SAFETY IMPROVEMENTS DO YOU PROPOSE FOR REDUCING CRASHES?"

"WHAT IS YOUR VISION FOR THE CORRIDOR? HOW SHOULD IT LOOK IN 10 YEARS?"

"WHAT ARE THE SHORT-TERM CHANGES THAT COULD BE MADE NOW?"

Next Steps

- Produce RSA Reports
- Implementation Matrix
- Final Study Report
- Conduct Follow-Up Public/TAC Meetings

Extra Slides

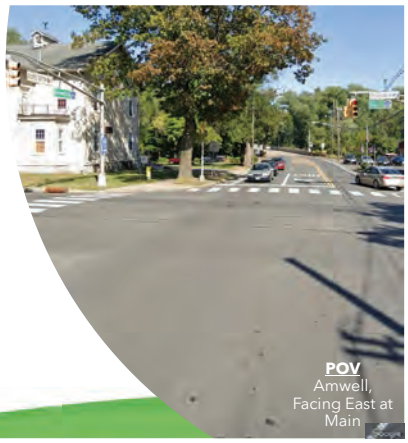
Main St

Yorktown Rd to Beardslee Rd

0.67 miles in Millstone Boro

Summary of Feedback

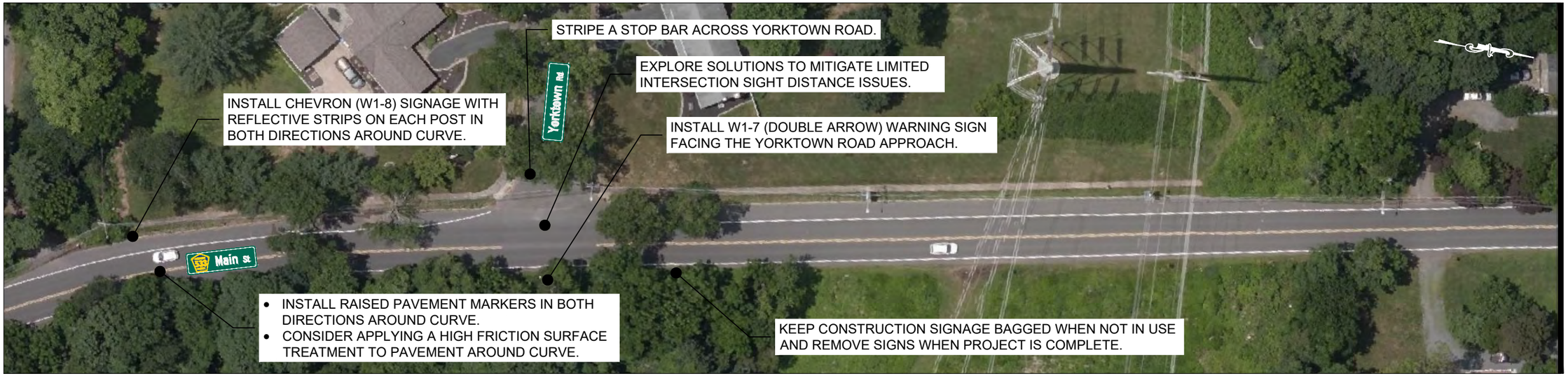
- Poor lighting on the corridor
- Perception of high truck traffic
- Perception of speeding on corridor
- Curvature/foliage inhibit sight distance
- Stripe crosswalks at additional locations



POV
Amwell, Facing East at Main

Appendix I

Recommendations from Implementation Matrix



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2021/07/14 10:47 AM By: DiRaimondo, Kati

ORIGINAL SHEET - ANSI B

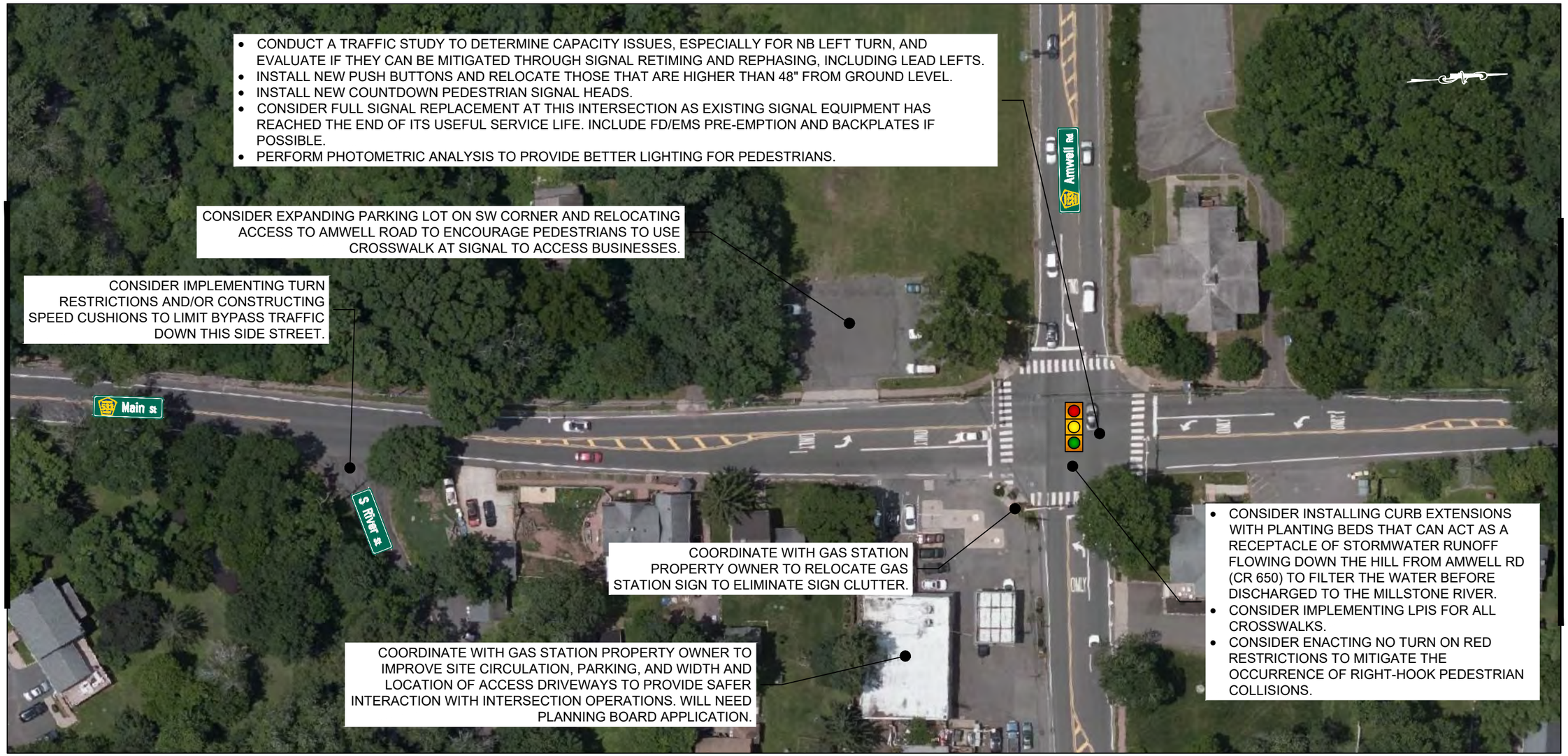
July, 2021
192510854

Stantec
365 West Passaic Street, Suite 175
Rochelle Park, NJ 07662
www.stantec.com

Client/Project
Somerset County/NJTPA
Somerset County Roadway Safety Study
Main Street (CR 533)

Sheet No.
1 of 3

Title
Millstone Borough RSA Recommendations
Scale: 1" = 60'



- CONDUCT A TRAFFIC STUDY TO DETERMINE CAPACITY ISSUES, ESPECIALLY FOR NB LEFT TURN, AND EVALUATE IF THEY CAN BE MITIGATED THROUGH SIGNAL RETIMING AND REPHASING, INCLUDING LEAD LEFTS.
- INSTALL NEW PUSH BUTTONS AND RELOCATE THOSE THAT ARE HIGHER THAN 48" FROM GROUND LEVEL.
- INSTALL NEW COUNTDOWN PEDESTRIAN SIGNAL HEADS.
- CONSIDER FULL SIGNAL REPLACEMENT AT THIS INTERSECTION AS EXISTING SIGNAL EQUIPMENT HAS REACHED THE END OF ITS USEFUL SERVICE LIFE. INCLUDE FD/EMS PRE-EMPTION AND BACKPLATES IF POSSIBLE.
- PERFORM PHOTOMETRIC ANALYSIS TO PROVIDE BETTER LIGHTING FOR PEDESTRIANS.

CONSIDER EXPANDING PARKING LOT ON SW CORNER AND RELOCATING ACCESS TO AMWELL ROAD TO ENCOURAGE PEDESTRIANS TO USE CROSSWALK AT SIGNAL TO ACCESS BUSINESSES.

CONSIDER IMPLEMENTING TURN RESTRICTIONS AND/OR CONSTRUCTING SPEED CUSHIONS TO LIMIT BYPASS TRAFFIC DOWN THIS SIDE STREET.

COORDINATE WITH GAS STATION PROPERTY OWNER TO RELOCATE GAS STATION SIGN TO ELIMINATE SIGN CLUTTER.

COORDINATE WITH GAS STATION PROPERTY OWNER TO IMPROVE SITE CIRCULATION, PARKING, AND WIDTH AND LOCATION OF ACCESS DRIVEWAYS TO PROVIDE SAFER INTERACTION WITH INTERSECTION OPERATIONS. WILL NEED PLANNING BOARD APPLICATION.

- CONSIDER INSTALLING CURB EXTENSIONS WITH PLANTING BEDS THAT CAN ACT AS A RECEPTACLE OF STORMWATER RUNOFF FLOWING DOWN THE HILL FROM AMWELL RD (CR 650) TO FILTER THE WATER BEFORE DISCHARGED TO THE MILLSTONE RIVER.
- CONSIDER IMPLEMENTING LPIS FOR ALL CROSSWALKS.
- CONSIDER ENACTING NO TURN ON RED RESTRICTIONS TO MITIGATE THE OCCURRENCE OF RIGHT-HOOK PEDESTRIAN COLLISIONS.

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2021/07/14 10:47 AM By: DiRaimondo, Kati

ORIGINAL SHEET - ANSI B

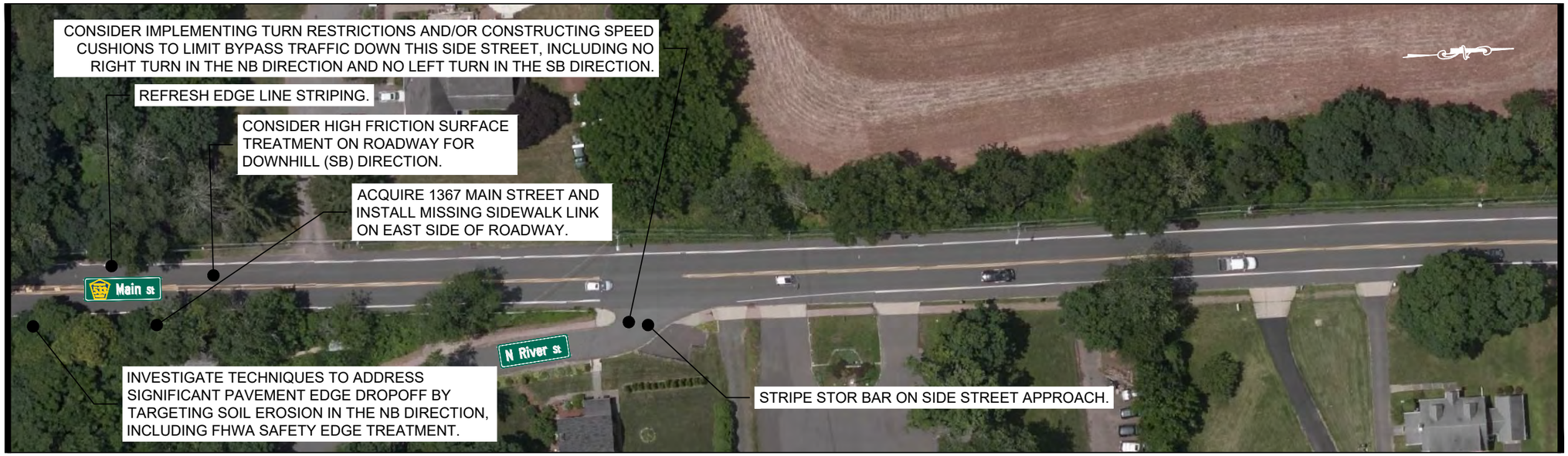
July, 2021
192510854

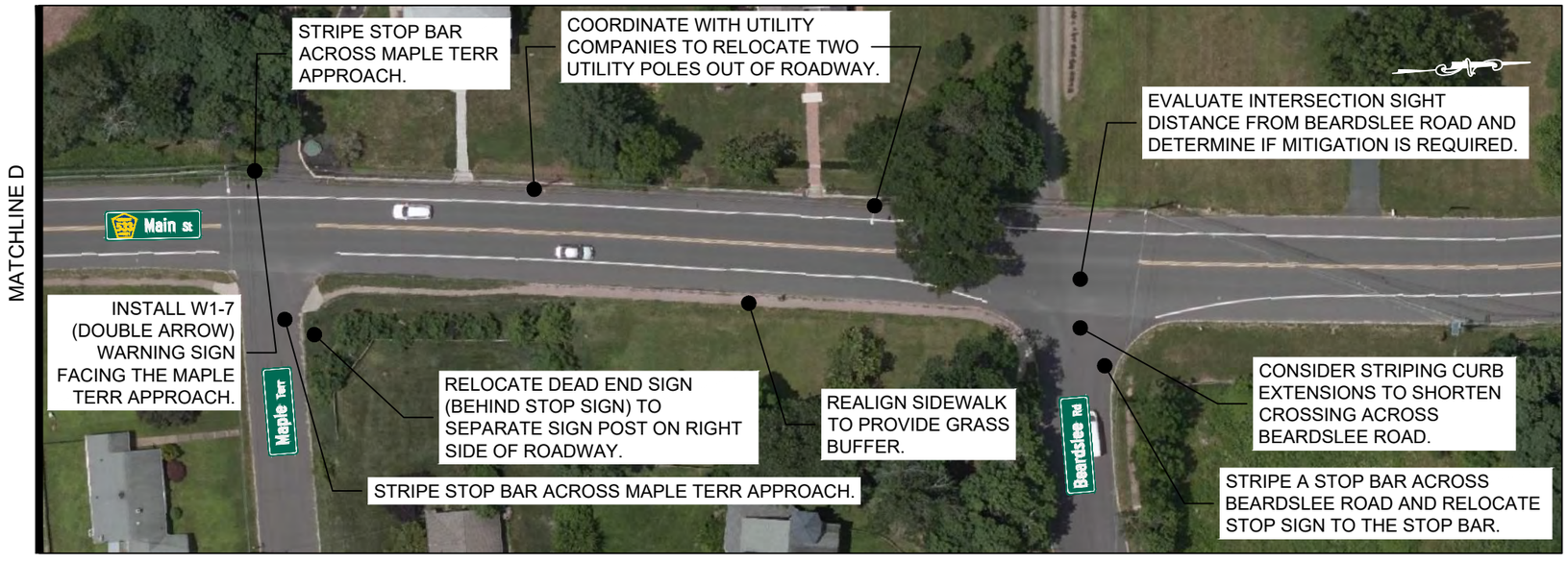
Stantec
365 West Passaic Street, Suite 175
Rochelle Park, NJ 07662
www.stantec.com

Client/Project
Somerset County/NJTPA
Somerset County Roadway Safety Study
Main Street (CR 533)

Sheet No.
2 of 3

Title
Millstone Borough RSA Recommendations
Scale: 1" = 60'





ORIGINAL SHEET - ANSI B

July, 2021
192510854

Stantec
365 West Passaic Street, Suite 175
Rochelle Park, NJ 07662
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Client/Project
Somerset County/NJTPA
Somerset County Roadway Safety Study
Main Street (CR 533)

Sheet No.
3 of 3

Title
Millstone Borough RSA Recommendations
Scale: 1" = 60'

Appendix J

Road Owner Response

Somerset County Response to the Main Street (CR 533) in Millstone Borough Road Safety Audit (owner's response)

Somerset County agrees with the recommendations of the Road Safety Audit. The County strives to make our roads safer for all users and is willing to investigate any recommendations that can assist in achieving that goal. Our agreement with the assessment should in no way be perceived as a commitment to the implementation of such suggestions. The following general points should be noted:

- Somerset County does not maintain or inspect sidewalks, street lighting, landscaping, or parking facilities along county roadways. That responsibility lies with the municipality or property owner.
- Some recommendations may not be warranted or feasible due to engineering or fiscal constraints. Additional analysis is necessary.

Somerset County Roadway Safety Study
Subregional Project

ROAD SAFETY AUDIT REPORT

GREENBROOK ROAD IN NORTH PLAINFIELD BOROUGH

November 2021

Executive Summary

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has conducted the Somerset County Roadway Corridor Safety Analysis study. The study will advance the County's efforts to address pedestrian/bicycle and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. This RSA report has been prepared for the Greenbrook Road corridor (Somerset County Route 636, CR 636), from Harrington Avenue at MP 0.7 to Somerset Street (CR 531) at MP 1.97, in North Plainfield Borough. According to the compiled crash data, 100 crashes occurred on the 1.27-mile segment analysis area during the 3-year vehicle and 5-year pedestrian crash analysis period.

The pre-audit meeting was held at 10:00 AM via video conferencing on Thursday, April 8th, 2021, on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. Participants were paired off with each other to walk halves of the corridor. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as safety measures to address potential safety concerns. On the following day (Friday, April 9th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit to discuss each potential safety concern, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study.

Discussions from the RSA process helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report, which serves as a record of items discussed during the post-audit meeting. Major findings (or recommendations) from these discussions included:

- Potential locations for new/refreshed crossings by West End Elementary, with curb extensions and Rectangular Rapid Flashing Beacons (RRFBs);
- Measures for pedestrian safety at West End Avenue, including No Turn on Red (NTOR), Leading Pedestrian Intervals (LPIs), and overgrowth trimming;
- Striping (stop bars and crosswalks) on side street approaches from West End Avenue to Grove Street;
- Grove Street signal upgrades: signal equipment location, ADA compliance, and LPIs;
- Daylighting at Duer Street to improve sight distances between through vehicles and crossing movements;
- School events to encourage students to walk and bike to schools located along the corridor;
- Curb cut/parking management, Duer Street to Somerset Street, to improve sight lines and ped safety.

A key recommendation from this RSA was to enhance pedestrian safety though sidewalk upgrades and crosswalks at school locations. Due to location of the corridor near parks, schools, or other land uses that tend to have a relatively high share of active mode trip generation, it was discussed to stripe or construct curb extensions and refresh crosswalk striping and consider the installation of Rectangular Rapid-Flashing Beacons (RRFBs) at unsignalized crossing locations. Daylighting or other striping in shoulder would aid to prohibit parking, allocate bus standing, and calm traffic speeds. At nearby signalized intersections, push button upgrades, lighting, No Turn on Red (NTOR) restrictions, and Leading Pedestrian Intervals (LPIs) are recommended. Further investigation would be necessary to implement these recommendations appropriately.

Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process, and are meant to be a record of ideas discussed. As these recommendations are considered for advancement into either a Concept Development (CD) study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for

feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices.

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I. Introduction

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has begun the Somerset County Roadway Corridor Safety Analysis. The Somerset County Roadway Corridor Safety Analysis will advance New Jersey's efforts to address pedestrian/bicycle and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. One of the locations that has been selected is the Greenbrook Road corridor (Somerset County Route 636, CR 636), from Harrington Avenue at MP 0.7 to Somerset Street (CR 531) at MP 1.97, in North Plainfield Borough.

The purpose of this RSA Report is to detail the site selection, road/multimodal inventory, land use investigation, crash data collection, crash analysis efforts, post/pre-audit meetings, and in-field RSA investigation conducted for the Greenbrook Road corridor. Flowing from this RSA is a list of potential recommendations proposed to improve safety. These recommendations were based on the investigated crash data and during the in-field RSA and post-audit meeting. This introduction serves to provide background on selection of the investigated corridor and covers the logistics of the RSA process that was performed. This RSA report also seeks to provide sample figures of improvements and crash countermeasures that could be considered as the County and/or municipality, seeks to move forward on its Concept Development (CD) and/or Local Safety Program grant (or other funding) application. Please note, in applying these ideas to the corridor, design of such improvements, conceptual or otherwise, is the responsibility of the designated jurisdiction as is standard RSA practice.

A. Site Selection

Selection of the Greenbrook Road corridor was based on a rigorous process which started with a list of top crash segments for the County from NJTPA's Network Screening Lists (NSL)[1] and used supporting collision data, equity data, recommendations from prior studies, and public/stakeholder input to develop a shortlist of top crash segments. Segments with recently-constructed safety improvements, or locations undergoing study/design were identified through discussions with County Engineering and removed from this shortlist to target segments not currently being considered. Remaining locations were further prioritized and ranked with more recent crash severity and frequency data (old crash data from NSL superseded with more recent crash data from Safety Voyager), traffic volume data from NJTPA's regional travel demand model (NJRTM-E), and environmental justice data from NJTPA.

Input on these top crash locations was obtained through the Public Involvement Plan for this project, which included gathering information from the public via a virtual mapping tool and project email address and gathering information from a Technical Advisory Committee (TAC)[2] via an initial virtual meeting conducted in August 2020. Based upon public and stakeholder input, the following (5) segment locations (including the segment being studied in this report) were selected to be advanced for RSA review:

1. Finderne Avenue/Main Street (CR 533) in Bridgewater Township, MP 29.60-30.60
2. Franklin Boulevard (CR 617) in Franklin Township, MP 0.00-1.00
3. Somerset Street (CR 626) in Raritan Borough, MP 0.00-0.67
4. Greenbrook Road (CR 636) in North Plainfield Borough, MP 0.70-1.97
5. Main Street (CR 533) in Millstone Borough, MP 25.14-25.87

[1] https://www.njtpa.org/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/Local-Safety-Program/Network-Screening-Lists.aspx Top crash segment lists on this webpage are based upon a programmatic analysis of statewide locations utilizing 2014-2018 crash data.
[2] Stakeholders on the TAC include NJDOT, NJ TRANSIT, FHWA, RideWise, AARP, Vorhees Transportation Center, and various County advocates.

Greenbrook Road was selected based on the relatively high crash frequency on this corridor, equity data, and pedestrian/cyclist crash frequency. Furthermore, this location was identified within the *WalkBikeHike* (2019) study as being one of the County's corridors with frequent pedestrian and cyclist crashes. **Table 1** shows the portions of the selected segment, or intersections, that qualified as one of the top 100 crash locations[1] in the County based on either overall crash data for the years of 2016 through 2018 or pedestrian/cyclist crash data for the years of 2014 through 2018 as listed on the NSLs.

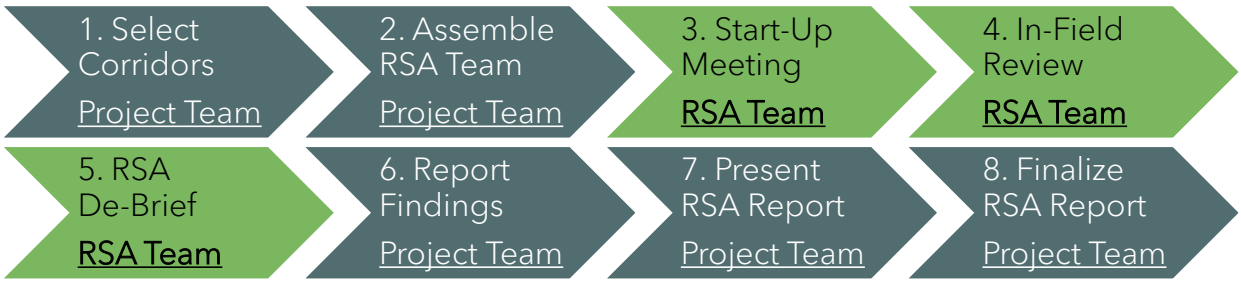
Table 1 – Greenbrook Road NJTPA 2019 NSL Rankings for Somerset County

Corridor Segments Overall Crash Data	Corridor Segments Ped/Bike Crash Data	Intersection Locations Overall Crash Data	Intersection Locations Ped/Bike Crash Data
#66 MP 0.55-1.55	#20 MP 0.84-1.55	Duer Street (#70)	Grove Street (#13)
			Somerset Street (#19)
			Wilson Avenue (#28-tied)
			Duer Street (#28-tied)
			West End Avenue (#36-tied)
			Stone Street (#36-tied)
			Glenside Pl (#76)

B. What is a Road Safety Audit (RSA)?

An RSA is a formal safety performance examination of an existing or future road or intersection by a multi-disciplinary audit team, including public works, law enforcement, emergency medical services, engineering, planning, and advocacy staff. It qualitatively estimates and reports on existing and potential road safety issues and identifies opportunities for improvements in safety for all road users. RSAs can be used on any size project, from minor maintenance to mega-projects, and can be conducted on facilities with a history of crashes or during the design phase of a new roadway or planned upgrade. RSAs consider all road users, account for human factors and road user capabilities, are documented in a formal report, and require a formal response from the road owner. **Figure 1** shows the steps employed by the County to complete the RSA, as informed by the Federal Highway Administration's (FHWA's) RSA process. The steps that traditionally consist of an in-field review of conditions with an RSA team are highlighted in green below.

Figure 1 – Eight-Step RSA Process as Adopted from FHWA RSA Process



The RSA program is conducted to identify potential countermeasures for roadway segments demonstrating a history of, or potential for, a high frequency of crashes, or an identifiable pattern of crash types. Recommendations range from low-cost, quick-turnaround safety improvements to more complex strategies, which are all codified in this report within an Implementation Matrix, categorizing improvements by timeline, cost, and jurisdiction. Implementation of improvement strategies identified through this process may be eligible for Local Federal Aid Safety Funds. Because the RSA process is adaptable to local needs and conditions, recommendations can be implemented incrementally as time and resources permit. Please note that the RSA process does not include the design or thorough evaluation of improvements that are being considered, conceptual or otherwise. Following the eighth and final step of the RSA process, it will be incumbent for the designated jurisdiction for each improvement proposed in the Implementation Matrix to start to evaluate and design the ideas presented herein as is standard RSA practice.

At the request of NJTPA, RSAs originally planned for Fall 2020 were postponed to Spring 2021 due to the COVID-19 pandemic. In addition to postponement, the County took additional steps to safely conduct this RSA. Both the start-up meeting and RSA de-brief (steps #3 and #5 shown in **Figure 1**), which are traditionally conducted in-person, were conducted virtually via video conferencing to reduce the exposure and potential risk of disease transmission. Furthermore, the essential step of in-field review was conducted in a socially-distanced manner with participants paired off in groups spaced more than six feet apart from each other. All in-field RSA participants were masked for the entire duration of the field visit to further reduce disease transmission. Through this process, the post-audit "de-brief" meeting benefitted from being held virtually after the day on which the in-field review was conducted.

Some notable benefits produced by a virtual post-audit included:

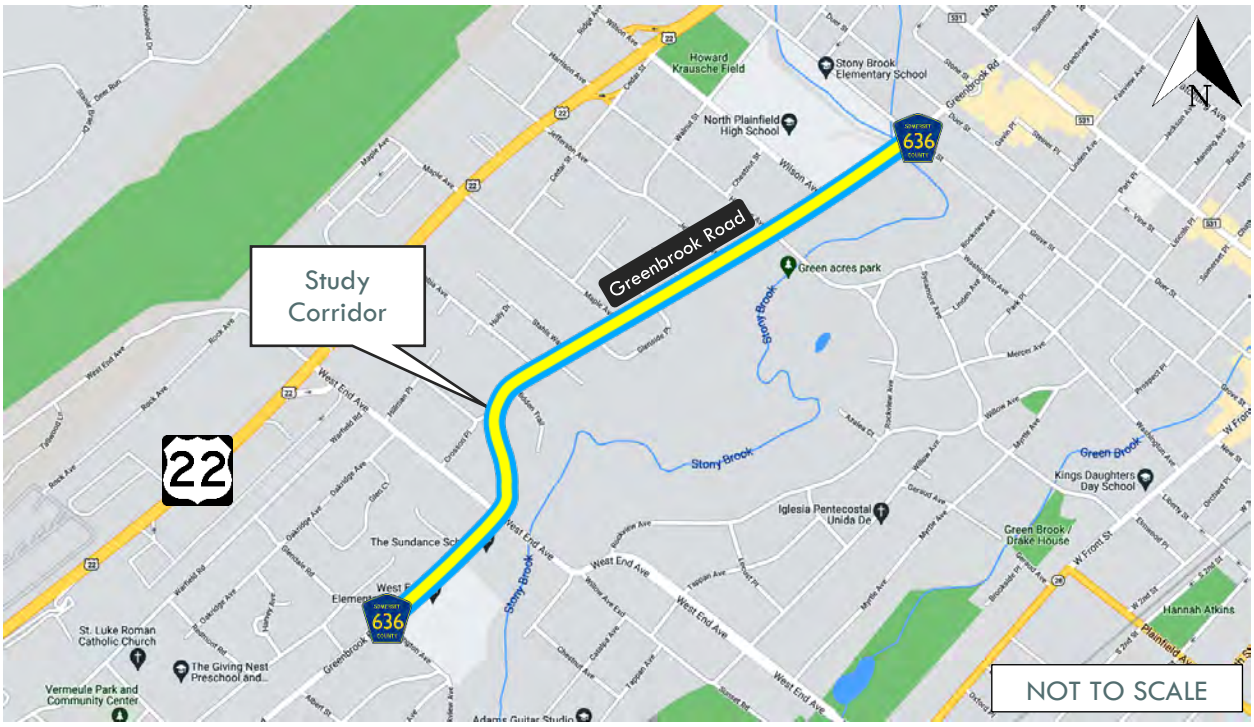
- Additional time for participants to share photos, videos, and scans of their observations;
- Available screensharing for quick review and consensus of RSA observations;
- An involved discussion of the observations and recommendations was well established by the wide audience of stakeholders;
- Additional time for participants to process their observations and organize their thoughts for discussion.

II. Corridor Description & Analysis

A. Study Location

The study area consists of 1.27 miles of CR 636 (Greenbrook Road) extending from the intersection with Harrington Avenue at MP 0.7 to the intersection with CR 531 (Somerset Street) at MP 1.97 (**Figure 2**). A straight-line diagram of the corridor is provided in **Appendix A.** The identified segment is in the Borough of North Plainfield in the County of Somerset. From Harrington Avenue on the west end of the corridor to Grove Street, land adjacent to Greenbrook Avenue is zoned as residential and buildings tend to be single-family detached housing; schools are also located along the road throughout this segment of the corridor. Schools located on, or proximate to, the Greenbrook Avenue corridor include West End Elementary School (at Harrington Avenue), Sundance School (at West End Avenue), Harrison School (at Harrison Avenue), North Plainfield Middle School/High School (at Wilson Avenue), and Stony Brook Elementary School (at Grove Street). East of Grove Street, land is zoned as a "Business" district and consists of multi-family housing, mixed-use buildings, and retail/office.

Figure 2 – Study Area Location Map



Major vehicle and pedestrian trip generators on this corridor include the aforementioned schools located along the corridor during school arrival and dismissal times, but can also include the laundromat, stores, and neighborhood restaurants in the vicinity of the Grove Street and Somerset Street intersections, especially during afternoon to PM peak hour times. The area surrounding the corridor segment has been designated by the County as the "North Plainfield Town Center" Priority Growth Investment Area (PGIA) in its 2017 *Supporting Priority Investment in Somerset County, Phase III* study.

B. Roadway and Intersection Characteristics

Greenbrook Road is classified by the New Jersey Department of Transportation (NJDOT) as an urban minor arterial and has a posted speed of 35 mph with static 25 mph advisory speed signing on the westbound roadway in the vicinity of the middle/high school and flashing 25 mph advisory speed signing in the vicinity of West End Elementary School. The corridor consists of two 12' travel lanes (one in each direction) undivided. Shoulder widths vary from eight feet wide shoulders on each side of the road with parking permitted from

Harrington Avenue to West End Avenue to five feet wide shoulders on each side of the road (shoulder narrower than 5' in certain areas) with parking restricted from West End Avenue to Grove Street.

East of Grove Street the eastbound lane has a minimal-width shoulder with no parking permitted while the westbound roadway lane is 20' wide to permit on-street parking. The parking lane is not striped. The road has a double S-curve immediately east of the intersection with West End Avenue; curve advisory signing is not provided. There are three signalized and 15 unsignalized intersections along the corridor. Left-turn bays are provided at signalized intersections with West End Avenue and Somerset Street.

C. *Existing Bicycle/Pedestrian Accommodations*

Sidewalks are provided on both sides of the road at the east and west ends of the corridor. However, sidewalks are only provided on the north side of the road between Hidden Trail and Grove Street. Sidewalks mostly consist of concrete but also consist of bituminous asphalt towards the east end of the corridor where wide curb cut driveways intersecting the street interrupt pedestrian space. Generally, marked crosswalks traversing Greenbrook Road are only provided at signalized intersections, resulting in long gaps in main street crossings provided for pedestrians. However, two marked crossings are provided at the following unsignalized locations: one at Harrington Avenue in the vicinity of West End Elementary School and one at Harrison Avenue in the vicinity of Harrison School. No accommodations are currently specified for cyclists on the corridor; however, a 5'-wide shoulder is provided on both sides of the roadway between Hidden Trail and Grove Street.

D. *Traffic Volumes*

According to traffic data available from NJDOT[3] count station #111834, Average Annual Daily Traffic (AADT) on Greenbrook Road is approximately 9,000 vehicles per day. Supporting count data from NJDOT is provided in **Appendix B**. NJTPA's NJRTM-E travel demand model provides an AADT estimate of 11,000 based upon 2020 pre-COVID-19 conditions.

E. *Transit Service[4]*

There are no transit services on this section of Greenbrook Road. The NJ TRANSIT Plainfield Train Station with Raritan Valley Line service is located approximately 1 mile south of the corridor from the intersection with Somerset Street. The corridor is more directly served by both the County's CAT 2R bus service (which runs only during AM and PM peak periods with 90-minute headways from North Plainfield to Raritan Valley Community College, traveling through Bound Brook, Somerville, and Raritan in between) and NJ TRANSIT's 822 bus service (which runs weekday and Saturdays between AM and PM peak period times with one-hour headways between North Plainfield and Plainfield). Both bus lines travel along the corridor between intersections with West End Avenue and Somerset Street. Signed bus stops are present at intersections with Maple Avenue and Wilson Avenue with limited amenities.

F. *Community Profile*

Population and income characteristics from the American Community Survey (ACS), an update to the 2010 Census performed by the U.S. Census Bureau, were used to identify Environmental Justice populations. The latest ACS for this study area is a five-year estimate from 2015 through 2019 for County Census Tract 510. A summary of the demographics is listed in **Table 2**. Limited English Proficiency populations are twice the County average in the vicinity of the study corridor. Public transit commuting was noted to be significantly above the County average. Also, zero-vehicle households are a substantial portion of the nearby population (approximately three times the County average), perhaps due to the walkability of the eastern end of the corridor. The Equity Analysis conducted for the Somerset County Roadway Corridor Safety Analysis highlighted this corridor as an Environmental Justice focus area based upon the share of minority residents living within a ¼-mile buffer of the corridor.

[3] AADT data obtained from https://www.njtms.org/map/.
[4] Information as of Winter 2020.

Table 2 – Greenbrook Road RSA Study Area Demographics

Characteristic		Census Tract Average	County Average
Below Poverty Level[5]		11.1%	5.1%
Race/ Ethnicity[6]	White	51.7%	66.3%
	Asian American	3.6%	17.7%
	Black or African American	20.3%	9.7%
	American Indian/Alaskan	0.0%	0.3%
	Other	24.4%	6.0%
	Hispanic/Latino (Ethnicity)	48.5%	14.7%
Limited English Proficiency (LEP)[7]		8.9%	4.4%
Use Public Transportation[8]		7.2%	5.3%
Zero Vehicle Households[7]		6.9%	2.1%

G. Redevelopment

The area surrounding the corridor segment has been designated by the County as a Priority Growth Investment Area (PGIA) by the County in its 2017 *Supporting Priority Investment in Somerset County, Phase III* study. As such, the Phase III study proposed transportation and land use improvements southeast of the study corridor, including the redevelopment of the Old Mill site, revitalization of land along Green Brook, and streetscaping of Watchung Avenue and nearby roadways (including curb extensions, green stormwater infrastructure, pedestrian lighting, and wayfinding). Redevelopment on Greenbrook Road has mainly consisted of expansion of existing commercial and institutional uses. There are no major applications currently pending along Greenbrook Road according to data delivered by County Planning.

H. Proposed Improvements from Previous Studies

Transportation improvements proposed specifically for the Greenbrook Road corridor are listed in the *Master Plan of Borough of North Plainfield, Somerset County, New Jersey* (2014). Recommendations at the intersection with Grove Street include capacity improvements, whether via turning bays or signal re-timing, to reduce vehicle delay. The West End Avenue intersection was also noted as an area of concern in the master plan due to limited sight distance for right turning traffic and pedestrian school crossing volumes; to address these concerns, "NO RIGHT TURN ON RED" restrictions are proposed for intersection approaches if feasible. Additionally, the master plan designates, the Greenbrook Road corridor is a Safe Routes to School (SRTS) corridor and a "Bicycle Compatible Roadway." A SRTS Travel Plan was produced by RideWise for West End Elementary School in 2011, which included signing and striping recommendations at the Harrington Avenue intersection to improve safety for pedestrian travel that have since been implemented.

Pertinent excerpts from these studies, and associated improvements, are provided in **Appendix C**.

I. Public Meeting #1

On Thursday, November 12, 2020, the first public meeting for this project was held via Zoom conferencing to obtain feedback from the public on the five locations selected for RSA review; Email blasts, advertisements, and social media notifications were provided in advance of the meeting. This meeting introduced the project team, who provided an overview of the study, stating the purpose and need. Statistics of crashes on County jurisdiction roadways were reviewed, showing a steady increase of crashes over the past ten years. The Consultant Team explained the RSA process and the technical analysis used in the development of the shortlist of corridors. Due to the pandemic, virtual or socially distanced options for conducting the RSA were discussed.

[5] 2019: ACS 5-Year Estimates Data Profiles, TableID S1701, "Poverty Status in the Last 12 Months"
[6] 2019: ACS 5-Year Estimates Data Profiles, TableID DP05, "ACS Demographic and Housing Estimates"
[7] 2019: ACS 5-Year Estimates Data Profiles, TableID S1602, "Limited English-Speaking Households"
[8] 2019: ACS 5-Year Estimates Data Profiles, TableID S0802, "Means of Transportation to Work by Selected Characteristics"

The Consultant Team then explained the study's Public Involvement Plan (PIP), an iterative process designed to collect feedback and input. The opportunities to collaborate on the PIP were virtual, including public meetings and comments received through the project website and project email. The Consultant Team then explained the process of selecting the five corridors. The selection process was based on County roadway screenings for top crash locations, evaluation of equity data, and public/stakeholder input obtained from the initial virtual mapping outreach conducted in Fall of 2020. The virtual mapping tool allowed users to pin comments on areas of concern on a virtual map.

As part of the PIP, the public meeting included an opportunity to hear from attendees on comments specific to each corridor selected for RSA review by splitting the overall meeting into breakout rooms. The group in the Greenbrook Road breakout room discussed various concerns and suggestions regarding traffic calming and pedestrian safety. Comments received were as follows:

- Concerns for making roadway more accommodating for trucks as there are schools on the roadway; there are already a lot of trucks that use this roadway
- Speeding concerns and suggestions to add more traffic signs to slow traffic
- Concerns about bikers who use the roadways and a suggestion to add roadway sharing signage
- A request to reduce the speed limit to 25 miles per hour
- The number of vehicles accessing the nearby Costco causes a backup on Rt. 22.

J. Technical Advisory Committee Meeting #2

Following an August 2020 meeting with the TAC (Technical Advisory Committee) to select the five corridor locations for further review Somerset County held the second TAC meeting in February 2021. This meeting consisted of a 45-minute presentation followed by interactive breakout rooms with discussion centered around the corridors selected for further review. The presentation included the following topics: project background, summary of selected corridors, description of potential safety measures, and a discussion of demonstration projects.

A breakout room was dedicated solely to the discussion of potential safety measures to be implemented on the Greenbrook Road corridor in North Plainfield Borough Participants were asked to review the ten safety measures discussed during the presentation. They were then asked to rate the effectiveness and ease of implementation of each safety measure based on their own opinion/perspective. Participants were also asked to identify specific areas within each corridor that were areas of concern. The following (**Table 3**) is a summary of those ratings and discussions. A table of each safety measure rating per corridor is found in each section, along with additional comments made by each group.

Table 3 – Perceived Effectiveness and Ease of Implementation for Various Safety Measures

Safety Measure	Effectiveness (1= not effective; 10= very effective)	Ease of Implementation (1=easy; 10= hard)
Lighting	6	10
Curb Extensions/Bus Bulbs	8	2
Daylighting[9] and Crosswalks	8	8
Walkways for Sidewalk Gaps	6	2
Dedicated Turn Lanes	8	2
Leading Pedestrian Intervals (LPI)	10	10
High Visibility Crosswalks	9	7
Turn Restrictions	6	7
Bike Lanes	5	5
Lane Width Reduction/Road Diet	7	7

[9] Daylighting is the act of restricting parked or standing vehicles through striping or curbing to improve sight distance at crosswalks or intersections.

Breakout Group Additional Comments:

- Lighting:
  - Lighting was noted to be adequate and follows the standards (every other telephone pole).
- Curb Extensions, Daylighting, and Crossings:
  - Curb extensions can be difficult to implement, perhaps can be implemented at West End Avenue.
  - Daylighting and crosswalks should be implemented only at parking locations, near North Plainfield High School to access athletic field on the south side of Greenbrook Avenue. This measure could remove the temptation of mid-block crossing.
  - Daylighting and crosswalks should not be a problem implementing where width allows.
  - Walkways for sidewalk gaps should be implemented generally on the north side of the road.
  - Duer & Greenbrook, Rockview, Harrison, to bring more attention to crossing. These could be potential locations for daylighting.
  - Additional safety improvements could include increased crosswalk signing (down diagonal arrow below diamond).
- Turn Lanes & Turn Restrictions:
  - Dedicated turn lanes would make things safer but would be difficult as there is not enough width at Grove Street.
  - Turn restrictions already prohibited by the schools, but maybe there are other school applications.
- Intersections:
  - LPIs are most effective at the Grove Street and West End Avenue intersection. LPIs still might improve pedestrian safety at Somerset even with lack of capacity.
- Bicycling:
  - Ease of implementation varies based on parking presence and tightness of street.
- Road Diets:
  - Lane width reductions and road diets are effective based on context; they were wanted near schools
  - Lane width reductions and road diets could be implemented on the southern side of the corridor towards the western end of the study area (at drop-off areas). This safety measure would not eliminate on street parking and could assist with the speeding perceived by participants.
- Map specific comments include:
  - Need for pedestrian improvements in the vicinity of West End Elementary School.
  - Need for pedestrian improvements from Wilson Avenue to Duer Street.
  - Need to consider roadway dimensions for buses from Maple Avenue to Harrison Avenue.

K. Technical Advisory Committee Meeting #3

Following the RSAs in Spring 2021 and authoring of the draft RSA reports and accompanying recommendations soon thereafter, the County held the third and final TAC meeting for the study in August 2021. The virtual meeting format consisted of a 45-minute presentation with interactive breakout rooms. The presentation included the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into five breakout rooms, one for each of the selected corridors. Each breakout room discussed a specific set of recommendations pertaining to that corridor. Participants were asked to provide their general reactions to the proposed recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed. The topic of discussion for the breakout room specific to the North Plainfield RSA were the bike lanes originally proposed for the Greenbrook Road corridor, between West End Avenue and Grove Street. Provided below is participant feedback received on this specific proposed safety measure:

- Participants urged the County to re-shift the study focus from bike lanes to pedestrian improvements for those attending schools along the corridor. Such improvements could include the following:
    - Leading Pedestrian Intervals (LPIs)
    - Rectangular Rapid Flash Beacons (RRFBs)
    - Shorter crossing distances
    - Curb extensions and/or bump-outs for school buses
    - Increased sidewalk widths
- A demonstration project could be proposed by the middle and high school that sets up temporary bike lanes for school children usage, all overseen by local police department. If a demonstration project is set up, it needs to take place in an area where a permanent bike lane is proposed.
- Bike lanes would conflict with roadway width that could be dedicated to prioritizing pedestrian crossings.
- The Department of Public Works can adjust its leaf pick-up schedule to prevent leaves blocking bike lane traffic should a bike lane be pursued.
- It was clarified that proposed bike lanes would not eliminate existing on-street parking provisions.
- If permanent bike lanes were installed, curbs would need to be pushed back in certain locations (along with narrowing of sidewalks) to accommodate standard bike lane widths.

Additional comments were received during the breakout room (not pertaining to the bike lanes):

- The Borough expressed interest in applying for grants to improve pedestrian environment.
- People speeding on Harrington Avenue was mentioned as a concern

This feedback allowed the County to re-focus the key study recommendation for the North Plainfield RSA to improved pedestrian infrastructure.

L. Public Meeting #2

On Wednesday, September 29, 2021, from 7:00 PM to 9:00 PM, Somerset County held the second and final public meeting for the study. The virtual meeting format consisted of a 45-minute presentation touching on the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into seven breakout rooms, one for each of the selected corridors, one for county-wide general transportation comments and suggestions, and one for Spanish speakers. Participants were asked to provide their general reactions to proposed pedestrian infrastructure improvements in the vicinity of West End Elementary and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed. Provided below is participant feedback received on this specific proposed safety measure:

- Participants were encouraged to see foliage management included as part of the pedestrian improvements near West End Elementary; tree overgrowth was noted to be a problem.
- Along with push button crossing upgrades near West End Elementary, it was recommended by participants that such crossings should be installed farther east near library and Green Acres Park.
- When asked, the participants were informed that the same types of improvements were being considered at the Grove Street intersection (LPIs, signal head upgrades, etc.)

Additional comments were received during the breakout room (not pertaining to the particular pedestrian improvements in question):

- Fences and utility poles alongside street approaches can obscure sight distance and worsen intersection safety; the side street approach for Rockview Terrace was mentioned as such a problem area.
- Drivers have been noted to speed down nearby Judges Lane and Warfield Road.
- Participants were informed that a speed study is recommended within the RSA to determine the particular enforcement and speed setting recommendations that are needed on Greenbrook Road, during school hours and at other times.
- Participants were informed that a bike lane was originally investigated; however, standard bike lane width was not available. Bike lanes would require narrowing of sidewalk and would conflict with same areas where pedestrian crossing movements are looking to be prioritized.
- Participants were informed that daylighting improvements are proposed at the Duer Street intersection to improve sight lines for crossing vehicles and pedestrians as another means to improve study area pedestrian safety.

III. Crash Findings

The analysis used to support the RSA process incorporated a data-driven effort to utilize reportable crash information resulting in any combination of fatality, injury, or property damage. The datasets used for this analysis are sourced from local law enforcement responses to reported vehicular crashes. These on-scene responses subsequently translate to official law enforcement generated reports. Concurrently, the individual reports are aggregated to render serviceable crash information. To be entirely inclusive in obtaining complete crash information, the data was accumulated using three distinct resources: NJDOT's Safety Voyager[10], New Jersey Division of Highway Traffic Safety (NJDHTS) Numetrics[11], and the NJDOT raw crash tables[12]. The three sources were compared against each of the other obtained sources to allow for duplicate records to be discarded and all distinct records to be included with the goal of producing a complete and comprehensive representation of the crashes within the boundaries of the corridor.

The datasets were obtained for a three-year analysis period from the beginning of January 2016 through the end of December 2018 for vehicle-vehicle crash incidents and from the beginning of January 2014 through the end of December 2018 for vehicle-pedestrian/cyclist crash incidents. According to the compiled crash data, 100 crashes occurred on the 1.27-mile segment analysis area during the analysis period. The following evaluation breaks down crash attributes as a percentage of the total crashes to achieve a stronger understanding of the localized trends compared to County roadway systems crash performance. Furthermore, all crashes along this segment were mapped onto collision diagrams, which can be found in **Appendix A**, providing a quick spatial overview of crash clustering patterns.

In reviewing the crash data, the following crash clusters and prevailing safety issues were noted:

- At the West End Avenue intersection
  - Numerous right angle and left-turn collisions, some involving injuries
  - Two pedestrian crashes have occurred at this intersection, located next to two schools
- Three fixed object collisions involving WB traffic heading into the double S-curve near Crosson Place
- Right angle collisions, including injury crashes, have occurred at the intersection with Harrison Avenue
- At the Wilson Avenue intersection
  - Right angle and left-turn collisions
  - Rear end crashes involving traffic on the SB approach
- At the Grove Street intersection
  - Four pedestrian crashes are clustered at this intersection location
  - Crashes with parked vehicles occurring on Grove Street north and south of the intersection
- At the Duer Street intersection
  - Right angle collisions, mainly involving EB traffic, clustered at this intersection
  - Bicycle and pedestrian crashes have been reported at this location
- Crashes between parked vehicles and WB traffic have occurred from Stone Street and Grove Street

A. Temporal Trends

Sorting the crashes by month reveals that the study segment generally experiences increased crashes during the Fall through Winter months from September to March. The Spring and Summer months from April through August mostly show lower frequencies. During the seven (7) months of January, February, March, July, September, October, and December, the study segment experienced higher crash frequencies than the County-wide average, as shown highlighted in yellow in **Figure 3**.

[10] https://www.njvoyager.org/App/
[11] https://www.numetric.com/
[12] https://www.state.nj.us/transportation/refdata/accident/rawdata01-current.shtm

Figure 4 below highlights the crash percent distributions by day of the week. Sundays, highlighted in yellow in **Figure 4**, show crashes occurring twice as frequently than County-wide, 15.9% versus 8.5%. The beginning of AM peak period, 7:00 AM, and the beginning of PM peak period, 4:00 PM, reveal a substantial increase in crash frequency than the County-wide averages, as shown highlighted in yellow in **Figure 5**. More specifically, the 7:00 AM hour has crash frequencies more than double the County-wide average, 13.1% local distribution versus a 6.7% County-wide distribution, perhaps due to school arrival related activity.

Figure 3 – Vehicular Crashes, Percent Distribution by Month

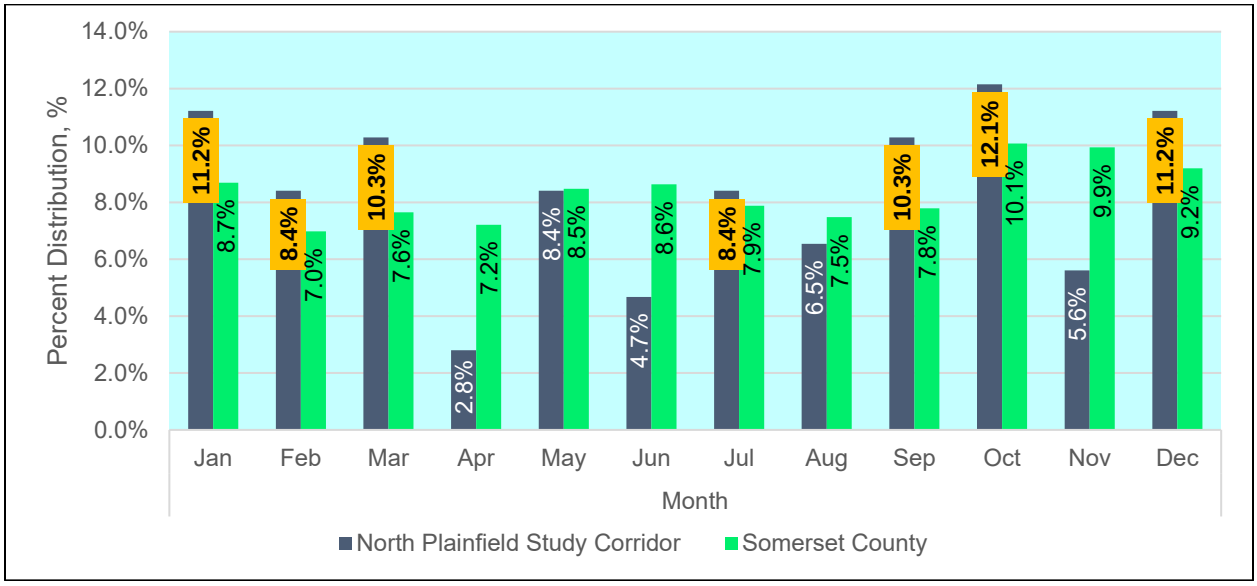


Figure 4 – Vehicular Crashes, Percent Distribution by Day

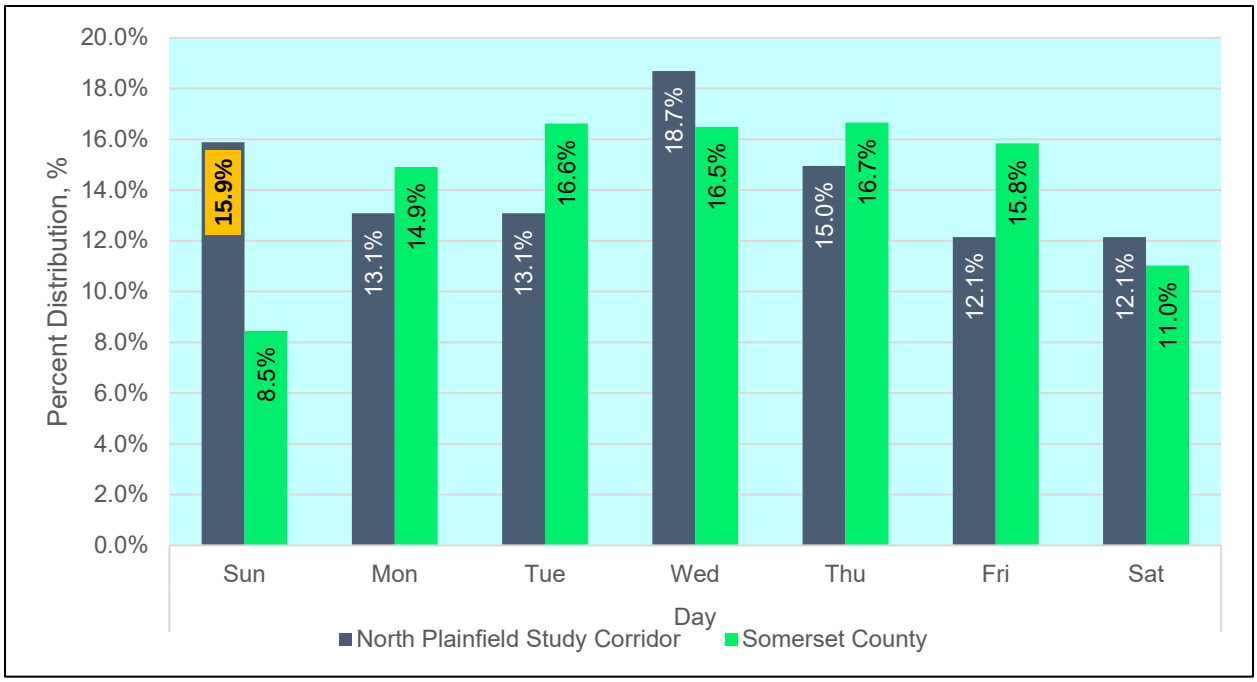
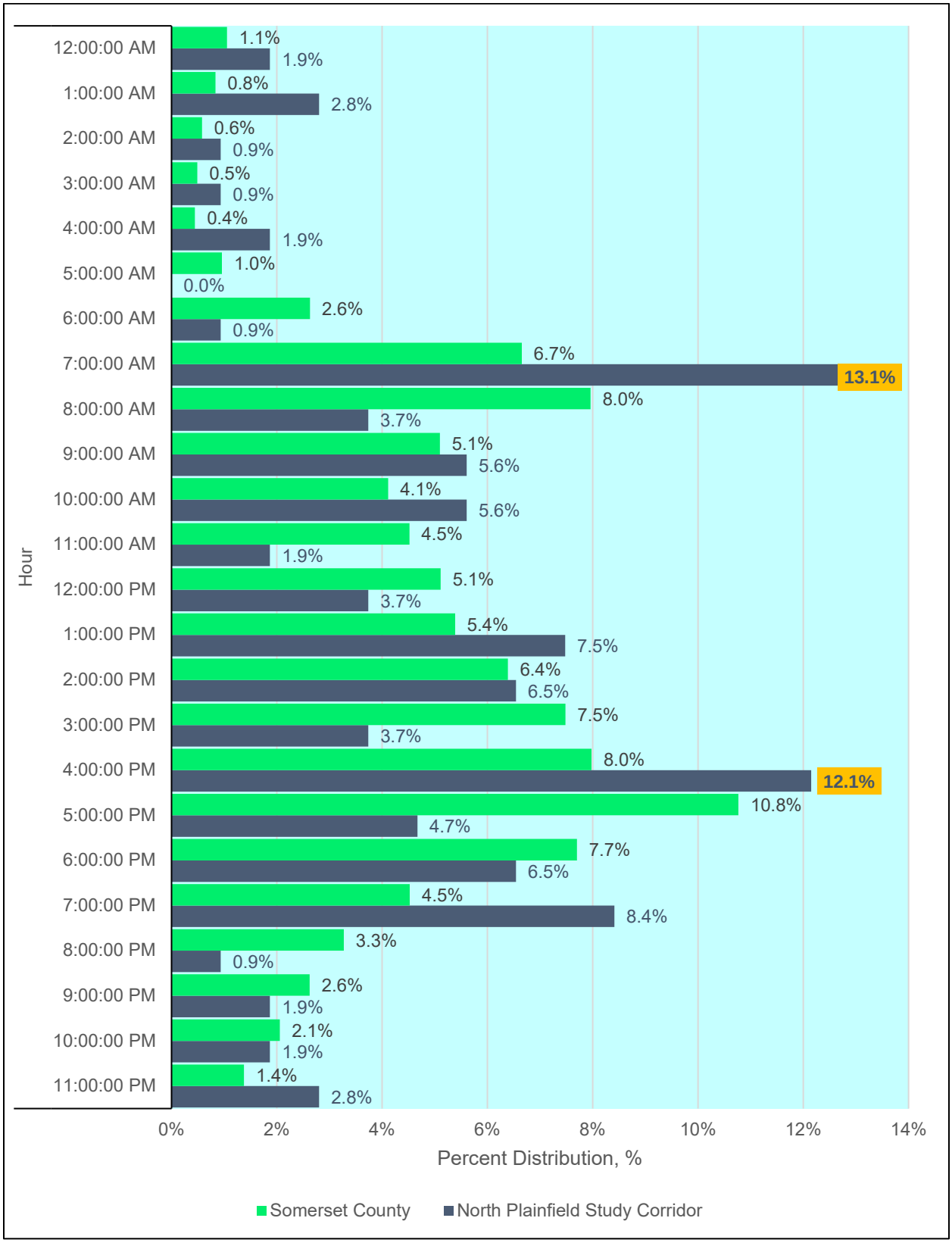


Figure 5 – Vehicular Crashes, Percent Distribution by Hour



B. Collision Types

Eighteen rear end and 26 right angle collisions make up more than 43% of the crash distribution along the study segment. When compared to County-wide averages, the study segment has less frequent rear end crashes than the County as a whole by 16.7%. However, right angle crashes are more frequent on the study segment than the County, by approximately 8.2%, as shown highlighted in yellow in **Figure 6**. Crashes involving parked vehicles account for 12.1% of crash occurrences, nearly four times the County average. The most significant information that can be discerned from **Figure 6** is the high frequency of pedestrian involved crashes highlighted in yellow. 0.8% of crashes that occur on County roads involve pedestrians, compared to a 12.1% frequency, more than the County-wide averages. A breakdown of frequency by crash type is provided on **Table 4**.

Figure 6 – Vehicular Crashes, Percent Distribution by Crash Type

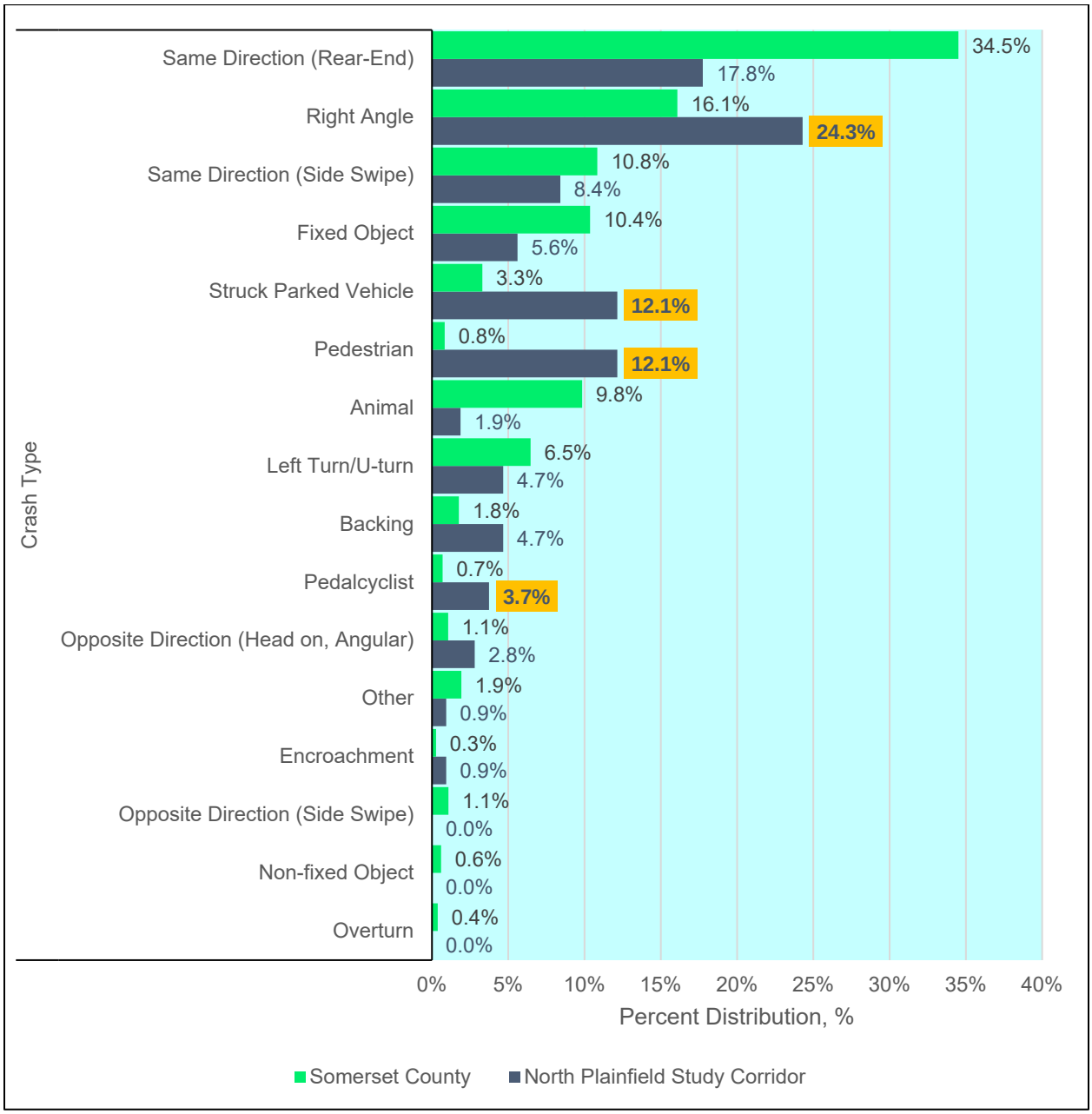


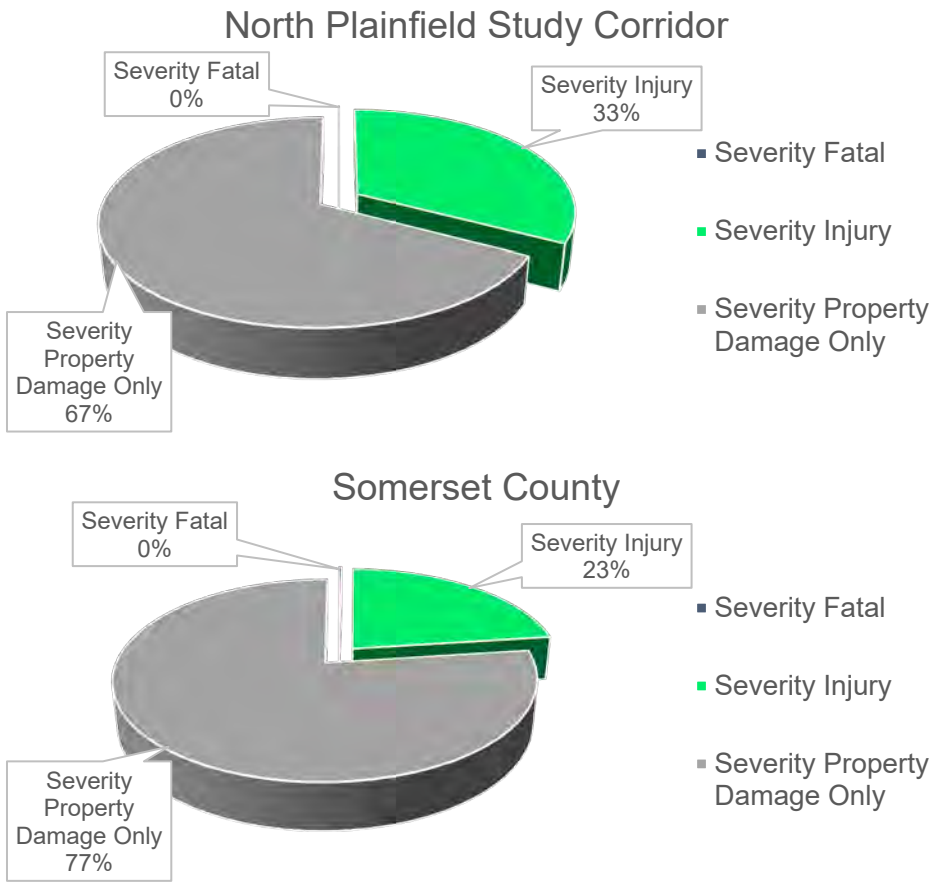
Table 4 – Vehicular Crashes by Type

Crash Type	Total
Animal	2
Backing	3
Fixed Object	6
Left Turn/U-turn	4
Opposite Direction (Head on, Angular)	3
Other	1
Pedalcyclist	4
Pedestrian	12
Right Angle	26
Same Direction (Rear-End)	18
Same Direction (Side Swipe)	9
Struck Parked Vehicle	12
Total	100

C. *Crash Severity*

Data shows a considerable increase in crashes resulting in injuries rather than property damage only when compared to the County, perhaps due to the relatively high share of pedestrian crashes at this location. The analysis period had no fatalities along the selected roadway study segment.

Figure 7 – Vehicular Crashes, Percent Distribution by Severity



D. Roadway Surface & Light Condition

Crashes occurred more frequently during dry driving conditions on the study segment than the County-wide average. Wet road-related crashes are the second most overrepresented roadway surface condition during crashes, 12.4%, which is approximately 4% less frequent than the County-wide average at 16.1% (highlighted in yellow in **Figure 8**).

Figure 8 – Vehicular Crashes, Percent Distribution by Surface Condition

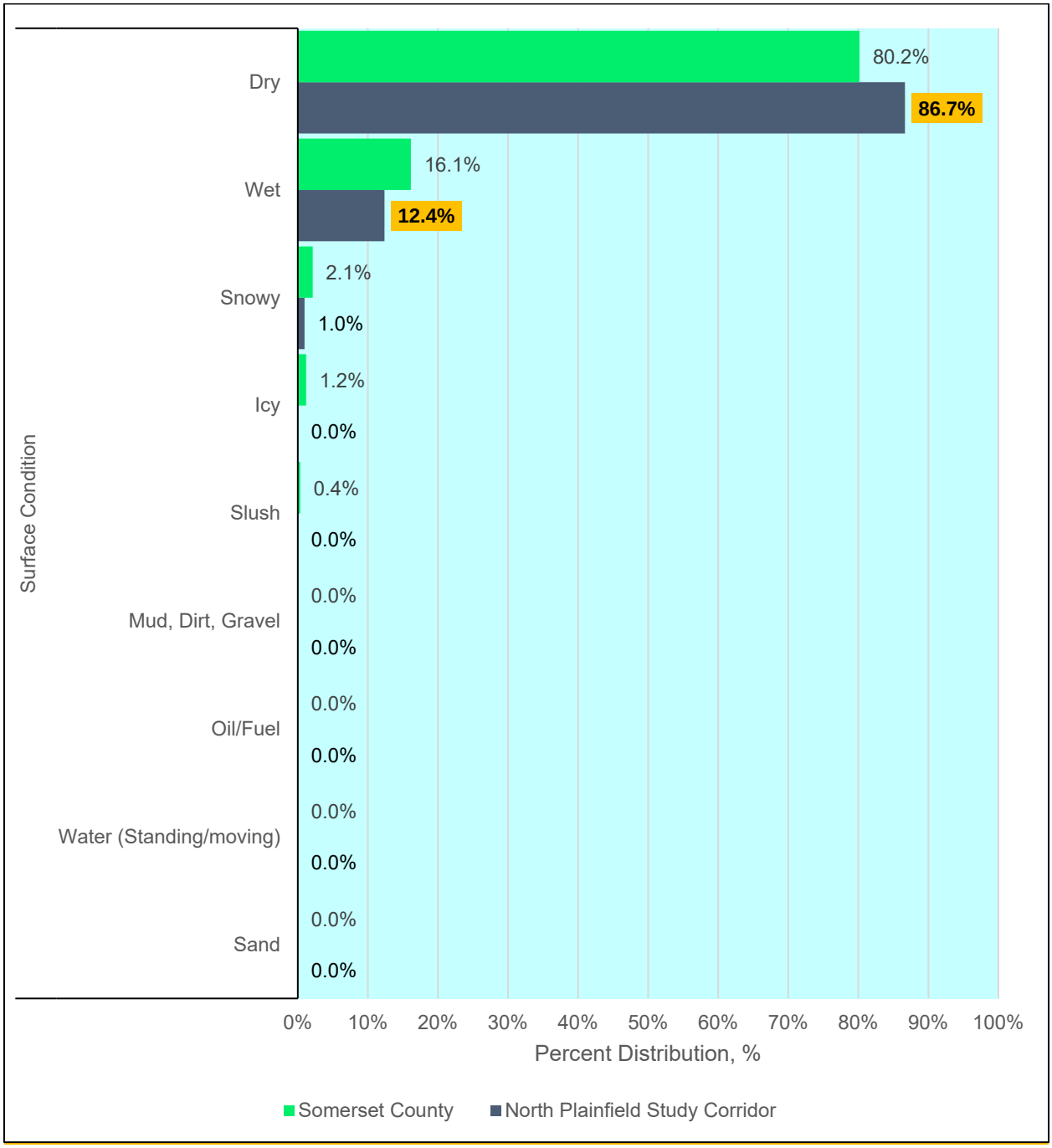
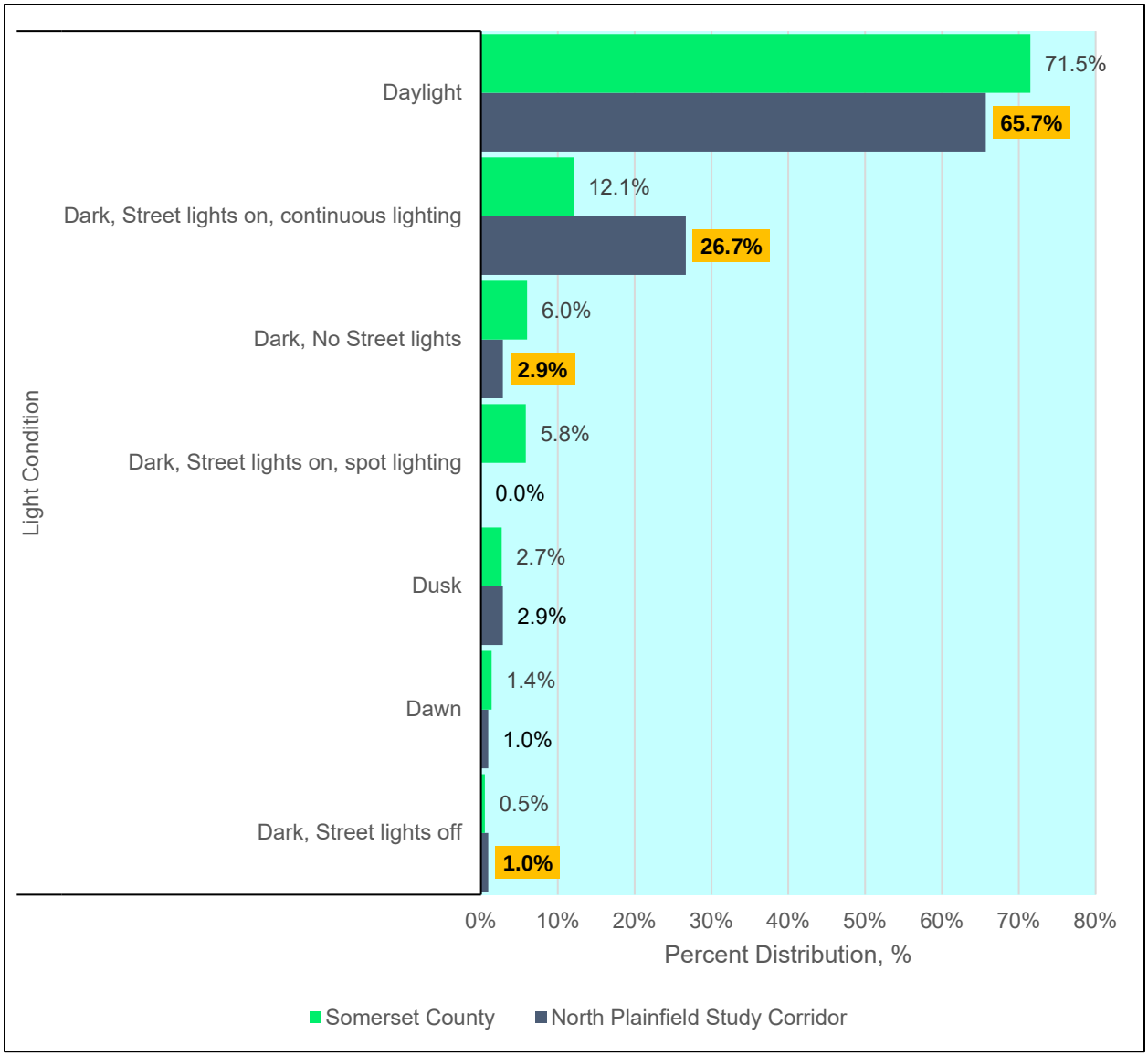


Figure 9 – Vehicular Crashes, Percent Distribution by Light Condition



Approximately 65.7% of the crashes on the study segment occurred during daylight conditions, which is slightly lower than the County-wide average of 71.5% (as shown highlighted in yellow in **Figure 9**). Crashes occurring during "Dark, Street lights on, continuous lighting" is noticeable higher than the County average, more than double the frequency. However, it should be noted that some of these County crashes were recorded as occurring in dark conditions with either no streetlights, or with streetlights off (as shown highlighted in yellow in **Figure 9**).

E. Location

Crash visualization by the use of the histogram, grouped in 0.02-mile segments, **Figure 10** below indicates that the signalized intersections of Grove Street and West End Avenue experience the highest occurrence rate of crashes, shown highlighted in yellow in **Figure 10.** Duer Street and Wilson Avenue presents the highest crash totals at unsignalized intersections, with 11 crashes, shown highlighted in yellow in **Figure 10.** A three-dimensional representation of this crash histogram for the 2016 through 2020 timeframe, imposed onto a map of the study area, is shown on **Figure 11.**

Figure 10 – Vehicular Crash Counts by Milepost

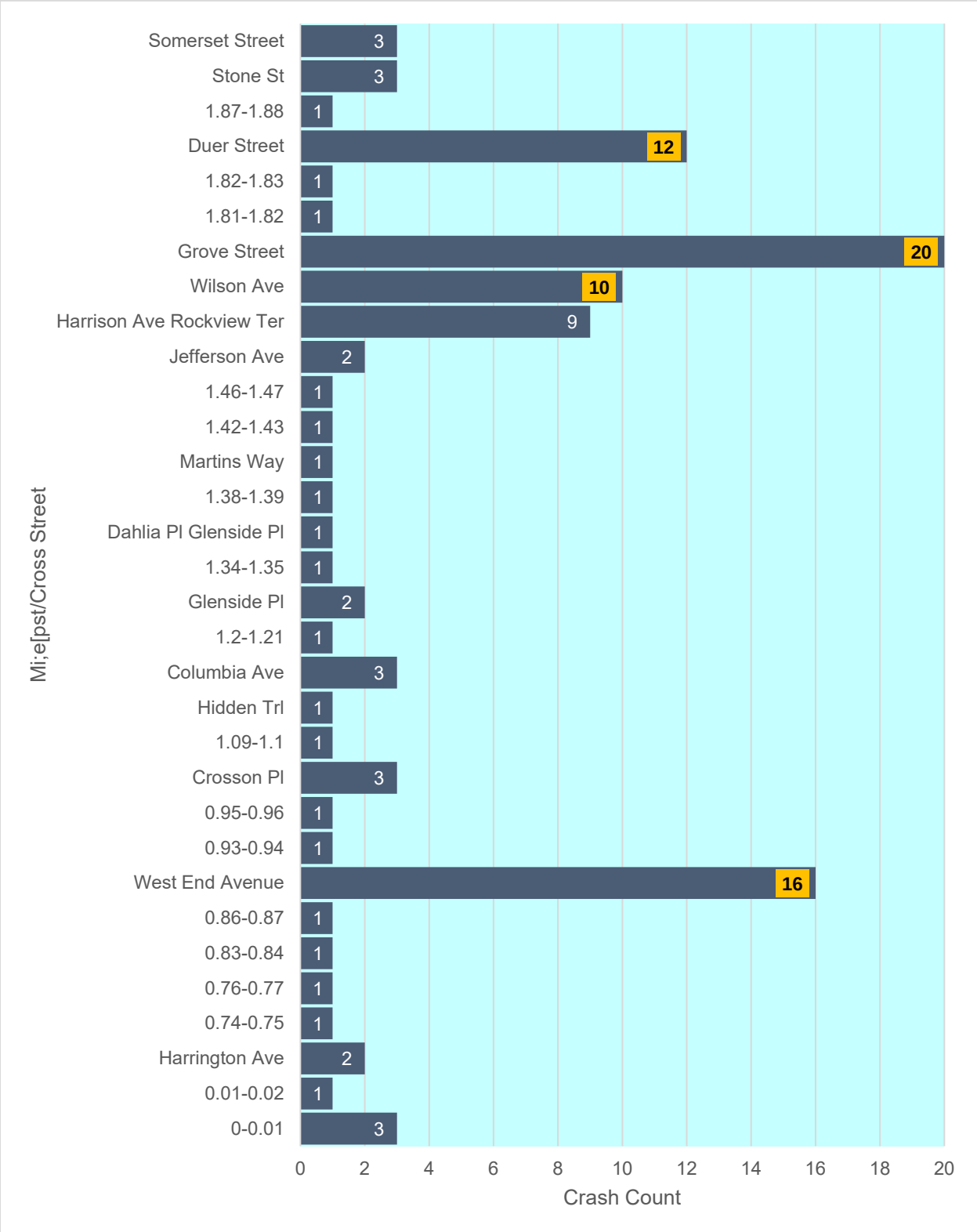
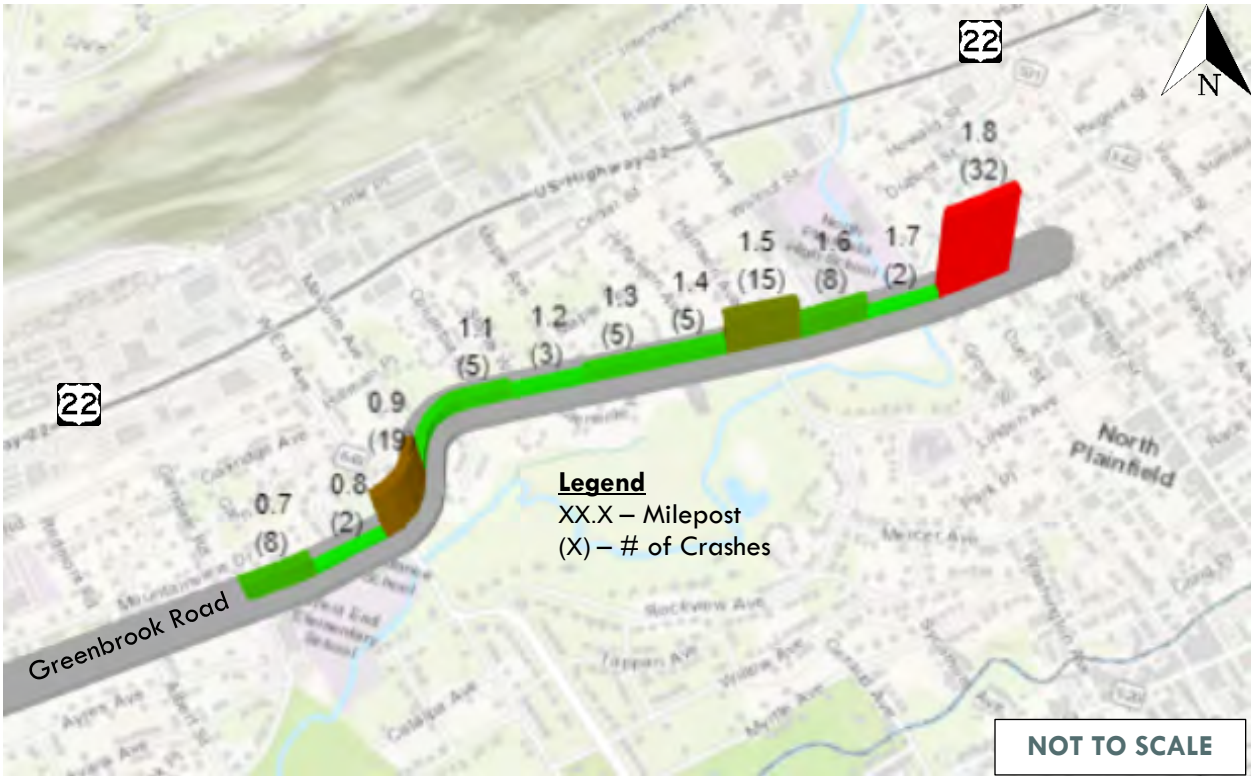


Figure 11 – Visual Estimation of 5-Year (2016 - 2020) Crash History Obtained from Safety Voyager [13]



F. Age of Those Involved

Driver-, occupant-, and pedestrian-involved data was also accessible from the NJDOT crash tables. A normal distribution table was developed (**Figure 12**) utilizing the age data provided by NJDOT. Amongst the eighty-eight crashes reported, the average person(s) involved age was determined to be approximately 33 years old. Approximately 68% of person(s) involved were between the ages of 14 and 51 years old. **Table 5** outlines the percent distribution of the age(s) of those involved in the vehicular crashes, grouped by ten years of age. Data from the table indicates that crashes with driver groups of 26-55 years old occur with a higher frequency on the study segment than the County average for the same age groups. Ages 16-25 and 46-55 account for the highest frequency of those involved at 21.4 percent each. Notably, the under 16 age group average was higher than the County, 8.6 percent versus 7.9 percent.

[13] Five-year crash totals shown on histogram from Safety Voyager may vary from crash report data obtained from municipality's police department and do not include crashes recorded as occurring on side street approaches, which are included in the record of analyzed collected crash data.

Figure 12 – Histogram of Age(s) Involved

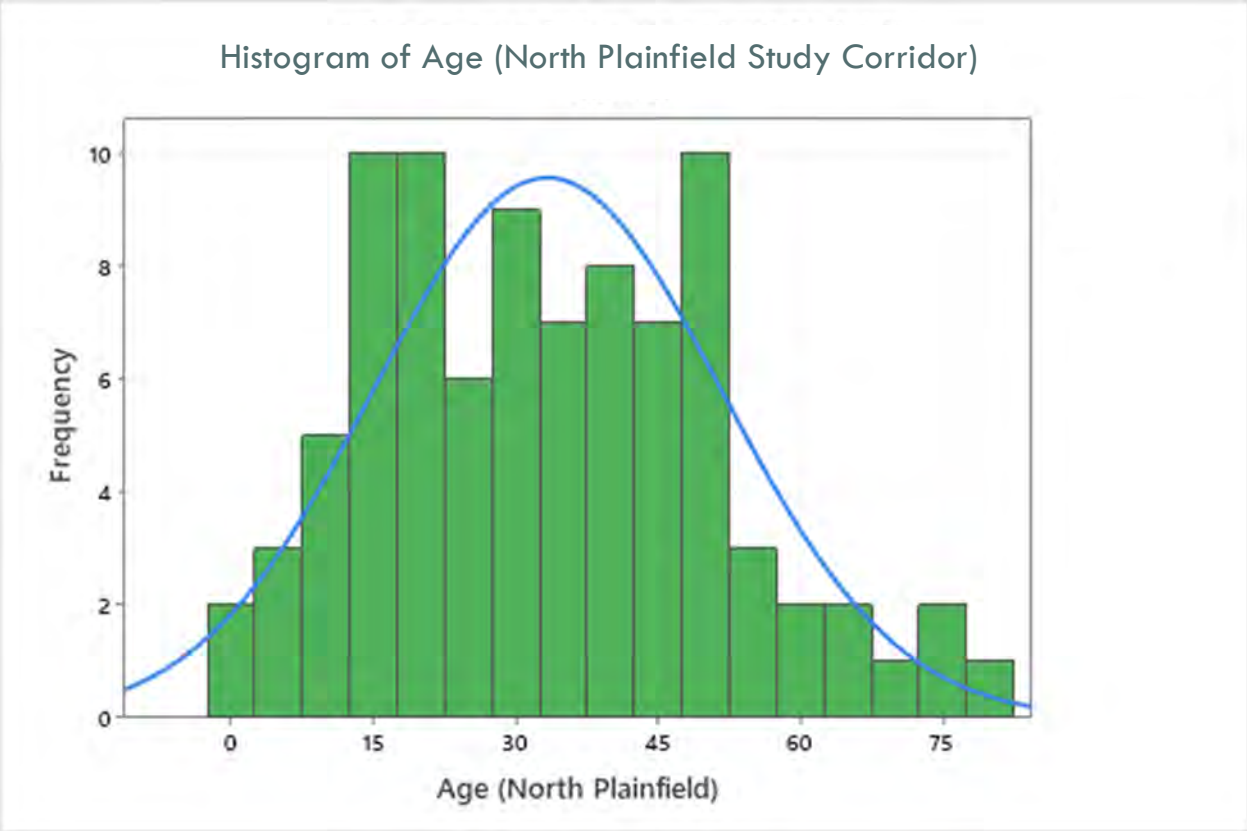


Table 5 – Age(s) Involved, percent distribution

Age Involved	North Plainfield Borough Study Corridor	Somerset County
Under 16	8.6%	7.9%
16-25	21.4%	23.1%
26-35	18.6%	16.9%
36-45	17.1%	15.8%
46-55	21.4%	16.7%
56-65	8.6%	11.3%
66-75	2.9%	5.1%
76-85	1.4%	2.5%
86-95	0.0%	0.7%
96-105	0.0%	0.0%
106-116	0.0%	0.0%

IV. RSA Logistics

All data previously discussed in this report was used to inform the RSA conducted on this corridor. All participants involved in this RSA, whether in attendance during the pre-audit meeting, in-field review, and/or post-audit meeting, are listed in **Appendix E**. The pre-audit meeting was held at 10:00 AM via video conferencing on Thursday, April 8th, 2021, on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The PowerPoint used to facilitate this discussion is provided in **Appendix F**.

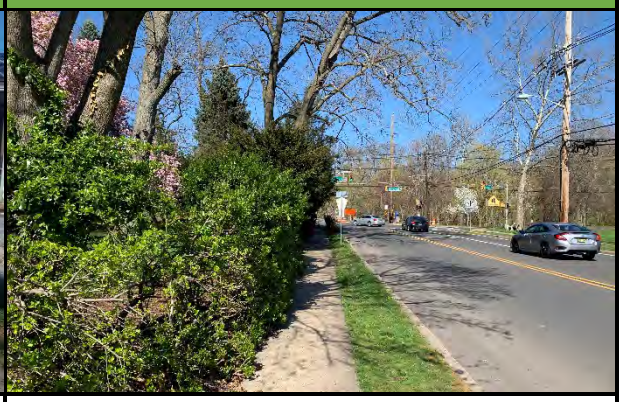
The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. The audit team met in a social-distanced manner, while masked, in the parking lot of Green Acres Park for a flipbook RSA orientation presentation to reiterate the ground rules of the audit. Upon conclusion of the orientation, participants were paired off with each other to walk halves of the corridor, seeking to pair each Somerset County Roadway Safety Study project team member (whether with the County or Consultant team) with each of the stakeholders. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as potential safety measures to address potential safety concerns. After walking the corridor, the RSA team met back in the parking lot to share overall thoughts on the corridor and fill out a survey on corridor identity, crossings, pedestrian-vehicle interactions, sidewalk and roadway conditions, and streetscape amenities, the answers of which were compiled and are averaged in **Appendix G**. Based on survey results, the corridor had the following perceived concerns:

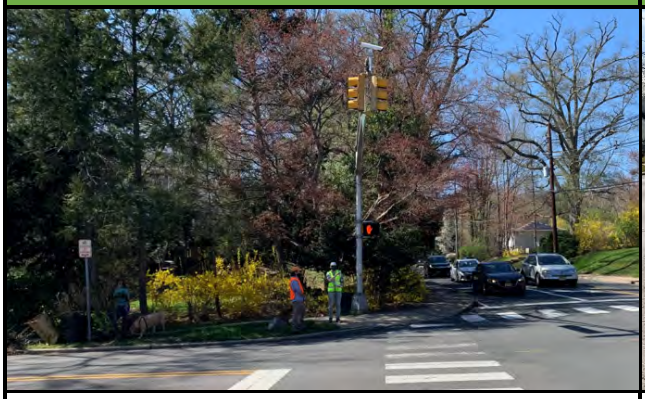
- Sidewalk potentially nearing end of service life;
- Lack of benches, places to rest, trash cans, etc.

On the following day (Friday, April 9th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit, some of which are presented in the following section, to discuss each observation, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study. This discussion helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report. The PowerPoint used to facilitate this discussion is provided in **Appendix H**.

V. Identified Issues & Observations

This section depicts a sampling of overall issues identified during the RSA. Please refer to the Implementation Matrix in the following section of the report for a comprehensive listing of identified corridor issues.

Pedestrian & Cyclist	Pedestrian & Cyclist
	
Steep driveway pitch that slopes toward street near Judges Lane	Branches and foliage obstruct pedestrian ROW approaching West End Avenue
	
Opportunity for midblock crossing at West End Elementary School near Harrington Avenue	Crosswalk opportunity from North Plainfield High School to athletic field across Greenbrook Road
	
Sidewalk in front of liquor store interrupted by wide asphalt curb cuts and encroach on pedestrian space	Bus stop in front of North Plainfield High School lacks pedestrian access

Operations & Visibility	Maintenance
	
Branches and foliage at the NW corner of West End Avenue and Greenbrook Road limit sight distance of approaching traffic	Crosswalk at Martin's Way needs maintenance repair and ADA-compliant upgrades
	
Decorative planting blocks motorist sight line to pedestrians traversing Somerset Street	Steep access to/from Stahl's Way causing vehicles to scrape pavement. Intersection also lacks crosswalk striping and ADA-compliance
	
Older signals at West End Avenue and Greenbrook Road lacking countdown pedestrian countdown.	Severe sidewalk heaving on Greenbrook Road near Maple Avenue

VI. Findings & Recommendations

This section summarizes the site-specific and corridor-wide safety issues, potential strategies, and recommendations to improve safety. An Implementation Matrix is provided that summarizes the recommendations and provides qualitative information on time frame, cost, and responsible jurisdiction. Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process and are meant to be a record of ideas discussed. Symbols used in the Implementation Matrix are defined in **Table 6** as follows:

Table 6 – Legend of Symbols in Implementation Matrix

Symbol	Meaning	Definition
$	Low cost	Could be accomplished through maintenance
$$	Medium cost	May require some engineering or design and funding may be readily available
$$$	High cost	Longer term; may require full engineering, ROW acquisition, and new funding
🕐	Short term	Could be accomplished within 1 year
🕐🕐	Medium term	Could be accomplished in 1 to 3 years; may require some engineering
🕐🕐🕐	Long term	Could be accomplished in 3 years or more; may require full engineering

A. Implementation Matrix

The following represents the specific findings and recommendations made by the interdisciplinary RSA team, which were subsequently evaluated via discussions with County Engineering on Wednesday, June 2nd, 2021, and Thursday, June 3rd, 2021. As these recommendations are considered for advancement into either a CD study, or incorporation into an overlapping County and/or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices. Corridor-wide recommendations, requiring a review of all important applicable infrastructure along the corridor pertinent to these specific topics, are provided in **Table 7**. Further defined recommendations at specific intersection or mid-block locations are provided in **Table 8**. **Recommendations bolded within the Implementation Matrix below feature one of the twenty Proven Safety Countermeasures from the FHWA[14], which means that the recommendation is shown to have a significant safety benefit as proven by substantial traffic safety research.** These recommendations are tied to Crash Modification Factors (CMFs) showing a substantial reduction in crashes, as well as research documented on the Crash Modification Factor Clearinghouse website that has a high-quality ranking. This high ranking indicates the quality of study design, sample size, statistical methodology, statistical significance, etc. for the research backing each CMF. Mapping of proposed location-specific recommendations is provided in **Appendix I**.

Table 7 – Corridor-Wide Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
Maintenance				🕐
1	Perform maintenance to clear overgrowth and debris on sidewalks and curb ramps.	$	🕐	Municipality
Operations				🕐
2	Assess stop bar placement and intersection sight distance at all unsignalized intersections.	$$	🕐	Municipality

[14] https://safety.fhwa.dot.gov/provencountermeasures/

No.	Recommendation	Cost	Time Frame	Jurisdiction
Pedestrian				
3	Conduct a sidewalk assessment to determine the extent of sidewalk that needs to be replaced, repaired, and constructed.	$$	🕐🕐	Municipality
4	Perform curb ramp assessment to determine the number of curb ramps that need to be replaced, repaired, and constructed.	$$	🕐🕐	County/ Municipality
5	Perform a crosswalk assessment to determine where crosswalks need to be restriped, resurfaced, and installed. Upgrade crosswalks to high-visibility type.	$$	🕐🕐	County
6	Consider performing a Walking Bus demonstration project	$	🕐	Municipality
Transit				
7	Consider coordinating with NJ TRANSIT to provide amenities and information at bus stops.	$	🕐🕐	County / NJ TRANSIT

Table 8 – Location-Specific Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
KEY STUDY RECOMMENDATION – from West End Avenue to Harrington Avenue				
8	Investigate feasibility to stripe or construct curb extensions and refresh crosswalk striping and consider the installation of Rectangular Rapid-Flashing Beacons (RRFBs) at unsignalized crossing locations. Daylighting or other striping in shoulder would aid to prohibit parking, allocate bus standing, and calm traffic speeds. At signalized intersection, consider push button upgrades, lighting, No Turn on Red (NTOR), and Leading Pedestrian Intervals (LPIs).	$$	🕐🕐	County/ Municipality
9	Investigate feasibility of a complete streets redesign to narrow cartway widths at crossing locations by constructing curb extensions and/or dedicated road width for bus pick-up/drop-off and bikes.	$$$	🕐🕐🕐	County/ Municipality
10	Install updated approach signage to elementary school including more modern school advisory flashing LED signs.	$	🕐	County/ Municipality
11	Perform a speed study to determine if targeted enforcement and/or improved school advisory speed signing is warranted. Study should be performed when flashing school signs are both in use and not in use.	$	🕐	County/ Municipality
12	Install radar speed feedback sign on each end of this segment.	$	🕐	Municipality
Harrington Avenue				
13	Schedule maintenance to clear overgrowth around utility pole on SE corner.	$	🕐	Municipality
14	Resurface and restripe crosswalks.	$	🕐	County
15	Stripe/Construct curb extensions to reduce width of crosswalk.	$	🕐	County
16	Relocate school crossing signs (S1-1) in both directions closer to crosswalk. Replace with fluorescent yellow-green panels and add diagonal downward-pointing arrow plaque.	$	🕐	County
17	Refresh stop bar striping and relocate STOP sign to stop bar on NB approach.	$	🕐	Municipality

No.	Recommendation	Cost	Time Frame	Jurisdiction
West End Elementary School				
18	Consider crosswalk with RRFB and crossing guard around elementary school and/or at Judges Lane	$$	🕐🕐	County/ Municipality/ School
19	Consider daylighting to prohibit parking in specific areas around elementary school.	$	🕐	County/ Municipality/ School
20	Consider dedicated pick-up/drop-off zones. Possibly off Greenbrook Road	$	🕐	County/ Municipality/ School
21	Consider dedicated parking for ball field east of elementary school.	$	🕐	County/ Municipality/ School
22	Consider striping techniques to reduce speeds around elementary school.	$	🕐	County/ Municipality/ School
23	Upgrade school signing and striping on Greenbrook Road approaching High School to MUTCD standards	$	🕐	County/ Municipality
Judges Lane				
24	Schedule maintenance to clear overgrowth around WB flashing beacon.	$	🕐🕐	Municipality
25	Consider adding a crosswalk with RRFB at this intersection for school and church crossings.	$	🕐🕐	County
West End Avenue				
26	Clear overgrowth on NW corner to improve turning sight distance.	$	🕐	County/ Property owner
27	Conduct lighting analysis and coordinate with utility company to install LED lighting.	$$	🕐🕐	Municipality/ Utility company
28	Explore NO TURN ON RED restrictions.	$$	🕐	County
29	Evaluate existing signal timing to determine if LPIs and longer flashing don't walk times can be accommodated.	$$	🕐	County
30	Upgrade push buttons.	$	🕐🕐	County
31	Upgrade 8" signal heads to 12" signal heads.	$	🕐🕐	County
32	Coordinate with utility companies to possibly relocate utility poles on SE corner to improve sight distance.	$$	🕐🕐	County/ Municipality
33	Replace bench on SW corner due to poor condition.	$	🕐	Municipality/ Church
Double Curve				
34	Explore adding raised pavement markers and/or reflectors to obstructions within clear zone to make double curve more visible at night.	$$	🕐	County
35	Consider adding S-curve warning signs at each end of the curve.	$	🕐	County
36	Investigate potential for high-friction surface treatment.	$$	🕐🕐	County
37	Replace sidewalk west of intersection to correct non-compliant cross slope through driveway.	$	🕐	Municipality

No.	Recommendation	Cost	Time Frame	Jurisdiction
Crosson Place				
38	Investigate feasibility of realigning approach to improve sight distance and grade.	$$$	🕐🕐🕐	County/ Municipality
39	Consider making right-in, right-out to discourage cut-through traffic.	$$	🕐🕐🕐	County/ Municipality
Hidden Trail				
40	Remove tree overgrowth at SW corner to improve sight distance.	$	🕐	County/ Municipality
41	Extend sidewalk on south side of street from Hidden Tr to Columbia Ave to provide a crosswalk across Greenbrook Rd with a better sight distance and better pedestrian connectivity.	$$	🕐🕐🕐	Municipality
42	Stripe crosswalk and stop bar.	$	🕐	County/ Municipality
Columbia Avenue				
43	Relocate stop bar to improve sight distance.	$	🕐	Municipality
44	Restripe crosswalk.	$	🕐	Municipality
Sweetbriar Lane				
45	Stripe crosswalk across Greenbrook Road to connect cul-de-sac.	$	🕐🕐	County
Stahls Way				
46	Investigate improvements to drainage due to evidence of ponding.	$$	🕐🕐🕐	County/ Municipality
47	Stripe stop bar and restripe crosswalk.	$	🕐	Municipality
48	Explore one-way pair options due to steep grade of this roadway. Evidence of vehicles "bottoming out".	$$	🕐🕐	County/ Municipality
Glenside Place				
49	Stripe stop bar.	$	🕐	Municipality
50	Fix sidewalk on north side of roadway that exhibits major heaving from tree.	$$	🕐🕐	Municipality
Martins Way				
51	Driveway access on NE corner should be evaluated to determine if driveway width needs to be reduced.	$$	🕐🕐	County
52	Reduce curb radii by striping or curb reconstruction.	$$	🕐🕐	County/ Municipality
Jefferson Avenue				
53	Replace bench south of intersection due to poor condition.	$	🕐	Municipality
Harrison Avenue				
54	Install STOP FOR PEDESTRIANS in-street signage. Signage can remain in the roadway at all times.	$	🕐	Municipality
Rockview Terrace				
55	Install fluorescent yellow-green S1-1 signs with diagonal downward-pointing arrow plaques in each direction at the crosswalk.	$	🕐	County
56	Upgrade crosswalks to high visibility.	$	🕐	County
57	Coordinate with property owner of 34 Rockview Terrace to relocate fence to improve sight distance.	$$	🕐🕐	Municipality

No.	Recommendation	Cost	Time Frame	Jurisdiction
Wilson Avenue				
58	Pending bus stop ADA compliance, construct crosswalk at this intersection for NJ TRANSIT bus stop access across the street.	$	🕐	Municipality/ NJ TRANSIT
59	Coordinate with school to restrict access to faculty parking lot to prevent parent/child pick-up/drop-off.	$$	🕐🕐	County/School
60	Coordinate with school to reduce driveway apron width to minimize crossing distance for students and slow vehicle speeds of ingress/egress movements.	$$	🕐🕐	County/School
North Plainfield High School				
61	Upgrade school signing and striping on Greenbrook Road approaching High School to MUTCD standards	$	🕐	Municipality
Fromm Field				
62	Install mid-block crossing and curb ramps where south side sidewalk drops off to connect sidewalk across the street. Pending county engineering approval.	$$	🕐🕐	Municipality
Grove Street				
63	Evaluate existing signal timing to determine if LPIs can be accommodated.	$$	🕐	County
64	Coordinate with property owner to add NO PARKING striping/daylighting in front of Grove BBQ and restrict deliveries to Grove St.	$	🕐	Municipality/ Property owner
65	Add planter boxes to separate pedestrian area from parking area in front of the business on the northeast corner of the intersection.	$	🕐	Municipality/ Property Owner
66	Add WB speed limit sign 300' east of the intersection.	$	🕐	County
67	Install more no parking signage closer to intersection and refresh parking striping.	$	🕐	Municipality
68	Review signal timing to determine if 3.5fps[15] flashing don't walk time can be accommodated.	$$	🕐	County
69	Consider adding dotted double yellow striping or white edge line striping through intersection to assist with right turns.	$$	🕐	County
70	Explore loading zone restrictions close to the intersection.	$$	🕐🕐	County/ Property Owner
71	Coordinate with utility company to remove guy wire hazard.	$	🕐🕐	County
72	Conduct a traffic study to determine if existing volumes warrant a dedicated SB left turn lane.	$$	🕐🕐	County
73	Investigate relocating signal pedestal pole on NW corner of intersection that blocks sight distance between SB vehicles and pedestrians crossing EB leg.	$$	🕐🕐🕐	County
Duer Street				
74	Add curb extensions and/or daylighting on Greenbrook Rd approaches to provide pedestrians with better sight distance and prevent parking too close to the intersection.	$	🕐🕐	County
75	Move stop bars forward to improve intersection sight distance.	$	🕐	Municipality
76	Add crosswalk striping for Duer Street	$	🕐	Municipality

[15] 3.5 ft/s (3.5 feet per second) refers to the typical pedestrian walking pace/speed

No.	Recommendation	Cost	Time Frame	Jurisdiction
Between Duer Street and Stone Street				
77	Perform lighting analysis to determine if more lighting needs to be installed in this very dark area.	$$	🕐🕐	Municipality
Liquor Store				
78	Coordinate with liquor store property owner to improve access to site by reducing width of driveways, reconfiguring parking, and defining pedestrian ROW around and through the site.	$$$	🕐🕐🕐	County/ Municipality/ Property Owner
Stone Street				
79	Install ONE WAY signs.	$	🕐	Municipality
80	Stripe stop bar on Stone Street	$	🕐	Municipality
81	Coordinate with businesses on northwest corner of intersection to encourage parking lot use rather than on-street parking.	$	🕐	Municipality
82	Install NO PARKING signs to denote where on-street parking begins adjacent to businesses on northwest corner of intersection. Consider no parking within 25' of crosswalk.	$	🕐	Municipality
83	Restrict WB parking between Stone Street and Somerset Street	$	🕐🕐	Municipality
Somerset Street				
84	Narrow the EB sidewalk in front of the hair cutting place (SW corner) to improve EB vehicle storage.	$	🕐	County/ Municipality
85	Offset intersection presents bad sight lines for pedestrian visibility. Consider phasing improvements, including LPIs.	$$	🕐🕐	County

B. Road Owner Response

An essential final step of the RSA process (see **Figure 1**) is a response from the roadway owner, which provides accountability between the funding body and the participating jurisdiction who acknowledges the findings within the RSA and their planned steps to address concerns. In responding to the RSA's findings, the road owner, in this case the County, must weigh the safety benefits posed by the recommendations within this report against the available resources to implement such improvements to make an informed decision. Because the audit process generated a long and wide-ranging list of potential improvements, the road owner is expected to implement these recommended improvements as time and funds allow in coordination with other projects and priorities.

Somerset County delivered their response following the finalization of the findings and recommendations table (see **Appendix J**). However, while the County has overseen this RSA process, by no means should this report be considered as a commitment to address some or all concerns and implement some or all improvements listed within this report. All potential recommendations must be fully studied. It is acknowledged that some recommendations may not be feasible.

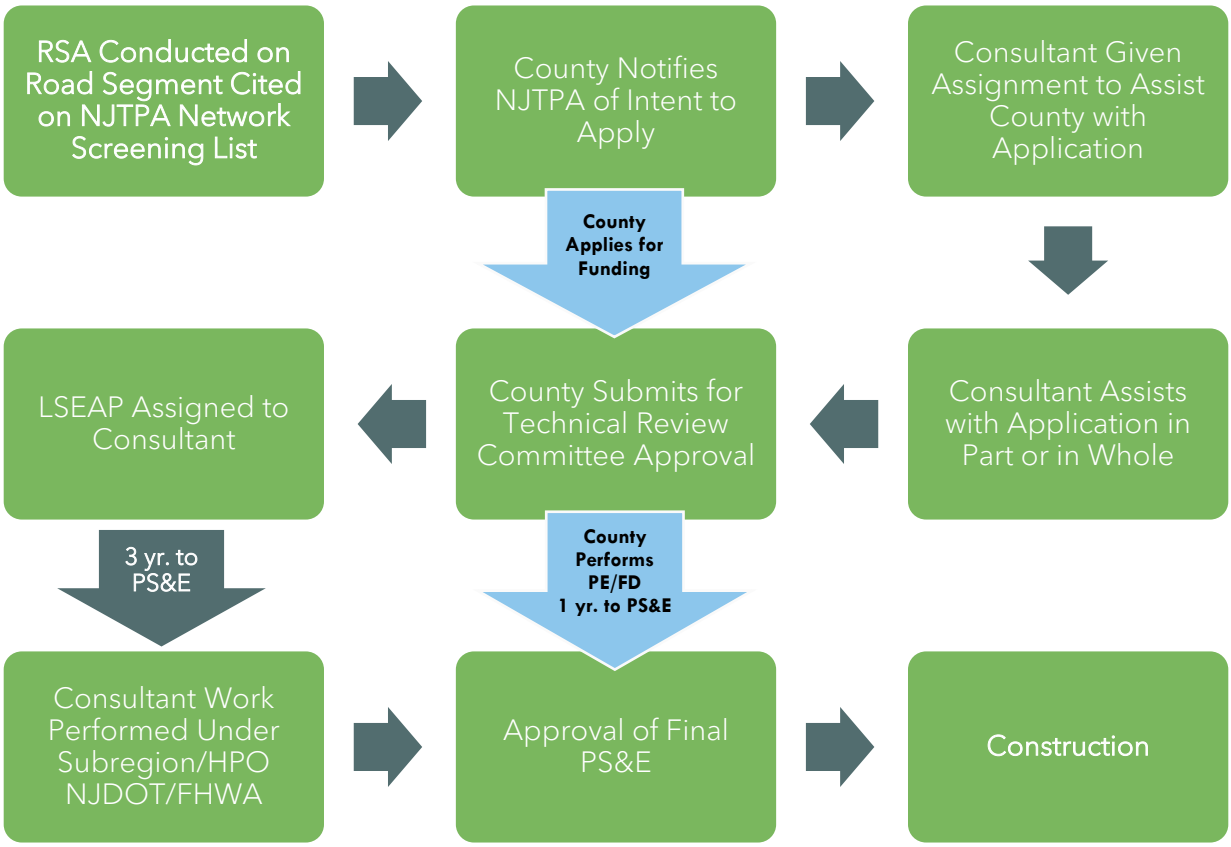
C. Potential External Funding Sources

Local Safety Program

The County has previously used RSAs as a "launching pad" for pursuing funding for corridor safety improvement projects, such as Main Street in Manville and Hamilton Street in Franklin, via the Local Safety Program (LSP) offered through NJTPA. Should the County desire to pursue funding of safety improvements on this corridor, the RSA can help to scope the specific safety improvements to be conceptualized and designed for eventual funding and construction. The RSA can also be appended to Section 4 of the funding

application[16] submitted to NJTPA as a further substantiation and documentation of the understanding of the existing safety issues and proposed safety measures. This application, which also requests information on scope, location ranking, HSM analyses, estimated costs, and environmental impacts, may be filled out by the County itself or with assistance from a consultant designated by NJTPA. Pending determination of eligibility by NJTPA's Technical Review Committee, the County can choose to either perform the Preliminary Engineering and Final Design work in-house or obtain assistance for such work through NJTPA's Local Safety Engineering Assistance Program. It should be noted that implementation of improvements through the LSP often takes around five to six years from corridor selection to construction. A simplified flowchart of this process from RSA to construction is shown in **Figure 13**. If faster implementation is desired, County, and municipal operating and capital budgets could be relied upon if internal funding is available.

Figure 13 – Project Development Process for Local Safety Program after RSA Completion



Transportation Alternatives Program

The purpose of the Transportation Alternatives Set-Aside Program (TA Set-Aside) federal grant initiative is to support the construction of "non-traditional" surface transportation projects, which typically involves the designing of infrastructure for active modes such as pedestrians, cyclists, and other non-motorized forms of travel. Supported projects can also have elements that bolster the recreational, historic, cultural, or environmental assets of the project area. Grant funding for a given project can range from $150,000 to $1,000,000. The amount of funding is determined on a project-by-project basis with award of prior grant money, and successful execution of prior funded projects, playing a factor. The County would not be prohibited from applying for both Safe Routes to School and TA Set-Aside funding at the same time.

[16] Application for FY 2020 provided here: https://www.njtpa.org/NJTPA/media/Documents/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/FY-2020-LSHRRRP-Application-Rev_191003.doc?ext=.doc

TA Set-Aside lists the following activities that are eligible for funding under its "Pedestrian/Bicycle Facilities" and "Community Improvement" categories:

- New/reconstructed sidewalks/curb ramps;
- Bike lane striping;
- Wide paved shoulders;
- Bike parking and bus racks;
- New or reconstructed off-road trails;
- Bike/pedestrian bridges and underpasses;
- Lighting;
- Historic sidewalk paving;
- Benches;
- Planting containers;
- Decorative walls; and,
- Walkways.

The recommendations within the Implementation Matrix touch on many of the prior elements listed. To best position itself to attain approval for funding, the applying jurisdiction, whether County or municipal, should pass a resolution of support showing the commitment of maintenance of the proposed complete streets elements. Furthermore, the applicant should have data supporting that the implementation of similar improvements elsewhere within its jurisdiction has resulted in the increase of non-motorized transportation, the stimulus of economic activity, and the improvement in quality of life. A handbook summarizing the process of applying for these funds can be found at NJDOT Local Aid website[17].

Safe Routes to School (SRTS)

SRTS is a federally-funded application program established to assist County, municipalities, school districts, and individual schools with programmed reimbursements for the implementation of improvements that would:

- Enable/encourage children in grades K-8, including those with disabilities, to walk/bicycle to school;
- Make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age; and,
- Facilitate the planning, development and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption and air pollution in the vicinity of schools.

Such improvements can include the construction of hard infrastructure, such as bridging sidewalk gaps, providing new crosswalks, specifying new traffic control for new school crossing movements (signals, RRFBs, etc.), proposing new traffic calming devices, and implementing bike lanes or other bike facilities to encourage alternate modes of travel to school. Design assistance programs are also provided for the applicant to work with a NJDOT-selected consultant to design such infrastructure improvements. Funding can also be used for non-infrastructure events and services, such as walking school buses, traffic safety lessons, increased enforcement, etc. A handbook specifying the application process for SRTS FY 2022 funding can be found on NJDOT's SRTS website[18]. Webinars are also available to learn more about the program.

D. Demonstration Project

Demonstration projects are where an example improvement is completed for a selected corridor with foresight to prepare for larger rollouts. The improvement(s) should highlight the concept and illustrate the benefits of RSAs and how RSAs may improve the overall level of safety for the road users. The selected demonstration projects should be of strategic importance, and which is representative of the general safety theme suggested for the selected corridor.

In concert with the Borough Police Department, the Borough's School District and RideWise TMA could plan a one-day event to conduct a Walking Bus activity along select neighborhood streets, and a selected length of Greenbrook Road with students and parents (**Figure 14**). The goals of this demonstration project are to reduce vehicular travel to school and improve the safety of students walking or biking to school. The North

[17] https://njdotlocalaidrc.com/perch/resources/Uploads/2020-ta-set-aside-handbook-8-12-20.pdf
[18] https://www.njdotlocalaidrc.com/perch/resources/Uploads/2022-srts-handbook-06-10-2021.pdf

Plainfield School District is encouraged to coordinate with RideWise (the County's TMA) to set up this demonstration project to improve the walkability of the Greenbrook Road corridor.

Figure 14 – Walking Bus Demonstration Project in Bound Brook[19]

E. Visualization of Potential Safety Measures

Provided in this section of the report are visualizations of some of the larger reaching proposed safety measures on the corridor in the Implementation Matrix (**Table 7** and **Table 8**). Visualizations of these safety measures, along with accompanying descriptions on how these ideas seek to improve safety for vehicular, pedestrian, and cyclist travel, are adapted from the following publications:

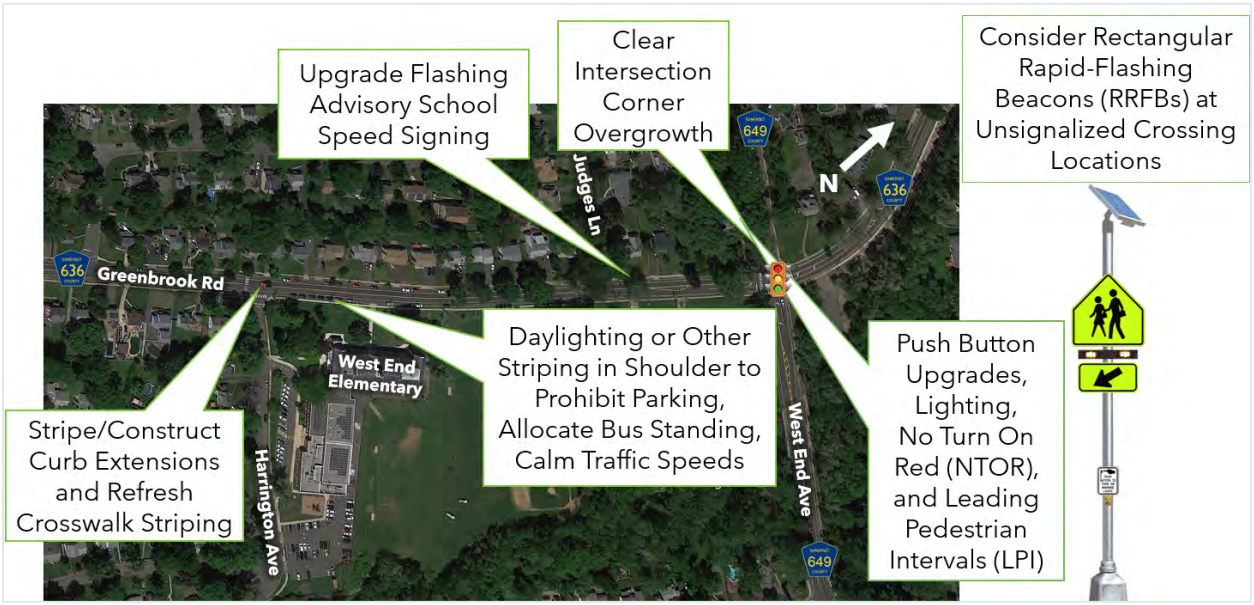
- *New Jersey Pedestrian and Bicycle Resource Center* video library, 2021[20]
- *Cross County Connection TMA* video library, 2021[21]
- *NJDOT Technology Transfer* video library, 2021[22]
- *NJDOT Safe Routes to School* video library, 2021[23]
- *2017 State of New Jersey Complete Streets Design Guide*, NJDOT, 2017
- *Proven Safety Countermeasures*, FHWA, 2017
- *Small Town and Rural Multimodal Networks*, FHWA, 2016
- *Separated Bike Lane Planning and Design Guide*, FHWA, 2015
- *New Jersey School Zone Design Guide*, NJDOT, 2014
- *Urban Bikeway Design Guide 2nd Edition*, National Association of City Transportation Officials, 2014
- *Urban Street Design Guide*, National Association of City Transportation Officials, 2012

Key Study Recommendation – Pedestrian Safety Improvements in the Vicinity of Schools

A key recommendation from this RSA is to enhance pedestrian safety though sidewalk upgrades and crosswalks at school locations, such as West End Elementary (**Figure 15**). Due to location of the corridor near parks, schools, or other land uses that tend to have a relatively high share of active mode trip generation, it was discussed to stripe or construct curb extensions and refresh crosswalk striping and consider the installation of Rectangular Rapid-Flashing Beacons (RRFBs) at unsignalized crossing locations.

[19] Safe Routes New Jersey. Walking School Bus. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=38vFiOw2WQY.
[20] https://www.youtube.com/channel/UCMsSU487ZPfaOAjcC7K8_SQ
[21] https://www.youtube.com/channel/UC5C0fODzuDqT9ycKMYv0C3Q
[22] https://www.youtube.com/channel/UC-L3YfqzFHcuDw6aI7wDrJQ
[23] https://www.youtube.com/channel/UCjlvrPjwNZ97MkX5lRol4ow

Figure 15 – Sample of Pedestrian Safety Improvements Near West End Elementary



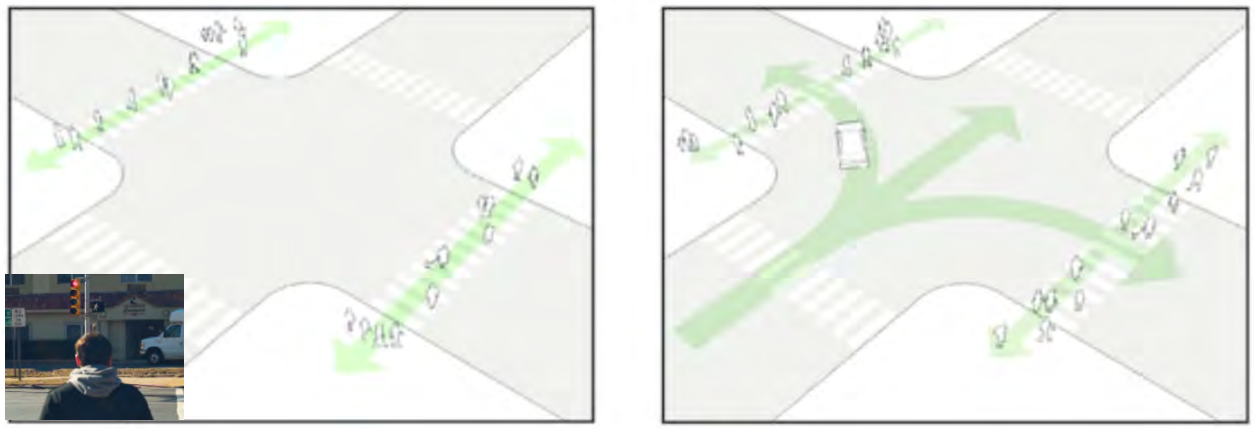
Daylighting or other striping in shoulder would aid to prohibit parking, allocate bus standing, and calm traffic speeds. At nearby signalized intersections, push button upgrades, lighting, No Turn on Red (NTOR) restrictions, and Leading Pedestrian Intervals (LPIs) are recommended.

Leading Pedestrian Intervals (LPIs) & Signal Phasing

LPIs are a low-cost, effective way to help pedestrians establish their presence at signalized crossing locations before conflicting vehicles have the right-of-way (**Figure 16**). This is one of FHWA's Proven Safety Countermeasures, boasting an approximate reduction of 13%[24] of pedestrian-vehicle crashes with proper implementation. Vehicular capacity is noted to be a barrier to implementation, which is why the County would need to conduct capacity analysis at intersections before implementation. However, Greenbrook Road signalized intersections with West End Avenue and Grove Street are prime candidates for LPI implementation due to the simple two-phase timing at these intersections and since both intersections facilitate walking routes to school. Student pedestrians are vulnerable users and have difficulty establishing their presence at an intersection, which is why LPIs could be warranted here to help students get a three to four-second start into the intersection that allows them to be better seen by drivers.

[24] FHWA. (2017). Proven Safety Countermeasures. https://safety.fhwa.dot.gov/provencountermeasures/.

Figure 16 – Leading Pedestrian Interval (from NACTO and Lakewood Township)[25]



PHASE 1

Pedestrians are given a minimum head start of 3–7 seconds when entering the intersection.

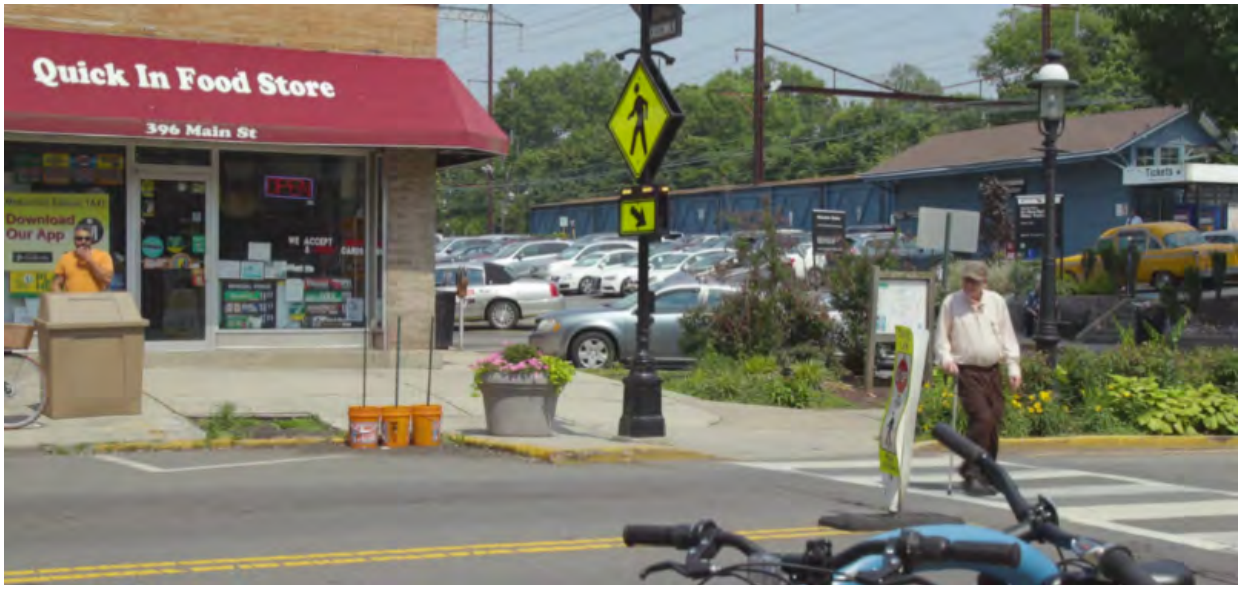
PHASE 2

Through and turning traffic are given the green light. Turning traffic yields to pedestrians already in the crosswalk.

Rectangular Rapid Flashing Beacons (RRFBs)

At locations where new midblock crosswalks are proposed in this RSA report, such as those near West End Elementary School and Fromm Field, pedestrian-actuated RRFBs could further increase the visibility of students and other pedestrians crossing at these locations. Installing RRFBs at crossing locations could reduce the risk of vehicle-pedestrian crashes to as little as 10% (average crash reduction seen is 47.4%[26]).

Figure 17 – RRFB Installation in Metuchen Borough by Middlesex County[27]



[25] Figure from National Association of City Transportation Officials. (2012). *Urban Street Design Guide*. Photo from NJDOT Technology Transfer. (2019). *What is an LPI?* YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=xk8hn7rdHds.

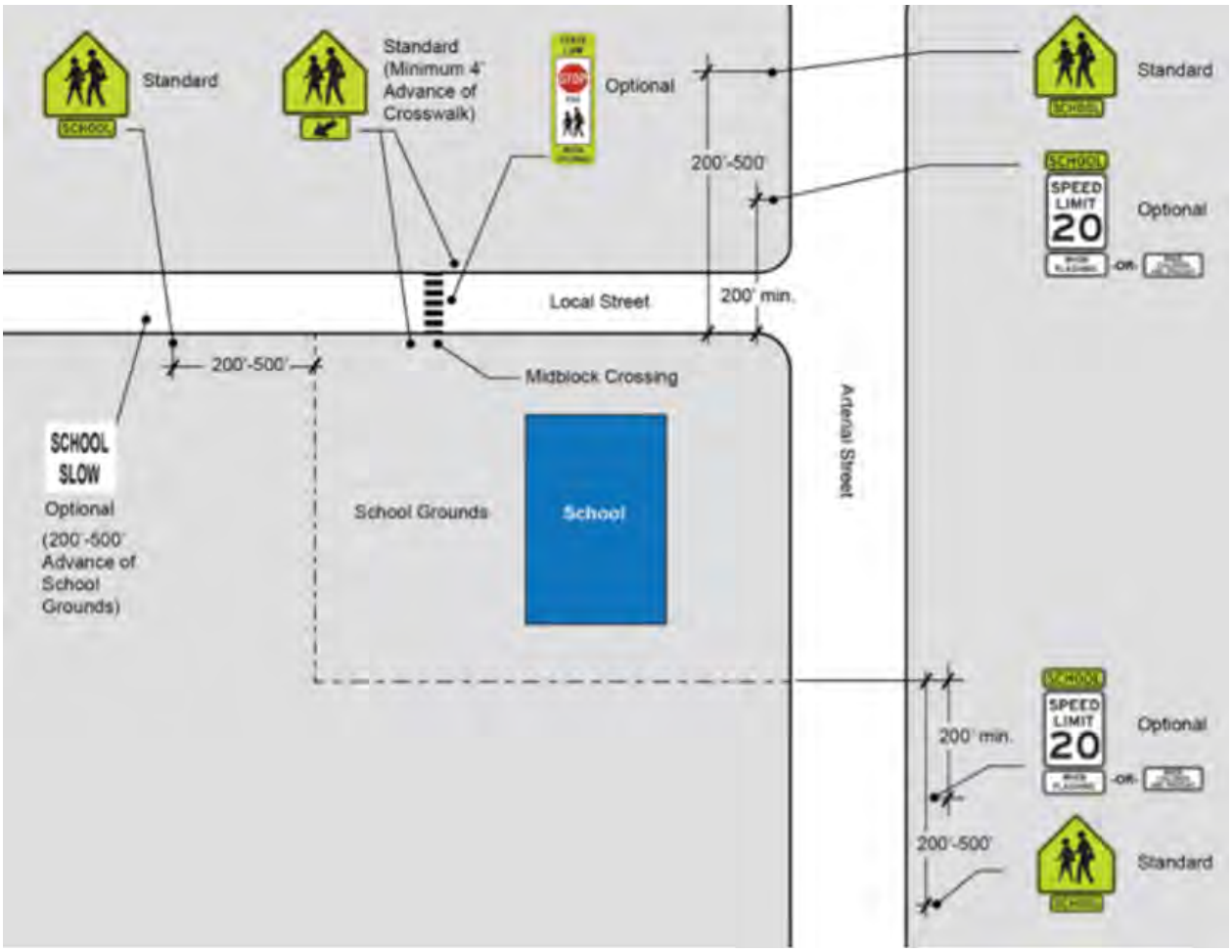
[26] http://www.cmfclearinghouse.org/detail.cfm?facid=9024

[27] NJDOT / FWHA. (2012). The Complete Streets Movement. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=IKAKxQvpeHk.

School Signing on Greenbrook Road

School signing and striping on Greenbrook Road on approach to West End Elementary School, and on approach to the Middle School/High School, needs upgrade to MUTCD standards (placement distance, fluorescent yellow-green signing, etc.) and state school signing practices. More clear and consistent messaging is needed at nearby intersections. Messages striped on the pavement, like "SCHOOL" and "SLOW," better catch the cone of vision for drivers passing the school. Wider crosswalk bars also better alert drivers to potential crossing pedestrian traffic. For the re-signing and re-striping of school advisory messages on Franklin Boulevard, the designer should refer to NJDOT's *New Jersey School Zone Design Guide* (2014, key figure shown on Figure 18) and the MUTCD for best practices.

Figure 18 – Figure from New Jersey School Zone Design Guide Showing Signing Placement



VII. Conclusion

This RSA Report seeks to describe the process undertaken by the County to investigate potential traffic safety issues along the Greenbrook Road corridor (CR 636), extending from the intersection with Harrington Avenue at MP 0.7 to the intersection with CR 531 (Somerset Street) at MP 1.97, located in North Plainfield Borough. From survey of prior County, municipal, or regional studies to public and stakeholder outreach conducted as part of this study to the crash data that was reviewed report-by-report to the observations made during in-field audits, potential concerns were observed and recorded, not only for corridor-wide issues, but for location-specific issues.

In order to address these potential concerns, discussions were held with the RSA team and County Engineering to develop a list of tasks to improve traffic safety on the corridor, which are codified in the Implementation Matrix (Chapter VI, Subsection A) in this report. To assist the responsible jurisdictions (whether municipal, County, or separate agency) to schedule and prioritize these improvements, such were classified by anticipated timeline, and cost magnitude. It is encouraged that the improvement recommendations are shared with all responsible jurisdictions to increase the benefits to be seen from the recommendations in this report.

While the recommendations in the Implementation Matrix are centered around the engineering (and associated maintenance) of roadway features, changes to hard infrastructure alone will fall shy of the benefit that would be seen by implementing the 5E's of highway safety[28]:

- Engineering: highway design, traffic, maintenance, operations, and planning professionals;
- Enforcement: State and local law enforcement agencies;
- Education: communication professionals, educators, and citizen advocacy groups;
- Emergency response: first responders, paramedics, fire, and rescue; and,
- Equity: prioritizing the safety of vulnerable roadway users.

This approach recognizes a shared responsibility across numerous professions to see improved benefits in corridor crash performance, beyond the anticipated reduction in crashes with the implementation of proven crash countermeasures. RideWise (the County's TMA), law enforcement, and EMS are encouraged to continue their efforts in educating the local driving population, holding driving behaviors accountable to Title 39, improving the response times to severe crash incidents, and reaching underserved communities with these safety strategies.

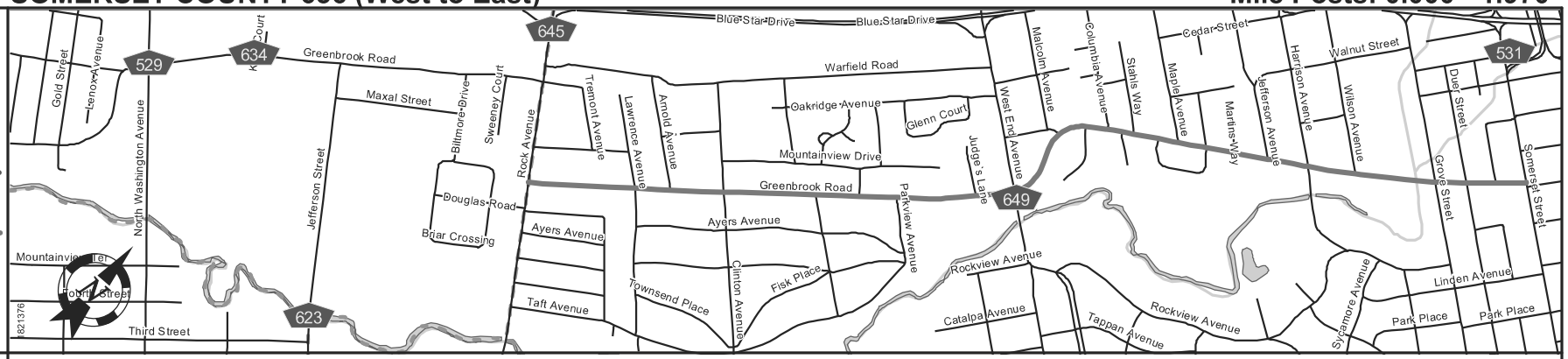
[28] Adapted from FHWA, https://safety.fhwa.dot.gov/hsip/resources/fhwasa1102/flyr3_in.cfm

Appendix A

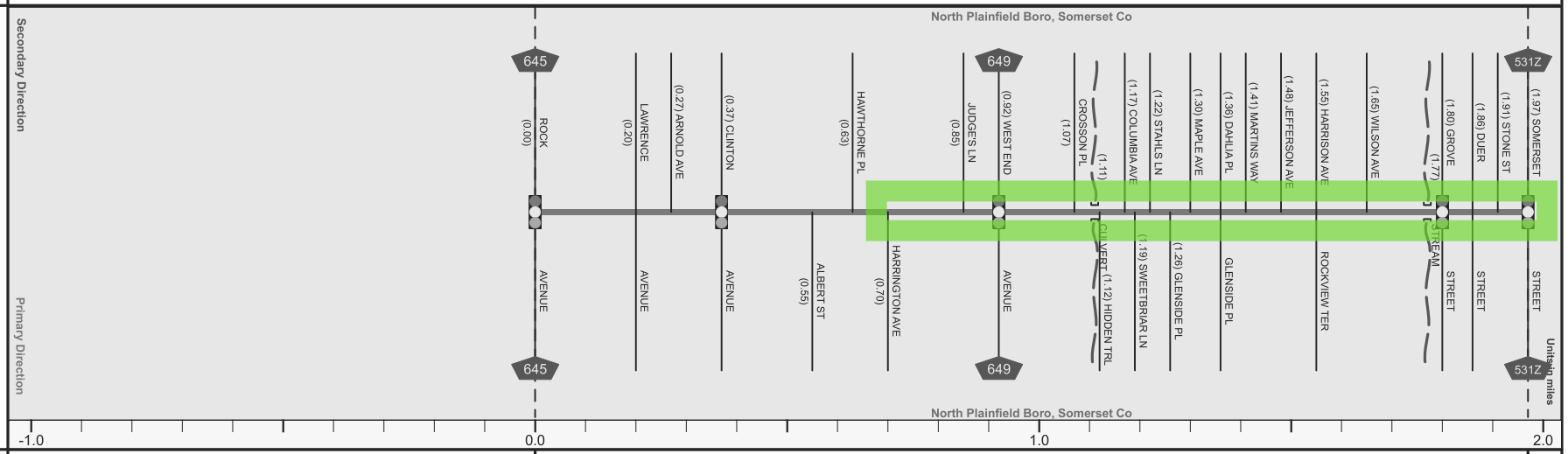
Straight Line Diagram

SOMERSET COUNTY 636 (West to East)

Mile Posts: 0.000 - 1.970



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



Street Name		Greenbrook Road	
Jurisdiction		County	
Functional Class		Urban Minor Arterial	
Federal Aid - NHS Sy		STP	
Control Section			
Speed Limit		35	
Number of Lanes		2	
Med. Type		None	
Med. Width		0	
Pavement		26 / 24 / 28	
Shoulder		8 / 4	
Traffic Volume		8,554 (2018)	
Traffic Sta. ID		111834	
Structure No.		18M1004	
Enlarged Views			

Begin Somerset County 636 MP=0

End Somerset County 636 MP=1.97

Page Created: March, 2019

SRI = 18000636__

Date last inventoried: July 2011

Appendix B

Traffic Data

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 07/10/2018 to 07/12/2018

Site names: 111834,Greenbrook Road-1.15,18000636__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET CROSSON PL COLUMBIA AVE

Seasonal Factor Grp: rg1_4U
Daily Factor Grp: rg1_4U
Axle Factor Grp: rg1_4U
Growth Factor Grp: rg1_4U

	Sun, Jul 8, 2018			Mon, Jul 9, 2018			Tue, Jul 10, 2018			Wed, Jul 11, 2018			Thu, Jul 12, 2018			Fri, Jul 13, 2018			Sat, Jul 14, 2018		
	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W
00:00										58	32	26	65	29	36						
01:00										27	10	17	30	12	18						
02:00										21	8	13	24	11	13						
03:00										23	9	14	26	8	18						
04:00										49	17	32	44	17	27						
05:00										162	71	91	167	77	90						
06:00										353	177	176	337	165	172						
07:00										532	248	284	565	290	275						
08:00										620	282	338	574	271	303						
09:00										417	201	216	411	208	203						
10:00										379	188	191	386	172	214						
11:00										417	176	241	431	194	237						
12:00							464	193	271	488	229	259									
13:00							490	219	271	457	190	267									
14:00							526	245	281	476	221	255									
15:00							603	257	346	555	259	296									
16:00							835	389	446	817	373	444									
17:00							1,070	530	540	1,075	517	558									
18:00							886	418	468	961	478	483									
19:00							612	280	332	650	267	383									
20:00							437	184	253	454	213	241									
21:00							378	168	210	355	170	185									
22:00							216	95	121	202	86	116									
23:00							123	53	70	130	58	72									
Total							6,640	3,031	3,609	9,678	4,480	5,198	3,060	1,454	1,606						
AM Peak Vol										644	294	350	605	292	320						
AM Peak Fct										.942	.855	.884	.945	.811	.87						
AM Peak Hr							:	:	:	7: 45	7: 45	7: 45	7: 30	7: 45	7: 30						
PM Peak Vol							1,070	530	544	1,075	530	558									
PM Peak Fct							.952	.908	.883	.963	.953	.943									
PM Peak Hr							17: 00	17: 00	17: 15	17: 00	17: 30	17: 00	:	:	:						
Seasonal Fct							1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001						
Daily Fct							.899	.899	.899	.895	.895	.895	.860	.860	.860						
Axle Fct							.495	.495	.495	.495	.495	.495	.495	.495	.495						
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000						

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ROAD AADT 8,554 NDIR AADT 4,597 PDIR AADT 3,957

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 07/10/2018 to 07/12/2018

Site names: 111834,Greenbrook Road-1.15,18000636__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET CROSSON PL COLUMBIA AVE

Seasonal Factor Grp: rg1_4U
Daily Factor Grp: rg1_4U
Axle Factor Grp: rg1_4U
Growth Factor Grp: rg1_4U

	Sun, Jul 8, 2018			Mon, Jul 9, 2018			Tue, Jul 10, 2018			Wed, Jul 11, 2018			Thu, Jul 12, 2018			Fri, Jul 13, 2018			Sat, Jul 14, 2018		
	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W
00:00										58	32	26	65	29	36						
01:00										27	10	17	30	12	18						
02:00										21	8	13	24	11	13						
03:00										23	9	14	26	8	18						
04:00										49	17	32	44	17	27						
05:00										162	71	91	167	77	90						
06:00										353	177	176	337	165	172						
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11:00										417	176	241	431	194	237						
12:00							464	193	271	488	229	259									
13:00							490	219	271	457	190	267									
14:00							526	245	281	476	221	255									
15:00							603	257	346	555	259	296									
16:00							835	389	446	817	373	444									
17:00							1,070	530	540	1,075	517	558									
18:00							886	418	468	961	478	483									
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20:00							437	184	253	454	213	241									
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22:00							216	95	121	202	86	116									
23:00							123	53	70	130	58	72									
Total							6,640	3,031	3,609	9,678	4,480	5,198	3,060	1,454	1,606						
AM Peak Vol										644	294	350	605	292	320						
AM Peak Fct										.942	.855	.884	.945	.811	.87						
AM Peak Hr							:	:	:	7: 45	7: 45	7: 45	7: 30	7: 45	7: 30						
PM Peak Vol							1,070	530	544	1,075	530	558									
PM Peak Fct							.952	.908	.883	.963	.953	.943									
PM Peak Hr							17: 00	17: 00	17: 15	17: 00	17: 30	17: 00	:	:	:						
Seasonal Fct							1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001						
Daily Fct							.899	.899	.899	.895	.895	.895	.860	.860	.860						
Axle Fct							.495	.495	.495	.495	.495	.495	.495	.495	.495						
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000						

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ROAD AADT 8,554 NDIR AADT 4,597 PDIR AADT 3,957

Appendix C

Excerpts from Prior Studies

Time System (travel time) message boards (TTS) on the existing West End Avenue pedestrian bridge, and installation of an eastbound camera and eastbound Digital Message Board in vicinity of the Norwood Avenue/North Drive intersection.

As part of the New Jersey Statewide Transportation Improvement Program, maintenance along the Route 22 corridor occurs on an ongoing basis, including roadway repairs, utility maintenance, and routine highway systems repairs (i.e. traffic signals, etc.). Additional near-term improvements slated for the portion of Route US 22 in North Plainfield include resurfacing of the mainline roadway through the West End Avenue, and "community based" multi-modal improvements to enhance travel options, including the provision of continuous sidewalks along eastbound and westbound Route 22 between Rock Avenue and Somerset Street.

Greenbrook Road (County Route 636): Greenbrook Road is an existing east-west major collector road which extends east from Rock Avenue to Somerset Street. The posted speed limit is 35 MPH, and a single travel lane is provided in each direction. Between Rock Avenue and Grove Street, Greenbrook Road has striped shoulders along each side of the road. On-street parking is permitted on both sides of Greenbrook Road, except on the north side of the road between West End Avenue and Grove Street, and along the south side of the road, between Stony Brook and Somerset Street. The pavement width varies along the roadway from approximately 40 feet between Rock Avenue and West End Avenue, to approximately 34 feet between West End Avenue and Somerset Street. The existing right-of-way for the roadway is seventy (70) feet between Rock Avenue and West End Avenue, and 50 feet between West End Avenue and Somerset Street. Somerset County proposes that the entire roadway have a minimum right-of-way of 60 feet.

Average daily traffic volume data collected by Somerset County along Greenbrook Road varies greatly, with 5,506 vehicles (two-way) recorded east of Rock Avenue; 7,124 vehicles recorded at Clinton Avenue; 11,716 vehicles recorded at West End Avenue; 18,440 vehicles recorded west of Grove Street; and 3,972 vehicles recorded west of Somerset Street. These volumes indicate the increasing levels of traffic activity along Greenbrook Avenue, particularly in vicinity of the Middle/High School and Stony Brook School facilities, and the function of Greenbrook Avenue as a major collector roadway, serving inter-municipal traffic and access to the local and regional arterial roadway system.

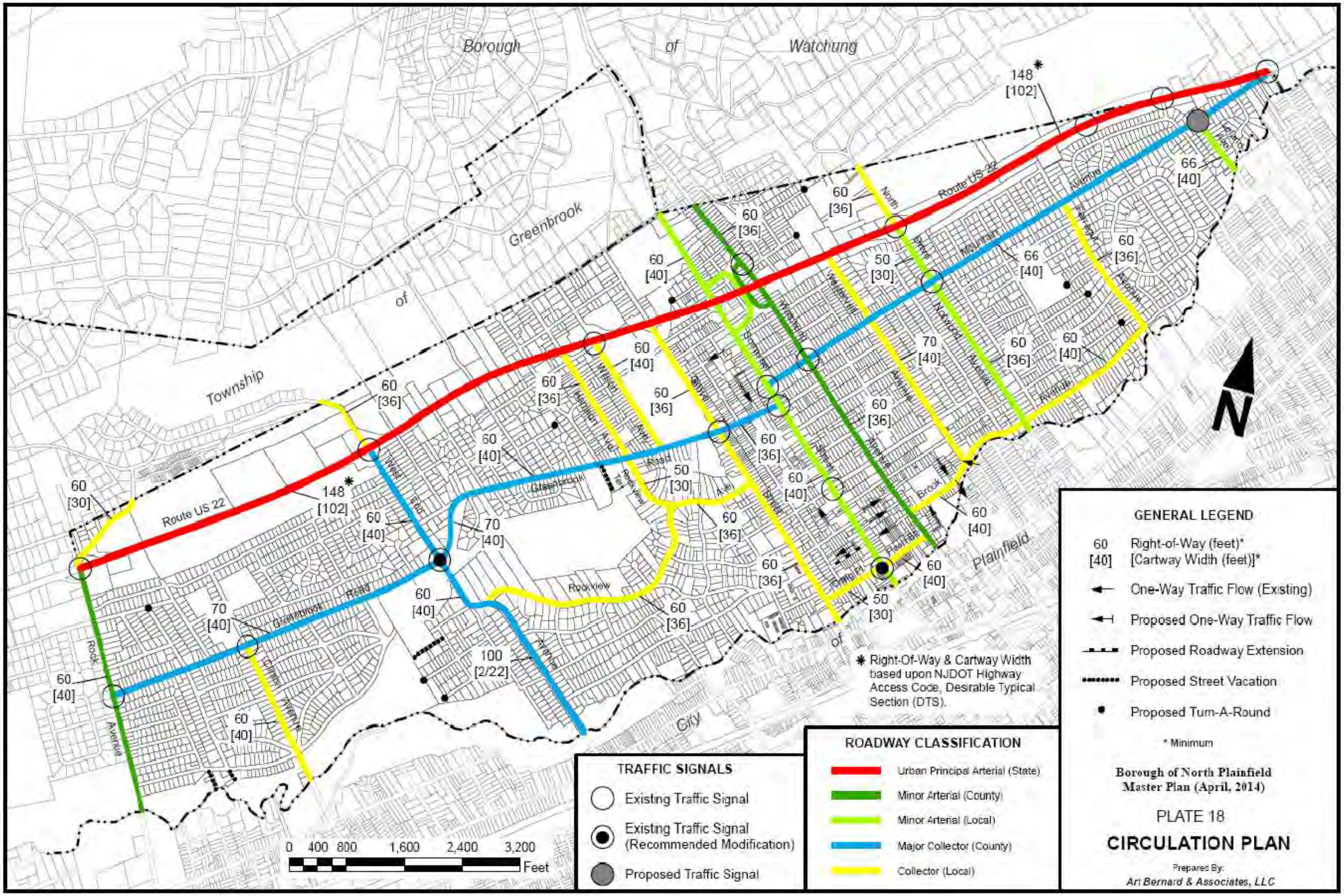
As shown on Exhibit 22, peak hour volumes along Greenbrook Avenue have increased a minimum of 30.4 percent, with peak hour volumes at Grove Street increasing more than double (+138.8%). With the exception of the Grove Street intersection, the remaining signalized intersections along Greenbrook Avenue have been upgraded by Somerset County, including lane geometry and traffic signal improvements, and are adequate to meet the existing traffic demand. At Grove Street, significant delays result on school-days as a

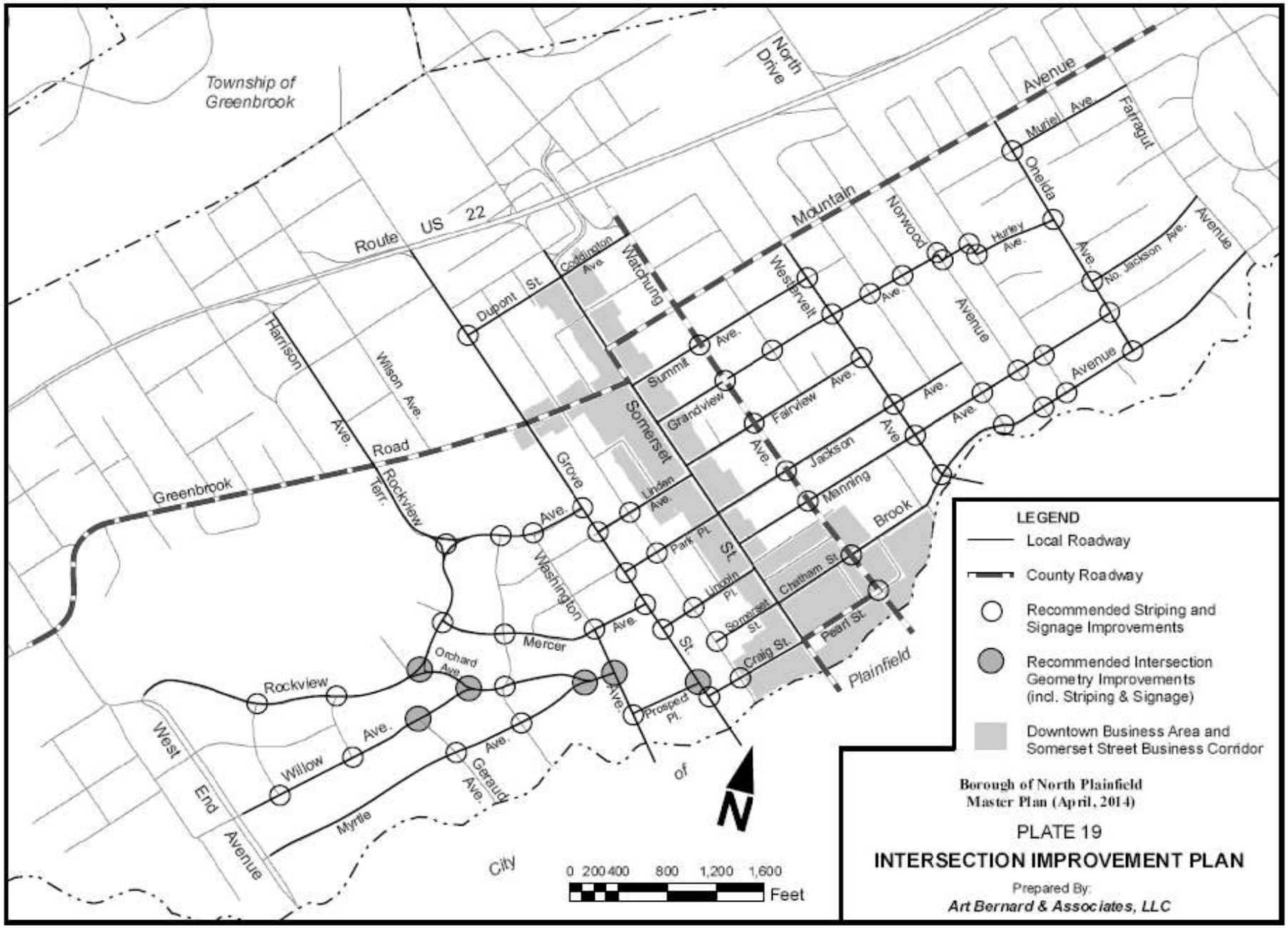
result of student drop-off/pick-up activities and high student pedestrian activity, as well as during PM peak hour periods. These delays appear to be the result of inadequate lane capacity at the intersection and school crossing-guard activity. While these conditions occur regularly on school days, congestion on local roadways results in significant delays and rerouting of traffic through alternate residential streets. No improvements are proposed at this intersection at this time. It is recommended that the Grove Street intersection at Greenbrook Avenue be evaluated to determine the feasibility of improving traffic operations at this location.

West End Avenue (County Route 649): West End Avenue is an existing major collector roadway, which extends between New Jersey Route 28 in Plainfield, through North Plainfield to Route U.S. 22. The posted speed limit in each direction is 35 MPH. The County Circulation Plan Element proposes that the entire roadway have a minimum right-of-way width of 60 feet. The northern portion of the roadway between Rockview Avenue and Route 22 has an existing right-of-way width of 60 feet, and is provided with a single travel lane in each direction. No shoulders are provided along this portion of the roadway, except along the northbound side, between Rockview Avenue and Greenbrook Road. The southerly portion of West End Avenue between the Borough boundary with Plainfield and Rockview Avenue has an existing right-of-way of 100 feet, with one travel lane and shoulders in each direction, separated by a curbed, grass median. No improvements are proposed to West End Avenue by Somerset County at this time.

The cartway width for West End Avenue is twenty feet in each direction between the Borough boundary with Plainfield and Rockview Avenue and approximately 36 feet for the entire roadway section north of Greenbrook Road. Between Rockview Avenue and Greenbrook Road, the cartway width varies between 40 feet and 48 feet. Average daily traffic volume data reported by Somerset County in 2010, indicates 11,318 vehicles in vicinity of Greenbrook Road. Peak hour activity on West End Avenue at the Greenbrook Avenue intersection (Exhibit 22) has increased 63.5 percent, from 631 to 1,032 northbound/southbound peak hour movements from 1974 to the present. This increase reflects the use of West End Avenue for intra-municipal traffic to/from Route 22. With the recent intersection lane geometry and traffic signal improvements, the intersection is adequate to meet the present traffic demand.

Mountain Avenue (County Route 642): Mountain Avenue is a major collector roadway which extends east from Somerset Street to the Borough's easterly boundary with Watchung Borough, in vicinity of Route 22 and Raymond Road. This roadway has an existing right-of-way width of 66 feet, and a posted speed limit of 35 MPH. The County proposes that Mountain Avenue have a minimum right-of-way of 60 feet. The cartway width for the entire roadway segment is approximately 40 feet, with one travel lane and on-street parking provided in both directions.


Borough of Watchung
Township of Greenbrook
Plainfield
City
Route US 22
148*
[102]
GENERAL LEGEND
60 [40] Right-of-Way (feet)* [Cartway Width (feet)]*
One-Way Traffic Flow (Existing)
Proposed One-Way Traffic Flow
Proposed Roadway Extension
Proposed Street Vacation
Proposed Turn-A-Round
* Minimum
* Right-Of-Way & Cartway Width based upon NJDOT Highway Access Code, Desirable Typical Section (DTS).
ROADWAY CLASSIFICATION
Urban Principal Arterial (State)
Minor Arterial (County)
Minor Arterial (Local)
Major Collector (County)
Collector (Local)
TRAFFIC SIGNALS
Existing Traffic Signal
Existing Traffic Signal (Recommended Modification)
Proposed Traffic Signal
0 400 800 1,600 2,400 3,200 Feet
Borough of North Plainfield Master Plan (April, 2014)
PLATE 18
CIRCULATION PLAN
Prepared By:
Ari Bernard & Associates, LLC


Township of Greenbrook
North Drive
Avenue
Muriel Ave.
Farragut
Mountain
Norwood
Oneida
Hurley Ave.
No. Jackson Ave.
Avenue
Route US 22
Dupont St.
Coddington Ave.
Watchung
Westervelt
Ave.
Summit
Grandview
Fairview Ave.
Jackson Ave.
Manning
Brook
Harrison
Wilson Ave.
Ave.
Road
Rockview Ter.
Greenbrook
Somerset
Linden Ave.
Grove
Park Pl.
St.
Lincoln Pl.
Somerset St.
Chatham St.
Pearl St.
Craig St.
Washington
Mercer
Orchard Ave.
Rockview
Willow
Myrtle
Geraud Ave.
Prospect Pl.
West End Avenue
Plainfield
City of
N
0 200 400 800 1,200 1,600
Feet
LEGEND
Local Roadway
County Roadway
Recommended Striping and Signage Improvements
Recommended Intersection Geometry Improvements (incl. Striping & Signage)
Downtown Business Area and Somerset Street Business Corridor
Borough of North Plainfield
Master Plan (April, 2014)
PLATE 19
INTERSECTION IMPROVEMENT PLAN
Prepared By:
Art Bernard & Associates, LLC

and pedestrian activity, and a general disregard of traffic control signage or pavement markings. While enforcement is an integral part of traffic control in any municipality, maintaining proper design and adequate signage, etc., is also necessary to reinforce safe travel patterns and driving habits.

To improve traffic conditions, and enhance traffic safety and pedestrian safety at the above noted locations, it is recommended that the Borough's Capital Roadway Improvement Plan incorporate geometric improvements (i.e. modified curb radii treatments, approach alignments, etc.) to discourage 'free-flow' conditions and reduce travel speeds along these primary access roads. In concert with these geometric improvements, the previously noted signing, striping and pavement marking improvements should also be included.

Signalized Intersections

At present, all existing traffic signal installations in North Plainfield are maintained by Somerset County, including two existing signals on Somerset Street (Park Place/Jackson Avenue, Craig Place/Pearl Street. With the exception of the traffic signal at Craig Place/Pearl Street and Somerset Street, all signals conform to the Manual On Uniform Traffic Control Devices (MUTCD), including pedestrian actuated operation.

To allow for adequate and safe traffic control at all signal locations, it is recommended that all signals be maintained in a manner that provides for proper operation and adequate visibility for motor vehicle and pedestrian activity, including replacement of aging equipment and clearance of obstacles or vegetation that may inhibit visibility of signal head displays. It is recommended that the existing signal installation at Somerset Street and Craig Place/Pearl Street be fully upgraded to provide pedestrian actuated operation.

Somerset County has proposed the installation of a traffic signal installation at the intersection of Mountain Avenue (CR 642) and Leland Avenue. According to the Somerset County Capital Improvement Plan for Roads and Bridges, this improvement is slated to begin in the near future. ***It is recommended that North Plainfield encourage the County to complete this improvement in a timely manner to improve traffic conditions at this intersection, which accommodates a large amount of traffic activity through North Plainfield, between the City of Plainfield and Route U.S. 22.***

As noted during the Basic Studies update, it was observed that the visibility is limited for 'right-turn-on-red' movements on the southbound and eastbound approaches at the signalized intersection of West End Avenue and Greenbrook Road. It is therefore recommended that this intersection be evaluated by North Plainfield and Somerset County to remediate this condition, as necessary, or prohibit these movements.

Downtown Circulation – Somerset Street/Watchung Avenue

As revealed in the Basic Studies of the Master Plan update, travel conditions and pedestrian safety in the downtown area, and along Somerset Street and Watchung Avenue are greatly

Strip crosswalk 5 and stop bars with thermoplastic not currently present.

Remove or replace No Parking w/in fifty feet sign at Harrington Avenue & Greenbrook Road

Harrington Avenue & Greenbrook Road: Patch & Replace markings with thermoplastic

Appendix D

Collision Diagrams

North Plainfield Borough
Somerset County

1

2

3

SOMERSET 636 COUNTY

Greenbrook Rd

Harrington Ave

Western Limit of Segment

MATCH LINE A

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A9-AII FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (1 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A1

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North Plainfield Borough
Somerset County

MATCH LINE B

MATCH LINE A

Judges Ln

Greenbrook Rd

SOMERSET 636 COUNTY

West End Ave

SOMERSET 649 COUNTY

4
19
14
10
9
20
22
21
13,7
15,16
11
8
6
12
5
17,18

LEGEND

CRASH NUMBER SEE EXHIBIT A9-AII FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (2 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A2

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North Plainfield Borough
Somerset County

Crosson Pl
Greenbrook Rd
SOMERSET 636 COUNTY
Hidden Trail
Columbia Ave

MATCH LINE B

MATCH LINE C

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A9-AII FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (3 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A3

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North Plainfield Borough
Somerset County

Stahls Way

Maple Ave

Dahlia Terr

MATCH LINE C

MATCH LINE D

Greenbrook Rd

SOMERSET 636 COUNTY

31

32

34

Sweetbriar Ave

Glenside Pl

33

Glenside Pl

LEGEND

CRASH NUMBER SEE EXHIBIT A9-AII FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (4 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A4

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North Plainfield Borough
Somerset County

Martin's Way

Jefferson Ave

MATCH LINE D

MATCH LINE E

SOMERSET 636 COUNTY

Greenbrook Rd

35 36 37 38 39 40

LEGEND

CRASH NUMBER SEE EXHIBIT A9-AII FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (5 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A5

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North Plainfield Borough
Somerset County

Harrison Ave

Wilson Ave

Greenbrook Rd

Rockview Terr

MATCH LINE E

MATCH LINE F

58

57,56

55

51

54,53

52

50

45,46

41

43

46,47

44

49,48

LEGEND

CRASH NUMBER SEE EXHIBIT A9-AII FOR DETAILS

- # PDO
- # INJURY
- # FATAL

EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (6 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A6

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North Plainfield Borough
Somerset County

MATCH LINE F

MATCH LINE G

Grove St

Duer St

Greenbrook Rd

SOMERSET 636 COUNTY

79 60 76,74 77 66 69 62 63 65 71 67 73 61 78 68,70 75 72 64 59 80 81 85 86 87 91,90,89, 88,82 84 83

LEGEND

CRASH NUMBER SEE EXHIBIT A9-AII FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (7 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A7

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North Plainfield Borough
Somerset County

MATCH LINE G

ONE WAY

Stone St

Greenbrook Rd

SOMERSET 636 COUNTY

SOMERSET 531 COUNTY

Somerset St

Summit Ave

96 94 95 93 92 100 98 99 97

Eastern Limit of Segment

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A9-AII FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (8 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A8

U:\192510854\graphic_design\CrashDiagrams\CR636_NorthPlainfield_MP0.70-1.97

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
1	11/22/2016	02:14 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
2	12/18/2017	02:58 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
3	02/25/2017	02:25 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
4	04/01/2017	10:25 AM	Injury	1	Fixed Object	Daylight	Dry
5	06/24/2017	08:34 AM	Injury	1	Fixed Object	Daylight	Dry
6	10/07/2018	04:34 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
7	09/02/2017	07:20 PM	Property Damage Only	0	Left Turn/U-turn	Dark, Street lights on, continuous lighting	Wet
8	10/02/2014	04:21 PM	Injury	1	Pedestrian	Daylight	Dry
9	10/30/2018	06:44 AM	Injury	1	Pedestrian	Dusk	Dry
10	07/30/2017	08:46 AM	Injury	2	Right Angle	Daylight	Dry
11	01/20/2017	01:00 PM	Property Damage Only	0	Right Angle	Daylight	Dry
12	12/11/2017	07:12 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
13	03/05/2018	06:42 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
14	06/28/2017	01:17 PM	Property Damage Only	0	Right Angle	Daylight	Dry
15	03/07/2017	07:24 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
16	12/20/2017	07:00 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
17	10/20/2016	09:49 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
18	12/26/2017	03:28 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
19	12/03/2018	07:05 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
20	12/25/2017	11:10 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
21	02/21/2016	01:59 AM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Dry
22	03/21/2018	07:17 PM	Property Damage Only	0	Opposite Direction (Head on, Angular)	Dark, Street lights on, continuous lighting	Snowy
23	07/10/2018	07:54 AM	Injury	2	Opposite Direction (Head on, Angular)	Daylight	Dry
24	10/07/2018	02:09 AM	Injury	2	Fixed Object	Dark, Street lights on, continuous lighting	Dry
25	03/10/2016	04:49 AM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, continuous lighting	Dry
26	01/09/2017	01:17 AM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Wet
27	11/02/2016	04:03 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
28	09/29/2017	10:45 PM	Injury	1	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
29	09/11/2018	07:21 PM	Property Damage Only	0	Animal	Dark, Street lights off	Dry
30	06/15/2016	05:13 PM	Property Damage Only	0	Pedalcyclist	Daylight	Dry
31	01/30/2016	11:54 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
32	12/09/2016	05:22 PM	Injury	1	Pedestrian	Dark, No Street lights	Dry
33	05/26/2017	09:05 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
34	07/28/2017	01:10 PM	Injury	2	Opposite Direction (Head on, Angular)	Daylight	Dry
35	01/30/2017	12:07 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
36	05/28/2014	02:52 PM	Injury	1	Pedestrian	Daylight	Dry
37	08/21/2016	11:50 PM	Property Damage Only	0	Animal	Dark, Street lights on, continuous lighting	Wet
38	01/24/2017	07:07 AM	Property Damage Only	0	Backing	Daylight	Wet
39	08/25/2017	04:39 PM	Injury	2	Pedestrian	Daylight	Dry
40	03/26/2018	05:39 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
41	07/06/2018	06:47 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
42	02/23/2016	01:32 PM	Injury	1	Right Angle	Daylight	Wet
43	04/16/2017	07:38 PM	Injury	1	Right Angle	-	Dry
44	12/24/2017	11:23 PM	Injury	1	Right Angle	Dark, Street lights on, continuous lighting	Wet
45	01/23/2017	06:28 PM	Injury	1	Right Angle	Dark, Street lights on, continuous lighting	Wet

CRASH DIAGRAM (9 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A9

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
46	07/10/2017	07:48 PM	Property Damage Only	0	Right Angle	Daylight	Dry
47	08/30/2017	01:30 PM	Property Damage Only	0	Right Angle	Daylight	Dry
48	09/11/2016	11:19 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
49	07/31/2016	12:07 AM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Wet
50	10/06/2017	02:06 PM	Property Damage Only	0	Left Turn/U-turn	Daylight	Dry
51	05/20/2015	03:18 PM	Injury	1	Pedalcyclist	Daylight	Dry
52	08/22/2018	10:10 AM	Property Damage Only	0	Right Angle	Daylight	Dry
53	03/23/2016	07:44 AM	Property Damage Only	0	Right Angle	Daylight	Dry
54	06/10/2016	04:12 PM	Property Damage Only	0	Right Angle	Daylight	Dry
55	09/08/2017	06:02 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
56	12/07/2017	09:43 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
57	09/22/2016	12:20 AM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
58	02/25/2017	03:37 AM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Dry
59	05/24/2018	06:19 PM	Property Damage Only	0	Backing	Daylight	Dry
60	07/07/2018	04:08 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
61	03/25/2018	02:21 PM	Property Damage Only	0	Backing	Daylight	Dry
62	11/21/2017	04:46 PM	Injury	2	Left Turn/U-turn	Dusk	Dry
63	05/26/2015	07:50 AM	Injury	1	Pedestrian	Daylight	Dry
64	10/17/2018	07:56 AM	Injury	1	Pedestrian	Daylight	Dry
65	09/11/2014	02:17 PM	Injury	1	Pedestrian	Daylight	Dry
66	11/02/2017	07:34 AM	Property Damage Only	0	Pedestrian	Dark, Street lights on, continuous lighting	Dry
67	10/10/2017	09:12 AM	Injury	1	Right Angle	Daylight	Dry
68	03/05/2018	10:24 AM	Property Damage Only	0	Right Angle	Daylight	Dry
69	09/28/2017	09:48 AM	Property Damage Only	0	Right Angle	Daylight	Dry
70	12/31/2016	06:05 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
71	09/09/2017	10:06 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
72	08/02/2016	04:59 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
73	05/28/2016	08:23 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
74	02/23/2017	03:27 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
75	04/26/2018	04:58 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
76	03/09/2017	04:20 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
77	09/03/2017	10:11 AM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Dry
78	03/02/2017	07:24 AM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Dry
79	12/27/2017	07:53 PM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Dry
80	10/06/2018	01:47 PM	Property Damage Only	0	Other	Daylight	Dry
81	10/16/2016	01:15 AM	Injury	1	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Dry
82	01/03/2018	07:37 AM	Property Damage Only	0	Right Angle	Daylight	Dry
83	05/21/2014	08:29 AM	Injury	1	Pedalcyclist	Daylight	Dry
84	09/13/2015	12:18 PM	Injury	1	Pedestrian	Daylight	Dry
85	11/23/2015	07:19 PM	Injury	1	Pedestrian	Dark, Street lights on, continuous lighting	Dry
86	12/19/2016	10:21 AM	Injury	1	Right Angle	Daylight	Dry
87	07/08/2017	01:03 PM	Injury	2	Right Angle	Daylight	Dry
88	01/03/2016	12:36 PM	Property Damage Only	0	Right Angle	Daylight	Dry
89	02/23/2016	05:01 PM	Property Damage Only	0	Right Angle	Dusk	Wet
90	01/20/2017	09:30 AM	Property Damage Only	0	Right Angle	Daylight	Dry

CRASH DIAGRAM (10 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A10

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Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
91	06/25/2017	03:42 PM	Property Damage Only	0	Right Angle	Daylight	Dry
92	10/08/2016	04:01 AM	Injury	1	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Dry
93	02/24/2016	09:53 AM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Wet
94	05/07/2014	09:20 AM	Injury	1	Pedestrian	Daylight	Dry
95	05/15/2018	05:39 PM	Property Damage Only	0	Right Angle	Daylight	Wet
96	07/06/2016	10:36 PM	Property Damage Only	0	Struck Parked Vehicle	Dark, No Street lights	Dry
97	11/13/2016	01:59 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
98	08/23/2017	12:27 PM	Property Damage Only	0	Fixed Object	Daylight	Dry
99	08/05/2015	04:09 PM	Injury	1	Pedalcyclist	Daylight	Dry
100	10/05/2018	07:27 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry

CRASH DIAGRAM (11 OF 11)

GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A11

Appendix E

Audit Team

North Plainfield - April 8th

Group 1 Pairs - Eastern Section

Matthew Maher, Stantec	Sergeant Dennus Kardos, Traffic Safety Officer
Tim Medina, Stantec	Pat Marotto, Somerset County
Ryan Walsh, FHI	Jody Karcher Alt to Pam Hinman
Adam Bradford, Somerset County	Elmira Bongiorno, NJ TRANSIT
Grant Lewis Somerset County	David Hollod, Borough Administrator

Group 2 Pairs - Western Section

Kati DiRaimondo, Stantec	Wallace Henry, Crossing Guard
Michael Ahillen, FHI	Pamela Hinman, School Business Administrator
Kenneth Wedeen, Somerset County	David Testa Public Works Acting Director
Walter Lane, Somerset County	Viriglio Tan, NJDOT
Jon Dugan, RideWise	

Appendix F

Pre-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Pre-Audit,
North Plainfield Corridor
April 8, 2021

North Plainfield Borough Pre-Audit Meeting

Introduction – Audit Team

- ***Funded by NJTPA***
- **Somerset County**
  - **Engineering and Planning**
  - **Board of County Commissioners**
  - **RideWise**
- **North Plainfield Borough**
  - **Engineering and Planning**
  - **Police and Fire Prevention**
  - **Public Works**
  - **BOE**
- **NJDOT**
- **NJ TRANSIT**
- **Stantec Consulting Services, Inc.**
- **FHI Studio**

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Today
In-Field Road Safety Audit

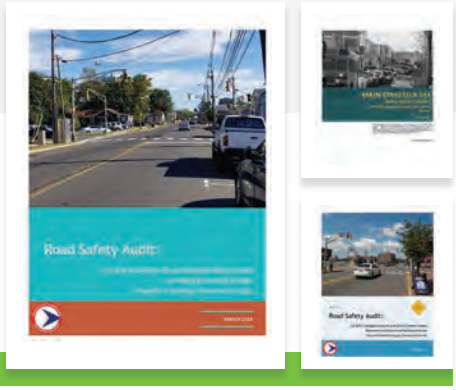
Noon Tomorrow
Adjourn

11:00 AM, Today
Pre-Audit Meeting Adjourn

10:00 AM, Tomorrow
Share Observations
Discuss Potential Improvements

Project Background

- **County initiatives for traffic safety**
- **Recommendations from RSAs to inform future…**
  - Studies
  - Improvements
  - Applications for funding



What is a Road Safety Audit (RSA)?

EVALUATION BY INDEPENDENT TEAM

IDENTIFIES CRASH TRENDS/CAUSES

PROPOSES POTENTIAL SAFETY IMPROVEMENTS

Steps of an RSA

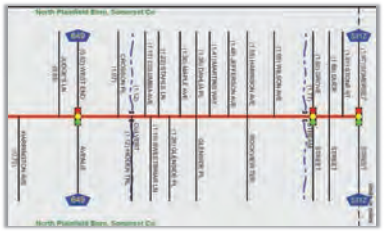
01	02	03	04	05	06	07	08
Select	Assemble	Conduct	Perform	Follow Up	Report	Present	Finalize
•Select Corridors with Stakeholder & Public Input	•Assemble RSA Team for Corridor	•Conduct Start-Up Meeting	•Perform In-Field Review	•Follow-Up on Observations •RSA De-Brief	•Report Findings •Analyze Findings	•Present Report to County	•Finalize RSA Report •County Responds

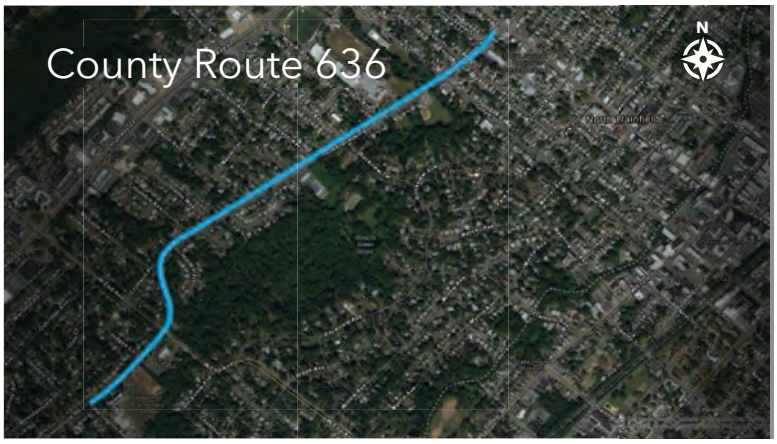
Pre-Audit Site Visit Post-Audit

Existing Conditions Data

Project Area

- Urban minor arterial
- 12' travel lanes, one in each direction
- ~9,000 AADT
- Posted 35 mph speed limit
- Posted advisory 25 mph near schools during session





Land Use

- Residential land-use
- Five schools located in study area
- Business district east of Grove Street
- Transit
  - County Shuttle – North Plainfield to RVCC
  - NJ Transit – North Plainfield Shopping Center to Plainfield Train Station
- Redevelopment
  - Consists of mainly expansion of existing commercial and institutional sites
  - No major applications currently pending

Existing Conditions Feedback

- Difficulty backing out of driveways
- Lack of pedestrian crossing locations
- Participants experienced pedestrian collisions
- Curb radii/setbacks facilitate truck traffic
- Lack of children/school awareness by drivers
- Cut-through traffic from Route 22 congestion
- Aggressive driving and speeding on corridor
- Grove Street intersection needs ped-friendly solutions

Safety Measures

FHWA Proven Safety Measures

Study-Focused Safety Measures

- Lighting
- Leading Pedestrian Intervals (LPI)
- Curb Extensions/ Bus Bulbs
- High Visibility Crosswalks
- Daylighting Crosswalks
- Turn Restrictions

Study-Focused Safety Measures

- Walkways for Sidewalk Gaps
- Bike Lanes
- Green Stormwater Infrastructure
- Dedicated Turn Lanes
- Lane Width Reduction/Road Diet

Safety Measures Feedback

- **Lighting:**
  - Lighting was noted to be adequate (every other telephone pole)
- **Curb Extensions, Daylighting, and Crossings:**
  - Curb extensions can be difficult to implement, perhaps at West End Avenue.
  - Roadway lacks width for curb extensions
  - Suggested at parking near West End School to deter midblock crossing temptation
  - Daylighting crosswalks good idea where width allows
  - Walkways for sidewalk gaps should be implemented on the north side of the road
  - Duer, Rockview, Harrison, need more attention for crossing
  - Additional safety improvements could include increased crosswalk signing
- **Turn Lanes & Turn Restrictions:**
  - Dedicated turn lanes would make things safer; difficult at Grove Street
  - Turn restrictions already signed at school locations

Safety Measures Feedback, cont'd

- **Leading Pedestrian Intervals:**
  - Most effective at the Grove Street and West End Avenue intersections
- **Bicycling:**
  - Perhaps not enough cyclists to justify bike lanes
  - Ease of implementation varies based on parking presence and street width
- **Lane Width Reductions:**
  - Lane width reductions are effective based on context; wanted near schools
  - Could be implemented towards the west end of corridor to counter speeding
- **Map specific comments include:**
  - Need for pedestrian improvements in the vicinity of Elementary School
  - Need for pedestrian improvements from Wilson Avenue to Duer Street
  - Need to consider roadway dimensions for buses from Maple to Harrison Ave

Public/ Stakeholder Improvement Feedback

Safety Measure	Effectiveness (1=not effective; 10=very effective)	Ease of Implementation (1=hard; 10=easy)
Lighting	6	10
Curb Extensions/Bus Bulbs	8	2
Daylighting and Crosswalks	8	8
Walkways for Sidewalk Gaps	6	2
Dedicated Turn Lanes	8	2
Leading Pedestrian Intervals (LPI)	10	10
High Visibility Crosswalks	9	7
Turn Restrictions	6	7
Bike Lanes	5	5
Lane Width Reduction/Road Diet	7	7

Crash Data

Crash Data - Statistics

- All Crashes 2016-2018
  - 100 Total Crashes
  - Overrepresentations:
    - Injury
    - Pedestrian crashes
    - PM
- Pedestrian Crashes 2014-2018
  - 12 Total Crashes

NJTPA Network Screening List (NSL) Crash Ranking

Overall Crash Data

Intersections

#70th Duer Street

Corridor Segments

#66th MP 0.55 – 1.55

Ped/Bike Crash Data

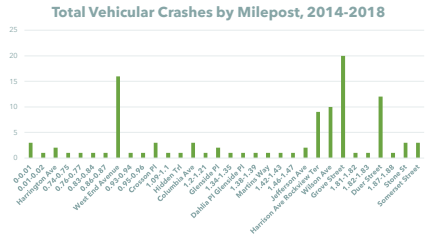
Intersections

#13th Grove Street
#19th Somerset Street
#28th Wilson Avenue | Duer Avenue - tie
#36th West End Avenue | Stone Street - tie
#76th Glenside Place

Corridor Segments

#20th MP 0.84 - 1.55

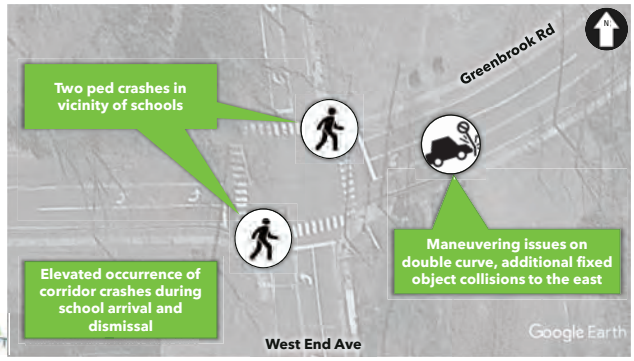
North Plainfield Borough – Histogram



- **Pedestrians** involved in **12% of crashes**, compared to 1% County average
- **33%** of crashes result in **injury**, compared to only 23% County-wide.
- **Double** the crash frequency during **night**

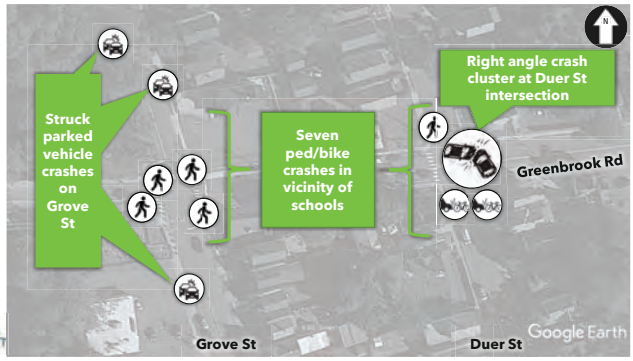
Crash Trends

Greenbrook Road in North Plainfield @ West End Avenue Intersection



Crash Trends

Greenbrook Road in North Plainfield @ Grove Street Intersection



Conducting the Audit

Guidelines & Safety

Be Observant & Alert
- Vehicles
- Wet Surfaces

Be Seen
- Face Traffic
- Avoid Sudden Movements
- Stick to Sidewalks

Be Respectful
- Traffic (Vehicular, Pedestrian, Cyclist)
- Motorists
- Property

PPE
- High Visibility Vest
- Proper Face Coverings
- Social Distancing (1 occupant/veh.)

What to Bring/Wear to the Field

COMFORTABLE CLOSED SHOES

WEATHER CONSCIOUS

HIGH VISIBILITY VESTS
- Bring your own

DOCUMENTING MATERIAL
- Smartphone
- Pen/Pencil
- Paper/notepad

What to Look for - Audit Form

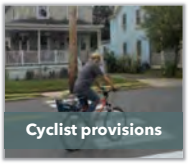
What to Look for - Photos

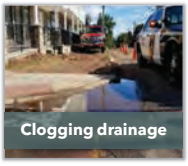

Sidewalk trip hazards


Sign visibility blocked by trees


Sidewalk overgrowth (shrubs)


Signal equipment upgrades


Cyclist provisions


Clogging drainage

What to Look for - Photos


No curb ramp/crosswalk present


Faded striping/non-compliant curb ramps


Driveway aprons too wide, lack ADA


Roadway too wide, hard to cross


Traffic calming at curve/intersection

How to Record Observations

- Photograph
- Pen/Pencil Paper
- Video
- Mobile Device
- Mental

BE SPECIFIC!!!

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Today
In-Field Road Safety Audit

Noon Tomorrow
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Today

Share Observations
Discuss Potential Improvements
10:00 AM, Tomorrow

Somerset County Roadway Safety Study

Participant	Group
Matthew Maher / Sgt Dennis Kardos	E
Tim Medina / Pat Marotto	E
Ryan Walsh / Jody Karcher (*alt to Pat Hinman*)	E
Adam Bradford / Elmira Bongiorno	E
Grant Lewis / David Hollod	E
Kati DiRaimondo / Wallace Henry	W
Michael Ahillen / Pamela Hinman	W
Kenneth Wedeen / David Testa	W
Grace Faughnan / Jon Dugan	W

Questions?

Somerset County Roadway Safety Study

Extra Slides

Somerset County Roadway Safety Study

Greenbrook Rd
Harrington to CR 531
1.27 miles in North Plainfield Boro

Summary of Feedback

- Difficulty backing out of driveways
- Lack of pedestrian crossing locations
- Participants experienced pedestrian collisions
- Curb radii/setbacks facilitate truck traffic
- Lack of children/school awareness by drivers
- Cut-through traffic from Route 22 congestion
- Aggressive driving and speeding on corridor
- Grove Street intersection needs ped-friendly solutions

POV
Greenbrook, Facing South at W.E. School

Somerset County Roadway Safety Study


Western Limit of Segment
Greenbrook Rd
Middle Rd
LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (1 OF 11)
GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A1


Greenbrook Rd
Middle Rd
LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (2 OF 11)
GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A2


Middle Rd
LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (3 OF 11)
GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A3


Greenbrook Rd
Middle Rd
LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (4 OF 11)
GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A4


Greenbrook Rd
Middle Rd
LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (5 OF 11)
GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A5


Greenbrook Rd
Middle Rd
LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (6 OF 11)
GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Exhibit A6


LEGEND
SYMBOLS
TYPES OF COLLISIONS
MOVING VEHICLE
PARKED VEHICLE
CYCLIST
PEDESTRIAN
FIXED OBJECT
NON-FIXED OBJECT
ANIMAL
REAR END
SIDE SWIPE
LEFT TURN/RIGHT ANGLE
HEAD ON/BACKING
OUT OF CONTROL
PDO
INJURY
FATAL
EXISTING SIGNALIZED INTERSECTION
CRASH DIAGRAM (7 OF 11)
GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Scale: 1"=60'
Exhibit A7


Eastern Limit of Segment
LEGEND
SYMBOLS
TYPES OF COLLISIONS
CRASH DIAGRAM (8 OF 11)
GREENBROOK RD (CR 636) IN
NORTH PLAINFIELD BOROUGH
Harrington Avenue to Somerset Street
SOMERSET COUNTY ROADWAY SAFETY STUDY

Appendix G

Post-Audit Survey

Participant Survey - Average Scores

As you near the end of the audit, rate how the following items impact your level of comfort.
(1: makes me uncomfortable; 4: makes me comfortable; N/A: issue does not exist along this corridor)

Category	Item	Bridgewater	Franklin	Millstone	North Plainfield	Raritan
Corridor Identity	**Average**	**2.3**	**2.4**	**2.7**	**3.2**	**2.7**
Corridor Identity	Activities and uses	2.3	2.6	3.0	3.2	2.5
Corridor Identity	Condition of buildings	2.6	2.3	3.0	3.3	2.5
Corridor Identity	Perception of personal safety	1.9	2.4	2.0	3.0	3.0
Crossings	**Average**	**2.2**	**2.3**	**2.3**	**2.3**	**2.4**
Crossings	Crossing guards	2.5	3.0	-	2.7	3.0
Crossings	Missing or inoperable pedestrian/audible signal	1.9	2.0	2.0	3.0	3.5
Crossings	Pedestrian signal crossing time	2.7	3.0	3.0	2.6	2.6
Crossings	Poorly marked or missing crosswalk	1.7	1.6	1.7	1.7	2.3
Crossings	Presence of curb ramps for strollers/wheelchairs	1.7	1.9	1.0	1.9	2.3
Crossings	View of traffic is blocked	2.0	2.6	2.3	2.1	1.6
Crossings	Wait time for pedestrian signal	2.9	2.8	3.0	2.8	2.4
Pedestrian-Vehicle Interactions	**Average**	**1.6**	**2.1**	**1.9**	**2.8**	**2.5**
Pedestrian-Vehicle Interactions	Amount of traffic	1.7	2.1	2.3	3.0	2.6
Pedestrian-Vehicle Interactions	Bicycling on the sidewalk	1.3	4.0	2.0	2.1	2.9
Pedestrian-Vehicle Interactions	Driver behavior (distracted, did not yield to pedestrians, etc.)	2.1	2.0	2.7	3.0	2.1
Pedestrian-Vehicle Interactions	Noise level due to auto traffic	1.2	2.0	1.3	2.9	2.1
Pedestrian-Vehicle Interactions	Presence of trucks or large vehicles	1.7	2.0	1.7	2.8	2.8
Pedestrian-Vehicle Interactions	Speed of traffic	1.4	2.1	1.3	2.5	2.5
Sidewalk/Roadway Condition	**Average**	**2.3**	**2.7**	**2.6**	**2.6**	**2.9**
Sidewalk/Roadway Condition	Areas on roadway with poor drainage	3.1	2.9	2.5	3.0	2.6
Sidewalk/Roadway Condition	Areas on sidewalk with poor drainage	3.0	2.8	2.0	2.9	2.6
Sidewalk/Roadway Condition	Buffer area between sidewalk and traffic	1.5	2.4	2.3	2.5	3.1
Sidewalk/Roadway Condition	Guide rails/protection systems	2.0	3.3	3.0	2.3	2.5
Sidewalk/Roadway Condition	Intersection configuration	2.1	2.7	3.0	2.8	2.7
Sidewalk/Roadway Condition	Obstacles blocking sidewalk (utilities/trees)	2.9	2.5	3.0	2.6	2.9
Sidewalk/Roadway Condition	Roadway condition	2.8	3.1	2.7	3.0	3.3
Sidewalk/Roadway Condition	Roadway width	2.2	2.8	3.0	3.0	3.3
Sidewalk/Roadway Condition	Sidewalk condition	1.9	2.3	1.7	1.8	2.9
Sidewalk/Roadway Condition	Sidewalk width	2.2	2.6	2.7	2.4	3.1
Streetscape Amenities	**Average**	**2.0**	**2.5**	**3.2**	**2.5**	**3.2**
Streetscape Amenities	Benches or places to rest, trash cans	1.5	2.8	N/A	1.1	3.8
Streetscape Amenities	Lighting (for pedestrians)	1.9	2.0	3.0	2.4	3.7
Streetscape Amenities	Lighting (for vehicles)	2.4	2.5	2.7	2.9	2.7
Streetscape Amenities	Presence of directional/regulatory signage	2.4	2.3	3.7	2.8	2.7
Streetscape Amenities	Street trees and landscaping	1.9	3.0	3.5	2.9	3.2

Appendix H

Post-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Post-Audit,
North Plainfield Corridor
April 9, 2021

North Plainfield Borough Post-Audit Meeting

Agenda: Schedule of Activities

10:00 AM, Yesterday
Project Background
Study Area Crash Data
RSA Orientation

2-4 PM, Yesterday
In-Field Road Safety Audit

Noon Today
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Yesterday

Share Observations
Discuss Potential Improvements
10:00 AM, Today

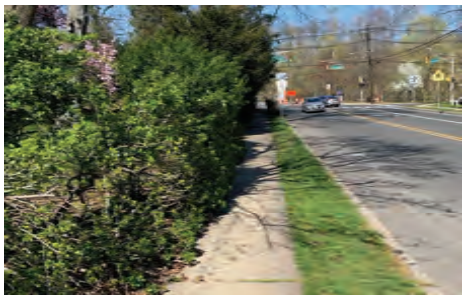
Field Photography

Field Photography

Field Photography

Field Photography

Field Photography



Field Photography

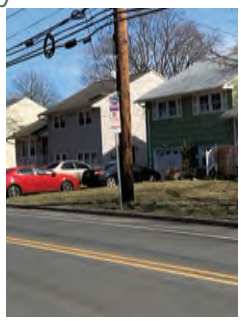
Field Photography

Field Photography

Field Photography

Field Photography

Field Photography



Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Field Photography

Prompt List Discussion

AUDIT FORM

"What operational/safety issues did you note on the corridor?"

Somerset County Roadway Safety Study

"What makes travel on the corridor difficult ?"

- For drivers?
- For non-drivers?
- For people with disabilities?
- For families with small children?
- For transit riders?

Somerset County Roadway Safety Study

"What pedestrian/cyclist connectivity issues were observed?"

Somerset County Roadway Safety Study

Recommendations Discussion

"WHAT SAFETY IMPROVEMENTS DO YOU PROPOSE FOR REDUCING CRASHES?"

"WHAT IS YOUR VISION FOR THE CORRIDOR? HOW SHOULD IT LOOK IN 10 YEARS?"

"WHAT ARE THE SHORT-TERM CHANGES THAT COULD BE MADE NOW?"

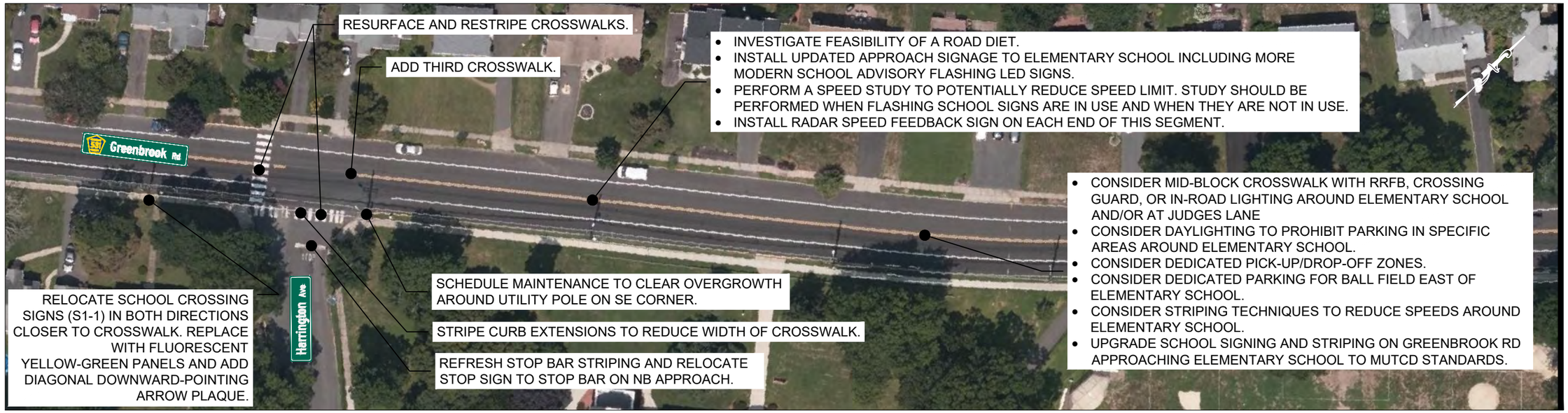
Next Steps

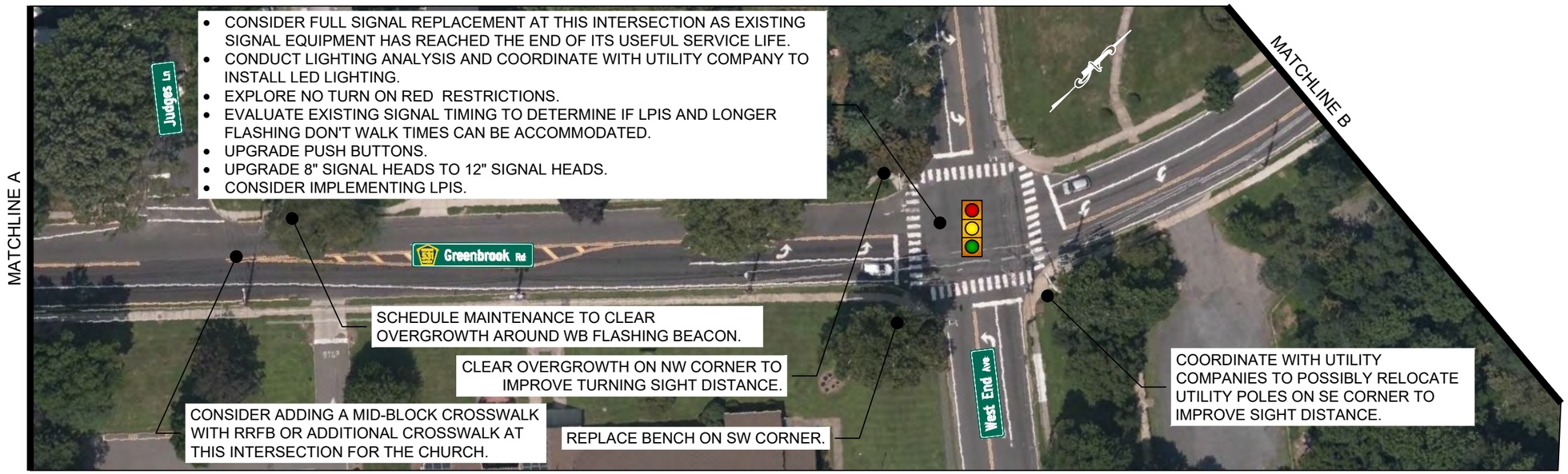
- Produce RSA Reports
- Implementation Matrix
- Final Study Report
- Conduct Follow-Up Public/TAC Meetings

Somerset County Roadway Safety Study

Appendix I

Recommendations from Implementation Matrix





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2021/07/14 2:05 PM By: DiRaimondo, Kati

ORIGINAL SHEET - ANSI B

July, 2021
192510854

Stantec
365 West Passaic Street, Suite 175
Rochelle Park, NJ 07662
www.stantec.com

Client/Project
Somerset County/NJTPA
Somerset County Roadway Safety Study
Greenbrook Road (CR 636)

Sheet No.
1 of 5

Title
N Plainfield Boro RSA Recommendations
Scale: 1" = 60'

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2021/07/14 2:05 PM By: DiRaimondo, Kati

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July, 2021
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Client/Project
Somerset County/NJTPA
Somerset County Roadway Safety Study
Greenbrook Road (CR 636)

Sheet No.
2 of 5

Title
N Plainfield Boro RSA Recommendations
Scale: 1" = 60'

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Somerset County/NJTPA
Somerset County Roadway Safety Study
Greenbrook Road (CR 636)

Sheet No.
3 of 5

Title
N Plainfield Boro RSA Recommendations
Scale: 1" = 60'

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Somerset County/NJTPA
Somerset County Roadway Safety Study
Greenbrook Road (CR 636)

Sheet No.
4 of 5

Title
N Plainfield Boro RSA Recommendations
Scale: 1" = 60'

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Somerset County/NJTPA
Somerset County Roadway Safety Study
Greenbrook Road (CR 636)

Sheet No.
5 of 5

Title
N Plainfield Boro RSA Recommendations
Scale: 1" = 60'

Appendix J

Road Owner Response

Somerset County Response to the Greenbrook Road (CR 636) in North Plainfield Borough Road Safety Audit (owner's response)

Somerset County agrees with the recommendations of the Road Safety Audit. The County strives to make our roads safer for all users and is willing to investigate any recommendations that can assist in achieving that goal. Our agreement with the assessment should in no way be perceived as a commitment to the implementation of such suggestions. The following general points should be noted:

- Somerset County does not maintain or inspect sidewalks, street lighting, landscaping, or parking facilities along county roadways. That responsibility lies with the municipality or property owner.
- Some recommendations may not be warranted or feasible due to engineering or fiscal constraints. Additional analysis is necessary.

Somerset County Roadway Safety Study
Subregional Project

ROAD SAFETY AUDIT REPORT

SOMERSET STREET IN RARITAN BOROUGH

November 2021

Executive Summary

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has conducted the Somerset County Roadway Corridor Safety Analysis study. The study will advance the County's efforts to address pedestrian, bicycle, and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. This RSA report has been prepared for the Somerset Street corridor (Somerset County Route 626, CR 626), from First Avenue (CRs 567 and 625) at MP 0.0 to US Route 206 (Route 206) at MP 0.67, in Raritan Borough. According to the compiled crash data, 144 crashes occurred on the 1-mile segment analysis area during the 3-year vehicle and 5-year pedestrian crash analysis period.

The pre-audit meeting was held at 10:00 AM via video conferencing on Thursday, April 1st, 2021 on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. Participants were paired off with each other to walk halves of the corridor. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as safety measures to address potential safety concerns. On the following week (Monday, April 5th, 2021), the RSA team reconvened via video conferencing to view photos gathered during the in-field audit to discuss each potential safety concern, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study.

Discussions from the RSA process helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report, which serves as a record of items discussed during the post-audit meeting. Major findings (or recommendations) from these discussions included:

- Mountable curbs at First Avenue to slow car turning movements while allowing for truck turning radii;
- Placemaking improvements, such as parklets and overhead gateway lighting to slow vehicle speeds;
- Speed humps on Nevius Street to slow cut-through traffic diverting around First Avenue intersection;
- Leading Pedestrian Intervals (LPIs) and additional crosswalk at Thompson Street intersection;
- Curb ramp improvements and paver resetting west of Frederick Street to improve downtown walkability;
- Push-button actuated crossings at Borough Public Library for pedestrian visibility; and,
- Changes in signal phasing/timing and crosswalk striping at Route 206 to improve pedestrian safety.

A key recommendation from this RSA is to build off of the complete streets improvements proposed for Somerset Street as part of Transportation Alternatives - Set Aside Program, or TAP grant, for which the Borough has applied, received funding, and currently designing new streetscaping. It is proposed that changes in side street circulation from two-way to one-way flow for this project provide opportunity for ample curb extensions, integrated with Green Stormwater Infrastructure to provide for a more resilient design to better receive and filter future stormwater. Additionally, it is also proposed that ergonomic (or flared) crosswalks be striped between these intersection corner curb extensions to better reflect the pedestrian paths of travel that take place at downtown intersections.

Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process, and are meant to be a record of ideas discussed. As these recommendations are considered for advancement into either a Concept Development (CD) study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices.

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I. Introduction

As part of the North Jersey Transportation Planning Authority (NJTPA)'s subregional studies grant program, Somerset County (the County) has begun the Somerset County Roadway Corridor Safety Analysis. The Somerset County Roadway Corridor Safety Analysis will advance New Jersey's efforts to address pedestrian/bicycle and intersection safety. Five (5) County roadway corridors have been selected to go through a comprehensive safety analysis following the Federal Highway Administration's Road Safety Audit (RSA) process to identify vehicle, pedestrian, and bicyclist safety issues and to develop safety improvement recommendations. One of the locations that have been selected is the Somerset Street corridor (Somerset County Route 626, CR 626), from First Avenue (CRs 567 and 625) at MP 0.0 to US Route 206 (Route 206) at MP 0.67, in Raritan Borough.

The purpose of this RSA Report is to detail the site selection, road/multimodal inventory, land use investigation, crash data collection, crash analysis efforts. post/pre-audit meetings, and in-field RSA investigation conducted for the Somerset Street corridor. Flowing from this RSA is a list of potential recommendations proposed to improve safety. These recommendations were based on the investigated crash data and during the in-field RSA and post-audit meeting. This introduction serves to provide background on selection of the investigated corridor and covers the logistics of the RSA process that was performed. This RSA report also seeks to provide sample figures of improvements and crash countermeasures that could be considered as the County, or municipality, seeks to move forward on its Concept Development (CD) and/or Local Safety Program grant (or other funding) application. Please note, in applying these ideas to the corridor, design of such improvements, conceptual or otherwise, is the responsibility of the designated jurisdiction as is standard RSA practice.

A. Site Selection

Selection of the Somerset Street corridor was based on a rigorous process which started with a list of top crash segments for the County from NJTPA's Network Screening Lists (NSL)[1] and used supporting collision data, equity data, recommendations from prior studies, and public/stakeholder input to develop a shortlist of top crash segments. Segments with recently-constructed safety improvements or locations undergoing study/design were identified through discussions with County Engineering and removed from this shortlist to target segments not currently being considered. The remaining locations were further prioritized and ranked with more recent crash severity and frequency data (old crash data from NSL superseded with more recent crash data from Safety Voyager), traffic volume data from NJTPA's regional travel demand model (NJRTM-E), and environmental justice data from NJTPA.

Input on these top crash locations was obtained through the Public Involvement Plan for this project, which included gathering information from the public via a virtual mapping tool and project email address and gathering information from a Technical Advisory Committee (TAC)[2] via an initial virtual meeting conducted in August 2020. Based upon public and stakeholder input, the following (5) segment locations (including the segment being studied in this report) were selected to be advanced for RSA review:

1. Finderne Avenue/Main Street (CR 533) in Raritan Borough, MP 29.60-30.60
2. Franklin Boulevard (CR 617) in Franklin Township, MP 0.00-1.00
3. Somerset Street (CR 626) in Raritan Borough, MP 0.00-0.67
4. Greenbrook Road (CR 636) in North Plainfield Borough, MP 0.70-1.97
5. Main Street (CR 533) in Millstone Borough, MP 25.14-25.87

[1] https://www.njtpa.org/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/Local-Safety-Program/Network-Screening-Lists.aspx Top crash segment lists on this webpage are based upon a programmatic analysis of statewide locations utilizing 2014-2018 crash data.
[2] Stakeholders on the TAC include NJDOT, NJ TRANSIT, FHWA, RideWise, AARP, Vorhees Transportation Center, and various County advocates.

Somerset Street was selected based on the relatively high crash frequency on this corridor, public feedback data, and pedestrian/cyclist crash frequency. Furthermore, this location was identified within the *Somerset County Regional Center Pedestrian, Bicycle & Greenways Systems Connection Plan* (2009) and *Supporting Priority Investment in Somerset County, Phase III* (2017) studies (amongst other studies), which proposed improved pedestrian/cyclist access to the NJ TRANSIT Raritan Train Station, Raritan Mall, and Raritan River Greenway via improved sidewalks and dedicated bicycle space. **Table 1** shows the selected segment, or intersections, that qualified as one of the top 100 crash locations[1] in the County based on either overall crash data for the years of 2016 through 2018 or pedestrian/cyclist crash data for the years of 2014 through 2018 as listed on the NSLs.

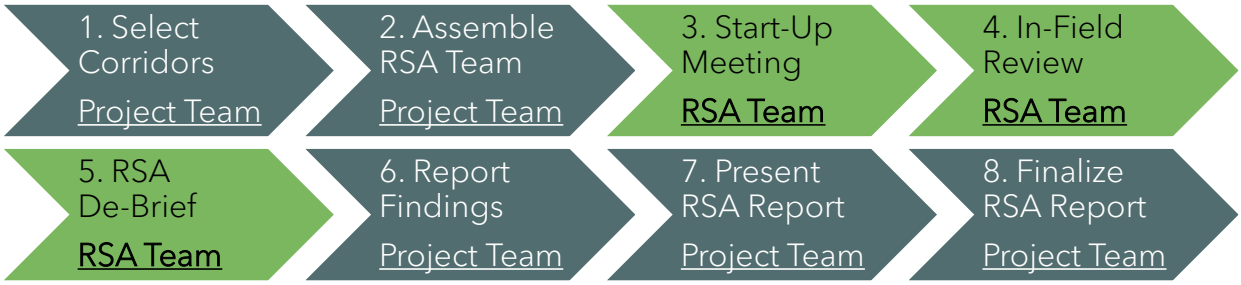
Table 1 – Somerset Street NJTPA 2019 NSL Rankings for Somerset County

Corridor Segments Overall Crash Data	Corridor Segments Ped/Bike Crash Data	Intersection Locations Overall Crash Data	Intersection Locations Ped/Bike Crash Data
#23, MP 0.0-0.67	#4, MP 0.11-0.67	None	First Avenue (#13)
			Frederick Street (#76)

B. What is a Road Safety Audit (RSA)?

An RSA is a formal safety performance examination of an existing or future road or intersection by a multi-disciplinary audit team, including public works, law enforcement, emergency medical services, engineering, planning, and advocacy staff. It qualitatively estimates and reports on existing and potential road safety issues and identifies opportunities for improvements in safety for all road users. RSAs can be used on any size project, from minor maintenance to mega-projects, and can be conducted on facilities with a history of crashes or during the design phase of a new roadway or planned upgrade. RSAs consider all road users, account for human factors and road user capabilities, are documented in a formal report, and require a formal response from the road owner. **Figure 1** shows the steps employed by the County to complete the RSA, as informed by the Federal Highway Administration's (FHWA's) RSA process. The steps that traditionally consist of an in-field review of conditions with an RSA team are highlighted in green in **Figure 1**.

Figure 1 – Eight-Step RSA Process as Adopted from FHWA RSA Process



The RSA program is conducted to identify potential countermeasures for roadway segments demonstrating a history of, or potential for, a high frequency of crashes, or an identifiable pattern of crash types. Recommendations range from low-cost, quick-turnaround safety improvements to more complex strategies, which are all codified in this report within an Implementation Matrix, categorizing improvements by timeline, cost, and jurisdiction. Implementation of improvement strategies identified through this process may be eligible for Local Federal Aid Safety Funds. Because the RSA process is adaptable to local needs and conditions, recommendations can be implemented incrementally as time and resources permit. Please note that the RSA process does not include the design or thorough evaluation of improvements that are being considered, conceptual or otherwise. Following the eighth and final step of the RSA process, it will be incumbent for the designated jurisdiction for each improvement proposed in the Implementation Matrix to start to evaluate and design the ideas presented herein as is standard RSA practice.

At the request of NJTPA, RSAs originally planned for Fall 2020 were postponed to Spring 2021 due to the COVID-19 pandemic. In addition to postponement, the County took additional steps to safely conduct this RSA. Both the start-up meeting and RSA de-brief (steps #3 and #5 shown in **Figure 1**), which are traditionally conducted in-person, were conducted virtually via video conferencing to reduce the exposure and potential risk of disease transmission. Furthermore, the essential step of in-field review was conducted in a socially-distanced manner with participants paired off in groups spaced more than six feet apart from each other. All in-field RSA participants were masked for the entire duration of the field visit to further reduce disease transmission. Through this process, the post-audit "de-brief" meeting benefitted from being held virtually after the day on which the in-field review was conducted.

Some notable benefits produced by a virtual post-audit included:

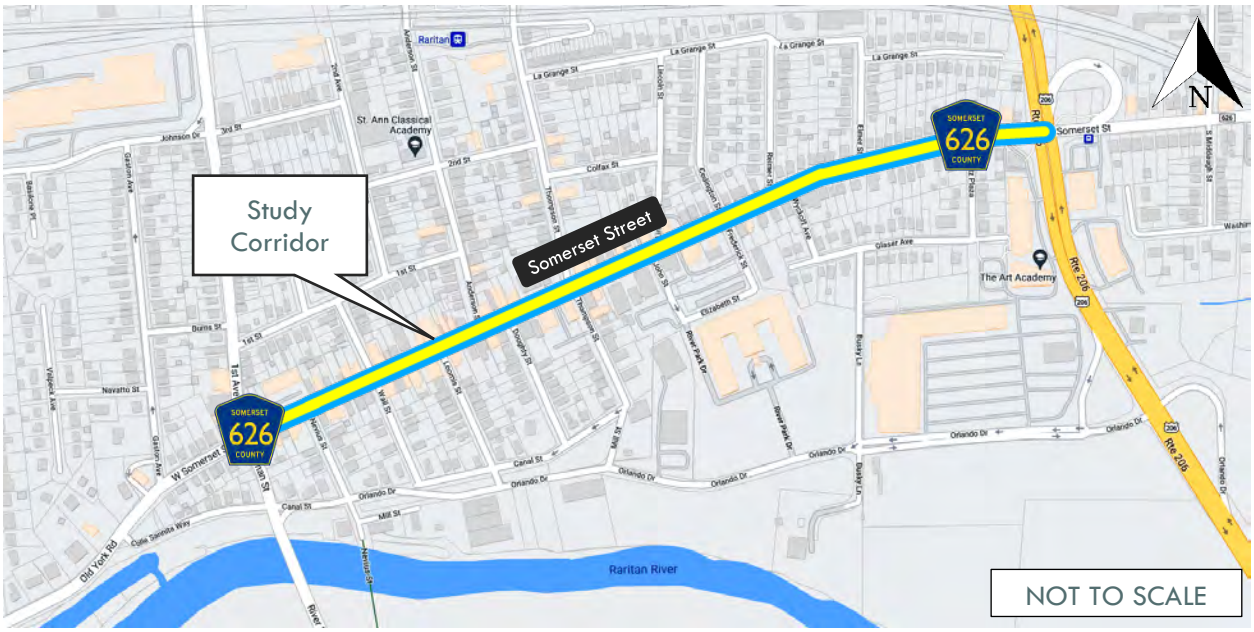
- Additional time for participants to share photos, videos, and scans of their observations;
- Available screensharing for quick review and consensus of RSA observations;
- An involved discussion of the observations and recommendations was well established by the wide audience of stakeholders;
- Additional time for participants to process their observations and organize their thoughts for discussion.

II. Corridor Description & Analysis

A. *Study Location*

The study area consists of 0.67 miles of CR 626 (Somerset Street), extending from the intersection with First Avenue (CR 567)/Lyman Street (CR 625) at MP 0.0 to the Somerville Borough municipal border at the intersection with Route 206 at MP 0.67 (**Figure 2**). A straight line diagram of the corridor is provided in **Appendix A**. The corridor segment is located in the Borough of Raritan in the County of Somerset. Land adjacent to Somerset Street is zoned as "Central Business" from First Avenue on the west end of the corridor to Codington Street, and buildings that line the street tend to be mixed-use in nature ranging from one-story to three-stories in height. Other uses include churches and retail buildings. Due to the density of businesses in this segment of the corridor, on-street parking (striped on both sides of the street) is heavily utilized, particularly during weekday midday, weekday PM peak, and weekend midday periods. East of Codington Street, the land use context is single-family detached residential in nature with less parking activity and larger setbacks from the street.

Figure 2 – Study Area Location Map



Vehicle and pedestrian trip generators on this corridor tend to be evenly distributed along with the "main street" retail between First Avenue and Codington Street. However, the QuickChek at First Avenue, the USPS Post Office at John Street, and the churches in between can become significant individual trip generators depending on the time of the day and day of the week. The area surrounding the corridor segment has been designated by the County as a Priority Growth Investment Area (PGIA) by the County in its 2017 *Supporting Priority Investment in Somerset County, Phase III* study.

B. *Roadway and Intersection Characteristics*

Somerset Street is classified by the New Jersey Department of Transportation (NJDOT) as an urban minor arterial and has a posted speed of 25 mph. The corridor consists of two 11-12' travel lanes (one in each direction) undivided with 8-9' parking on either side where parking is striped. The road has an average cartway width of 40'. There are three signalized and 12 unsignalized intersections along the corridor. Left-turn bays are provided at either end of the corridor at intersections with First Avenue and Route 206.

C. *Existing Bicycle/Pedestrian Accommodations*

Sidewalk coverage is provided along both sides of the road along the entire length of the corridor, varying in width from 4-12' and consisting of more narrow concrete sidewalks on the eastern end of the corridor and wider paver sidewalks on the western end of the corridor. Except at sidewalk locations with pavers towards the western end of the segment and at crossings where paving was recently done, curb ramps tend to have detectable warning surfaces and connecting continental crosswalks. Daylighting[3] areas are designated on Somerset Street at cross-street locations, which helps with pedestrian visibility and clarity of pedestrian-vehicle sightlines. Crosswalks traversing Somerset Street are provided at approximately 200' intervals, with the exception of the eastern end of the segment, which has a 700' crosswalk gap. Currently, no street space is dedicated to cyclists despite nearby recreational destinations, such as Nevius Street Sitting Bridge, Raritan Valley Park, Duke Island Park, and Duke Farms. However, due to relatively low posted speeds, Somerset Street was classified as having a Bicycle Level of Traffic Stress of 2 in the recent WalkBikeHike (2019) study, which is representative of cycling travel conditions that are comfortable to most adult cyclists.

D. *Traffic Volumes*

According to traffic data available from NJDOT[4] count station #111827, Average Annual Daily Traffic (AADT) on Somerset Street is approximately 10,000 vehicles per day. Supporting count data from NJDOT is provided in **Appendix B**. This figure is supported by traffic volume estimates from NJTPA's NJRTM-E travel demand model, which provides an AADT estimate of 10, 000 based upon 2020 pre-COVID-19 conditions.

E. *Transit Service*

Somerset Street is not directly served by NJ TRANSIT bus or rail. The NJ TRANSIT Raritan Train Station with Raritan Valley Line service is located approximately ¼-mile north of the corridor from intersections with Anderson Street and Thompson Street. NJ TRANSIT bus routes 114, 117, and 65 serve Somerset Street at Route 28 approximately ½ mile east of the project limits. The corridor is more directly served by the County's CAT 1R bus service (which runs from New Brunswick to Branchburg/Raritan Valley Community College, while also running through Somerville, Bound Brook, South Bound Brook, and Franklin) and CAT 3R bus service (which runs between Bridgewater Commons and the Branchburg Shop-Rite, traveling through Raritan and Somerville in between). While CAT 3R operates one scheduled round trip ride during the weekday AM peak period, CAT 1R operates more frequently with one- to two-hour headways during weekday AM and PM peak period conditions. Bus stops for these services do not appear to be signed on the corridor; however, RideWise lists scheduled stops at the Somerset Street intersections with First Avenue and Route 206. CAT 1R travels along the Somerset Street corridor and may permit stop requests for intermediate locations. CAT 3R travels along the parallel Orlando Drive corridor between First Avenue and Route 206 but turns north at both streets to service Somerset Street.

F. *Community Profile*

Population and income characteristics from the American Community Survey (ACS), an update to the 2010 Census performed by the U.S. Census Bureau, were used to identify Environmental Justice populations. The latest ACS for this study area is a five-year estimate from 2015 through 2019 for County Census Tract 505. A summary of the demographics is listed in **Table 2.** Limited English Proficiency populations are twice the County average in the vicinity of the study corridor. While public transit commuting was noted to be below the County average, zero-vehicle households are a substantial portion of the nearby population (approximately three times the County average), perhaps due to the walkability of this downtown location.

[3] Daylighting is the act of restricting parked or standing vehicles through striping or curbing to improve sight distance at crosswalks or intersections.
[4] AADT data obtained from https://www.njtms.org/map/.

Table 2 – Somerset Street RSA Study Area Demographics

Characteristic		Census Tract Average	County Average
Below Poverty Level[5]		7.9%	5.1%
Race/ Ethnicity[6]	White	73.9%	66.3%
	Asian American	17.7%	17.7%
	Black or African American	1.5%	9.7%
	American Indian/Alaskan	0.4%	0.3%
	Other	6.5%	6.0%
	Hispanic/Latino (Ethnicity)	22.7%	14.7%
Limited English Proficiency (LEP)[7]		9.5%	4.4%
Use Public Transportation[8]		2.6%	5.3%
Zero Vehicle Households[7]		6.5%	2.1%

G. Redevelopment

The area surrounding the corridor segment has been designated by the County as a Priority Growth Investment Area (PGIA) by the County in its 2017 *Supporting Priority Investment in Somerset County, Phase III* study. Additionally, the County and NJTPA are investing in the future of the Borough with the Raritan Sustainable Economic Development Plan study, which is being conducted concurrently with this study. The primary goal of the Economic Development Plan is to develop a vision for economic development that revitalizes the downtown and promotes an integrated community that incorporates new developments into the downtown consistent with the vision. The vision will also leverage existing transportation assets, such as the Raritan Train Station, to attract development. Since mobility, parking, TOD zoning, pedestrian infrastructure, and pedestrian infrastructure recommendations are a key part of this study, the Project Team for the Somerset County Roadway Corridor Safety Analysis is coordinating with the Project Team for the Raritan Sustainable Economic Development Plan to share initial crash data findings from this report, discuss a wide range of crash countermeasures that also support the Borough's goals, and develop recommendations that are compatible. This concurrent study is anticipated to be completed by mid-2021. Redevelopment on Somerset Street has mainly consisted of "change of use" applications to mixed-use buildings on the western end of the corridor and conversion of single-family residential housing to medical office space towards the eastern end of the corridor. There are no major applications currently pending along Somerset Street, according to data delivered by County Planning. However, there is a nearby transit-oriented development (most notably, Crossings at Raritan Station on First Avenue) that will stimulate economic growth and activity not only in the vicinity of the train station but also downtown along Somerset Street.

H. Proposed Improvements from Previous Studies

The following six studies have prescribed various engineering, education, and enforcement strategies to improve the safety of those using the Somerset Street corridor:

- *Supporting Priority Investment in Somerset County, Phase III*, dated 2017
- *Raritan Borough Master Plan Updated*, dated 2003
- *Regional Center Pedestrian, Bicycle & Greenways Systems Connection Plan*, dated 2009
- *Raritan Borough Street Smart Pedestrian Safety Campaign*, dated 2019
- *WalkBikeHike*, dated 2019
- *Circulation Plan Element & Bicycle and Pedestrian Safety Plan, dated 2020*

[5] 2019: ACS 5-Year Estimates Data Profiles, TableID S1701, "Poverty Status in the Last 12 Months"
[6] 2019: ACS 5-Year Estimates Data Profiles, TableID DP05, "ACS Demographic and Housing Estimates"
[7] 2019: ACS 5-Year Estimates Data Profiles, TableID S1602, "Limited English Speaking Households"
[8] 2019: ACS 5-Year Estimates Data Profiles, TableID S0802, "Means of Transportation to Work by Selected Characteristics"

Pertinent excerpts from these studies, and associated improvements, are provided in **Appendix C.**

Supporting Priority Investment in Somerset County, Phase III
Raritan Borough is located within the Regional Center Priority Growth Investment Area (PGIA) designated by the County. As such, the Phase III Study recommended improvements for pedestrian and cycling mobility, not only throughout the Borough but along Somerset Street, as shown in **Figure 3**. Recommended bike infrastructure improvements included shared lane markings on Somerset Street to make travel by bike more prevalent through the downtown area. The connecting streets of Nevius Street and Elmer Street would also have provisions for cyclist traffic, whether via bicycle boulevard or shared lane markings. Bike lanes were proposed on Thompson Street to better connect the downtown area and the Raritan Train Station, although parking would need to be eliminated on one side of the street to accommodate bike lanes in both directions.

This study also recommended that downtown streetscaping be updated, particularly along Somerset Street, to replace brick pavers with traditional concrete sidewalks or textured pavement for a more ADA-compliant walking surface. Streetscaping towards the western end of Somerset Street was also recommended to be extended eastward as development occurs. Finally, pedestrian access and roadway connectivity improvements were recommended via Somerset Street and Orlando Drive towards Raritan Mall to incentivize economic activity during the redevelopment of this retail space.

Figure 3 – Transportation Planning Recommendations from Phase III Study

Raritan Borough Master Plan Updated
Recommendations from this study, although limited, include possible pedestrianization of a north-south street between Somerset Street and Orlando Drive to improve north-south pedestrian and cyclist access to riverside destinations and implementation of curb extensions at intersections along Somerset Street to improve pedestrian safety.

Regional Center Pedestrian, Bicycle & Greenways Systems Connection Plan
This study proposed many recommendations for improved traffic safety and mobility in the Borough of Raritan, including the following on Somerset Street:

- Redesign Somerset Street and Orlando Drive as a one-way eastbound and westbound pair
- Re-stripe Somerset Street to accommodate cyclists via sharrow markings
- Provide pedestrian and cyclist linkage from Somerset Street to Raritan Mall
- Implement signal timing and intersection improvements at Route 206 & Somerset Street:
    - Install median refuge
    - Implement high-visibility crosswalks
    - Install countdown pedestrian signal heads (has since been installed)
    - Reconfigure intersection to eliminate eastbound and westbound double lefts to improve signal phasing
    - Investigate pedestrian crossing alerts and pushbuttons for elderly and disabled

Raritan Borough Street Smart Safety Campaign
RideWise, the Transportation Management Association for the County, provided a report summarizing the Street Smart campaign held in the Borough. The campaign was conducted with the support and assistance of local businesses. Raritan Borough Police provided ongoing community policing and pedestrian and driver enforcement. Before and after the campaign, RideWise staff conducted observations on Somerset Street at its unsignalized intersections with Loomis Street and Anderson Street. The evaluations showed that the Street Smart campaign in Raritan resulted in an increase in awareness of the Street Smart messages, enforcement efforts, and an emphasis on pedestrian safety throughout the community. The intersection observations showed a reduction in the prevalence of some non-compliant behavior by drivers and pedestrians. This study recommended that ongoing pedestrian, driver and cyclist education and enforcement be regularly conducted along Somerset Street, in the community and in the schools to address pedestrian safety concerns in Raritan Borough.

WalkBikeHike
This study recommended improved east-west bicycle connectivity through the Borough via shared bike lanes on Somerset Street. Additionally, bike lanes were proposed for the intersecting streets of Anderson Street and Thompson Street as depicted on a bike network recommendations map.

Circulation Plan Element & Bicycle and Pedestrian Safety Plan
This circulation plan element was issued recently in 2020 by the Borough and summarizes the future traffic impact to Raritan Borough based on current land use and traffic data. It also proposes a set of recommended road improvements that may be needed to serve anticipated future traffic volumes. Recommendations from this study include the following, including many traffic safety recommendations:

- Where possible throughout the entire town: Install sidewalks, crosswalks and ADA compliant curb ramps where they are currently missing; repair uneven sidewalks.
- Where possible throughout the entire town: Install traffic calming techniques as a tool to increase pedestrian safety and access.
- Update the Borough's Complete Streets Policy to follow the State's Policy and create design guidelines for individual roadway types.
- Update the proposed cross-section for each roadway, including the number and width of traffic lanes and the requirements for shoulders and sidewalks, bike lanes and biofitration facilities.

- Educate homeowners about property maintenance of landscaping so as not to impede on the public right-of-way.
- Prepare a 5-year road improvement plan. This plan should study areas identified in the Borough's Circulation Plan Element and prioritize the recommended improvements for all road infrastructure improvements that fall under municipal jurisdiction.
- Provide short-and/or long-term bicycle parking in all commercial districts, in employment centers and multifamily developments, at schools, in industrial developments, at special events, in recreational areas, and transit facilities.
- Coordinate proposed bike and pedestrian connections with the Borough's Open Space and Recreation Plan and the Borough's Land Use Plan.
- Ensure that all projects in Raritan Borough conform to the NJDOT Pedestrian guidelines.
- Identify existing or future roadway features that are unsafe or limit the passage of trucks.
- Increase enforcement of motor vehicle violations by trucks and other large vehicles.
- Borough government should sponsor walk and bike to work days as an annual event.
- The NJ Transit bus service (Route 114) should be extended into Raritan.
- Develop benchmarks, standards, or measurements which the community can gauge current and future compliance and noncompliance with overall plan goals.

I. Public Meeting #1

On Thursday, November 12, 2020, the first public meeting for this project was held via Zoom conferencing to obtain feedback from the public on the five locations selected for RSA review; Email blasts, advertisements, and social media notifications were provided in advance of the meeting. This meeting introduced the project team, who provided an overview of the study, stating the purpose and need. Statistics of crashes on County jurisdiction roadways were reviewed, showing a steady increase of crashes over the past ten years. The Consultant Team explained the RSA process and the technical analysis used in the development of the shortlist of corridors. Due to the pandemic, virtual or socially distanced options for conducting the RSA process were discussed.

The Consultant Team then explained the study's Public Involvement Plan (PIP), an iterative process designed to collect feedback and input. The opportunities to collaborate on the PIP were virtual, including public meetings and comments received through the project website and project email. The Consultant Team then explained the process of selecting the five corridors, which was based on County roadway screenings for top crash locations, evaluation of equity data, and public/stakeholder input obtained from the initial virtual mapping outreach conducted in Fall 2020. The virtual mapping tool allowed users to pin comments on areas of concern on a virtual map.

As part of the PIP, the public meeting included an opportunity to hear from attendees on comments specific to each corridor selected for RSA review by splitting the overall meeting into breakout rooms. The group in the Somerset Street breakout room discussed various concerns and suggestions regarding traffic calming and pedestrian safety. Comments received were as follows:

- The intersection of Wall Street & Somerset Street would benefit from a new pedestrian crossing traversing the west leg with accompanying curb extensions or flexible delineators. Queues from the nearby ice cream shop extend into the sidewalk and street during busy periods.
- There should be signage that says to share the road.
- Delivery trucks need spaces so the curb space should be managed better.
- It would be nice to see some landscaping.
- Participant said biking is not safe for children on Somerset Street.
- Turning left onto Somerset Street is difficult because of low visibility and high vehicle speeds. People should not be allowed to park near the intersections. It would be helpful if these locations had daylighting that was hardscaped.

- Participants were interested in exploring Orlando Drive as a potential couplet with Somerset Street.
- If there were better flow on Route 206 and 202, traffic would be reduced on Somerset Street.
- It would be nice if restaurants on Somerset Street could extend their seating into the street for parklets and beer gardens.
- There are concerns about sidewalks that are closed off when there is construction.
- If there was an off-street parking lot, drivers may not need to rely on on-street parking as much.
- There needs to be driver and pedestrian safety education.

J. Technical Advisory Committee Meeting #2

Following an August 2020 meeting with the TAC (Technical Advisory Committee) to select the five corridor locations for further review Somerset County held the second TAC meeting in February 2021. This meeting consisted of a 45-minute presentation followed by interactive breakout rooms with discussion centered around the corridors selected for further review. The presentation included the following topics: project background, summary of selected corridors, description of potential safety measures, and a discussion of demonstration projects.

A breakout room was dedicated solely to the discussion of potential safety measures to be implemented in response to potential safety issues observed on the Somerset Street corridor in Raritan Borough. Participants were asked to review the ten safety measures discussed during the presentation. They were then asked to rate the effectiveness and ease of implementation of each safety measure based on their own opinion/perspective. Participants were also asked to identify specific areas within each corridor that were areas of concern. **Table 3** is a summary of those ratings and discussions. A table of each safety measure rating per corridor is found in each section, along with additional comments made by each group.

Table 3 – Perceived Effectiveness and Ease of Implementation for Various Safety Measures

Safety Measure	Effectiveness (1= not effective; 10= very effective)	Ease of Implementation (1=easy; 10= hard)
Lighting	3	5
Curb Extensions/Bus Bulbs	5	5
Daylighting and Crosswalks	5	5
Walkways for Sidewalk Gaps	8	5
Dedicated Turn Lanes	1	1
Leading Pedestrian Intervals (LPI)	2	1
High Visibility Crosswalks	6	-
Turn Restrictions	5	-
Bike Lanes	5	8
Lane Width Reduction/Road Diet	-	-

Breakout Group Additional Comments:

- Lighting:
  - There have been no complaints about the decorative light poles in the area.
  - It would be nice if some of the side streets had lighting for a more cohesive feel. The town has not been able to replace lightbulbs; there is a need for coordination.
  - Lighting is especially important at crosswalks.
  - There is pushback from homeowners about installing lighting in their neighborhoods.
  - Introducing lighting could have a negative effect.
- Curb Extensions/Bus Bulbs:
  - Curb extensions would be effective; they are becoming more popular.
  - As a demonstration project, look at parklets near a curb extension during an event.
  - Curb extension concerns include:
    - Lack of parking- if there is a loss of parking there will be considerable pushback.

        - Off-street parking lot for business owners didn't quite work.
        - Drainage challenges
        - Strategy for ramping up enforcement is considered to be a challenge
- Daylighting and Crosswalks:
    - Participants agreed that people cross where there is no crosswalk present, and if provided, they would choose the safer option to use the crosswalk.
    - Type of crosswalks are important. Potential for decorative crosswalks? Depends on the funding. (County roads don't allow for decorative crosswalks currently.)
    - County uses continental crosswalks, which cost a bit more money. In some cases, the County straightens the crosswalks to shorten crosswalk.
    - There are sidewalks on both sides. To the west of First Avenue, the sidewalk drops off. There has been a grant to extend that sidewalk.
    - First Avenue and Somerset Street could potentially have refuge islands in the center.
- Leading Pedestrian Intervals (LPI):
    - Participants believed LPI implementation depends on the timing of the plan and are not effective in all cases.
    - Thompson Street, First Avenue, and 206 (County can't implement changes along 206, this could be coordinated with the State)
    - The County would consider LPIs. An analysis would need to be conducted including 206. The crash history should be explored. There was one location that had three pedestrian crashes on the same leg.
- Turn Restrictions:
    - The corridor has no turn on red in some locations. Some have been implemented, more analysis can be done to install more.
    - There are a lot of complaints about the no right turns in Raritan Borough.
- Bike Lanes:
    - For bike lanes, parking would need to be eliminated. There are bike lanes mapped out in other areas around the corridor; side streets are probably better suited for biking.
- Map specific comments include:
    - Intersection of W Somerset Street and First Avenue
        - Could be a location for a pedestrian refuge island
        - Should have longer crossing times or have the crosswalks shifted for a shorter crossing distance
            - There is a slight hill with glare, making it slightly longer for pedestrians to cross and harder for cars to see pedestrians.
        - Look at turning radii
    - Nevius Street could be used as a cut through
    - W Somerset and Thompson Street intersection has a no turn on red in place during the hours of 7am to 7pm.

K. Technical Advisory Committee Meeting #3

Following the RSAs in Spring 2021, and authoring of the draft RSA reports and accompanying recommendations soon thereafter, the County held the third and final TAC meeting for the study in August 2021. The virtual meeting format consisted of a 45-minute presentation with interactive breakout rooms. The presentation included the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into five breakout rooms, one for each of the selected corridors. Each breakout room discussed a specific set of recommendations pertaining to that corridor. Participants were asked to provide their general reactions to the proposed recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed. The topic of discussion for the breakout room specific to the Raritan Borough RSA was the conversion of daylighting to

curb extensions proposed for the Somerset Street corridor. Provided below is participant feedback received on this specific proposed safety measure:

- Participants generally thought daylighting and curb extensions would work along the corridor.
- One participant noted that the ongoing economic development plan planned for curb extensions and daylighting.
- There were concerns about compatibility with truck traffic with trucks occasionally on Thompson Street and Anderson Street. The County will need to look at truck turning movements at specific intersections before recommending curb extensions.
- Parklets can create visibility concerns at intersections, so they should be avoided in locations where daylighting is currently an issue. The Borough should determine the locations with greater specificity for parklet recommendations to encourage designs and locations that do not impact visibility.

Additional comments were received during the breakout room (not pertaining to the proposed curb extensions):

- Parklets are also recommended for this corridor. There has a been a parklet on a trial basis at a street festival where the street was closed off. There have been concerns about taking parking spaces away, so there has been a request to put the parklet on Wall Street rather than on Somerset Street. The Borough has been in contact with Jon Dugan at RideWise to coordinate. The Borough would also need to coordinate with the economic development committee. There is support for parklets among businesses.
- Parklets are opportunities to collaborate with community groups. Community groups can offer creativity and engagement opportunities. Other cities have done competitions to decorate parklets.
- Parklets should have a barrier, such as walls or planters, that create a safer space that separates the parklet from the roadway.
- Speeding needs to be addressed through mitigation measures for parklets to feel comfortable.
- There is a request to have the Borough to have a dedicated merchants parking lot (such as where the team met for the road safety audit). This would prevent merchants from parking in on-street spaces that could be used for parklets or visitor parking.
- Participant express support for right turn only at the Quick Check, as well as don't block the box recommendation.
- Participant noted that some recommendations suggest adding signs and some suggest taking away. There is concern about sign clutter. There is also a wayfinding plan as part of the TAP grant, so there could be more signs coming.
- Participant said there should be high visibility crosswalks at the Route 206 intersection. A participant from NJDOT said the State would be amenable to adding high visibility crosswalks.
- A participant requested an LPI at the intersection at First Avenue. County Engineering noted that this had been discussed, but the phasing at this location poses a challenge.
- A participant requested some signal optimization along the corridor. The Borough Engineer said the County has already done some adjustments to timing on First Avenue, and the State is looking into adjustments on Route 206.

L. Public Meeting #2

On Wednesday, September 29, 2021, from 7:00 PM to 9:00 PM, Somerset County held the second and final public meeting for the study. The virtual meeting format consisted of a 45-minute presentation touching on the following topics: project background, project status, identification of needs, and proposed safety measures by corridor.

The meeting was then divided into seven breakout rooms, one for each of the selected corridors, one for county-wide general transportation comments and suggestions, and one for Spanish speakers. Much like at the third TAC meeting, participants were asked to provide their general reactions to the proposed curb

extension recommendations and whether they would accomplish the goals of the study. Potential barriers or other ways to accomplish study goals were also discussed. Provided below is participant feedback received on this specific proposed safety measure:

- Participants favored curb extensions and recommended the space be used for bike racks, benches, landscaping, and green infrastructure.
- The County may wish to consider temporary (e.g., painted) measures if hardscaping of the curb extensions cannot be accomplished in the near term.
- Vast majority of this corridor is uncontrolled; anything that will increase visibility of pedestrians (i.e., crosswalks, better lighting, etc.) is a good thing.
- Parking enforcement is limited on the corridor, and curb extensions would help to act as a barrier for parking in non-permissible areas.
- Reducing the crossing distance can help people cross Somerset Street more quickly.

Additional comments were received during the breakout room (not pertaining to the proposed curb extensions):

- Additional lighting, particularly at the corridor gateways (i.e., First Avenue) should be implemented to create a plaza effect and encourage people to stay downtown.
- Bike signing and sharrows to encourage cyclists are requested.
- There is interest in parklets; mayor is aware of the RideWise parklet. It is important to find the right location. The intersection of Wall Street is the strongest spot for parklet; it has short term use (ice cream) rather than a longer term like a restaurant.
- Explore the potential for a parklet at First Avenue. The area needs lighting. Lighting is shielded and does not extend into the neighborhood at the Veteran's Park.
- The Borough library needs lighting and better crossings. There is need for additional traffic calming in that area. Potentially consider a pedestrian crossing lit with beacons.

III. Crash Findings

The analysis used to support the RSA process incorporated a data-driven effort to utilize reportable crash information resulting in any combination of fatality, injury, or property damage. The datasets used for this analysis are sourced from local law enforcement responses to reported vehicular crashes. These on-scene responses subsequently translate to official law enforcement generated reports. Concurrently, the individual reports are aggregated to render serviceable crash information. To be entirely inclusive in obtaining complete crash information, the data was accumulated using three distinct resources: NJDOT's Safety Voyager[9], New Jersey Division of Highway Traffic Safety (NJDHTS) Numetrics[10], and the NJDOT raw crash tables[11]. The three sources were compared against each of the other obtained sources to allow for duplicate records to be discarded and all distinct records to be included with the goal of producing a complete and comprehensive representation of the crashes within the extents of the corridor.

The datasets were obtained for a three-year analysis period from the beginning of January 2016 through the end of December 2018 for vehicle-vehicle crash incidents and from the beginning of January 2014 through the end of December 2018 for vehicle-pedestrian/cyclist crash incidents. According to the compiled crash data, 144 crashes occurred within the 0.67-mile segment analysis area during the analysis period. The following evaluation breaks down crash attributes as a percentage of the total crashes to achieve a stronger understanding of the localized trends compared to County roadway systems crash performance. Furthermore, all crashes along this segment were mapped onto collision diagrams, which can be found in **Appendix A**, providing a quick spatial overview of crash clustering patterns.

In reviewing the crash data, the following crash clusters and prevailing safety issues were noted:

- At the First Avenue intersection
  - Two (2) crashes involving cyclists perhaps due to nearby recreational destinations
  - Multiple rear end crashes occurring on the NB, SB, and WB approaches
- Struck parked vehicle and sideswipe crashes clustered between Nevius Street and Codington Street
- Pedestrian crashes clustered at Andrerson, Doughty, Thompson, and Codington streets
- Multiple right angle crashes at Thompson Street signalized intersection
- At the Route 206 intersection
  - Multiple crashes involving pedestrians crossing south side of intersection, including one fatal
  - Multiple right-angle crashes, which tend to involve injuries due to high speed on Route 206
  - Multiple right-angle crashes between EB queue and vehicles from strip mall on SW corner
  - Numerous rear end collisions on NB, SB, and EB approaches to intersection, including injuries

A. Temporal Trends

Sorting the crashes by month reveals that the study segment generally conforms to County's trends when considering the percent distribution of crashes by month. During the three (3) months of May, July, and August, the study segment experienced significantly higher crash frequencies than the County-wide average. Notably, July experienced an increase in crashes over the County-wide average (7.9% vs. 14.5%), as shown highlighted in yellow in **Figure 4**.

Figure 5 highlights the crash percent distributions by day of the week. Midday, between 11:00 AM and 4:00 PM, reveals higher crash percentages than the County-wide average, as shown in **Figure 6**, perhaps due to downtown retail activity. More specifically, the 12:00 PM hour has crash frequencies is almost double the County-wide average, 9.2% local distribution versus a 5.1% County-wide distribution.

[9] https://www.njvoyager.org/App/
[10] https://www.numetric.com/
[11] https://www.state.nj.us/transportation/refdata/accident/rawdata01-current.shtm

Figure 4 – Vehicular Crashes, Percent Distribution by Month]

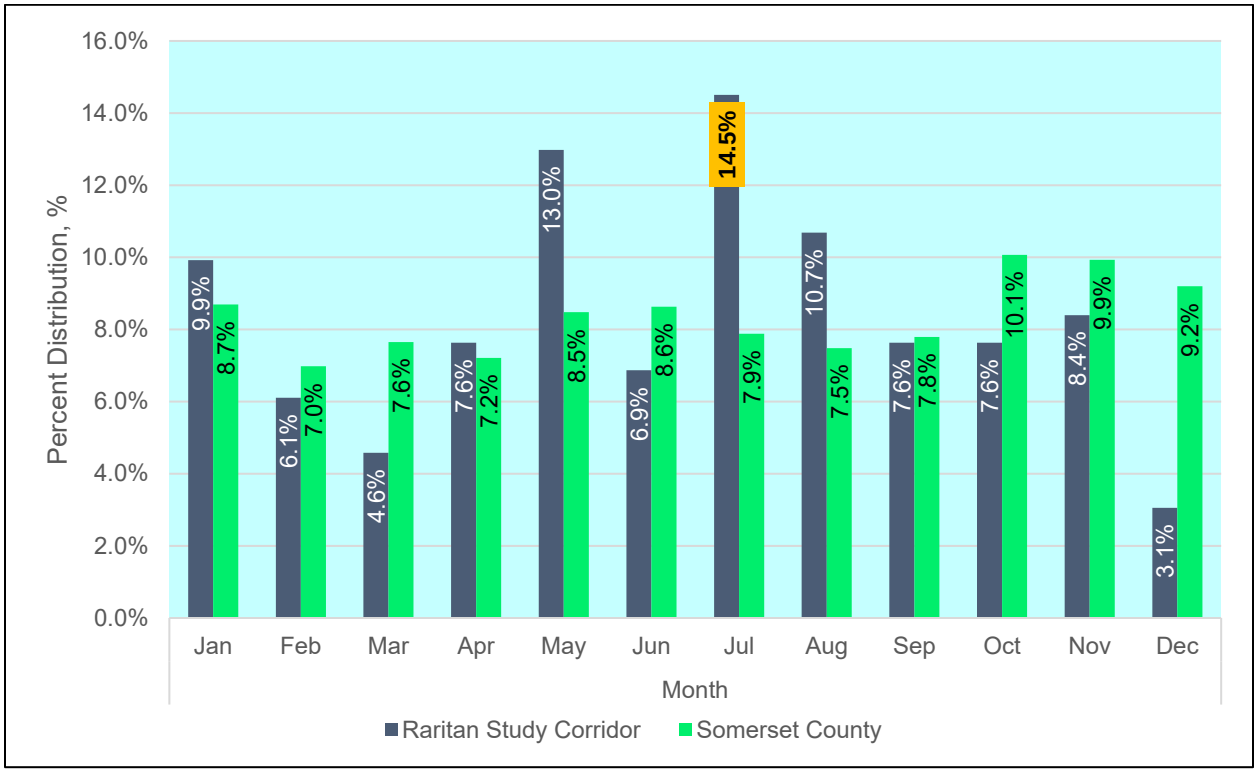


Figure 5 – Vehicular Crashes, Percent Distribution by Day

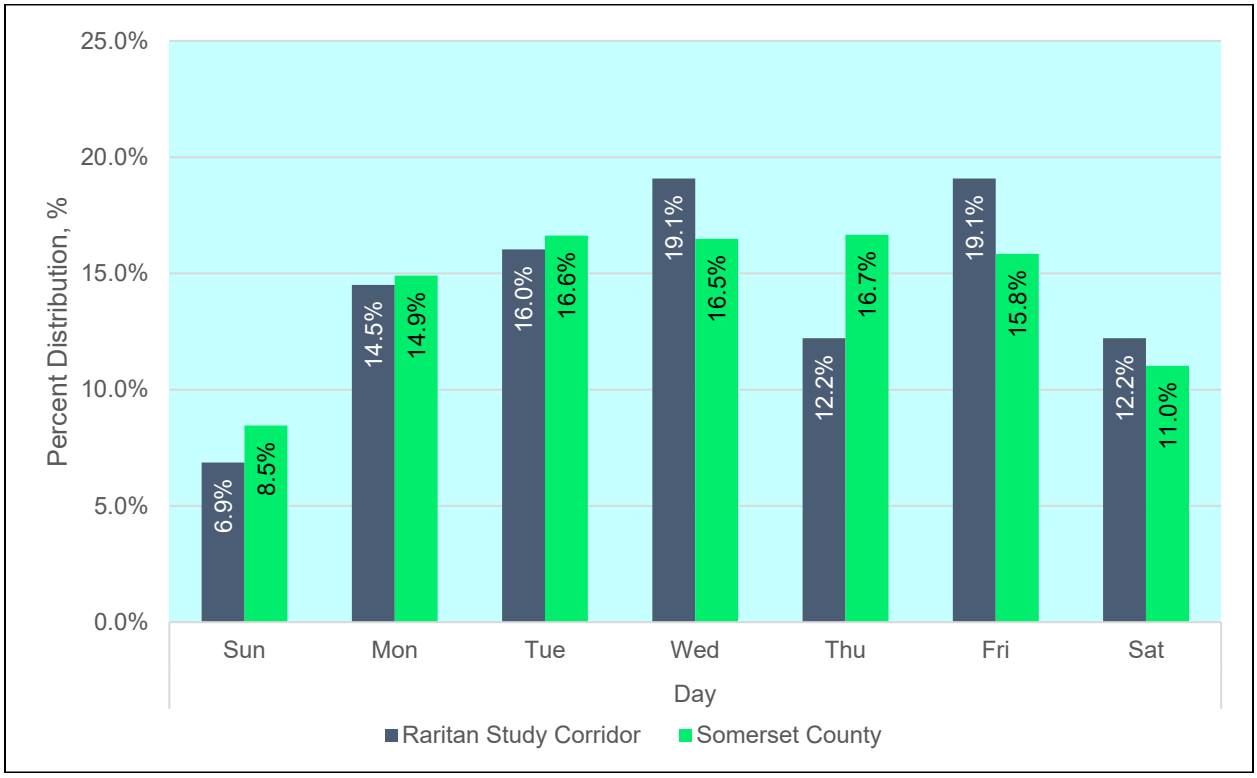
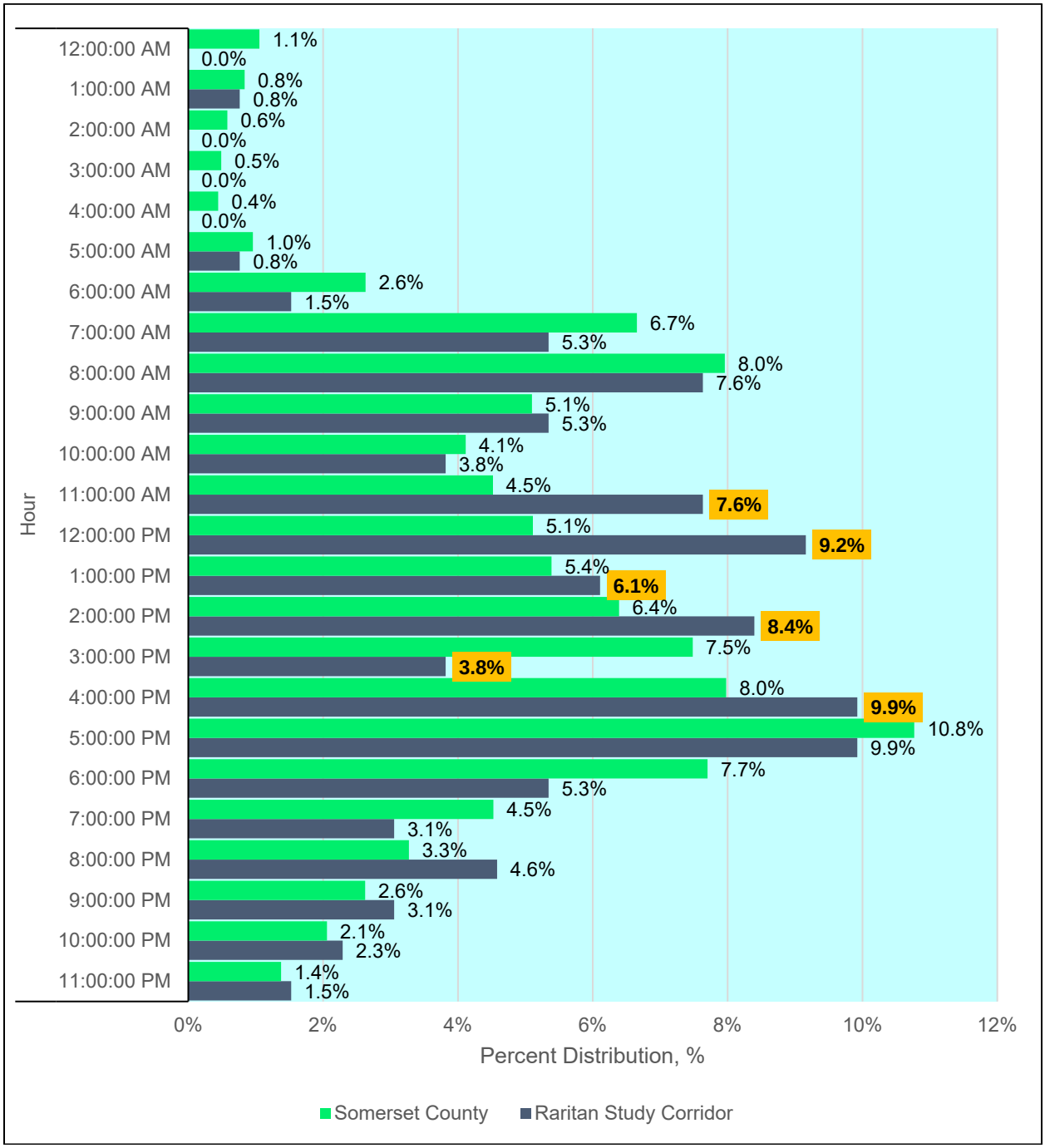


Figure 6 – Vehicular Crashes, Percent Distribution by Hour



B. Collision Types

Fifty-four rear end and 25 right angle crashes make up more than 54% of the crash distribution along the study segment. When compared to the County roadway system, rear end crashes occur less than 4% as frequent. Right angle crashes occur more frequently within the study segment than the County, by approximately 1.5%. However, most notably, vehicular crashes involving parked vehicles are considerably overrepresented on the study corridor compared to the County roadway system. Struck parked vehicle crashes occur 16.0% during the study period compared to only 3.3% County-wide, nearly five times as frequent, as shown highlighted in yellow in **Figure 7**. Additionally, both pedestrian and cyclist crashes are

overrepresented by multiples of approximately five times and two times when compared to the County average (highlighted in yellow in **Figure 7**). A table of crash types is provided in **Table 3.**

Figure 7 – Vehicular Crashes, Percent Distribution by Crash Type

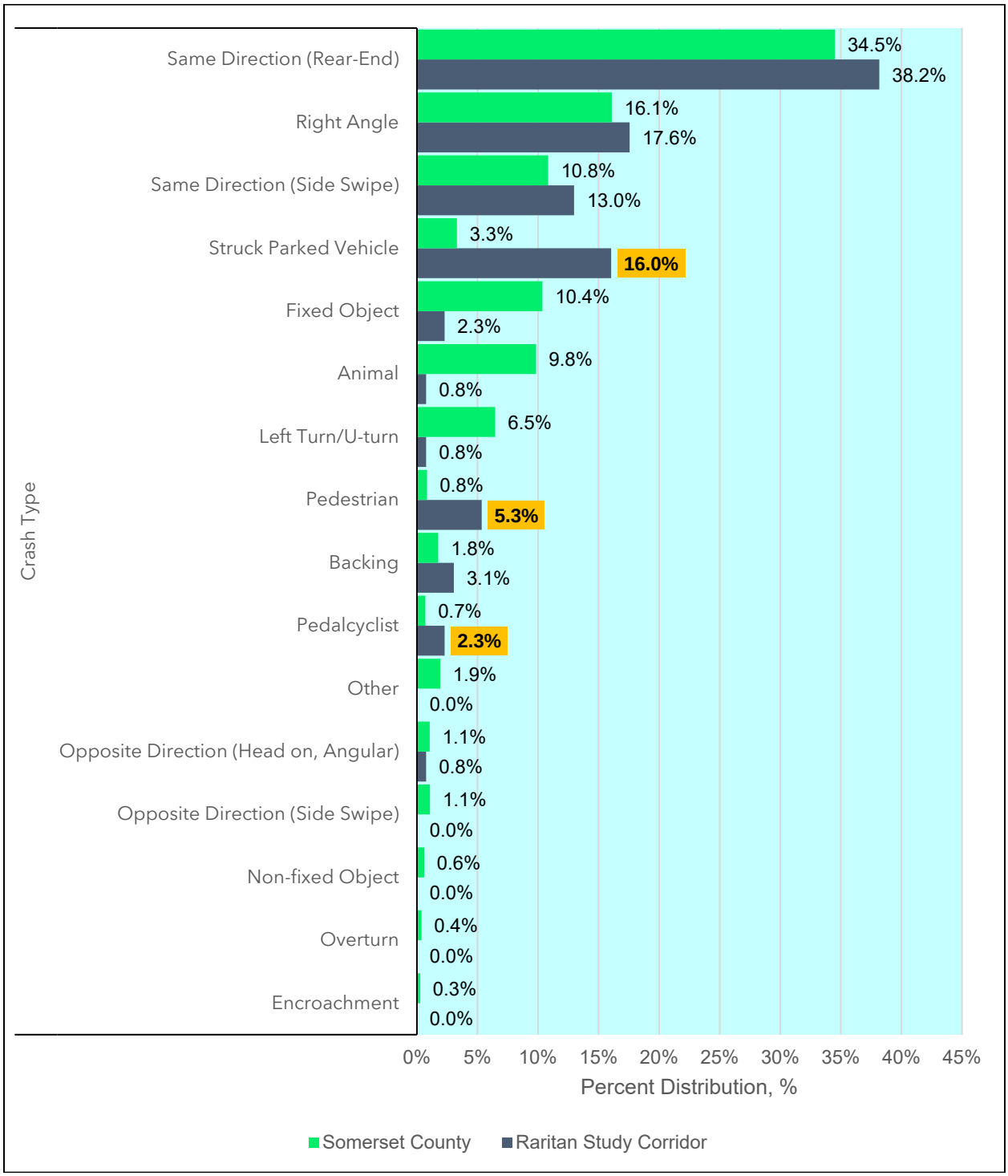


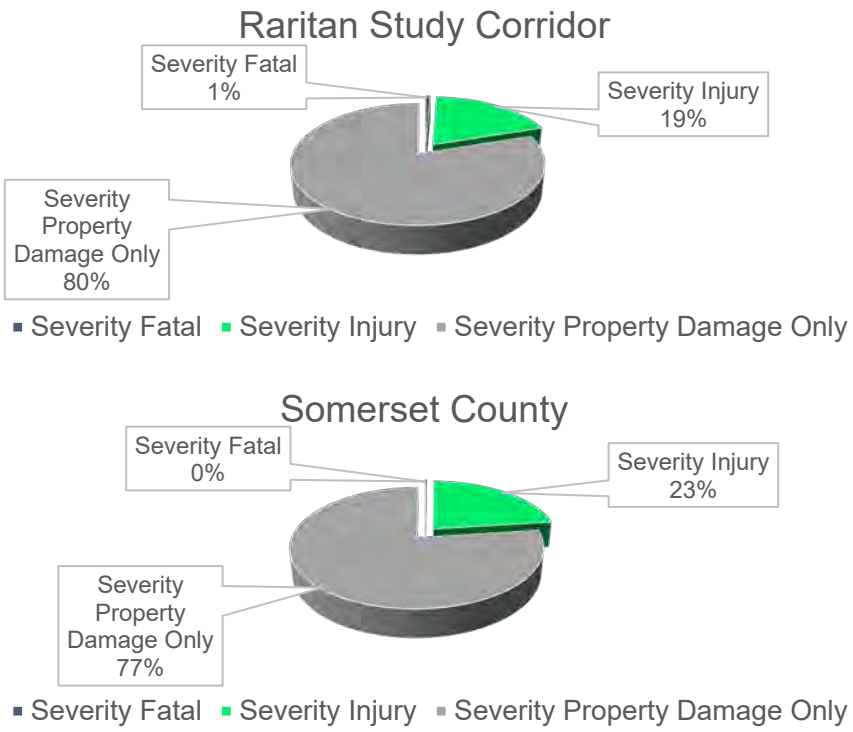
Table 4 – Vehicular Crash Counts by Type

Crash Type	Total
Animal	1
Backing	4
Fixed Object	4
Left Turn/U-turn	1
Opposite Direction (Head on, Angular)	1
Pedalcyclist	3
Pedestrian	9
Right Angle	25
Same Direction (Rear-End)	54
Same Direction (Side Swipe)	20
Struck Parked Vehicle	22
Total	144

C. *Crash Severity*

The study segment generally conforms to County's trends when considering the percent distribution of crash severity. Data shows a slight increase in crashes resulting in injuries rather than property damage only when compared to the County. The analysis period saw one (1) fatality along the selected roadway study segment (Figure 8).

Figure 8 – Crash Severity, Percent Distribution by Classification



D. Roadway Surface & Light Condition

Crashes occurred more frequently during dry driving conditions on the study segment than the County-wide average. Wet road-related crashes are the second most overrepresented roadway surface condition during crashes, 16.0%, which is approximately 0.1% less frequent than the County-wide average, 16.1% (highlighted in yellow in **Figure 9**).

Figure 9 – Vehicular Crashes, Percent Distribution by Surface Condition

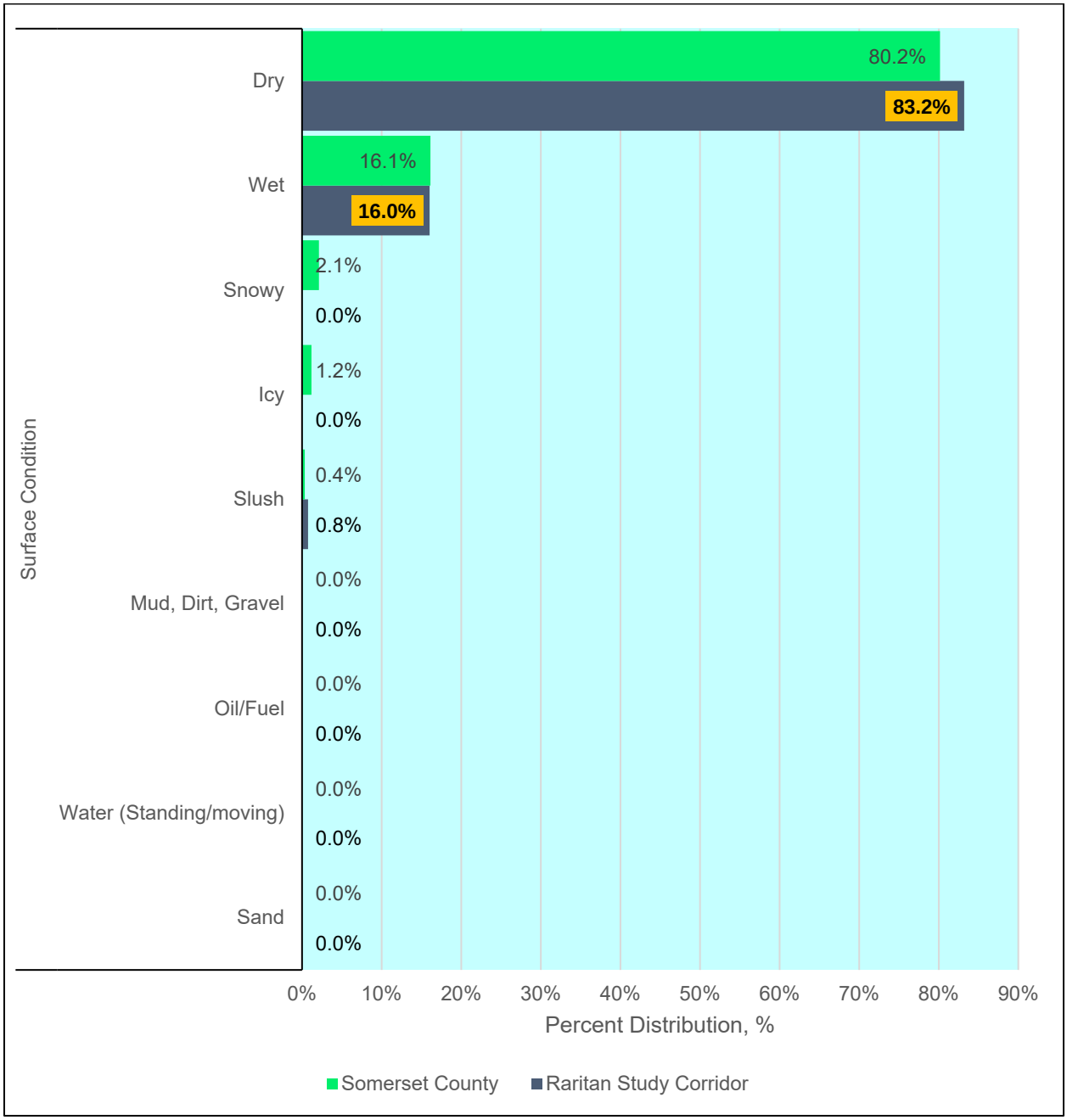
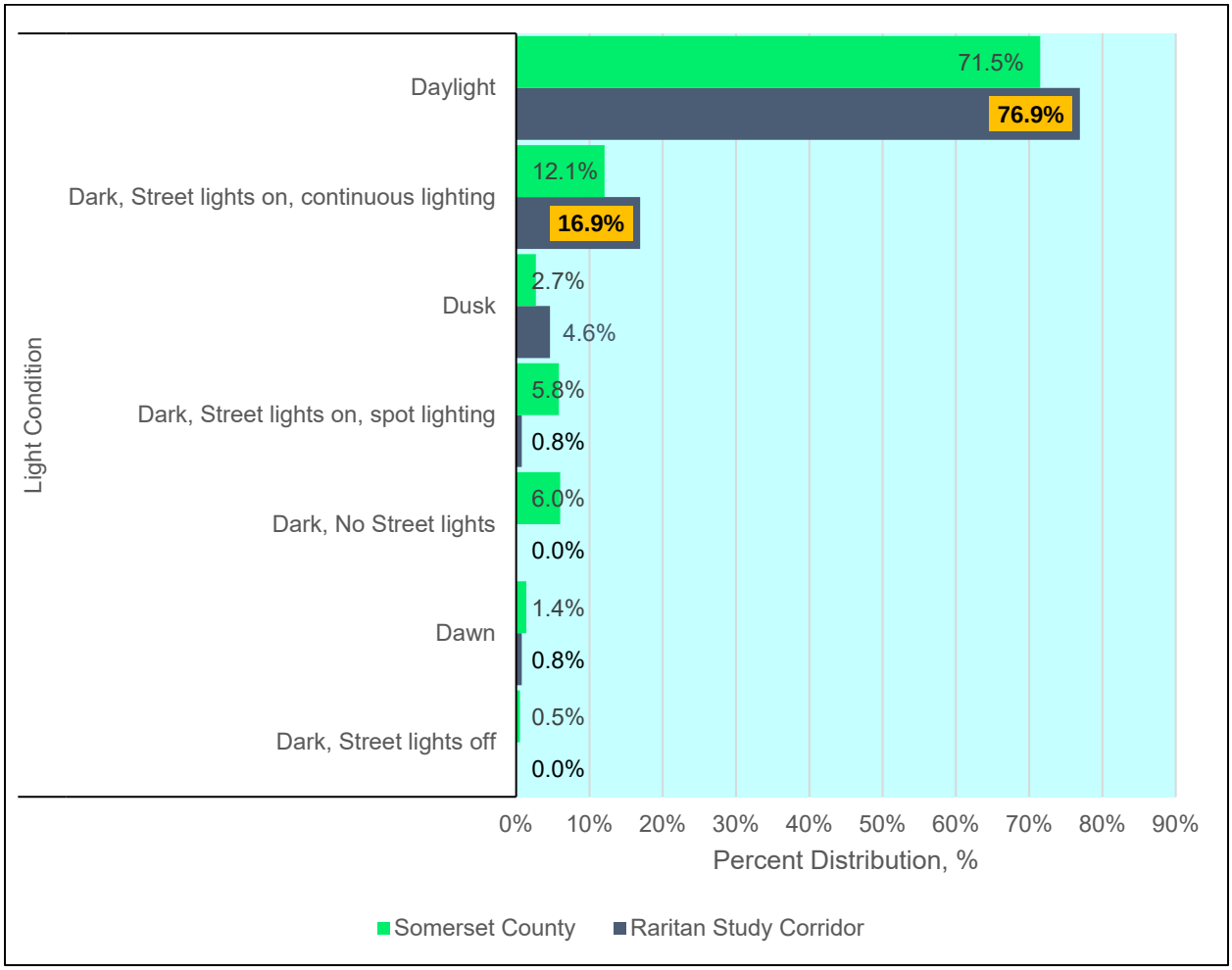


Figure 10 – Vehicular Crashes, Percent Distribution by Light Condition



Approximately 76.9% of crashes on the study segment occurred during daylight conditions. This is slightly higher than the County-wide average of 71.5% (highlighted in yellow in **Figure 10**). Crashes occurring during "Dark, Street lights on, continuous lighting" is higher than the County average, 16.9% on the study segment corridor versus the 12.1% for the County due to the developed nature of the study area (highlighted in yellow in **Figure 10**). An elevated occurrence of dusk condition crashes may suggest westbound sun glare issues (**Figure 10**).

E. Location

Crash visualization using the histogram, grouped in 0.01-mile segments, **Figure 11** indicates that the signalized intersections of US 206 and First Avenue experienced the highest occurrence of crashes along the study segment, as shown highlighted in yellow. These intersections account for nearly half of all crashes. The signalized intersections of First Avenue/Lyman Street and Thompson Street also present high crash totals, 19, and 13, respectively. At unsignalized intersections, Loomis Street had the highest total of 7 crashes (highlighted in yellow in **Figure 11**). A three-dimensional representation of this crash histogram for the 2016 through 2020 timeframe, imposed onto a map of the study area, is shown on **Figure 12**.

Figure 11 – Vehicular Crashes by Milepost

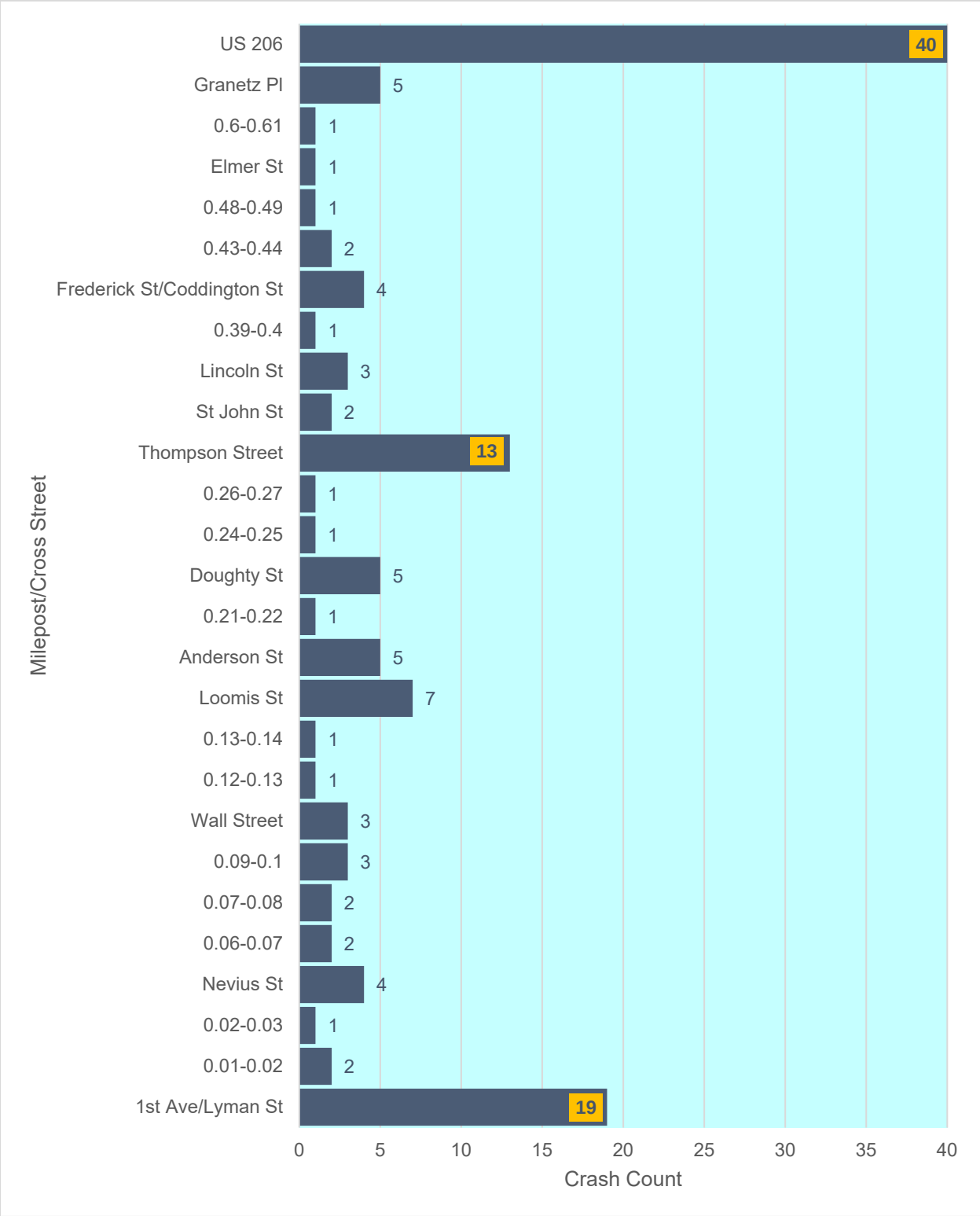
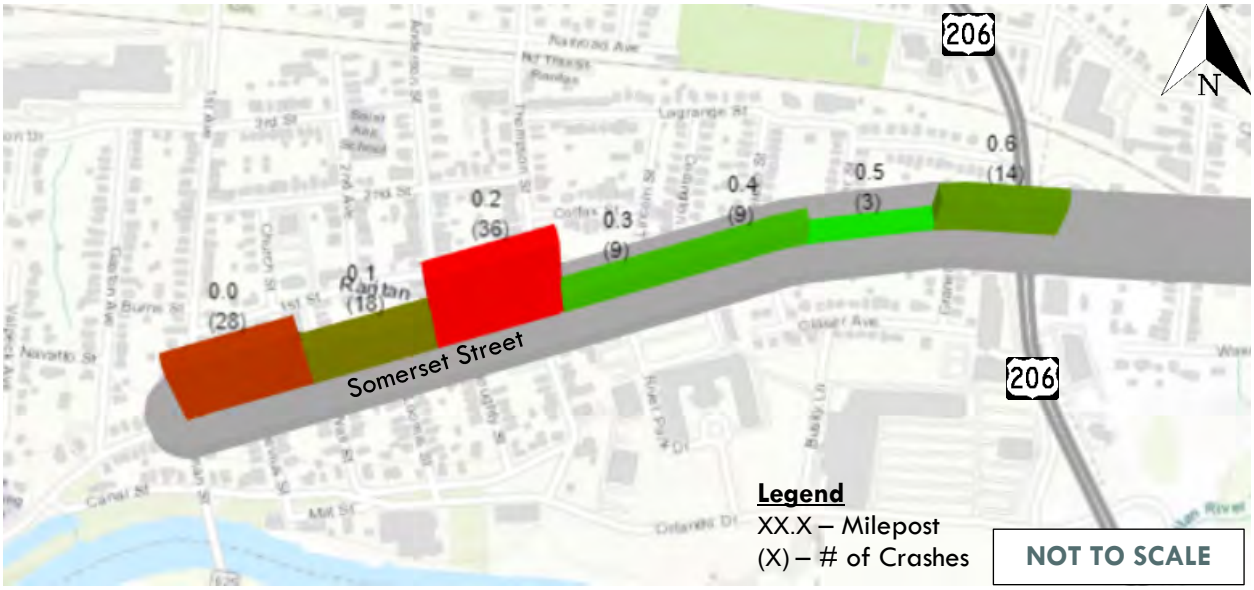


Figure 12 – Visual Estimation of 5-Year (2016 - 2020) Crash History Obtained from Safety Voyager [12]



F. Age of Those Involved

Driver-, occupant-, and pedestrian-involved data was also accessible from the NJDOT crash tables. A normal distribution table was developed (**Figure 13**) utilizing the age data provided by NJDOT. Among the 111 crashes reported, the average person(s) involved age was determined to be approximately 39 years old. Approximately 68% of person(s) involved were between the ages of 21 years old and 57 years old. **Table 5** outlines the percent distribution of the age(s) of those involved in the vehicular crashes, grouped by ten years of age. Data from the table indicates that crashes with drivers between the ages of 26-55 years old occur with a higher frequency on the study segment than the County average for the same age groups. Age group 16-25 account for the highest frequency of those involved at 21.0%. Most notably, the under 16 age group represented 14.3 percent of those involved in vehicular crashes, almost double the County average of 7.9%.

[12] Five-year crash totals shown on histogram from Safety Voyager may vary from crash report data obtained from municipality's police department and do not include crashes recorded as occurring on side street approaches, which are included in the record of analyzed collected crash data.

Figure 13 – Histogram of Age(s) Involved

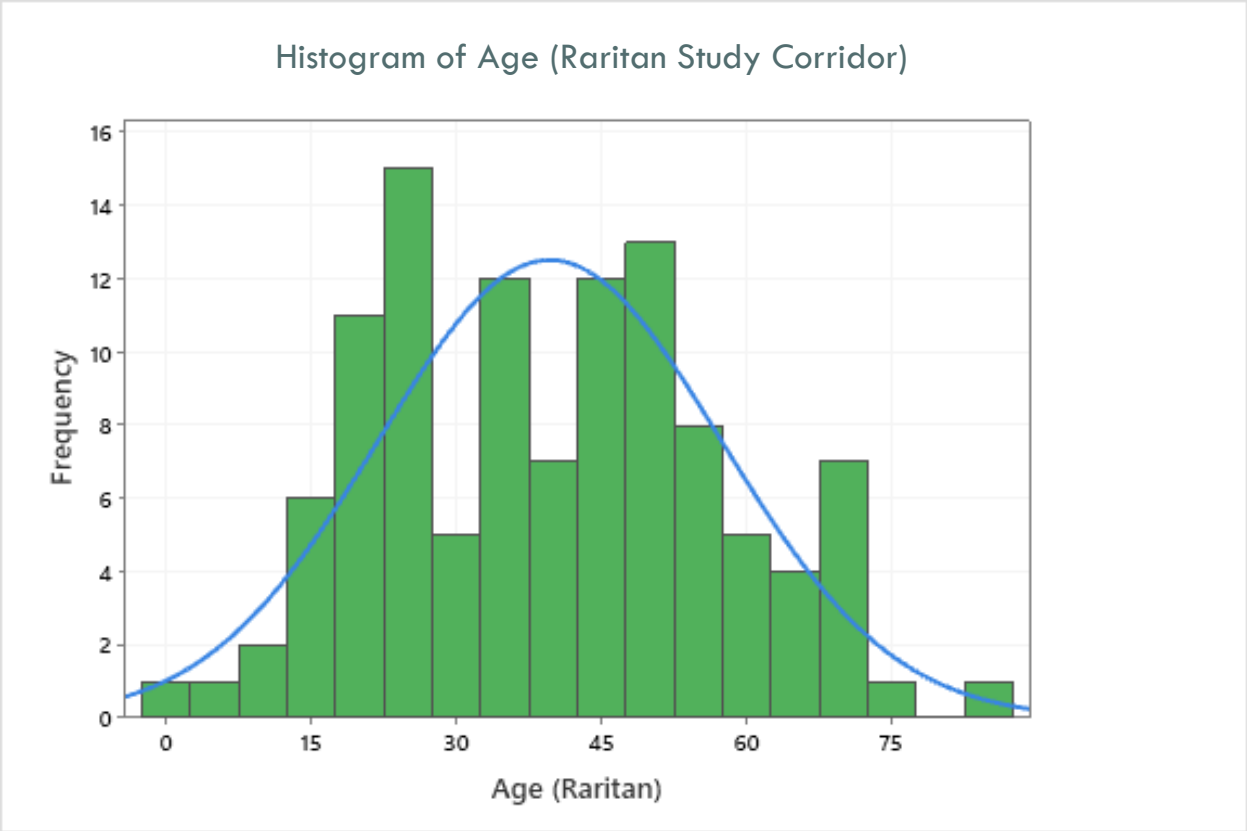


Table 5 – Age(s) Involved, Percent Distribution

Age Involved	Raritan Borough Study Corridor	Somerset County
Under 16	14.3%	7.9%
16-25	21.0%	23.1%
26-35	18.5%	16.9%
36-45	16.0%	15.8%
46-55	17.6%	16.7%
56-65	5.0%	11.3%
66-75	6.7%	5.1%
76-85	0.8%	2.5%
86-95	0.0%	0.7%
96-105	0.0%	0.0%
106-116	0.0%	0.0%

IV. RSA Logistics

All data previously discussed in this report was used to inform the RSA conducted on this corridor. All participants involved in this RSA, whether in attendance during the pre-audit meeting, in-field review, and/or post-audit meeting, are listed in **Appendix E**. The pre-audit meeting was held at 10:00 AM via video conferencing on Thursday, April 1st, 2021 on the morning of the in-field review meeting to introduce the audit team, cover the activities to complete the RSA, define the RSA process, cover existing conditions data, present safety measures under consideration, summarize crash data collected for the corridor, and go over ground rules for conducting the in-field portion of the audit safely. The PowerPoint used to facilitate this discussion is provided in **Appendix F**.

The in-field component of the RSA was conducted at 2:00 PM on the same day as the pre-audit meeting. The audit team met in a social-distanced manner, while masked, in the Municipal Parking Lot at 34 Thompson St in Raritan Borough for a flipbook RSA orientation presentation to reiterate the ground rules of the audit. Upon conclusion of the orientation, participants were paired off with each other to walk halves of the corridor, seeking to pair each Somerset County Roadway Safety Study project team member (whether with the County or Consultant team) with each of the stakeholders. Utilizing aerial mapping, prompt lists, photography, and video, participants recorded their observations of the corridor, as well as potential safety measures to address potential safety concerns. After walking the corridor, the RSA team met back in the parking lot to share overall thoughts on the corridor and fill out a survey on corridor identity, crossings, pedestrian-vehicle interactions, sidewalk and roadway conditions, and streetscape amenities, the answers of which were compiled and are averaged in **Appendix G**. Based on survey results, the corridor had the following perceived concerns:

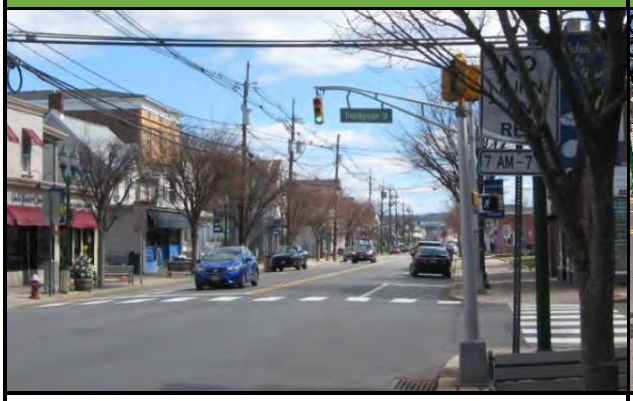
- Obscured sight lines between pedestrians and vehicles at crossing locations.

The following week, on Monday, April 5th, 2021, the RSA team reconvened via video conferencing to view photos gathered during the in-field audit, some of which are presented in the following section, to discuss each observation, elaborate on potential ideas to mitigate, cover questions on travel pertaining to the overall corridor, and summarize next steps for this study. This discussion helped to form the basis of the Implementation Matrix in the **Identified Issues & Observations** section of this report. The PowerPoint used to facilitate this discussion is provided in **Appendix H**.

V. Identified Issues & Observations

This section depicts a sampling of overall issues identified during the RSA. Please refer to the Implementation Matrix in the following section of the report for a comprehensive listing of identified corridor issues.

Pedestrian & Cyclist	Pedestrian & Cyclist
	
Curb ramps lack ADA compliance and need restriping and pavement repair	Cyclists traverse corridor without dedicated bike lanes
	
Steep driveway pitch that slopes toward street near Thompson Street	Crossing at Frederick Street lacks crosswalk striping and ADA compliance
	
Curb ramps at Route 206 appear to need ADA-compliant upgrades	Lincoln Street lack indication of one-way traffic northbound from Raritan Street

Operations & Visibility	Maintenance
	
Signs are blocked by roadside tree branches.	Ponding near crossings compromises pedestrian crossing areas indicate drainage problems
	
Business driveway access set too close to busy Route 206 intersection causing dangerous vehicular exits	Tree pits that have the ability to be widened if tree grows larger are not addressed properly causing raised grates
	
Stop bar on Route 206 South seems set further than MUTCD guidelines compromising pedestrian safety	Pavement encounters uneven settling after utility work

VI. Findings & Recommendations

This section summarizes the site-specific and corridor-wide safety issues, potential strategies, and recommendations to improve safety. An Implementation Matrix is provided that summarizes the recommendations and provides qualitative information on time frame, cost, and responsible jurisdiction. Please note that recommendations cited in the Implementation Matrix are to reflect feedback received during the RSA process, and are meant to be a record of ideas discussed. Symbols used in the Implementation Matrix are defined in **Table** 6 as follows:

Table 6 – Legend of Symbols in Implementation Matrix

Symbol	Meaning	Definition
$	Low cost	Could be accomplished through maintenance
$$	Medium cost	May require some engineering or design and funding may be readily available
$$$	High cost	Longer term; may require full engineering, ROW acquisition, and new funding
🕐	Short term	Could be accomplished within 1 year
🕐🕐	Medium term	Could be accomplished in 1 to 3 years; may require some engineering
🕐🕐🕐	Long term	Could be accomplished in 3 years or more; may require full engineering

A. Implementation Matrix

The following represents the specific findings and recommendations made by the interdisciplinary RSA team, which were subsequently evaluated via discussions with County Engineering on Wednesday, June 2nd, 2021 and Thursday, June 3rd, 2021. As these recommendations are considered for advancement into either a CD study, or incorporation into an overlapping County or municipal project, the recommendations herein should be thoroughly evaluated for feasibility and practicability and designed as appropriate by the roadway owner and/or a professional engineer for conformance to all applicable codes, standards, and best practices. Corridor-wide recommendations, requiring a review of all important applicable infrastructure along the corridor pertinent to these specific topics, are provided in **Table 7**. Further defined recommendations at specific intersection or mid-block locations are provided in **Table 8**. **Recommendations bolded within the Implementation Matrix below feature one of the twenty Proven Safety Countermeasures from the FHWA[13], which means that the recommendation is shown to have a significant safety benefit as proven by substantial traffic safety research.** These recommendations are tied to Crash Modification Factors (CMFs) showing a substantial reduction in crashes, as well as research documented on the Crash Modification Factor Clearinghouse website that has a high-quality ranking. This high ranking indicates the quality of study design, sample size, statistical methodology, statistical significance, etc. for the research backing each CMF. Mapping of proposed location-specific recommendations is provided in **Appendix I**.

Table 7 – Corridor-Wide Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
KEY STUDY RECOMMENDATION – Entire Somerset Street, Raritan Borough Study Corridor				
1	Consider hardscaping existing daylighting areas with solid curbing and sidewalk. Could also be implemented alongside Green Stormwater Infrastructure to filter stormwater runoff. Look for opportunities to implement with ongoing Borough TAP grant work.	$$$	🕐🕐🕐	Municipality
2	Stripe no parking zones in compliance with Title 39 regulations	$	🕐	Municipality

[13] https://safety.fhwa.dot.gov/provencountermeasures/

No.	Recommendation	Cost	Time Frame	Jurisdiction
Bicycle				
3	Evaluate existing inlets for bicycle-safe grates and replace as necessary.	$$	🕐🕐	County
Maintenance				
4	Coordinate with the Borough to replace and/or maintain tree knock-out grates. Consider raised pits instead.	$	🕐	Municipality
5	Remove DRUG FREE SCHOOL ZONE signs. This area is not a school zone.	$	🕐	County
Operations				
6	Conduct an assessment to determine where daylighting and/or curb extensions should be added, extended, or shortened.	$$	🕐	County
7	Relocate signage so it is not blocked by trees.	$	🕐	County
8	Coordinate with the Borough and PSE&G to upgrade lighting.	$	🕐🕐	Municipality/ Utility company
9	Conduct sign inventory to determine what traffic signs should be upgraded, relocated, removed, and installed to reduce sign clutter.	$	🕐	County
10	Coordinate with ongoing TAP grant design work on corridor, which includes improved sidewalks and crosswalks, and new curb extensions.	$	🕐🕐🕐	County/ Municipality
11	**Conduct speed study along the corridor between Codington Street and US 206 to analyze if posted speed limits are appropriate**	**$$**	🕐	**County**
12	Consider establishing a bicycle wayfinding plan for the intersecting bicycle routes.	$$	🕐🕐🕐	Municipality
13	Consider installing infiltration planters	$$$	🕐🕐	Municipality
Pedestrian				
14	Perform curb ramp assessment to determine the number of curb ramps that need to be replaced, repaired, and constructed.	$$	🕐	County/ Municipality
15	Coordinate with RideWise to install/construct several parklets along the corridor.	$$	🕐🕐	County/ Municipality/ RideWise
16	Conduct a sidewalk assessment to determine the extent of sidewalk that needs to be replaced, repaired, and constructed.	$$	🕐	Municipality
17	Consider implementing flared crosswalks	$	🕐	County/ Municipality

Table 8 – Location-Specific Recommendations

No.	Recommendation	Cost	Time Frame	Jurisdiction
Lyman Street/1st Avenue				
18	Conduct photometrics analysis to determine if intersection lighting meets standards, especially on west side of intersection.	$$	🕐🕐	County
19	**Evaluate existing timing directive to determine if LPIs and 3.5fps flashing don't walk times can be accommodated.**	**$$**	🕐🕐	**County**
20	Coordinate with SCOOT to increase visibility of transit stops near this intersection.	$	🕐🕐	Municipality/ SCOOT

No.	Recommendation	Cost	Time Frame	Jurisdiction
21	Consider adding edge line striping and/or mountable curb to assist with turning movements and keep vehicles from driving over curb.	$	🕐🕐	County
22	**Determine if backplates can be added to signal heads.**	**$**	🕐🕐	**County**
23	Evaluate intersection capacity to determine if NO TURN ON RED signs can be installed on all approaches.	$$	🕐🕐	County
24	Add edge line with gore hatching to reduce width of EB receiving lane so it does not appear as two lanes.	$	🕐🕐	County
25	Consider gateway treatments, such as banners strung between utility poles or buildings	$	🕐	Municipality
26	Consider installing mountable curbs	$$	🕐🕐	Municipality
Quick Check Driveway				
27	Consider installing "DO NOT BLOCK THE BOX/INTERSECTION" signage and striping.	$	🕐	County
28	Consider formalizing daylighting/no on-street parking directly across from the driveway.	$	🕐	Municipality
29	Consider removing dedicated left turn lane on EB Somerset Street so there is one lane approaching the driveway.	$$	🕐	County
30	Restripe stop bar and install stop sign for driveway.	$	🕐	Property Owner
31	Investigate feasibility of restricting driveway to right-in, right-out movements only.	$$	🕐🕐	County/ Property Owner
32	When property is redeveloped, driveway should be realigned with Nevius St during Borough application process.	$$$	🕐🕐🕐	Municipality
Nevius Street				
33	**Consider installing RRFB or LED pedestrian warning sign for crosswalk on Somerset Street.**	**$$**	🕐🕐	**Municipality**
34	Consider installing no pedestrian crossing signs.	$	🕐	County
35	Install speed cushions on Nevius Street to limit bypass traffic around signal during congested periods.	$$$	🕐🕐🕐	Municipality
36	Refresh daylighting, no parking striping, and crosswalks.	$	🕐	County
37	Consider hardscaped curb extensions along with a gateway treatment for downtown Raritan.	$$$	🕐🕐🕐	County/ Municipality
Wall Street				
38	Consider installing no pedestrian crossing signs.	$	🕐	County
39	Explore hardscaping/daylighting areas with curb extensions to increase pedestrian visibility and eliminate parking that is too close to the crosswalks.	$$	🕐🕐	County
40	Perform feasibility study to relocate drainage facilities where conflicting with pedestrian paths of travel.	$$	🕐🕐🕐	County
41	Plant new tree in empty tree pit on NE corner.	$	🕐	Municipality
42	Install parklet in NW corner of intersection to service ice cream business pedestrian overflow.	$$	🕐	Municipality/ RideWise
43	If parklet and/or other hardscaping is installed, consider relocating crosswalk and stop bar on SB approach to improve vehicle sight distance.	$	🕐	County
44	Construct full-height curb to replace depressed curb next to parking spaces approximately 100' east of Wall Street.	$$$	🕐🕐🕐	County/ Municipality

No.	Recommendation	Cost	Time Frame	Jurisdiction
Loomis Street				
45	Consider striping a crosswalk on the west side of the intersection or installing no pedestrian crossing signs.	$	🕐	County
46	Construct hardscaping to replace striped area across from Loomis Street and extend no parking limits. Consider installing in concert with rain garden.	$$	🕐🕐	Municipality
47	Extend no parking area across from Loomis Street with striping.	$	🕐	Municipality
Between Loomis Street and Anderson Street				
48	Implement bike signing and striping on this segment of Somerset Street to connect the planned bike lanes on both intersecting streets.	$$$	🕐🕐🕐	County/ Municipality
Anderson Street				
49	Consider striping a crosswalk on the west side of the intersection or installing no pedestrian crossing signs.	$	🕐	County
50	Opportunity for GSI at NE corner where ponding was observed.	$$$	🕐🕐🕐	Municipality
Doughty Street				
51	Consider installing no pedestrian crossing signs.	$	🕐	County
52	Consider constructing curb extensions, daylighting, or parklet around crosswalk. However, existing utilities would make an ADA compliant crossing difficult.	$$	🕐🕐	County
53	Install wayfinding signage for public parking lots on Thompson Street.	$	🕐	County/ Municipality
Thompson Street				
54	Construct curb extension with rain garden on NW corner. However, existing utilities would make an ADA compliant crossing difficult.	$$	🕐🕐	Municipality
55	Evaluate if existing signal timing can accommodate LPIs.	$$	🕐🕐	County
56	Install gore striping between NO PARKING signs on SB approach to make approach lane narrower.	$	🕐	County
57	Consider NO TURN ON RED (NTOR) on WB approach. Evaluate if existing signal timing can accommodate NTOR signage.	$	🕐🕐	County
58	Consider upgrading push buttons and push button signs.	$	🕐🕐	County
59	Consider removing pedestrian signal heads and push buttons for crossing that no longer exists across EB approach and install no pedestrian crossing signage.	$	🕐🕐	County
60	Consider adding striped daylighting on the north side of the intersection to block parking.	$	🕐	County
61	Consider if backplates can be added to signals.	$$	🕐🕐	County
62	Consider relocating stop bars to be at least 4' from crosswalks.	$	🕐	County
63	Consider investigating if street trees on EB approach can be pruned to remove obstructions for signage or relocate blocked signage.	$	🕐	Municipality
64	Consider utilizing parking available behind nearby bank to supplement the public parking available at 34 Thompson.	$	🕐	Municipality
John Street				
65	Restripe SW curb extension corner to align with curb on John Street.	$	🕐	County
66	Install R9-3 and R9-3bP (no pedestrian crossing) signage on the west side of the intersection.	$	🕐	County

No.	Recommendation	Cost	Time Frame	Jurisdiction
67	Reconstruct corner to reduce curb radii.	$$	🕐🕐	County
Between John Street and Lincoln Street				
68	Stripe dedicated ADA space with blue paint, daylight no parking area, relocate 2-hour parking sign from no parking area to on-street parking east of post office, and reorient mailbox to face post office.	$	🕐	Municipality/ USPS
Lincoln Street				
69	Coordinate with bagel shop business owner to relocate tables and chairs out of the pedestrian walking area.	$	🕐	Municipality/ Property owner
70	Install R9-3 and R9-3bP (no pedestrian crossing) signage on the east side of the intersection.	$	🕐	County
71	Reconstruct NW corner to reduce curb radius.	$$	🕐🕐	County
Codington Street/Frederick Street				
72	**Evaluate gas station for access violations and modify as necessary.**	**$$$**	🕐🕐🕐	**Municipality/ Property owner**
73	Stripe crosswalk and stop bar across Frederick Street.	$	🕐	County/ Municipality
74	Refresh existing crosswalk striping.	$	🕐	County
75	Add landscaping to delineate gas station driveways and provide visual separation from pedestrian space.	$$	🕐🕐	Property Owner
76	Consider GSI treatment in front of gas station to reduce ponding and standing water.	$$$	🕐🕐🕐	Municipality
77	Reconstruct sidewalk through gas station driveways to correct non-ADA-compliant cross slopes.	$$	🕐🕐	Municipality
78	Install R9-3 and R9-3bP (no pedestrian crossing) signage on the west side of the intersection if no crosswalk will be installed.	$	🕐	County
Between Frederick Street and US 206				
79	Stripe missing shoulder line and striping for parking to have more of a traffic calming effect.	$	🕐	County
Reimer Street				
80	Stripe crosswalk across SB approach.	$	🕐	County
81	Stripe stop bar across SB approach.	$	🕐	Municipality
Wycoff Street				
82	Drainage inlets must be relocated from pedestrian ROW or pedestrian ROW must be relocated.	$$$	🕐🕐🕐	County
83	Consider adding painted curb extensions.	$	🕐	County
84	**Consider installing a more visible, actuated crossing such as RRFB, blinking LED sign panels, or in-pavement lights.**	**$$**	🕐🕐	**County/ Municipality**
85	Refresh existing crosswalk striping.	$	🕐	County
86	Install R9-3 and R9-3bP (no pedestrian crossing) signage on the west side of the intersection if no crosswalk will be installed.	$	🕐	County
Elmer Street				
87	Install R9-3 and R9-3bP (no pedestrian crossing) signage on the west side of the intersection if no crosswalk will be installed.	$	🕐	County
88	Extend daylighting striping on NE corner to increase sight distance, which preserves sightlines between vehicles turning out of Elmer Street and through traffic on Somerset Street.	$	🕐	County

No.	Recommendation	Cost	Time Frame	Jurisdiction
Granetz Plaza				
89	Coordinate with utility company to remove guy wire hazard.	$$	🕐🕐	Municipality/ Utility company
90	Add daylighting to prevent parking too close to intersection.	$	🕐	Municipality
91	Construct DO NOT BLOCK BOX/INTERSECTION striping.	$	🕐	County
92	Refresh crosswalk striping.	$	🕐	County
93	Consider removing tree that obstructs view from SW corner.	$	🕐	Municipality/ Property owner
94	Replace brick paver sidewalk transition with concrete on SE corner of intersection.	$$	🕐🕐	Municipality
95	Gateway treatments, e.g., banners between utility poles/buildings	$	🕐	Municipality
US 206				
96	Update crosswalk striping.	$$	🕐🕐🕐	NJDOT
97	**Incorporate LPI in signal timing.**	**$$**	**🕐🕐🕐**	**NJDOT**
98	Update push buttons/signage.	$$	🕐🕐🕐	NJDOT
99	Update signal timing to incorporate 3.5fps flashing don't walk time.	$$	🕐🕐🕐	NJDOT
100	Adjust phasing so EB split phase goes first.	$$	🕐🕐🕐	NJDOT
101	Fix EB approach detection for overnight operations.	$$	🕐🕐🕐	NJDOT
102	Construct striping to help trucks make turns through intersection.	$$	🕐🕐🕐	NJDOT
103	Add more signal heads over receiving lanes.	$$	🕐🕐🕐	NJDOT
104	Relocate SB stop bar.	$$	🕐🕐🕐	NJDOT
105	**Install no left turn signage across from Verizon store and restripe driveway.**	**$**	🕐	**Municipality/ Property owner**

B. Road Owner Response

An essential final step of the RSA process (see **Figure 1**) is a response from the roadway owner, which provides accountability between the funding body and the participating jurisdiction who acknowledges the findings within the RSA and their planned steps to address concerns. In responding to the RSA's findings, the road owner, in this case the County, must weigh the safety benefits posed by the recommendations within this report against the available resources to implement such improvements to make an informed decision. Because the audit process generated a long and wide-ranging list of improvements, the road owner is expected to implement these recommended improvements as time and funds allow in coordination with other projects and priorities.

Somerset County delivered their response following the finalization of the findings and recommendations table (see **Appendix J**). However, while the County has overseen this RSA process, by no means should this report be considered as a commitment to address some or all concerns and implement some or all improvements listed within this report. All potential recommendations must be fully studied. It is acknowledged that some recommendations may not be feasible.

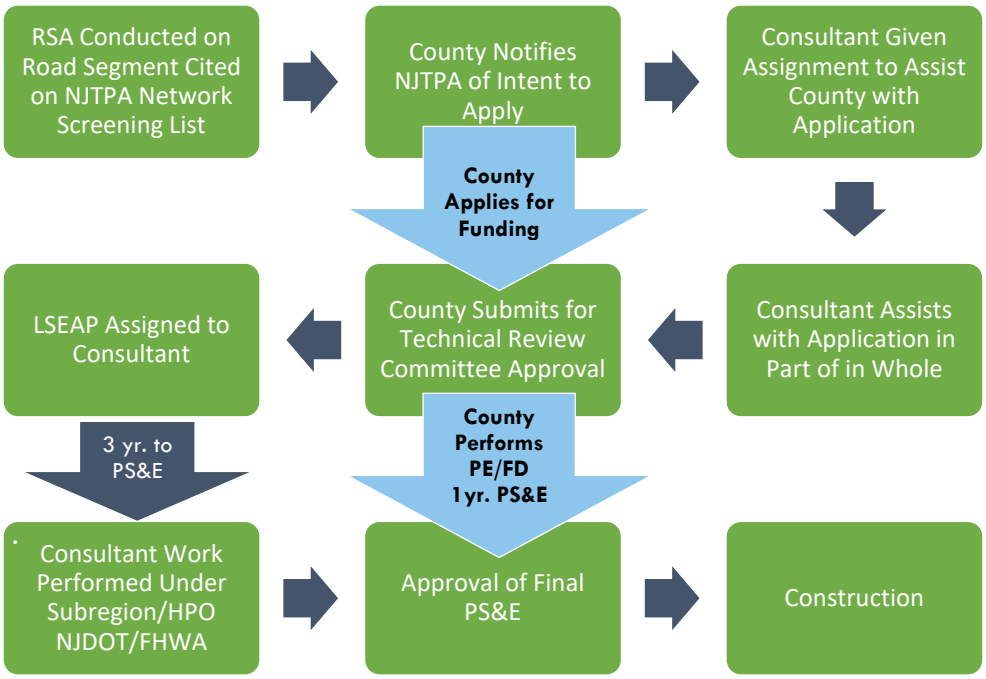
C. Potential External Funding Sources

Local Safety Program

The County has previously used RSAs as a "launching pad" for pursuing funding for corridor safety improvement projects, such as Main Street in Manville and Hamilton Street in Franklin, via the Local Safety Program (LSP) offered through NJTPA. Should the County desire to pursue funding of safety improvements

on this corridor, the RSA can help to scope the specific safety improvements to be conceptualized and designed for eventual funding and construction. The RSA can also be appended to Section 4 of the funding application[14] submitted to NJTPA as a further substantiation and documentation of the understanding of the existing safety issues and proposed safety measures. This application, which also requests information on scope, location ranking, HSM analyses, estimated costs, and environmental impacts, may be filled out by the County itself or with assistance from a consultant designated by NJTPA. Pending determination of eligibility by NJTPA's Technical Review Committee, the County can choose to either perform the Preliminary Engineering and Final Design work in-house or obtain assistance for such work through NJTPA's Local Safety Engineering Assistance Program. It should be noted that implementation of improvements through the LSP often takes around five to six years from corridor selection to construction. A simplified flowchart of this process from RSA to construction is shown in **Figure 14**. If faster implementation is desired, County and municipal operating and capital budgets could be relied upon if internal funding is available.

Figure 14 – Project Development Process for Local Safety Program after RSA Completion



Transportation Alternatives Program

The purpose of the Transportation Alternatives Set-Aside Program (TA Set-Aside) federal grant initiative is to support the construction of "non-traditional" surface transportation projects, which typically involves the designing of infrastructure for active modes such as pedestrians, cyclists, and other non-motorized forms of travel. Supported projects can also have elements that bolster the recreational, historic, cultural, or environmental assets of the project area. Grant funding for a given project can range from $150,000 to $1,000,000. Approximately $12 million in funding was awarded across the state in FY 2020 via this program. The amount of funding is determined on a project-by-project basis with award of prior grant money, and successful execution of prior funded projects, playing a factor. The County would not be prohibited from applying for both Safe Routes to School and TA Set-Aside funding at the same time.

[14] Application for FY 2020 provided here: https://www.njtpa.org/NJTPA/media/Documents/Projects-Programs/Local-Programs/Local-Safety-Rural-Roads/FY-2020-LSHRRRP-Application-Rev_191003.doc?ext=.doc

TA Set-Aside lists the following activities that are eligible for funding under its "Pedestrian/Bicycle Facilities" and "Community Improvement" categories:

- New/reconstructed sidewalks/curb ramps;
- Bike lane striping;
- Wide paved shoulders;
- Bike parking and bus racks;
- New or reconstructed off-road trails;
- Bike/pedestrian bridges and underpasses;
- Lighting;
- Historic sidewalk paving;
- Benches;
- Planting containers;
- Decorative walls; and,
- Walkways.

The recommendations within the Implementation Matrix touch on many of the prior elements listed. To best position itself to attain approval for funding, the applying jurisdiction, whether County or municipal, should pass a resolution of support showing the commitment of maintenance of the proposed complete streets elements. Furthermore, the applicant should have data supporting that the implementation of similar improvements elsewhere within its jurisdiction has resulted in the increase of non-motorized transportation, the stimulus of economic activity, and the improvement in quality of life. A handbook summarizing the process of applying for these funds can be found at NJDOT Local Aid website[15].

D. Demonstration Project

Demonstration projects are where an example improvement is completed for a selected corridor with foresight to prepare for larger rollouts. The improvement(s) should highlight the concept and illustrate the benefits of RSAs and how RSAs may improve the overall level of safety for the road users. The selected demonstration projects should be of strategic importance, and which is representative of the general safety theme suggested for the selected corridor.

Members of the public and participants on the RSA suggested the need for more pedestrian space at the intersection of Somerset Street & Wall Street. The popularity of the local ice cream shop results in these spaces already being used by people eating and waiting for ice cream during popular times. A parklet on Wall Street could offer shelter, seating, and plantings to create a comfortable and attractive space to enjoy ice cream. RideWise (the County's TMA) has supplies for temporary parklets. A painted crosswalk connecting the northwest corner of the intersection to the southwest corner could further establish a crossing used by some pedestrians today. Shown in **Figure 15** is an example temporary parklet established by Somerset County 4-H in nearby Bound Brook Borough just a few years ago.

[15] https://njdotlocalaidrc.com/perch/resources/Uploads/2020-ta-set-aside-handbook-8-12-20.pdf

Figure 15 – Temporary Parklet in Downtown Bound Brook[16]

E. Visualization of Potential Safety Measures

Provided in this section of the report are visualizations of some of the larger reaching proposed safety measures on the corridor in the Implementation Matrix (**Table 7** and **Table 8**). Visualizations of these safety measures, along with accompanying descriptions on how these ideas seek to improve safety for vehicular, pedestrian, and cyclist travel, are adapted from the following publications:

- *New Jersey Pedestrian and Bicycle Resource Center* video library, 2021[17]
- *Cross County Connection TMA* video library, 2021[18]
- *NJDOT Technology Transfer* video library, 2021[19]
- *NJDOT Safe Routes to School* video library, 2021[20]
- *2017 State of New Jersey Complete Streets Design Guide*, NJDOT, 2017
- *Proven Safety Countermeasures*, FHWA, 2017
- *Small Town and Rural Multimodal Networks*, FHWA, 2016
- *Separated Bike Lane Planning and Design Guide*, FHWA, 2015
- *New Jersey School Zone Design Guide*, NJDOT, 2014
- *Urban Bikeway Design Guide 2nd Edition*, National Association of City Transportation Officials, 2014
- *Urban Street Design Guide*, National Association of City Transportation Officials, 2012

Key Study Recommendation – Green Stormwater Infrastructure and Flared Crosswalks for Proposed Curb Extensions

About 20 years ago, the Borough began a corridor-wide daylighting initiative on Somerset Street, cross-hatching areas along the curb near intersections to further reinforce parking restrictions, which helped to improve sight lines between through traffic on Somerset Street and 1) vehicles pulling out from side streets or 2) pedestrians looking to cross Somerset Street. However, as evidenced by faded daylighting striping and vehicles parked in daylighting areas during the RSA, continued enforcement and maintenance is needed to make this current crash countermeasure effective. Curb extensions can be an effective way to entirely preclude vehicles from parking on top of intersections and provide pedestrians with a space to better establish their presence at a roadway crossing location.

In 2016, the Borough received a million-dollar grant for the Pedestrian Improvements from the NJ Transit Rail Station to the Riverfront from the Local Aid/Transportation Alternatives Program. These improvements are currently in design, which includes converting Anderson Street and Thompson Street from bi-directional

[16] Safe Routes NJ. (2020). Bound Brook Youth Engagement. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=aHtUWTjhOMw.
[17] https://www.youtube.com/channel/UCMsSU487ZPfaOAjcC7K8_SQ
[18] https://www.youtube.com/channel/UC5C0fODzuDqT9ycKMYv0C3Q
[19] https://www.youtube.com/channel/UC-L3YfqzFHcuDw6aI7wDrJQ
[20] https://www.youtube.com/channel/UCjlvrPjwNZ97MkX5lRol4ow

traffic into a pair of one-way streets, striping bike lanes and sharrows on various streets in the neighborhood, and constructing hard curb extensions (**Figure 16**) at improved intersections with Somerset Street. These curb extensions reduce crossing distances and pedestrian exposure to vehicular traffic.

As designs of these improvements on Somerset Street move forward, additional treatments that could be implemented alongside curb extensions should be considered, including ergonomic crosswalks (used to better reflect pedestrian circulation at an intersection, **Figure 17**) and infiltration planters (used to act as a receptacle to filter stormwater runoff, details in **Figure 18**).

Figure 16 – Curb Extensions in the City of Hoboken[21]

Figure 17 – Ergonomic Crosswalk in Downtown Union Township[22]

[21] Hoboken / NJTPA. (2019). Hoboken Street Design Guide. Civic Eye Collaborative. https://www.hobokennj.gov/resources/street-design-guide.
[22] NJDOT / FHWA. (2019). Stuyvesant Ave, Union: 2019 CS. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=5sUElycQc78.

Figure 18 – Millburn Township Curb Extensions with Infiltration Planters, Details Included[23]

[23] NJDOT / FHWA. (2017). Millburn Township,: 2017 CS. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=XjRPx5YhwoU.

Gateway Treatments

RSA participants, particularly from the Borough, highlighted the fact that elevated vehicle speeds can be an issue on entrance to the downtown area, especially during weekend travel periods. Gateway treatments, such as banners strung between utility poles or buildings (as is currently done at the Coddington/Frederick Street intersection), can convey visual queues to drivers of entering a downtown environment with slower speeds. The Borough could also implement a similar gateway treatment for vehicles entering the Borough from the west (Branchburg) and south (Hillsborough) with lights strung overhead at the Nevius Street intersection with Somerset Street, which can also help to add street ambience and incentivize local retail use.

Figure 19 – Example Gateway Treatment with Light Strings in Millburn Township[24]

Mountable Curbs at First Avenue Intersection

The intersection of First Avenue & Somerset Street serves as a conduit of not only vehicular travel, but also pedestrian and cyclist travel to nearby recreational destinations, such as Duke Island Park, Duke Farms, and the Nevius Street Sitting Bridge. However, design of this intersection is vehicular-centric with relatively large turning radii. The County could consider constructing concrete mountable curbs on all corners of the First Avenue intersection to tighten turning radii for general passenger car traffic, slowing turning speeds and mitigating the risk of pedestrian-vehicle conflicts and collisions while accommodating large sweeping truck turning movements. This feature, however, would need to accommodate the pavement loading of the trucks utilizing the feature to preserve the integrity of the mountable curb for crossing pedestrians.

Figure 20 – Mountable Concrete Curbs in Portland Oregon[25]

Speed Cushions on Nevius Street

Cut-through traffic was observed to occur on Nevius Street, with vehicles bypassing peak hour congestion at the First Avenue intersection. Speed cushions (**Figure 21**) could help to discourage this cut-through traffic

[24] NJDOT / FHWA. (2017). Millburn Township,: 2017 CS. YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=XjRPx5YhwoU.
[25] NJDOT. (2017). *2017 State of New Jersey Complete Streets Design Guide.*

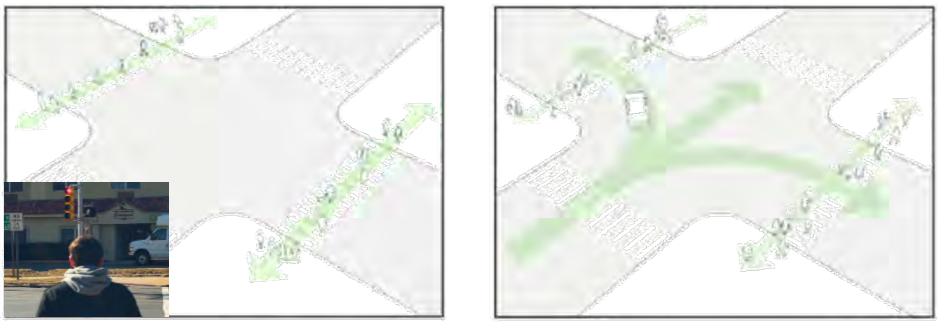
activity. Speed cushions can be designed to slow an average vehicle's wheelbase width yet can also allow for bicyclists and larger emergency vehicles, such as firetrucks, to move along the street unimpeded. The construction of speed humps on two-lane residential streets and on one-way residential streets under county or municipal jurisdiction are permissible on roadways with 1) a posted speed of 30 mph or less and 2) an AADT of 3,000 vehicles per day or less, in accordance with NJDOT law (C.39:4-8.9 Construction of speed humps, traffic calming measures by municipality, county).

Figure 21 – Sample Speed Humps from NACTO[26]

Leading Pedestrian Intervals (LPIs) & Signal Phasing

LPIs are a low-cost, effective way to help pedestrians establish their presence at signalized crossing locations before conflicting vehicles have the right-of-way (**Figure 22**). This is one of FHWA's Proven Safety Countermeasures, boasting an approximate reduction of 13%[27] of pedestrian-vehicle crashes with proper implementation. Vehicular capacity is noted to be a barrier to implementation, which requires intersection capacity analysis before implementation. Thompson Street is a prime candidate for implementation due to relatively low vehicle volumes and two-phase signal timing. Implementation would be difficult at the Route 206 (where NJDOT coordination is needed) and First Avenue (where lead left phasing and congestion may preclude implementation) signals. ADA improvements and phasing adjustment at Route 206 could improve pedestrian safety, by changing the split phasing at the intersection to allow the southern crosswalk phase (which has seen pedestrian collisions, including a fatality) to proceed before the northern crosswalk phase.

Figure 22 – Leading Pedestrian Interval (from NACTO and Lakewood Township)[28]



PHASE 1
Pedestrians are given a minimum head start of 3–7 seconds when entering the intersection.

PHASE 2
Through and turning traffic are given the green light. Turning traffic yields to pedestrians already in the crosswalk.

[26] Figure from National Association of City Transportation Officials. (2012). *Urban Street Design Guide*.
[27] FHWA. (2017). Proven Safety Countermeasures. https://safety.fhwa.dot.gov/provencountermeasures/.
[28] Figure from National Association of City Transportation Officials. (2012). *Urban Street Design Guide*. Photo from NJDOT Technology Transfer. (2019). *What is an LPI?* YouTube. Civic Eye Collaborative. https://www.youtube.com/watch?v=xk8hn7rdHds.

VII. Conclusion

This RSA Report seeks to describe the process undertaken by the County to investigate possible traffic safety improvements along the Somerset Street corridor, extending from the intersection with First Avenue (CR 567)/Lyman Street (CR 625) at MP 0.0 to the Somerville Borough municipal border at the intersection with Route 206 at MP 0.67, located in Raritan Borough. From survey of prior County, municipal, or regional studies to public and stakeholder outreach conducted as part of this study to the crash data that was reviewed report-by-report to the observations made during in-field audits, potential issues were observed and recorded, not only for corridor-wide issues, but for location-specific issues.

In order to address improve traffic safety, discussions were held with the RSA team and County Engineering to develop a list of tasks to improve traffic safety on the corridor, which are codified in the Implementation Matrix (Chapter IV, Subsection A) in this report. In an effort to assist the responsible jurisdictions (whether municipal, County, or separate agency) to schedule and prioritize these improvements, such were classified by anticipated timeline, and cost magnitude. It is encouraged that the improvement recommendations are shared with all responsible jurisdictions to increase the benefits to be seen from the recommendations in this report.

While the recommendations in the Implementation Matrix are centered around the engineering (and associated maintenance) of roadway features, changes to hard infrastructure alone will fall shy of the benefit that would be seen by implementing the 5E's of highway safety[29]:

- Engineering: highway design, traffic, maintenance, operations, and planning professionals;
- Enforcement: State and local law enforcement agencies;
- Education: communication professionals, educators, and citizen advocacy groups;
- Emergency response: first responders, paramedics, fire, and rescue; and,
- Equity: prioritizing the safety of vulnerable roadway users.

This approach recognizes a shared responsibility across numerous professions to see improved benefits in corridor crash performance, beyond the anticipated reduction in crashes with the implementation of proven crash countermeasures. RideWise (the County's TMA), law enforcement, and EMS are encouraged to continue their efforts in educating the local driving population, holding driving behaviors accountable to Title 39, improving the response times to severe crash incidents, and reaching underserved communities with these safety strategies.

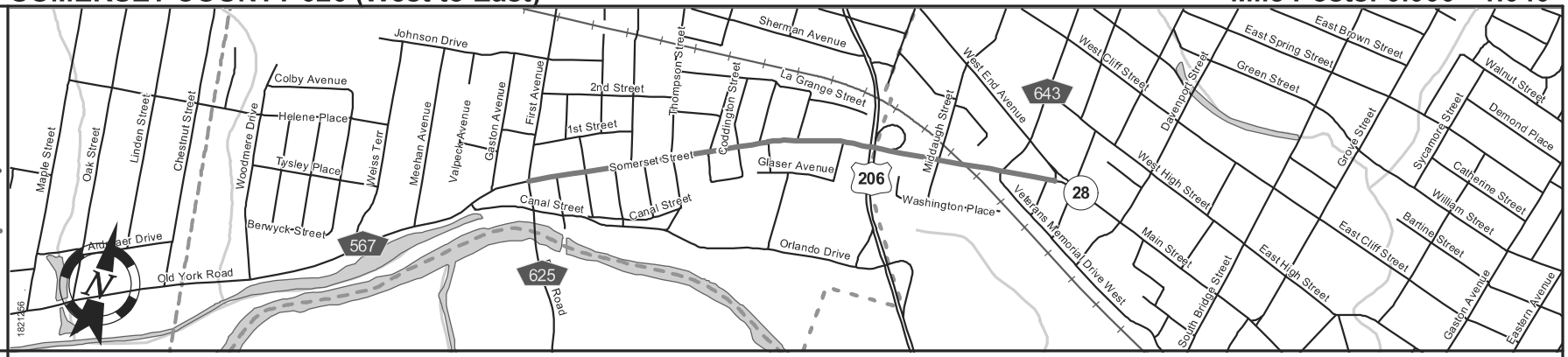
[29] Adapted from FHWA, https://safety.fhwa.dot.gov/hsip/resources/fhwasa1102/flyr3_in.cfm

Appendix A

Straight Line Diagram

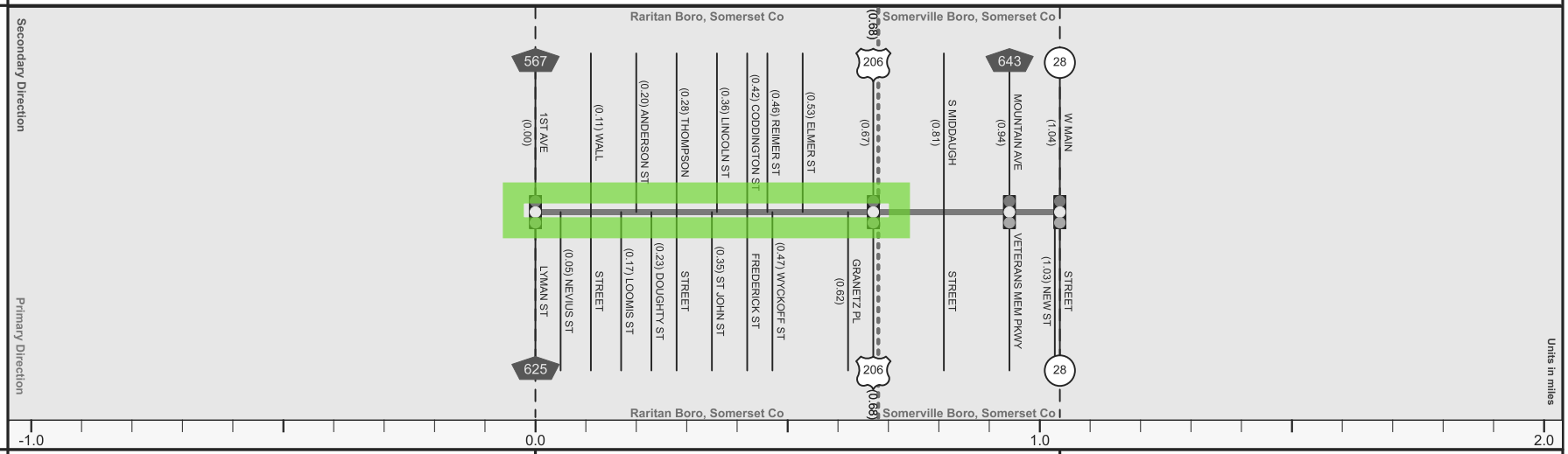
SOMERSET COUNTY 626 (West to East)

Mile Posts: 0.000 - 1.040



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	

Interstate Route 287 · US Route 22 · NJ Route 33 · County Road 689 · Interchange Number 2 · Grade Separated Interchange · Traffic Signal · Traffic Monitoring Sites WIM AVC VOL · Road Underpass · Road Overpass



Street Name	Somerset Street		
Jurisdiction	County		
Functional Class	Urban Minor Arterial		
Federal Aid - NHS Sy	STP		
Control Section			
Speed Limit	NOT POSTED	25	30
Number of Lanes	2	3	2
Med. Type	None		
Med. Width	0		
Pavement	40	36 / 24	40
Shoulder	0	8 / 6	0
Traffic Volume	10,255 (2017)		
Traffic Sta. ID	111827		
Structure No.			
Enlarged Views			

Begin Somerset County 626 MP=0

End Somerset County 626 MP=1.04

SRI = 18000626__

Date last inventoried: July 2011

Page Created: March, 2019

Appendix B

Traffic Data

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 05/02/2017 to 05/08/2017

Site names: 111827,Somerset Street-.54,18000626__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET ELMER ST GRANETZ PL

Seasonal Factor Grp: rg3_4U
Daily Factor Grp: rg3_4U
Axle Factor Grp: rg3_4U
Growth Factor Grp: rg3_4U

	Sun, Apr 30, 2017			Mon, May 1, 2017			Tue, May 2, 2017			Wed, May 3, 2017			Thu, May 4, 2017			Fri, May 5, 2017			Sat, May 6, 2017		
	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W
00:00							48	15	33	63	26	37	45	12	33	49	10	39	94	33	61
01:00							18	8	10	32	8	24	31	9	22	24	7	17	63	21	42
02:00							21	5	16	18	7	11	8	0	8	15	3	12	53	14	39
03:00							22	10	12	25	7	18	27	13	14	16	7	9	29	9	20
04:00							44	21	23	29	14	15	34	13	21	37	14	23	25	13	12
05:00							114	68	46	105	53	52	131	73	58	114	65	49	51	21	30
06:00							400	243	157	423	249	174	433	255	178	364	202	162	151	73	78
07:00							852	523	329	861	512	349	808	474	334	763	458	305	353	199	154
08:00							732	429	303	758	441	317	752	410	342	739	432	307	443	253	190
09:00							644	343	301	584	277	307	662	353	309	602	326	276	656	323	333
10:00							629	295	334	553	252	301	617	312	305	564	281	283	816	396	420
11:00							637	274	363	626	283	343	606	282	324	577	249	328	863	412	451
12:00							660	278	382	708	295	413	714	317	397	666	295	371	799	361	438
13:00							686	290	396	634	255	379	713	319	394	615	270	345	724	287	437
14:00							749	312	437	710	270	440	760	296	464	734	277	457	736	328	408
15:00							840	334	506	849	325	524	855	344	511	823	336	487	724	320	404
16:00							1,023	400	623	938	381	557	1,021	415	606	917	386	531	683	299	384
17:00							1,017	379	638	1,018	384	634	1,014	412	602	938	360	578	621	276	345
18:00							793	306	487	819	298	521	860	354	506	780	342	438	547	238	309
19:00							651	225	426	643	269	374	668	239	429	619	274	345	512	214	298
20:00							484	167	317	535	199	336	484	185	299	471	192	279	448	168	280
21:00							339	123	216	354	117	237	307	102	205	377	119	258	369	135	234
22:00							192	67	125	188	47	141	199	66	133	264	83	181	294	102	192
23:00							102	37	65	106	30	76	107	28	79	179	45	134	152	50	102
Total							11,697	5,152	6,545	11,579	4,999	6,580	11,856	5,283	6,573	11,247	5,033	6,214	10,206	4,545	5,661
AM Peak Vol							852	523	363	861	512	349	808	474	342	763	458	328	863	412	451
AM Peak Fct							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AM Peak Hr							7: 00	7: 00	11: 00	7: 00	7: 00	7: 00	7: 00	7: 00	8: 00	7: 00	7: 00	11: 00	11: 00	11: 00	11: 00
PM Peak Vol							1,023	400	638	1,018	384	634	1,021	415	606	938	386	578	799	361	438
PM Peak Fct							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PM Peak Hr							16: 00	16: 00	17: 00	17: 00	17: 00	17: 00	16: 00	16: 00	16: 00	17: 00	16: 00	17: 00	12: 00	12: 00	12: 00
Seasonal Fct							.972	.972	.972	.972	.972	.972	.972	.972	.972	.972	.972	.972	.972	.972	.972
Daily Fct							.954	.954	.954	.922	.922	.922	.932	.932	.932	.924	.924	.924	1.131	1.131	1.131
Axle Fct							.486	.486	.486	.486	.486	.486	.486	.486	.486	.486	.486	.486	.486	.486	.486
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 05/02/2017 to 05/08/2017

Site names: 111827,Somerset Street-.54,18000626__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET ELMER ST GRANETZ PL

Seasonal Factor Grp: rg3_4U
Daily Factor Grp: rg3_4U
Axle Factor Grp: rg3_4U
Growth Factor Grp: rg3_4U

	Sun, May 7, 2017			Mon, May 8, 2017			Tue, May 9, 2017			Wed, May 10, 2017			Thu, May 11, 2017			Fri, May 12, 2017			Sat, May 13, 2017		
	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W	Road	E	W
00:00	115	41	74	32	10	22															
01:00	64	19	45	21	5	16															
02:00	29	8	21	12	7	5															
03:00	6	2	4	17	5	12															
04:00	15	5	10	33	16	17															
05:00	37	15	22	105	57	48															
06:00	77	42	35	410	242	168															
07:00	201	98	103	825	489	336															
08:00	310	159	151	720	405	315															
09:00	468	253	215	593	328	265															
10:00	585	284	301	608	287	321															
11:00	671	331	340	654	311	343															
12:00	644	268	376	732	304	428															
13:00	630	303	327	720	320	400															
14:00	635	283	352	703	288	415															
15:00	590	243	347	830	330	500															
16:00	529	203	326	919	378	541															
17:00	464	194	270	935	358	577															
18:00	510	203	307	779	297	482															
19:00	452	192	260	619	255	364															
20:00	359	150	209	467	142	325															
21:00	253	102	151	353	141	212															
22:00	128	46	82	158	55	103															
23:00	72	31	41	84	25	59															
Total	7,844	3,475	4,369	11,329	5,055	6,274															
AM Peak Vol	671	331	340	825	489	343															
AM Peak Fct	1	1	1	1	1	1															
AM Peak Hr	11: 00	11: 00	11: 00	7: 00	7: 00	11: 00															
PM Peak Vol	644	303	376	935	378	577															
PM Peak Fct	1	1	1	1	1	1															
PM Peak Hr	12: 00	13: 00	12: 00	17: 00	16: 00	17: 00															
Seasonal Fct	.972	.972	.972	.972	.972	.972															
Daily Fct	1.306	1.306	1.306	1.032	1.032	1.032															
Axle Fct	.486	.486	.486	.486	.486	.486															
Pulse Fct	2.000	2.000	2.000	2.000	2.000	2.000															

Appendix C

Excerpts from Prior Studies

Local Bicycle and Pedestrian Improvements

Bicycle and pedestrian improvements within the Borough seek to improve linkages between the focal areas, the train station, and the Raritan River Greenway. Potential improvements include:

- Provide bicycle facility along Thompson Street: This north/south street provides a connection between the train station, the Somerset Street (CR 626) commercial district, and the Nevius Street Bridge and the Greenway via Canal Street or Mill Street. Potential improvements include:
  - Between the rail station and Somerset Street (~42' existing cartway, parking both sides):
    - Alternative 1: Remove on-street parking on one side and install bicycle lanes in both directions. The provision of full bicycle lanes will improve bicyclist comfort for most bicyclists
    - Alternative 2: install a bicycle lane in the northbound direction (uphill) and shared lane markings in the southbound direction
  - Between Somerset Street and Canal Street (~34' existing cartway, parking both sides)
    - Install shared lane markings. The existing cartway width is too narrow to accommodate bicycle lanes without eliminating on-street parking.
  - Mill Street (~31' existing cartway, no parking)
    - Install bicycle lanes in both directions, providing a connection to the proposed Orlando Drive bicycle lanes
- Install bicycle boulevard along La Grange Street and Elmer Street, providing a low stress connection between the focal areas and the train station, and an alternative route to Somerset Street
- Investigate shared-lane markings along Somerset Street. Although it has higher traffic volumes (10,500 ADT) and is less comfortable for the average adult bicyclist, shared-lane markings will assert the legitimacy of bicyclists using the roadway through the downtown
- Investigate shared-lane markings on Tillman Street, Fifth Street, and segments of Sherman Street and Thompson Street. This corridor is an on-street segment of the proposed Regional Greenway Plan, providing a connection to downtown Raritan via the proposed bicycle lanes on Thompson Street, and a connection west to Greenway segments in Bridgewater and Branchburg
- Formalize pedestrian access to the train station from 2nd Avenue. An existing unimproved path is currently used by vehicles and pedestrians. Install a sidewalk connection parallel to the railroad, with a fence separating it from train activity
- Update downtown streetscape to replace rounded brick pavers. Utilize traditional concrete, or textured pavement or pavers with square edges and tight joints to create a more ADA-friendly surface
- Accompanying redevelopment, extend downtown streetscape treatment farther east along East Somerset Street, including wider sidewalks, pedestrian scale lighting, and street trees

Table 6 – Linkage Concept R1 - Raritan Borough

Link	Deficiencies	Recommendations	Time Frame	Cost
A – Somerset Street	• No designated bicycle facilities	• Shared lane markings • Eliminate double-left turn	Short term	Low
B – Somerset Street and Route 206 intersection	• Signal timing • No pedestrian refuge • Long crossing distance • Long vehicle queues	• Install median refuge (via restriping) • High visibility crosswalks • Install countdown pedestrian heads • Install median • Reconfigure intersection to eliminate double left turn lanes & improve signal phasing • Investigate additional street crossing technologies to accommodate senior citizens (i.e. sound, textured pavement, etc.)	Short term Short term Medium term Medium term Medium term Medium term	Low Low Low Medium Medium Medium
C – Route 206	• No sidewalk (southbound) • No designated bicycle facilities	• Construct sidewalk (west) • Connect crosswalk (curb ramp) on southeast corner to provide pedestrians access through the parking area	Long term Short to medium term	Medium Low
D – Granetz Place and Glaser Avenue	• No designated bicycle facilities • Missing sidewalks (Glaser Avenue to Raritan Mall parking area)	• Shared lane markings; route bicycle traffic to Granetz Place and Glaser Avenue through signing and shared lane striping • Provide sidewalks/pathway to Raritan Mall from Glaser Avenue (coordinate with property owner)	Short to medium term Medium term	Low Medium
E – Route 206 and Orlando Drive intersection	• No sidewalk (south or west) • No crosswalks or pedestrian signals with pedestrian heads or timer on 3 of the 4 legs of the intersection	• Install countdown signal • Construct sidewalk (south and west)	Medium term Medium term	Medium Medium
F – Orlando Drive	• No designated bicycle and pedestrian facilities	• Construct sidewalk (north) • Construct designated bike lanes	Medium term Medium term	Medium Medium
G – Orlando Drive and Raritan Mall entrance and exit	• No designated bicycle and pedestrian facilities	• Define crosswalks • Install curb ramps at Raritan Mall entrance and exit; install pedestrian crossing advanced warning signs at the entrance and exit (coordinate w/Landfill development)	Short term Short term	Low Low

Summary of Public Comments

	Linkages and Access	Bicyclist	Pedestrian	Greenway
Consider creating a trail along the active NJ Transit Raritan Valley Line, with extensions to the Bridgewater Towne Center and Vanderhaven Farms.	•	•	•	•
Improve bicycle and pedestrian access between Vanderhaven Farms and North Branch Park through existing "cut-through".	•	•	•	
Replace missing bike route signs in Somerville Borough.		•		
There is an existing informal trail between Foothill Road (Bridgewater-Raritan Middle School) and Bridge Street across Vocational Technical High School property.		•	•	•
Consider developing a trail connecting Route 28 and Route 22 through the Ortho Office Park.	•	•	•	•
Trail connection needed to access municipally owned property at the confluence of the Peters Brook and Raritan River - especially for fishing. Consider access east of 5th Street.	•			•
Consider a bridge across Ross Brook from E. Young Street to provide expanded neighborhood access to the Walnut Street Park.	•			•
Bank stabilization improvements needed at the confluence of the Peters Brook and the Ross Brook as there is significant erosion.	•			•
Develop safe pedestrian and bicycle routes connecting Somerville High School and Vanderveer athletic fields. High school students utilize Vanderveer School athletic fields for after school sports but do not have a safe designated path to travel between the two schools.	•	•	•	
Raritan Borough Specific				
Connections to downtown Raritan Borough and transit.	•	•	•	
Hazardous crossings along 1st Avenue/Country Club Road at Route 22, Route 28, Route 202 and Old York Road.		•	•	
Convert Somerset Street and Orlando Drive to one-way traffic, which would allow dedicated bicycle lanes on both streets. Traffic on Somerset Street would travel west to east while traffic on Orlando Drive would travel east to west - forming a loop.	•	•		
Somerset Street is too narrow for bicyclists.		•		

Summary of Public Comments

	Linkages and Access	Bicyclist	Pedestrian	Greenway
Improvements to 1st Avenue/Country Club Road could potentially eliminate the need for hazard/courtesy busing, saving an estimated $58,000.	●	●	●	
Create connections from the general Raritan area to Duke Farms and the rest of the Regional Center.	●			
Sidewalk needed along Route 202 between Country Club Road and the Somerville Circle.			●	
Sidewalk needed along Route 28 between Country Club Road and the Somerville Circle.			●	
Old York Rd. between Bridgewater & Branchburg is very narrow and dangerous for biking/walking.		●	●	
Pave the undeveloped footpath along Raritan River behind golf course between Nevius St and Rt. 206.	●	●	●	●
Add bike lane on Orlando Drive.		●		
Implement signs for bike crossing at Old York Rd by the canal and Duke Park Path.		●		
Raritan neighborhoods need better connections to shopping across Rt. 28.	●	●	●	
Somerset Street is a corridor in need of improvement.	●	●	●	
Bicyclists often use Country Club Rd. to avoid navigating the Rt. 202/206 circle and to reach attractors such as Duke Island.		●		
Develop one continuous trail system that connects attractors in Raritan and other destinations include distinct signage that highlights the different attractors and the trails system.	●			●
Improve pedestrian crossing on First Ave. (currently hard to cross).			●	
Toys R Us to First Ave., there is need for pedestrian safety and connectivity.	●		●	
Provide bicycle and pedestrian access to nursing home.	●	●	●	
Talmage Avenue in Bound Brook unsafe for biking.		●		
Improve pedestrian and bicyclist facilities along Washington Valley Road to access the Village from the west or east	●	●	●	

Corridor/area Capacity Problem

___Need for corridor study
___Possible highway on new alignment
___Possible new transit line
___Need for park and ride development

Describe the problem: This corridor is a proposed link in the Somerset County Regional Center Conceptual Greenway System. A key linkage concept is to connect the downtowns of Raritan and Somerville and the Raritan Mall. Currently, there are no designated bicycle facilities on Route 206. Along the southbound side of Route 206 and westbound Orlando Drive sidewalk does not exist. At the intersection of Route 206 and Orlando Drive, three of the four legs of the intersection are missing crosswalks and pedestrian signals with pedestrian heads/timers. This corridor could be improved to safely accommodate bicycle and pedestrian travel in coordination with NJDOT's current plans to install countdown timers at the intersection of Route 206 and Somerset Street. Intersection improvements including sidewalks, crosswalk striping, and countdown signals are needed at Orlando Drive (see Link E on the attached) for bicycle and pedestrian safety and access in anticipation of future development on the Somerville Landfill site. See attached for potential improvements.

If an outside group actively supports this problem, please identify:
The recommendation described here emerged from the public involvement process that guided the *Somerset County Regional Center Pedestrian, Bicycle and Greenways Systems Connection Plan*. The study was directed by a Steering Committee consisting of:

- *Counties:* Somerset County
- *Municipalities*: Bridgewater Township, Raritan Borough and Somerville Borough
- *State Agencies*: North Jersey Transportation Planning Authority; New Jersey Department of Transportation, New Jersey Transit
- *Other Organizations*: Ridewise Transportation Management Agency

Other comments (if any) by initiator:
This identified segment of Route 206 is part of a larger network aimed at improving bicycle and pedestrian circulation throughout Somerset County's Regional Center (see attached for map of the system). This linkage within the Conceptual Greenways System proposes bicycle and pedestrian accommodations to make connections to the downtowns of Raritan and Somerville and to the Raritan Mall via Somerset Street, Route 206 and Orlando Drive. Two alternative routes for bicycle and pedestrian travel (see Links C and D on the attached) were proposed to mitigate the lack of pedestrian and bicycle access to the Raritan Mall, which may provide short term solutions to facilitate bicycle and pedestrian circulation.

Master Plan/Zoning

The 1989 Raritan Borough Master Plan addresses the Raritan Woolen Mills site in extensive detail and locates it within the Townhouse Density Residential District. The major recommendations are adaptive reuse of the site with multi-family housing and/or townhouses at a density of 8 units per acre with accessory retail or office uses. The recommended use remains appropriate given the transitional nature of the parcel, its underutilization and proximity to the central business district.

Since the publication of the 1989 Raritan Master Plan, the Raritan Woolen Mills site (Block 116, Lot 12) and the adjacent property (Block 116.02, Lot 12.01) have been identified as the only two sites in the Borough to be placed in the new "Planned Downtown Residential Overlay District" (PDRD). The PDRD serves as an overlay to the IRD-3 and M-1 zones that previously regulated the uses on Block 116, Lot 12 and Block 116.02, Lot 12.01, respectively. The PDRD permits multi-family residential housing and provides for the remediation and/or reclamation of former manufacturing sites. Ten percent or more of the total PDRD's site area must be used for the provision of a public amenity, park or recreation facility.

The requirements of the PDRD zone include a maximum density of 13.5 market rate dwelling units per gross acre, exclusive of the manager's apartment. The number of required affordable units to be constructed within the PDRD shall be determined by the COAH. The bulk requirements include a maximum building height of 4 stories over one level of parking or 60 feet above grade, whichever is greater, and a maximum impervious coverage of 80 percent.

Opportunities/Challenges

The Raritan Woolen Mills site offers the following opportunities:

- Adaptive reuse and/or redevelopment of a vacant and underutilized parcel that is strategically located between the central business district and the planned Raritan River Greenway.
- Establishment of a new residential community in a downtown setting that will provide needed multi-family housing, diversify the Borough's housing stock and support the continued revitalization of the central business district.
- Potential for the development of new affordable housing consistent with the Borough's COAH certified fair share/housing plan.
- Creation of a new gateway to the Borough that will create a sense of arrival in the downtown, reinforce community character/design, increase the visibility of the central business district and enhance the visual environment.
- Provision of public access through the site that will connect the central business district to the planned Raritan River Greenway and link adjacent residential neighborhoods.
- Expansion of recreation and open space opportunities by reserving a portion of the parcel for a Borough park facility.
- Strengthening the Somerset Street central business district by extending streetscape improvements along John Street, Elizabeth Street and Frederick Street and coordinating with the development of the vacant Barbieri tract.
- Promoting economic development and strengthening the Borough tax base by providing for residential and accessory commercial uses as well as an appropriate bedroom mix for planned housing so that redevelopment has a positive fiscal impact.

The Raritan Woolen Mills site has the following challenges:

- The feasibility of adaptive reuse for the existing Woolen Mills building is uncertain given its age, structural condition, past industrial use and location within the 100-year flood hazard zone.
- The redevelopment of the site is constrained by environmentally sensitive features such as wetlands and the 100-year flood hazard zone as well as potential contamination.
- The site has limited visibility because it is oriented towards Orlando Drive and is located in a relatively isolated section of the Borough behind the Somerset Street central business district.
- There are established residential neighborhoods to the northeast and west that are located in close proximity to the site and have the potential to be impacted by redevelopment.
- There is limited access to the site from the Somerset Street central business district and most sections of the Borough because of its relatively isolated location, one-way configuration of John Street and distance to the NJ Transit train station.
- The Borough's COAH certified fair share/housing plan designates the site for inclusionary affordable housing.
- Future redevelopment of the site will be impacted by, and should be coordinated with, the development of the vacant Barbieri tract to the north on Elizabeth Street.

Recommendations

- Consult and coordinate with COAH on the Woolen Mills redevelopment process to the extent that it affects the certified fair share/housing plan.
- Encourage the adaptive reuse of the existing Raritan Woolen Mills building through zoning incentives, creative design techniques and historic preservation tax credits. At a minimum, consider the preservation of the front or northern facade of the building to

protect and enhance the historic Elizabeth Avenue streetscape. The development of architectural standards and retention of an architect is recommended if demolition and new construction is required.

- Require the redevelopment of the site to include the following site plan elements: (1) public access through the site linking the Somerset Street central business district to the planned Raritan River Greenway, (2) pedestrian access to Elizabeth Street/Somerset Street and vehicular as well as pedestrian access to Orlando Drive, (3) minimum landscaped buffer width of 10-feet along all property lines and 20-feet where abutting a residential property or zone, (4) minimum usable open space of 2.5 percent including a public park, streetscape improvements along Elizabeth Street, John Street, Frederick Street and Orlando Drive consistent with the design of the Borough's Somerset Street program, (5) historic marker and/or kiosk identifying the site, its history and role in the Borough.
- Require a conceptual site plan, area plan showing off-site improvements, fiscal impact analysis, traffic study and environmental impact statement to be submitted for Borough review prior to redevelopment.
- Promote redevelopment of the vacant parcel immediately to the north across Elizabeth Street. Consider redeveloping the parcel with a public park or townhouses that will complement and balance the Woolen Mills project.
- Incorporate gateway treatment into the site with a strong visual presence on Somerset Street and Orlando Drive.

Redevelopment Principles

- See the following aerial photograph for principles to guide redevelopment.

Federal Steel/Johnson Drive Sites

The Federal Steel/Johnson Drive site is a major potential redevelopment site in the Borough of Raritan and is distinguished by its relatively large size, strategic location, transitional nature and dual character. The Federal Steel/Johnson Drive site is not addressed in the 1999 Somerset County Regional Center Vision Report but was identified as a priority during the public participation process by residents, officials and other stakeholders from the Borough. As a consequence, the importance of the site has resulted in its inclusion in the Issues Report for the Somerset County Regional Center Strategic Master Plan. The Issues Report recommends pursuing "the redevelopment of key sites in the Regional Center including... Federal Steel..."

Existing Conditions

The Federal Steel/Johnson Drive site is a transitional industrial area consisting of multiple properties that span both sides of the NJ Transit Raritan Valley Line. The area has a dual character that reflects the location, use, historical development and neighborhood context of each site. The Federal Steel site consists of two (2) properties with a total area of approximately 23-acres. The site is bordered by Route 202 to the north, the NJ Transit Raritan Valley Line and yard to the south, a residential neighborhood on Raritan Avenue to the east and the Ortho-Clinical Diagnostics facility to the west. The Johnson Drive site consists of three (3) properties bordered by the NJ Transit Raritan Valley Line and yard to the north, residential neighborhoods to the south, First Avenue to the east and John F. Kennedy School and Basilone Park to the west.

The Federal Steel site is a former industrial parcel that has been vacant for an extended period of time and is underutilized in its current condition. The site is contaminated as a result of past manufacturing activity and is characterized by its proximity to an established residential neighborhood and relatively isolated location. It is accessible from Tillman Street, however, the street passes through a residential neighborhood. The existing buildings are aging and deteriorated industrial buildings typical of 19th and early 20th factories. They are obsolete for continued industrial use and their structural condition is unknown, although the original Federal Steel building may be worth saving given its historical role in the Borough and industrial architecture.

The Johnson Drive site is an active industrial area that is used for medical research/laboratories, warehousing/distribution and other light industrial activity. The site pre-dates modern industrial parks and is characterized by its uncoordinated linear design and proximity to an established residential neighborhood and school. It is accessible from Johnson Drive, which connects to First Avenue and Route 202. The existing buildings are generally 50,000 square feet in size and range in condition from the modern, updated LabCorp facility to the marginal structures in the Raritan Valley Industrial Park.

Master Plan/Zoning

The Raritan Borough Master Plan contains a limited discussion of the Federal Steel/Johnson Drive site and does not recommend any changes to the land use plan or zoning ordinance for this area. This reflects the date of the Master Plan, pending litigation at that time and relatively stable uses on Johnson Drive. The conditions in the area have changed over

RARITAN STREET SMART CAMPAIGN

The campaign in Raritan was modeled closely after the pilot programs implemented by the NJTPA and the previous campaigns coordinated by RideWise in North Plainfield, Somerville and Manville. RideWise began discussions with borough representatives in November 2017. After the council approved the coordination of the campaign, two target intersections were identified by the police as priorities for pedestrian safety: Somerset Street and Loomis Street, and Somerset Street and Anderson Street.

TARGET INTERSECTION #1

Somerset Street & Loomis Street

- 3-way intersection
- No traffic control devices
- No pedestrian head signals
- Two crosswalks, one on Loomis St. and one across Somerset St.
- 2 lanes

TARGET INTERSECTION #2

Somerset Street & Anderson Street

- 3-way intersection
- No traffic control devices
- 2 lanes
- No pedestrian head signals
- Driveways leading out into intersection

The campaign consisted of four weeks of education and enforcement activities, concentrated during the month of July, and four weeks of pre- and post-campaign components, including an online survey and intersection observations. While not statistically significant, these quantitative measures

Wallace House & Old Dutch Parsonage Historic Site

Located about eight miles south of the Vanderveer House the Wallace House was built in 1776 by John Wallace a Philadelphia fabric merchant. It was General Washington's headquarters from December 1778 to June 1779 when the Continental Army was stationed at Middlebrook. The House maintains its 18th-century appearance and has been fully restored.

Across the street and built in 1751, the Georgian style Old Dutch Parsonage in Somerville was built for Reverend John Frelinghuysen. Later residing in the parsonage was Reverend Jacob Hardenbergh, who helped establish Queen's College, now known as Rutgers University. Hardenbergh served as the college's first president and also served in the Provincial Congress of New Jersey during the Revolutionary War.

The Wallace House & Old Dutch Parsonage Historic Site is a State-operated historic site and is located on Washington Place, in Somerville. Washington Place is a residential street situated between U.S. 206 and NJ TRANSIT's Raritan Valley Line.

Existing Access to the Wallace House is via Somerset Street (CR 626) or two lightly traveled residential streets, South Middaugh Street and Washington Place. The Wallace House is also a five-minute walk (about one quarter mile) along Somerset Street from the Somerville Train Station. Currently none of these roadways includes existing designated bicycle facilities.

Potential Improvements include several new facilities and amenities to supplement the existing access:

- Sidepath along U.S. 202/206 to provide north-south interconnect to Somerville via Mountain Avenue and Peters Brook trails, and create connections to the Wallace House
- Connections to the west (Raritan Borough) and south via bike lane on Somerset Street (CR 567) and shared use path on the Somerville Landfill redevelopment site
- Regional east-west connectivity includes bike lanes, sidepath, and shared lane segments along Old York Road (Raritan), Somerset Street (Raritan/Somerville), Veterans Memorial Drive (Somerville), and Main Street (Somerville/ Bridgewater) to Talmadge Avenue/Main Street (Bound Brook) to Elizabeth Avenue (South Bound Brook)
- Alternative east-west connectivity would be provided by linking low-stress routes south of Main Street (Somerville) using sidepath segments along local streets and through off-road properties and parks between the Peters Brook Greenway Finderne Avenue, and Van Veghten House
- Extension of the Raritan River Greenway in Somerville, Bridgewater, and Manville would provide additional off-road connections between Raritan, Peters Brook Greenway, and Van Veghten House

Appendix D

Collision Diagrams

Borough of Raritan
Somerset County

Gaston Ave

W Somerset St

SOMERSET 567 COUNTY

1st Ave

SOMERSET 567 COUNTY

E Somerset St

SOMERSET 626 COUNTY

Western Limit of Segment

Lyman St

SOMERSET 625 COUNTY

Nevius St

MATCH LINE A

LEGEND

CRASH NUMBER SEE EXHIBIT A6-A9 FOR DETAILS

- # PDO
- # INJURY
- # FATAL

EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (1 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A1

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Borough of Raritan
Somerset County

Wall St
Anderson St
Loomis St
Doughty St
E Somerset St
626

MATCH LINE A
MATCH LINE B

LEGEND

CRASH NUMBER SEE EXHIBIT A6-A9 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

CRASH DIAGRAM (2 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A2

U:\192510854\graphic_design\CrashDiagrams\CR626_Raritan_MP0.00-0.67

Borough of Raritan
Somerset County

Thompson St
ONE WAY
Lincoln St
Codington St
MATCH LINE B
MATCH LINE C
E Somerset St
SOMERSET 626 COUNTY
John St
ONE WAY
Frederick St
Thompson St

85 63 72 68 69,71,77 62 73 70 60 61 67 64 65 66 78 74 75 76 75 79 84

LEGEND

CRASH NUMBER SEE EXHIBIT A6-A9 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (3 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A3

U:\192510854\graphic_design\CrashDiagrams\CR626_Raritan_MP0.00-0.67

Borough of Raritan
Somerset County

Codington St
Reimer St
Elmer St
MATCH LINE C
81
83
80
82
SOMERSET 626 COUNTY
E Somerset St
87
88
Frederick St
Wycoff Ave
SOMERSET 626 COUNTY
E Somerset St
MATCH LINE D

LEGEND	SYMBOLS	TYPES OF COLLISIONS
CRASH NUMBER SEE EXHIBIT A6-A9 FOR DETAILS	MOVING VEHICLE	REAR END
# PDO	PARKED VEHICLE	SIDE SWIPE
# INJURY	CYCLIST	LEFT TURN/RIGHT ANGLE
# FATAL	PEDESTRIAN	HEAD ON/BACKING
EXISTING SIGNALIZED INTERSECTION	FIXED OBJECT	OUT OF CONTROL
	NON-FIXED OBJECT	
	ANIMAL	

CRASH DIAGRAM (4 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A4

U:\192510854\graphic_design\CrashDiagrams\CR626_Raritan_MP0.00-0.67

Borough of Raritan
Somerset County

Somerville Borough
Somerset County

Borough of Raritan

Somerville Borough

206

142 135

129
114
130
113
128 133 112
126 127
136
141
143

131
99
117
105
108
116 115 110 101
95
104
103 109 106 138
100
102

90 94
89 92 91 93
97 96
98 107

132 139
140
111 137
118
119
120-125
134
144

206

MATCH LINE D

SOMERSET 626 COUNTY

E Somerset St

Granetz Plaza

Eastern Limit of Segment

SOMERSET 626 COUNTY

E Somerset St

LEGEND

CRASH NUMBER SEE EXHIBIT A6-A9 FOR DETAILS

- # PDO
- # INJURY
- # FATAL
- EXISTING SIGNALIZED INTERSECTION

SYMBOLS

- MOVING VEHICLE
- PARKED VEHICLE
- CYCLIST
- PEDESTRIAN
- FIXED OBJECT
- NON-FIXED OBJECT
- ANIMAL

TYPES OF COLLISIONS

- REAR END
- SIDE SWIPE
- LEFT TURN/RIGHT ANGLE
- HEAD ON/BACKING
- OUT OF CONTROL

SOMERSET COUNTY

CRASH DIAGRAM (5 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: 1"=60' | Exhibit A5

U:\192510854\graphic_design\CrashDiagrams\CR626_Raritan_MP0.00-0.67

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
1	04/01/2016	08:32 PM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Dry
2	02/05/2018	01:47 PM	Property Damage Only	0	Opposite Direction (Head on, Angular)	Daylight	Dry
3	10/06/2014	10:06 PM	Injury	1	Pedalcyclist	Daylight	Dry
4	08/23/2017	03:50 PM	Property Damage Only	0	Pedalcyclist	Daylight	Dry
5	02/06/2018	04:43 PM	Injury	1	Right Angle	Daylight	Dry
6	08/29/2018	12:20 PM	Property Damage Only	0	Right Angle	Daylight	Dry
7	05/18/2016	08:02 AM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
8	07/17/2016	07:35 PM	Property Damage Only	0	Same Direction (Rear-End)	Dusk	Dry
9	07/19/2017	05:29 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
10	07/14/2018	04:45 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
11	06/30/2017	04:01 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
12	05/08/2016	01:26 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
13	05/05/2018	02:13 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
14	10/30/2018	08:38 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
15	02/07/2017	09:50 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
16	09/20/2017	08:32 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
17	09/22/2017	07:55 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
18	06/15/2017	07:26 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
19	07/31/2017	05:22 AM	Property Damage Only	0	Same Direction (Side Swipe)	Dawn	Dry
20	03/14/2016	08:43 PM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Dry
21	08/21/2018	04:26 PM	Property Damage Only	0	Right Angle	Daylight	Dry
22	05/05/2017	12:50 PM	Property Damage Only	0	Right Angle	Daylight	Wet
23	04/04/2018	05:00 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
24	07/12/2017	05:26 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
25	08/24/2016	06:25 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
26	05/10/2016	07:09 AM	Property Damage Only	0	Struck Parked Vehicle	-	Dry
27	05/02/2018	06:58 AM	Property Damage Only	0	Animal	Daylight	Dry
28	09/10/2018	03:54 PM	Property Damage Only	0	Right Angle	Daylight	Dry
29	06/20/2017	08:49 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
30	10/18/2018	04:11 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
31	04/23/2018	04:36 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
32	10/10/2017	02:03 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
33	10/10/2018	08:52 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
34	07/21/2017	08:56 PM	Property Damage Only	0	Backing	Dusk	Dry
35	05/03/2017	06:09 PM	Property Damage Only	0	Right Angle	Daylight	Dry
36	12/03/2016	02:03 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
37	06/02/2017	05:28 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
38	07/10/2016	03:49 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
39	04/07/2016	04:04 PM	Property Damage Only	0	Backing	Daylight	Wet
40	11/02/2016	09:54 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
41	07/28/2017	05:59 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
42	11/25/2017	04:50 PM	Property Damage Only	0	Backing	Dark, Street lights on, continuous lighting	Dry
43	09/13/2017	11:53 AM	Injury	1	Pedestrian	Daylight	Dry
44	04/06/2017	02:33 PM	Property Damage Only	0	Right Angle	Daylight	Wet
45	08/05/2017	04:03 PM	Property Damage Only	0	Right Angle	Daylight	Dry

CRASH DIAGRAM (6 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A6

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
46	01/03/2017	02:21 PM	Property Damage Only	0	Right Angle	Daylight	Wet
47	01/20/2018	11:30 AM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
48	01/29/2018	02:00 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
49	05/03/2017	07:21 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
50	03/31/2017	07:06 PM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Wet
51	05/26/2017	02:51 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
52	06/29/2018	05:06 PM	Property Damage Only	0	Fixed Object	Daylight	Dry
53	11/14/2018	06:25 PM	Injury	3	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
54	04/06/2017	09:46 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
55	04/24/2017	11:36 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
56	06/12/2017	10:41 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
57	10/20/2016	08:09 PM	Property Damage Only	0	Struck Parked Vehicle	Dark, Street lights on, continuous lighting	Dry
58	07/09/2016	10:12 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
59	07/31/2017	12:44 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
60	05/13/2017	09:55 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
61	09/04/2016	12:24 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
62	09/08/2016	11:50 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
63	07/31/2018	05:38 PM	Injury	1	Left Turn/U-turn	Daylight	Dry
64	07/05/2014	11:49 AM	Injury	1	Pedestrian	Daylight	Dry
65	02/01/2017	01:20 PM	Injury	1	Pedestrian	Daylight	Dry
66	04/27/2016	10:01 AM	Injury	1	Pedestrian	Daylight	Dry
67	12/10/2016	11:14 AM	Property Damage Only	0	Right Angle	Daylight	Dry
68	02/13/2018	04:58 PM	Property Damage Only	0	Right Angle	Daylight	Dry
69	08/10/2018	05:25 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
70	12/14/2018	05:44 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, spot lighting	Wet
71	10/03/2017	05:53 PM	Property Damage Only	0	Same Direction (Rear-End)	Dusk	Dry
72	07/05/2017	04:30 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
73	06/19/2018	11:47 AM	Injury	1	Struck Parked Vehicle	Daylight	Dry
74	08/15/2017	02:40 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
75	08/31/2018	01:23 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
76	05/23/2016	10:46 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
77	04/16/2017	01:47 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
78	05/25/2017	09:07 AM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Wet
79	10/26/2017	06:04 PM	Property Damage Only	0	Right Angle	Dusk	Dry
80	09/29/2014	12:34 PM	Injury	1	Pedestrian	Daylight	Dry
81	08/11/2014	01:07 AM	Injury	1	Pedestrian	Dark, Street lights on, continuous lighting	Dry
82	05/16/2018	02:57 PM	Injury	1	Right Angle	Daylight	Wet
83	11/10/2017	05:52 PM	Injury	2	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
84	02/23/2018	02:31 PM	Property Damage Only	0	Right Angle	Daylight	Wet
85	02/01/2018	03:27 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
86	06/13/2016	08:11 AM	Injury	2	Struck Parked Vehicle	Daylight	Dry
87	06/16/2017	01:15 PM	Property Damage Only	0	Struck Parked Vehicle	Daylight	Dry
88	01/24/2016	11:18 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Slush
89	07/13/2018	06:11 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
90	03/31/2016	05:10 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry

CRASH DIAGRAM (7 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A7

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
91	06/28/2016	12:24 PM	Property Damage Only	0	Right Angle	Daylight	Wet
92	03/18/2017	11:48 AM	Property Damage Only	0	Right Angle	Daylight	Dry
93	12/02/2017	05:45 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
94	08/22/2017	08:03 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, continuous lighting	Dry
95	09/04/2018	07:42 PM	Injury	1	Backing	Dark, Street lights on, continuous lighting	Dry
96	11/17/2017	12:26 PM	Injury	1	Right Angle	Daylight	Dry
97	05/02/2016	07:04 AM	Property Damage Only	0	Right Angle	Daylight	Wet
98	09/27/2018	06:18 PM	Property Damage Only	0	Right Angle	Daylight	Dry
99	05/31/2017	11:22 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
100	01/05/2017	10:23 PM	Property Damage Only	0	Fixed Object	Dark, Street lights on, continuous lighting	Dry
101	11/21/2016	09:41 AM	Injury	1	Pedalcyclist	Daylight	Dry
102	03/20/2017	09:43 PM	Fatal	0	Pedestrian	Dark, Street lights on, continuous lighting	Dry
103	04/02/2018	11:29 AM	Injury	1	Pedestrian	Daylight	Dry
104	05/22/2018	03:56 PM	Injury	1	Pedestrian	Daylight	Wet
105	09/29/2017	08:26 AM	Injury	1	Right Angle	Daylight	Dry
106	04/23/2018	10:59 PM	Injury	1	Right Angle	Dark, Street lights on, continuous lighting	Dry
107	05/10/2018	12:46 PM	Property Damage Only	0	Right Angle	Daylight	Dry
108	01/27/2016	07:42 PM	Property Damage Only	0	Right Angle	Dark, Street lights on, continuous lighting	Dry
109	11/29/2018	06:54 AM	Property Damage Only	0	Right Angle	Daylight	Dry
110	08/04/2016	09:00 PM	Injury	1	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
111	11/11/2016	05:52 PM	Injury	2	Same Direction (Rear-End)	Dusk	Dry
112	01/27/2016	06:52 PM	Injury	1	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
113	04/12/2016	08:24 AM	Injury	1	Same Direction (Rear-End)	Daylight	Wet
114	08/07/2016	12:21 PM	Injury	1	Same Direction (Rear-End)	Daylight	Dry
115	05/13/2016	04:40 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
116	07/14/2016	09:09 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
117	07/22/2016	11:39 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
118	01/09/2016	10:41 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Wet
119	01/21/2016	12:08 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
120	11/18/2016	07:52 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
121	11/23/2016	07:29 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
122	02/07/2017	08:03 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
123	07/15/2017	11:47 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
124	07/03/2018	05:57 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Wet
125	11/28/2018	05:49 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry
126	08/22/2016	08:14 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
127	11/01/2016	06:09 PM	Property Damage Only	0	Same Direction (Rear-End)	Dusk	Dry
128	11/13/2016	02:25 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
129	01/14/2017	12:12 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
130	07/25/2017	08:48 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Wet
131	02/17/2016	12:50 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
132	06/16/2018	09:38 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
133	01/04/2017	10:56 AM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
134	09/18/2018	05:33 PM	Property Damage Only	0	Same Direction (Rear-End)	Daylight	Dry
135	07/25/2017	03:04 PM	Injury	2	Same Direction (Side Swipe)	Daylight	Wet

CRASH DIAGRAM (8 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A8

Crash #	Date	Time	Severity	Total Injured	Crash Type	Light Condition	Surface Condition
136	01/22/2016	11:36 AM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
137	08/28/2016	01:45 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
138	01/27/2017	09:44 PM	Property Damage Only	0	Same Direction (Side Swipe)	Dark, Street lights on, continuous lighting	Dry
139	03/24/2017	01:03 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
140	10/30/2017	04:38 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
141	10/31/2017	03:10 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
142	11/24/2018	02:54 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
143	05/20/2018	04:29 PM	Property Damage Only	0	Same Direction (Side Swipe)	Daylight	Dry
144	12/20/2017	05:24 PM	Property Damage Only	0	Same Direction (Rear-End)	Dark, Street lights on, continuous lighting	Dry

CRASH DIAGRAM (9 OF 9)

SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206

SOMERSET COUNTY ROADWAY SAFETY STUDY

Stantec | Scale: N.T.S. | Exhibit A9

Appendix E

Audit Team

Raritan - April 1st

Group 1 Pairs - Eastern Section

Matthew Maher, Stantec	Robert Fulminate, Public Works Supervisor
Tim Medina, Stantec	Michael Patente, Borough Council Engineering Liaison
Jessica Ortiz, FHI	Virgilio Tan, NJDOT
Adam Bradford, Somerset County	Adam Kardon, Planner
Walter Lane, Somerset County	

Group 2 Pairs - Western Section

Kati DiRaimondo, Stantec	Angela Knowles, Planner
Michael Ahillen, FHI	Stan Shrek, Engineer
Kenneth Wedeen, Somerset County	Jon Dugan, RideWise
Adam Slutsky, Somerset County	Pat Marotto, Somerset County

Appendix F

Pre-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Pre-Audit,
Raritan Corridor
March 31, 2021

Raritan Borough Pre-Audit Meeting

Introduction – Audit Team

- ***Funded by NJTPA***
- **Somerset County**
  - **Engineering and Planning**
  - **Board of County Commissioners**
  - **RideWise**
- **Raritan Borough**
  - **Public Works**
  - **Engineering**
  - **Planning**
  - **Borough Council**
- **NJDOT**
- **Stantec Consulting Services, Inc.**
- **FHI Studio**

Stantec

FHI studio

NJTPA
NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

SOMERSET COUNTY

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2-4 PM, Tomorrow
In-Field Road Safety Audit

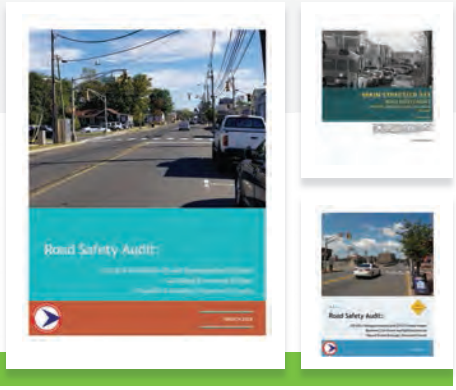
Noon, Monday
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Today

Share Observations
Discuss Potential Improvements
10:00 AM, Monday

Project Background

- **County initiatives for traffic safety**
- **Recommendations from RSAs to inform future…**
  - Studies
  - Improvements
  - Applications for funding



What is a Road Safety Audit (RSA)?

EVALUATION BY INDEPENDENT TEAM

IDENTIFIES CRASH TRENDS/CAUSES

PROPOSES POTENTIAL SAFETY IMPROVEMENTS

Steps of an RSA

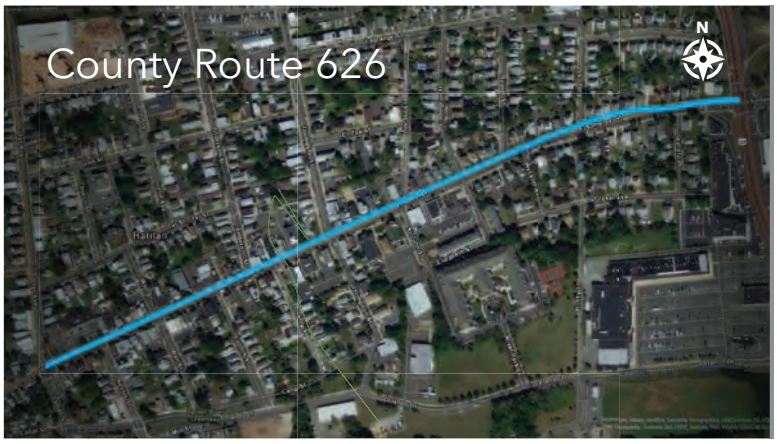
01	02	03	04	05	06	07	08
Select	Assemble	Conduct	Perform	Follow Up	Report	Present	Finalize
•Select Corridors with Stakeholder & Public Input	•Assemble RSA Team for Corridor	•Conduct Start-Up Meeting	•Perform In-Field Review	•Follow-Up on Observations •RSA De-Brief	•Report Findings •Analyze Findings	•Present Report to County	•Finalize RSA Report •County Responds

Pre-Audit Site Visit Post-Audit

Existing Conditions Data

Project Area

- Urban minor arterial
- 12' travel lanes, one in each direction
- ~9,000 AADT
- Posted 35 mph speed limit
- Posted advisory 25 mph near schools during session



Land Use

Central Business District

Mixed-use zone (e.g., residential, retail, churches)

Transit

- County Shuttle – North Plainfield to RVCC
- County Shuttle – Bridgewater Commons to Branchburg Shop-Rite

Redevelopment

- Mainly consist of "change of use" applications
- Nearby transit-oriented developments (e.g., Crossings at Raritan Station)

Existing Conditions Feedback

- Lack of driver awareness of cyclists.
- Lack of pedestrian provisions at Wall Street.
- Curb space management issues.
- Desire for adaptive use of street space.
  - Off-street parking options;
  - One-way couplet (Somerset and Orlando);
- Side street sight lines blocked despite daylighting.
- Congestion on Routes 202 or 206 results in cut-through.

Safety Measures

FHWA Proven Safety Measures

Study-Focused Safety Measures

- Lighting
- Leading Pedestrian Intervals (LPI)
- Curb Extensions/ Bus Bulbs
- High Visibility Crosswalks
- Daylighting Crosswalks
- Turn Restrictions

Study-Focused Safety Measures

- Walkways for Sidewalk Gaps
- Bike Lanes
- Green Stormwater Infrastructure
- Dedicated Turn Lanes
- Lane Width Reduction/Road Diet

Safety Measures Feedback

- **Lighting:**
  - No complaints on the decorative light poles in the area.
  - Suggestions for side street lighting for a more cohesive feel.
  - The town has not been able to replace lightbulbs; there is a need for coordination.
  - From Google Street View, it appears there is only one corner light.
  - There is pushback from homeowners about installing lighting.
- **Curb Extensions/Bus Bulbs:**
  - Consider parklets near a curb extension during a closed street event.
  - Potential for painted curb extensions.
  - Curb extension concerns include:
    - Lack of parking;
    - Off-street parking lot for business owners didn't work;
    - Drainage challenges; and,
    - Strategy for ramping up enforcement is challenging.

Safety Measures Feedback, cont'd

- **Daylighting and Crosswalks:**
  - Pedestrians cross where there is no crosswalk present.
  - Daylighting and crosswalks may have the same impact as curb extensions.
  - Potential for decorative crosswalks. (County currently prohibits)
  - To the west of First Avenue, the sidewalk drops off. (grant in to extend)
  - First Avenue and Somerset Street could potentially have refuge islands.
- **Leading Pedestrian Intervals (LPI):**
  - Participants believed LPI implementation depends on the timing of the plan.
  - Suggestions for Thompson Street, First Avenue, and Route 206 (State-owned).
- **Turn Restrictions:**
  - The corridor has No Turn On Red (NTOR) in some locations.
  - Complaints received on NTORs in Raritan Borough.

Safety Measures Feedback, cont'd

- **Bike Lanes:**
  - Parking would need to be eliminated.
  - Borough studies identify side streets for in-street bike right-of-way.

- **Map specific comments include:**
  - Intersection of W Somerset Street & First Avenue:
    - Could be a location for a pedestrian refuge island.
    - Longer crossing times needed.
    - Crosswalks could be shifted for a shorter crossing distance.
    - Glare and grade make visibility difficult for pedestrians and motorists.
    - Redesign turning radii.
  - Nevius Street used as a cut through.
  - W Somerset Street & Thompson Street intersection has NTOR.

Public/ Stakeholder Improvement Feedback

Safety Measure	Effectiveness (1= very effective; 10= not effective)	Ease of Implementation (1=easy; 10= hard)
Lighting	3	5
Curb Extensions/Bus Bulbs	5	5
Daylighting and Crosswalks	5	5
Walkways for Sidewalk Gaps	8	5
Dedicated Turn Lanes	1	1
Leading Pedestrian Intervals (LPI)	2	1
High Visibility Crosswalks	6	-
Turn Restrictions	5	-
Bike Lanes	5	8
Lane Width Reduction/Road Diet	-	-

Crash Data

Crash Data - Statistics

- **All Crashes 2016-2018**
  - **144 Total Crashes**
  - **Overrepresentations:**
    - **Struck Parked Vehicles**
    - **Pedestrian crashes**
    - **1 Fatality**
- **Pedestrian Crashes 2014-2018**
  - **7 Total Crashes**

NJTPA Network Screening List (NSL) Crash Ranking

Overall Crash Data

Intersections
Not Ranked

Corridor Segments
#23rd MP 0.00 – 0.67

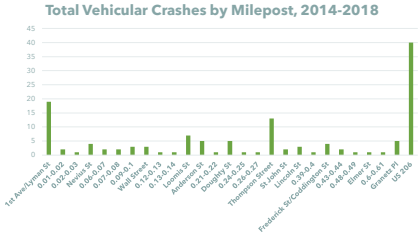
Pedestrian/Bike Crash Data

Intersections
#13th First Avenue
#76th Frederick Street

Corridor Segments
#4th MP 0.11 – 0.67

Raritan Borough - Histogram

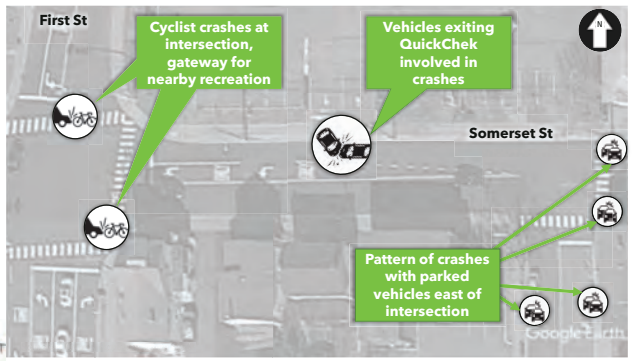
Total Vehicular Crashes by Milepost, 2014-2018



- **Pedestrians 5%** of crashes
- **5x Struck Parked Vehicles**
- **1 Fatality @ US 206** intersection

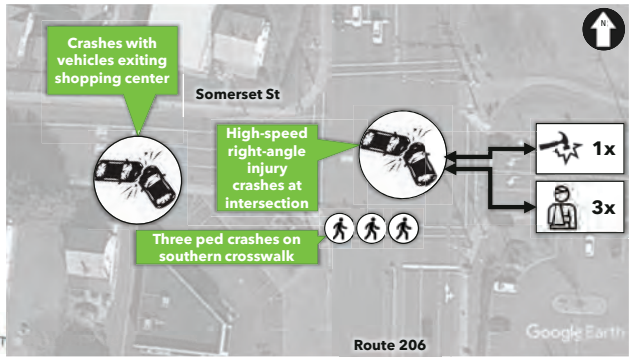
Crash Trends

Somerset Street in Raritan @ First Avenue Intersection



Crash Trends

Somerset Street in Raritan @ US Route 206 Intersection



Conducting the Audit

Guidelines & Safety

Be Observant & Alert
- Vehicles
- Wet Surfaces

Be Seen
- Face Traffic
- Avoid Sudden Movements
- Stick to Sidewalks

Be Respectful
- Traffic (Vehicular, Pedestrian, Cyclist)
- Motorists
- Property

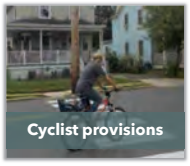
PPE
- High Visibility Vest
- Proper Face Coverings
- Social Distancing (1 occupant/veh.)

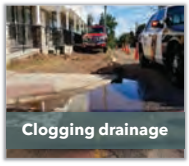
What to Bring/Wear to the Field

COMFORTABLE CLOSED SHOES	WEATHER CONSCIOUS	HIGH VISIBILITY VESTS	DOCUMENTING MATERIAL
		• Bring your own	• Smartphone • Pen/Pencil • Paper/notepad

What to Look for - Photos

What to Look for - Photos



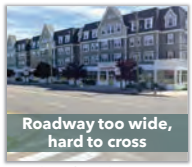


What to Look for - Photos


No curb ramp/crosswalk present


Faded striping/non-compliant curb ramps


Driveway aprons too wide, lack ADA


Roadway too wide, hard to cross


Traffic calming at curve/intersection

How to Record Observations

- Photograph
- Pen/Pencil Paper
- Video
- Mobile Device
- Mental

BE SPECIFIC!!!

Agenda: Schedule of Activities

10:00 AM, Today
Project Background
Study Area Crash Data
RSA Orientation

2-4 PM, Tomorrow
In-Field Road Safety Audit

Noon, Monday
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Today

Share Observations
Discuss Potential Improvements
10:00 AM, Monday

Participant	Group
Matthew Maher / Robert Fulminante	E
Tim Medina / Adam Kardon	E
Jessica Ortiz / Adam Bradford	E
	E
Kati DiRaimondo / Stan Shrek	W
Michael Ahillen / Kenneth Wedeen	W
Adam Slutsky / Pat Marotto	W
	W

Questions?

Extra Slides

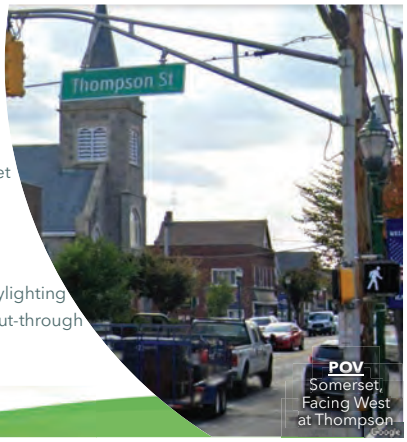
Somerset Street

1st Avenue to RT 206

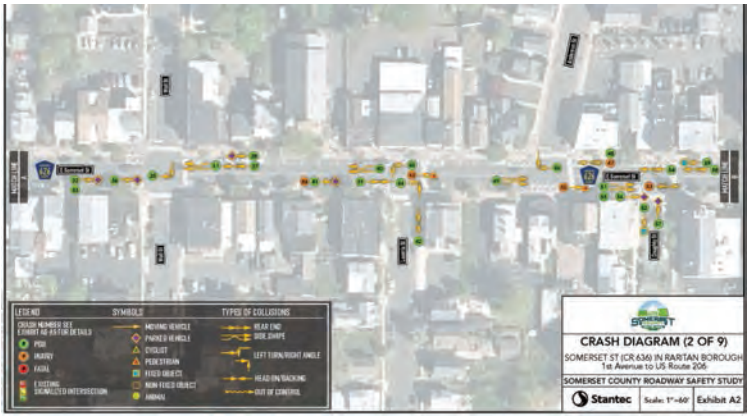
0.67 miles in Raritan Boro

Summary of Feedback

- Lack of driver awareness of cyclists
- Lack of pedestrian provisions at Wall Street
- Curb space management issues
- Desire for adaptive use of street space
  - Off-street parking options
  - One-way couplet (Somerset and Orlando)
- Side street sight lines blocked despite daylighting
- Congestion on Route 202/206 results in cut-through



POV
Somerset, Facing West at Thompson



Appendix G

Post-Audit Survey

Participant Survey - Average Scores

As you near the end of the audit, rate how the following items impact your level of comfort.
(1: makes me uncomfortable; 4: makes me comfortable; N/A: issue does not exist along this corridor)

Category	Item	Bridgewater	Franklin	Millstone	North Plainfield	Raritan
Corridor Identity	**Average**	**2.3**	**2.4**	**2.7**	**3.2**	**2.7**
Corridor Identity	Activities and uses	2.3	2.6	3.0	3.2	2.5
Corridor Identity	Condition of buildings	2.6	2.3	3.0	3.3	2.5
Corridor Identity	Perception of personal safety	1.9	2.4	2.0	3.0	3.0
Crossings	**Average**	**2.2**	**2.3**	**2.3**	**2.3**	**2.4**
Crossings	Crossing guards	2.5	3.0	-	2.7	3.0
Crossings	Missing or inoperable pedestrian/audible signal	1.9	2.0	2.0	3.0	3.5
Crossings	Pedestrian signal crossing time	2.7	3.0	3.0	2.6	2.6
Crossings	Poorly marked or missing crosswalk	1.7	1.6	1.7	1.7	2.3
Crossings	Presence of curb ramps for strollers/wheelchairs	1.7	1.9	1.0	1.9	2.3
Crossings	View of traffic is blocked	2.0	2.6	2.3	2.1	1.6
Crossings	Wait time for pedestrian signal	2.9	2.8	3.0	2.8	2.4
Pedestrian-Vehicle Interactions	**Average**	**1.6**	**2.1**	**1.9**	**2.8**	**2.5**
Pedestrian-Vehicle Interactions	Amount of traffic	1.7	2.1	2.3	3.0	2.6
Pedestrian-Vehicle Interactions	Bicycling on the sidewalk	1.3	4.0	2.0	2.1	2.9
Pedestrian-Vehicle Interactions	Driver behavior (distracted, did not yield to pedestrians, etc.)	2.1	2.0	2.7	3.0	2.1
Pedestrian-Vehicle Interactions	Noise level due to auto traffic	1.2	2.0	1.3	2.9	2.1
Pedestrian-Vehicle Interactions	Presence of trucks or large vehicles	1.7	2.0	1.7	2.8	2.8
Pedestrian-Vehicle Interactions	Speed of traffic	1.4	2.1	1.3	2.5	2.5
Sidewalk/Roadway Condition	**Average**	**2.3**	**2.7**	**2.6**	**2.6**	**2.9**
Sidewalk/Roadway Condition	Areas on roadway with poor drainage	3.1	2.9	2.5	3.0	2.6
Sidewalk/Roadway Condition	Areas on sidewalk with poor drainage	3.0	2.8	2.0	2.9	2.6
Sidewalk/Roadway Condition	Buffer area between sidewalk and traffic	1.5	2.4	2.3	2.5	3.1
Sidewalk/Roadway Condition	Guide rails/protection systems	2.0	3.3	3.0	2.3	2.5
Sidewalk/Roadway Condition	Intersection configuration	2.1	2.7	3.0	2.8	2.7
Sidewalk/Roadway Condition	Obstacles blocking sidewalk (utilities/trees)	2.9	2.5	3.0	2.6	2.9
Sidewalk/Roadway Condition	Roadway condition	2.8	3.1	2.7	3.0	3.3
Sidewalk/Roadway Condition	Roadway width	2.2	2.8	3.0	3.0	3.3
Sidewalk/Roadway Condition	Sidewalk condition	1.9	2.3	1.7	1.8	2.9
Sidewalk/Roadway Condition	Sidewalk width	2.2	2.6	2.7	2.4	3.1
Streetscape Amenities	**Average**	**2.0**	**2.5**	**3.2**	**2.5**	**3.2**
Streetscape Amenities	Benches or places to rest, trash cans	1.5	2.8	N/A	1.1	3.8
Streetscape Amenities	Lighting (for pedestrians)	1.9	2.0	3.0	2.4	3.7
Streetscape Amenities	Lighting (for vehicles)	2.4	2.5	2.7	2.9	2.7
Streetscape Amenities	Presence of directional/regulatory signage	2.4	2.3	3.7	2.8	2.7
Streetscape Amenities	Street trees and landscaping	1.9	3.0	3.5	2.9	3.2

Appendix H

Post-Audit Presentation

SOMERSET COUNTY ROADWAY SAFETY STUDY

Roadway Safety Post-Audit,
Raritan Corridor
April 1, 2021

Raritan Borough
Post-Audit Meeting

Agenda: Schedule of Activities

10:00 AM, Yesterday
Project Background
Study Area Crash Data
RSA Orientation

2:00-4:00 PM, Yesterday
In-Field Road Safety Audit

Noon Today
Adjourn

Pre-Audit Meeting Adjourn
11:00 AM, Yesterday

Share Observations
Discuss Potential Improvements
10:00 AM, Today

Field Photography/Videos

Prompt List Discussion

"What operational/safety issues did you note on the corridor?"

"What makes travel on the corridor difficult ?"

- For drivers?
- For non-drivers?
- For people with disabilities?
- For families with small children?
- For transit riders?

"What pedestrian/cyclist connectivity issues were observed?"

Recommendations Discussion

"WHAT SAFETY IMPROVEMENTS DO YOU PROPOSE FOR REDUCING CRASHES?"

"WHAT IS YOUR VISION FOR THE CORRIDOR? HOW SHOULD IT LOOK IN 10 YEARS?"

"WHAT ARE THE SHORT-TERM CHANGES THAT COULD BE MADE NOW?"

Next Steps

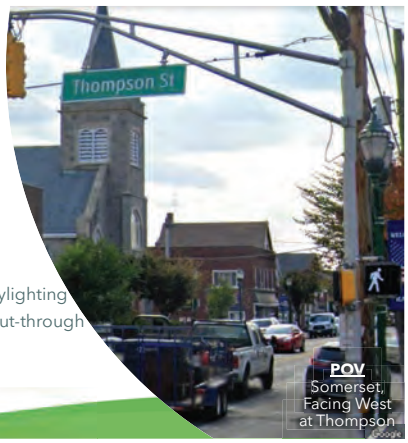
- Produce RSA Reports
- Implementation Matrix
- Final Study Report
- Conduct Follow-Up Public/TAC Meetings

Extra Slides

Somerset St
1st Ave to RT 206
0.67 miles in Raritan Boro

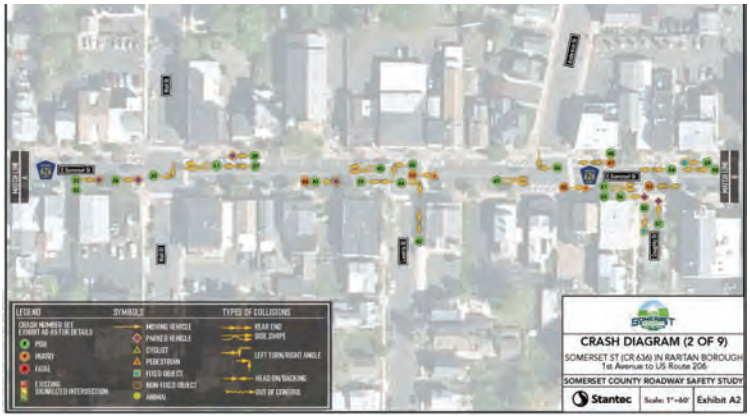
Summary of Feedback

- Lack of driver awareness of cyclists
- Lack of ped provisions at Wall Street
- Curb space management issues
- Desire for adaptive use of street space
  - Off-street parking options
  - One-way couplet (Somerset and Orlando)
- Side street sight lines blocked despite daylighting
- Congestion on Route 202/206 results in cut-through



POV
Somerset, Facing West at Thompson


Western Limit of Segment
CRASH DIAGRAM (1 OF 9)
SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Scale: 1"=60'
Exhibit A1


CRASH DIAGRAM (2 OF 9)
SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Scale: 1"=60'
Exhibit A2


CRASH DIAGRAM (3 OF 9)
SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Scale: 1"=60'
Exhibit A3


CRASH DIAGRAM (4 OF 9)
SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Scale: 1"=60'
Exhibit A4


Eastern Limit of Segment
206
CRASH DIAGRAM (5 OF 9)
SOMERSET ST (CR 636) IN RARITAN BOROUGH
1st Avenue to US Route 206
SOMERSET COUNTY ROADWAY SAFETY STUDY
Stantec
Scale: 1"=60'
Exhibit A5

Appendix I

Recommendations from Implementation Matrix

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2021/07/14 3:05 PM By: DiRaimondo, Kati

ORIGINAL SHEET - ANSI B

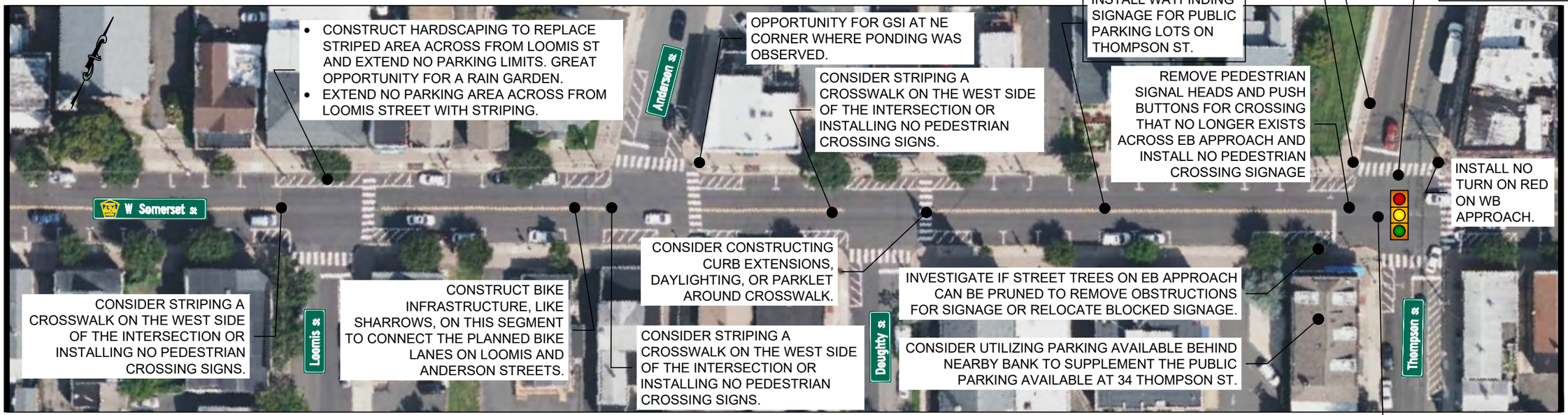
July, 2021
192510854

Stantec
365 West Passaic Street, Suite 175
Rochelle Park, NJ 07662
www.stantec.com

Client/Project
Somerset County/NJTPA
Somerset County Roadway Safety Study
East Somerset Street (CR 626)

Sheet No.
1 of 4

Title
Raritan Borough RSA Recommendations
Scale: 1" = 60'



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2021/07/14 3:05 PM By: DiRaimondo, Kati

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Sheet No.
2 of 4

Title
Raritan Borough RSA Recommendations
Scale: 1" = 60'

MATCHLINE B

RECONSTRUCT CORNER TO REDUCE CURB RADIUS.

COORDINATE WITH BAGELICIOUS BUSINESS OWNER TO RELOCATE TABLES AND CHAIRS OUT OF PEDESTRIAN ROW.

INSTALL R9-3 AND R9-3BP (NO PEDESTRIAN CROSSING) SIGNAGE

- RESTRIPE CURB EXTENSION ON SW CORNER TO ALIGN WITH CURB ON JOHN ST.
- RECONSTRUCT CORNER TO REDUCE CURB RADII.

STRIPE DEDICATED ADA SPACE WITH BLUE PAINT, DAYLIGHT NO PARKING AREA, RELOCATE 2-HOUR PARKING SIGN FROM NO PARKING AREA TO ON-STREET PARKING EAST OF POST OFFICE, AND REORIENT MAILBOX TO FACE POST OFFICE.

CLEAR CLOGGED INLET TO REMEDIATE PAVEMENT EROSION/CRACKING PROBLEM.

- EVALUATE GAS STATION FOR ACCESS VIOLATIONS AND MODIFY AS NECESSARY.
- ADD LANDSCAPING TO DELINEATE GAS STATION DRIVEWAYS AND PROVIDE VISUAL SEPARATION FROM PEDESTRIAN SPACE.
- CONSIDER GSI TREATMENT IN FRONT OF GAS STATION TO REDUCING PONDING AND STANDING WATER.
- RECONSTRUCT SIDEWALK THROUGH GAS STATION DRIVEWAYS TO CORRECT NON-ADA-COMPLIANT CROSS SLOPES.

STRIPE CROSSWALK AND STOP BAR ACROSS SB APPROACH.

REFRESH EXISTING CROSSWALK STRIPING.

STRIPE MISSING SHOULDER LINE AND STRIPING FOR PARKING TO HAVE MORE OF A TRAFFIC CALMING EFFECT.

STRIPE CROSSWALK AND STOP BAR ACROSS FREDERICK ST.

INSTALL R9-3 AND R9-3BP (NO PEDESTRIAN CROSSING) SIGNAGE ON THE WEST SIDE OF THE INTERSECTION IF NO CROSSWALK WILL BE INSTALLED.

MATCHLINE C

INSTALL R9-3 AND R9-3BP (NO PEDESTRIAN CROSSING) SIGNAGE ON THE WEST SIDE OF THE INTERSECTION IF NO CROSSWALK WILL BE INSTALLED.

- CONSIDER STRIPING CURB EXTENSIONS.
- REFRESH EXISTING CROSSWALK STRIPING.

EXTEND DAYLIGHTING ON NE CORNER TO INCREASE SIGHT DISTANCE.

MATCHLINE C

CONSIDER INSTALLING A MORE VISIBLE, ACTUATED CROSSING SUCH AS RRFB, BLINKING LED SIGN PANELS, OR IN-PAVEMENT LIGHTS.

DRAINAGE INLETS MUST BE RELOCATED FROM PEDESTRIAN ROW OR PEDESTRIAN ROW MUST BE RELOCATED.

MATCHLINE D

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2021/07/14 3:05 PM By: DiRaimondo, Kati

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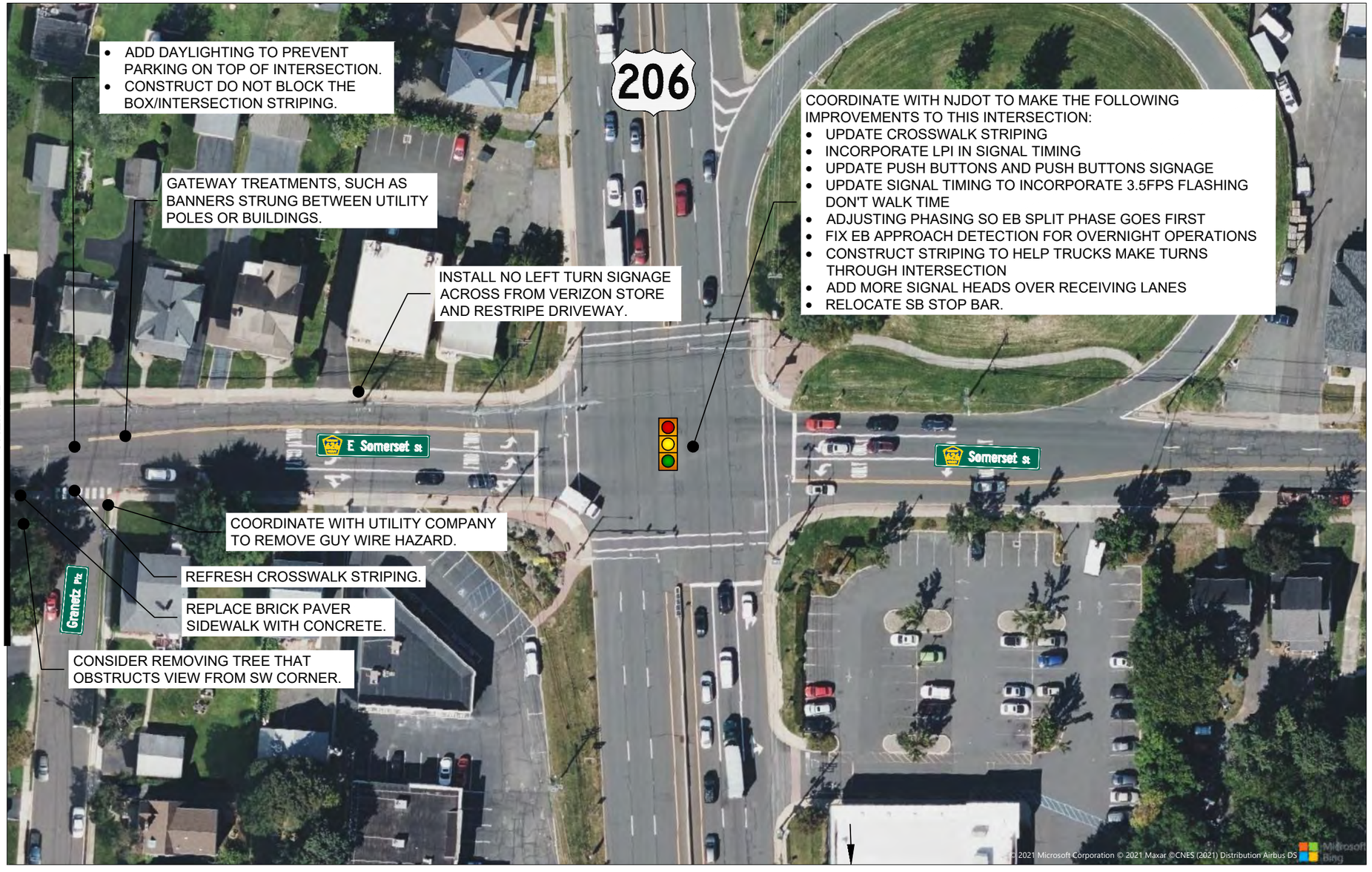
Sheet No.
3 of 4

Title
Raritan Borough RSA Recommendations
Scale: 1" = 60'



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2021/07/14 3:05 PM By: DiRaimondo, Kati

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East Somerset Street (CR 626)

Sheet No.
4 of 4

Title
Raritan Borough RSA Recommendations
Scale: 1" = 60'

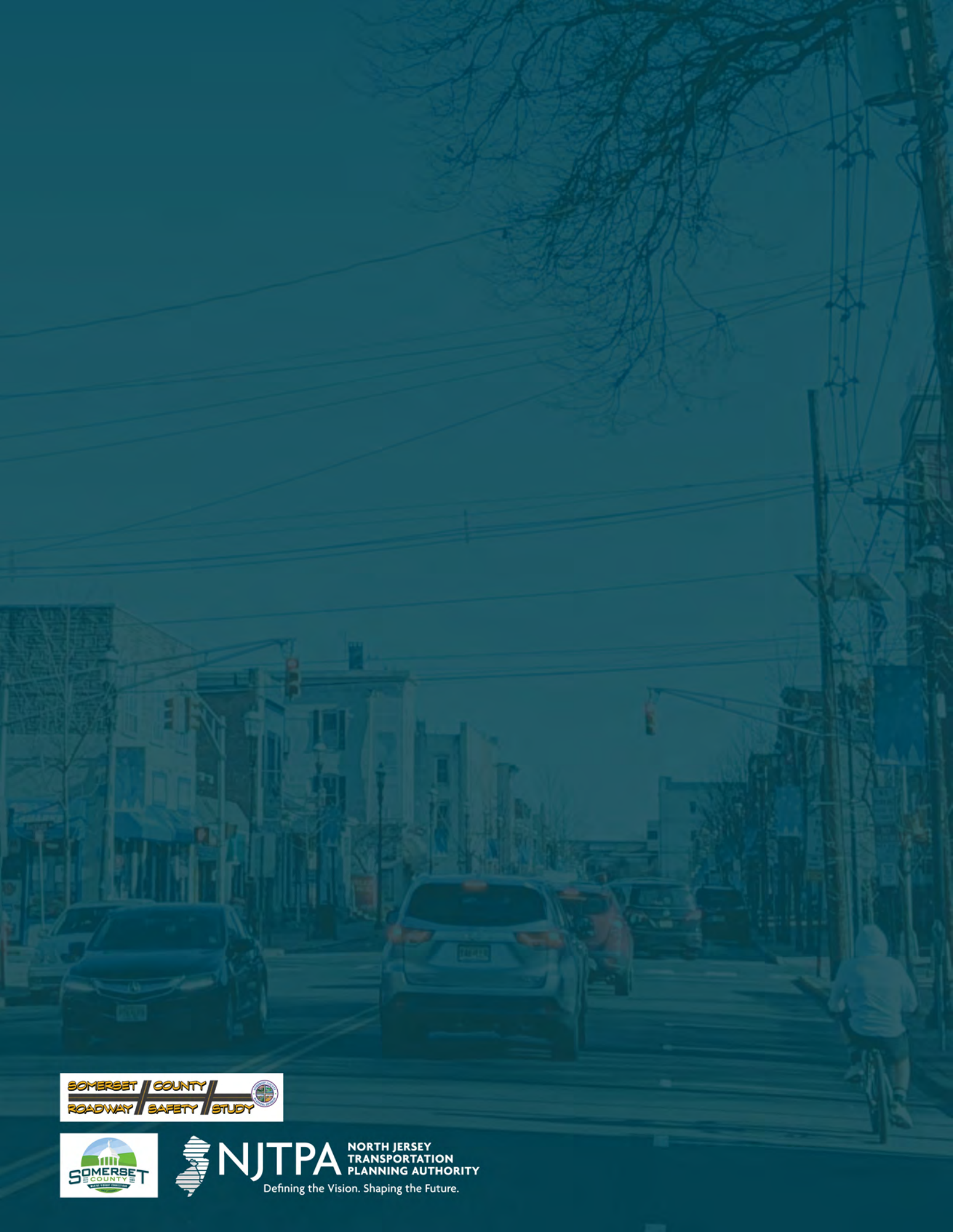
Appendix J

Road Owner Response

Somerset County Response to the Somerset Street (CR 626) in Raritan Borough Road Safety Audit (owner's response)

Somerset County agrees with the recommendations of the Road Safety Audit. The County strives to make our roads safer for all users and is willing to investigate any recommendations that can assist in achieving that goal. Our agreement with the assessment should in no way be perceived as a commitment to the implementation of such suggestions. The following general points should be noted:

- Somerset County does not maintain or inspect sidewalks, street lighting, landscaping, or parking facilities along county roadways. That responsibility lies with the municipality or property owner.
- Some recommendations may not be warranted or feasible due to engineering or fiscal constraints. Additional analysis is necessary.



SOMERSET COUNTY ROADWAY SAFETY STUDY

SOMERSET COUNTY

NJTPA NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

Defining the Vision. Shaping the Future.