

Buena Borough Bicycle & Pedestrian Study



Buena Borough Bicycle and Pedestrian Study

Prepared by:

Cross County Connection Transportation Management Association

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Cross County Connection Transportation Management Association was formally incorporated in 1989 through the efforts of a group of southern New Jersey business leaders, local government officials, and representatives from the New Jersey Department of Transportation (NJDOT) and New Jersey Transit Corporation (NJ TRANSIT) to address mobility issues in the region and reduce the number of vehicles on state and local roadways. Cross County Connection is a non-profit organization that partners with NJDOT, NJ TRANSIT, Federal Highway Administration, Delaware Valley Regional Planning Commission (DRVPC), South Jersey Transportation Planning Organization (SJTPA), North Jersey Transportation Planning Authority (NJTPA), and its members to provide solutions to complex transportation problems for counties, municipalities, employers and commuters in Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Salem Counties.

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CHAPTER 1: INTRODUCTION

Background

In August 2014, Cross County Connection Transportation Management Association (TMA) met with Buena Borough Council and other stakeholders to discuss the TMA's Complete Streets, Safe Routes to School (SRTS), and Bicycle and Pedestrian Planning Technical Assistance programs. After the presentation and subsequent discussions, Borough staff and officials were eager to pursue these initiatives to help achieve their goal of becoming a more bicycle and pedestrian-friendly community. Information about Safe Routes to School and sample Complete Streets policies were provided to relevant municipal and school district personnel for review. In October 2014, Buena Borough Council adopted a Complete Streets policy and the School Board adopted a SRTS Resolution of Support.

Shortly thereafter, Cross County Connection staff met with Borough representatives to discuss next steps. They requested for Cross County Connection to conduct a bicycle and pedestrian safety audit, report the findings, and provide some general recommendations to mitigate identified issues. The results would be reported in a study that would be used to guide the implementation of their Complete Streets policy and support SRTS programming. This publication is that study.

Project Overview and Methods

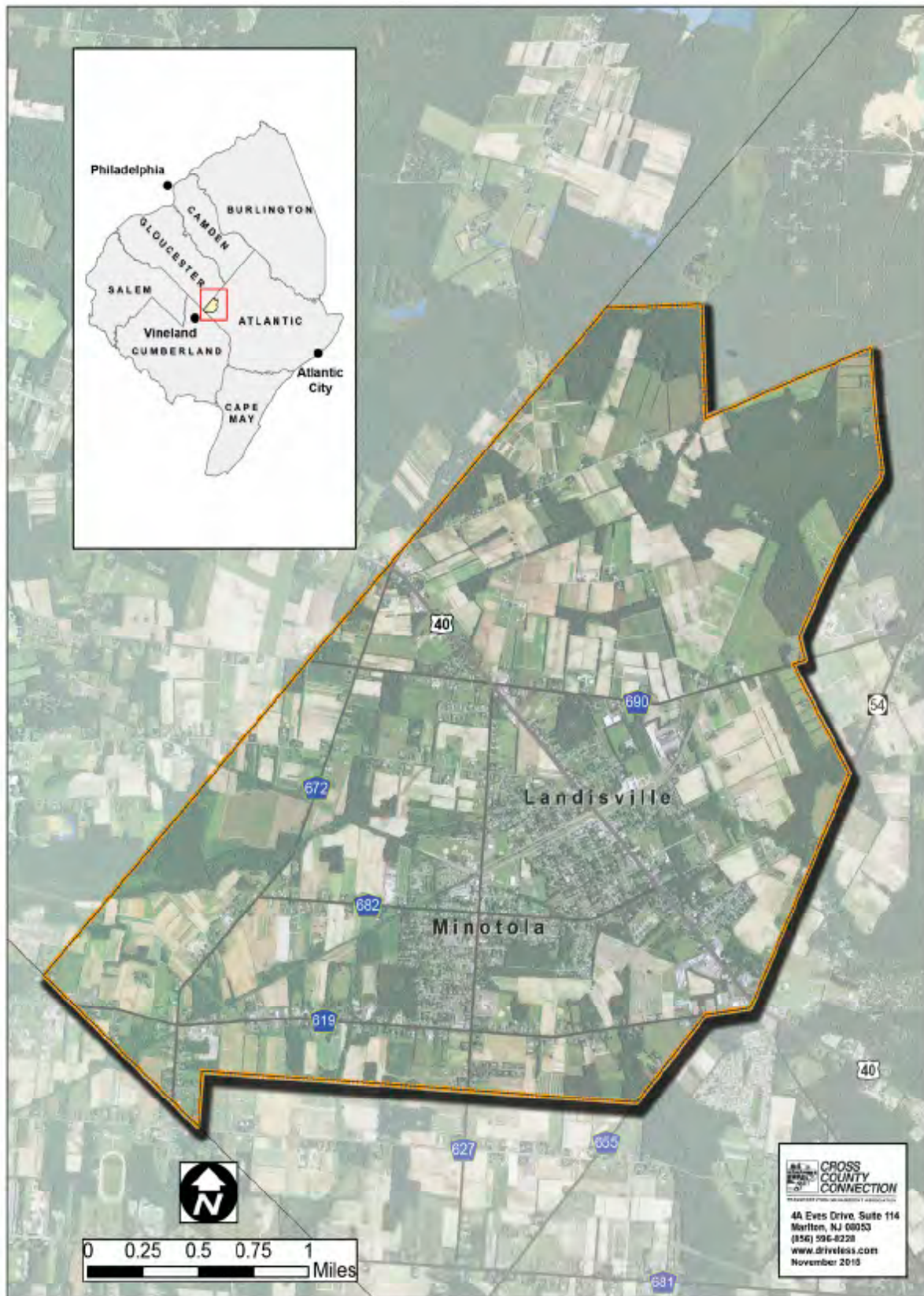
The Buena Borough Bicycle and Pedestrian Study will provide Buena Borough with strategies and recommendations to develop a safe, connected bicycle and pedestrian network. The study is primarily focused on the communities of Landisville and Minotola. These two adjacent communities are characterized by a fairly connected street network and contain numerous local destinations, including the Buena Borough Municipal Building, Bruno Melini Park, Cleary Elementary School, and the Buena Borough Bike Path, which make it an ideal area to target improvements for bicyclists and pedestrians. An emphasis of this study is to identify ways to enhance safe and convenient bicycle and pedestrian travel between residential areas and these destinations.

The first step of this study was to inventory the components of the bicycle and pedestrian transportation network in Landisville and Minotola, including sidewalks, crosswalks, and bikeways. Chapter 2 functions as this inventory of existing conditions. An analysis of the existing bicycle and pedestrian transportation network is included in Chapter 3. This analysis considers how the network is meeting the needs of its potential users, identifies issues, and assesses needs. Chapter 4 contains recommendations to enhance the safety and connectivity of the bicycle and pedestrian transportation network within the study area. These planning recommendations are based on the analysis conducted in Chapter 3, as well as input from Buena Borough staff and elected officials.

Setting

Buena, shown in Map 1, is a 7.6 square mile borough located in the southwestern corner of Atlantic County. The Borough is bordered by Buena Vista Township to the north and east, Franklin Township in Gloucester County to the west, and Vineland to the south. The Borough has a population of 4,603 with 607.34 residents per square mile, which is relatively more dense than Atlantic County (494.1 residents per sq. mi.) as a whole.

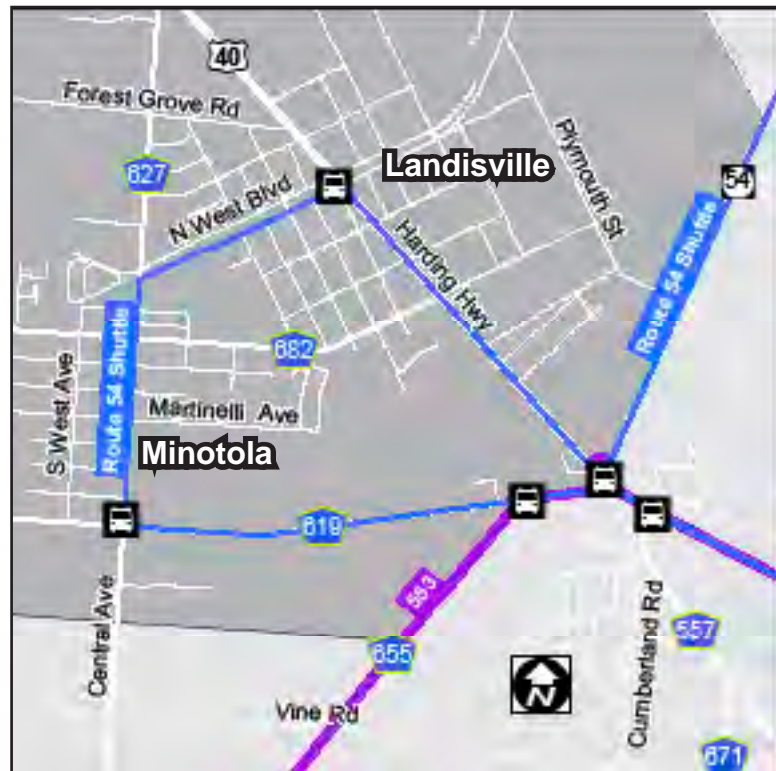
Map 1: Overview of Buena Borough



The bulk of Buena's development is contained within the communities of Landisville and Minotola. These neighborhoods were developed in a more compact manner than the remainder of the municipality, which is predominantly rural in nature. Landisville and Minotola's residential streets feature a fairly connected grid pattern, which is inherently beneficial to pedestrians and bicyclists, providing multiple route choices and shorter more direct trips to reach destinations. Buena contains the state highways US 40 (Harding Highway), which passes through the center of the Borough, and Route 54, which runs along its eastern edge. There are also several county roadways that traverse the municipality, although the majority of roads are under local jurisdiction.

Buena's public transit network is shown in Map 2. Public transit began serving Buena Borough in 2015. New Jersey Transit (NJ TRANSIT) 553 bus service travels along a small portion of the Borough's southeastern border with Buena Vista Township. The 553 travels between Atlantic City and Upper Deerfield Township, Cumberland County seven days a week, with hourly service in both directions at most hours of the day, including early mornings and late evenings. Currently, the only stop within Buena is at Wheat Road at US 40. NJ TRANSIT began 553 service in Buena in June 2015. Initially, the bus served Landisville and Minotola directly, but the route was modified at the Borough's request, due to frequent resident complaints. The route modifications went into effect in January 2016.

Map 2: Public Transit Availability in Buena Borough



Fortunately for Landisville and Minotola residents looking for a public transit option, the Route 54/40 Community shuttle began operations in January 2016. The shuttle serves these communities directly, with two signed stops in Buena Borough - South Boulevard at US 40 in Landisville and Central Avenue at Wheat Road in Minotola - though the bus can be flagged down at any point along the route. The Route 54/40 Community Shuttle connects Landisville and Minotola residents to destinations in the nearby communities of Hammonton, Collings Lake, Newtonville, and Richland. The shuttle also connects to multiple NJ TRANSIT bus routes, including the 553, and the Atlantic City Rail Line. The Route 54 Community Shuttle arrives every hour in each direction, Monday through Friday, between the hours of 5:30AM and 10:00AM in the morning and 3:00PM and 7:30PM in the afternoon/evening. South Jersey Transportation Authority (SJTA) operates the Route 54/40 Community Shuttle in collaboration with Atlantic County.

Previous Planning Initiatives

The Buena Borough Master Plan (2005) provides direction and guidance for future development in the Borough and is intended to provide the framework for the development of an attractive, vibrant, and economically thriving place to live. The Master Plan includes numerous goals and objectives that are advanced by the *Landisville and Minotola Bicycle and Pedestrian Study*, including:

- Establish new and upgrade existing municipal recreational facilities
- Encourage the design and location of transportation and circulation routes which will permit the free flow of traffic in appropriate locations; discourage the location of roadways in areas which will result in congestion, blight, or depreciated property values

Additionally, the following recommendations that are outlined in the Circulation Element of the Buena Borough Master Plan are supported and advanced by this study:

- Promote pedestrian and bicycle safety and circulation by providing intersection improvements at high traffic locations and utilizing traffic calming measures at selected locations
- Specific traffic improvements recommended by the Borough Police should be coordinated with the County and State for funding and implementation
- Research alternative funding sources to undertake a sidewalk inventory in the Borough. The inventory should include the location, width, handicap accessibility, and condition of all sidewalks.
- The Borough should consider implementing traffic calming techniques in area that have a large number of pedestrian crossings. Rumble strips and pedestrian crossing signs are types of traffic calming which can easily be implemented in these areas.

The *Landisville and Minotola Bicycle and Pedestrian Study* advances these recommendations by:

- Identifying opportunities to improve bicycle and pedestrian safety and circulation
- Facilitating coordination with Atlantic County and NJDOT
- Developing a sidewalk, crosswalk, and bikeway inventory
- Providing guidance on funding opportunities and other planning and design resources
- Improving trail access for Buena Borough residents
- Providing Buena Borough residents safe, multi-modal, access to public transportation services.

CHAPTER 2: EXISTING CONDITIONS

Buena's pedestrian and bicycle transportation network centerpiece is the Buena Bike Path, an attractive facility to both bicyclists and pedestrians. The Borough's bicycle and pedestrian network also consists of several large, uninterrupted stretches of sidewalks on major roadways, fragmented sidewalks in residential neighborhoods, crosswalks in key locations, and bicycle lanes on South Boulevard.

Sidewalks

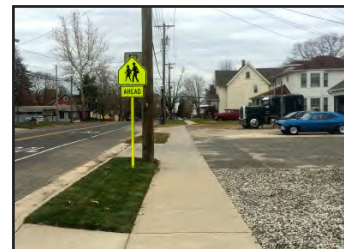
Cross County Connection conducted fieldwork in November 2014 to locate and ascertain the quality of Buena's existing sidewalks. In total, there is a sidewalk network of 3.9 miles (20,706 ft.) within the Buena Borough. The quality of these sidewalks were determined based upon visual observation and are subjective in nature. Sidewalk condition was divided into three categories:

Good - Presence of no discernible tripping hazards. No visible cracking, vegetation overgrowth, or uneven surface resulting from lifting caused by undergrowth of tree roots or other sources.

Fair - Presence of minor tripping hazards that could affect vulnerable populations such as small children, the elderly, or disabled persons. Minor cracking; minor overgrowth, either encroaching onto sidewalks or between slabs; minor lifting creating slight changes in surface elevation.

Poor - Significant tripping hazards for all users, especially small children, the elderly, and disabled persons. Major cracking; missing slabs; significant overgrowth encroaching onto sidewalks or between slabs; major lifting causing significant changes in elevation.

Sidewalks in good condition account for 65.3% of Buena Borough's sidewalk network, totaling 2.6 miles (13,521 ft.). Sidewalks in fair condition account for 33.3% of the network, totaling 1.3 miles (6,887 ft.). Sidewalks in poor condition account for 1.4% of the network, totaling 0.1 miles (298 ft.)



Sidewalk in "Good" Condition



Sidewalk in "Fair" Condition



Sidewalk in "Poor" Condition

Sidewalk Locations

The biggest concern in Buena Borough is the lack of sidewalks, especially on residential streets. This is common in rural communities like Buena. Installing sidewalks on every street would be prohibitively expensive and may not be a pressing issue on many streets, due a lack of pedestrian activity and the low volume and speed of motor vehicle traffic. However, the Borough should consider installing sidewalks on streets that may provide key linkages to destinations such as the Buena Bike Path, the Cleary School, and Bruno Melini Park. As a first step, Cross County Connection provides the following inventory of the location and quality of Buena Borough's existing sidewalks. The most significant segments of sidewalks are discussed in the text. The location and quality of all of Buena's sidewalks is listed in Table 1 and shown in Map 3. Priority gaps will be identified in Chapter 3.

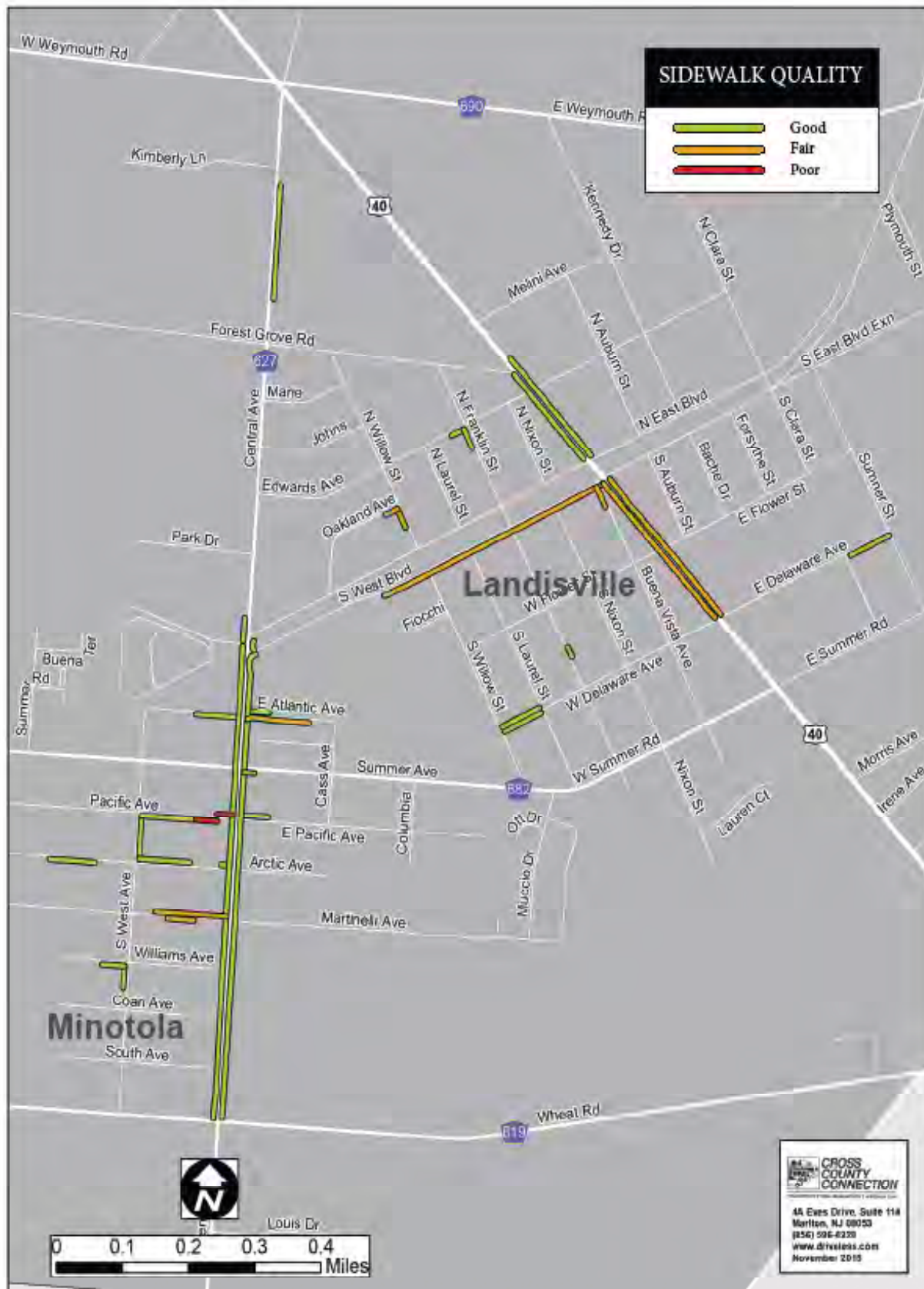
Table 1: Buena Borough Sidewalk Inventory, November 2014

Road Name	Start Point (N/W)	End Point (S/E)	Street Side	Condition	Length (Ft.)	Notes
W Arbor Ave	Mid-block (N Willow St)	N Franklin St	North	Good	108	Curb ramps on east side, ends at property line to the west
W Arctic Ave	Southwest Ave	Mid-block (S Central Ave)	North	Good	404	South side of Buena Gardens Senior Apartments, curb ramps
W Arctic Ave	Mid-block (Southwest Ave)	Mid-block (S Central Ave)	North	Good	55	Small sidewalk adjacent to Town & Country Liquor, curb ramps
W Arctic Ave	Mid-block	Mid-block (Southwest Ave)	South	Good	355	Isolated sidewalk in front of three residential properties
E Atlantic Ave	S Central Ave	Mid-block (Cass Ave)	North	Good	166	No curb ramps at bank driveway, vegetation overgrowth into sidewalk
E Atlantic Ave	S Central Ave	Mid-block (Cass Ave)	South	Fair	493	Cracked sidewalk
W Atlantic Ave	Mid-block (Southwest Ave)	S Central Ave	South	Good	342	Stub of sidewalk, curb ramps at S Central Ave
Buena Vista Ave	Southwest Blvd	Mid-block (W Flower St)	West	Fair	158	Curb ramp at Southwest Blvd, ends abruptly
S Central Ave	Southwest Blvd	Wheat Rd (CR 619)	West	Good	3,740	Begins at the Municipal Building
S Central Ave	Southwest Blvd	Wheat Rd (CR 619)	East	Good	3,485	Begins just south of the Buena Bike Path
S Central Ave	Northwest Blvd	Southwest Blvd	East	Good	116	Connects to Buena Bike Path, curb cuts
S Central Ave	Mid-block (Forest Grove)	Mid-block (Weymouth Rd)	East	Good	842	Isolated sidewalk in front of six residential properties
E Delaware Ave	Mid-block	Sumner St	South	Fair	322	Adjacent to cemetery, no curb cuts
W Delaware Ave	S Willow St	S Laurel St	North	Good	324	ADA-compliant curb ramps on both sides
W Delaware Ave	S Willow St	S Laurel St	South	Good	324	ADA-compliant curb ramps on both sides
N Franklin St	W Arbor Ave	Mid-block (Northwest Blvd)	West	Good	156	Isolated sidewalk in front of two residential properties
S Franklin St	Mid-block (W Flower St)	Mid-block (W Delaware Ave)	East	Fair	79	Isolated sidewalk in front of one residential property
Jonas Ave	Mid-block (Southwest Ave)	S Central Ave	North	Fair	565	Uneven sidewalks

Road Name	Start Point (N/W)	End Point (S/E)	Street Side	Condition	Length (Ft.)	Notes
Jonas Ave	Mid-block (Southwest Ave)	Mid-block (S Central Ave)	South	Fair	202	Sidewalk ends before intersection with S Central Ave
E Pacific Ave	S Central Ave	Mid-block (Cass Ave)	North	Good	209	Sidewalk ends in front of Church
W Pacific Ave	Mid-block (Southwest Ave)	S Central Ave	North	Poor	127	In front of one residential property, connects to sidewalk on S Central Ave
W Pacific Ave	Southwest Ave	Mid-block (S Central Ave)	South	Good	434	Sidewalk in poor condition east of Buena Gardens
W Pacific Ave	Mid-block (Southwest Ave)	Mid-block (S Central Ave)	South	Poor	171	In front of residential property to the east of Buena Gardens Senior Apartments
Park Ave	Mid-block (Oakland)	N Willow St	South	Fair	107	In front of one residential property, connects to sidewalk on N Willow St
Summer Rd	S Central Ave	Mid-block (Cass Ave)	South	Fair	78	In front of one commercial property, ends at driveway
Southwest Ave	W Pacific Ave	W Arctic Ave	East	Good	324	West side of Buena Gardens Senior Apartments
Southwest Ave	Williams Ave	Mid-block (Coari Ave)	West	Good	158	Curb ramps but not ADA compliant
South Blvd.	S Willow St	US 40	South	Fair	1,938	Lack of curb cuts at several intersections, cracked sidewalks
US 40	Melini Ave	Northwest Blvd	West	Good	832	ADA ramps at Melini Ave, Arbor Ave, and Northwest Blvd
US 40	Melini Ave	Northeast Blvd	East	Good	967	ADA ramps at Arbor Ave and Northeast Blvd
US 40	Southwest Blvd	W Delaware Ave	West	Fair	1,338	ADA ramps at Southwest Blvd, W Flower St, and W Delaware Ave. Variable sidewalk quality.
US 40	Southeast Blvd	E Delaware Ave	East	Fair	1,340	ADA ramps at Southeast Blvd, E Flower St, and E Delaware Ave. Variable sidewalk quality.
Williams Ave	Mid-block	Southwest Ave	South	Good	180	Ends at church property line. Minor damage from tree roots.
N Willow St	Park Ave	Mid-block (Northwest Blvd)	West	Fair	267	In front of one residential property, connects to sidewalk on Park Ave

Source: Cross County Connection TMA Fieldwork, November 2014

Map 3: Sidewalk Location and Condition within Buena Borough



South Central Avenue (Northwest Boulevard to Wheat Road): South Central Avenue is the primary north-south roadway in Buena Borough and functions as Minotola's main street. Cleary Middle School, the Buena Borough Municipal Building, the Minotola Post Office, and other destinations are located along this roadway. Sidewalks are present on both sides of South Central Avenue throughout the majority of Minotola (from the Municipal Building to Wheat Road). These sidewalks act as the primary north-south travel corridor for pedestrians. They also connect to sidewalks on adjacent residential roadways, including West Atlantic Avenue, East Atlantic Avenue, Pacific Avenue, East Pacific Avenue, and Jonas Avenue.



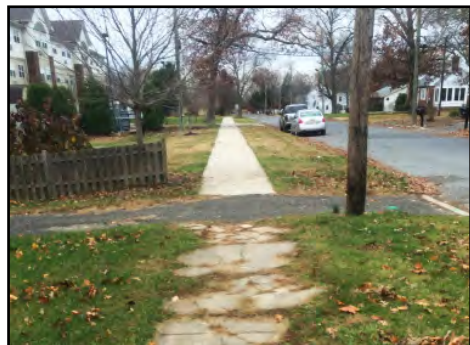
South Central Avenue sidewalks

South Central Avenue (Forest Grove Road to Weymouth Road/US 40): Sidewalks were installed on South Central Avenue with the construction of six single-family residential homes on the east side of the roadway. This is the only segment of sidewalk on South Central Avenue north of the Buena Borough Municipal Building. The sidewalks along this 0.2 mile segment are in good condition, but they are isolated from the rest of the Borough's pedestrian network.



Isolated South Central Avenue sidewalks

Pacific Avenue, Southwest Avenue, and West Arctic Avenue: Sidewalks were constructed with the development of Buena Gardens, a senior housing development in Minotola. These sidewalks facilitate pedestrian travel around the facility, and would connect with the sidewalk network on South Central Avenue with the exception of a small gap which prevents this connection. The sidewalks immediately around the development are in good condition; however, the condition of those around neighboring properties varies greatly.



Sidewalk in varying condition on West Arctic Avenue

South Boulevard: Sidewalks exist on the southern side of South Boulevard from South Willow Street to Harding Highway (US 40). This sidewalk runs parallel to the Buena Bike Path and may be a more convenient option for pedestrians walking from the southern side of the railroad tracks, since there are no access points to the bike path from South Boulevard on the west side of Harding Highway. This sidewalk, however, ends just west of South Willow Street and therefore does not connect to the sidewalks on South Central Avenue or the Buena Municipal Building. ADA compliant curb ramps exist at several intersections



Sidewalk with ADA-compliant curb ramps on W. South Boulevard

throughout the corridor but are absent at others.

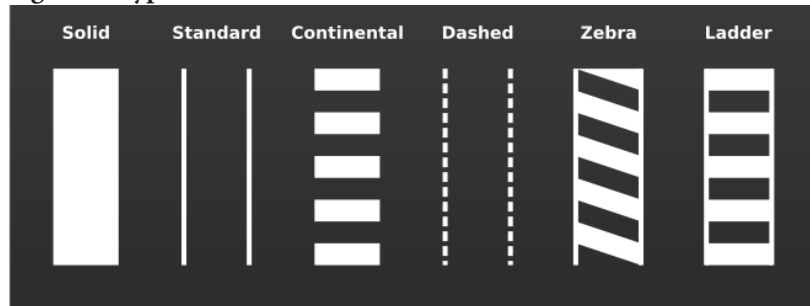
US 40 (Forest Grove Road to Flower Street): US 40 contains sidewalks on both sides of the roadway from Forest Grove Road to Flower Street. With the exception of a gap in the sidewalk network on the median that contains the Buena Bike Path and the railroad right-of-way, this segment of sidewalk would stretch nearly 0.5 mile through the heart of the Borough. The sidewalks along this segment are in varying condition, ranging from fair to good.



Marked Crosswalks

Marked crosswalks designate preferred locations for pedestrians to cross the roadway and designate right-of-way where vehicles should yield to pedestrians. They should be placed where it is anticipated there will be frequent interactions between pedestrians and vehicle traffic. There are various acceptable types of marked crosswalks that are shown in Figure 1.

Figure 1: Types of Marked Crosswalks



The term Americans with Disabilities Act (ADA) compliant curb ramps will be mentioned throughout the sections of this study addressing pedestrian infrastructure. A brief explanation of what ADA compliant curb ramps are and how they benefit the community is warranted.

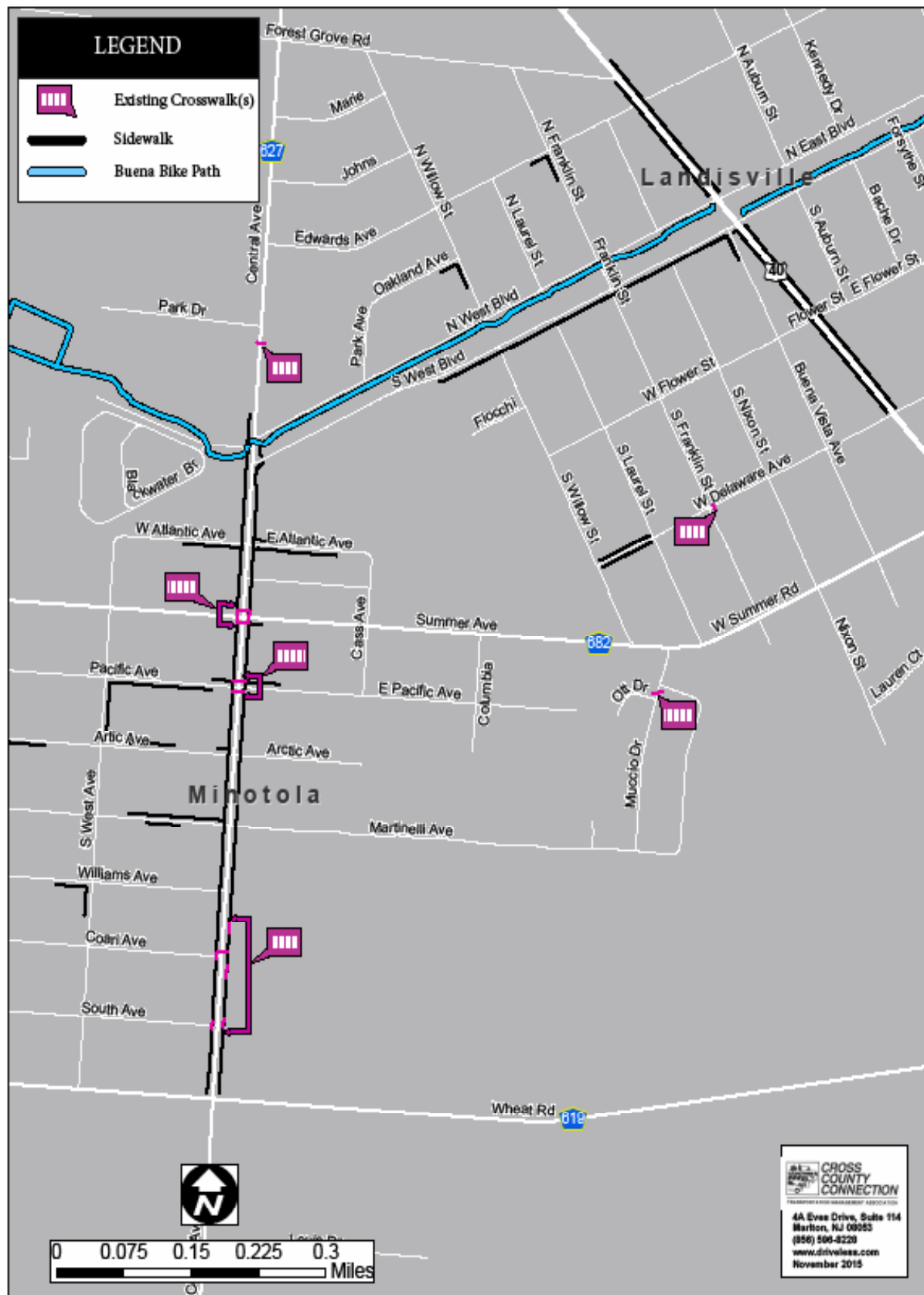
ADA compliant curb ramps are designed to allow persons with disabilities to safely transition between a curbed sidewalk and a roadway. They are built to accommodate the mobility needs of vulnerable populations, who may have difficulty in mounting a curb. ADA compliant curb ramps can safely accommodate personal mobility devices such as wheelchairs, scooters, walkers, etc. They are also equipped with tactile warnings to notify vision impaired individuals that they are entering a roadway. Standard practice is to provide tiles or pavers, equipped with truncated domes, the width of the ramp. If no ramp is provided, persons with disabilities would either be unable to make trips that many able bodied individuals take for granted, or be forced to take a more dangerous path, traveling in the roadway exposed to motor vehicle traffic. Recognizing this, Title II of the ADA requires local governments to provide curb ramps at pedestrian crossings and public transportation stops where walkways intersect a curb.

To comply with ADA requirements, the curb ramps must meet specific standards for width, slope, cross slope, placement, and other features, such as the tactile warnings mentioned above. These features and more information on ADA requirements in general, can be found at www.ada.gov. A common treatment found in Buena, and elsewhere, is to provide diagonal curb ramps at intersections. This is not a violation of ADA requirements, but is often not ideal in accommodating the needs of populations with vision impairment. Often, these types of ramps are aligned to guide users into the middle of an intersection, and potentially into the path of traffic, rather than towards the crosswalk. This type of treatment should only be considered when other options are not feasible. Buena Borough's engineer should ensure that ADA-compliant curb ramps are installed when planned sidewalk and/or intersection improvements are implemented and, if possible, ensure the ramps are properly positioned to safely guide persons with disabilities to the safest part of a roadway crossing.

Crosswalk Locations

The location of Buena Borough's crosswalks are shown in Map 4. Specific details on the location, type and condition of the Borough's crosswalks, including the presence of ADA compliant curb

Map 4: Crosswalk Location within Buena Borough



ramps, are provided in Table 2.

Table 2: Landisville and Minotola Crosswalk Inventory

Intersection	Type	Curb Ramps	ADA	Condition	Notes
S Central Ave & Summer Rd	Continental	Yes	Yes	Good	North side
S Central Ave & Summer Rd	Continental	Yes	Yes	Good	South side
Summer Rd & South Central Ave	Standard	Yes	Yes	Fair	West side
Summer Rd & South Central Ave	Standard	Yes	Yes	Fair	East side
S Central Ave (Mid-block)	Ladder	Yes	No	Fair	In front of Notre Dame Regional, pedestrian crossing sign is damaged
S Central Ave & Pacific Ave	Ladder	Yes	No	Poor	North side, faded crosswalk
S Central Ave & Pacific Ave	Ladder	Yes	No	Poor	South side, faded crosswalk
S Central Ave & Coari Ave	Ladder	Yes/No	No	Good	Curb ramp only on west side
Coari Ave & S Central Ave	Standard	Yes	No	Good	West side of S Central
South Ave & S Central Ave	Standard	Yes	No	Good	West side of S Central
Cleary School Driveway	Zebra	Yes	No	Fair	Northern driveway
Cleary School Driveway	Zebra	Yes	No	Poor	Central driveway
Cleary School Driveway	Zebra	Yes	Yes	Fair	Southern Driveway
Mucio St & Martinelli Ave	Ladder	No	No	Good	No sidewalks or curb cuts
Delaware Ave & S Franklin St	Continental	No	No	Poor	No sidewalks

Source: Cross County Connection TMA Fieldwork, November 2014

South Central Avenue & Summer Avenue (CR 682): Crosswalks and curb ramps exist at all four corners of the intersection of South Central Avenue and Summer Avenue. This intersection is a two-way stop, with vehicles traveling on Summer Avenue stopping for through traffic on South Central Avenue.



High-visibility continental crosswalks facilitate pedestrian travel across South Central Avenue, while standard crosswalks transect Summer Avenue. These crosswalks were strategically placed, as South Central Avenue is the major north-south corridor in Minotola and Summer Avenue is the only east-west roadway that connects Minotola to Landisville. These crosswalks provide access to sidewalks on South Central Avenue and a small segment of sidewalk on the southeast side of Summer Avenue.

South Central Avenue & Pacific Avenue: Ladder crosswalks are provided to facilitate pedestrian travel across South Central Avenue at the intersection with Pacific Avenue.



Painted curb ramps are installed on all four corners of this unsignalized intersection; however, none are ADA-compliant. These crosswalks are very faded and connect two segments of sidewalk on the north side of Pacific Avenue.

South Central Avenue & Coari Avenue: A ladder-style crosswalk connects the sidewalks on the east side of South Central Avenue with those on the west at the intersection of Coari Avenue. This is an unsignalized intersection, with traffic on Coari Avenue yielding to vehicles traveling along South Central Avenue. This crosswalk is in good condition but was painted on an angle, which increases the distance that a pedestrian must travel to cross the roadway. The angled crosswalk also limits the effectiveness of the ADA curb ramp. The ramp is at an offset angle from the crosswalk, which would guide visually impaired pedestrians to cross the street outside the crosswalk. Additionally, there is no ramp on the Cleary School side of the street, limiting the ability of disabled pedestrians to mount the curb. This is significant because this crosswalk provides the only opportunity to cross South Central Avenue to access the Cleary School.



Ladder crosswalk on South Central Avenue and traditional crosswalk on Coari Avenue



Faded zebra crosswalk at entrance to Cleary School

Cleary School Driveways: The Cleary School features three driveways along South Central Avenue. Narrow zebra-style crosswalks are painted across each driveway to connect the sidewalks on the east side of South Central Avenue to facilitate north-south travel. Each crosswalk is in varying condition, but all are generally fading.

South Central Avenue at Notre Dame Regional School: A ladder-style crosswalk exists at the entrance to the former site of Notre Dame Regional School. Notre Dame was closed in 2012 and the building currently remains unoccupied. This is the only marked crosswalk on South Central Avenue north of Summer Avenue in the study area. This facility provides access to Bruno Melini Park; however, there are no sidewalks on either side of this portion of South Central Avenue to access the crosswalk. This crosswalk was intended for students traveling to or from Notre Dame Regional School students and/or crossing the street to access the park. The top part of the pedestrian crossing sign is missing, and the crosswalk paint is fading.



Ladder crosswalk and part of a pedestrian crossing sign on South Central Avenue at the Notre Dame Regional School

South Brewster Road & Buena Bike Path: The Buena Bike Path, a two-mile multi-use trail that traverses the Borough, intersects South Brewster Road at a mid-block location. A



Continental crosswalk on South Brewster Road to facilitate travel on the bike path

continental crosswalk is provided at this crossing, as well as signage and bicycle crossing pavement markings. As shown in the photo, a stop sign and stop bar for bicyclists has been installed at this location to ensure that bicyclists stop before crossing the 50 mph roadway.

West Delaware Avenue & South Franklin Street: A faded continental crosswalk is located at the intersection of West Delaware Avenue and South Franklin Street in a residential neighborhood in Landisville. This facility is one of two crosswalks on predominantly low-volume residential roadways in the Borough. The crosswalk provides a means to cross West Delaware Avenue on the west side of South Franklin Street, but does not connect to sidewalks or feature curb ramps on either side of the street.



Continental crosswalk on West Delaware Avenue in Landisville

Muccio Drive & Martinelli Avenue/Ott Drive: In this residential neighborhood south of Summer Street, a ladder-style crosswalk provides a means to cross Muccio Drive near the intersections with Martinelli Avenue and Ott Drive. The crosswalk is in good condition, and a pedestrian crossing sign is located on the east side of Muccio Drive; however, sidewalks are not located on either side of the roadway.



Ladder crosswalk with pedestrian crossing sign on Muccio Drive

Bikeways

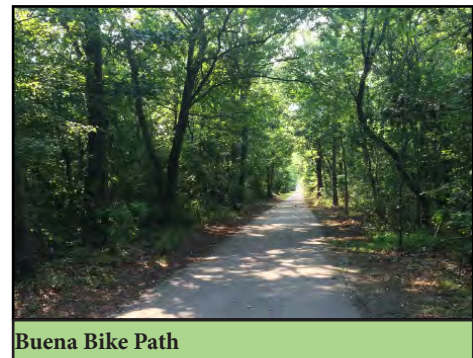
Buena Borough's bikeway network consists of two facilities detailed below in Table 3, and shown on Map 5.

Table 3: Landisville and Minotola Bikeways Inventory

Bikeway	Type	Class	Length (mi)	Notes
Buena Bike Path	Off-Road	Trail	2.33	Franklin Twp border to South Clara Street
South Boulevard Bike Lanes	On-Road	Bike Lane	0.45	South Clara Street to East Weymouth Road

Source: Cross County Connection TMA Fieldwork, November 2014

Buena Bike Path: The Buena Bike Path is a two-mile multi-use trail that functions as the backbone of Buena's bicycle network. This facility provides an east-west bicycle and pedestrian travel corridor throughout a large portion of the Borough, connecting Landisville with many important destinations in Minolta. The trail parallels a rail right-of-way in Landisville, adjacent to North and South Boulevards. Heading west, the trail travels by the Buena Borough Municipal Building and through Bruno Melini Park, where it then occupies the right-of-way of a former rail line in the wooded area in the western part of the Borough. The Buena Bike Path terminates on two large



Buena Bike Path

Map 5: Bikeways within Buena Borough



parcels of land owned by the Borough near the border of Franklin Township in Gloucester County. The trail connects to the bicycle lanes on South Avenue at the eastern terminus of the path.

Buena Bike Path Access Points

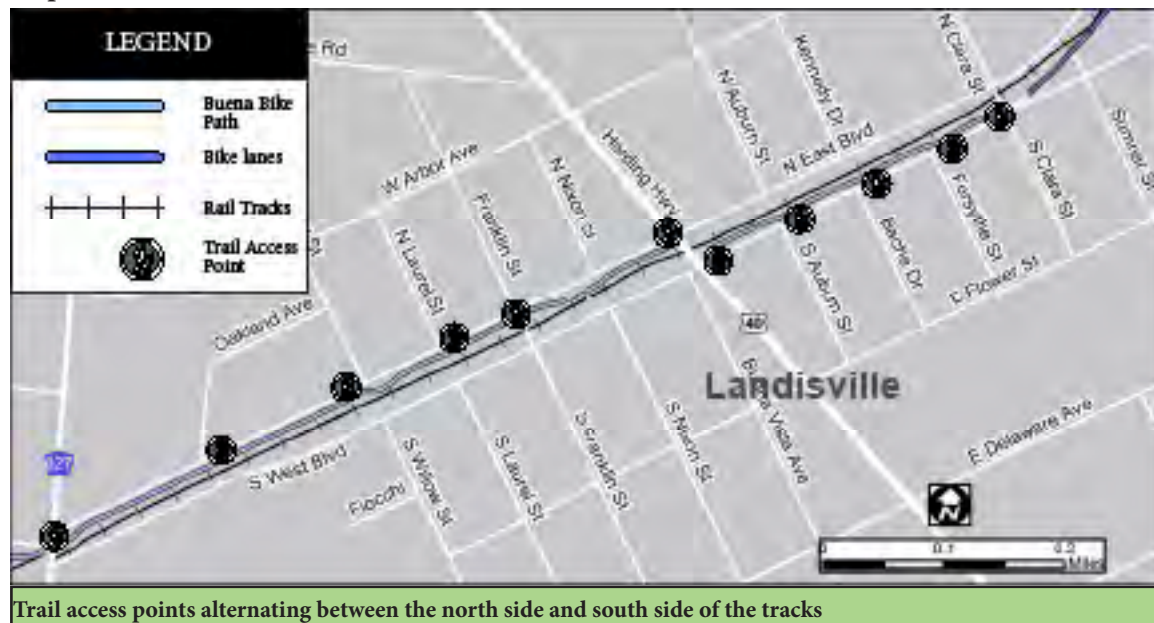
The steering committee cited trail access as a primary concern during the study process. The trail runs parallel to rail tracks, switching sides as it crosses US 40. West of US 40 the trail runs to the north of the tracks along North Boulevard. East of US 40 the trail runs south of the tracks along South Boulevard. The tracks create a barrier for those attempting to access the trail from the opposite side of the tracks. Currently, there are 13 trail access points along the Buena Bike Path. These are shown on Map 6. Moving from the west to east they are:

- | | |
|--|--|
| 1. Brewster Road | 9. South Boulevard at US 40
(from south side of tracks only) |
| 2. Bruno Melini Park | 10. South Boulevard at South Auburn
Street (from south side of tracks only) |
| 3. South Central Avenue | 11. South Boulevard at Bache Drive
(from south side of tracks only) |
| 4. North Boulevard at Oakland Street
(from north side of tracks only) | 12. South Boulevard at Forsythe Street
(from south side of tracks only) |
| 5. North Boulevard at Willow Street
(from north side of tracks only) | 13. South Boulevard at South Clara Street. |
| 6. North Boulevard at Northwest Street
(from north side of tracks only) | |
| 7. North Boulevard at Franklin Street | |
| 8. North Boulevard at US 40
(from north side of tracks only) | |



Segment of Buena Bike Path between South-east Boulevard and the rail tracks

Map 6: Buena Bike Path Trail Access Points in Landisville



Trail access points alternating between the north side and south side of the tracks

South Boulevard Bicycle Lanes: Bicycle lanes are installed on South Boulevard at the eastern end of the Buena Bike Path. These traditional bicycle lanes extend the Borough's bicycle network nearly 0.5 miles from South Clara Street to East Weymouth Road (CR 690).



Bicycle lanes on South Boulevard

CHAPTER 3: METHODS & NETWORK ANALYSIS

Several analyses were conducted to develop recommendations for Buena's bicycle and pedestrian transportation network, including an examination of bicycle and pedestrian collisions, mapping of pedestrian network gaps, the development of a bicycle level of stress model, examining trip attractors and generators, and qualitative input from the Buena Borough staff and elected officials. These analyses were informed by data collected in the field utilizing GPS technology, as well as from existing databases and geospatial resources.

Attractors and Generators

Several destinations throughout Buena Borough were identified as places that bicyclists and pedestrians may desire to travel. Trip generators are areas of relatively high residential density, or areas where residents may be more dependent on transportation options other than their personal automobile. Trip attractors are places within the community where bicyclists and pedestrians will desire to travel.

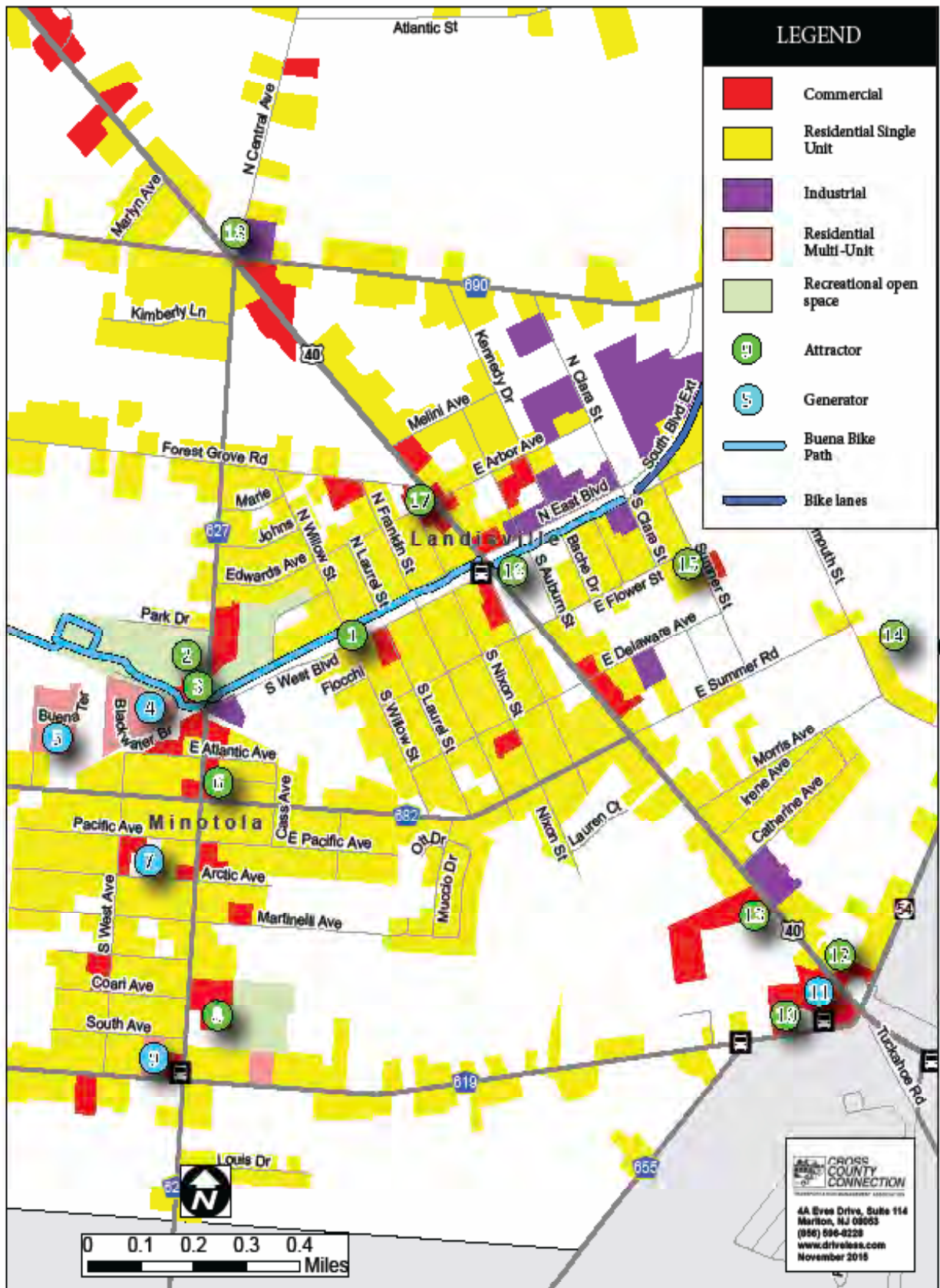
Trip attractors and generators were identified through input from Buena staff and elected officials that served as advisors during the study process and an analysis of Buena Borough's land use characteristics. Parks, commercial, residential and industrial properties were mapped to identify corridors where one should anticipate a relatively high number of trips within Buena. Table 4 lists the specific attractors and generators that were identified. These attractors and generators are shown in Map 7, along with the land uses within Buena Borough that are often associated with generating and attracting trips.

Based on an evaluation of Map 7, clusters of attractors and generators emerge in the primary residential and commercial areas in Buena Borough. These destinations are of prime importance when prioritizing Buena's bicycle and pedestrian improvements. Enhancing access to these destinations will be considered throughout the remaining analyses of Buena Borough's existing conditions, and when developing the recommendations found in Chapter 4.

Table 4: Buena Borough Trip Attractor and Generators

ID#	Location	Type
1	Buena Bike Path	Attractor
2	Bruno Melini Park	Attractor
3	Buena Borough Municipal Building	Attractor
4	Parkview Gardens Apartments	Generator
5	Buena Terrace Apartments	Generator
6	Minotola Post Office	Attractor
7	Buena Gardens Senior Apartments	Generator
8	Cleary Middle School	Attractor
9	Wheat Manor Apartments	Generator
10	Dollar General	Attractor
11	Budget Lodge	Generator
12	Wawa	Attractor
13	Family Dollar	Attractor
14	Buena MUA	Attractor
15	Spanish Community Center	Generator
16	Landisville Post Office	Attractor
17	Volunteer Fire Department	Attractor
18	Saint Padre Pio Shrine	Attractor

Map 7: Destinations within Buena Borough



Crash Analysis

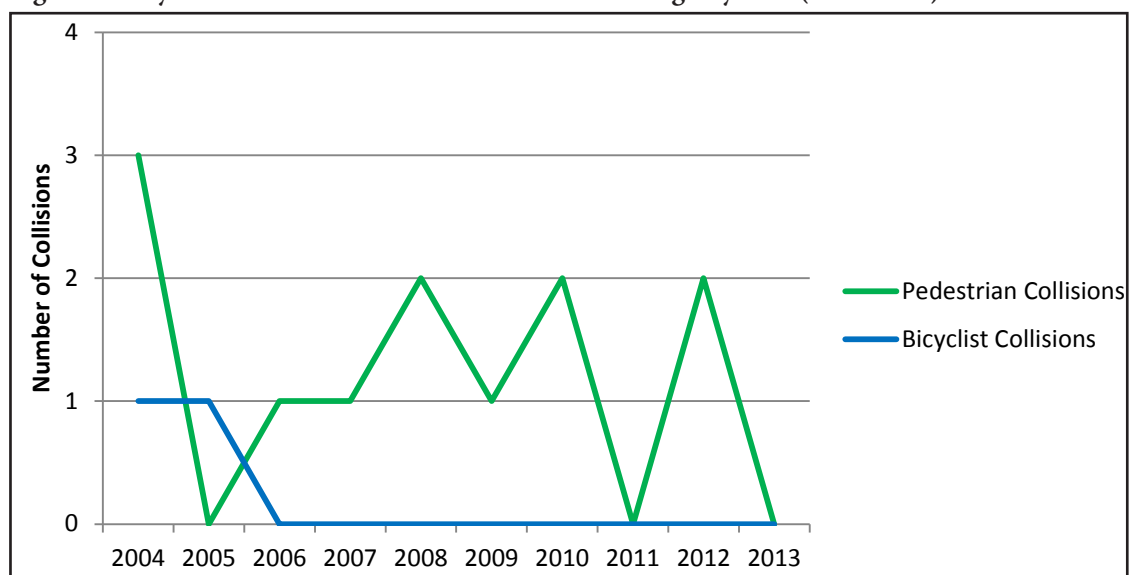
A crash analysis was conducted to examine trends in accidents that involved pedestrians and bicyclists in Buena Borough. The crash data is retrieved from the Plan4Safety crash database maintained by the Transportation Safety Research Center (TSRC) at Rutgers Center of Advanced Infrastructure and Transportation (CAIT). Police crash investigation reports are collected through a federally mandated process to create the database. This crash data does have its limitations. For one, not all crashes involving a bicyclist will be reported. Some crashes involving a bicyclist or pedestrian may be relatively minor and go unreported to police. Further, when police are notified a crash is only reportable on reports submitted to the state if it causes injury or property damage in excess of \$500. Another limitation is the thoroughness of the police crash investigation reports. Reports are often incomplete and have null or unknown values. Regardless, the Plan4Safety database is a valuable tool to effectively identify serious bicycle safety concerns.

Bicycle and pedestrian crash data from 2004 to 2013 was collected to conduct this analysis. The crashes identified here are those where a vehicle struck either a bicyclist or a pedestrian and do not include crashes where a bicyclist may have struck another object, or a pedestrian. These types of crashes are more difficult to account for since they are often unreported. A ten-year period was selected, as opposed to a smaller time-frame, because of the a relatively few number of bicycle and pedestrian crashes that occurred in Buena Borough.

Time Series

Between 2004 and 2013, two bicycle and twelve pedestrian crashes with a vehicle occurred in Buena Borough. As shown in Figure 2, a bicycle crash has not occurred in Buena since 2005. Though, without clearer data on the number of people biking in the Borough during this time, it is difficult to determine if this is based on there being a safer environment for bicyclists since that time. The lack of crashes could be explained by an overall lack of bicycling in the community. The number of crashes involving pedestrians fluctuated during the ten-year period. The highest number of crashes

Figure 2: Bicycle and Pedestrian Crashes in Buena Borough by Year (2004-2013)



Source: Plan4Safety

(3) occurred in 2004, while zero crashes occurred in 2005, 2011, and 2013.

Crash Severity

There were no fatal bicycle or pedestrian crashes in Buena Borough throughout the ten-year analysis period. While crashes involving bicyclists were relatively minor, as shown in Table 5, seven of twelve pedestrian crashes resulted in incapacitating or moderate injuries.

Table 5: Bicycle and Pedestrian Crashes in Buena Borough by Severity (2004-2013)

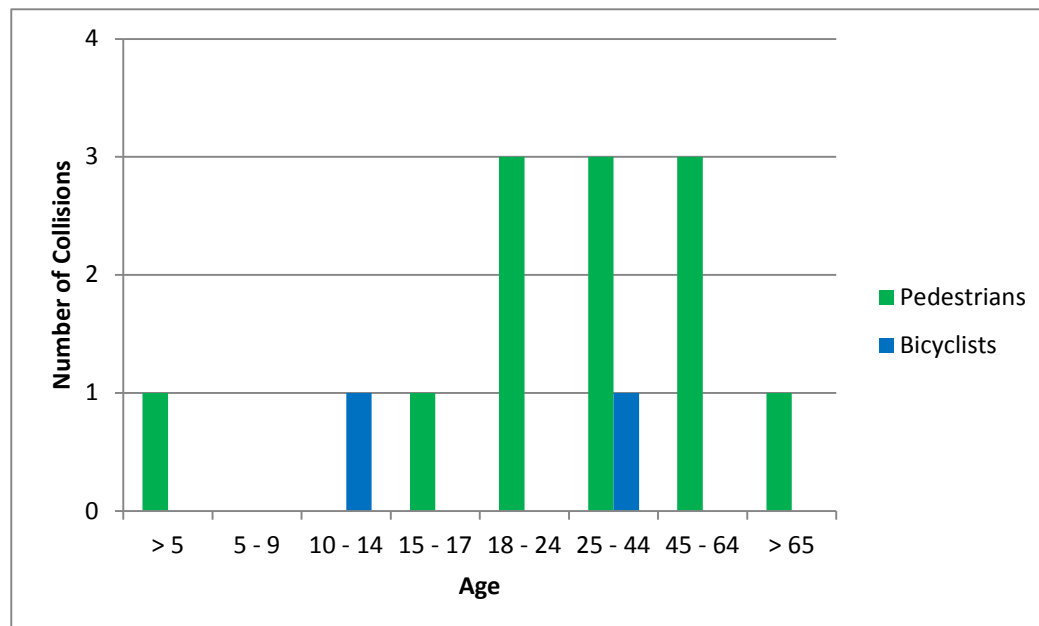
Crash Type	Fatal	Incapacitating Injury	Moderate Injury	Pain	Property Damage Only	Grand Total
Pedestrian	0	2	5	5	0	12
Bicyclist	0	0	0	2	0	2
Grand Total	0	2	5	7	0	14

Source: Plan4Safety

Demographics

Crashes involving bicyclists and pedestrians involved a higher percentage of males than females. In the majority of crashes involving pedestrians (83%), the pedestrian was male, while all bicycle crashes involved males. As shown in Figure 3, nine of twelve of pedestrian crashes involved adults between the ages of 18 and 64; however, individuals of all ages were involved in crashes, including one adult over the age of sixty-five and a child under the age of five.

Figure 3: Bicycle and Pedestrian Crashes in Buena Borough by Age (2004-2013)



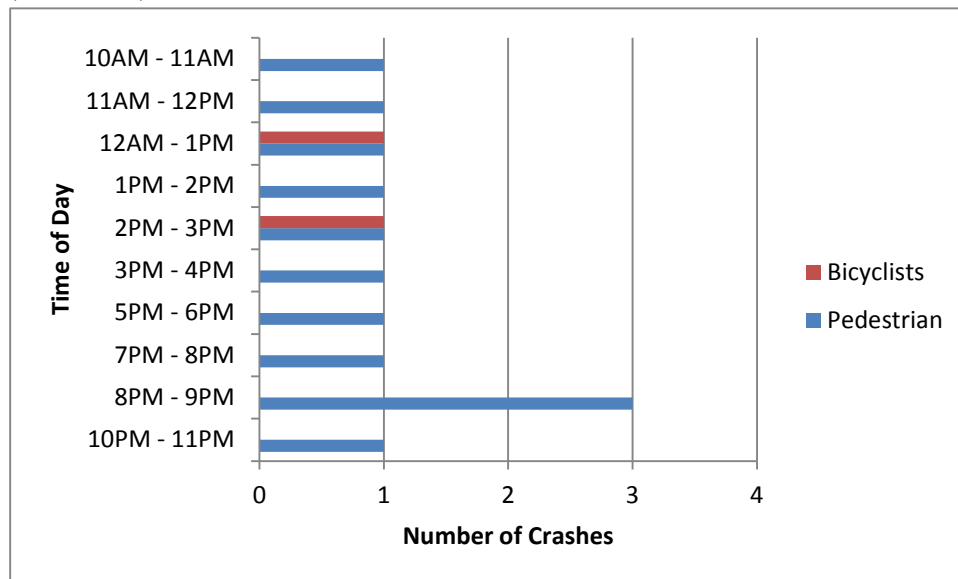
Source: Plan4Safety

Environmental Factors

Between 2004 and 2013, the majority of pedestrian crashes (7) and both bicyclist crashes (2) occurred during daylight hours. Figure 4 demonstrates that these crashes were generally evenly

distributed throughout the day, with the exception of a cluster of pedestrian crashes occurring between 8pm and 9pm. Crashes also tended to occur in the warm summer months, with a total of four crashes occurring in June and July, as well as in December, when three pedestrian crashes occurred over the ten-year period.

Figure 4: Bicycle and Pedestrian Crashes in Buena Borough by Time of Day (2004-2013)



Source: Plan4Safety

Crash Circumstances

Crash reports identify contributing circumstances for the motorists, as well as contributing factors for pedestrians and bicyclists involved. The top contributing circumstances for pedestrian crashes were crossing/jaywalking and driver inattention, which is shown in Table 6. Only one contributing circumstance was identified in either bicycle crashes, which was driver inattention, as shown in Table 7. For every crash involving a bicyclist and two crashes involving a pedestrian this field was left blank resulting in "NULL" value.

Table 6: Pedestrian/Bicyclist Contributing Circumstances

Circumstance	Pedestrians	Bicyclists
Crossing / Jaywalking	4	0
NULL	2	2
Other Pedestrian Action	2	0
Crossing at marked Crosswalk (At Intersection)	1	0
Pedestrian Off Road	1	0
Standing/Lying/Kneeling Against Traffic	1	0
Walking/Jogging with Traffic	1	0
Grand Total	12	2

Source: Plan4Safety

Crash reports also identify pre-crash actions for both vehicles and pedestrians/bicyclists. A pre-crash action identifies the specific activity either party was engaged in immediately prior to the crash. The top pedestrian pre-crash action was jaywalking (4), which is consistent with the top contributing circumstance. The top pre-crash vehicle actions were driving straight ahead (10), followed by making a left turn (2). No pre-crash bicyclist actions were recorded in either crash

involving a bicyclist.

Crash Locations

Both crashes involving bicyclists occurred on US 40 in Landisville, which are shown on Map 8. One occurred at the intersection of with South Boulevard, adjacent to the Buena Bike Path, where a motorist hit a bicyclist while making a left-hand turn, and the other incident occurred to the north at the intersection with Melini Avenue, where a motorist was traveling straight and hit an eleven-year old child.

Table 7: Motorist Contributing Circumstances

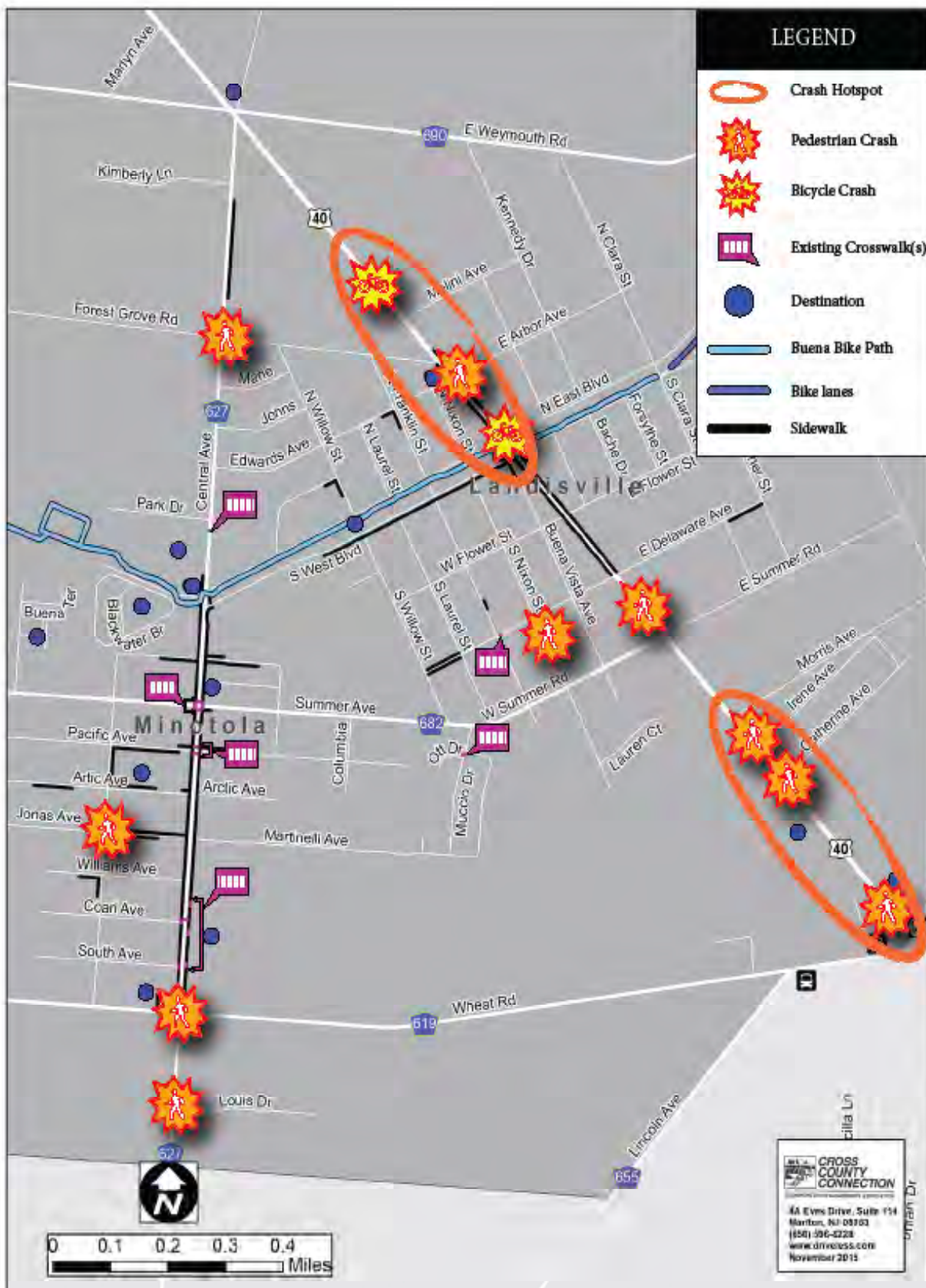
Circumstance	Pedestrians	Bicyclists
Driver Inattention	3	1
None	3	1
NULL	3	0
Obstruction/Debris In Road	1	0
Other Pedestrian Factors	1	0
Unsafe Speed	1	0
Grand Total	12	2

Source: Plan4Safety

Pedestrian crashes in Buena were concentrated along US 40 and South Central Avenue (CR 627). The majority of these crashes occurred at intersections, all of which are not marked with crosswalks. The intersection of US 40 and Catherine Avenue featured the most collisions (2). The only crashes that occurred outside of the US 40 and Central Avenue corridors were located at the intersection of Jonas Avenue and South West Avenue in Minotola and one mid-block crash on South Nixon Street in Landisville.

Based on analysis of Map 8, two locations emerge as crash hot spots due to the presence of three crashes in close vicinity. These hot spots are both located along US 40 within Buena Borough. The first is located at the intersections of North and South Boulevards with US 40, near the Buena Bike Path's crossing of the highway. The second is further south, along a stretch of highway featuring two of the Borough's busier destinations, Family Dollar and Wawa.

Map 8: Bicycle and Pedestrian Crashes within Buena Borough (2004-2013)



Pedestrian Network Gaps

Buena's pedestrian network can be broken into two components - sidewalks and crosswalks. The following analysis will highlight gaps in both components.

Sidewalk Gaps

As discussed in Chapter 2, Buena Borough features sidewalks in many key areas, such as along South Central Avenue and on US 40 in Landisville. The Buena Bike Path also functions effectively as an east-west pedestrian corridor. However, very few residential streets feature sidewalks. Therefore, this sidewalk gap analysis does not solely identify roadways without sidewalks, but rather identifies gaps in the existing network and opportunities to make spot improvements to connect the Borough's existing network, improving opportunities for residents to safely walk to destinations in both Minotola and Landisville.

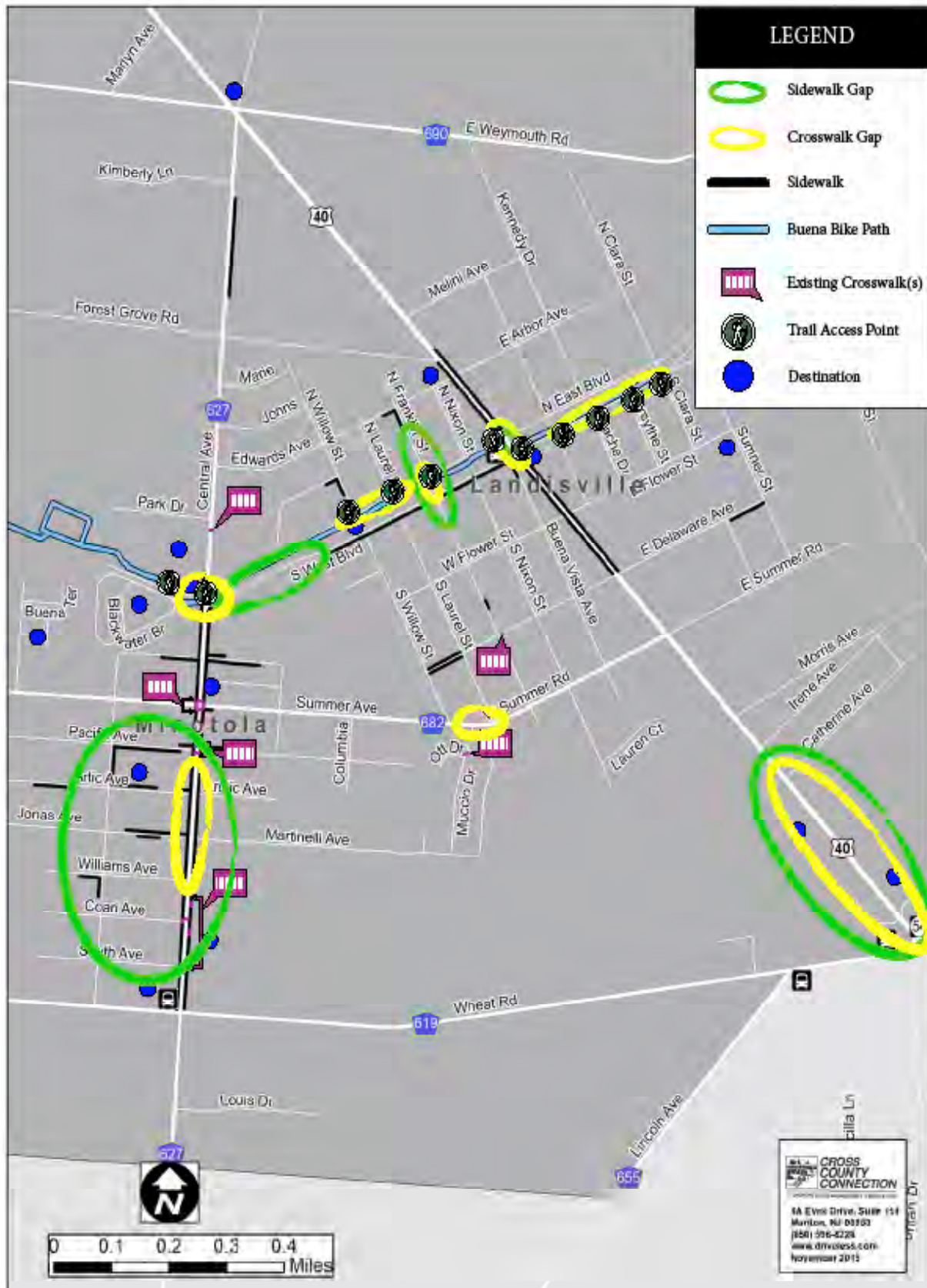
Map 9 displays identified sidewalk gaps. These gaps have been determined based on whether the installation of sidewalks would satisfy any of these important criteria:

- Improve access to the Buena Bike Path
- Create linkages between Landisville and Minotola
- Fill in small gaps in areas that already have a relatively extensive sidewalk network

Crosswalk Gaps

Marked crosswalks serve a critical function within a pedestrian network, providing a safe and visible place for pedestrians to cross a roadway. They should be placed where it is anticipated there will be frequent interactions between pedestrians and vehicle traffic. Many of Buena's marked crosswalks are located along South Central Avenue in Minotola, however, there remains a few gaps where installing additional crosswalks could improve the safety and mobility of the Borough's pedestrians. There are a number of high speed roadways lacking crosswalks, such as US 40, where a majority of Buena's pedestrian crashes have occurred, and Summer Road, a 35 mph county road that creates a barrier between Landisville and Minolta. These, and a few other important areas, where crosswalks can significantly improve pedestrian safety, are also shown in Map 9.

Map 9: Buena Borough's Pedestrian Network Gaps



Bicycle Network Gaps

Bicycle Level of Traffic Stress (LTS)

The Bicycle Level of Traffic Stress (LTS) model classifies roadways based on an individual's comfort level in various bicycling environments. This model relates to a widely used bicyclist classification scheme that groups the general population into four categories based on their attitudes toward bicycling. This classification method has become an accepted industry standard and is widely referred to in bicycle planning documents, literature and academic journals.¹ This categorization is effective because it does not focus solely on those individuals already bicycling regularly, but includes those who would potentially be interested in bicycling more often.

This classification was developed using surveys of the general population of Portland, Oregon, which includes individuals who have no interest in bicycling, as well as people who do not regularly use a bicycle. As shown in Table 8, the majority of the population (60%) is "Interested but Concerned." These individuals are interested in bicycling, but safety concerns limit their bicycle use. These people find situations where they have to interact with traffic uncomfortable, but enjoy bicycling on paths or on quiet streets with low speeds and low traffic volumes. While Buena's population has never been surveyed to determine the portion which falls under the "Interested but Concerned" category, it can be assumed that safety is a primary consideration of many residents. The volume and speed of traffic they would be required to interact with while bicycling would significantly affect their perception of safety and act a primary determinant in whether they choose to bicycle or not.

Table 8: Bicyclists' Classification Categories

Bicyclist Classification	Percentage of Population (Portland, OR)	Description
No Way No How	33%	Individuals who do not currently ride a bicycle nor foresee themselves doing so in the future due to a lack of interest or inability.
Interested but Concerned	60%	Bicyclists who occasionally ride on off-road trails or low-volume neighborhood streets. These are the types of bicyclists who enjoy riding a bicycle on the boardwalk during vacation or taking a leisurely ride in their neighborhood but do not feel safe riding on busy streets and are hesitant to use a bicycle on a regular basis.
Enthusied and Confident	7%	Bicyclists that are comfortable riding on busy street equipped with bicycle lanes or wide shoulders, as well as with traffic on moderately busy streets with low speeds.
Strong and Fearless	< 1%	Bicyclists that are comfortable riding almost anywhere, including busy streets with no bicycle facilities.

In order to create a widely-used bicycle network, facilities should appeal to this large group of "Interested but Concerned" individuals. The Bicycle Level of Traffic Stress model identifies which

¹ Dill, Jennifer & McNeil, Nathan. (2012). Four Types of Cyclists? Examining a Typology to Better Understand Bicycling Behavior and Potential. Retrieved from <http://docs.trb.org/prp/13-5213.pdf>

roadways are currently suitable for these groups of bicyclists based on several variables that measure their comfort level in certain bicycling environments. Variables include speed limits, number of lanes, and the presence of a centerline. The Bicycle Level of Traffic Stress model's roadway classification scheme is shown in Table 9.²

Table 9: Bicycle Level of Traffic Stress Model Classifications

Level of Traffic Stress (LTS)	User Group	Description
LTS 1	Interested but Concerned (little experience)	Lowest stress, suitable for unaccompanied children, attractive for a relaxing bike ride
LTS 2	Interested but Concerned (some experience)	Low traffic stress, suitable for most adult bicyclists
LTS 3	Enthusied and Confident	Higher traffic stress, unacceptable for most people
LTS 4	Strong and Fearless	Highest level of stress, riding with traffic traveling 35mph or more

This study's analysis focuses on the majority of Buena's streets that require bicyclists to mix with traffic. There are just a few simple factors that are evaluated to determine a bicyclist's level of traffic stress on a given roadway. These criteria are: speed limit; number of travel lanes; and the presence of centerlines to separate traffic traveling in opposite directions. The resulting classification scheme, based on these factors, is shown in Figure 5.

Figure 5: Bicycle Level of Traffic Stress Model Classification Criteria

Criteria for Mixed Traffic			
Speed Limit	Street Width		
	2-3 lanes	4-5 lanes	6+ lanes
Up to 25 mph	LTS 1 ^a or 2 ^a	LTS 3	LTS 4
30 mph	LTS 2 ^a or 3 ^a	LTS 4	LTS 4
35+ mph	LTS 4	LTS 4	LTS 4

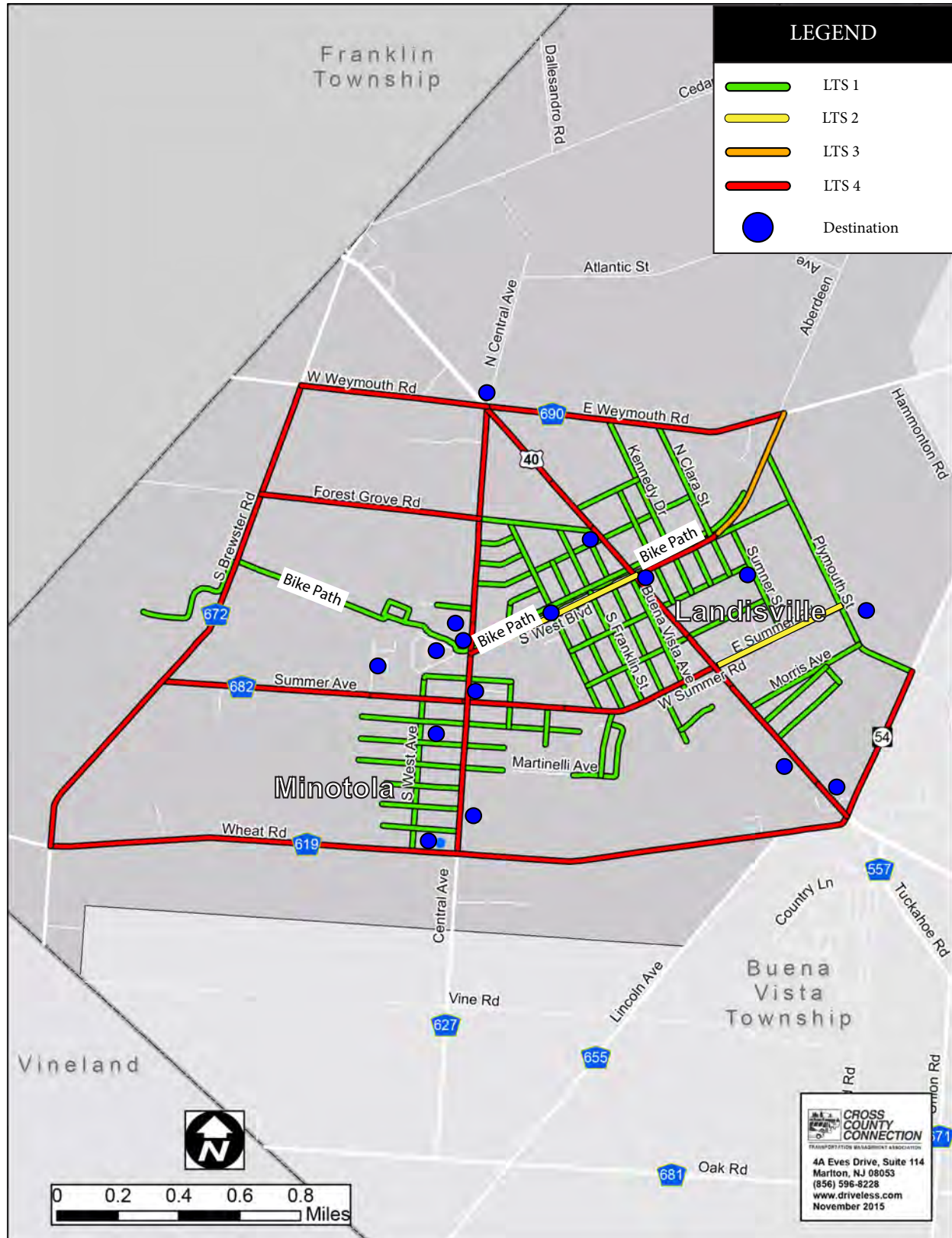
a. Use lower value for streets **without marked centerlines** or classified as residential and with fewer than 3 lanes; use higher value otherwise.

The results of this analysis for Buena's streets are shown in Map 10. This model is useful to identify connections between low-stress streets, as well as those streets that may be in need of improvement to reduce a bicyclist's stress level and make it an inviting place to bicycle. As shown in Map 10, the majority of Landisville and Minotola streets are LTS 1. These roadways are primarily residential and feature low-speeds and low traffic volumes that most bicyclists would find very comfortable.

LTS 4 was the next most common stress level for streets in the study area, which included major travel corridors such as South Central Avenue, US 40, Wheat Road, and Summer Avenue. Riding a bicycle on these roadways would be a stressful, and potentially dangerous, experience for all but the most confident and experienced bicyclists. This is a significant concern, because these high-stress

² This method of analysis has become prominent in the last few years and is largely based upon the research of Peter G. Furth at Northeastern University, <http://www.northeastern.edu/peter.furth/criteria-for-level-of-traffic-stress/>.

Map 10: Buena Borough's Bicycle Level of Traffic Stress (LTS)



roadways bisect Buena, limiting the connectivity of its many LTS 1 roadways and creating a barrier to bicycle travel.

There are just a few LTS 2 roadways in Buena. These are East Summer Road and portions of South Boulevard. The stretch of South Boulevard with bike lanes is an LTS 3 bicycling environment, due to the 35 MPH speed limit. The presence of bike lanes alone do not make a roadway LTS 1, because bicyclists are still riding in close proximity to high speed traffic, with no physical separation. Still, the presence of the bike lanes does provide a dedicated space for bicyclists, creating an LTS 3 bicycling environment on what would otherwise be an LTS 4 roadway. This bikeway may not be ideal for children and inexperienced bicyclists, but it does provide an attractive facility for individuals comfortable riding alongside traffic. In addition, traffic volume is fairly low on South Boulevard, limiting a bicyclist's exposure to traffic stress. If Buena Borough would like to create a more attractive bicycling environment, they could explore the potential to convert these bike lanes into protected bike lanes, fitted with some form of physical separation.



Barriers and other key gaps in the bikeway network are illustrated in Map 11, which shows all roadways except those that received a score of LTS 4. Removing LTS 4 roadways from Map 10 reveals a disconnected network of low stress bikeway islands, where a bicyclist has no low-stress option to travel between destinations located in different parts of the Borough, virtually limiting them to only travel within the island they find themselves stranded on.

The islands roughly show the divide between Minotola and Landisville. The most significant illustration of this divide is that individuals in Minolta have no low stress bicycling options to reach the Buena Bike Path. A bicyclist will encounter a high stress bicycling environment no matter which route they select to reach the path from Minolta. The high stress environment presented by Central and Summer Avenues are a significant barrier that both bicyclists and pedestrians must negotiate when attempting to navigate to a path access point. Focusing on a few key gaps will greatly improve bikeway connections between these two communities and greatly improve trail access for residents in both parts of Buena Borough. The recommendations in Chapter 4 are based on the results of this model and seek to improve bicycle network connectivity from a Level of Stress perspective.

Map 11: Buena Borough's Bikeway Network Gaps



Sites of Opportunity

In addition to examining the strengths and weaknesses of Buena's existing bicycle and pedestrian network, this analysis identified areas of opportunity that may be of interest for future bicycle and pedestrian improvements. These areas, shown in Map 12, are currently underutilized and could provide safe and attractive connections between many Buena Borough's destinations. These sites include:

Buena Terrace Apartments to Bruno Melini Park Cut-Through: To the south of the Buena Bike Path, an informal, unpaved path connects the parking lot of Bruno Melini Park to the back of the Buena Terrace Apartments. This dirt path meanders through trees and features a small downhill slope. Several individuals were observed walking through this path while conducting field work.



Buena Terrace Apartments Cut-Through

Martinelli Avenue: When accessing Martinelli Avenue from South Central Avenue or Muccio Drive, the paved, residential street suddenly becomes an unimproved, dirt road through the woods. This unimproved portion of the roadway occupies the central 0.25 mile segment of Martinelli Avenue. The surrounding undeveloped parcels are privately owned.



Martinelli Avenue

Rail Right-of Ways: The right-of-way of two former rail lines criss-cross at the intersection of South Central Avenue and Southwest Boulevard, directly outside of the Buena Borough Municipal Building. The Buena Bike Path occupies the northeast and northwest spurs of this rail-right-of-way, which are under municipal ownership. The southeast leg of the rail line is interrupted by Summer Avenue, residential development in Landisville, and several industrial land uses, which has left this right-of-way fragmented. The southwest segment, however, remains an uninterrupted corridor for approximately 1.5 miles, until the intersection of Wheat Road (CR 619) and South Brewster Road.



Southwest Spur of the Rail Right-of-Way

Map 12: Opportunities for Expanding Buena Borough's Multi-use Path Network



Identification of Target Areas

The results of each separate analysis are overlayed onto one another in Map 13 to reveal if any patterns emerge. Map 13 illustrates that distinct nodes appear within Buena Borough. In many instances, bikeway and pedestrian network gaps appear in close proximity to one another. In others, crash hotspots are in areas featuring clusters of attractors and generators, but lacking in crosswalks. Additionally, identified opportunities appear in prime locations to serve areas of concern within the Borough.

Map 14 synthesizes these separate analyses and identifies five distinct target areas that will be the focus for the improvements contained in Chapter 4. These Target Areas are:

1. The Buena Bike Path's Crossing of US 40 (Harding Highway)
2. Bruno Melini Park & Buena Borough Municipal Building
3. South Central Avenue & Cleary Middle School
4. Martinelli Avenue and the Intersection of Summer Road (CR 682) & Muccio Drive
5. Intersection of NJ 54 and US 40 (Wawa and Family Dollar)

Analysis Results

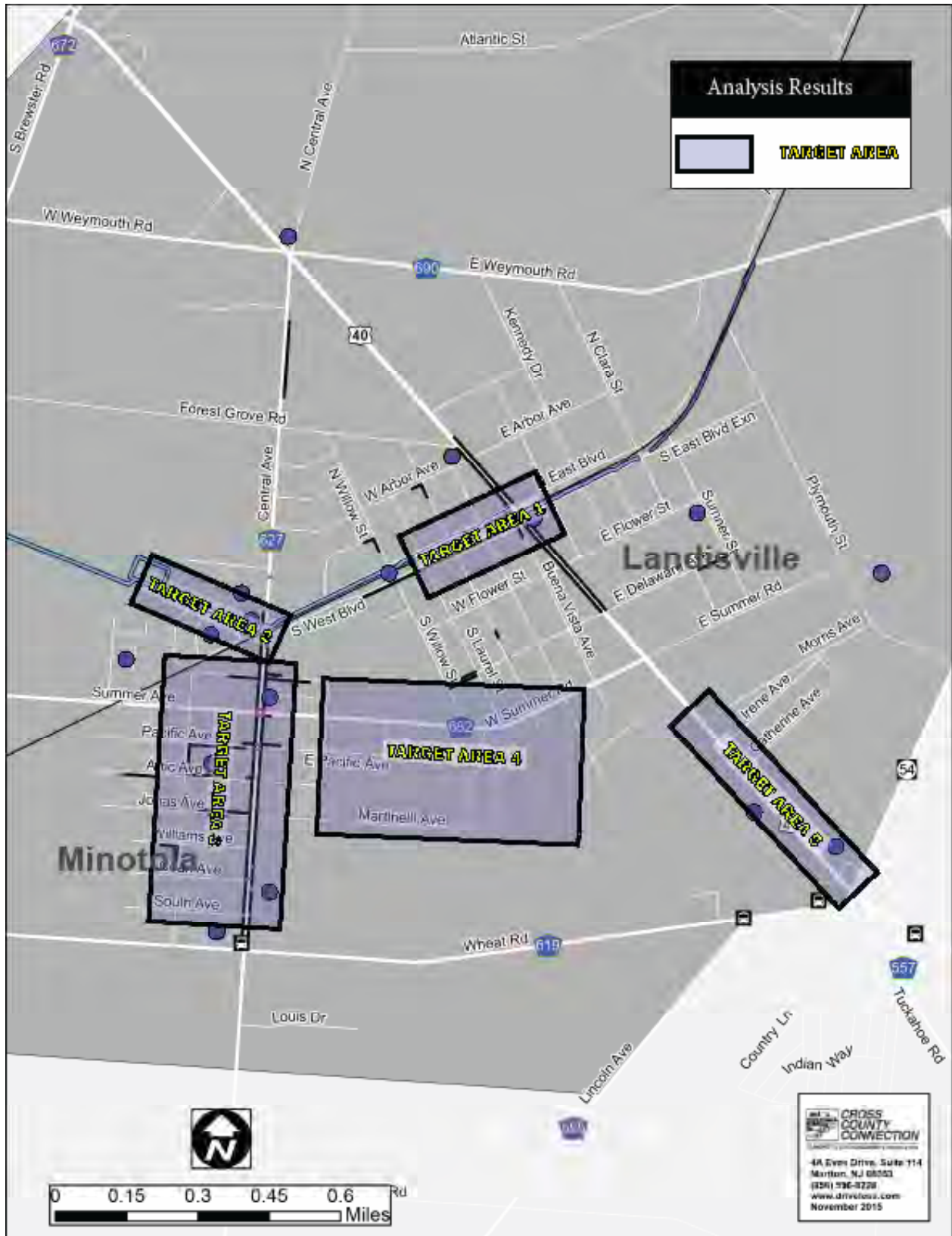
- Crash Hotspot
- Crosswalk Gap
- Sidewalk Gap
- Bike Network Gap
- Opportunity

Map Labels: Landisville, Minotola, Atlantic St, E Weymouth Rd, US-40, US-67, US-69, US-54, US-557, US-619, US-627, US-630, US-632, US-634, US-636, US-638, US-640, US-642, US-644, US-646, US-648, US-650, US-652, US-654, US-656, US-658, US-660, US-662, US-664, US-666, US-668, US-670, US-672, US-674, US-676, US-678, US-680, US-682, US-684, US-686, US-688, US-690, US-692, US-694, US-696, US-698, US-700, US-702, US-704, US-706, US-708, US-710, US-712, US-714, US-716, US-718, US-720, US-722, US-724, US-726, US-728, US-730, US-732, US-734, US-736, US-738, US-740, US-742, US-744, US-746, US-748, US-750, US-752, US-754, US-756, US-758, US-760, US-762, US-764, US-766, US-768, US-770, US-772, US-774, US-776, US-778, US-780, US-782, US-784, US-786, US-788, US-790, US-792, US-794, US-796, US-798, US-800, US-802, US-804, US-806, US-808, US-810, US-812, US-814, US-816, US-818, US-820, US-822, US-824, US-826, US-828, US-830, US-832, US-834, US-836, US-838, US-840, US-842, US-844, US-846, US-848, US-850, US-852, US-854, US-856, US-858, US-860, US-862, US-864, US-866, US-868, US-870, US-872, US-874, US-876, US-878, US-880, US-882, US-884, US-886, US-888, US-890, US-892, US-894, US-896, US-898, US-900, US-902, US-904, US-906, US-908, US-910, US-912, US-914, US-916, US-918, US-920, US-922, US-924, US-926, US-928, US-930, US-932, US-934, US-936, US-938, US-940, US-942, US-944, US-946, US-948, US-950, US-952, US-954, US-956, US-958, US-960, US-962, US-964, US-966, US-968, US-970, US-972, US-974, US-976, US-978, US-980, US-982, US-984, US-986, US-988, US-990, US-992, US-994, US-996, US-998, US-1000.

Scale: 0 0.15 0.3 0.45 0.6 Miles

Contact: CROSS COUNTY CONNECTION, 4A Eves Drive, Suite 114, Minotola, NJ 08053, (609) 596-8228, www.drtireless.com, November 2015

Map 14: Targeted Areas for Recommendations



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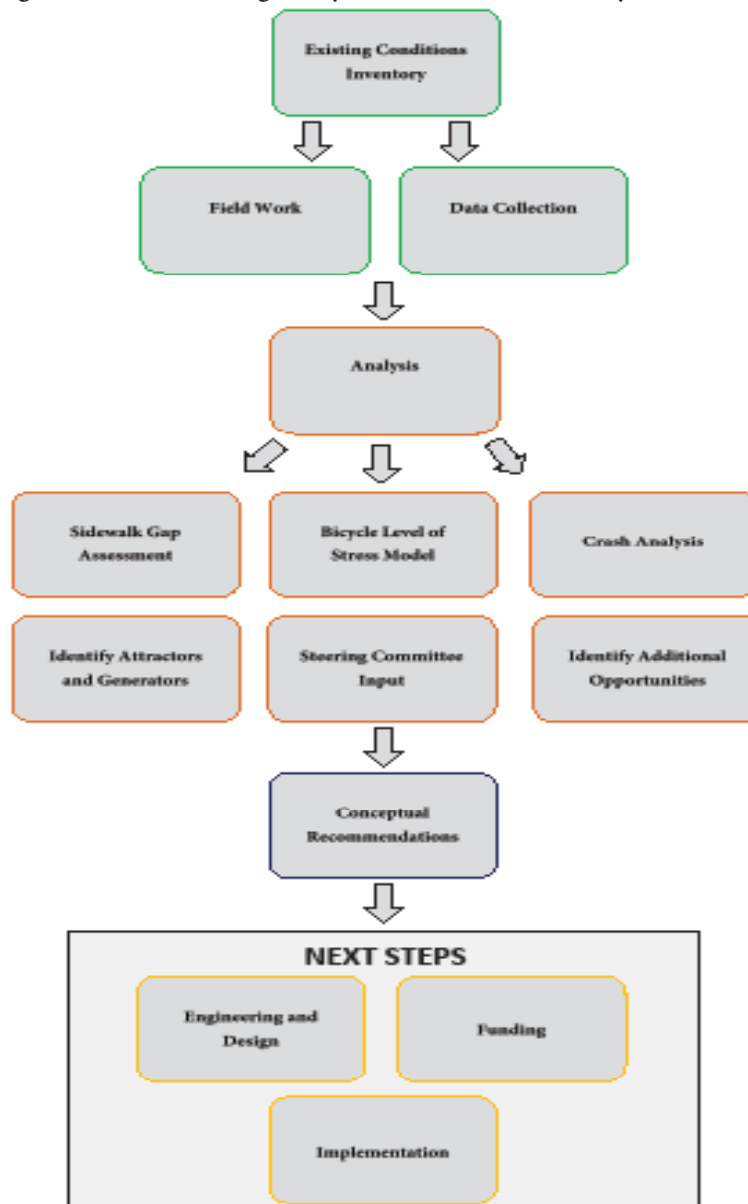
CHAPTER 4: RECOMMENDATIONS

Recommendations are broken down into five target areas identified through a series of analyses.

Methods

Planning recommendations identified in this chapter are based on an assessment of the existing conditions documented in Chapter 2, the bicycle and pedestrian network analysis in Chapter 3, input from the project steering committee, and observations made while conducting field work. These recommendations are intended to enhance bicycle and pedestrian circulation and safety in Buena Borough, but are general and conceptual in nature. Further engineering analysis, concept development, and design is necessary prior to implementation. Figure 6 below further illustrates how these recommendations were developed within the study process, and outlines next steps that are not fully addressed in this study.

Figure 6: Buena Borough Bicycle and Pedestrian Study Process



Target Area 1 - The Buena Bike Path's Crossing of US 40 (Harding Highway)



Target Area 1 encompasses the area around the Buena Bike Path's intersection with US 40. Recommendations address two important intersections that are located in close proximity to one another. The first is the intersection of US 40 (Harding Highway) at North and South Boulevards. The second is the intersection of Franklin Street at North and South Boulevards, located approximately 750 feet to the west. These intersections function as two important access points to the Buena Bike Path within Landisville. The project steering committee cited trail access as a primary concern during the study process.

Recommendations in Target Area 1 address concerns arising from three interrelated issues:

- The path's alignment alongside railroad tracks
- The shifting alignment of the Buena Bike Path to opposite sides of the tracks at its crossing of US 40, a busy state highway
- The lack of bicycle and pedestrian amenities to indicate and provide for a safe crossing of US 40 and indicate preferred path access points

The Buena Bike Path alignment alongside railroad tracks is an issue due to the limited number of track crossings in Landisville and Minotola. There is limited opportunity for bicyclists and pedestrians to access the trail from the opposite side of the tracks without walking over them. This is especially problematic for disabled persons, seniors, and individuals traveling with children in strollers. US 40 and Franklin Street are two of three crossings that provide access from both sides of the tracks. The third, South Central Avenue, will be discussed in Target Areas 2 and 3.

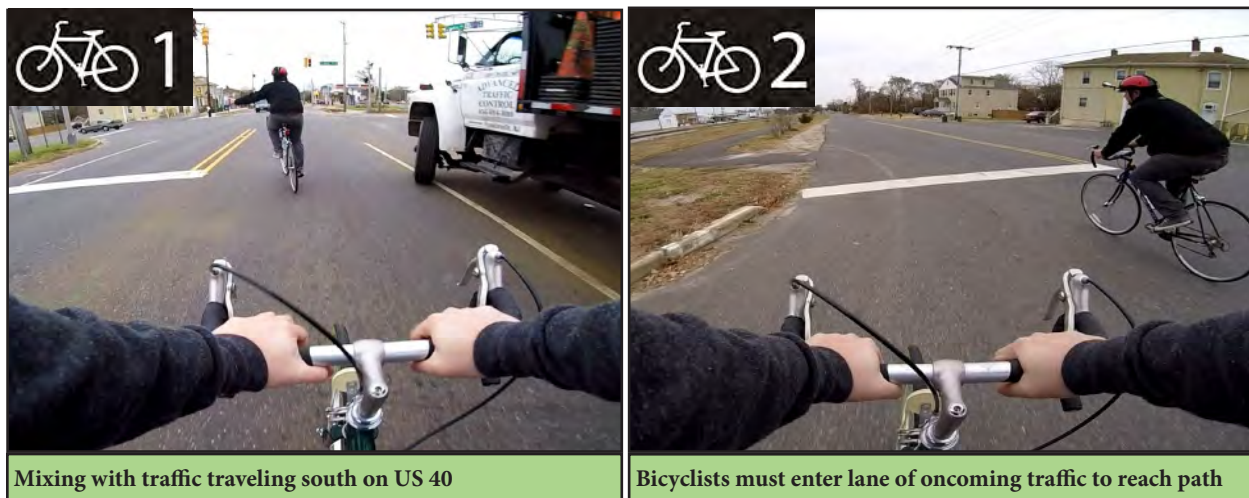
Intersection of US 40 at North and South Boulevards

The Buena Bike Path provides an important bicycle and pedestrian crossing of US 40, a busy state highway. Currently, there is a lack of bicycle and pedestrian accommodations to provide a safe crossing and facilitate path access. Additionally, the path shifts its alignment at US 40, creating

a complicated indirect crossing that exacerbates the danger already present to pedestrians and bicyclists crossing a busy highway with motor vehicle traffic traveling in excess of 35 mph.

ISSUES

- **Trail Crossing:** West of US 40, the Buena Bike Path is on the north side of the railroad tracks. East of US 40 it is on the south side of the tracks. There is no direct way for bicyclists and pedestrians to cross US 40 to continue on the path. For example, a bicyclist approaching from the west, must turn right onto US 40 and ride with traffic before turning left, into oncoming traffic, on South Boulevard. This precarious turning maneuver is depicted in the images below. The image locations are denoted on the graphics on the next page.



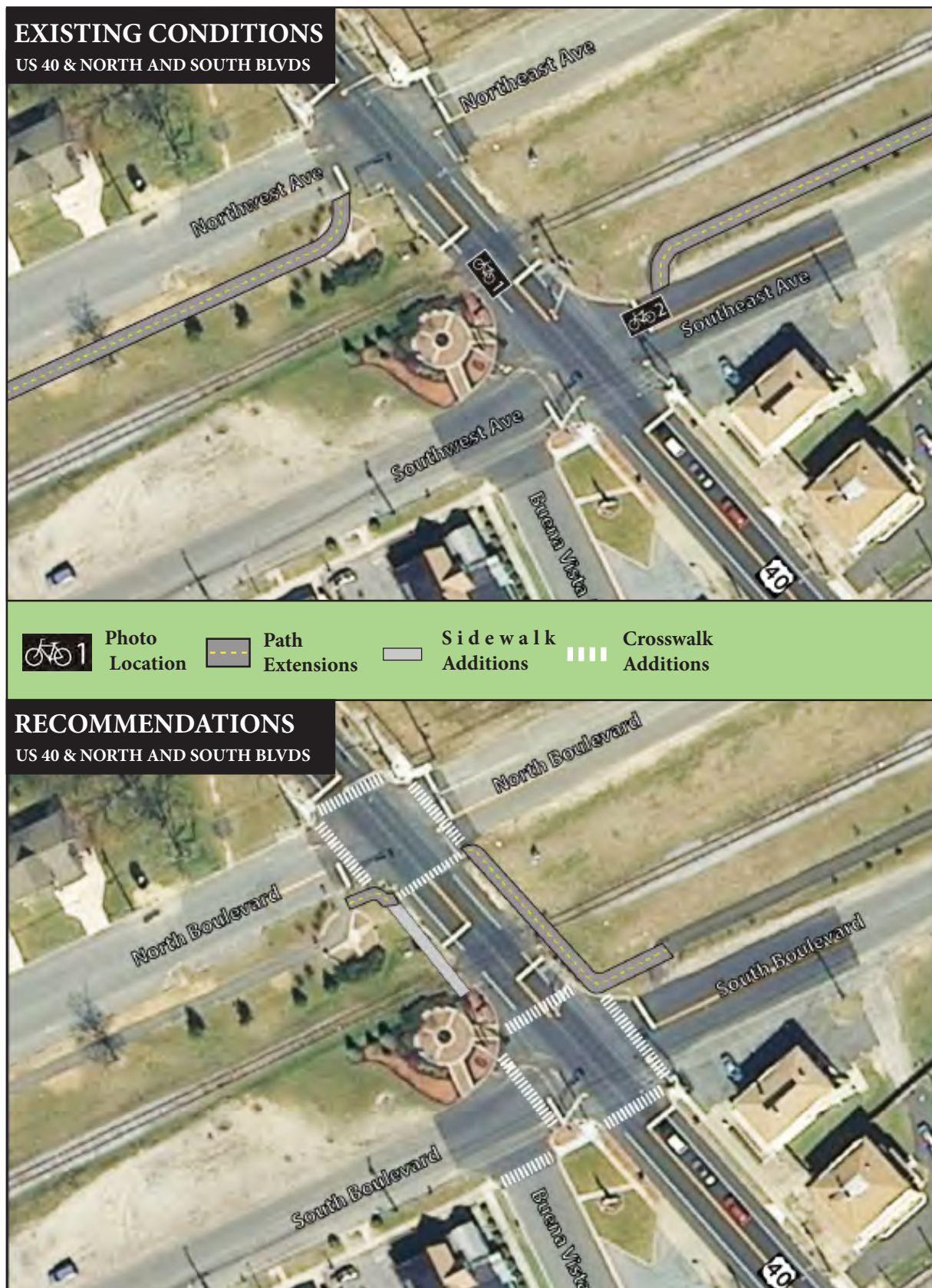
- **Sidewalk Connectivity:** While sidewalks are present on both sides of US 40 to the north and south of the path, there are no sidewalks contained within the right-of-way that contains the Buena Bike Path and the tracks. This is a significant gap in an otherwise contiguous stretch of sidewalk along US 40.
- **Lack of Crosswalks:** There are no crosswalks at this intersection, making it difficult for pedestrian to cross this busy intersection.

RECOMMENDATIONS (Shown in Figure 7)

- **Extend the bike path** to Northeast Avenue on the east side of US 40. This segment would improve crossing US 40 for bicyclists and would function as a sidewalk for pedestrians walking on the east side of South Central Avenue.
- **Install high-visibility crosswalks** at all anticipated crossing locations to enhance visibility of pedestrians and bicyclists while navigating this busy intersection.
- **Install sidewalks and ADA accessible curb ramps** on the west side of South Central Avenue, which would provide safe and convenient pedestrian access to the Buena Bike Path.
- **Contact representatives from NJDOT's Office of Bicycle and Pedestrian Programs** to discuss submitting a problem statement to their Division of Capital Investment Planning and Development. A problem statement will make NJDOT aware of the safety issues present on this state highway.³ South Jersey Transportation Organization (SJTPOT) should also be contacted.

³ For more information on submitting a Problem Statement visit NJDOT's Complete Streets web-page at <http://www.state.nj.us/transportation/eng/completestreets/implementation.shtm>

Figure 7: Recommendations for US 40 at North and South Boulevards



Intersection of Franklin Street at North and South Boulevards

Approximately 750 feet to the west of the intersection of US 40 and North and South Boulevards is the intersection of Franklin Street and North and South Boulevards. This is a key access point to the Buena Bike Path since it is the only low volume/low speed residential street crossing of the railroad tracks between Central Avenue and US 40. As shown previously in Map 11 in Chapter 3, Franklin Street is the only trail crossing, in its current condition, that provides a low stress bicycle connection to the Buena Bike path from both sides of the tracks. Additionally, as shown on Map 2 in Chapter 2, Franklin Street is located in close proximity to some of the longest stretches of high quality sidewalks within the Buena. These conditions make Franklin Street an ideal location for a high visibility access point for trail users coming from both sides of the rail tracks.

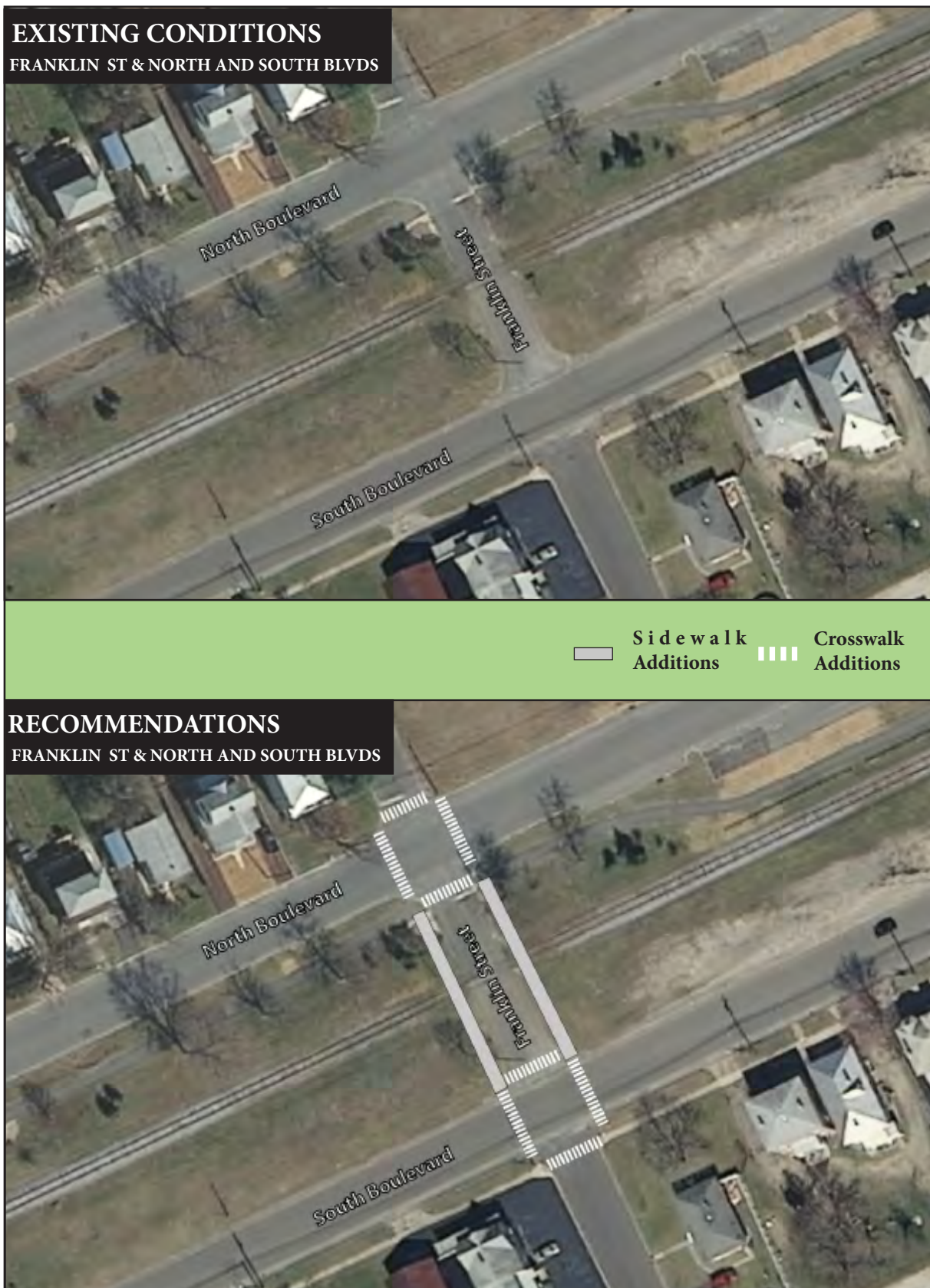
ISSUES

- **Trail Access:** Trail access is difficult for individuals trying to access the trail from South Boulevard due to the rail tracks creating a physical barrier, especially for those individuals with strollers, bicycles and mobility assistance devices.
- **Sidewalk Connectivity:** While sidewalks are present on South Boulevard, the railroad right-of-way divides the sidewalks from the Buena Bike Path, limiting access from to the trail. There is a lack of sidewalks connecting the exiting ones on South Boulevard to the trail. This is a significant gap in an area featuring one of the 's longest stretches of continuous sidewalks.
- **Lack of Crosswalks:** There are no crosswalks at either of the two intersections, making it difficult for pedestrians to cross the intersection and access the trail. Additionally, the lack of crosswalks misses an opportunity to indicate to trail users one of the few trail access points for users on the opposite side of the rail tracks.

RECOMMENDATIONS (Shown in Figure 8)

- **Install sidewalks and ADA accessible curb ramps** on both sides of Franklin Street, between North and South Boulevard. This would enhance connectivity of the pedestrian transportation network and make traveling along this corridor safer for pedestrians.
- **Install high-visibility crosswalks** at all anticipated crossing locations to enhance visibility of pedestrians and bicyclists while navigating this intersection, in addition to indicating a preferred crossing for trail access.

Figure 8: Recommendations for Franklin Street at North and South Boulevards



Target Area 2- Bruno Melini Park & Buena Borough Municipal Building



Target Area 2 was identified as a cluster of attractors and generators within Buena Borough. Bruno Melini Park is the site of a majority of the Borough's active recreation opportunities. Target Area 2 also is the site of the Buena Borough Municipal Building, making it an important civic destination. This area also is the site of two of the Borough's larger apartment complexes, Buena Terrace and Parkview Gardens. The Buena Bike Path directly serves Target Area 2 and features a number of trail access points, most notably at Central Avenue. Recommendations in Target Area 2 will focus on:

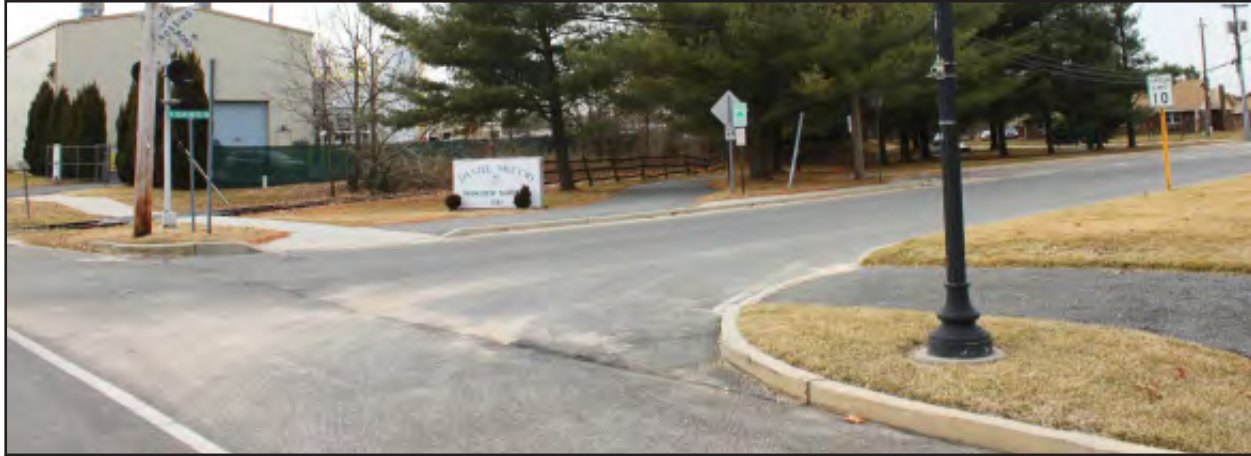
- Improving bike path access and safety at its Central Avenue crossing
- Creating direct access between Buena Terrace and the Buena Bike Path, Buena Borough Municipal Building, and Bruno Melini Park

Intersection of South Central Avenue at North and South Boulevards

South Central Avenue is one of Buena's main north-south thoroughfares connecting the Buena Bike Path, and destinations in Landisville, to a majority of Minotola residents. North and South Boulevards are primary corridors for east-west travel in the Borough. This area consists of two three-legged unsignalized intersections and a driveway for the Buena Borough Municipal Building. The Buena Bike Path also crosses South Central Avenue at this location.

ISSUES

- **Trail Crossing:** While riding on the Buena Bike Path, South Central Avenue can be difficult to cross at this mid-block location. Bicyclists must be aware of traffic traveling and turning from multiple locations and there is no marked crosswalk at this location to alert motorists to the presence of trail users at this crossing.
- **Driveways:** There are three locations where the Buena Bike Path crosses a driveway for Bruno Melini Park and the Municipal Building. While it appears that one of these crossing locations once featured a crosswalk, there are currently no pavement markings to alert motorists to the potential presence of bicyclists.



Bike Path crossing at the Buena Borough Municipal Building driveway lacks marked crosswalks

- **Crosswalk:** There is currently no crosswalk connecting the sidewalk on the east side of South Central Avenue to the bicycle path on the rail right-of-way. As South Central Avenue can be busy, and there are numerous possibilities for vehicle turning movements at this location, it can be difficult to cross this intersection as a pedestrian

RECOMMENDATIONS (Shown in Figure 9)

- **Install a high-visibility crosswalk at the Buena Bike Path crossing of Central Avenue.** This marked crossing should be complemented by signage, as well pavement markings, to alert motorists to the presence of bicyclists traveling along the path. (*Completed during study process.*)
- **Install marked crosswalks at the three path crossing locations** in the Buena Municipal Building parking lot to make bicyclists riding along the Buena Bike Path more visible and guide trail users through this segment of the path.
- **Install a marked crosswalk on South Avenue** to make pedestrians that are traveling to or from the Buena Bike Path more visible.

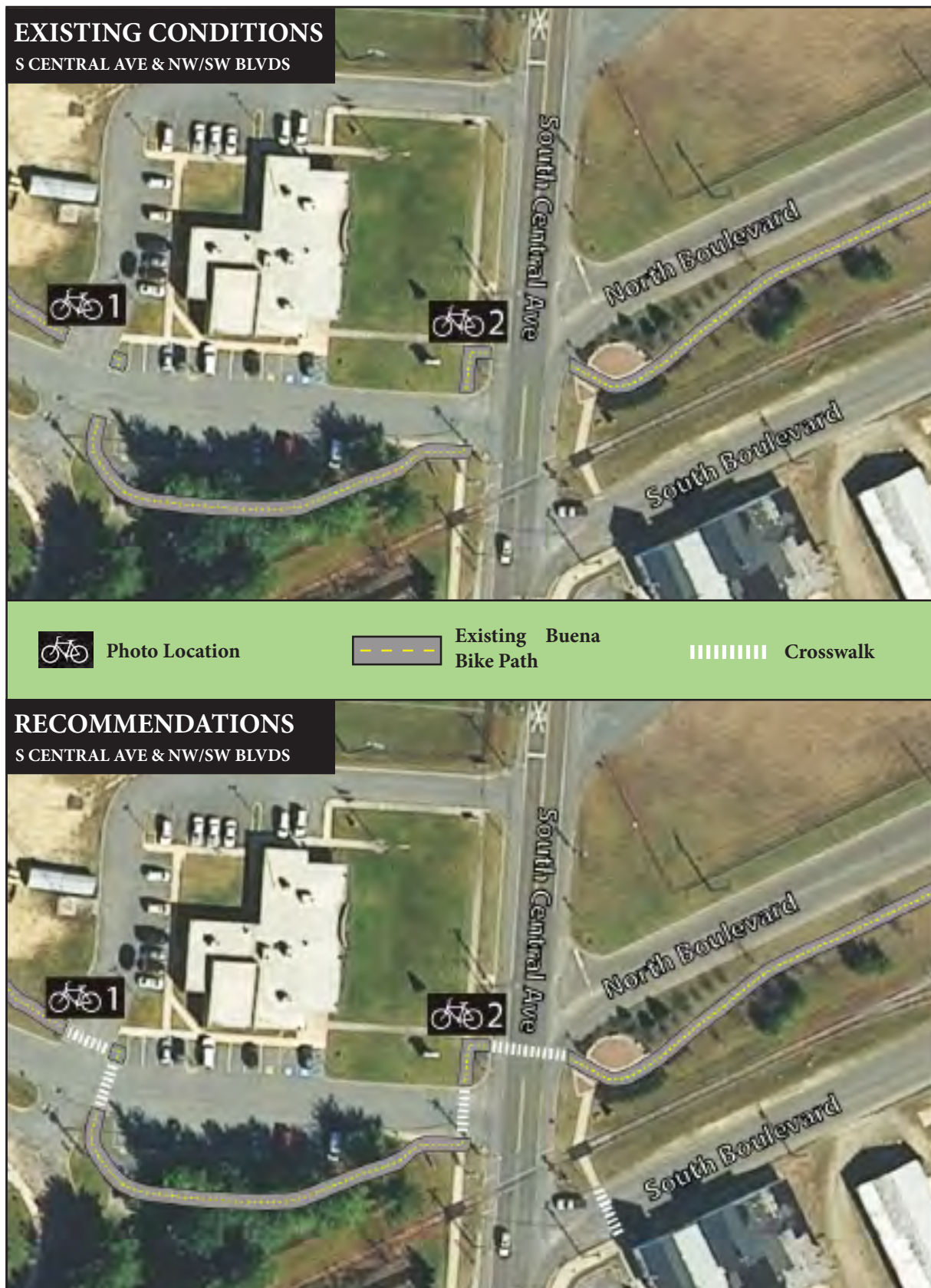


Path crossing within municipal building parking lot



Path crossing at Central Avenue

Figure 9: Recommendations for Central Avenue at North and South Boulevards



Buena Terrace Apartments to Bruno Melini Park Cut-Through

An unpaved dirt path connects the parking lot of Bruno Melini Park to the back of the Buena Terrace Apartments, providing residents an access point to the Buena Bike Path and destinations in Minotola and Landisville. This dirt path meanders through trees and features a small downhill slope. Several individuals were observed walking through this path while conducting field work in late November.

ISSUES

- **The dirt path is unimproved**, traversing this area could potentially be difficult for some individuals, including seniors and those with mobility impairments

OPPORTUNITIES

- **This path is already widely used** and provides nearly direct access to the Buena Bike Path

RECOMMENDATIONS (Shown in Figure 10)

- **Implement a Paved Pathway:** While this path currently functions as a convenient cut-through for residents of Buena Terrace Apartments, paving the path would enhance safety and enable access for bicyclists and people with disabilities, such as individuals in wheel chairs. Pedestrian scale lighting should also be installed to maintain visibility and safety at night.



Buena Terrace Apartments Cut-Through

Figure 10: Recommendations for Buena Terrace Apartment's Path To Melini Park

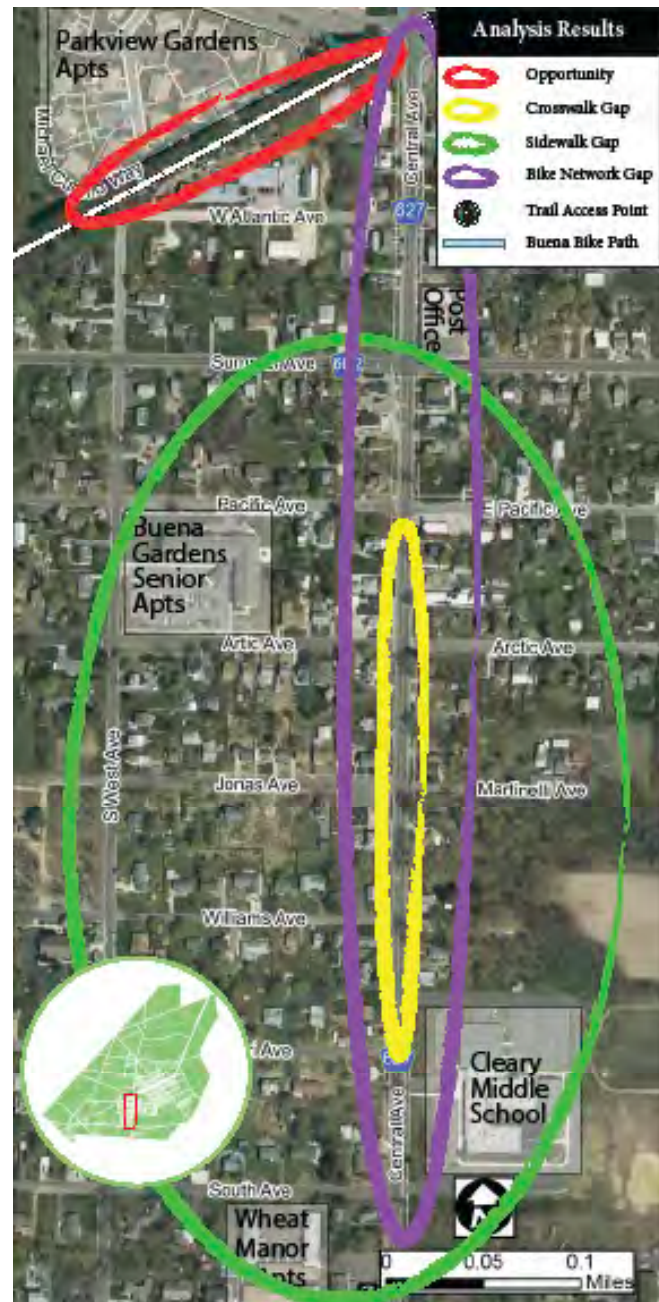


Target Area 3 - South Central Avenue in Minotola

South Central Avenue functions as Minotola's main street. Cleary Middle School, the Buena Borough Municipal Building, Melini Park, the Minotola Post Office, and other destinations are located along this roadway. South Central Avenue features sidewalks on both sides of the road for its entire length through Minotola, from the Municipal Building to Wheat Road. Thus, South Central offers the most attractive way for Minotola residents to walk to the Buena Bike Path and destinations in Landisville. Though, in its current condition the roadway is not an attractive option for bicyclists due to its 35 mph speed limit and lack of a dedicated bikeway. The only other means to reach Landisville is to walk or bike on Summer Avenue, a high stress county road with limited shoulders and traffic speeds in excess of 35 mph.

ISSUES

- Sidewalk Gaps on Intersecting Streets:** There are some sidewalks present on the streets that intersect South Central Avenue. Atlantic, Pacific, Arctic and Jonas Avenues all have some sidewalk segments; although, there exist a number of gaps on these streets, limiting the effectiveness of the existing sidewalks. Residents of interior blocks are not provided a continuous stretch of safe pedestrian space, removed from the roadway, to reach destinations along Central Avenue.
- Crosswalk Gap:** There is a lack of crosswalks along a 1/4 mile stretch of South Central Avenue, between Pacific and Coari Avenues, in the heart of Minotola. Crosswalks are located at important intersections at the northern and southern end of the avenue, providing a visible space to cross the street to reach destinations such as the municipal building, Melini Park, the post office and Cleary Middle School. The crosswalk gap in the central portion of South Central Avenue can be explained by the lack of popular destinations and the lack of development on the eastern side of the roadway. However, a 1/4 mile is a sizable distance, thus some pedestrian crossings should be anticipated.
- Wide crossing distance for pedestrians:** Currently, pedestrians must cross 40 feet of pavement



to safely cross Central Avenue.

- **Lack of dedicated bikeway:** There is no dedicated bikeway on South Central Avenue to create an exclusive space on the roadway for bicyclists traveling between the Buena Bike Path and a majority of the residences and attractions in Minotola. The existing shoulder functions well for more experienced cyclists, but it is often blocked by parked vehicles at popular destinations, such as the liquor store.

RECOMMENDATIONS

- **Fill in sidewalk gaps** on blocks of intersecting streets. Work with residents on the immediate blocks in the vicinity of South Central Avenue to fill in sidewalk gaps, and fix sidewalks in disrepair.
- **Provide a crosswalk(s)** in the 1/4 mile stretch of Central Ave without any. Jonas/Martinelli Avenue would be an appropriate location. This location is the halfway point in the 1/4 mile crosswalk gap. Additionally, Martinelli Avenue will be discussed in Target Area 4 and could potentially function as an integral part of Buena Borough's bicycle and pedestrian network. Providing crosswalks at this location would maximize the effectiveness of any improvements made in that area.
- **Explore the potential to install curb extensions** at intersection along Central Avenue with a marked crosswalk.. There are currently two eight foot shoulders on either side of the roadway. Installing a curb extension, detailed in Figure 11, would reduce the crossing distance, thus limiting pedestrians and bicyclists' exposure to motor vehicle traffic resulting in improved safety. The design of any curb extension should also balance the needs of bicyclists, should Buena Borough choose to install some form of bikeway along Central Avenue.



Cracked sidewalks on West Pacific Avenue

Figure 11: An Overview of Curb Extensions

Curb Extensions

Curb extensions, also known as bump-outs or bulb-outs, extend the sidewalk or curb-line into a parking lane, which reduces street width. They improve pedestrian crossings by reducing the crossing distance, improving pedestrians' visibility, and reducing the time that pedestrians are exposed to traffic. Curb extensions can be installed at intersections or mid-block. Curb extensions must not extend into travel lanes, including bicycle lanes. The turning needs of larger vehicles, such as school buses, need to be considered in curb extension design.



A curb extension in Woodbury, NJ
Source: CCCTMA

- **Provide a dedicated bikeway facility on South Central Avenue** to create an exclusive space for bicyclists to safely and conveniently travel between the Buena Bike Path and destinations in Minotola. There are two primary options that can effectively reallocate space within the existing 40 foot cartway. Currently, very few vehicles park within South Central Avenue's 8 foot shoulders, warranting an evaluation of whether some or all of this space would be better

allocated to serve bicycle traffic. Restricting on-street parking may raise issues with residents and businesses on Southwest Avenue. Community input should be sought before restricting parking. Multiple bikeway options are described below and demonstrated in Figure 12.

Bikeway Options for South Central Avenue

Option 1 - Buffered bike lane: Buffered bike lanes are fitted with an additional painted buffer between the bike lane and motor vehicle traffic and/or parking. The buffer provides additional passing (or “shy”) distance between bicyclists and passing motor vehicles, contributing to an increased sense of security. Providing buffered bike lanes would restrict parking on both sides of South Central Avenue and dedicate both shoulders to an 8 foot wide bicycle facility (5 foot bike lane paired with a 3 foot buffer). Removing on-street parking is maybe a possibility, because a majority of the residences, businesses, and other destinations along South Central Avenue provide off-street parking. The buffer could also be paired with some form a channelizing device, such as flexible delineators, planters, or bollards, to provide additional bicyclist’s protection and comfort.

Option 2 - Standard bike lanes: Standard bike lanes can be provided on South Central Avenue by restricting parking to one side of the street and reducing current lane widths from 11 feet to 10 feet. The American Association of State Highway and Transportation Officials’ publication *A Policy on Geometric Design of Highways and Streets* (AASHTO Green Book) considers 10 foot travel lanes an acceptable minimum lane width. There has been no general indication that 10 foot travel lanes have had any noticeable effect on roadway safety, compared to 11 foot or 12 foot lanes, and in fact often slow traffic, improving bicyclist and pedestrian safety.⁴ Reducing lane widths will allow Central Ave to be equipped with either two 5 foot bike lanes, or one 6 foot bike lane next to a parking lane and a 5 foot curbside bike lane. A qualified engineer should review the narrowing of travel lanes.

- **Coordinate any improvements with Atlantic County**, since Central Avenue is a county road.
- **Provide a bikeway on Southwest Avenue** as an alternative/addition to a bikeway on South Central Avenue.



Parking on Central Avenue at liquor store

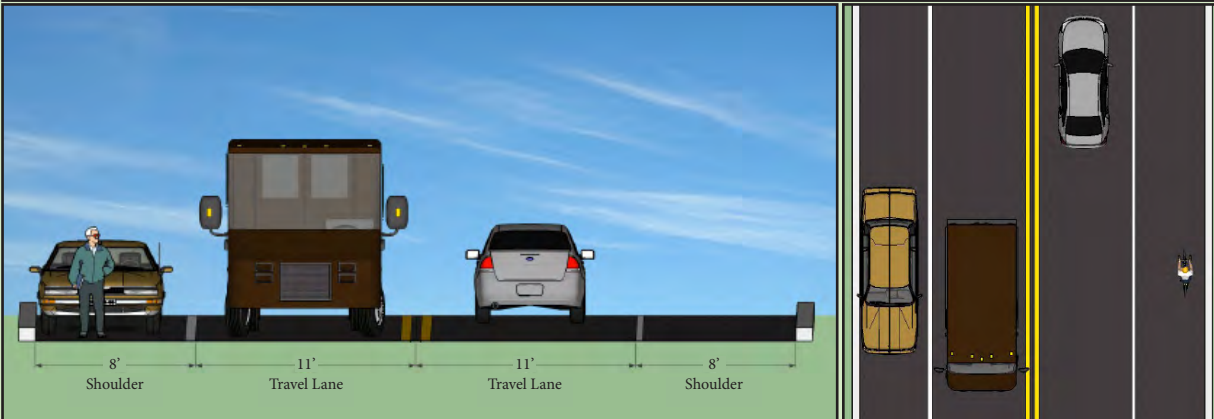
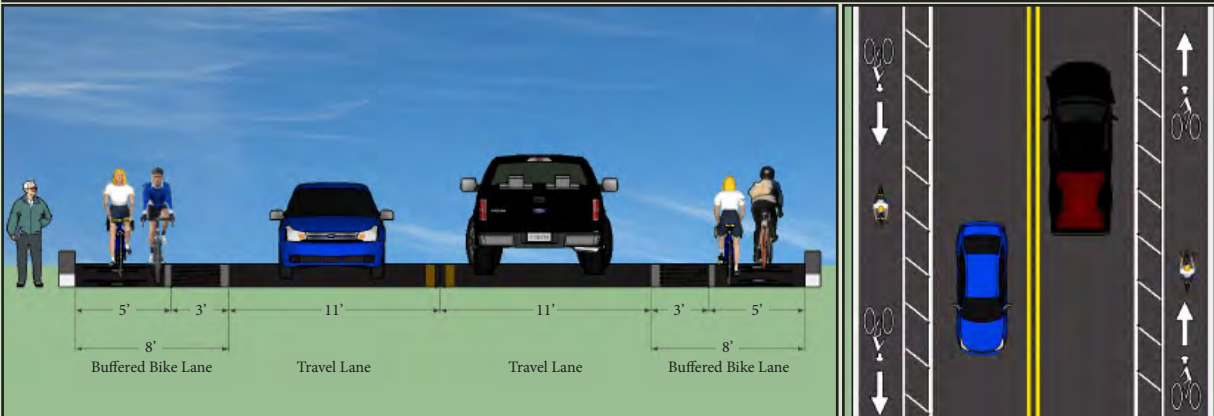
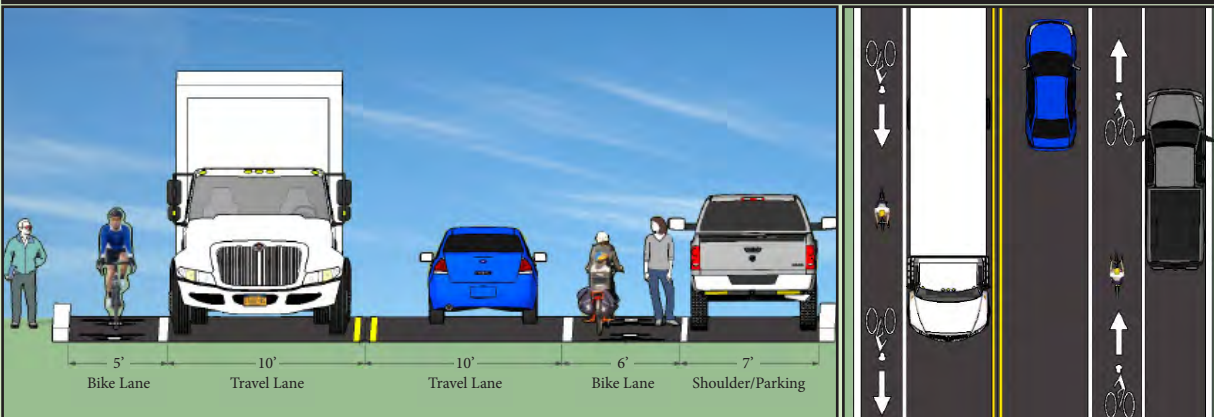


A buffered bike lane in Philadelphia



A flexible delineator

⁴American Association of State Highway and Transportation Officials’ (AASHTO) *Guide for the Development of Bicycle Facilities*, 2012, Fourth Edition

Figure 12: Bikeway Options for South Central Avenue - Minotola**EXISTING CONDITIONS — 8' SHOULDER****OPTION 1 — 8' BUFFERED BIKE LANES****OPTION 2 — 5-6' STANDARD BIKE LANES**

Southwest Avenue between Atlantic Avenue and Wheat Road

Southwest Avenue parallels South Central Avenue one block to the west. It is a residential street with a 25 MPH speed limit and a 30 foot cartway. Based upon field observations, it handles a lighter volume of traffic compared to South Central Avenue, though slightly higher volumes than most residential streets in Buena. It is assumed this is because it offers direct access to destinations such as Saint Michael's Church, Buena Gardens Senior Apartments, and a majority of Minolta's residential development.

Southwest Avenue is classified as an LTS 1 bicycling environment, meaning that in its current condition, most bicyclists would find it a comfortable and safe bicycling experience. Improvements can be made to upgrade the bicycling environment and make it a safe and inviting environment for all bicyclists, including children trying to reach Cleary Middle School. However, access issues to the Buena Bike Path and the crossing of Summer Avenue will need to be addressed to maximize the effectiveness of any bicycle improvements made on Southwest Avenue.

ISSUES

- Access to the Buena Bike Path is limited due to the crossing of Summer Boulevard and the need to use South Central Avenue for one block. Both of these roadways are considered LTS 4 roadways, which are an uncomfortable, and possibly dangerous, riding experience for all but the most experience bicyclists.
- While Southwest Avenue is currently considered LTS 1, observed traffic volume and speeds are sufficient enough to present dangers to children traveling to and from Cleary Middle School.
- Very little on-street parking was observed during field visits. This would indicate removing on-street parking to provide bike lanes may not cause major disruption. However, there were no events or services occurring at Saint Michael's Church during field visits. It is unknown if the off-street parking provided by the parking lot at Saint Michael's is sufficient to handle demand at typical church events. Parking demand should be observed during church events/services to estimate demand and the results should be considered when selecting an appropriate bikeway facility type.

OPPORTUNITIES

- The existing LTS 1 bicycling environment on Southwest Avenue.
- The underutilized southwest spur of the rail right-of-way, identified in Chapter 3, that offers direct access between Southwest Avenue and the Buena Bike Path.

RECOMMENDATIONS

- **Create a spur of the Buena Bike Path** in the southwest spur of the rail right-of-way to provide direct access to Southwest Avenue and/or provide one of the bikeway options, discussed previously, on South Central Avenue. Provide wayfinding signs to direct bicyclists, looking for a calmer bicycling environment, to Southwest Avenue.
- **Provide high visibility crosswalks and advanced warning signs** indicating crossing bicycle traffic, similar to the



Buena Bike Path's crossing of Brewster Road, at the intersection of Southwest and Summer Avenues. Due to the higher intensity of commercial and residential land uses in this area, a higher volume of bicycle, pedestrian, and motor-vehicle traffic may be expected. The need to supplement this crossing with an active warning beacon, such as a rectangular rapid flashing beacon, highlighted in Figure 13, should be explored. Coordinate any crossing treatment with Atlantic County, since Summer Avenue is a county road.

Figure 13: An Overview of Active Warning Beacons

Rectangular Rapid Flashing Beacons

Flashing lights to alert motorists to yield to bicyclists and pedestrians.

Recommended features: Push button actuation that does not require a bicyclist to dismount or automated bicycle detection

Typical Applications: Two-lane or multi-lane roads where motorist compliance to yield to bikes or pedestrians is low. Where bikeways cross roads at mid-block or at unsignalized intersections. Common at trail crossings.

Estimated costs: \$10,000 - \$25,000



A warning beacon at a commercial highway crossing
Source: NACTO

- **Provide a bikeway** the length of Southwest Avenue.

Bikeway Options for Southwest Avenue

Option 1 - Shared Lanes with Sharrows and Wayfinding Signs:

A shared lane facility designates preferred routes for bicycle traffic, often through employing shared lane pavements markings (sharrows) and signs to alert motorists of the presence

of bicyclists and provide wayfinding assistance for bicyclists traveling between desired destinations. Sharrows and wayfinding are detailed in Figure 14 on the next page. This type of facility would be sufficient for most bicyclists, capitalizing on the already low-stress bicycling environment of Southwest Avenue, while providing the added benefit of guiding users to destinations such as Cleary Middle School, Melini Park and the Buena Bike Path. Shared lanes would also be appropriate on Jonas and Coari Avenues to provide connections to Cleary Middle School, and potential improvements covered in Target Area 4.



A shared lane facility

Option 2 - Bicycle Boulevard: Bicycle Boulevards are similar to shared lanes, but prioritize bicycle traffic by slowing motor-vehicle traffic, and in some cases, diverting motor-vehicle traffic to reduce volume. Bicycle Boulevards employ the same type of wayfinding signs and sharrows pavement markings as shared lanes, but employ traffic calming devices, such as

curb extensions, medians, and roundabouts to slow motor-vehicle traffic to speeds close to the speed of bicycle traffic. Bicycle boulevards will also lower speed limits to 15-20 MPH to indicate to motorists that the street is different than typical residential streets.

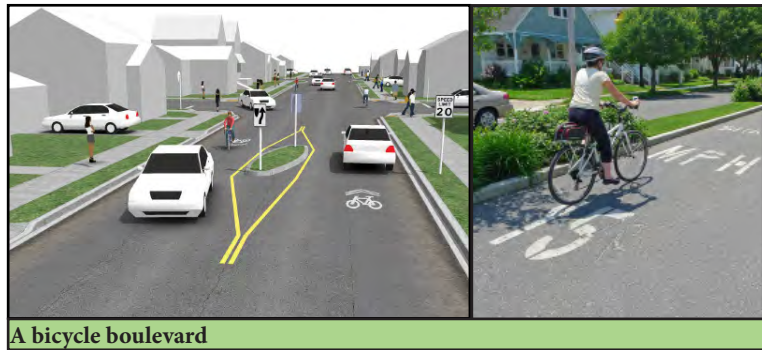


Figure 14: An overview of shared lane markings and wayfinding

Shared Lane Marking (Sharrows)

Provides a higher level of guidance to both motorists and bicyclists by demonstrating where a bicyclist should ride to be safe.

Recommended features: Placed at least 4 ft. from the curb on streets with no parking, 11 ft. on streets with parking, at intervals no greater than 250 ft. apart.

Typical Applications: Roads with insufficient width to accommodate bike lanes. Not to be used on roads with speed limits >35 mph.

Estimated costs: \$250 per symbol

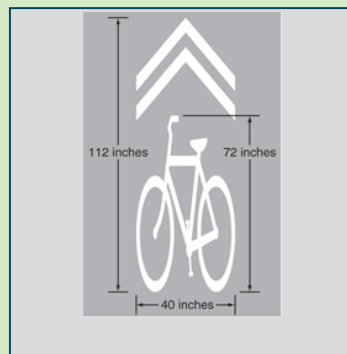
Wayfinding

Signs and/or markings guiding bicyclists to destinations along preferred bicycling routes. Can be used to uniquely brand trail networks.

Recommended features: Should provide directional guidance, route identification and distance to key destinations.

Typical Applications: Used at decision points along a route, at the intersection of two or more bikeways and/or every 1/4 to 1/2 mile.

Estimated cost: \$200 per sign; \$250 per sharrow



Shared lane (sharrow) marking dimensions
Source: Manual on Uniform Traffic Control Devices



Signs pointing out direction and distance
Source: NACTO

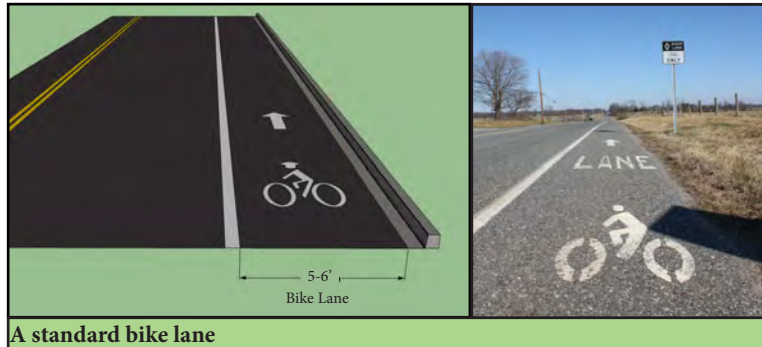
Southwest Avenue has a 30 foot cartway, which based upon field observations, experiences very little on-street parking. In effect, this creates two 15 foot travel lanes, which are overly wide for a residential street and may encourage speeding. Center medians, bump-outs, and roundabouts could be an effective means to narrow the roadway, slow traffic, and create a safer pedestrian and bicycling environment for all users including children and seniors. Traffic diversion infrastructure is likely unnecessary due to the low traffic volumes on Southwest Avenue. Slowing traffic may prove enough to create a safe and comfortable experience for all road users. A shared lane facility could be employed on Jonas and Coari Avenues to provide connections to Cleary Middle School and Target Area 4 from Southwest

Avenue. Ocean City, NJ's bike boulevard on Haven Avenue has been very popular with bicyclists and provides an exemplary local example to follow.

Option 3 - Standard

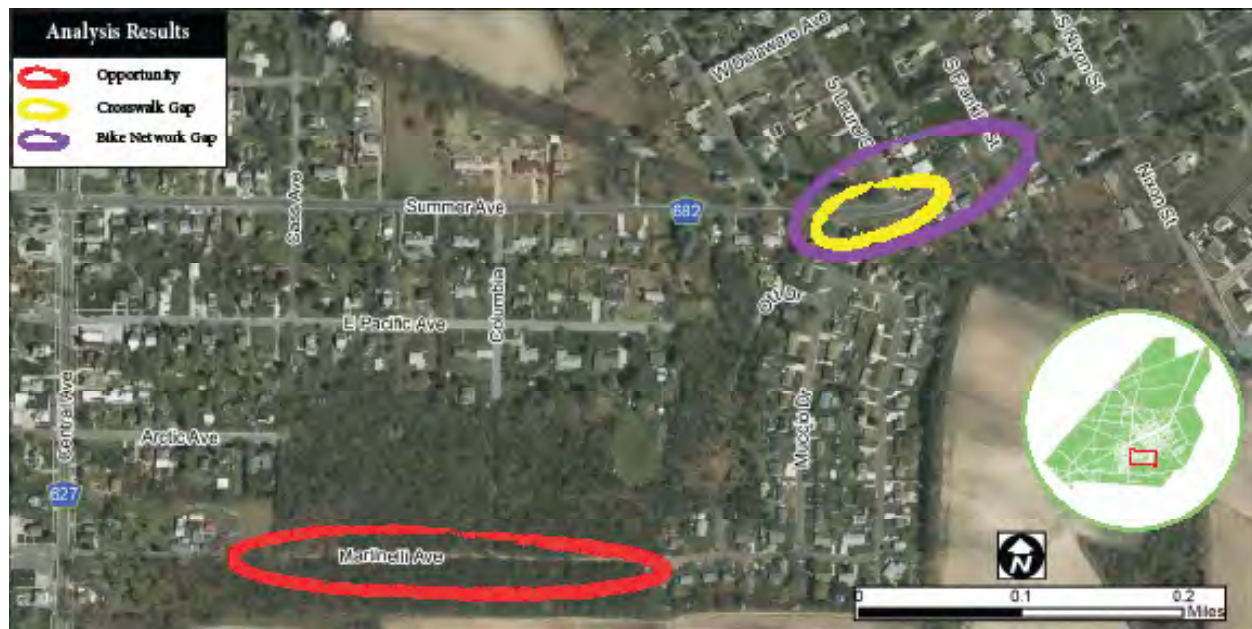
bike lanes: Standard bike lanes can be provided on South Central Avenue by restricting on-street parking. Standard 5-6 foot bike lanes would visually narrow the roadway and provide a similar traffic calming effect to hard infrastructure,

such as medians. Restricting on-street parking may cause an issue with Saint Michael's parishioners during peak times of worship. Community input should be sought before restricting parking. A shared lane facility could be employed on Jonas and Coari Avenues to provide connections to Cleary Middle School and Target Area 4 from Southwest Avenue.



A standard bike lane

Target Area 4 - Martinelli Avenue and the Intersection of Summer Road & Muccio Drive



Despite the compact nature of Buena Borough's developed area, there are few connections between Landisville and Minotola. Currently, there are only two - Summer Road (CR 682) and South/North Boulevards. Summer Road is unwelcoming to bicyclists and pedestrians, leaving the Buena Bike Path, located between North and South Boulevards, as the only viable bicycle and pedestrian connection between the two communities. This is an indirect connection for those traveling between the southern half of Landisville and destinations along Central Avenue in Minoltola, such as Cleary Middle School. An unimproved section of Martinelli Avenue, identified in Chapter 3, provides an opportunity to create a more direct bicycle and pedestrian connection between Landisville and the heart of Central Avenue. Utilizing Martinelli Avenue as a connection will require exploring methods to create a safe crossing of Summer Road between South Willow and South Franklin Streets.

Martinelli Avenue

A 1/4 mile portion of Martinelli Avenue, which is currently unimproved, provides a direct linkage between Central Avenue and residential development in eastern Minotola and the entirety of Landisville.

ISSUES

- The current unimproved path is subject to ponding, making bicycle and pedestrian travel very difficult.
- This portion of Martinelli Avenue may be the location of future residential development.
- To access any improvements along Martinelli Avenue from Landisville requires a difficult crossing of Summer Road at an offset intersection between Muccio Drive



Ponding of water on Martinelli Avenue

and South Laurel Streets

OPPORTUNITIES

- The unimproved portion of Martinelli Avenue.

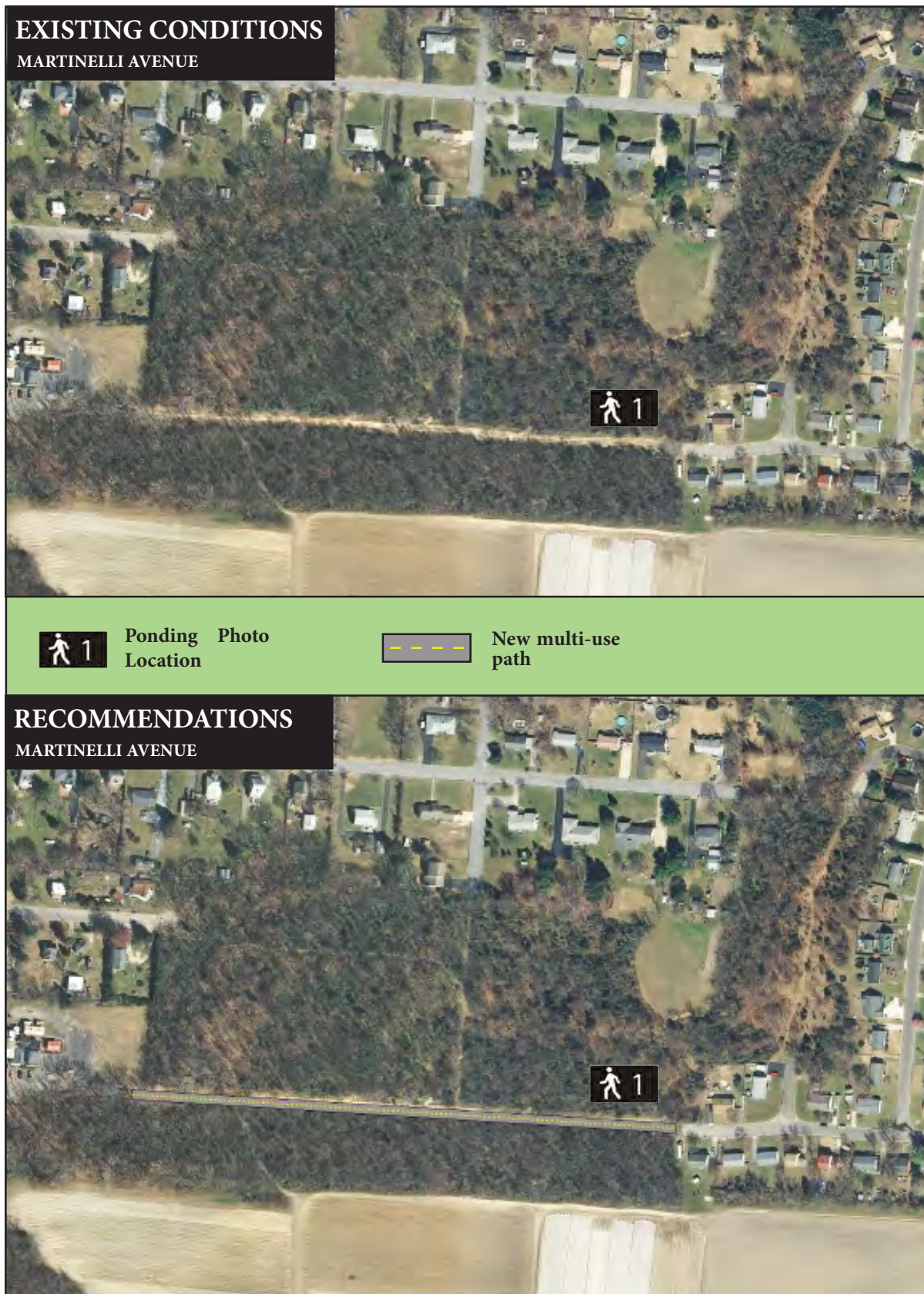
RECOMMENDATIONS (Shown in Figure 15)

- Provide a multi-use trail, similar to the Buena Bike Path, along the unimproved portion of Martnelli Avenue to remove obstacles, such as ponding, to pedestrian and bicycle travel.
- Provide adequate lighting to create a safe environment during evening hours.
- If the area becomes subject to residential development, ensure adequate bicycle and pedestrian facilities are included during the development review process.
- Install sidewalks along the existing paved portion of Martinelli Avenue to connect to Central Avenue.
- Provide a crosswalks at the intersection of Martinelli Avenue and South Central Avenue.
- Consider providing multi-use trails on other unimproved streets in the vicinity of Martinelli Avenue to maximize connectivity.



A multi-use trail in a similar setting to Martinelli Avenue

Figure 15: Recommendations for Martinelli Avenue



Intersection of Summer Road & Muccio Drive

If any improvements are made along the unimproved section of Martinelli Avenue, bicyclists and pedestrians traveling between Central Avenue and Landisville will have to cross Summer Avenue at its intersection with Muccio Drive. This intersection is an offset with no street directly across from Muccio Drive on the northern side of Summer Road. The closest streets on the northern side are Willow and Laurel. Laurel may offer the most beneficial crossing point, because it offers more direct access to Franklin Street, identified previously as one of the few streets to provide access to the Buena Bike Path from south of the railroad tracks, making it an idea candidate to provide a linkage between any improvements on Martinelli Avenue and the Buena Bike Path.

This offset intersection is illustrated in Map 15.

Map 15: Offset Intersection at Summer Road & Muccio Drive



ISSUES

- The offset intersection at Summer Road (CR 682), a 35 MPH road with no existing bicycle or pedestrian accommodation.

OPPORTUNITIES

- Summer Road's existing shoulder and additional right-of-way to provide accommodations.
- The existing LTS 1 bicycling environment on Muccio Drive and Laurel and Franklin streets that could provide direct access to Landisville and the Buena Bike Path from destinations along Central Avenue, such as Cleary Middle School.

RECOMMENDATIONS (Shown in Figure 16)

- Work with the county to provide a safe crossing at the offset intersection of Summer Road and

Muccio Drive that creates physical separation between motor vehicle traffic and bicyclists and pedestrians. Any crossing must take into account potential visibility issues caused by the slight curve in the roadway and the presence of a private driveway at Laurel Street. Two potential options are shown in Figure 16.

Option 1 - Side-paths

A side-path is a shared-use path that runs adjacent to the roadway. Side-paths function like sidewalks, but are designed for bicycle operating speeds, thus adequately serving both users. They can be either one-way or two-way. Side-paths are preferable for children and inexperienced bicyclists, because they provide complete physical separation from the roadway.

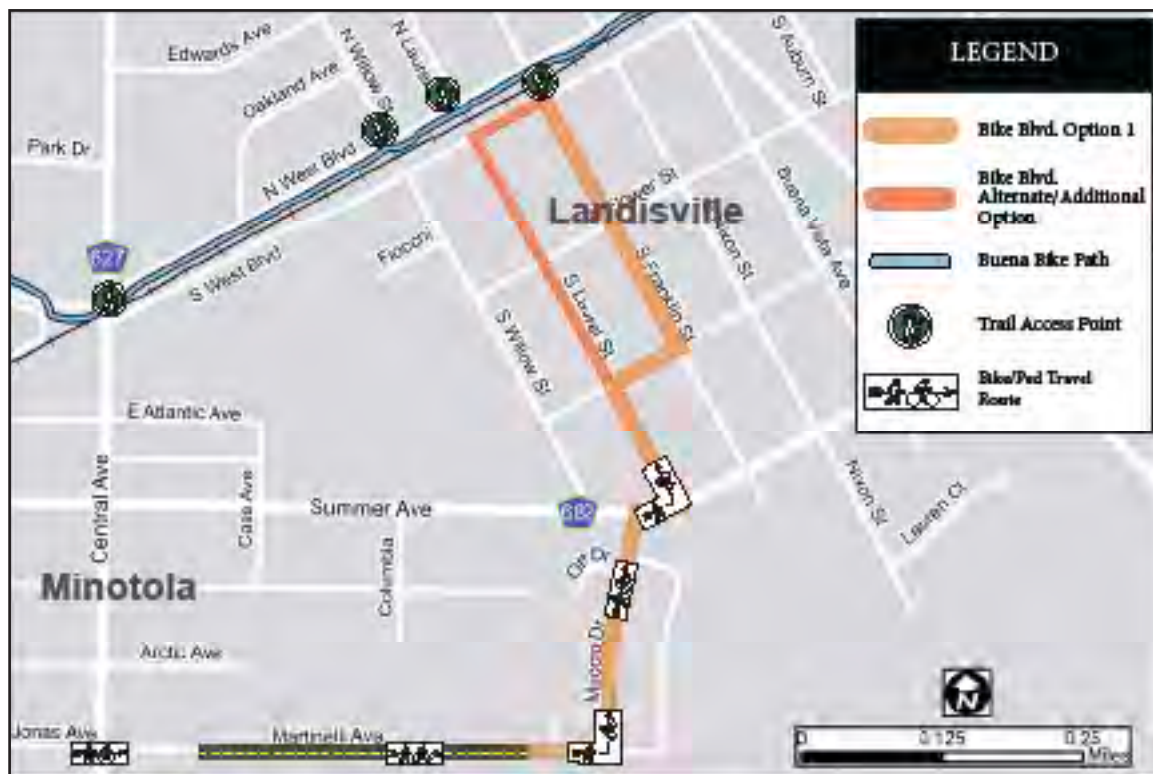
Option 2 - Two-way protected bike lane

Protected bike lanes are similar to buffered bike lanes, but use a physical barrier to provide the comfort and perceived safety of an off-road path. They can be one-way or two-way. They often entail lower implementation costs, since they are built within an existing roadway. A two-way protected bike lane should at least be 11-12 feet wide to accommodate two 4-5 foot bike lanes and a 3 foot buffer fitted with a physical barrier, such as bollards, planters, or a curb. Protected bike lanes can also be painted with green thermoplastic to improve the bikeway's visibility to passing motorists.

Figure 16: Intersection Options for Summer Road and Muccio Drive**EXISTING CONDITIONS****OPTION 1 - SIDEPATHS****OPTION 2 - TWO-WAY PROTECTED BIKE LANE**

RECOMMENDATIONS (Cont.)

- Provide high visibility crosswalks and advanced warning signs indicating crossing bicycle traffic. Consider installing active warning beacons.
- Provide a bikeway on Muccio Drive, and portions of Laurel Street, Delaware Avenue, and Franklin Street to provide direct access to the Buena Bike Path and residential development north of South Boulevard. Potential routing options are shown in Map 16. The bikeway options discussed for Southwest Avenue in Target Area 3, such as shared lanes or a bicycle boulevard are appropriate and require the same considerations. Bicycle traffic should be directed along the necessary portions of Laurel Street, Delaware Avenue, and Franklin Street to reach the trail access point on Franklin Street. If bike lanes are preferred and are installed the length of Laurel Street, consider extending the existing bike lanes on South Boulevard the length of the roadway to facilitate bicycle connections to Franklin Street. Again bike lanes will require restricting on-street parking so community input should be sought.

Map 16: Bikeway Routing Options to Reach Trail Access Point on Franklin Street

The Buena Bike Loop

Implementing the recommendations in Target Areas 1 through 4 would create a well connected loop of bikeways that would serve a majority of the Buena's destinations and residents. This loop of bikeways can become a visible source of community pride and feature wayfinding signs that provide the loop with a unique identity and assist bicyclists and pedestrians with navigating through the community. A potential name for this network could be "The Buena Bike Loop."



Unique wayfinding signs

The network of paths, sidewalks, bike lanes and bicycle friendly streets would also benefit pedestrians by either providing a dedicated place to walk or slowing traffic and creating safer streets to share with motorists and bicyclists. Eventually streets included in this loop should be fitted with sidewalks, or side-paths where feasible, to provide pedestrians physical separation from traffic. This will be costly and take a number of years to work with affected property owners to develop installation and maintenance procedures. In the meantime, Buena Borough should evaluate these recommendations to see what can be implemented in the short term to make safer roads for all users. The potential "Buena Bike Loop" and its associated bikeway treatments are shown in Map 17.

Periodic events could be held on the Buena Bike Loop's streets that restrict motor vehicle traffic and invite the community to come out and enjoy these facilities. These events are often called "Open Streets" or "Ciclovias." These events demonstrate the benefits of active transportation and the need to designate space on roadways for pedestrians and bicyclists. Events like these have been well received in New Jersey. New Brunswick, NJ has been organizing three to four separate ciclovias every year since 2013. They have become a highlight of the community calendar.



A "ciclovía" is New Brunswick, NJ

Map 17: The Buena Bike Loop



Target Area 5 - Intersection of NJ 54 and US 40 (Wawa and Family Dollar)

The intersection of Routes 54 and 40 are located at the southeastern corner of the Borough at its border with Buena Vista Township. The project steering committee identified this as concern due to the frequency of pedestrians crossing Route 40 from the Budget Lodge and the Roadway Inn and Suites to reach Wawa. There have also been three crashes involving pedestrians in this area, two of which were located approximately 300 yards to the northwest of Wawa, in the vicinity of the intersection of Route 40 and Catherine Avenue, near the Family Dollar. This area of Buena Borough is an important destination since it is the location of many retail and dining options. The presence of the two motels in Target Area 5 also places a population in the area desiring to travel to and from these retail and dining options.

ISSUES

- This area is lacking in virtually any pedestrian accommodations other than some curb ramps at the intersection of US 40 and NJ 54, and some sidewalks on Wawa's property.
- The Budget Lodge and Wawa are directly across the street from one another, while the signalized intersection of US 40 and NJ 54 is located over 150 yards away, leading to frequent mid-block pedestrian crossings.
- Two out of three pedestrian crashes in the area have occurred near the intersection of US 40 and Catherine Avenue over 500 yards from the nearest signalized intersection.
- The presence of jug-handles at the intersection of US 40 and 54, which encourage traffic to exit at high speed and create additional dangerous pedestrian crossing at an already precarious intersection with multiple lanes and turning movements.

OPPORTUNITIES

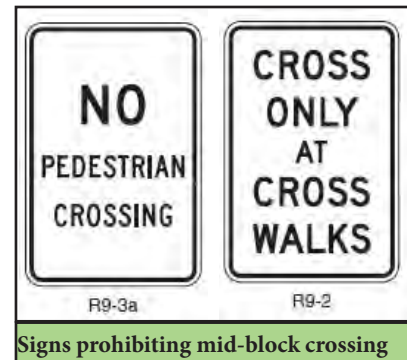
- The presence of a few existing curb-ramps at the intersection of US 40 and NJ 54.



- The presence of a few existing sidewalk segments on the Wawa property along US 40.
- The narrowing of US 40 from four travel lanes to two near the Wawa that slows traffic and reduces the crossing distance and conflict points for pedestrians crossing US 40.

RECOMMENDATIONS (Shown in Figures 17 and 18)

- Install crosswalks, preferable high visibility zebra or ladder style, at all four legs of the intersection of US 40 and NJ 54, utilizing the existing curb ramps. Update any curb-ramps that are not currently ADA complaint.
- Install crosswalks and curb-ramps at the entry and exit point of the jug-handle.
- Signs can be used to direct pedestrians to cross at the crosswalks provided at the intersection. This may be effective for those traveling from the south of the Budget Inn, but may not change the behavior of those crossing mid-block, directly between the motel and the Wawa.
- Work with NJDOT to explore implementing a mid-block crosswalk between the Budget Lodge and Wawa, approximately 200 yards north of the intersection, where these existing sidewalks already serve the property and the number of travel lanes are reduced to two. According to the 2009 Manual on Uniform Traffic Control Devices (MUTCD) new crosswalks may be provided at an uncontrolled intersection, without other measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence where the speed limit does not exceed 40 MPH and the roadway has less than four travel lanes⁵. Though these types of measures should be examined.
- In the long-term, sidewalks should be provided to link pedestrians to destinations in the area from these crossing points.
- The installation of a mid-block crosswalk at the intersection of US 40 and Catherine should also be explored with NJDOT. Sidewalks should be installed to connect the crosswalk to the residences on Catherine Avenue. These improvements are shown in Figure 18.
- Buena Borough should contact representatives from NJDOT's Office of Bicycle and Pedestrian Programs to discuss submitting a problem statement to DOT's Division of Capital Investment Planning and Development (CIPD). A problem statement will make NJDOT aware of the pedestrian safety issues present in this busy commercial area.⁶ The regional Metropolitan Planning Organization (MPO), South Jersey Transportation Organization (SJTPO) should also be informed of the problem.



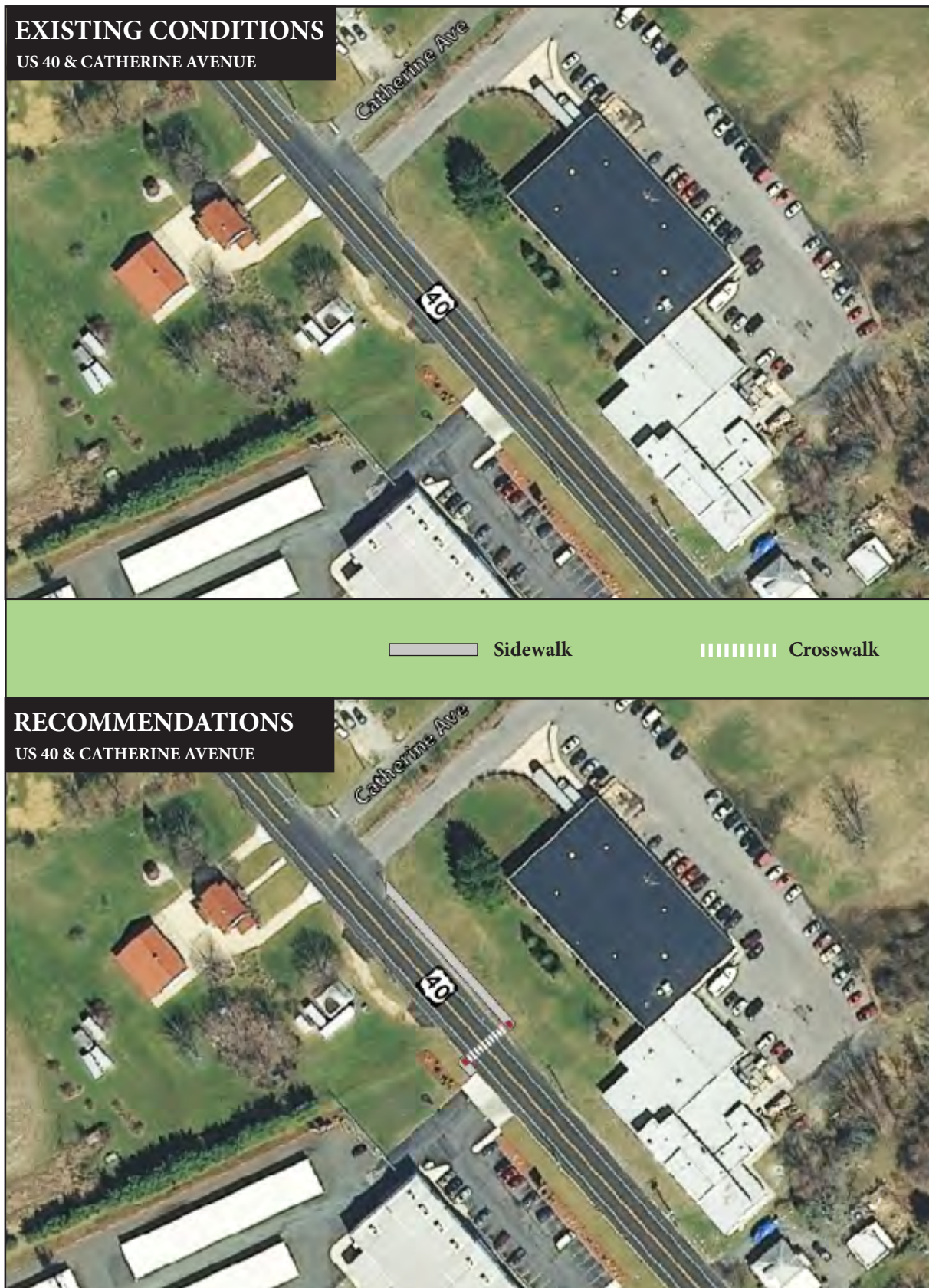
⁵ The Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), 2009 Edition, Section 3B.18, P1, US Department of Transportation, Federal Highway Administration.

⁶ For more information on submitting a Problem Statement visit NJDOT's Complete Streets web-page at <http://www.state.nj.us/transportation/eng/completestreets/implementation.shtm>

Figure 17: Recommendations for US 40 Near Wawa



Figure 18: Recommendations for US 40 & Catherine Avenue



Additional Areas for Consideration

Buena Regional High School- There are no bicycle and pedestrian connections linking Landisville and Minotola to Buena Regional High School. The bike lanes on South Boulevard end at Weymouth Road, approximately 1/2 mile to the east of the high school. A side-path along either the south or north side of Weymouth Road should be explored together with Buena Vista Township.

Padre Pio Shrine - There is no bicycle or pedestrian connection linking Landisville and Minotola to the Padre Pio Shrine located approximately 8/10 of a mile north of the Buena Municipal Building. There is a small stretch of sidewalk in front of six residences, between Forest Grove Road and Kimberly Lane. Extending these sidewalks the length of the gap between the Buena Bike Path and the Padre Pio Shrine would be very costly. If development opportunities arise along this stretch of roadway, the Borough should ensure that sidewalks are provided to begin filling in this sizable sidewalk network gap piece by piece. This may require a pro-active revision to current land development regulations. Otherwise, the Borough could explore linking the Shrine to the developed portion of the trail using a side-path. This too would be costly to install and maintain.

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CHAPTER 5: CONCLUSION

Overall, Buena Borough is a pleasant community to walk and bike around. It is largely characterized by calm streets with a low volume of traffic traveling at low speeds. The centerpiece of the Borough's walking and bicycling networks is the Buena Bike Path, an asset that many communities would be envious of. There are, however, a few key areas that need to be addressed to optimize the mobility and safety of bicyclists and pedestrians within Buena. County roads and state highways present significant dangers to bicyclists and pedestrians and act as barriers to bicycle and pedestrian mobility. The crossings of these roadways need special attention to ensure they take into account the needs of all road users, including pedestrians, bicyclists and disabled persons. Once many of these crossings are addressed the existing low speed/low volume characteristics of Buena Borough's existing roadway network can be capitalized upon with relatively low-cost improvements, such as the painting of additional pavement markings or striping, and the provision of signs to provide a higher level of guidance to motorists, bicyclists, and pedestrians. With just a few of these key improvements, Buena Borough will provide an exemplary model of a Complete Streets Community.

Next Steps

- Buena Borough should use this study, and some of the conceptual designs contained in its recommendations, to work with the municipal engineer and its Public Works Department, to prioritize projects, conduct any required further study, and develop construction plans to bring pockets up to a shovel ready status. There exist a number of guides to assist engineers and project designers in development final plan and construction documents. These include, but are not limited to, the *Manual on Uniform Traffic Control Devices (MUTCD)*, *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities*, *AASHTO Guide for the Development of Bicycle Facilities*, *NACTO Urban Bikeway Design Guide*, and the United States Access Board's *Public Rights-of-Way Access Guide (PROWAG)*. Cross County Connection's *Bicycle Facilities Design Toolkit*, included as Appendix A, can also be used as a resource to provide additional detail regarding some of the bikeway facility types included in this study, and other bicycle facilities being implemented throughout the United States.
- Buena Borough should pursue any and all funding opportunities once these plans and construction documents have been prepared. An overview of available funding opportunities is included in Appendix B.

Resource Guide

National Standards and Guides

- American Association of Highway Transportation Officials (AASHTO), *Guide for the Development of Bicycle Facilities, 4th Edition* (2012). More information available at: www.transportation.org.
- American Association of Highway Transportation Officials (AASHTO), *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 1st Edition* (2004). More information available at: www.transportation.org.
- American Association of Highway Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets, 6th Edition* (2011). More information available at: www.transportation.org.

- Federal Highway Administration (FHWA), *Case Studies in Delivering Safe, Comfortable and Connected Pedestrian and Bicycle Networks* (2015). More information available at: www.fhwa.dot.gov.
- Federal Highway Administration (FHWA), *Manual on Traffic Control Devices for Streets and Highways (MUTCD), 2009 Edition* (updated 2012). More information available at: mutcd.fhwa.dot.gov.
- Federal Highway Administration (FHWA), *Separated Bike Lane Planning and Design Guide* (2015). More information available at: www.fhwa.dot.gov.
- National Association of City Transportation Officials (NACTO), *Urban Street Design Guide, First Edition* (2013). More information available at: www.nacto.org.
- National Association of City Transportation Officials (NACTO), *Urban Bikeway Design Guide, Second Edition* (2014). More information available at: www.nacto.org.

New Jersey Standards and Guides

- New Jersey Department of Transportation (NJDOT), *New Jersey Statewide Bicycle and Pedestrian Master Plan, Phase 2* (2004). More information available at: www.state.nj.us/transportation.
- New Jersey Department of Transportation (NJDOT), *New Jersey Pedestrian Safety Action Plan* (2014). More information available at: www.state.nj.us/transportation.
- New Jersey Department of Transportation (NJDOT), *Bicycle Compatible Roadways and Bikeways* (1996). More information available at: www.state.nj.us/transportation.
- New Jersey Department of Transportation (NJDOT), *Pedestrian Compatible Planning and Design Guidelines* (1996). More information available at: www.state.nj.us/transportation⁷.

⁷NJDOT's Bicycle and Pedestrian compatibility standards are out-of-date compared to the national guides. They do not reflect many of the advancements that have occurred in bicycle and pedestrian planning and engineering during the past 20 years, which are considered in the more up-to-date national guides.

