
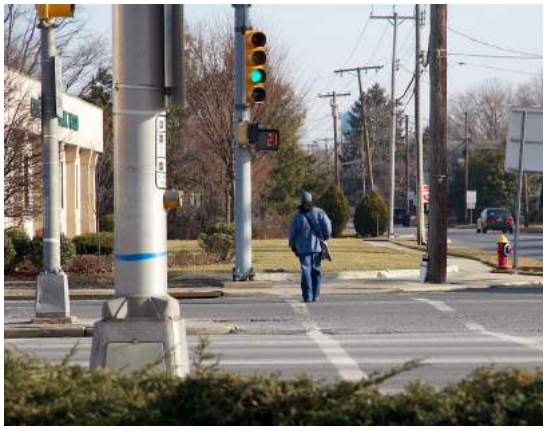


EAST WINDSOR TOWNSHIP

BICYCLE AND PEDESTRIAN CIRCULATION STUDY

2015

DRAFT

DISCLAIMER

NJDOT provides the information and recommendations contained in these Local Bicycle and Pedestrian Studies as a service to local communities. The Department and its consultants strive to provide quality planning studies that include a range of recommended improvements, but make no claims, promises, or guarantees about the availability of funding to complete the projects recommended.

EAST WINDSOR TOWNSHIP

BICYCLE AND PEDESTRIAN CIRCULATION STUDY

ABOUT THIS PLAN

East Windsor Township sought to develop a plan for bicycle and pedestrian circulation that accommodates access and provides connections to key generators of non-motorized traffic. The plan is anticipated as a framework plan to guide the development of improvement concepts and policies, and to support planning and implementation of bicycle and pedestrian improvements for the township. East Windsor has indicated their commitment to improving conditions for non-motorized traffic through their Complete Streets Policy, passed in May 2014.

The assessment of existing conditions is based on review of data and field observations at the time of the study. Something identified as "deficient" indicates that it is does not meet current design standards or best practice guidelines. It is not the role of this plan to place blame or fault for identified deficiencies and/or gaps in coverage, but rather to simply note where changes are recommended in order to improve access and mobility, address existing deficiencies, and lead to greater numbers of bicycle and pedestrian trips. The need for a recommended improvement is made independent of the jurisdiction of the facility, or the party responsible for its design and maintenance.

The recommendation from this plan are to be understood within the ever-changing landscape of standards and best practices. A design commonplace a decade ago may be considered outdated today. Similarly, demand has shifted in recent years, with a greater need and interest in walking and biking due to a variety of health, economic, sustainability, and livability reasons. In response, best practices have also evolved, as evidenced by East Windsor's adoption of a Complete Streets policy.

This document is intended as a master plan for bicycle and pedestrian circulation in East Windsor. The recommendations provided are essentially an "a la carte" menu of bicycle and pedestrian improvements for the municipality to consider and choose to implement as it sees fit and as funding allows. The recommendations are conceptual in nature, and some may require detailed design, additional community input, right-of-way assessment, or consideration of other constraints before implementation. Many recommendations can be implemented during regular maintenance and resurfacing programs to minimize costs. Implemented over time, a more robust bicycle and pedestrian network will contribute to a vibrant East Windsor community.

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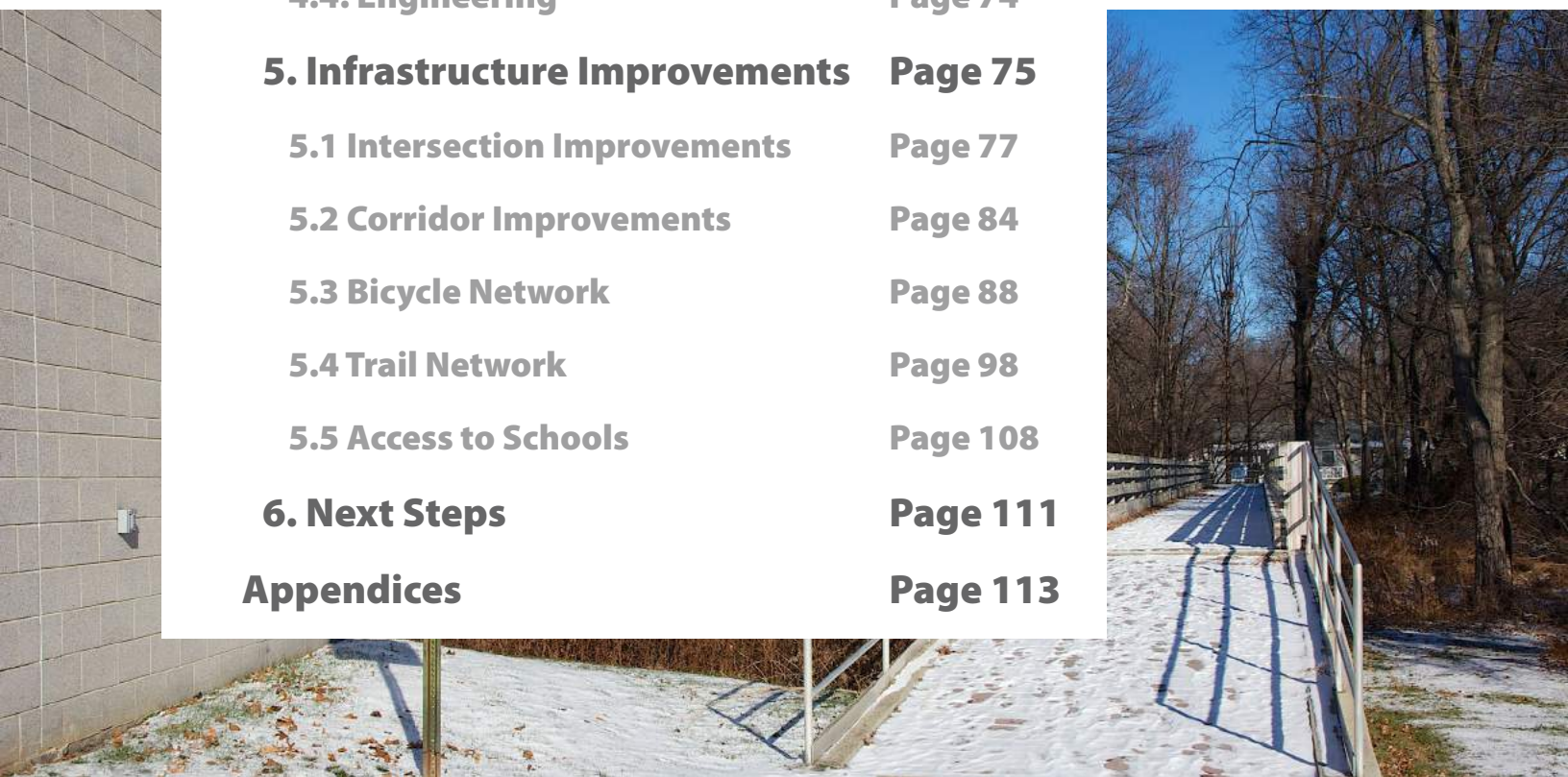


Introduction

The Township of East Windsor in Mercer County has undertaken the development of a bicycle and pedestrian circulation plan as part of the New Jersey Department of Transportation's (NJDOT) Local Bicycle/Pedestrian Planning Assistance Program, which seeks to foster the development of non-motorized transportation modes in accordance with statewide goals and local needs.

This study seeks to support the community's objective of making East Windsor a more walkable and bikeable community. East Windsor adopted a Complete Streets policy in May 2014 to provide access for all users in the design and implementation of transportation options in the Township; this study furthers the goals of the policy.

This plan is organized in two main parts. The first provides an overview of the existing conditions for bicyclists and pedestrians in East Windsor. It includes an analysis of crash data, identification of key pedestrian and bicycle traffic generators, assessment of existing infrastructure, review of key corridors and intersections for non-motorized traffic within the Township, and a review of the roadway network's bicycle level of traffic stress within the Township. Based upon the existing conditions assessment, a series of recommendations are provided for improved facilities to enhance the overall bicycle and pedestrian network and strategies to encourage safe biking and walking. These recommendations will improve mobility and safety for all travelers and travel modes.

1. Background

East Windsor Township was incorporated by an Act of the New Jersey Legislature in 1797. The township historically maintained populations between 700 and 2,500 residents before experiencing explosive population growth in the 1970s.

East Windsor is a predominantly rural township covering 15.75 square miles on the eastern border of Mercer County and has a population of 27,190 residents (2010 U.S. Census). The Township has a population density of 1,737 persons per square mile, which is slightly higher than the average in both the county and the state. East Windsor Township surrounds Hightstown Borough and the linkages to, from, and through the borough are very important for mobility in area. Hightstown is also a destination for many residents of East Windsor. Twin Rivers is a planned unit development (P.U.D) located within the eastern section of East Windsor. It is home to approximately 25% of the Township's total population (7,443 residents, 2010 U.S. Census). East Windsor Township is approximately a 0.5 – 1 hour drive from major regional hubs and attractions such as New York City, Philadelphia, and the Jersey Shore.

East Windsor is served by four major transportation routes that transect the township: NJ Route 33 (east-west), NJ 133 (east-west), U.S. 130 (north-south), and the New Jersey Turnpike (north-south). This configuration creates distinct areas within the Township with limited mobility and connectivity to the other areas. Within each area further mobility limitations are created by limited street networks and fragmented connectivity. A series of county roads are also key elements of the roadway network, including CR 571 (Princeton-Hightstown Road/Etra Road) and CR 539 (N. Main Street/S. Main Street). East Windsor's location and principal roadways are depicted in Map 1.1.

Land use patterns vary throughout the Township, with a greater amount of rural development, farmland, and open space in the eastern and southern portions of the Township and lower density suburban residential neighborhoods in the western and northern sections. Higher density neighborhoods, often composed of garden apartment complexes, are interspersed throughout the western, northern, and eastern reaches of the Township. Many of East Windsor's residential areas offer limited street connectivity to adjacent districts and roadways, with many cul-de-sacs and dead end streets.


East Windsor
Bicycle and Pedestrian Circulation Plan
Map 1.1 - Location
Plainsboro Township
Cranbury Township
Monroe Township
Cranbury Township
535
133
571
130
539
33
Hightstown Borough
East Windsor Township
Monroe Township
West Windsor Township
Robbinsville Township
East Windsor Township
Robbinsville Township
East Windsor Township
Millstone Township
Roosevelt Borough
Millstone Township
Millstone Township
Upper Freehold Township
0
0.5
1
2
Miles

1.1. Previous Studies

The project team consulted several previous planning studies initiated by East Windsor Township in order to build upon existing knowledge and avoid duplicating the efforts of recent projects. These resources provided valuable information as a starting point for this analysis. This study seeks to build off of the recommendations provided in the previous reports by expanding the bicycle and pedestrian network around the already proposed improvements. This synergy with previous work will produce a more comprehensive and expansive bicycle and pedestrian system.

New Jersey Turnpike Interchange 8 Planning Study, 2014

The 2014 planning study examined development opportunities in five areas surrounding New Jersey Turnpike Exit 8 in East Windsor. Framework concepts for these areas include a commerce park, mixed use, Turnpike commercial, Turnpike gateway, and industrial opportunity. Relevant to pedestrian circulation, the study included improvement concepts for NJ Route 33 with sidewalks along both sides, street trees along both sides of the roadway and median, pedestrian-level street lighting, and street furniture including benches and trash receptacles.

Route 33 Corridor Revitalization Plan, 2012

The corridor revitalization plan focused on a portion of the Route 33 corridor from U.S. Route 130, in East Windsor to Summit Street, in Hightstown. The study developed revitalization recommendations and implementation strategies to enhance development and redevelopment opportunities for the approximately 1.15 mile stretch of NJ Route 33 between U.S. Route 130 in East Windsor and Summit Street in Hightstown. The plan includes a blend of land use, zoning, marketing, and transportation improvements. Among them is the conceptual proposal for an off-road trail and greenway network, to enhance bicycle and pedestrian access along the corridor. Key segments include a greenway parallel to NJ Route 33, which connects Hickory Corner Road to the Roger C. Cook Greenway in Hightstown; a trail running due south along existing right-of-way from the intersection of Airport Road and NJ Route 33, which is a part of the proposed regional Union Transportation Trail (UTT); and connections to the Hightstown High School to the east.

Traffic Calming Study for Dutch Neck Road, 2010

NJDOT approved speed limit reductions along Dutch Neck Road from 35-40 mph to 30-35 mph. This study reviewed existing practices for traffic calming, and evaluated which techniques may be applicable to Dutch Neck Road. The study recommended raised intersections, bumpouts/neckdowns, textured pavement/crosswalks, and traffic signage and pavement markings at eight intersections along the corridor. It also recommended considering roundabouts or multi-way stop control at five intersections. Corridor-wide improvements included filling gaps in the sidewalk network and striping a bicycle lane or shoulder along Dutch Neck Road in order to provide bicycle accommodations and narrow the travel lanes.

Master Plan Reexamination, 2008

East Windsor's Master Plan includes the objective to "encourage development of a township wide open space network which connects local parks and portions of environmentally sensitive areas with walkways or bicycle paths within easy access to local residents..." This study will support this objective of the Master Plan by seeking to develop a robust bicycle and pedestrian network to connect residents with key destinations.

Previous Grant Applications

East Windsor has pursued several Safe Routes to School grants in recent years to improve walking and biking near the Township's schools. A 2014 application for the Melvin H. Kreps Middle School in East Windsor identified the lack of a bike path and high traffic volumes as significant barriers to walking and biking to school. Specific problem areas included the intersections of Dutch Neck Road at Brooktree/Wiltshire Drive, Dutch Neck Road at Oak Creek Road, Oak Creek Road at Yorkshire/Wiltshire Drive, and Dorchester Drive at Devonshire Drive. The grant proposal sought funding to install a bike lane on the west shoulder of Oak Creek Road between Dutch Neck Road and Winsdor Center Drive, and to upgrade crossings with rectangular rapid flashing beacons and pedestrian refuge islands.

In 2014, East Windsor also submitted a Safe Routes to School grant for the installation of two solar powered flashing 25mph school zone signs near the Perry L. Drew School and Ethel McKnight School, both in Twin Rivers. The grant application identified high traffic volumes on Twin Rivers Drive as major barriers to walking to these schools, and noted that vehicles often fail to observe the 25mph school zone speed limit.

A 2012 Safe Routes to School grant application also sought funding to improve sidewalk connections to the Melvin H. Kreps Middle School, including along Dutch Neck Road between Oxford Drive and Hickory Corner Road (approximately 480 feet).

2. Study Methodology

The study methodology has several components to better understand existing bicycle and pedestrian mobility in East Windsor and to target more detailed field evaluation efforts. The project team gathered information on bicycle and pedestrian attractors and generators, crash history, key elements of the roadway network within the Township, and the roadway network's bicycle level of traffic stress. These components of the study were mapped to illustrate the existing bicycle and pedestrian network, to identify crash "hot spots" where bicycle and pedestrian crashes may be clustered, and to determine areas of confluence among the study components that might indicate specific constraints and deficiencies, inadequate bicycle and pedestrian facilities, or a combination thereof.

2.1. Attractors and Generators

Locations that could attract or produce a high number of pedestrian or bike trips were inventoried and mapped, as shown in Map 2.1. Mapping and evaluating the attractors and generators provides an understanding of key travel routes and desire lines. Attractors and generators were sorted into the following categories:

- Schools – Children (an age group considered most at-risk) walking or biking to school
- Parks – Many users bike or walk to recreational facilities and many users are children
- Municipal Buildings – Libraries, post offices, and other public facilities
- Places of worship – Many attendees walk or bike to houses of worship
- Commercial – Some shoppers arrive on foot or by bike, but many park and still have to access stores by foot

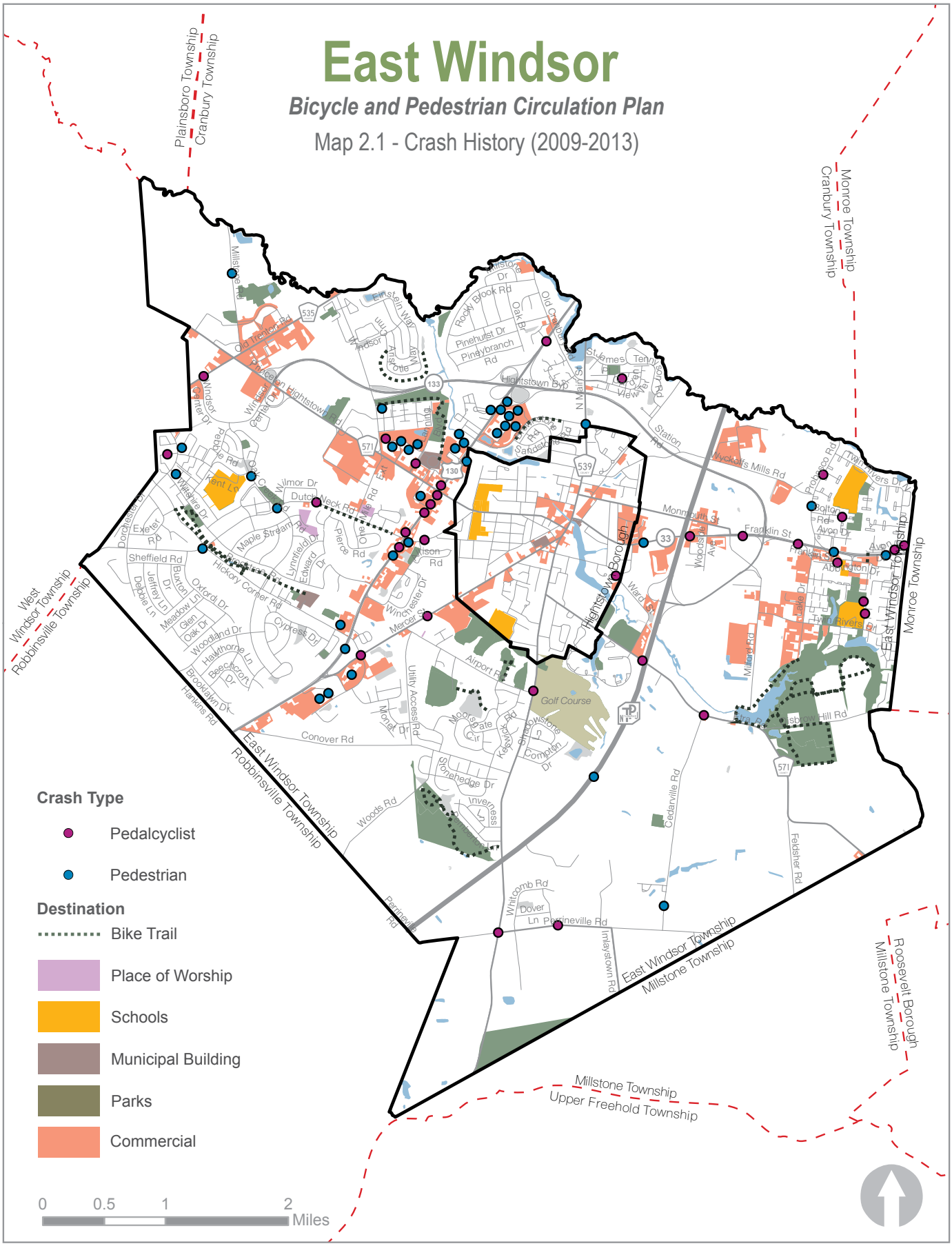
Map 2.1 on page 8 provides a map of attractors and generators and crash locations in East Windsor. The map displays pedestrian and bicyclist crashes from 2009 to 2013. A more comprehensive analysis of crash history in the Township can be found on page 9.

As an historically rural community without a traditional downtown, many of East Windsor's attractors and generators are spread out along highway corridors. East Windsor Township and Hightstown Borough share the East Windsor Regional School District. There are two elementary schools within the Township - Perry L. Drew Elementary School and Ethel McKnight Elementary School - both located in the Twin Rivers community. The Melvin H. Kreps Middle School is located in the western portion of the Township. High school age children in East Windsor attend Hightstown High School located in Hightstown Borough. Two additional elementary schools - Walter C. Black Elementary School and Grace N. Rogers Elementary School - are located in Hightstown Borough.

East Windsor

Bicycle and Pedestrian Circulation Plan

Map 2.1 - Crash History (2009-2013)



2.2. Crash Locations

The project team reviewed Township-wide NJDOT crash data to identify the location of recent bicycle and pedestrian crashes and potential areas where repeated incidents or crash clusters may have occurred. The analysis included data for 2009-2013 (inclusive), during which 42 crashes (55% of total) involving pedestrians and 34 (45% of total) crashes involving bicyclists were identified. This differs from the statewide average where pedestrian crashes account for approximately 72% of all bicycle/pedestrian crashes.

The crash locations are shown in Map 2.1, overlaid with the pedestrian and bicycle attractors and generators. The highest concentration of crashes occurred along one of the Township's main arterials (U.S. Route 130). Clusters of crashes (primarily pedestrian) can be seen in shopping centers along U.S. Route 130 and Mercer County Route 571. The Twin Rivers community is also an area with a higher number of crashes, with 7 pedestrian and 3 bicyclist crashes occurring between 2009 and 2013.

2.3. Crash Analysis

The project team also analyzed Township-wide bicycle and pedestrian NJDOT crash data in order to identify any common roadway, environmental, behavioral, or demographic factors in the data. Trends revealed in this data could indicate areas where targeted engineering or educational strategies might improve pedestrian and bicyclist safety.

As shown in Chart 2.1, approximately 81% of pedestrian crashes (34) occurred at midblock locations, while the remaining 19% (8 crashes) occurred at intersection locations. This is significantly greater than the larger statewide trend during the same analysis period, where 61% of all pedestrian crashes occurred at midblock locations. The trend among bicyclist crashes was similar, but less pronounced, with 65% (22 crashes) occurring at midblock locations, while 35% (12 crashes) occurred at intersections. This pattern differs from the statewide trend for all bicyclist crashes, where more than half typically occur at intersections (45% at midblock locations, 55% at intersection).

Chart 2.1 - Crash Distribution by Location Type

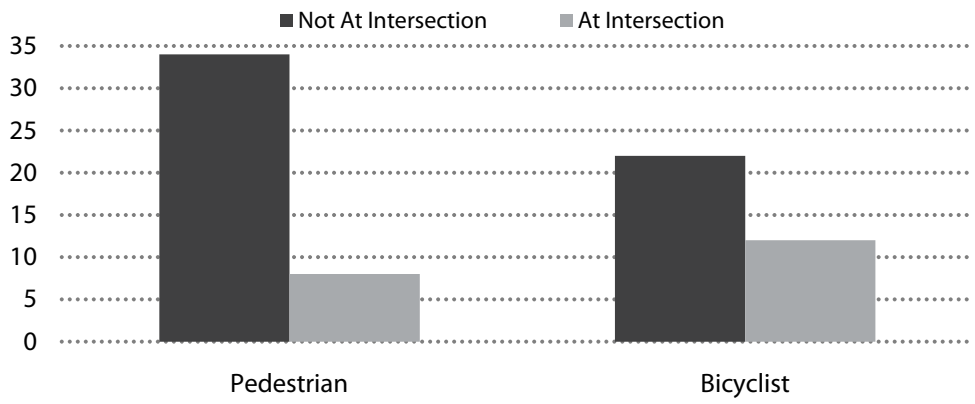
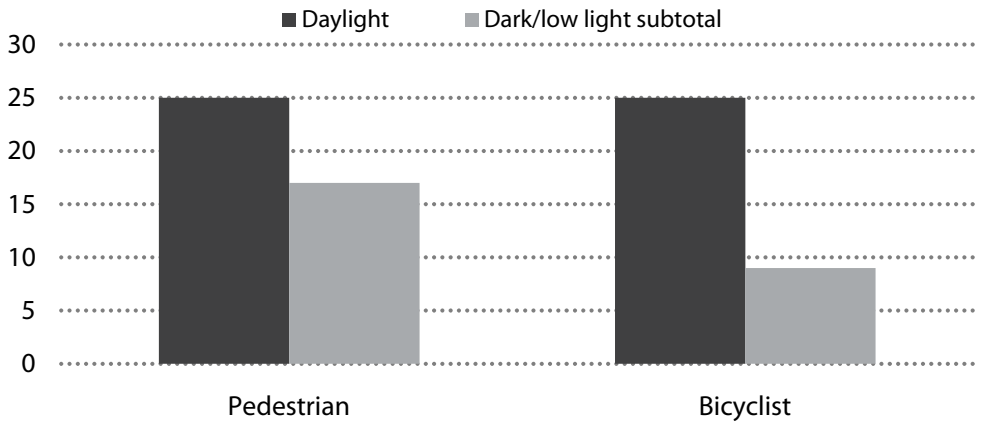


Chart 2.2 - Crash Distribution by Lighting Condition



As shown in Chart 2.2, lighting was not a major factor in pedestrian crashes. Nearly two-thirds (25 crashes, 60%) occurred during daylight conditions. This is comparable to the statewide trend, where 61% of all pedestrian crashes from 2006-2013 occurred during daylight conditions. Similarly, the majority of bicyclist crashes occurred during daylight (25 crashes, 74%), consistent with the statewide trend (75%).

The 76 pedestrian and bicyclist crashes reported during the analysis period involved 89 victims: the 42 pedestrian crashes involved 53 pedestrians and the 34 bicyclist crashes involved 36 bicyclists. There were 4 fatal crashes including 2 pedestrians and 2 bicyclists, and an additional 4 pedestrian crashes resulting in severe injury.

Pedestrian crashes involved a similar proportion of females to males. Among pedestrian crashes, 51% involved females and 49% males. The proportion was skewed for bicyclist crashes, which involved nearly five times as many males as females. This is generally consistent with statewide and national trends, where males tend to be more frequently involved in pedestrian and bicyclist crashes. The proportion of male pedestrian crashes and bicyclist crashes in the Township are both comparable to the statewide proportion (49% vs. 52% and 81% vs. 82%, respectively). Chart 2.3 illustrates the distribution of crashes by gender.

Chart 2.3 - Crash Distribution by Gender

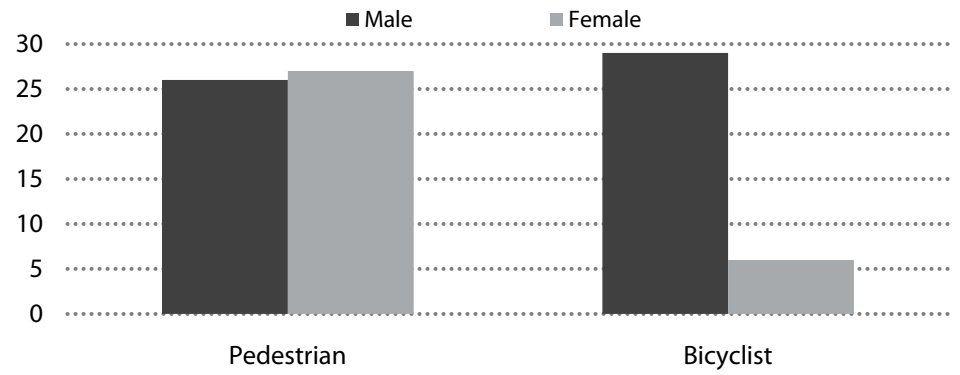
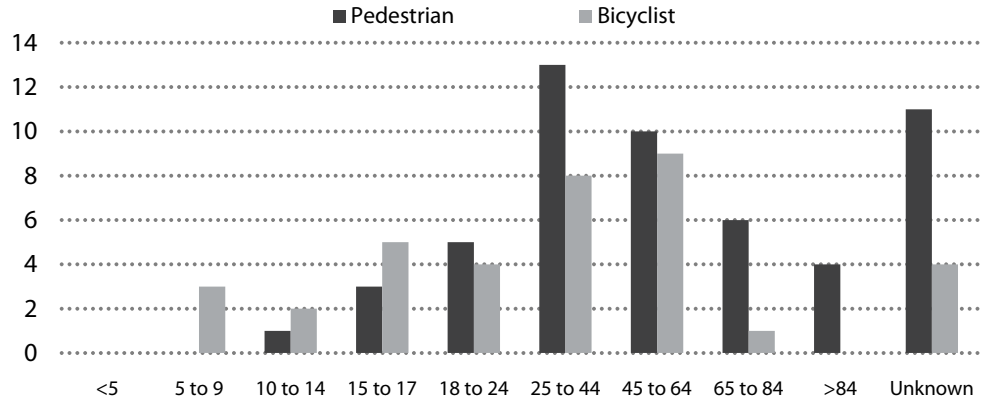


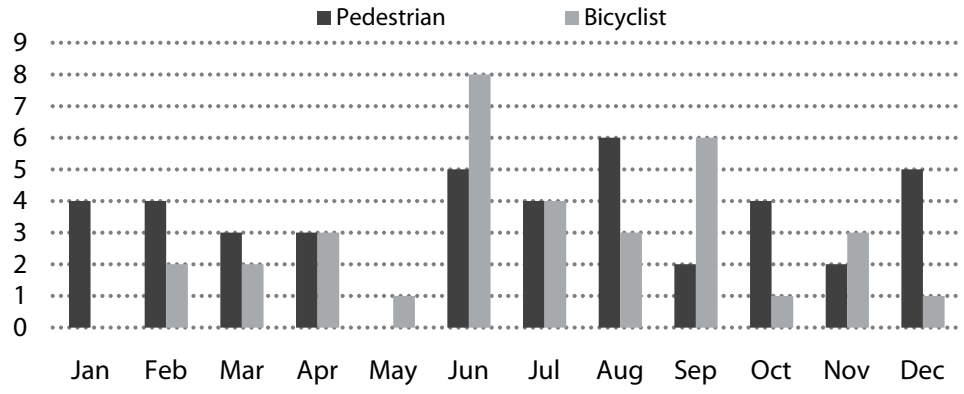
Chart 2.4 - Crash Distribution by Victim Age



Crashes were also reviewed by the age distribution of the pedestrian(s) or bicyclist(s) involved. Pedestrian crashes were generally skewed toward the middle age groups. Young people (ages 5-24) were involved in only 17% of all pedestrian crashes (9 crashes), while 44% of pedestrian crashes involved the 25 to 64 age group, consistent with statewide averages. Seniors (65+) were involved in 19% (10) of pedestrian crashes. Bicyclist crashes involved both young people and adults. Young people (ages 5-24) accounted for 39% of bike crashes. Other age groups with the largest number of crashes included ages 25-44 (8, 22%) and 45-64 (9, 25%), consistent with statewide averages. The age distribution of crashes is illustrated in Chart 2.4.

An increase in crashes may be expected during the summer season (June-August) due to an increase in bicycle and pedestrian activity due to warmer weather and school vacation. A review of the crash data indicates that a slightly higher portion of crashes occurred during the summer season, higher than the statewide average for the same period. For pedestrian crashes, 36% (15 crashes) occurred during the summer season, compared to 23% statewide. Bicyclist crashes tend to peak during the summer months. In East Windsor, June had the highest number of bicycle crashes (8). Overall, 15 bicyclist crashes (44%) occurred during the summer season, comparable to 42% statewide. The monthly distribution of crashes is illustrated in Chart 2.5.

Chart 2.5 - Crash Distribution by Month



Crash reports identify up to two "contributing factors" by vehicles and up to two "contributing factors" by pedestrians/bicyclists that led to the crash. This information can identify behavioral factors contributing to crashes that could be addressed through engineering or education strategies. Among the 42 pedestrian crashes, 46 driver contributing circumstances were cited – 23 for "driver inattention", 8 for "backing unsafely", 6 for "failed to yield the right of way", and the remainder for other factors. A variety of pedestrian contributing circumstances were cited, though there was no clear leading factor. Pedestrian factors cited in more than two crashes included: "running/darting across traffic" (3 crashes) and "other pedestrian factors" (5 crashes).

Among the 34 bicyclist crashes, 22 driver contributing circumstances were cited – 13 for "driver inattention", 5 for "failed to yield the right of way", and 2 for "improper turning." Five different bicyclist actions were noted as contributing circumstances, including: "failed to yield the right of way" (5 crashes), "driver inattention" (4 crashes), "wrong way" (4 crashes), "improper turning" (3 crashes), "improper lane change" (2 crash), and "failed to use signal" (1 crash). The crash data also indicated that alcohol was involved in 3 of the bicyclist crashes.

Crash data also identifies the "precrash action" of the pedestrian, bicyclist, and vehicle before the crash occurred. Among the 42 pedestrian crashes, 9 involved crossing actions - 6 "crossing at a marked crosswalk (at intersection)", 2 "crossing at a marked crosswalk (at midblock)", and 1 "crossing/jaywalking (at midblock)." Other pedestrian precrash actions with more than one instance included "standing/lying/kneeling in road" (4 crashes) and "coming from behind parked vehicle" (3 crashes). One of the crashes involved "walking to/from school." The most common vehicle precrash actions were "going straight ahead" (25 crashes), "backing" (9 crashes), "making left turn" (6 crashes), and "making right turn (not turn on red)" (2 crashes).

Among the 34 bicyclist crashes, most bicyclists and drivers were typically traveling straight ahead at the time of the crash (22 and 14, respectively). The only other bicyclist action with more than one occurrence was "making left turn" (2 crashes) and "riding on shoulder" (2 crashes). Vehicles making left-turns were involved in 5 crashes, vehicles turning right on red were involved in 4 crashes, vehicles making right-turns (not on red) were involved in 3 crashes, and vehicles merging/entering traffic lane were involved in 3 crashes.

The crash data is summarized in Table 2.1.

Table 2.1 - 2009 – 2013 Pedestrian and Bicyclist Crash Data Summary

Crash Type	Total	% of Total
Pedestrian	42	55%
Bicyclist	34	45%
Total	**76**	**100%**

Crash Type	Severity	Total	% of Total
Pedestrian	**Killed**	2	4%
	Incapacitated	4	8%
	Moderate Injury	9	17%
	Complaint of Pain	21	40%
	Unknown	17	32%
	Total	**53**	**100%**

Crash Type	Severity	Total	% of Total
Bicyclist	**Killed**	2	6%
	Incapacitated	0	0%
	Moderate Injury	11	31%
	Complaint of Pain	14	39%
	Unknown	9	25%
	Total	**36**	**100%**

Crash Type	Location	Total	% of Total
Pedestrian	**At Intersection**	8	19%
	Not At Intersection	34	81%
	Total	**42**	**100%**

Crash Type	Location	Total	% of Total
Bicyclist	**At Intersection**	12	35%
	Not At Intersection	22	65%
	Total	**34**	**100%**

Crash Type	Lighting	Total	% of Total
Pedestrian	**Daylight**	25	60%
	Dawn, Dusk, or Dark	17	40%
	Total	**42**	**100%**

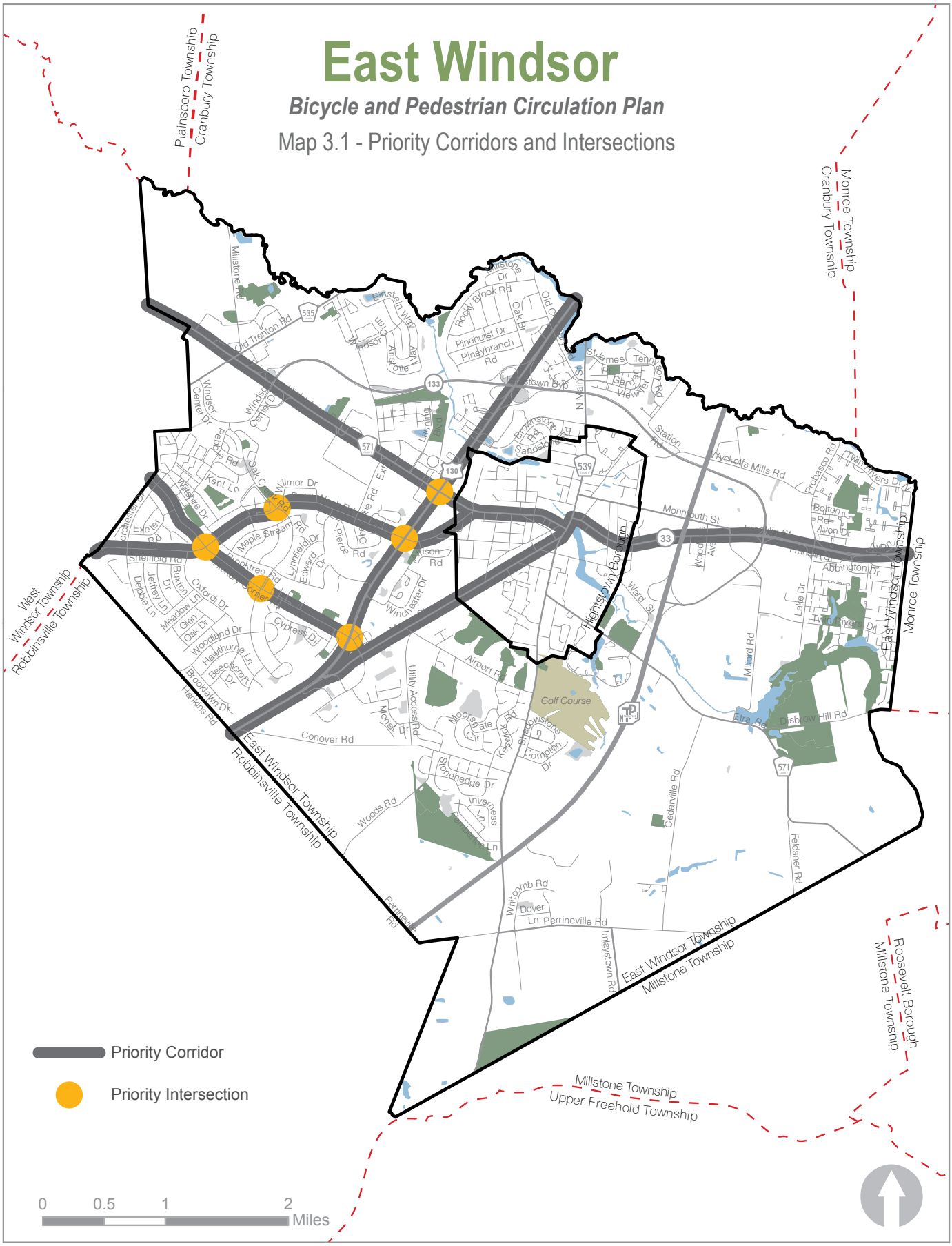
Crash Type	Lighting	Total	% of Total
Bicyclist	**Daylight**	25	74%
	Dawn, Dusk, or Dark	9	26%
	Total	**34**	**100%**

Source: 2009-2013 NJDOT crash data

East Windsor

Bicycle and Pedestrian Circulation Plan

Map 3.1 - Priority Corridors and Intersections



3. Existing Conditions

Crash data, trip generators, a review of the local roadway network, previous studies and grant applications, and initial input from Township stakeholders provided during the kick-off meeting were analyzed together to identify candidate focus areas within East Windsor for a more detailed field analysis. A focus area could be based on the expected travel patterns given the roadway network and generator locations or could be a crash "hot spot" where multiple crashes involving pedestrians or bicyclists occurred during the study period. For example, a high number of pedestrian crashes near a large generator (like a school) might indicate a recurring problem.

Based on the analysis, the project team sought to gather more detailed information on the Township's existing pedestrian and bicycle network in the following areas.

Pedestrian Facilities

The project team collected detailed information at several corridors and spot locations throughout the Township. The crash data indicated that there were no crash "hot spots" at intersections. Instead they tended to be distributed along the main arterials (particularly U.S. Route 130), which also serve many of the key trip generators within the Township, including commercial areas, schools, recreation, and municipal services. The corridors selected for further analysis are:

- U.S. Route 130
- NJ Route 33 (Mercer Street)
- Princeton-Hightstown Road (County Route 571)
- Hickory Corner Road
- Dutch Neck Road

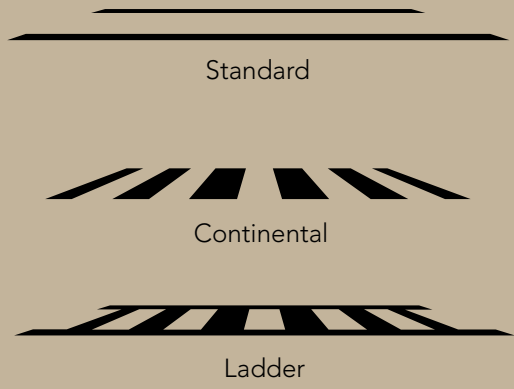
In addition to the corridors, five key intersections were identified for field evaluation. These intersections link the key corridors, had multiple crashes, are proximate to major generators, and/or are problem locations cited in previous studies. Pedestrian accommodations were reviewed at each, including:

- U.S. Route 130 at Hickory Corner Road
- U.S. Route 130 at Dutch Neck Road
- U.S. Route 130 at Princeton-Hightstown Road (County Route 571)
- Hickory Corner Road at Oak Creek Road
- Dutch Neck Road at Oak Creek Road

Each corridor and spot location is described in more detail in the following sections. The corridors and spot locations were evaluated for appropriate pedestrian facilities

Crosswalk Types

Standard two-stripe crosswalks (such as shown on top) have low visibility to drivers as they approach the crossing. Crosswalks with longitudinal stripping (such as the bottom two) improve visibility to drivers from a greater distance, allowing greater reaction time and increased expectation of potential pedestrian crossing activity.



and accommodations, including presence of shoulders (approximate widths), crosswalks, roadway widths/number of lanes, on street parking, drainage grates, speed limit, sidewalks, grading, lighting, driveways, ADA-compliant curb ramps, obstructions, and bus stops. Additionally, signalized intersections were examined for pedestrian signals (including the presence of countdown pedestrian signal heads compliant with Manual on Uniform Traffic Control Devices (MUTCD) guidance) and push buttons.

Figure 3.1 indicates the locations of the pedestrian corridors and intersections selected for analysis and field conditions evaluation.

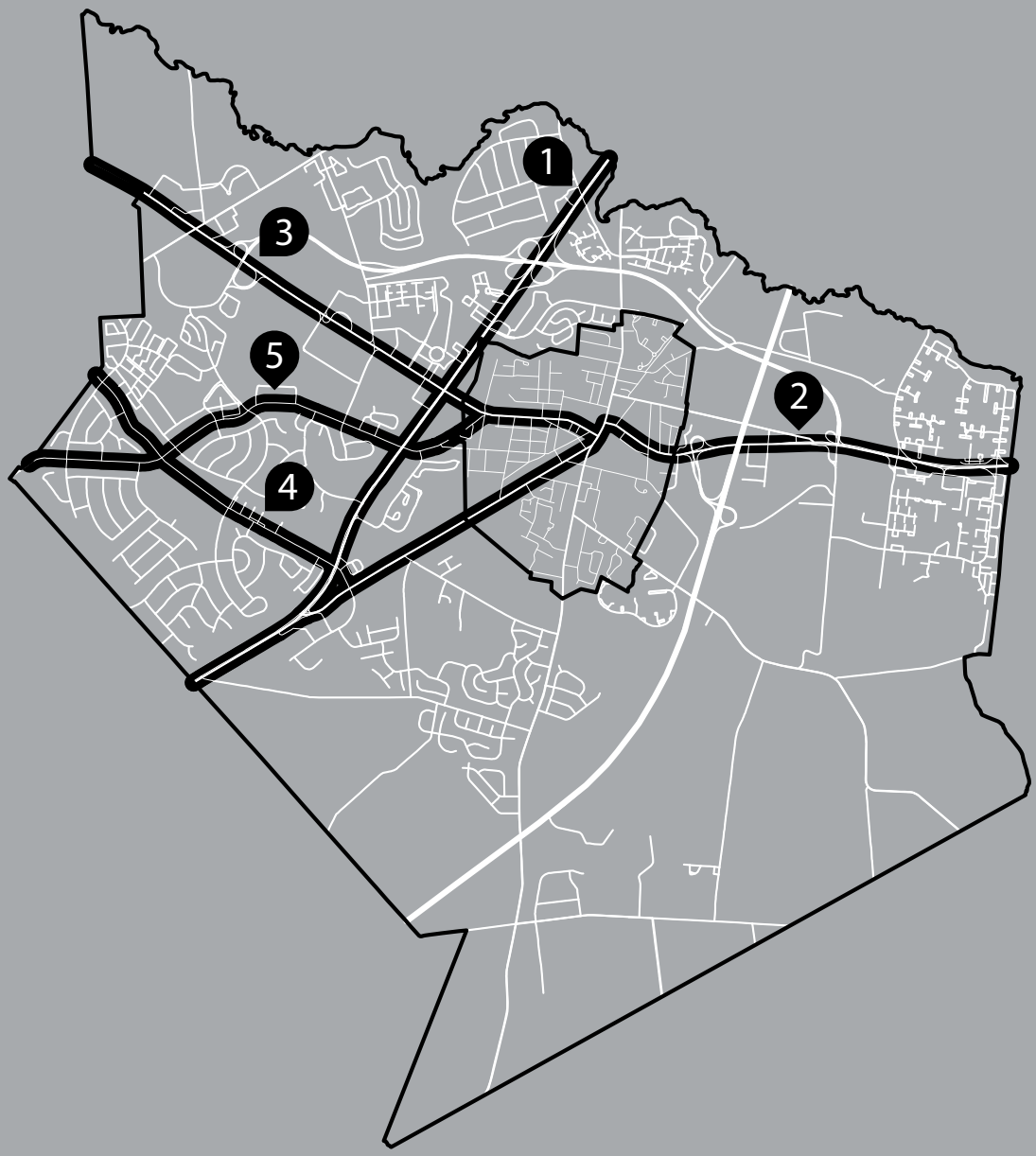
Bicycle Facilities

The project team evaluated the Township's roadway network from the perspective of bicycle level of traffic stress (LTS). The bicyclist LTS analysis is the state of the art in bicycle planning and design practice and accounts for various skill levels, travel purposes, age and experience of cyclists. It is reflective of how cyclists view and experience the roadway environment and how they choose routes based on the experience of comfort and stress level from exposure to vehicle speeds and volumes, as well as relative proximity to vehicular traffic. The metric provides a snapshot of the suitability of each link in the roadway network for bicycling and identifies areas for potential improvements. The bicycle analysis is summarized starting on page 48.

Trails and Parks

East Windsor's existing multi-use paths and trails provide important off-road alternatives for biking and walking through the Township. The project team evaluated the condition of the trail network, with particular focus on road crossings and connections between the paths. The analysis of the Township's off-road trail facilities is summarized starting on page 54.

3.1 PRIORITY CORRIDORS

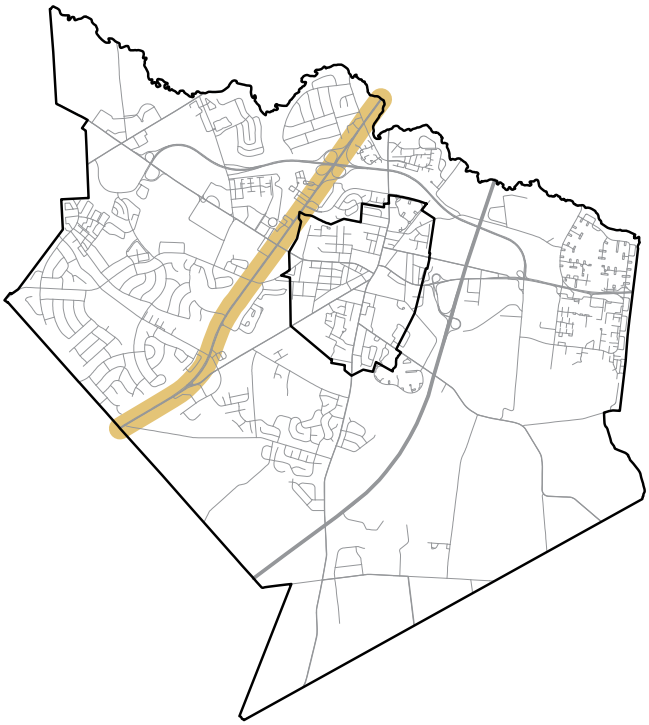


1 U.S. Route 130 (Mile Post 67.22 – 70.04)

U.S. Route 130 is the primary north-south arterial through East Windsor. It carries both local and regional traffic, providing connections to Robbinsville Township and I-195 to the south and Cranbury Township and the New Jersey Turnpike Interchange 8A to the north. U.S. Route 130 carries significant traffic volumes, with recent NJDOT traffic counts at several locations along the corridor indicating an annual average daily traffic (AADT) of over 29,000 vehicles. Due in part to its connections to I-195 and the New Jersey Turnpike, U.S. Route 130 is also a major truck route serving several distribution and warehousing centers and industrial land uses in the region. NJDOT traffic counts indicate that truck traffic composes over 6% of traffic volume, which was supported by anecdotal field observations.

U.S. Route 130 is a high speed, divided roadway. It carries two lanes of traffic in both directions, separated by a vegetated median. Travel lanes are typically 12 feet with a 10-foot shoulder, and the speed limit ranges from 45 – 55 mph within the Township. The combination of high traffic speeds and volumes, high truck volumes, traffic noise, and wide cross-section creates an unfriendly environment for bicycling and pedestrian activity.

U.S. Route 130 has been cited in various studies for safety concerns and design deficiencies. It is one of East Windsor's principal commercial corridors, providing access to a variety of stores, retail centers, and big-box retail development between Hickory Corner Road and NJ Route 133. Due to the concentration of commercial development, a relatively high degree of pedestrian activity was observed along this portion of the corridor during field observations, despite its arterial designation and design. The sidewalk network along the Route 130 corridor is generally continuous in both directions from Hickory Corner Road (MP 67.50) to Old Cranbury Road (MP 69.79). The sidewalk is typically five feet wide with a grass buffer of variable width between the curb-line and the sidewalk. There are no wide, open access driveways to properties along the corridor and access points along the roadway are generally limited and well defined, minimizing potential conflict points between turning vehicles and pedestrians, bicyclists, and other vehicles. Driveways typically divide the sidewalk network, however, rather than pulling the sidewalk through the driveway to prioritize pedestrian movement, and many lack ADA-compliant treatments (e.g., detectable warning surfaces).



There are six signalized intersections along the corridor. While the signals enable pedestrian crossings of the high speed and high traffic volume roadway, the spacing of the crossing opportunities (typically 0.33 miles or greater) limits network connectivity and convenience for pedestrians. Lighting along the corridor is limited to ambient commercial lighting and scattered utility-pole mounted streetlights, typically near intersections.

U.S. Route 130, looking north towards Town Center shopping center and NJ 133 interchange

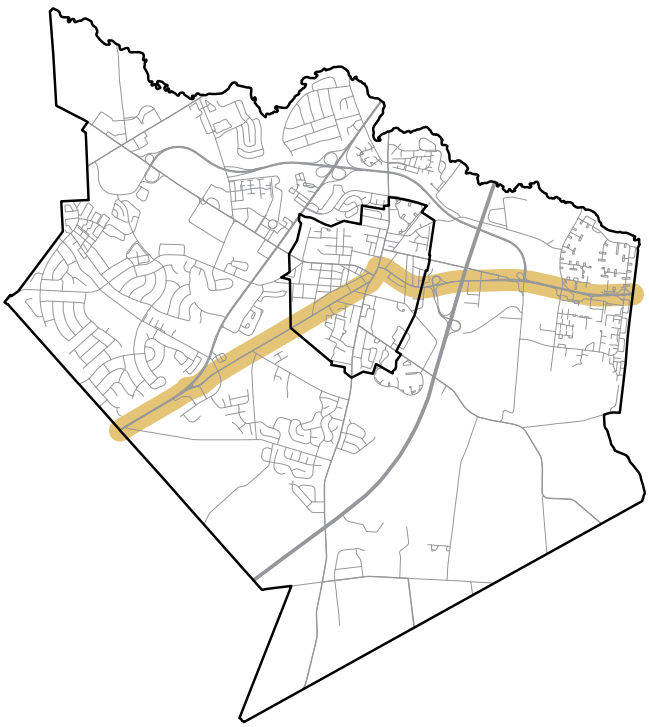
U.S. Route 130 at Princeton-Hightstown Road, looking north

2 NJ Route 33 (Mercer Street; Mile Post 12.42 –13.38, 14.68 – 16.42)

NJ Route 33 is one of the primary east-west arterials through the Township, traversing Hightstown and linking the western and eastern portions of East Windsor. The corridor carries both local and regional traffic, connecting vehicular traffic to U.S. Route 130 to the west and Monroe Township to the east. Within the Township, it also provides access to the New Jersey Turnpike via East Windsor, located east of Hightstown. Traffic volumes are high throughout the corridor. NJDOT traffic counts indicate an AADT of approximately 11,300 vehicles (2010) on the portion west of Hightstown and approximately 29,600 vehicles (2013) on the segment east of the New Jersey Turnpike. Due in part to the link to the New Jersey Turnpike, NJ Route 33 is also a significant truck route. An NJDOT traffic count indicates that trucks compose approximately 7.1% of vehicular traffic on the corridor.

The character of NJ Route 33 changes as it traverses East Windsor. West of Hightstown, NJ Route 33 is typically a two-lane roadway with 12-foot lanes, 6-foot shoulders, and a 45 mph speed limit. With the exception of a shopping plaza at the intersection with Hickory Corner Road, there are few pedestrian generators on this portion of the roadway. There is an incomplete sidewalk network along this segment; sidewalk is limited to the eastbound side in the vicinity of the shopping plaza, between U.S. Route 130 and just east of Hickory Corner Road. Despite the presence of a shoulder, the high traffic speeds and volumes create a stressful environment for bicyclists, and the limited sidewalk network makes the corridor segment inaccessible for pedestrians.

As NJ Route 33 crosses Hightstown, the speed limit lowers to 25-35 mph and the character transitions to more of a residential and main street environment. In the eastern portion of East Windsor, east of Hightstown, NJ Route 33 transitions back to an arterial character. Between Hightstown and the New Jersey Turnpike, the speed limit increases to 50 mph and the typical cross section to two 12-foot lanes with an 8-foot shoulder. East of the New Jersey Turnpike, the speed limit increases again to 55 mph and NJ Route 33 becomes a divided highway. This segment of NJ Route 33 has 2-3 lanes in each direction, separated by a grass median approximately 38 feet wide, with 12-foot shoulders. There are several commercial properties along this segment of the corridor, but few significant pedestrian activity generators. The segment is inaccessible to pedestrians due to the lack of a sidewalk network, and the high traffic speeds and volumes create a stressful environment for bicyclists, despite the presence of a shoulder.



NJ Route 33 near Lake Drive, looking east

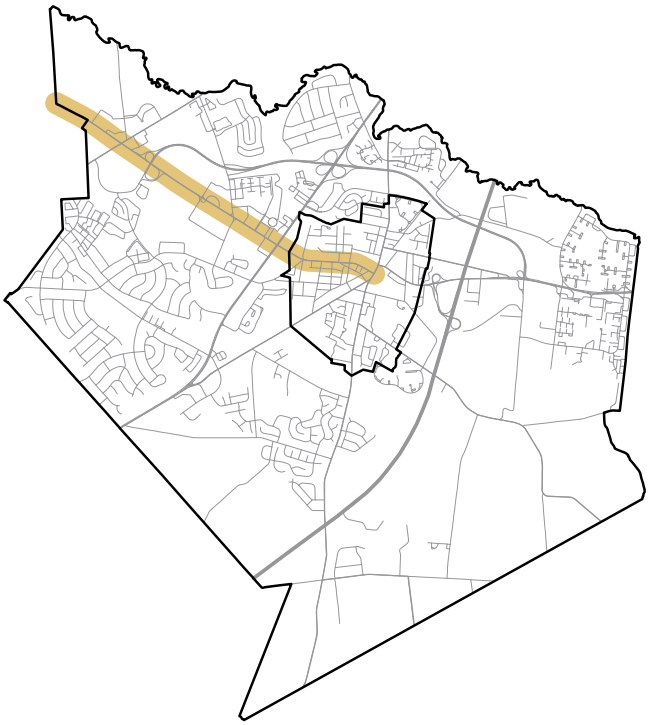
NJ Route 33 near Lake Drive, looking west

3 Princeton-Hightstown Road (CR 571, Mile Post 35.21 – 37.53)

Princeton-Hightstown Road is a major east-west corridor through the western portion of East Windsor. It provides a connection to Hightstown to the east and Princeton and West Windsor and U.S. Route 1 to the west. It also provides a connection to the western terminus of NJ Route 133, which provides a limited access bypass around Hightstown to the eastern portion of East Windsor. The roadway carries heavy vehicular traffic, with NJDOT traffic counts indicating an AADT of approximately 22,400 vehicles (2013) west of NJ Route 133 and 15,000 vehicles (2013) east of NJ Route 133.

Princeton-Hightstown Road has high travel speeds throughout the corridor, with the speed limit ranging from 45-50 mph. The typical cross section varies along the corridor. Between the West Windsor border and NJ Route 133, the roadway is four 12-foot lanes with no shoulder. East of NJ Route 133, the corridor is typically two 12-foot lanes with a 6-foot shoulder until One Mile Road. Between One Mile Road and Lanning Blvd, Princeton-Hightstown Road is three travel lanes with no shoulder. West of Lanning Boulevard, to Route 130, the corridor is typically four travel lanes with a two-way-center-left-turn-lane and no shoulder.

The corridor is generally low density commercial. Pedestrian destinations are concentrated in the eastern portion of the corridor between One Mile Road and U.S. Route 130, including stores, retail centers, and big-box retail development, as well as the Township municipal building.



Pedestrian accommodations along the corridor are limited. There is no sidewalk network west of One Mile Road. East of One Mile Road, there is a generally continuous sidewalk along the westbound side only, which provides pedestrian access to the majority of the corridor's commercial properties. The existing sidewalk network consists of an eight-foot wide multi-use path in front of the Target shopping plaza and a five-foot wide concrete sidewalk between Lanning Boulevard and U.S. Route 130. There is one significant sidewalk gap, located at the property at the corner of Lanning Boulevard. Pedestrian facilities at intersections and driveways are inconsistent throughout the corridor, as many lack crosswalk striping or ADA-compliant treatments. Lighting along the corridor is limited to scattered utility-pole mounted streetlights, typically near intersections.

Due to the high traffic speeds and volumes, the corridor is a stressful environment for cyclists. It is also largely deficient from a pedestrian perspective, as pedestrian facilities are limited to the westbound side of the corridor between One-Mile Road and U.S. Route 130.

Princeton-Hightstown Road at McGraw Hill, looking southeast

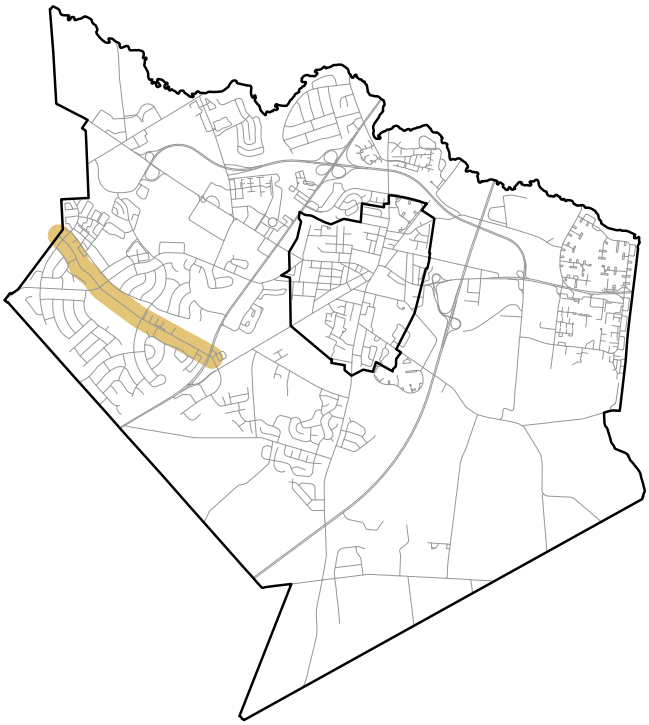
Princeton-Hightstown Road at U.S. Route 130, looking northwest

4 Hickory Corner Road

Hickory Corner Road is an east-west corridor in the western portion of East Windsor. It is a connector roadway linking residential neighborhoods with U.S. Route 130. Hickory Corner Road has an AADT of approximately 4,100 vehicles (NJDOT). Pedestrian destinations along the corridor include the Hickory Corner Library, linear parkland adjacent to the Bear Brook Pathway, and the Melvin H. Kreps Middle School near the western end of the corridor.

The character of the roadway varies slightly along the corridor. Between U.S. Route 130 and Dutch Neck Road, the roadway is suburban/rural with a mixture of single family detached residential, garden apartment buildings, and farmland, as well as some commercial properties near the U.S. Route 130 intersection. The typical cross section is a two-lane road with 12-foot travel lanes and 6-foot shoulders, and the speed limit is posted at 40 mph. There is minimal sidewalk network along this portion of the corridor. The sidewalk is limited to between One Mile Road South and U.S. Route 130 (approximately 500 feet), as well as frontage of the Hickory Corner Library property. Though the segment lacks a continuous sidewalk network, the Bear Brook Pathway provides an alternative parallel route for pedestrians traveling west of the Library. The pathway extends west from the library to Yorkshire Drive, running mid-block between Hickory Corner Road and Wiltshire Drive. Lighting along the segment is limited to scattered utility-pole mounted streetlights, typically near intersections.

Overall, this segment of the corridor generally lacks adequate pedestrian facilities, most notably between the Hickory Corner Library and One Mile Road South (approximately a 0.25 mile stretch). This creates a gap between existing sidewalk at the eastern end of the corridor and the Bear Brook Pathway west of the Library. For bicyclists, the segment has a moderately low traffic volume and a consistent shoulder, which accommodates experienced cyclists. However, the high traffic speeds create a stressful environment for most cyclists.



From Dutch Neck Road to Dorchester Drive, the western terminus of the corridor, Hickory Corner Road is a low speed local residential street with single family detached housing. The roadway is typically 36 feet wide with on-street parking and no marked center-line, and the speed limit is reduced to 25 mph. This segment has a continuous sidewalk network throughout, typically four feet wide with a three-foot grass buffer. Lighting along the segment is limited to scattered utility-pole mounted streetlights, typically near intersections. Overall, this segment of the corridor has adequate facilities for both pedestrians and bicyclists.

Hickory Corner Road at Oak Creek Road, looking northwest

Hickory Corner Road just east of Dutch Neck Road, looking northwest

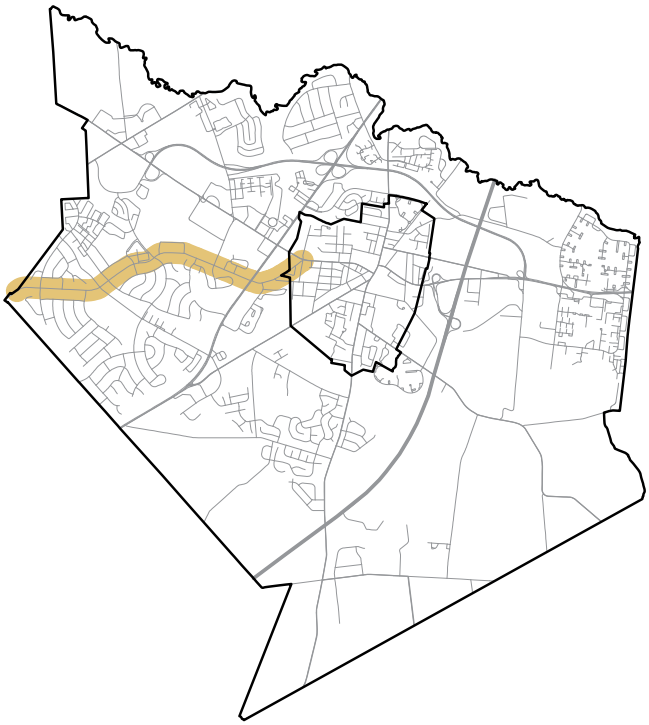
5 Dutch Neck Road

Dutch Neck Road is a meandering east-west corridor primarily in the western portion of East Windsor. The local roadway connects residential neighborhoods to the west with U.S. Route 130 and Hightstown to the east. Pedestrian destinations along the roadway include commercial development at the intersection with U.S. Route 130 and the Melvin H. Kreps Middle School near the western end of the corridor. There is no NJDOT traffic count data available for the corridor; however, based on field observations and layout of the roadway network, the AADT is expected to be slightly higher than Hickory Corner Road.

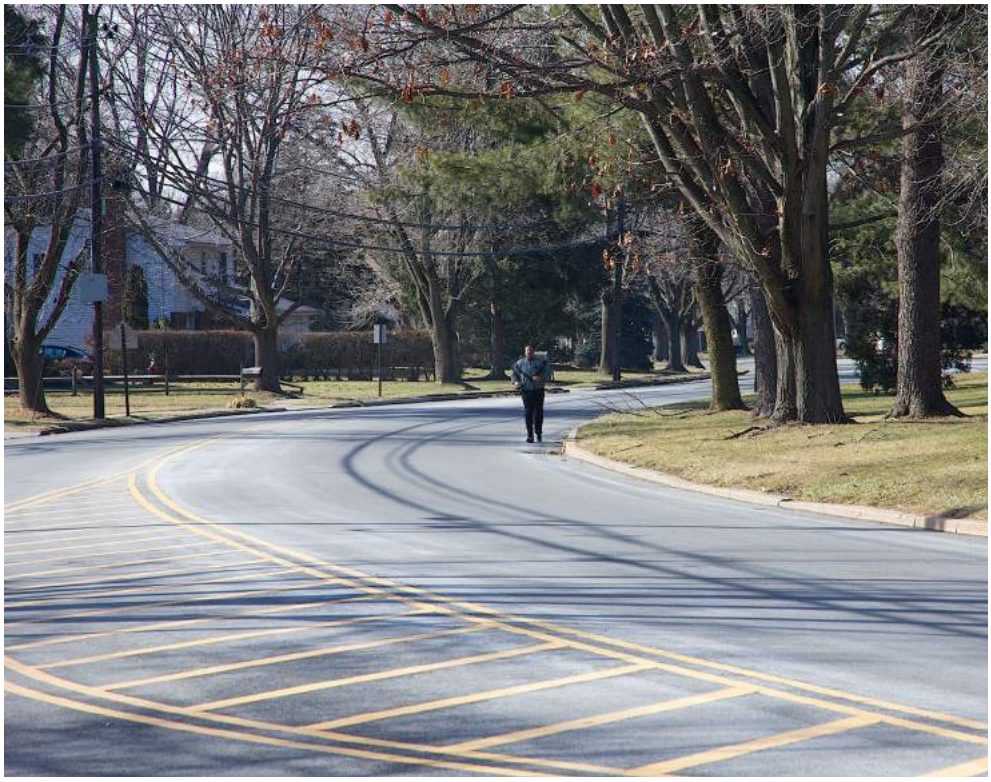
Dutch Neck Road is a two-lane roadway with a posted speed limit of 30-35 mph. The roadway configuration varies slightly along the corridor. Between U.S. Route 130 and Oak Creek Road, the typical cross section is a 34-foot cartway width with 12-foot travel lanes and 5-foot shoulders. West of Oak Creek Road, the typical cartway width is 40 feet, divided into two 20-foot lanes and no shoulder.

The Dutch Neck Road corridor lacks a continuous sidewalk network. While there are several long segments of existing sidewalk, they alternate between the eastbound and westbound side of the roadway and there are significant gaps between sections. Intersection treatments are variable – some intersections have marked crosswalks and/or ADA-compliant curb ramps while others lack marked crosswalks and/or curb ramps. Lighting along the segment is limited to scattered utility-pole mounted streetlights, typically near intersections.

Overall, the corridor lacks a continuous sidewalk network for pedestrians. For bicyclists, the corridor has moderate traffic volumes and speeds, but lacks dedicated bicycle facilities. However, the large existing cartway width provides an opportunity for improvements.



Dutch Neck Road, looking east towards U.S. Route 130



Dutch Neck Road at Oak Creek Road, looking west

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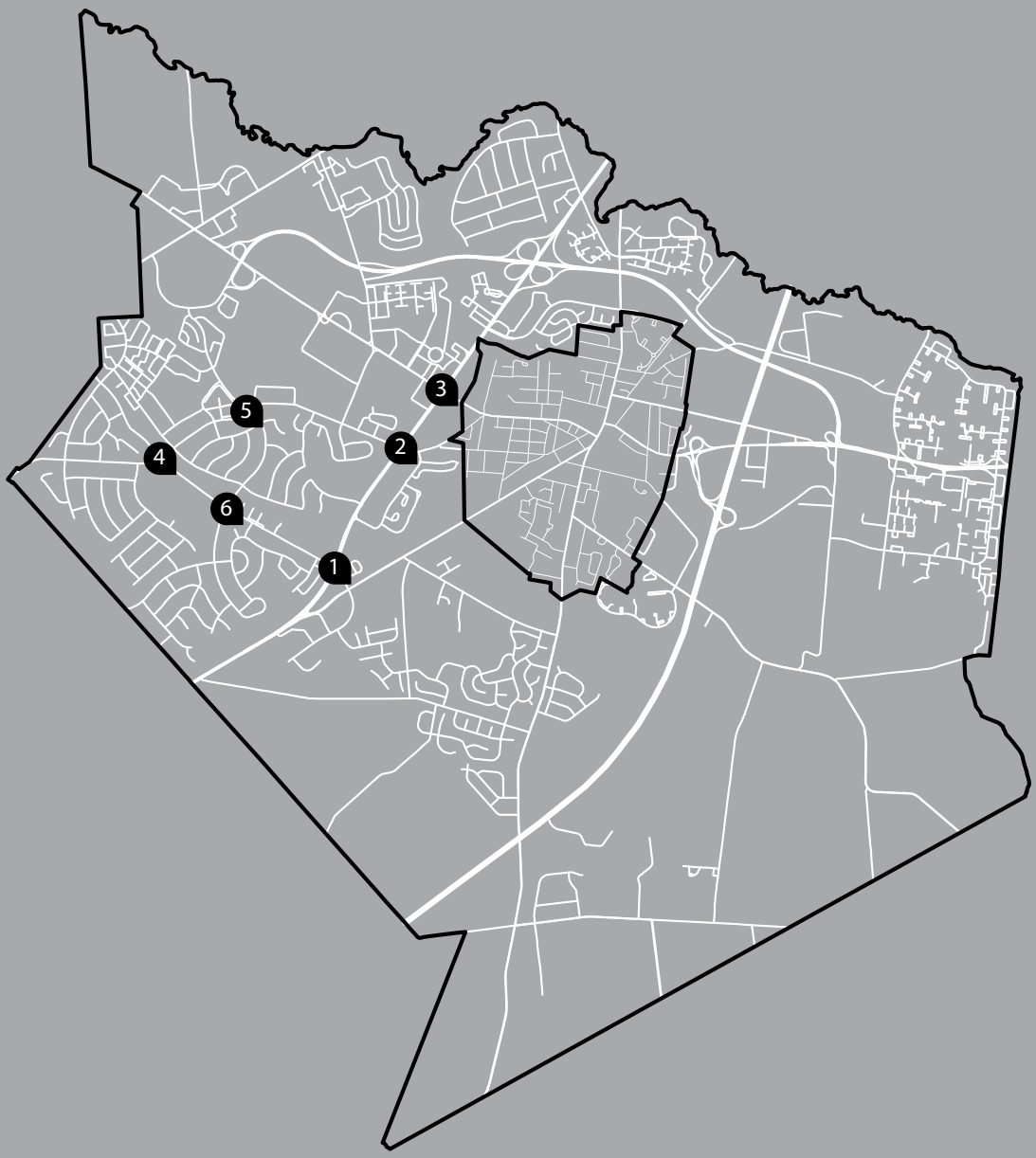
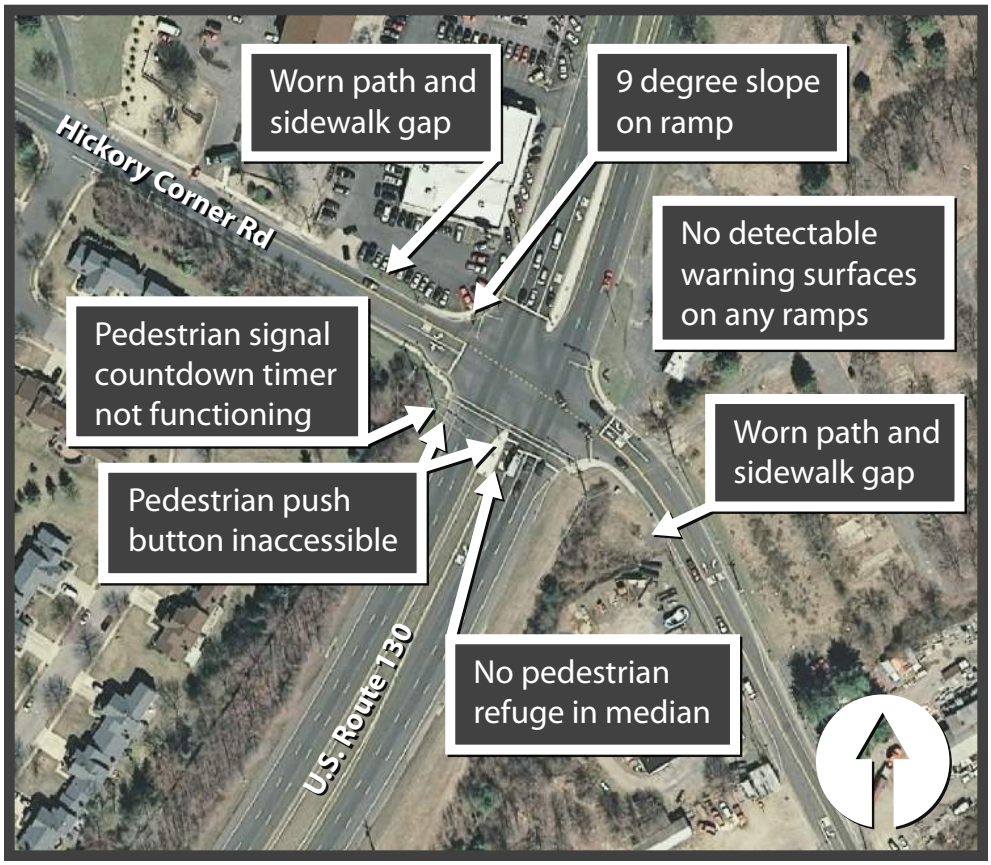
3.2 PRIORITY INTERSECTIONS



1 U.S. Route 130 at Hickory Corner Road

Located along one of the primary arterials in East Windsor, this intersection provides an essential link between residential neighborhoods in the western portions of the Township and retail and commercial development to the east. The north-south approach (U.S. Route 130) connects to NJ Route 33 approximately 0.25 miles to the south. The east-west approach (Hickory Corner Road) provides access to the most populous quadrant of East Windsor in the southwest corner of the Township. The southbound intersection approach along U.S. Route 130 is four lanes including one left-turn only lane. The northbound approach along U.S. Route 130 is five lanes including one left-turn only and one right-turn only lane. The eastbound approach along Hickory Corner Road includes one through-right lane and one left-turn only lane. The westbound approach along Hickory Corner road includes one straight only and one right-turn only lane. Pedestrian destinations in the area include a commercial development near the northwest corner that features food and convenience establishments. Two pedestrian crashes occurred at the intersection during the crash analysis period.

Key pedestrian issues and deficiencies at the intersection include a lack of detectable warning surfaces on curb ramps and limited sidewalk connectivity. These deficiencies make this location a significant barrier for many pedestrians. Existing pedestrian infrastructure is summarized below and deficiencies are highlighted in the annotated aerial photo.



Crosswalk striping

- Standard crosswalk striping at all approaches (Sign at NW and NE corners instructs pedestrians to use other crosswalk to cross U.S. Route 130)

Curb Ramps

- All ramps lack detectable warning surfaces
- Ramp at NW corner exceeds ADA-standards for slope (9 degree slope)

Pedestrian Signals and Push Buttons

- Three crossings have pedestrian signal heads with countdown timers. Crosswalk across U.S. Route 130 at NW and NE corners does not have signal heads as pedestrians are instructed to use other crosswalk.
- Pedestrian clearance times meet MUTCD guidelines (40 seconds for approximately 140 foot distance to cross U.S. Route 130; 25 seconds for approximately 63 foot distance across Hickory Corner Road)
- Pedestrian push buttons at all corners (and median); button at SW corner is not ADA-compliant as it is not accessible from the sidewalk; button located on the center median is not ADA-compliant as the median lacks curb ramps and is not accessible from the crosswalk. This button allows for a two-step crossing which might be necessary for those with a disability.
- Pedestrian countdown timer at SW corner facing U.S. Route 130 was not functioning at the time of the field visit

Sidewalk Network

- Sidewalks exist at all corners but there are significant gaps in the network along Hickory Corner Road to the east and west and along U.S. Route 130 to the south
- Worn paths to the east and west indicate unmet pedestrian demand

Lighting

- Crosswalk lighting only at SW corner
- No pedestrian scale lighting

Other Infrastructure (signage, obstructions, etc)

- Median on U.S. Route 130 not extended for ADA-compliant pedestrian refuge.

Worn path and utility obstruction along Hickory Corner Road near U.S. Route 130, facing east

Sign at NW corner of intersection instructs pedestrians to use other crosswalk

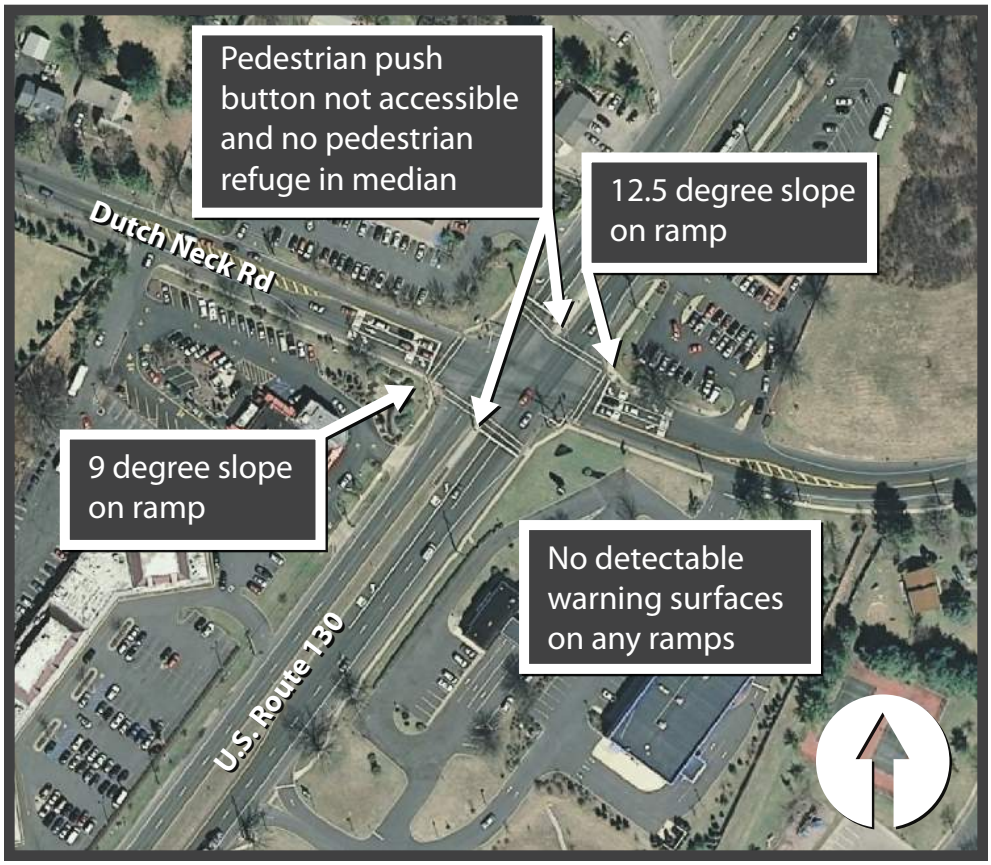
U.S. Route 130, facing north

Worn path along Hickory Corner Road near U.S. Route 130, facing west

2 U.S. Route 130 at Dutch Neck Road

Similar to the intersection of U.S. Route 130 and Hickory Corner Road, this intersection provides an essential link between residential neighborhoods in the western portions of the Township, retail and commercial development surrounding the intersection, and access into Hightstown Borough to the east. The north-south approach (U.S. Route 130) connects to Princeton Hightstown Rd (CR 571) approximately 0.4 miles to the north. The east-west approach (Dutch Neck Road) provides access to the most populous quadrant of East Windsor in the southwest corner of the Township. The southbound intersection approach along U.S. Route 130 is four lanes including one left-turn only lane and one right-turn only lane. The northbound approach along U.S. Route 130 is three lanes including one left-turn only lane. The eastbound and westbound approaches along Dutch Neck Road include one left-turn only lane, one straight only lane and one right-turn only lane. Pedestrian destinations in the area include commercial and retail development surrounding the intersection, which feature food and convenience establishments. Two pedestrian crashes and three bicyclist crashes occurred near the intersection during the crash analysis period.

Key pedestrian issues and deficiencies at the intersection include a lack of detectable warning surfaces on curb ramps and limited sidewalk connectivity. Existing pedestrian infrastructure is summarized below and deficiencies are highlighted in the annotated aerial photo.



Crosswalk striping

- Standard crosswalk striping at all approaches

Curb Ramps

- All ramps lack detectable warning surfaces
- Ramp at NE and SW corners exceed ADA-standards for slope (12.5 degree slope at NE corner and 9.5 degree slope at SW corner)

Pedestrian Signals and Push Buttons

- All crossings have pedestrian signal heads with countdown timers.
- Pedestrian clearance times meet MUTCD guidelines at all approaches (37 seconds for approximately 118 foot distance across U.S. Route 130; 25 seconds for approximately 55 foot distance across western leg of Dutch Neck Road).
- Pedestrian push buttons at all corners (and medians); buttons at NE, SW, and SE corners are not ADA-compliant as they are not accessible from the sidewalk. Buttons in median are not ADA-compliant as they are facing away from the crosswalk, lack approaching curb ramps, and are not accessible from the crosswalk. These buttons allow for a two-step crossing which might be necessary for those with a disability.

Sidewalk Network

- Sidewalks exist at all corners but there are gaps in the network along the north side of Dutch Neck Road

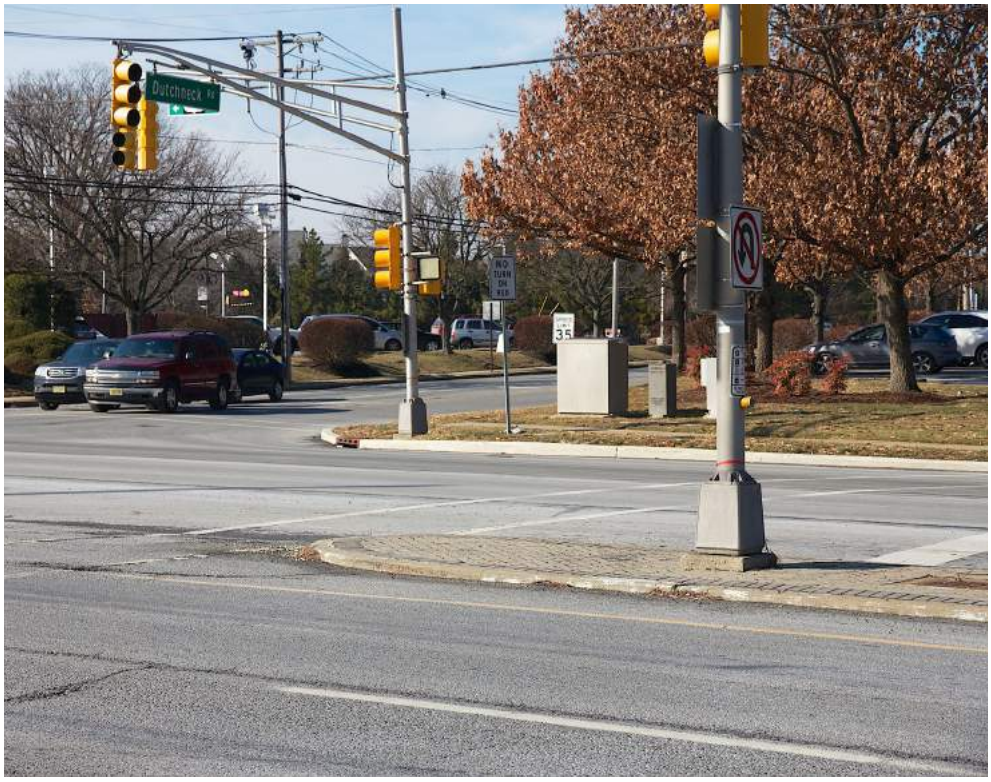
Lighting

- Crosswalk lighting only at NE and SW corners
- No pedestrian scale lighting

Other Infrastructure (signage, obstructions, etc)

- Median on U.S. Route 130 not extended for ADA-compliant pedestrian refuge.

U.S. Route 130, facing north



Pedestrian push button in median on U.S. Route 130 aligned away from crosswalk, facing west

Pedestrian push button not accessible from crosswalk on SE corner, facing north

Worn detectable warning surface at SE corner, facing west

3 U.S. Route 130 at Princeton-Hightstown Road/ Stockton Street (CR 571)

This intersection provides a link between points west, retail and commercial development surrounding and at the intersection, the Township municipal building and access into Hightstown Borough. The north-south approach (U.S. Route 130) connects to NJ 133 approximately 1 mile to the north. The east-west approach (CR 571) provides access to commercial and retail establishments in East Windsor and downtown Hightstown Borough. The northbound and southbound intersection approaches along U.S. Route 130 consist of four lanes including one left-turn only lane, two through lanes, and one right-turn only lane. The eastbound approach along CR 571 includes one left-turn only lane, one straight-only lane and one right-turn only lane. The westbound approach along CR 571 features one left-turn only lane and one through-right lane. Pedestrian destinations in the area include commercial and retail developments surrounding and near the intersection that feature food and convenience establishments, and the Township municipal building to the northwest of the intersection. One pedestrian crash and four bicyclist crashes occurred near the intersection during the crash analysis period.

Key pedestrian issues and deficiencies at the intersection include a lack of detectable warning surfaces on curb ramps and missing sidewalks on eastbound approach on CR 571. These deficiencies make U.S. Route 130 a significant pedestrian barrier . Existing pedestrian infrastructure are summarized below and deficiencies is highlighted in the annotated aerial photo.

Crosswalk striping

- Standard crosswalk striping at all approaches

Curb Ramps

- All corners and crossings feature ADA-compliant curb ramps, except at the SE corner (no detectable warning surface) and NE corner (crosswalk across CR 571 not aligned to ramp)

Pedestrian Signals and Push Buttons

- All crossings have pedestrian signal heads with countdown timers.
- Pedestrian clearance times meet MUTCD guidelines at all approaches (33 seconds for approximately 106 foot distance across U.S. Route 130; 29 seconds for approximately 66 foot distance across CR 571).
- Pedestrian push buttons at all corners (and medians); button at NW corner is not ADA-compliant as it is too high from the sidewalk. Buttons in median are not ADA-compliant as they are facing away from the crosswalk, lack approaching curb ramps, and are not accessible from the crosswalks. These buttons allow for a two-step crossing which might be necessary for those with a disability.

Sidewalk Network

- Sidewalks exist at NW corner, and parts of NE, SE, and SW corners

Lighting

- Crosswalk lighting only at SW corner over U.S. Route 130
- No pedestrian scale lighting

Other Infrastructure (signage, obstructions, etc)

- Median on U.S. Route 130 not extended for ADA-compliant pedestrian refuge.
- View of the pedestrian signal from SE corner ramp looking west is obscured by the median signal pole and signage

NW corner, facing south

SE corner, facing west

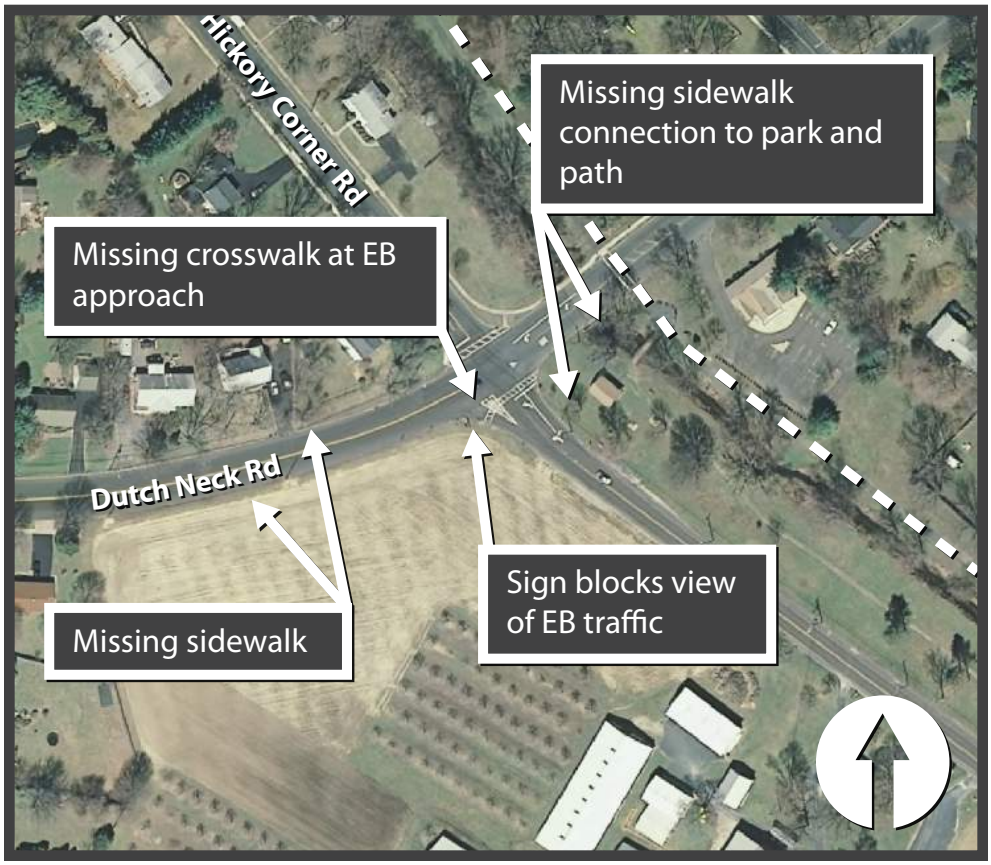
SE corner, facing north

Worn path at SE corner, facing northeast

4 Hickory Corner Road at Dutch Neck Road

This unsignalized intersection provides a link between residential neighborhoods and Anker Park at the SE corner. The north-south approach (Hickory Corner Road) connects to the East Windsor Library, approximately 0.75 miles to the southeast. The eastbound approach along Dutch Neck Road features one lane and a channelized right-turn onto Hickory Corner Road. The westbound approach along Dutch Neck Road includes a straight-right turn lane and a left-turn only lane. The southbound approach along Hickory Corner Road includes one lane while the northbound approach includes two lanes, one being a left-turn only lane. Pedestrian destinations in the area include Anker Park at the southeast corner and the Bear Brook Pathway east of the intersection on Dutch Neck Road. One pedestrian crash occurred near the intersection during the crash analysis period.

Existing pedestrian infrastructure is summarized below and deficiencies are highlighted in the annotated aerial photo. A 2012 Safe Routes to School grant application previously identified the need for a sidewalk connection along the eastbound approach.



Crosswalk striping

- Zebra crosswalk striping at southbound and westbound approaches. Continental crosswalk striping at northbound approach, including channelized right-turn. No crosswalk at eastbound approach.

Curb Ramps

- All corners and crossings feature ADA-compliant curb ramps

Pedestrian Signals and Push Buttons

- N/A

Sidewalk Network

- Sidewalks exist at NW and NE corners only

Lighting

- No crosswalk lighting
- No pedestrian scale lighting

Other Infrastructure (signage, obstructions, etc)

- Sign at SW corner blocks visibility of northbound traffic on Dutch Neck Road

Hickory Corner Road, facing north

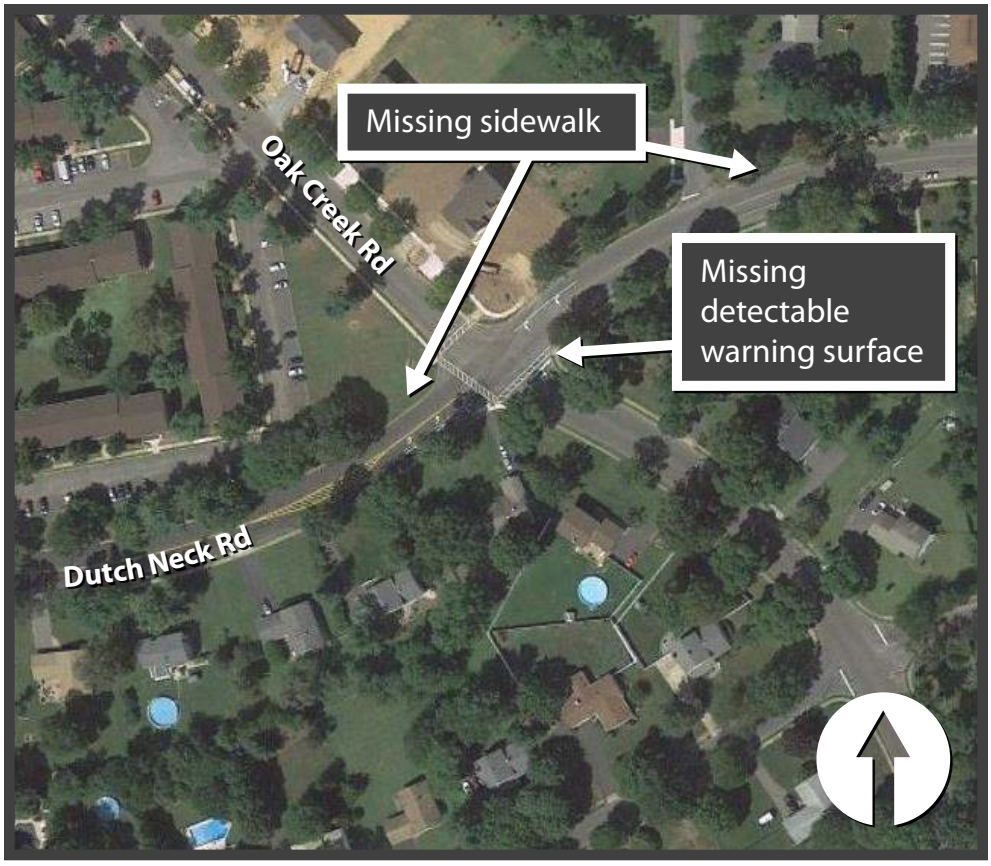
Left: North corner, facing northeast

Right: Sign obstructing visibility at south corner, facing west

5 Oak Creek Road at Dutch Neck Road

This unsignalized intersection provides a link between residential neighborhoods. The north-south approach (Oak Creek Road) connects to the Melvin H. Kreps Middle School, approximately 0.4 miles to the northwest. The northbound and southbound approaches along Oak Creek Road do not have lane striping. The eastbound and westbound approaches along Dutch Neck Road each include one through lane and one left-turn only lane. Pedestrian destinations in the area include the Melvin H. Kreps Middle School to the north. One pedestrian crash occurred near the intersection during the crash analysis period.

Existing pedestrian infrastructure is summarized below and deficiencies are highlighted in the annotated aerial photo.



Crosswalk striping:

- Zebra crosswalk striping at eastbound approach along Dutch Neck Road and southbound and northbound approaches along Oak Creek Road

Curb Ramps:

- All corners and crossings feature ADA-compliant curb ramps except SE corner (no detectable warning surface)

Pedestrian Signals and Push Buttons:

- N/A

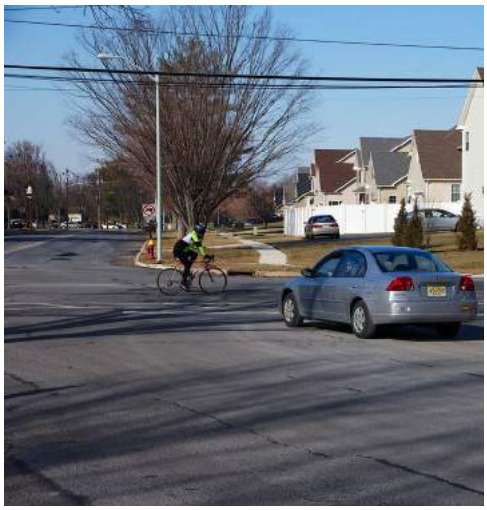
Sidewalk Network:

- No sidewalk along westbound side of Dutch Neck Road

Lighting:

- Crosswalk lighting at NE and NW corners
- No pedestrian scale lighting

Oak Creek Road, looking northwest



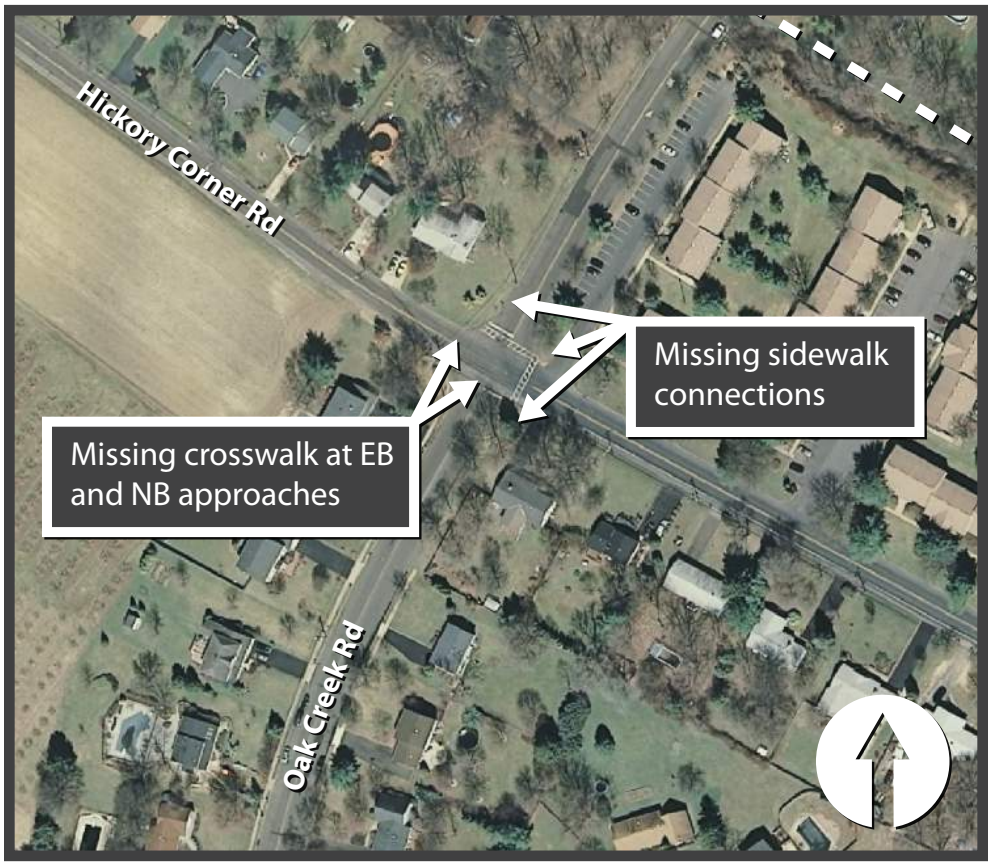
Left: Cyclist on Dutch Neck Road, facing north

Right: South corner, facing north

6 Oak Creek Road at Hickory Corner Road

This unsignalized intersection provides a link between residential neighborhoods. The east-west approach (Hickory Corner Road) connects to the East Windsor Library, approximately 0.25 miles to the east. A crossing of the Bear Brook Pathway is located approximately 0.07 miles to the east along Oak Creek Road. All approaches to the intersection feature single lanes. There were no pedestrian or bicycle crashes reported at the intersection during the crash analysis period.

Existing pedestrian infrastructure is summarized below and deficiencies are highlighted in the annotated aerial photo.



Crosswalk striping:

- Continental crosswalk striping at southbound approach along Oak Creek Road and westbound approaches along Hickory Corner Road

Curb Ramps:

- All corners and crossings feature ADA-compliant curb ramps

Pedestrian Signals and Push Buttons:

- N/A

Sidewalk Network:

- Sidewalks exist at southwest corner only

Lighting:

- Crosswalk lighting at SW corner only
- No pedestrian scale lighting

Hickory Corner Road, facing west

Left: Missing sidewalk connection along Hickory Corner Road, facing west

Right: Crosswalk sign on Hickory Corner Road, facing east

3.3 Bicycle Facilities

Bicycle facilities and infrastructure were inventoried in the Township. Several paved multi-use trails in the Township provide off-road alternative routes to improve connectivity. Cyclists and pedestrians share these trails together, unimpeded by vehicle traffic. Elsewhere, bicycle flows are combined with vehicle flows on roadways. Bicycle parking facilities exist at some major destinations such as schools and parks.

Bicycle Level of Traffic Stress

A key objective of a bicycle network is to create an interconnected system that accommodates cyclists of all ages and abilities and enables them to comfortably and conveniently access major destinations. By focusing on accommodating all cyclists and improving perceived comfort and safety, the bicycle network encourages more people to bicycle. Bicycle Level of Traffic Stress (LTS) is a metric used to evaluate this objective.

Bicycle LTS measures a cyclist's potential comfort level given the current conditions of the roadway. Different cyclists have different tolerances for stress created by the volume, speed, and proximity of automobile traffic. The LTS metric is based on the Dutch concept of low-stress bicycle facilities. In general, lower stress facilities have increased separation between cyclists and vehicular traffic and/or have lower speeds and lower traffic volumes. Higher stress environments generally involve cyclists riding in close proximity to traffic, multi-lane roadways, and higher speeds or traffic volumes. A detailed look at the criteria used to determine LTS can be found in Appendix A.

Based on an analysis of the criteria, the LTS for a given roadway segment is classified into one of four categories:

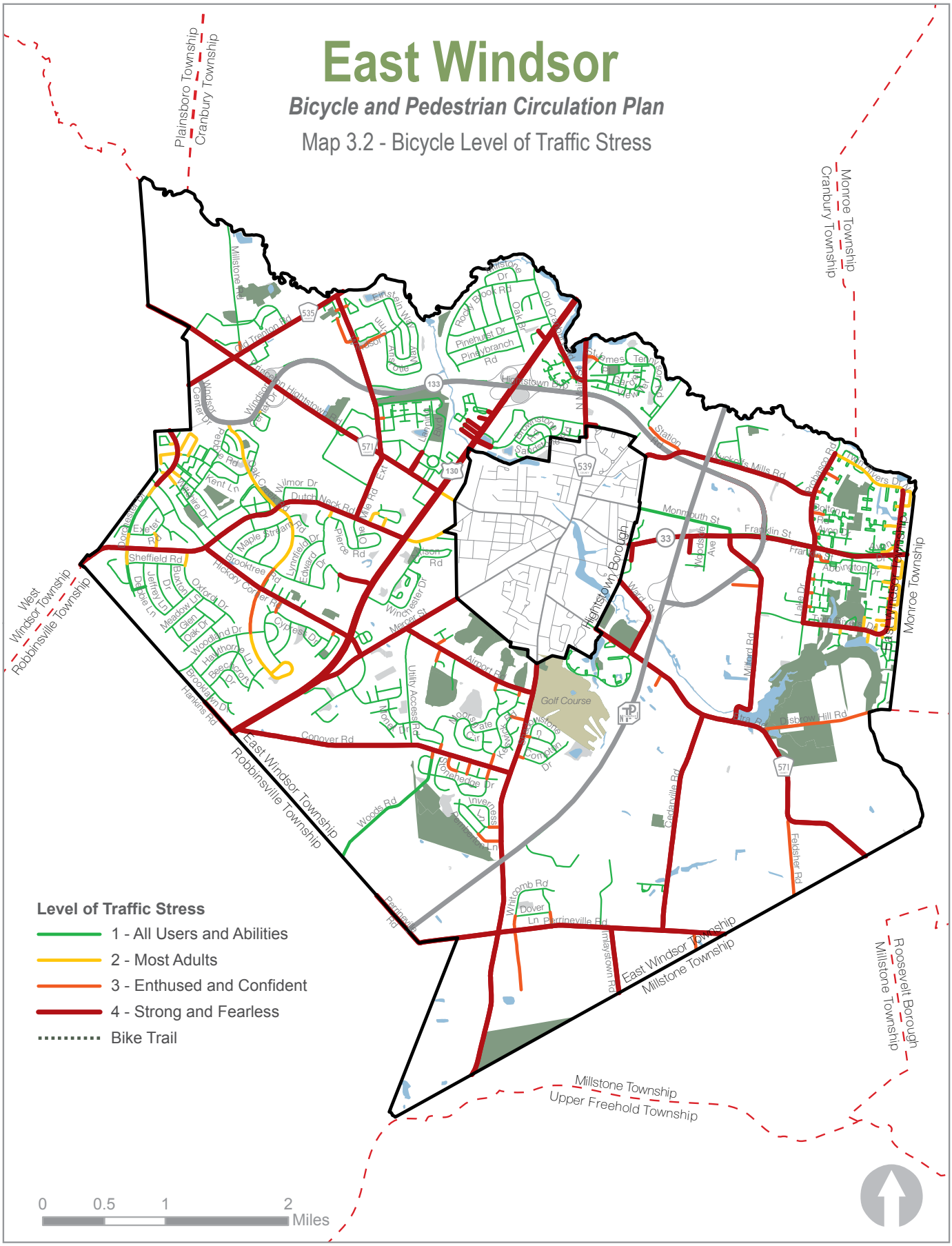
- Level of Traffic Stress 1: the level most users can tolerate (including children and seniors)
- Level of Traffic Stress 2: the level tolerated by most adults
- Level of Traffic Stress 3: the level tolerated by "enthusiastic" riders who might still prefer dedicated space
- Level of Traffic Stress 4: the level tolerated by the most experienced riders

The LTS was evaluated for all roads in East Windsor. The project team assessed major roadways and key minor roadways in the Township using a variety of data sources, including base mapping, GIS data files, NJDOT Straight Line Diagrams, and traffic data from NJDOT. The team also conducted field evaluations to take measurements and verify the various roadway features, character, parameters, and user behavior. For many of the local roads in the study area, basic assumptions were made for their typical characteristics. The resulting output (shown in Map 3.2) illustrates that the majority of roads within the Township have a low level of stress (LTS 1 or 2). However, the major roadways often have high levels of stress and create barriers that impede the ability of cyclists to cross from one area of town to another at a low stress level.

East Windsor

Bicycle and Pedestrian Circulation Plan

Map 3.2 - Bicycle Level of Traffic Stress



A hierarchical assessment was undertaken to assess bicycle LTS of roadways in the Township:

- Primary Arterials – State and county roadways, including portions of U.S. Route 130, NJ Route 33, NJ Route 133, and CR 571 (Princeton-Hightstown Road). These roadways are generally high stress environments due to their high traffic speeds and/or the presence of multiple travel lanes.
- Secondary Streets – County or municipal streets that provide access to key bicycle and pedestrian generators or that support local and regional mobility within the Township, including Dutch Neck Road, Hickory Corner Road, Old York Road, Conover Road, Airport Road, One Mile Road, Milford Road, and Wyckoff's Mills Road. Although these roadways have lower traffic volumes than the primary arterials, and some are located in more rural environments, they are generally high stress environments for bicycling due to their high vehicular traffic speeds.
- Local Streets – The local street network can provide alternative, parallel routes to the secondary streets and primary arterials, as well as the "last mile" connections between where residents live and the major through streets. The local network in East Windsor tends to be low speed, low traffic, two-lane roadways, which provide a low stress environment for all cyclists.
- Trails – The Township has several off-road trail and multi-use paths, which are discussed in more detail in the Trails and Parks section. These trails provide additional low stress environments, completely separated from vehicular traffic, that improve connectivity of the bicycle network.

The LTS metric measures a bicycle network from the perspective of the user. As such, the metric accounts for the ability of a user to move from one point to another unimpeded by higher stress environments. To this end, part of the stress analysis accounts for the change in stress level a user might encounter at an intersection. For example, if a user was riding on a road with a stress level of 1 but desired to cross a road with a stress level of 4, the trip would no longer be considered low stress. High stress roads, often arterials and primary connectors, can reduce bicycle connectivity, impeding a user's ability to travel to a desired destination, and discouraging wider cycling use. Figures 3.3 and 3.4 demonstrate this "island effect" in East Windsor. When removing the roads with a stress level of 3 or higher, it becomes impossible for a rider seeking a low stress environment (such as families or children traveling to/from school) to travel very far within the Township. Most low stress networks are confined to a residential neighborhood, isolated by high stress arterials and secondary streets.

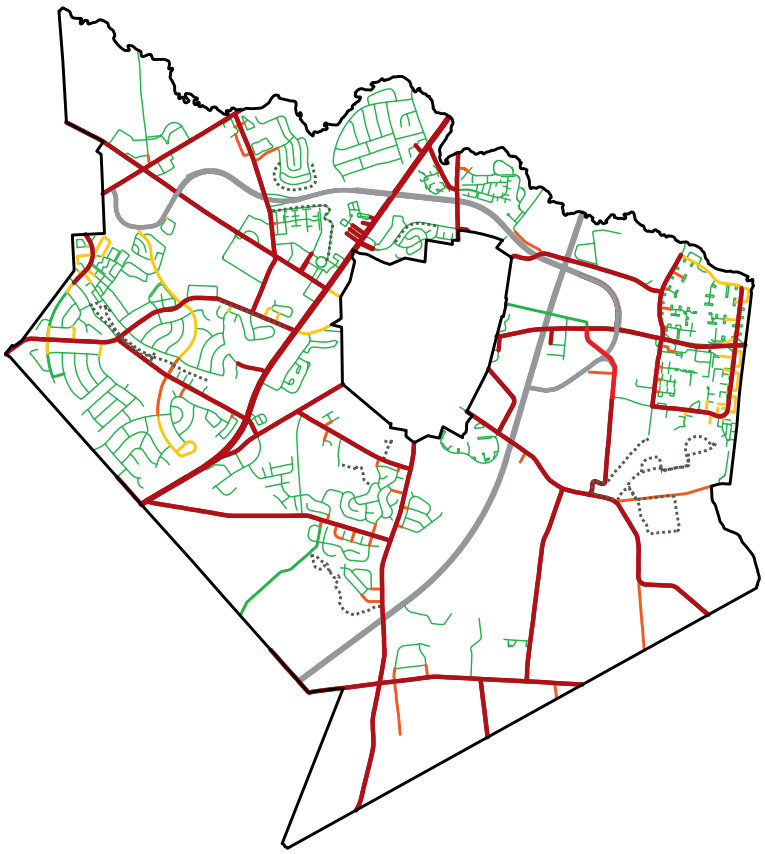


Figure 3.3: East Windsor Roadway Network Showing All Levels of Traffic Stress:

The entire roadway network is shown to the left, classified by the level of traffic stress for cyclists. Roads shown in red are classified as high stress environments. These roads also represent the primary connectors within the town, providing mobility for motorists yet impeding low-to-moderate stress bicycle travel.

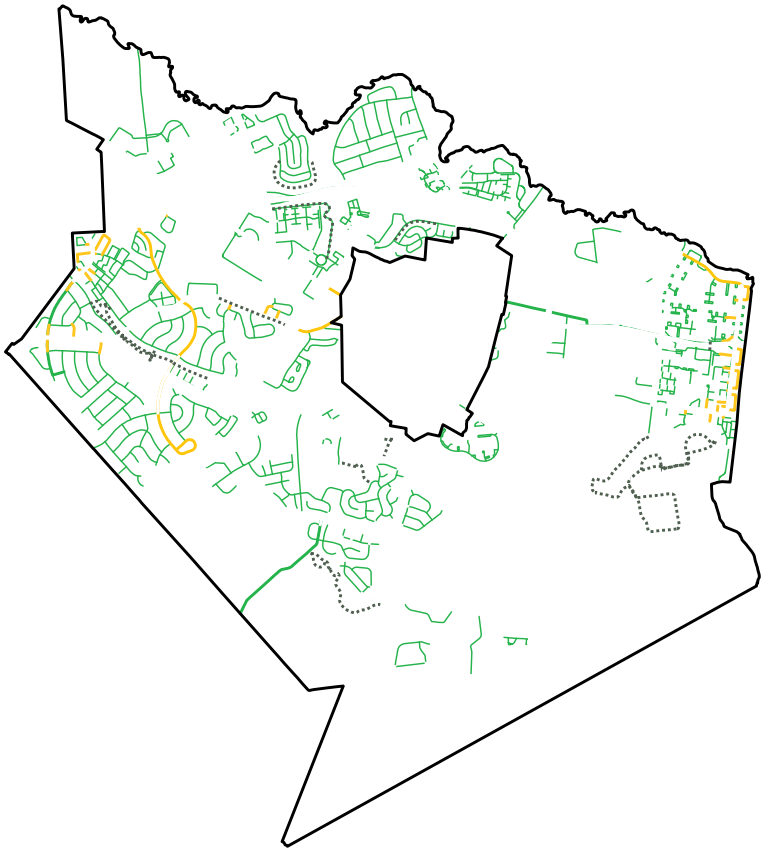


Figure 3.4: East Windsor Roadway Network Showing Levels of Traffic Stress 1 and 2 Only:

Removing the higher stress roadways from the graphic demonstrates a lack of low stress connectivity within the network. This means that typical bicyclists who are not comfortable on higher stress roadways have limited ability to travel longer distances within the town, creating an "island effect" where there are isolated areas of low stress bike networks. Although many multi-use path exist in the town, (indicated with a dotted green line) these path exist within low stress "islands" and do not function to connect the network.

Bike Parking

Bicycle parking facilities are needed to extend bicycle use from an opportunity for recreation to a feasible mode of transportation. In East Windsor, bike racks are often provided at parks and other Township facilities. In general, bicycle parking is provided via aging racks that pre-date current standards.

Providing adequate, secure bicycle parking is an important measure to accommodate and encourage cycling as an alternative travel mode. Proper parking facilities increase the convenience of cycling for commuting, utilitarian, or recreational purposes while also alleviating the threat of theft. Parking should be conveniently located, well lit, and easily visible for cyclists arriving at a destination. There are a variety of bicycle parking racks available. Based on guidelines from the Association of Pedestrian and Bicycle Professionals (APBP), a bicycle rack should meet the following requirements:

- Support the bicycle upright by its frame in two locations
- Prevent the wheel of the bicycle from tipping over
- Enable the frame and one or both wheels to be secured
- Support bicycles without a diamond shaped frame and horizontal top tube (e.g. step-through frames)
- Allow both front-in and back-in parking with a U-lock through the frame and front or rear wheel
- Resist the cutting or detaching of any rack element with hand tools

Older style racks, such as the "comb"/ "schoolyard", "toast", and "wave" are not recommended because they do not properly support the bicycle frame, generally do not facilitate locking of the frame to the rack, and frequently cause interference between the handlebars of adjacent bikes when the rack is near capacity. Recommended racks include the "inverted U", "A", and "post and loop." These rack types are illustrated in Figure 3.5. Bike racks should also be properly spaced to allow easy, independent access to each bike.

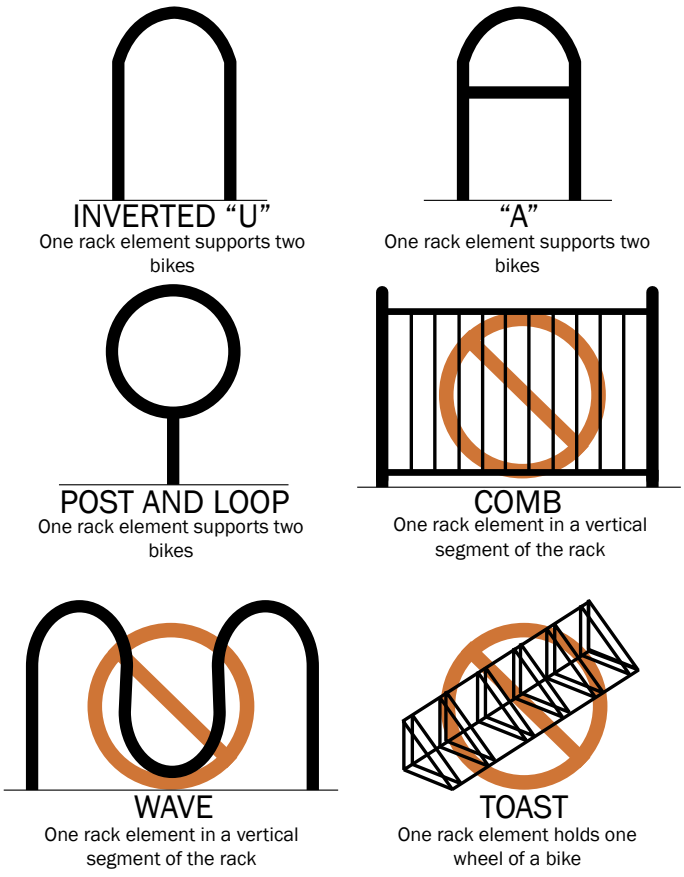


Figure 3.5: Recommended Bicycle Rack Types

Source: Association of Pedestrian and Bicycle Professionals

3.4 Trails and Parks

East Windsor has several existing trails, multi-use paths, and park facilities that provide off-road alternative routes for walking and biking and are a unique asset to the town. The existing trail network, shows in Map 3.6 on the following page, is a valuable resource within the Township that creates opportunities for not only recreation, but also enhanced network connectivity for walking and biking. Based on input from Township stakeholders, the project team identified and evaluated the trail facilities described below.

Bear Brook Pathway

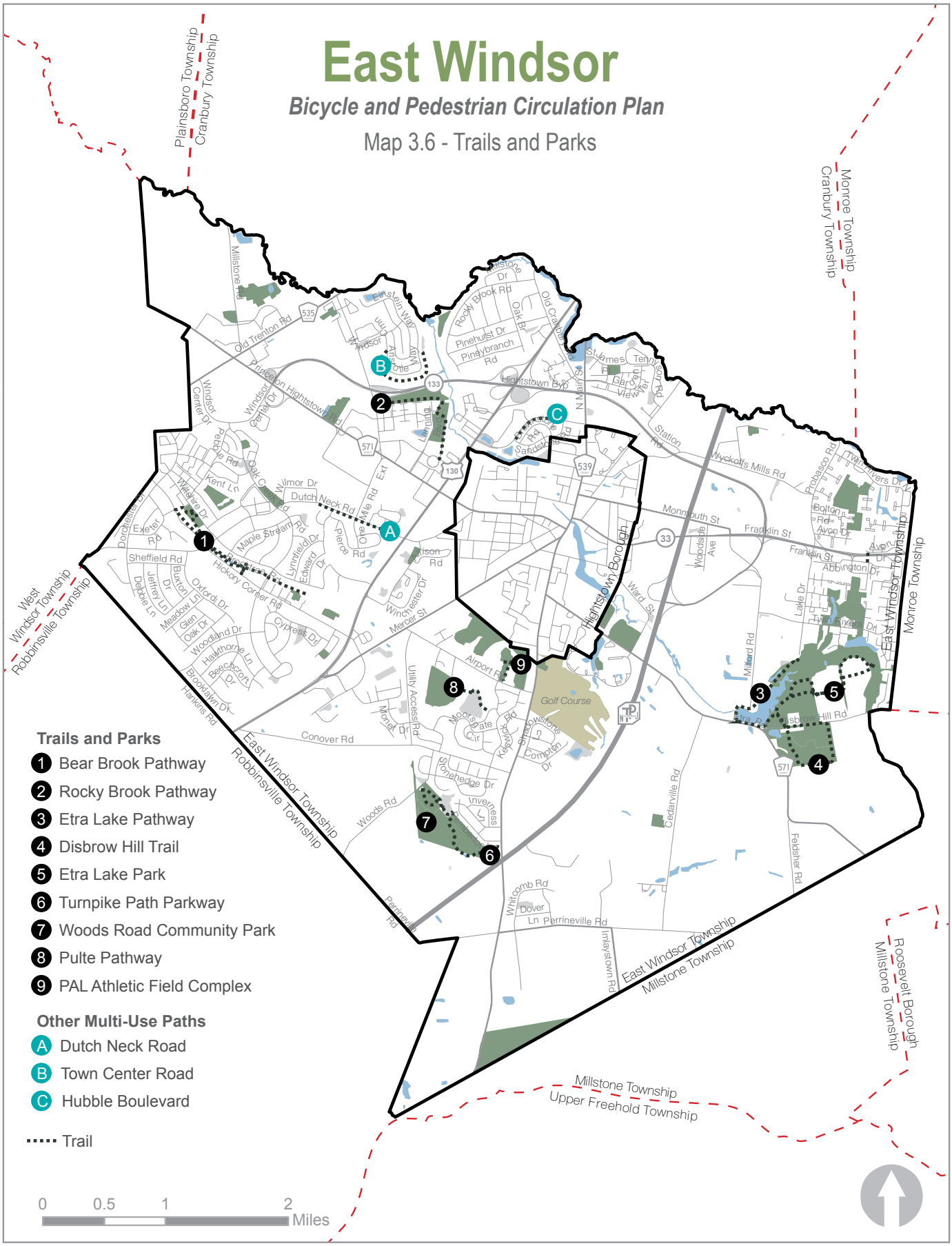
Bear Brook Pathway is approximately 1.0 mile long. It is a paved multi-use path approximately eight feet wide and located in the western portion of the Township. The pathway runs through residential neighborhoods, between and parallel to Hickory Corner Road and Brooktree Road. The pathway provides a spine for pedestrian and bicycling activity and serves as an alternate route to the adjacent roadways, which lack sidewalk facilities. The pathway links residential neighborhoods along its length, including garden apartments and detached single family housing, to the Hickory Corner Library at its eastern terminus. The pathway also provides access to two parks (Anker Park and Wiltshire Park) and terminates two blocks south of the Melvin H. Kreps Middle School. Several spur pathways enhance connectivity to the surrounding neighborhoods.

The pathway has two road crossings – Dutch Neck Road and Oak Creek Road. The Dutch Neck Road crossing is marked by continental crosswalk striping, while the Oak Creek Road crossing has standard crosswalk striping. Both crossings also have advance signage and pavement markings alerting motorists of pedestrians and bicyclists. The signage used is an older style and not the current MUTCD trail crossing signage, and the pavement markings are significantly worn and faded. Both roads carry two lanes of traffic and have a wide cross section (approximately 45 feet). Dutch Neck Road has a sidewalk connection to the pathway along the westbound side, while Oak Creek Road has no existing sidewalk network near the pathway.

East Windsor

Bicycle and Pedestrian Circulation Plan

Map 3.6 - Trails and Parks



Rocky Brook Pathway

The Rocky Brook Pathway is approximately 0.8 miles long. It is a paved multi-use path approximately 10 feet wide with a striped centerline. The pathway is located in the northwest quadrant of the Township near the municipal building. It improves connectivity for walking and biking by linking a garden apartment complex at the western end of the pathway with the municipal building, senior center, and retail and commercial development along U.S. Route 130 at the eastern end of the pathway. The pathway provides an alternate route to walking and biking along One-Mile Road and Princeton-Hightstown Road.

The western terminus of the pathway at One-Mile Road lacks a connection to the adjacent sidewalk network to the south (approximately 40 feet). The eastern path terminus connects to the sidewalk network at the municipal building and shopping plaza.

Rocky Brook Pathway

Etra Lake Pathway

The Etra Lake Pathway is approximately 0.9 miles and is located in the eastern portion of the Township in the Twin Rivers Planned Unit Development. The pathway is paved and approximately eight feet wide. It runs from the terminus of Lake Drive along Etra Lake to Milford Road and Etra Road (CR 571). The pathway provides a connection between the residences in Twin Rivers and Etra Lake Park. It also provides a connection to CR 571, which is a lower traffic volume alternative to NJ Route 33 for bicyclists traveling to Hightstown or western East Windsor.

Disbrow Hill Trail

The Disbrow Hill Trail is an approximately 1.0 mile loop that runs the perimeter of the Disbrow Hill athletic fields in the eastern portion of the Township adjacent to Etra Lake Park. The trail is paved and approximately eight feet wide. It is confined to the athletic field complex and its principal function is for recreation. At Disbrow Hill Road (CR 571), a ladder crosswalk links the Disbrow Hill Trail to the Etra Lake Pathway. Trail crossing signage both at the crossing and in advance of the crossing enhance the visibility of the approximately 24-foot crossing.

Etra Lake Park

Etra Lake Park has over 1 mile of trails through surrounding fields, farmlands, and arboretum. The trails are generally packed earth or gravel, and are used principally for recreation. The trails loop through the park, and there is currently no external connectivity. The trails approach the southern end of the Twin Rivers Planned Unit Development in the vicinity of Huntington Drive, but are separated by Rocky Brook. The current lack of connectivity requires a detour of approximately 1.6 miles via Twin Rivers Drive and the Etra Lake Pathway in order to access Etra Lake Park. A makeshift bridge and worn path indicates informal use by nearby residents and unmet pedestrian demand for a more direct route.

Disbrow Hill Trail

Turnpike Park Pathway

The Turnpike Park Pathway is approximately 0.65 miles and located in the southern portion of the Township. The pathway connects the Woods Road Community Park to the Turnpike Park and Old York Road (CR 539). Between Woods Road Community Park and the wooded section of Turnpike Park, the pathway follows the berm of a storm water retention basin and is constructed of compacted gravel and is approximately eight feet wide. Through the wooded section of the Turnpike Park, the pathway is a dirt trail of varying width. A portion of the pathway also follows a high-tension power line right-of-way with a gravel utility access road, which may offer opportunities to expand the trail network.

Although the pathway runs adjacent to a residential neighborhood along Pemberton Lane, there are no formal connections to the neighborhood. The lack of connectivity reduces the utility of the pathway network and makes the connection to the Woods Road Community Park of limited use to surrounding residents. Several worn paths within the wooded section of the trail indicate informal connections to adjacent houses. Right-of-way at the Arborwood Court cul-de-sac presents a potential opportunity to formally link the pathway, and therefore the Turnpike Park and Woods Road Community Park, to the surrounding residential neighborhood.

Turnpike Park Pathway

Woods Road Community Park

The Woods Road Community Park has an approximately 0.3 mile pathway and exercise loop along the perimeter of the park. The park is located in the southern portion of the Township and the pathway is paved and approximately four feet wide. The pathway itself is principally a recreational loop, but is connected to the Turnpike Park via the Turnpike Park Pathway.

Pulte Pathway

The Pulte Pathway is located in the south-central portion of the Township near Airport Road. The pathway is approximately 0.3 miles long and runs from Fulham Way to Endeavor Boulevard, linking two residential neighborhoods. It provides a more direct connection between the two neighborhoods and is an alternate route to Airport Road, which lacks a continuous sidewalk network. The pathway is paved, approximately six feet wide, and follows the berm of a storm water retention basin. At its termini, the pathway is connected to the sidewalk network within each neighborhood.

The pathway connects to Airport Road via the neighborhood's sidewalk network and is in close proximity to the East Windsor P.A.L athletic field complex and the East Windsor Regional School District High School. However, with the exception of a curb ramp on the southern side of the crossing, the crossing of Airport Road to the P.A.L complex lacks any pedestrian infrastructure.

Pulte Pathway

East Windsor P.A.L Athletic Field Complex

The East Windsor P.A.L athletic field complex is a large park facility located in the center of the Township on Airport Road, between Route 33 and Old York Road. In addition to the recreational facilities, it also connects the residential neighborhoods along Airport Road to the Hightstown High School. The PAL complex has an internal pathway network, which is asphalt and four to five feet wide. The pathway has two connectivity issues:

- It is disconnected from the entrance to the P.A.L complex and the crossing at Airport Road, which links the complex to the adjacent residential neighborhoods
- There is no existing connection across the P.A.L complex to the Hightstown High School. Pathways extend into the P.A.L complex from both the north and south sides of the complex; however, they are discontinuous and there is an approximately 400-foot gap between them.

PAL Athletic Field Complex

Twin Rivers Tunnel

Located at the eastern edge of the Township, Twin Rivers is a planned unit development (PUD) that straddles NJ Route 33. A tunnel and connecting pathway link the development on either side of NJ Route 33. Through Twin Rivers, NJ Route 33 is a four-lane divided highway with a grass median and a 55 mph speed limit. Two signalized intersections, spaced 0.5 miles apart and located at the eastern and western edges of the Twin Rivers community, are the only safe crossing opportunities for pedestrians at grade. The tunnel, therefore, provides a critical pedestrian link near the center of the PUD. It connects residences on the north side of NJ Route 33 with a NJ TRANSIT bus stop, shopping complex, and residences to the south of NJ Route 33.

The tunnel is approximately 200 feet long and 10 feet wide. Asphalt paths connect the tunnel to the PUD's sidewalk network. The tunnel and southern approach are lit with pedestrian scale lighting. Lighting at the northern approach is limited, and provided only from a utility pole mounted fixture above the tunnel entrance.

Twin Rivers Tunnel

Multi-Use Paths

Several residential developments within the Township have also installed multi-use paths along their perimeter. These paths provide additional facilities for biking and walking and can enhance the surrounding network, as well as serve as recreational amenities for residents. Paths were observed in several locations around the Township:

Dutch Neck Road: Approximately 0.5 miles long, this eight-foot wide multi-use path extends along the eastbound side of Dutch Neck Road from new Wilmor Drive to near U.S. Route 130. It provides a low stress facility for biking and walking separated from vehicular traffic, connecting residential neighborhoods to the west with commercial development to the east at U.S. Route 130. The eastern terminus connects to the sidewalk network. At the western terminus, there is no existing sidewalk to extend the network.

Town Center Road: Approximately 0.35 mile path along the eastbound side of Town Center Road. The path is connected to the broader sidewalk network, and improves access between the residential neighborhoods and the Shop Rite plaza along Town Center Road.

Hubble Boulevard: The residential neighborhood surrounding Hubble Boulevard has a multi-use path around the southern perimeter of the development. The neighborhood is relatively self-contained, constrained by NJ Route 133 to the south and Rocky Brook to the east. Therefore, the path is primarily a part of the neighborhood's internal circulation and a recreational amenity rather than part of a broader network.

Dutch Neck Road Path

Dutch Neck Road Multi-Use Path, Facing East

Multi-Use Path along Town Center Road, Facing North

3.5. Summary

Based on the analysis of existing conditions, several general trends were apparent:

- East Windsor is a low-density suburban community with a mix of development patterns. Pockets of density exist near clusters of multi-family residential, while other sections of the Township are more rural in character. Typical of many suburban communities, long distances between destinations, lack of street connectivity, and auto-centric development create challenges for walking and biking.
- East Windsor's open space, rural character, and park facilities are valuable resources that provide opportunities for recreation and local mobility for bicyclists and pedestrians.
- The Township's existing trail facilities improve network connectivity for walking and biking by providing off-road, alternative routes. Opportunities exist to improve the trail network by enhancing crossings, better linking the trails to surrounding neighborhoods and destinations, and creating an interconnected trail system.
- Hightstown is located within the center of East Windsor, and many routes linking the eastern and western portions of East Windsor traverse Hightstown. This presents unique jurisdictional challenges, requiring coordination in planning network improvements. Several significant destinations are also located within Hightstown, including a traditional "main street" style commercial district and the East Windsor Regional School District (two elementary schools and the high school), which are part of a shared East Windsor-Hightstown school system.
- From 2009-2013, 42 pedestrian and 34 bicycle crashes occurred in East Windsor. The crash analysis indicated that bicycle and pedestrian crashes tended to be concentrated along the primary arterials, particularly U.S. Route 130. A notable number of pedestrian crashes also occurred in parking lots.
- A majority of crashes occurred mid-block (81% of pedestrian, 65% of bicyclist), which exceeds the state averages.
- Bicycle crashes involved a high percentage of young people (ages 5-24; 39% of bicycle crashes; comparable to the statewide average). Pedestrian crashes involved a significant percentage of seniors (19%; higher than the statewide average).
- Several primary arterials traverse the Township and are barriers to pedestrian and bicycle circulation. Due to their multi-lane cross sections, high traffic speeds, and high traffic volumes, they present difficult crossings and stressful environments for walking and biking.
- Two limited access highways (the New Jersey Turnpike and NJ Route 133) run through East Windsor, posing additional barriers to pedestrian and bicycle circulation, as well as local vehicular circulation.
- The Township's secondary roadways typically have high vehicular speeds, creating a stressful environment for cyclists.
- Based on the bicycle level of traffic stress analysis, a low stress roadway "island

effect" is apparent. The low stress local roadways are isolated by high stress primary and secondary arterials, which create difficult crossings and limit the extent of the bicycle network accessible to cyclists of all abilities.

- Many of the signalized intersections within the Township have updated traffic signal equipment that includes pedestrian signal heads with countdown timers.
- ADA-compliant treatments at intersections are inconsistent. Some intersections have been updated to meet current standards, while others have not.
- The sidewalk network throughout the Township is inconsistent. Among the primary corridors evaluated, only U.S. Route 130 had a generally continuous sidewalk network.
- Many worn paths were noted, indicating significant pedestrian demand not being met by current infrastructure.

4. Recommendations

The following chapters highlight the recommendations developed by the project team to improve conditions for bicyclists and pedestrians in East Windsor. These recommendations are based on the analysis of existing conditions summarized in Chapter 3, as well as input from the Stakeholder Advisory Committee. The proposed improvement concepts focus on the "4 E's" – Education, Encouragement, Enforcement and Engineering. Through this holistic approach, the education, encouragement, and enforcement recommendations focus on policy and program options to improve safety and foster bicycle and pedestrian travel throughout the Township, while the engineering recommendations identify physical infrastructure improvements at priority locations. These recommendations will improve mobility and safety for all travelers and travel modes.


TO

4.1 Education

Education programs provide all roadway users – cyclists, pedestrians, and motorists – with information about their rights and responsibilities and applicable laws. These efforts can increase general awareness and promote courteous and safe interaction among all users. Educational programs may include a simple distribution of information in a wide range of formats to improve motorist, cyclist, or pedestrian awareness and understanding of traffic laws and safe practices. Larger efforts could include a more structured, hands-on training to improve individual skills and abilities. Education programs should be tailored to specific audiences, including school-age children, parents, adults, seniors, or motorists. Specific recommendations for East Windsor include:

- Continue efforts to distribute public service announcements (PSAs) and brochures on topics such as speeding, safe bicycling tips, how to bicycle with traffic, proper helmet usage, and safe pedestrian behavior at the public library, the East Windsor Township Municipal Building, schools, and/or Township events. PSAs may also be printed in the local newspaper or posted on the Townships's website or social media sites. Resources with safety information include the Greater Mercer TMA; NJDOT's Biking in New Jersey and Pedestrian Safety websites; the Pedestrian and Bicycle Information Center, a national clearinghouse of information related to walking and biking sponsored by the FHWA and operated by the University of North Carolina Highway Safety Research Center; and the National Highway Traffic Safety Administration (NHTSA).
- Provide education programs for schools. As noted in the existing conditions chapter, the largest number of bike crashes during the eight year analysis period involved young people aged 5-24. Therefore, providing educational programs tailored for children and young adults should be an important element of the overall township-wide campaign. Several types of resources are available:
    - Traffic Safety Learning Progression Component: Funded by the Division of Highway Traffic Safety and developed by Kean and Rowan Universities, the curriculum includes lessons on pedestrian, bicycle, and traffic safety. It is an on-going educational program, with lesson plans on several pedestrian safety issues tailored to each age group with interactive activities. These materials are available to all New Jersey schools free of charge. Kindergarten through Grade 8 lesson plans can be found at **http://www.brainybunch.info/pedestrian-safety**, and Grade 9-12 lesson plans at **http://www.njdrivereducation.com/lesson-plans**.
    - Safe Routes to School (SRTS): Resources are available through SRTS, a Federal and state program designed to enable and encourage children to walk and bike to school. Education is a key element when developing a
    - SRTS plan. Information is available through the **NJDOT program office**, the **Federal Highway Administration**, and the **National Center for Safe Routes to School**.
    - Other programs, such as **WalkSafe™**, **BikeSafe™**, and **Safe Kids** also offer educational materials and other activities focused on school-aged children.

Example public safety education campaign in Ocean City, NJ

- Continue existing efforts to partner with local community groups, schools, the police department, businesses, local advocacy groups, or other interested parties to organize bicycle training through the **League of American Bicyclists (LAB)**. The LAB offers a range of courses by certified instructors for different ages and different abilities. These interactive training courses are a good way to educate cyclists on traffic rules and safety equipment, as well as to practice cycling skills that enable novices and experts to ride confidently and safely with traffic.
- Provide training for Township officials, planners, engineers, and public works staff about Complete Streets and its implementation. The Township's adoption of a Complete Streets policy ensures that transportation projects should provide for all expected users, including pedestrians and cyclists. Providing training on effective implementation and maintenance will reinforce the Township's policy and help make it part of all future transportation investments in East Windsor.

4.2 Encouragement

Encouraging active modes of transportation such as walking and biking has a host of benefits for residents and the community, including better health, reduced road congestion, environmental benefits, and lower per-trip costs. By supporting and promoting walking and bicycling activities, the Township can spur a change in travel habits among residents and visitors, and entice more residents to walk and bike more regularly. Township-specific recommendations include:

- Publicize and participate in International Walk to School Day, typically held in October. Use the event to encourage walking throughout the month and the year.

Example walking school bus in Morristown, NJ

- Publicize and participate in Bike Month activities, typically held in May. Events include Bike to School Day, Bike to Work Day, and Bike to Work Week. Use the events to encourage cycling throughout the month and the year.
- Encourage the use of "Walking School Buses" to promote physical activity for children and parents traveling to and from schools. Work with school staff, parent volunteers, and the police department to organize the walking school buses. Assistance is available through the **Greater Mercer TMA**.
- Utilize resources through SRTS to provide activities that encourage bicycling and walking at local schools, such as bike rodeos or other events.
- Provide incentives for Township employees to walk or bike to work.
- Publish an online bike map on the Township's website, highlighting the location of bike lanes, off-road facilities, preferred on-road cycling routes, bike parking, and major destinations (schools, businesses, Township offices, etc). Providing information on the Township's bicycle facilities and best routes can encourage more people to try cycling. Resources include the bike network evaluated in this report, as well as the statewide map currently under development by NJDOT.
- Provide inexpensive or free safety equipment such as reflectors, vests, and lights at the public library, schools, or municipal buildings to promote safe cycling and walking after dark. Approximately 40% of pedestrian crashes and 26% of bicycle crashes occurred after dark during the four year analysis period.
- Continue efforts to partner with local cycling clubs, businesses, schools, parent groups, the police department, and other interested organizations to promote higher bicycle helmet utilization in the Township. At schools and/or community

events, a booth can be set-up to provide instruction on proper bicycle helmet fit and offer reduced prices on helmets.

- Highlight pedestrian and bicycle improvements that accompany transportation projects through press releases, the Township website, and social media. By focusing on these elements and improved conditions, more people will be encouraged to walk and bike.
- Apply to become a Bicycle or Walk Friendly Community through the League of American Bicyclists. This program will not only encourage bicycle use by residents, but serve as a potential marketing tool to encourage visitors to travel to or through East Windsor.
- Market the Township's bicycling and walking assets, including its connections to commercial areas, local parks and trails, and schools. Work with local businesses to publicize the Township's resources, promote tourism, and make East Windsor a regional destination for biking and walking.

4.3 Enforcement

Combined with education, enforcement is a key element to ensuring safe travel for all roadway users. While the police department cannot dedicate significant amounts of resources to enforce traffic regulations, targeted enforcement campaigns, through warnings and tickets, are effective at correcting unsafe behaviors. Enforcement should apply to all roadway users and include motorists (speeding, failure to stop for pedestrians), cyclists (riding on the wrong side of the street, failure to adhere to traffic control devices), and pedestrians (jaywalking, ignoring pedestrian signals). Township-specific recommendations include:

- Target pedestrian safety enforcement (PSE). A key resource for local police departments is the PSE program sponsored by the NJ Division of Highway Traffic Safety (NJDHTS) with support from NJDOT. The PSE program provides a structured approach to crosswalk compliance enforcement, with training and support for local police officers. It addresses two important contributing factors to pedestrian crashes: driver knowledge of the law and driver yielding behavior. A variety of resources for enforcement are available through the NJDHTS, including **grant funding**. PSE training workshops are also available through the **NJ Bicycle and Pedestrian Resource Center**. One common PSE program supported by the NJDHTS is the "Cops in Crosswalks" decoy program. Used in municipalities throughout New Jersey, the program is a targeted enforcement campaign. A plainclothes police officer attempts to cross a marked crosswalk, and drivers who fail to stop for the pedestrian are given a warning or citation.
- Continue the use of variable message signage and mobile radar units on roadways throughout the Township to make motorists more aware of their actual travel speed and the posted speed limit. A vehicle traveling faster than is appropriate for the surrounding land use and/or roadway design reduces the driver's awareness of surrounding activity, such as pedestrians or cyclists, and negatively impacts the safety of all roadway users. Consequently, high-speed traffic also generally discourages pedestrian and bicycling activity. Data collected can also be used by

Example mobile radar unit in Highland Park, NJ

the Township to identify areas with high incidents of speeding, and target them for enforcement or engineering improvements that reduce speeds.

- Implement a "Drive 25" campaign near key destinations on low speed limit roadways and near the Township's schools. A similar campaign was initiated by the Borough of Haddonfield in Camden County and has been emulated by other municipalities in New Jersey. "Keep Kids Alive – Drive 25" is a common slogan for the campaign. It may be timed to coincide with back to school activity in September. The campaign may include use of variable message signs (VMS) at gateways into the Township and main corridors, use of the Township's website and social media, posters and flyers at municipal buildings, mailings, and/or distribution of "Keep Kids Alive – Drive 25" stickers to residents, which may be posted to curbside garbage barrels or their vehicles as a reminder to motorists.

4.4 Engineering

A major outcome of this study is the development of pedestrian and bicycle infrastructure improvements for specifically targeted sites and corridors based on deficiencies identified via field efforts or based on comments provided by the Study Advisory Committee. Building upon the existing network of bike paths and pedestrian walkways, these improvements focus on improving circulation opportunities to and from major bicycle and pedestrian generators. Pedestrian recommendations enhance crossing locations, build upon and expand the existing sidewalk network, and seek to create a more pedestrian friendly environment. Recommended bicycle improvements are focused on creating a low-stress, Township-wide bicycle network linking numerous recreational, commercial, and residential areas throughout East Windsor.

Improvement concepts are intended to be easily implementable and emphasize low-cost options such as restriping of existing roadways, enhanced signage, or improved sidewalks. Projects may be implemented over time as funding allows, and incorporated into routine roadway maintenance at minimal additional cost. The list of recommended projects may be used to support grant applications, integrate bicycle and pedestrian projects into the capital improvement pipeline, and/or identify bicycle and pedestrian improvements as roadways are due for maintenance and resurfacing.

The following section details pedestrian specific improvements, bicycle specific improvements, and corridor and school access improvements that address both pedestrian and bicycle mobility and safety. Following the improvement recommendations, general order of magnitude cost estimates have been provided, indicating the level of investment that proposed concepts would require for implementation. The cost estimates are based on industry and NJDOT standards for per unit material costs, and do not include the cost of any labor, right-of-way acquisition, movement of utilities that could be involved, or contingencies.

5. Infrastructure Improvements

A major outcome of this study is the improvement of existing pedestrian and bicycle infrastructure for specifically targeted sites and corridors based on deficiencies identified via field efforts or based on comments provided by the Study Advisory Committee.

These improvements focus on improving circulation to and from major bicycle and pedestrian generators. Pedestrian recommendations enhance crossing locations, enhance and expand the existing sidewalk network, and seek to create a more pedestrian friendly environment. Recommended bicycle improvements are focused on improving corridors that are not currently bicycle compatible. The ultimate goal is to create a Township-wide bicycle network linking numerous recreational, commercial, and residential areas throughout East Windsor and connecting to bicycle networks in adjacent municipalities. Improvement concepts are intended to be easily implementable and emphasize low-cost options such as re-striping of existing roadways, enhanced signage, or improved sidewalks.

The proposed improvements are intended to be conceptual recommendations that would likely require varying levels of design or further analysis, depending on the magnitude of the improvement. Where practical, general cost estimates are included for each improvement based on average material rates for sidewalks, crosswalks, striping, etc. These estimates are only intended to convey an order-of-magnitude cost. The estimates do not include labor costs and assume that many projects could be performed by NJDOT or Mercer County.

The engineering improvements are discussed in the following four sections:

Pedestrian Intersection Improvements
This section details proposed pedestrian and bicycle specific improvements to address safety and mobility at:

- U.S. Route 130 at Hickory Corner Road
- U.S. Route 130 at Dutch Neck Road
- U.S. Route 130 at Princeton-Hightstown Road (CR 571)
- Hickory Corner Road at Dutch Neck Road
- Oak Creek Road at Dutch Neck Road
- Oak Creek Road at Hickory Corner Road

Recommendations include both corridor-wide strategies as well as targeted improvements at specific intersections. Where practical, improvements are classified as either short-term (less than six months), mid-term (six months to two years), or long-term (longer than two years) based on the expected amount of time that would be needed for design and implementation. Implementation is contingent on available funding.

Pedestrian walking in the shoulder on Hickory Corner Road, looking west

Bicycle Network

The Bicycle Network section presents the final build-out of the Township-wide network based on the proposed improvements. The section summarizes the bicycle-related corridor and intersection enhancements discussed in previous sections and highlights their impact on the Township-wide bicycle network. The impact of the recommendations are measured using the bicycle level of stress metric, which illustrates and quantifies the anticipated improvements to user comfort, access, and suitability to different categories of cyclists.

The section also includes proposed improvements to develop connectivity among existing and future elements of the regional trail system and enhanced trail crossings.

Trail Network

East Windsor's existing park facilities and trails are vital assets, which the Township should capitalize on. They provide opportunities for recreation and local mobility for bicyclists and pedestrians. With improvements in access and connectivity between trails and parks to each other and to local attractors and generators, East Windsor could create a more friendly environment for pedestrians and bicyclists.

Access to Schools

East Windsor Township and Hightstown Borough share a regional school district. This encompasses a total of four elementary schools, (two of which are within Hightstown Borough), a middle school (in East Windsor), and high school (in Hightstown, with athletic fields in East Windsor). School bus services are provided for elementary and middle school children to provide safe crossings on roads that experience high traffic volume and where the sidewalk network is discontinuous. Since a large population of the student body lives within a proximate distance, safe routes to and from school are a critical component of this plan.

5.1 Pedestrian Intersection Improvements

Based on the results of several field visits, data analysis, and stakeholder input, as detailed in the existing conditions section, pedestrian improvement recommendations were developed for targeted intersections within East Windsor. For each location, an aerial view is shown depicting recommendations. These improvements are intended to be conceptual recommendations that will likely require varying levels of design or further analysis, depending on the magnitude of the improvement. For each location, improvements are classified as either short-term (less than 6 months), mid-term (6 months to 2 years), or long-term (more than 2 years), based on the expected amount of time that would be needed for implementation. The rate at which improvements are implemented may be subject to availability of funding. Where practical, general cost estimates are included for each improvement as well, based on average material rates for sidewalks, crosswalks, and striping. It is important to note that these cost estimates do not include labor costs, and assume that many projects would be performed by NJDOT, Mercer County, or Township Department of Public Works staff.

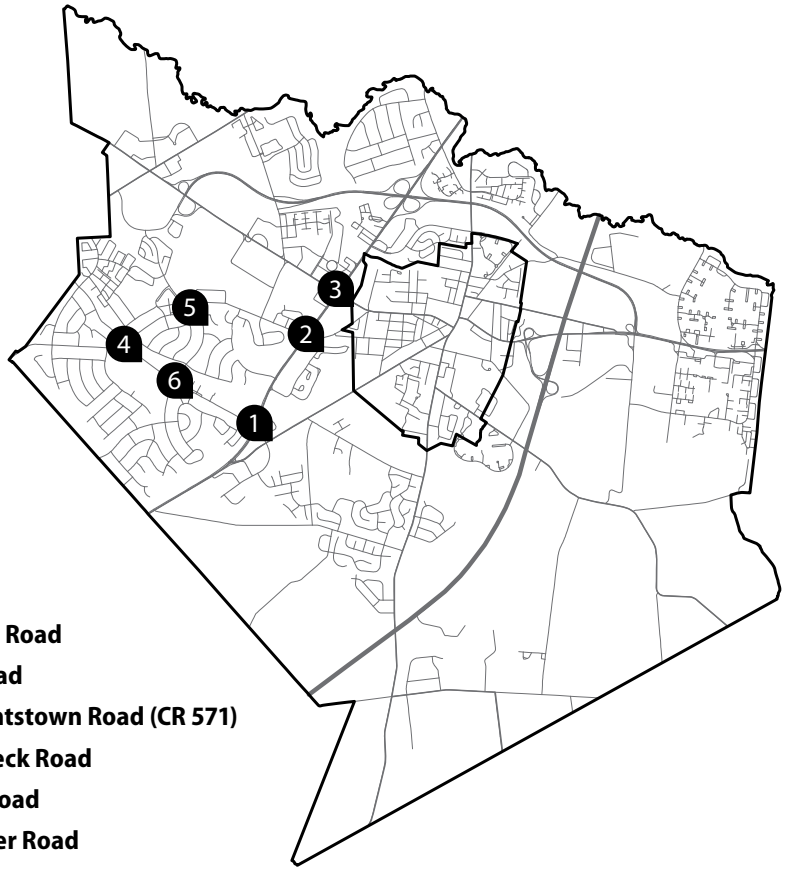


Figure 5.1: Intersection Locator Map

U.S. Route 130 at Hickory Corner Road

This signalized intersection provides an essential link between residential neighborhoods to the west and retail and commercial development to the east. Improvements seek to improve pedestrian circulation and update traffic signal equipment. Proposed improvements include:

Short Term

- Install detectable warning surface with truncated domes at all curb ramps
- Install ADA-compliant pedestrian push button and repair pedestrian signal countdown timer at the SW corner of the intersection
- Install ADA-compliant curb ramp on the NW corner
- Install pedestrian signal heads with countdown timers on the NW and NE corners

Mid Term

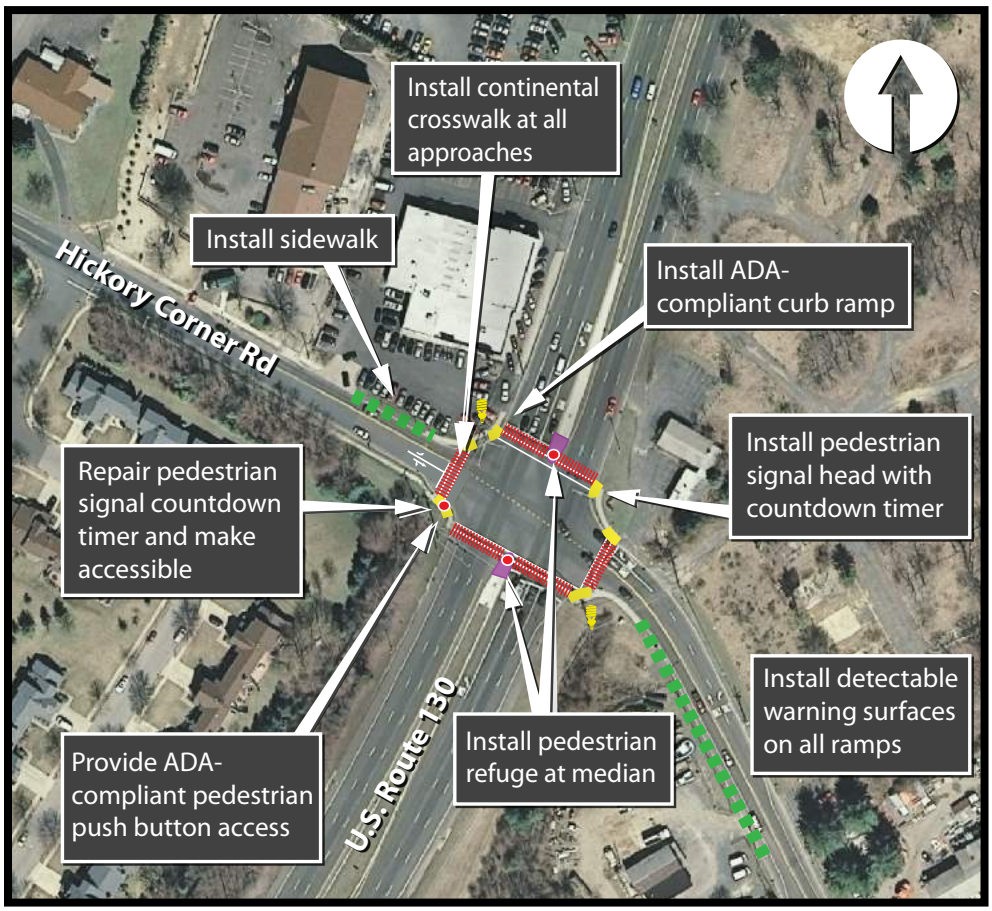
- Restripe all approaches with continental crosswalk striping
- Install sidewalks to fill gaps in the sidewalk network at the NW corner

Long term

- Install pedestrian refuges at the median along U.S. Route 130 along with ADA-compliant pedestrian push buttons

Cost Estimates

Short	$5,100
Mid	$11,200
Long	$11,200



U.S. Route 130 at Dutch Neck Road

This signalized intersection is similar to U.S. Route 130 at Hickory Corner Road in that it is also a link between residential neighborhoods to the west and commercial developments to the east. Proposed improvements include:

Short Term

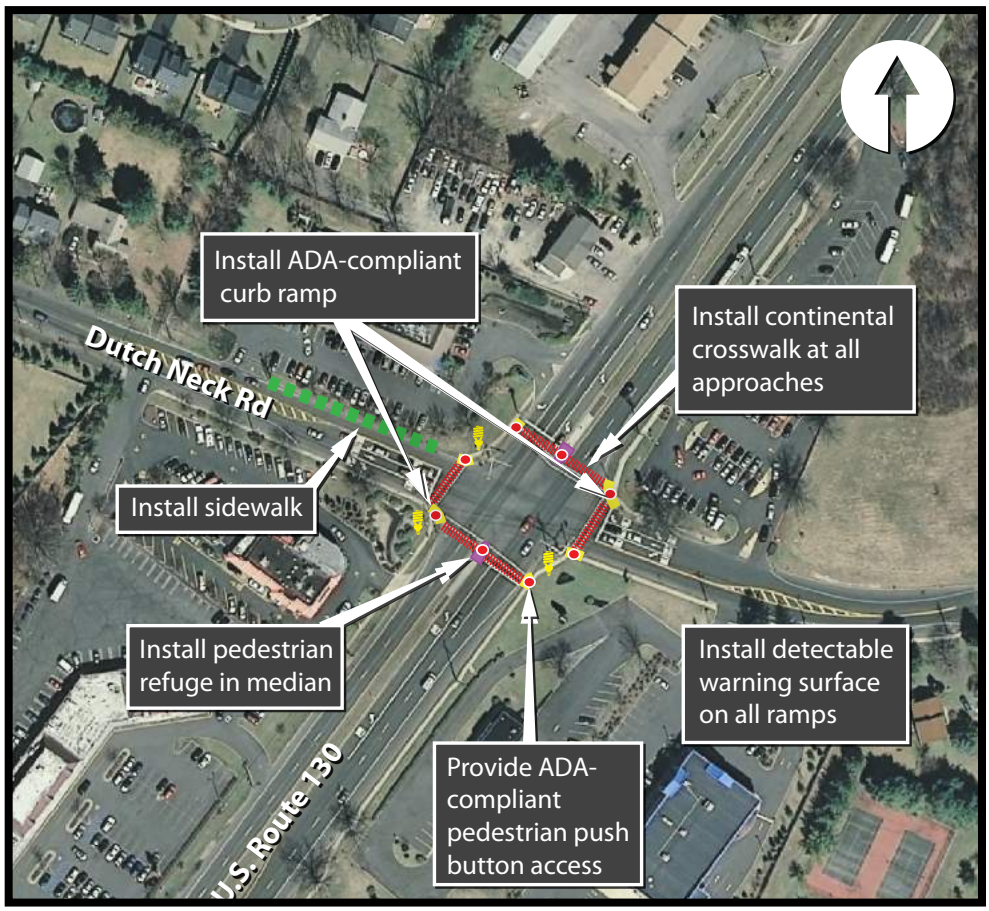
- Install detectable warning surfaces on all ramps in the intersection
- Install ADA-compliant pedestrian push buttons at all corners, as they are currently not accessible from the crosswalk

Mid Term

- Restripe all approaches with continental crosswalk striping
- Complete sidewalk network along the North side of Dutch Neck Road
- Install ADA-compliant curb ramps at the NE and SW corner of the intersection

Long term

- Install pedestrian refuge in the median on U.S. Route 130
- Install crosswalk lighting at NW and SE corners of the intersection



Cost Estimates

Short	$4,600
Mid	$17,000
Long	$87,200

U.S. Route 130 at Princeton-Hightstown Road

Pedestrian destinations surrounding this signalized intersection include commercial and retail development. It also serves as a connection between residential neighborhoods to the east and commercial development, municipal building, and the Rocky Brook Pathway, located NW of this intersection. Proposed improvements include:

Short term

- Install detectable warning surface on curb ramp at the NW corner
- Install ADA-compliant pedestrian push button access on the pedestrian refuge islands on U.S. Route 130 and on the NW corner of the intersection

Mid term

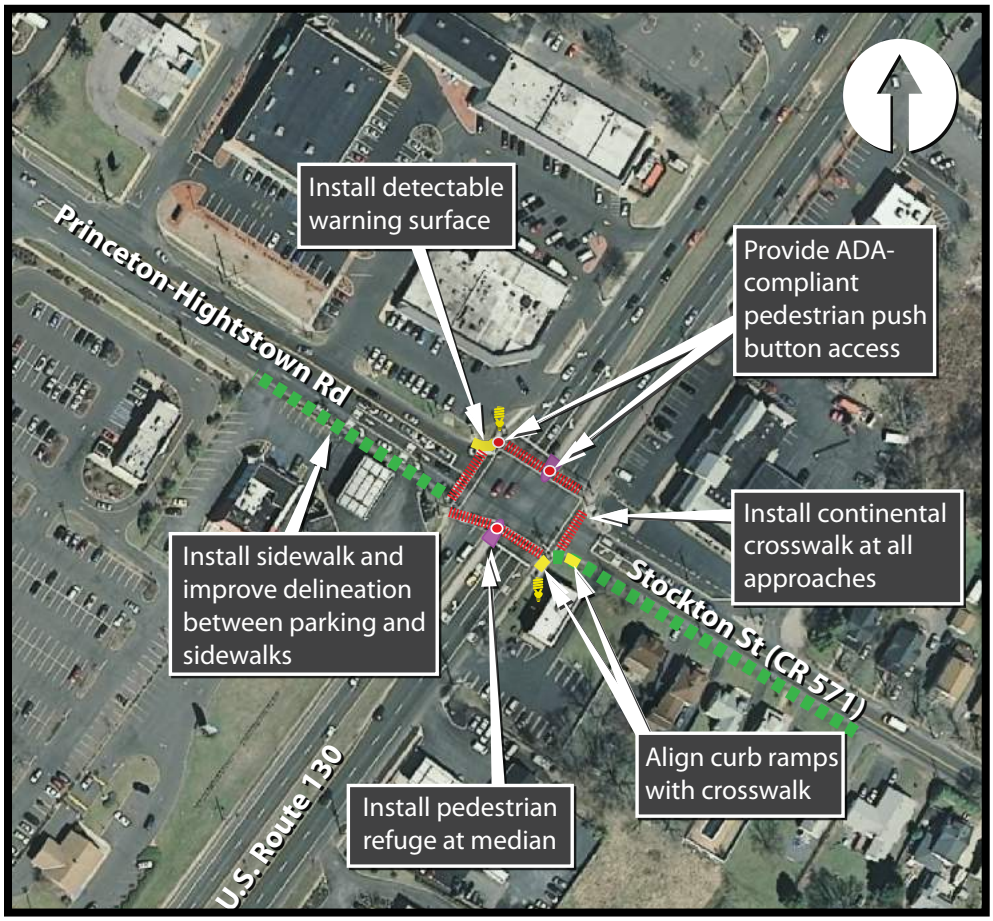
- Restripe with continental crosswalk striping at all approaches
- Fill gaps in the sidewalk network adjacent to the property along the SE and SW corners
- Align curb ramps with the crosswalks at the SE corner

Long term

- Install pedestrian refuge islands at median on the South of U.S. Route 130

Cost Estimates

Short	$1,300
Mid	$16,200
Long	$6,000



Hickory Corner Road at Dutch Neck Road

This is an unsignalized intersection and provides a link between residential neighborhoods and Anker Park (along the SE corner), Bear Brook Pathway (east of the intersection on Dutch Neck Road), the Melvin H. Kreps Middle School (north of the intersection), and the East Windsor Library (SE of the intersection along Hickory Corner Road).

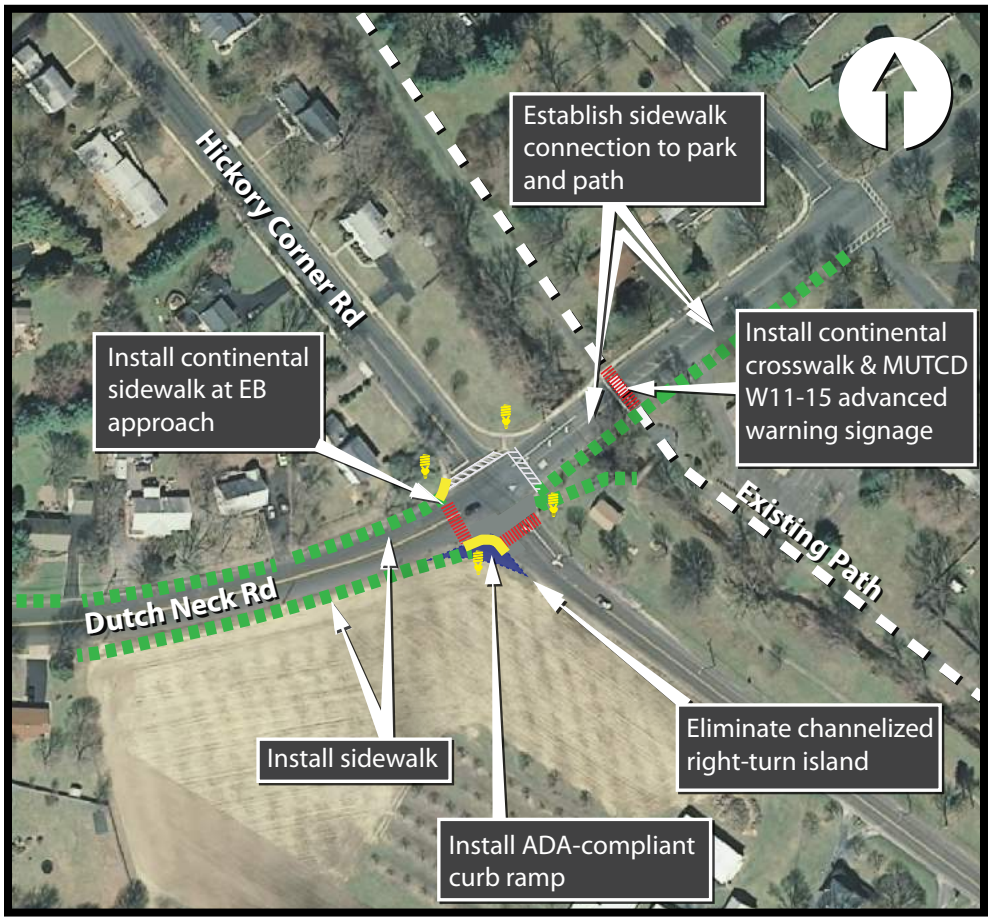
Proposed improvements include:

Short term

- Install continental crosswalk at eastbound approach
- Establish sidewalk connection to the Anker Park and Bear Brook Pathway at the SE corner

Long term

- Fill sidewalks gaps along Dutch Neck Road
- Eliminate channelized right-turn island at SW corner, creating a one-lane eastbound approach
- Provide crosswalk lighting at the intersection



Cost Estimates

Short	$3,100
Mid	$ -
Long	$50,500

Install Sidewalk (mid-term)
Install Continental Crosswalk
Install ADA-compliant Curb Ramp
Provide Lighting for Pedestrians

Oak Creek Road at Dutch Neck Road

The unsignalized intersection provides a connection between residential neighborhoods. Additionally, it is a vital crossing for students walking to the Melvin H. Kreps Middle School, which is located to the north of the intersection. The intersection is also along a route between the Bear Brook Pathway (to the west) and the shared-use path along Dutch Neck Path (to the east).

Proposed improvements include:

Short term

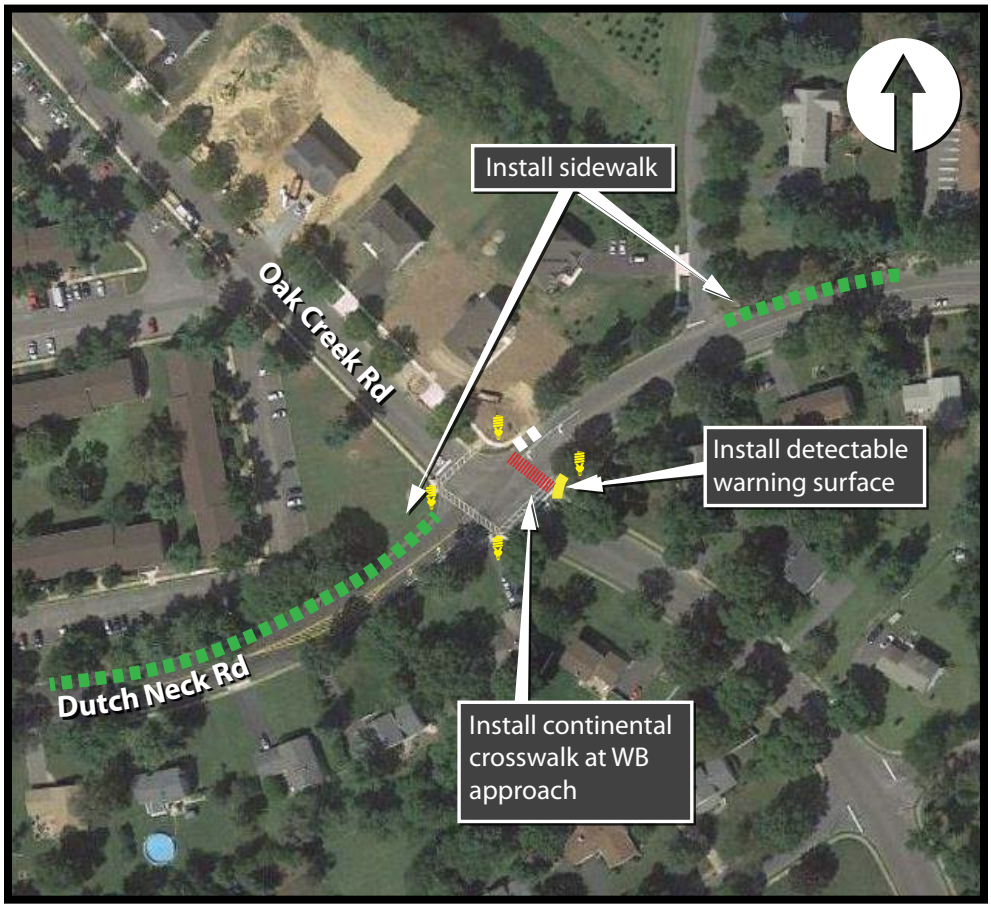
- Install detectable warning surface on curb ramp at the NE corner
- Install continental crosswalk at the westbound approach of Oak Creek Road

Long term

- Install sidewalks along the westbound side of Dutch Neck Road
- Provide crosswalk lighting for pedestrians at the NE and NW corners of the intersection

Cost Estimates

Short	$2,500
Mid	$ -
Long	$27,500



Oak Creek Road at Hickory Corner Road

This intersection is unsignalized and provides a link between residential neighborhoods. Sidewalk connections should be solidified to create a more continuous sidewalk network and provide a more convenient and safer pedestrian connection to the Bear Brook Pathway, located just north of this intersection, and the East Windsor Library, located to the east.

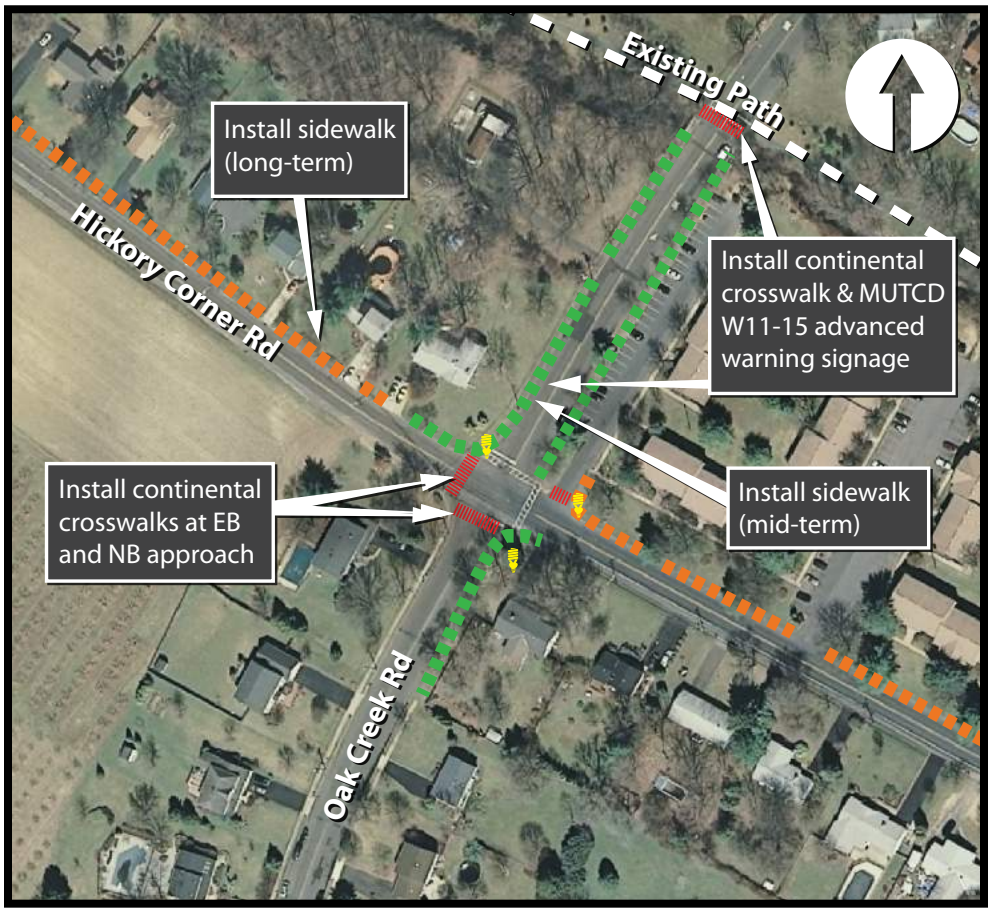
Proposed improvements include:

Short term

- Install continental crosswalks at the eastbound and northbound approaches to the intersection

Long term

- Install missing sidewalk connections to the NE, NW, and SE corners
- Provide crosswalk lighting for pedestrians at NE, NW and SE corners



Cost Estimates

Short	$2,200
Mid	$27,400
Long	$61,700

5.2 Corridor Improvements

The existing conditions chapter analyzed five primary corridors in East Windsor for further analysis:

- U.S. Route 130
- NJ Route 33 (Mercer Street)
- Princeton-Hightstown Road (County Route 571)
- Hickory Corner Road
- Dutch Neck Road

Based on the analysis of these corridors, as well as for Oak Creek Road, recommendations were developed to improve pedestrian mobility. These recommendations generally focus on two factors that influence pedestrian mobility: sidewalk connectivity and driveway design.

Sidewalk standards

New sidewalk construction should provide a minimum width of five feet, which provides a more comfortable environment for pedestrians to walk side-by-side and pass each other, and makes it possible for two wheel chairs to pass each other. Where significant constraints exist that preclude full sidewalk width, a minimum width of four feet should be provided. Funding for construction of new sidewalks, as well as available right-of-way, is always a limiting factor in what can be constructed. A comprehensive sidewalk network should be built up over time as funding is available.

Driveway Design

In many locations throughout East Windsor, commercial (and residential) driveways follow similar design standards as a typical intersection, where the sidewalk is segmented by the driveway, requiring intersection infrastructure (such as crosswalks and curb ramps) to facilitate a comfortable crossing. This design creates an unfriendly pedestrian environment by prioritizing vehicular movement and enabling higher speed turning movements. Where possible, driveways should be reconfigured so the sidewalk continues uninterrupted, giving the pedestrian priority over motor vehicles. Figure 5.2 on the following page provides more detail on driveway design.

U.S. Route 130

This roadway has a relatively high degree of pedestrian traffic due to commercial and retail development between Hickory Corner Road and NJ Route 133. The sidewalk network along U.S. Route 130 is generally continuous without many gaps. However, pedestrian mobility is inhibited by commercial driveway design that cuts into the sidewalk network. Where possible, these driveways should be reconfigured to maintain a consistent and connected sidewalk. ADA-compliant treatments, such as detectable warning surfaces on ramps, should be installed where needed throughout the corridor. This is especially important given the high travel speeds and traffic volumes along the corridor, which pose mobility and safety challenges for

Figure 5.2 | Driveway Design Standards

To create a pedestrian friendly environment, driveway access design should maintain a continuous, level sidewalk across the driveway opening (shown in bottom photo). Driveways designed as intersections should be avoided, as they segment the sidewalk network by using curbing and/or requiring additional ADA-compliant curb ramps, prioritize vehicular movement, and allow higher speed turning movements (shown in top photo).

Wrong: Driveway cutting through sidewalk

Right: Sidewalk built through driveway

pedestrians, particularly those with a physical impairment. Additionally, sidewalks should be installed along the southbound portion of U.S. Route 130 between Birch Lane and Rocky Brook Drive (near NJ 133) where significant gaps impede pedestrian mobility.

NJ Route 33 (Mercer Street)

High travel speeds and traffic volumes can make this corridor a stressful environment for pedestrians. This corridor generally lacks sidewalks both on the east and west sides of Hightstown. Driveway design is less of an impedance to pedestrian mobility than on U.S. Route 130, but proper driveway design should be implemented where applicable.

Princeton-Hightstown Road (CR 571)

Pedestrian facilities are very limited along Princeton-Hightstown Road. There is no sidewalk network west of One Mile Road and significant gaps to the east. These sidewalk gaps are primarily in the vicinity of commercial properties near the corner of U.S. Route 130. The most prominent locations where sidewalk should be added are:

- One-block segment on the westbound side of Princeton-Hightstown Road, just east of Lanning Boulevard.
- Eastbound side of Princeton-Hightstown Road, surrounding the intersection with U.S. Route 130. The addition of a sidewalk by the gas station and convenient store near the southwest corner would help control access to those sites, making for more predictable driver behavior.

- Eastbound side of Princeton-Hightstown Road, between U.S. Route 130 and the Hightstown border.

Over time, the Township should look for opportunities to extend a sidewalk/off-road path on the westbound side of Princeton-Hightstown Road, west of One Mile Road. Short-term improvements would be focused on the intersection with U.S. Route 130.

Hickory Corner Road

Hickory Corner Road features a complete sidewalk network throughout the residential neighborhood north of Dutch Neck Road. However, little sidewalk network exists between Dutch Neck Road and U.S. Route 130. Bear Brook Pathway, which runs parallel to Hickory Corner Road, provides a route for pedestrians between Dutch Neck Road (and just north) and the East Windsor Public Library. However, many of the neighboring residential developments do not have direct access to the Bear Brook Pathway, and the Bear Brook limits access opportunities to the pathway from the south. A sidewalk should be considered in this segment and may be constructed in phases:

- Along the northbound side between the Library and One Mile Road South: This segment would connect the Library and the Bear Brook Pathway to the existing sidewalk along Hickory Corner Road and the intersection with U.S. Route 130 (high priority)
- Between U.S. Route 130 and NJ Route 33: Connects two major corridors, and connects to existing sidewalk and commercial plaza at the intersection of the NJ Route 33 intersection (high priority)
- Between Oak Creek Road and the library: Provides an alternative route to the Bear Brook Pathway and improves local residential access and mobility (medium priority)
- Between Oak Creek Road and Dutch Neck Road: Provides an alternative route to the Bear Brook Pathway and improves local residential access and mobility (low priority)

Dutch Neck Road

Dutch Neck Road lacks a continuous sidewalk network between McKinley Court and Hickory Corner Road. These gaps in sidewalk connectivity tend to alternate between the eastbound and westbound sides of the roadway. These gaps should be filled over time. Sidewalk connectivity should also be improved near the U.S. Route 130 commercial corridor. A new sidewalk connection should be constructed along the westbound side of Dutch Neck Road near the intersection, providing improved pedestrian access to the commercial properties at the corner.

Additionally, sidewalk should be constructed along both the eastbound and westbound sides of the roadway between Oxford Drive and Hickory Corner Road. This would extend the existing network west of Oxford Drive to Hickory Corner Road and the Bear Brook Pathway. This is also along a walking route to the Melvin H. Kreps Middle School, and was identified as an area of need in a previous Safe Routes to Schools grant application.

Figure 5.3 | Addition of Sidewalks on Hickory Corner Road

Existing condition on Hickory Corner Road near Oak Creek Road, looking west

Photosimulation showing the addition a sidewalk in this same segment

Oak Creek Road

The majority of Oak Creek Road has an established sidewalk network. However, there are gaps in the network between Hickory Corner Road and Poplar Road. These gaps should be completed, improving corridor connectivity and connections to the Bear Brook Pathway.

North Main Street and 1 Mile Road

Both North Main Street and 1 Mile Road lack a complete sidewalk network. On North Main Street, there is no sidewalk between Town Center Road and St. James Place. On 1 Mile Road, there is no sidewalk between Dutch Neck Road and Princeton Hightstown Road (CR 571), and several smaller sidewalk gaps between The Orchards of East Windsor and Old Trenton Road. Both roadways provide important links between residential neighborhoods and commercial shopping areas. Filling these network gaps will enhance corridor connectivity, improve pedestrian mobility under the Route 133 bypass, and improve pedestrian access to major destinations.

5.3 Bicycle Network

Given the open space, rural character and park facilities, a solid foundation for bicycle use exists within the Township. This report aims to provide a roadmap for improving on and off road conditions for cyclists in East Windsor through the recommendation of targeted improvements. While East Windsor features many off-road multi-use trails, no on-road bicycle dedicated facilities currently exist in the town. Through a thorough analysis of streets in the township, the project team determined where bicycle facilities could be implemented within the current roadway alignment and where facilities could exist if certain changes were to be made to the road. The bicycle recommendations are intended to create a unified cycling network in the town that is:

- *comfortable for most users*
- *connects origins and key destinations*
- *can be implemented with minimal cost and disruption to current roadway configurations*

The following recommendations aim to provide a more complete bicycle network and improve existing infrastructure to better accommodate bicyclists and make biking more convenient.

Bicycle Level of Traffic Stress

The existing conditions chapter analyzed and categorized the entire roadway network in East Windsor based on a bicyclist's perceived level of stress. The resulting classifications were mapped to show the entire roadway network, and then higher level of stress roadways were removed to illustrate network connectivity issues within the Township. The analysis demonstrated that while there are low stress pockets within the Township, high stress roadway often impede connectivity.

In determining recommended bicycle improvements for the Township, the project team sought to improve bicycle network connectivity from the perspective of Level of Stress. The bicycle improvements recommended here are intended to connect low stress islands, create a more robust low stress bicycle network, and provide better access to destinations within East Windsor and beyond its borders.

Result of Bicycle Recommendations

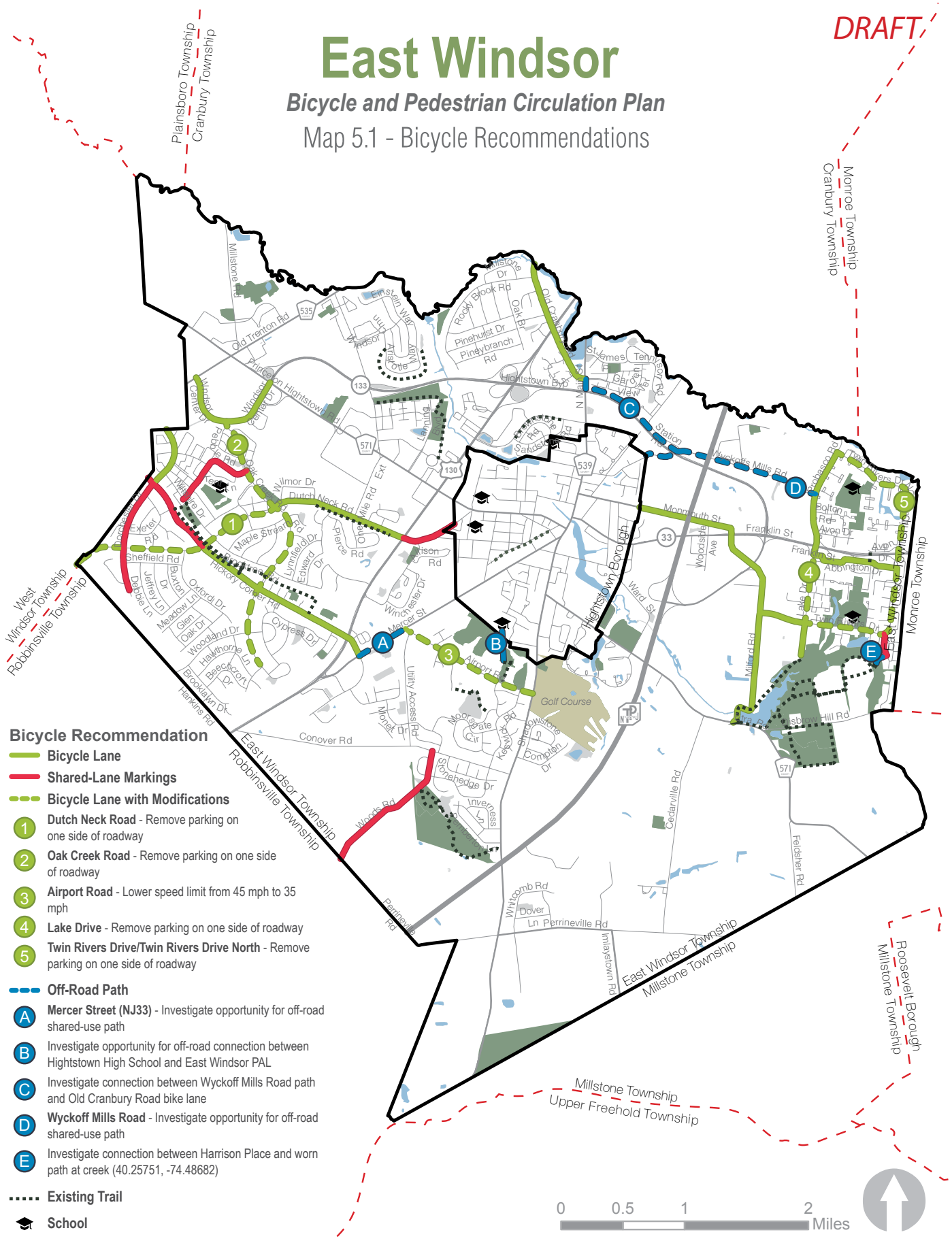
The bicycle recommendations are shown on the following page on Map 5.1. The recommendations are divided into four categories: bicycle lanes, shared-lane markings, bicycle lanes with roadway modifications (segments that would require some level of roadway reconfiguration/speed limit change to accommodate bicycle lanes), and off-road paths.

DRAFT

East Windsor

Bicycle and Pedestrian Circulation Plan

Map 5.1 - Bicycle Recommendations



Bicycle Lanes

Proposed bicycle lanes are shown in a solid green line on Map 5.1. These streets can currently accommodate bicycle lanes in both directions of traffic within their current configuration. The following standards should be used as a guide to implementing bicycle lanes.

Table 5.1: Bicycle Lane Standards

Traffic Lane Width	Minimum Bike Lane Width	Buffer between Bike Lane and Traffic Lane	Posted Speed
10-11′	5′ (if curbed) 4′ (if not curbed)	2-3′ (where possible - or next to parking)	≤35 mph with no buffer, ≤45 mph with buffer

The following streets can currently accommodate and are recommended for the installation of bicycle lanes:

Dutch Neck Road (Oak Creek Road to U.S. Route 130, 0.81 miles)
Segment connects Oak Creek Road to commercial properties at U.S. Route 130, as well as provides a route in Hightstown. Existing shoulders in this segment range between 4 and 7 feet. The striped shoulders should be marked as bike lanes, and the width adjusted to maintain 5-foot minimum width where possible. The addition of bike lanes in this segment would lower the bicycle level of traffic stress (LTS) from 3 to 2 from Oak Creek Road to McKinley Court (speed limit of 30 mph) and from 4 to 3 from McKinley Court to U.S. Route 130 (speed limit of 35 mph).

Hickory Corner Road (Dutch Neck Road to Mercer Street, 1.2 miles)
Segment connects Dutch Neck Road, the East Windsor Public Library, and commercial properties at U.S. Route 130 and Mercer Street, as well as provides access into Hightstown. Existing striped shoulders in this segment range from 5 to 6 feet. The striped shoulders should be marked as bike lanes, and the width adjusted to maintain 5-foot minimum width where possible. The addition of a bike lane in this segment would have no impact on LTS (it would remain 4). If the speed limit were lowered from 40 to 30, the LTS would be lowered to 1.

Dorchester Drive (Hickory Corner Road to Old Trenton Road/CR 535, 0.4 Miles)
Segment connects Hickory Corner Road to Old Trenton Road/CR 535 and housing at Dantone Boulevard. Existing cartway width of approximately 45 feet can accommodate a striped bike lane in each direction with either no parking or parking on one side of the road only. The addition of a bike lane in this segment would lower the LTS from 4 to 3.

Windsor Center Drive (Old Trenton Road/CR 535 to CR 571, 0.77 miles)
Connects Old Trenton Road/CR 535 to Oak Creek Road and Princeton-Hightstown Road. Existing 42-foot cartway width can accommodate two travel lanes and two bicycle lanes. The addition of a bike lane in this segment would lower the LTS from 4 to 3.

Photosimulation of proposed bicycle lane on Hickory Corner Road

Monmouth Street (Hightstown border to Franklin Street, 0.61 miles)
Connects Hightstown to proposed bicycle lane on Milford Road and the Etra Lake Park. Existing 30-foot cartway width can accommodate two 10-foot travel lanes and two 5-foot bike lanes. The addition of bicycle lanes in this segment would have no impact on the existing LTS of 1.

Milford Road (Between NJ 33 and Etra Road, 1.34 miles)
This segment connects Monmouth Street (and Hightstown) to Twin Rivers Drive (and the northern entrance to the Etra Lake Park) and Etra Road (and the south-western entrance to Etra Lake Park). The addition of a bike lane is this segment would lower the LTS from 4 to 3.

Probasco Road (Twin Rivers Drive N to NJ 33, 0.59 miles)
Segment connects Twin Rivers Drive North to proposed off-road trail on Wyckoff Mills Road, to Lake Drive and south side of Twin Rivers. Existing 44-foot cartway width accommodates two lanes of traffic, two bike lanes, and parking on one side of the roadway. The addition of bicycle lanes in this segment would have no impact on the existing LTS of 4. If the current speed limit of 40 mph were lowered to 30 mph, the LTS would drop to 2.

Twin Rivers Drive (Milford Road to Lake Drive, 0.29 miles)
This segment would connect a proposed bike lane on Milford Road to the Twin Rivers neighborhood and Lake Drive (with access to the Etra Lake Park path). Existing 44-foot cartway width accommodates two travel lanes, two bike lanes, and parking on one side of the roadway. The addition of bike lanes in this segment would lower the LTS from 4 to 3.

Lake Drive (Twin Rivers Drive to southern terminus, 0.2 miles)
This segment would connect the Twin Rivers neighborhood to the Etra Lake Park path. Existing 45-foot cartway width accommodates two 11-foot travel lanes, two 6.5-foot bike lanes, and parking on one side of the roadway. The addition of bike lanes in this segment would lower the LTS from 4 to 3.

Abington Drive (Between Lake Drive and Twin Rivers Drive, 0.55 miles)
This segment would connect Lake Drive and Twin Rivers Drive to the tunnel underneath NJ Route 33 and the northern side of Twin Rivers. Existing 35-foot cartway width would accommodate two 11-foot travel lanes and two 6-foot bike lanes. The addition of bike lanes in this segment would reduce the LTS from 2 to 1.

Shared-Lane Markings

Proposed shared-lane markings are shown in red on Map 5.1. Shared-lane markings are recommended on roadways where the cartway is too constrained to accommodate a dedicated bicycle facility. Shared lane markings improve bicycle accommodations within constrained right-of-ways by alerting motorists of potential bicycle activity, instructing bicyclists where to position themselves within the travel lane, and reducing wrong-way bicycling incidences. Share-lane markings are only recommended on roads with a posted speed ≤25 mph and vehicle volumes lower than 10,000 vehicles per day. Because shared-lane markings do not provide a dedicated facility for bicyclists, they have no impact on a roadway segment's bicycle level of traffic stress. Shared-lane marking are utilized in the recommended bicycle network for East Windsor to make short connections between proposed and existing bicycle facilities and key origins/destinations. Shared-lane markings are recommended in the following locations:

Dorchester Drive (Between southern terminus and Hickory Corner Road, 0.8 miles)
Segment connects Dutch Neck Road to proposed bicycle lane from Hickory Corner Road to Old Trenton Road/CR 535.

Hickory Corner Road (Between Dorchester Drive and Dutch Neck Road, 0.55 miles)
Connects proposed Hickory Corner Road bicycle lane at Dutch Neck Road to Dorchester Road.

Yorkshire Drive (Between Oak Creek Road and Wiltshire Drive, 0.55 miles)
Connects proposed Oak Creek Road bicycle lanes to Melvin H. Kreps Middle School and Bear Brook Pathway.

Dutch Neck Road (Between U.S. Route 130 and Hightstown border, 0.34 miles)
Connects terminus of Dutch Neck Road bicycle lanes at U.S. Route 130 to Hightstown.

Woods Road (Between East Windsor border and Conover Road, 0.92 miles)
Connects Conover Road and Perrineville Road to Woods Road Community Park and Turnpike Park.

Huntington Drive (Between Twin Rivers Drive and Harrison Place, 0.15 miles)
Connects Twin Rivers Drive to proposed off-road connection to Etra Lake Park.

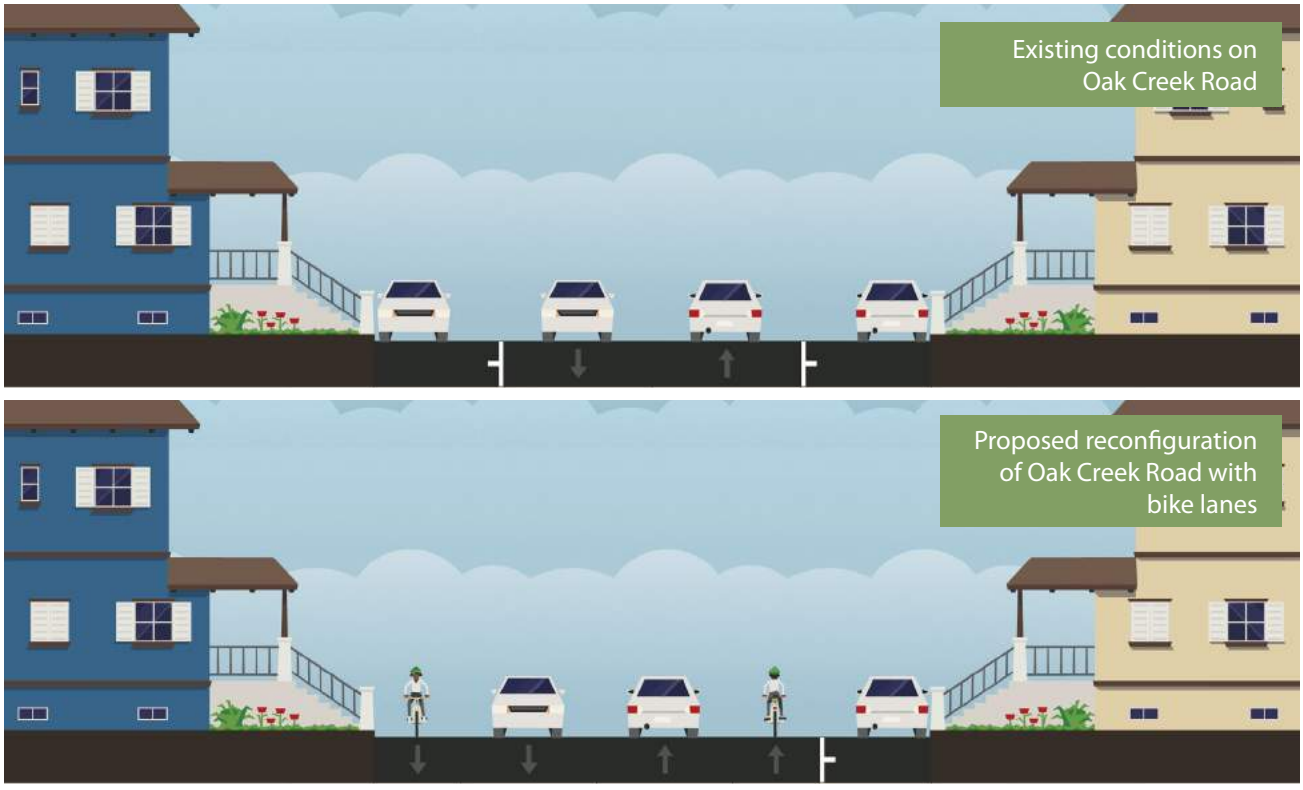
Example of shared-lane marking
Shared lane markings should be placed at least 4 feet from the curb if there is no on-street parking and 11 feet from the curb if there is on-street parking

Bicycle Lane with Modifications

The following roads can accommodate bicycle lanes, provided that additional roadway modifications are made (shown in a dotted green line on Map 5.1). While the proposed facilities would provide critical links in creating an interconnected bicycle network, it is up to the Township of East Windsor and its citizens to weigh the pros and cons of potential action.

Dutch Neck Road – (Between South Lane and Oak Creek Road, 1.22 miles, #1 on Map 5.1)
This segment would connect South Lane to Dorchester Drive, Hickory Corner Road, Oak Creek Road and the proposed bicycle lane to U.S. Route 130. Addition of a bicycle lane in this segment would require restricting parking on one side of the roadway. With this restriction, this segment can accommodate two 11-foot travel lanes and two-6 foot bicycle lanes within the 45-foot cartway width. The addition of bike lanes in this segment would lower the bicycle level of traffic stress from 3 to 2.

Oak Creek Road (Between Windsor Center Drive and Brooklawn Drive, 2.15 miles, #2 on Map 5.1)
This segment connects Windsor Center Drive, Yorkshire Drive (and the Melvin H. Kreps Middle School), Dutch Neck Road, the Bear Brook Pathway, and Hickory Corner Road. Addition of a bicycle lane in this segment would require restricting parking on one side of the roadway. With this restriction, this segment can accommodate two 11-foot travel lanes and two-6 foot bicycle lanes within the 45-foot cartway width. The addition of a bike lane in this segment would have no impact on the existing LTS of 2.



Experienced cyclist along Perrineville Road (LTS 3 or 4)

Airport Road (Between Mercer St/NJ Route 33 and CR 539, 0.89 miles, #3 on Map 5.1)
This segment connects Hickory Corner Road (via potential Mercer Street off-road path) to the East Windsor PAL and the Hightstown High School. Addition of a bicycle lane in this segment would require lowering the posted speed limit from 45 mph to 35 mph. The roadway can currently accommodate two 7-foot bike lanes within the 37 foot cartway. The addition of a bike lane on this segment, along with the lower speed limit would reduce the LTS from 4 to 3.

Lake Drive (Between NJ Route 33 and Twin Rivers Drive, 0.48 miles, #4 on Map 5.1)
This segment connects Probasco Road and Abbington Road to Twin Rivers Drive. In order to accommodate bicycle lanes within the existing 47-foot cartway width, parking would have to be restricted to one side of the roadway. With this restriction, this segment can accommodate two 11-foot travel lanes and two-6 foot bicycle lanes. The addition of bike lanes in this segment would lower the LTS from 4 to 3.

Twin Rivers Drive/Twin Rivers Drive North (Between Probasco Road and Lake Drive, 1.9 miles, #5 on Map 5.1)
This segment connects Probasco Road to the Perry L. Drew Elementary school, Abbington Road, the Ethel McKnight Elementary School, and the Etra Lake Park. In order to accommodate bicycle lanes within the 45-foot cartway width, parking would have to be restricted on one side of the roadway. With this restriction, this segment can accommodate two 11-foot travel lanes and two-6 foot bicycle lanes. The addition of a bike lane in this segment would lower the LTS from 4 to 3.

Off-Road Paths

In some locations, an on-street bicycle facility is not feasible. The three recommended off-road paths are intended on creating links between other proposed or existing facilities. Because an off-road path is an entirely separated facility, it is always classified as a LTS 1.

Mercer Street (Between Hickory Corner Road and Airport Road, 0.33 miles, A on Map 5.1)
Proposed off-road path would connect potential Hickory Corner Road bicycle lanes to potential Airport Road bicycle lanes and East Windsor PAL/Hightstown High School.

Wyckoff Mills Road (Between Probasco Road and Hightstown border, 1.1 miles, B on Map 5.1)
Proposed off-road path would connect Hightstown and Probasco Road.

Connection between Harrison Place and worn path at creek (40.25751, -74.48682, ~0.06 miles, C on Map 5.1)
Proposed off-road path would provide entrance to Etra Lake Park from southeast corner of Twin Rivers community. Existing worn path and makeshift bridge over creek at WGS coordinates 40.25751, -74.48682 indicate use and desire for connection.

Recreational users at Etra Lake Park path along Etra Road (LTS 1)

Bicycle Network

As stated at the outset, the bicycle recommendations made here are intended to provide a roadmap for creating an interconnected, low-stress bicycle network throughout East Windsor. The bicycle network is intended on being versatile and useful for cyclists of all ages, abilities, and background. The network connects neighborhoods to many popular destinations, including recreational trails, schools, and commercial centers. The network also prioritizes connections to and from Hightstown, which because of its geographic location in the center of East Windsor, is critical for cyclists intending on traveling from one side of the town to the other. Additionally, Hightstown might be considered a destination for many East Windsor residents.

Other Bicycle Facilities

Bicycle Parking

Providing adequate, secure bicycle parking is an important measure to accommodate and encourage cycling as an alternative travel mode. Proper parking facilities increase the convenience of cycling for commuting, utilitarian, or recreational purposes while also alleviating the threat of theft. Parking should be conveniently located, well lit, and easily visible for cyclists arriving at a destination.

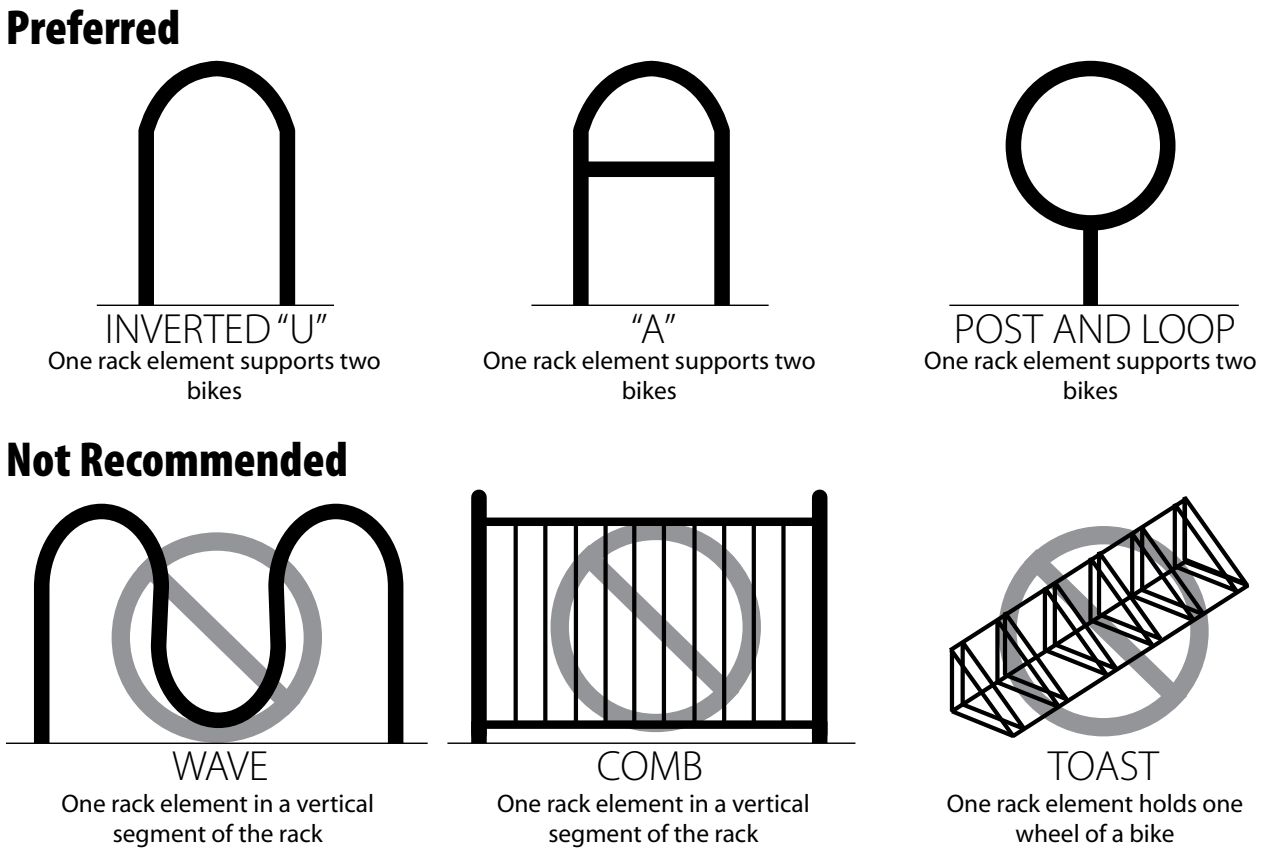
East Windsor should install additional bicycle parking using current standards in bicycle rack design. Nearly all existing bicycle racks are an obsolete "wave" or "comb style". These rack designs do not adequately support the bike frame, have poor spacing, and are frequently used incorrectly. There are a variety of bicycle parking racks available. Based on guidelines from the Association of Pedestrian and Bicycle Professionals (APBP), a bicycle rack should meet the following requirements:

- Support the bicycle upright by its frame in two locations
- Prevent the wheel of the bicycle from tipping over
- Enable the frame and one or both wheels to be secured
- Support bicycles without a diamond shaped frame and horizontal top tube (e.g. step-through frames)
- Allow both front-in and back-in parking with a U-lock through the frame and front or rear wheel
- Resist the cutting or detaching of any rack element with hand tools

As the existing racks approach the end of their life cycle, they should be replaced with racks that meet current standards, such as the inverted-U, "A", or post and loop designs more commonly installed today. (Recommended bike rack designs can be found in Figure 5.4 on the following page.)

The Township should also install new racks at major public destinations currently lacking parking. The Township should also encourage businesses and require new development to provide bicycle parking to further expand parking capacity and improve the convenience of bicycling.

Figure 5.4: Bicycle Rack Designs



Source: *Bicycle Parking Guidelines*, Association of Pedestrian and Bicycle Professionals, 2002

Drainage Grates

Although a complete inventory was not conducted, field observations noted several drainage grates within the Township that are an older non-bike safe design. Non-bike safe grates throughout East Windsor should be replaced and upgraded to a bike-safe design during typical drainage system maintenance cycles or roadway projects.

Non-Compliant Drainage Grate

Bike Safe Drainage Grate

5.4 Trail Network

As discussed in the existing conditions chapter, East Windsor's existing trail network is a valuable and unique resource within the Township. As discussed in the previous section, improving connections between the trails and to new bike facilities will be an important step forward in creating a more complete network.

Improved Connectivity

There are several proposed bicycle facility improvements, which will enhance connectivity between trails and parks (shown in Map 5.2). These improvements consist of dedicated bike lanes, shared-lane markings, and off-road paths. The proposed bike facilities would improve access to a number of trails and parks by providing lower stress routes. Several proposed dedicated bike lanes, along Twin Rivers Drive and on Lake Drive, would provide connections to the Etra Lake Park path. Proposed shared-lane markings would establish connections to Bear Brook Pathway, Woods Road Community Park, Turnpike Path Parkway, and Etra Lake Park.

Enhanced Crossings

In addition to improving connections to the trails, on-street crossings (particularly along the Bear Brook Pathway) can be enhanced to improve the visibility of trail users crossing the roadway to motorists. Figure 5.5 below demonstrates a crossing improvement on Oak Creek Road at the Bear Brook Pathway crossing. This concept includes the addition of high visibility continental crosswalk striping, repainted crossing marking, the addition of an in-street stop for pedestrians sign, and updated trail crossing signage (MUTCD sign W11-15) located along the side of the road, to better alert drivers to the upcoming crossing.

Figure 5.5: Trail crossing improvement concepts shown at intersection of Bear Brook Pathway and Oak Creek Road

Figure 5.6: Existing makeshift bridge at WSG 40.25751, -74.48682 near Etra Lake Park

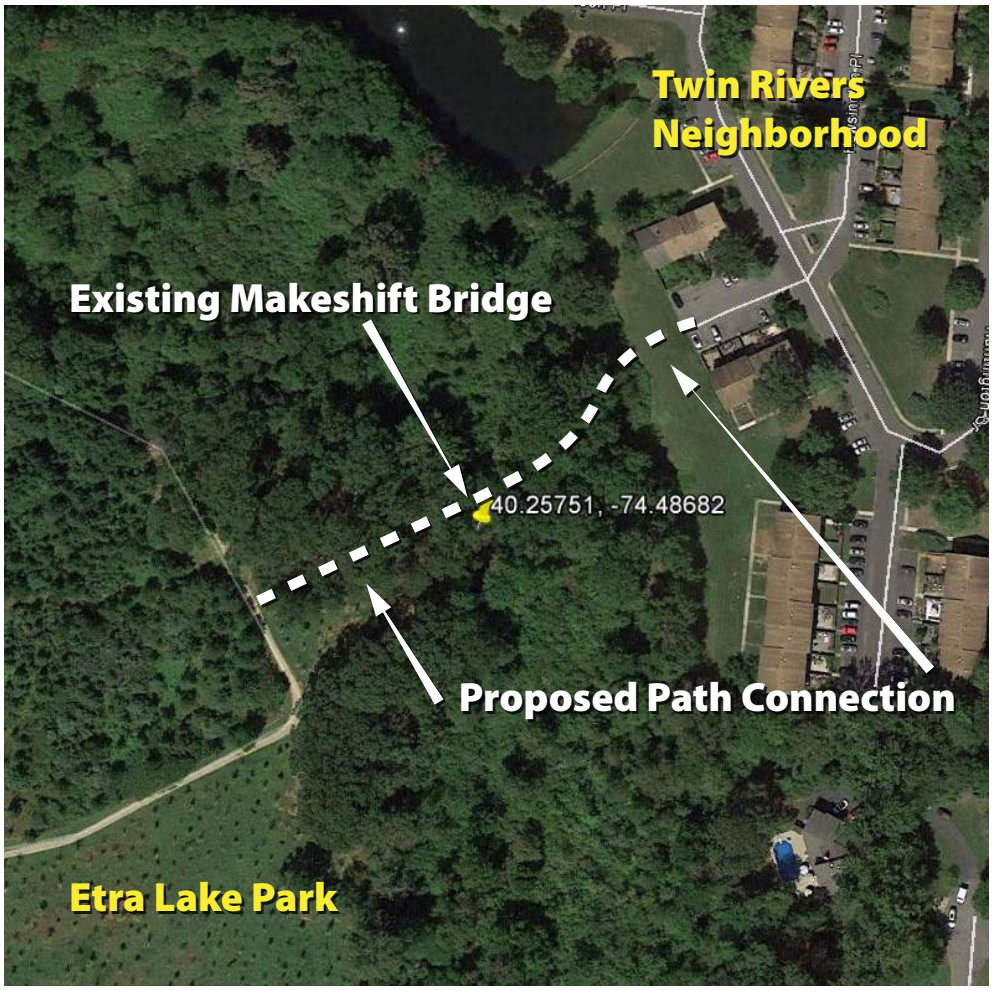


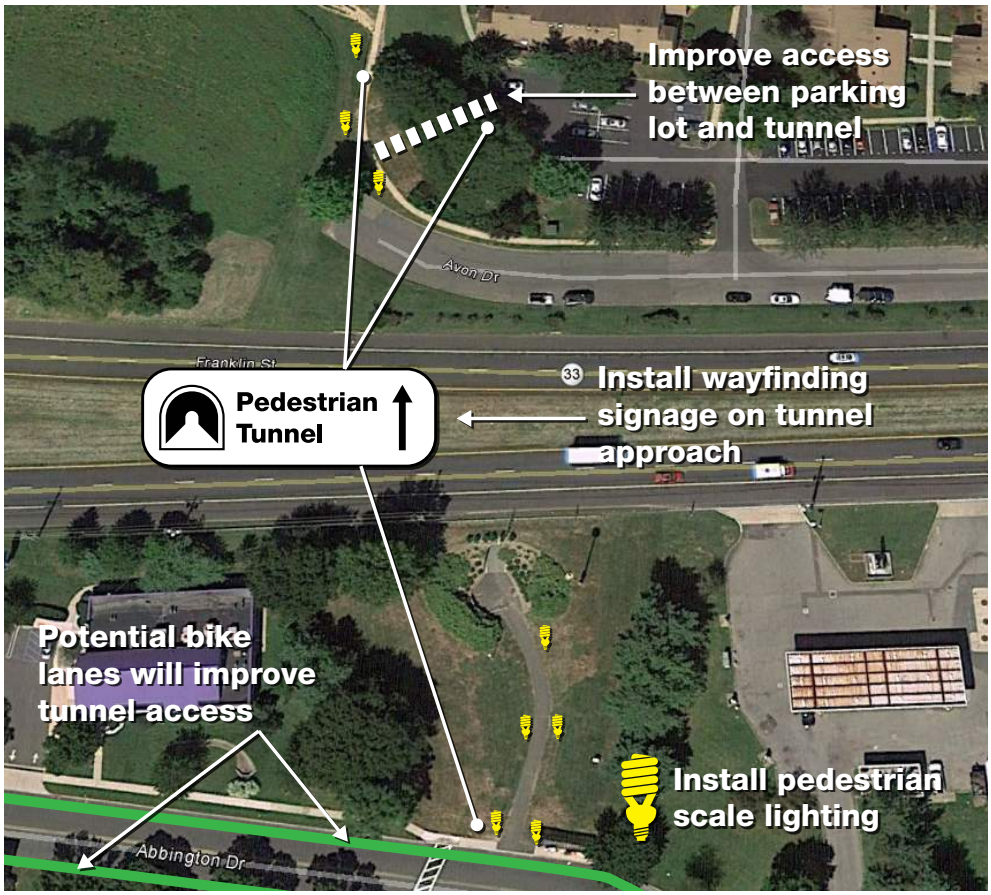
Figure 5.7: Proposed connection between Twin Rivers neighborhood, via Harrison Plan, to Etra Lake Park

Twin Rivers Tunnel

Located at the eastern edge of the Township, Twin Rivers is a planned unit development (PUD) that straddles NJ Route 33. A tunnel and connecting pathway link the development on either side of NJ Route 33. Through Twin Rivers, NJ Route 33 is a four-lane divided highway with a grass median and a 55 mph speed limit. Two signalized intersections, spaced 0.5 miles apart and located at the eastern and western edges of the Twin Rivers community, are the only safe crossing opportunities for pedestrians at grade. The tunnel, therefore, provides a critical pedestrian link near the center of the PUD. It connects residences on the north side of NJ Route 33 with a NJ TRANSIT bus stop, shopping complex, and residences to the south of NJ Route 33.

The tunnel is approximately 200 feet long and 10 feet wide. Asphalt paths connect the tunnel to the PUD's sidewalk network. The tunnel and southern approach are lit with pedestrian scale lighting. Lighting at the northern approach is limited, and provided only from a utility pole mounted fixture above the tunnel entrance.

Figure 5.8: Twin Rivers Tunnel Proposed Access Improvements



Cyclist along Windsor Perrineville Road, near connection to proposed Union Transportation Trail

Twin Rivers Tunnel Improvements

As indicated in the existing conditions technical memorandum, the existing tunnel connection underneath NJ Route 33 provides a critical pedestrian link near the center of Twin Rivers. It connects residences on the north side of NJ Route 33 with a NJ TRANSIT bus stop, shopping complex, and residences to the south of NJ Route 33.

Improvements are needed around the tunnel to improve access and visibility of the tunnel. These improvements are illustrated in Figure 5.8.

Lighting

Pedestrian scale lighting should be installed along approaches to the tunnel at the southern and northern entrances.

Signage

Wayfinding signage should be installed near approaches to both sides of the tunnel.

Access

An additional connection between the northern entrance of the tunnel and the nearby parking lot is needed to improve access.

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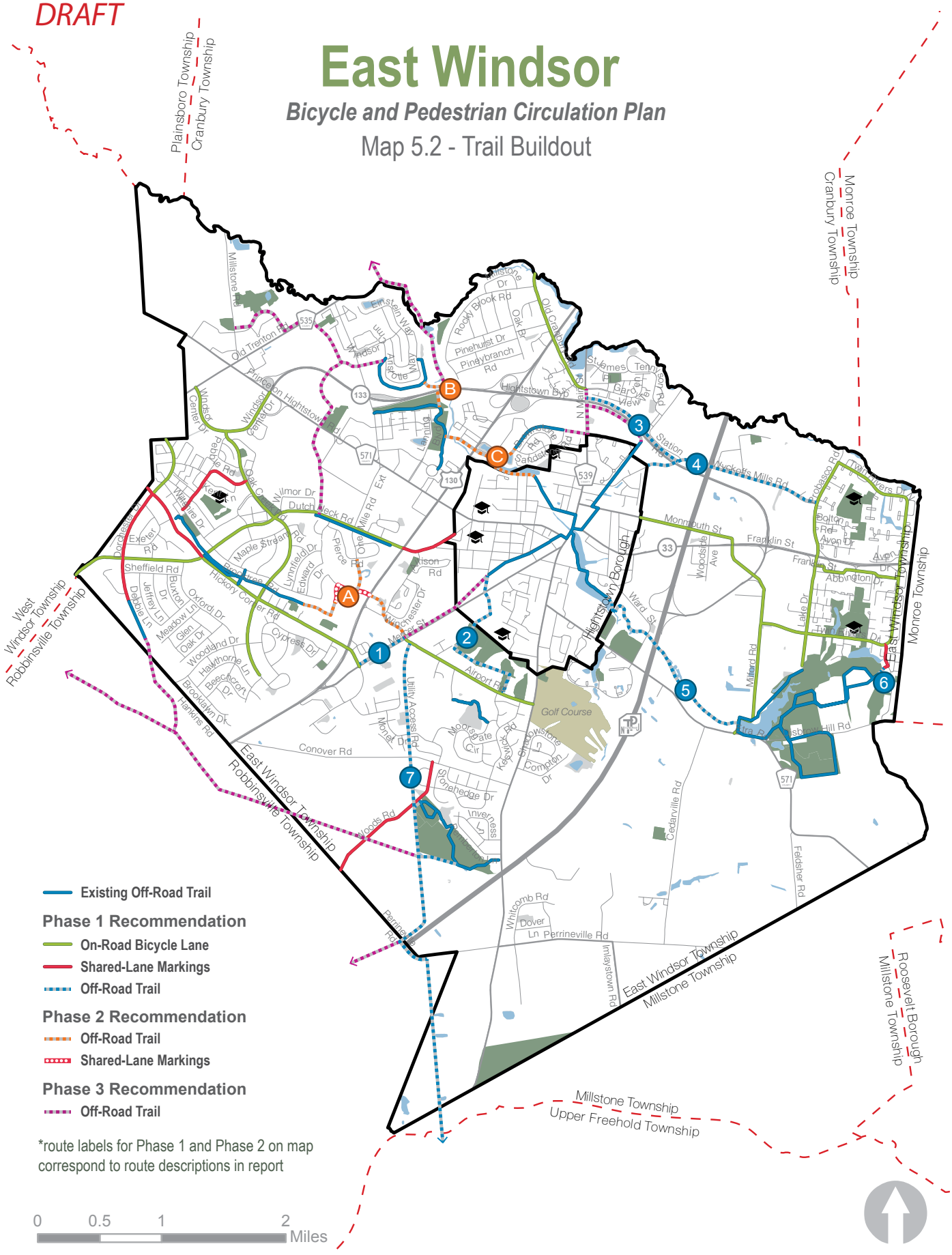
East Windsor

Bicycle and Pedestrian Circulation Plan

Map 5.2 - Trail Buildout



Regional Trail Connectivity

Trail facilities provide recreational opportunities, as well as supplement the on-road bicycle network discussed in Section 5.3 for more utilitarian trips. Where the on-road options may be circuitous or difficult due to stressful arterial roadways, an expanded trail network could provide a valuable alternative for cyclists of all ages and abilities, as well as pedestrians, greatly enhancing both Township and region-wide bicycle and pedestrian mobility.

East Windsor has several existing trail facilities; however, they generally are isolated from one another and lack overall network connectivity. There are opportunities to link to existing and planned trails in adjacent municipalities. Creating and enhancing these connections will improve off-road mobility through East Windsor, as well as tie the municipality into broader, regional trail systems, such as the Delaware Valley Regional Plan Commission's (DVRPC) multi-county "The Circuit" trail program.

This plan examined opportunities for creating and expanding a more connected off-road trail system through East Windsor. The concepts are divided into three phases in order to prioritize advancing different segments of the network for more detailed analysis, design, and construction. The following sections describe the trail segments associated with each phase, and the complete trail network is depicted in Map 5.2 on the previous page.

Phase I Trail Network Improvements

Phase I trail improvements include the highest priority trail segments proposed for further study and advancement through design and construction. These trails provide key connections to existing facilities and major destinations and significantly improve network connectivity. They also support trail facilities that are already in the planning or design phases. Proposed trail improvements include:

Mercer Street (Between Hickory Corner Road and Airport Road, 0.33 miles, #1 on Map 5.2)

Proposed off-road path would connect the proposed Hickory Corner Road bicycle lanes to the proposed Airport Road bicycle lanes and the East Windsor PAL/ Hightstown High School. This proposed path is consistent with recommendations from the *Route 33 Corridor Revitalization Plan.*

East Windsor Green Link (Approx. 0.70 miles, #2 on Map 5.2)

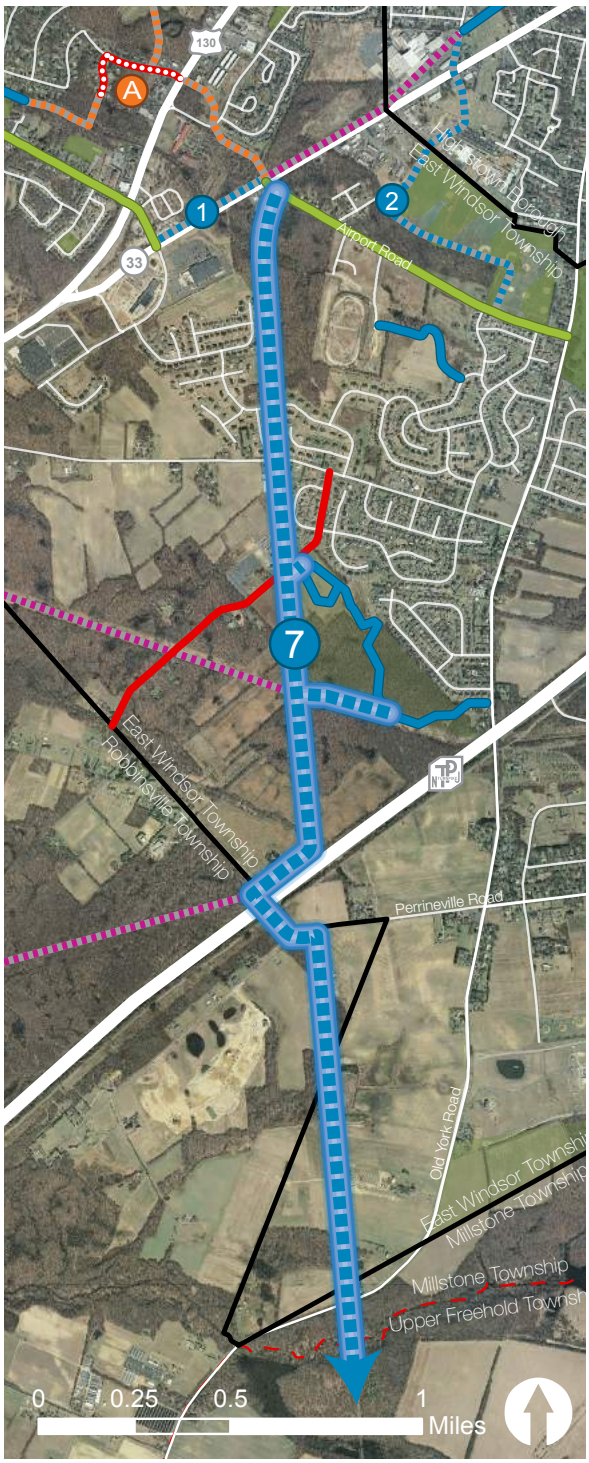
This proposed trail would improve access to the East Windsor PAL and Hightstown High School. From Airport Road, it traverses both properties and connects to a proposed segment of the Roger C. Cook Greenway west of the High School. The trail would then continue into Hightstown, where it would tie into the existing portion of the Roger C. Cook Greenway adjacent to Railroad Avenue.

Cranbury Station Road & Off-Road Trail (Between Wyckoff Mills Road and North Main Street, Approx 0.75 miles, #3 on Map 5.2)

Proposed off-road path would connect Wyckoff Mills Road and North Main Street, ultimately connecting the northern residential neighborhoods with Twin Rivers and the broader on-road and off-road bicycle and pedestrian networks. The eastern section would run adjacent to Cranbury Station Road, while the western section would run through the existing right-of-way associated with the NJ Route 133 Bypass.

Wyckoff Mills Road (Between Probasco Road and Hightstown border, Approx 1.10 miles, #4 on Map 5.2)
Proposed off-road path would connect Hightstown and Probasco Road at the northern portion of Twin Rivers. The off-road path would run adjacent to the roadway.

Proposed UTT alignment and interconnections

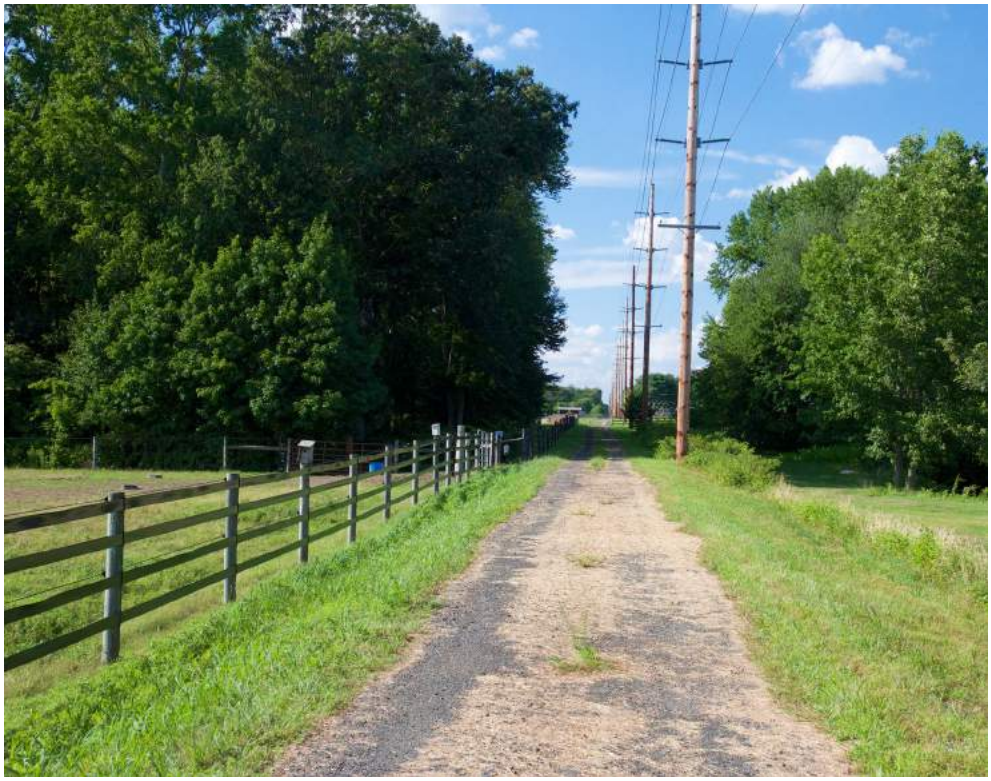


Peddie Lake to Etra Lake Trail (Approx. 1.10 miles, #5 on Map 5.2)
From the Hightstown/East Windsor border, the trail would extend east on the north side of Rocky Brook to Milford Road, where it would connect to the existing Etra Lake Pathway and trail system. It would use an existing underpass to cross under the New Jersey Turnpike. At the East Windsor border, the trail would connect to proposed and completed sections of the Roger C. Cook Greenway in Hightstown. The completed trail would provide an off-road alternative to NJ Route 33, connecting Twin Rivers and Etra Lake Park to Hightstown and the western section of East Windsor.

Connection between Harrison Place and worn path at creek (40.25751, -74.48682, ~0.06 miles, #6 on Map 5.2)
Proposed off-road path would provide an entrance to Etra Lake Park from the southeast corner of Twin Rivers community. An existing worn path and makeshift bridge over the creek at WGS coordinates 40.25751, -74.48682 indicate use and desire for connection.

Union Transportation Trail (UTT) (Approx. 3.25 miles, #7 on Map 5.2)
The UTT, part of "The Circuit", is an on-going trail project that runs through Monmouth County, with connections into Burlington County. Several segments south of East Windsor have already been completed. The UTT enters East Windsor from the south at a crossing of Old York Road (CR 539). Following an existing utility line right-of-way owned by Jersey Central Power and Light, the trail would extend approximately 3.25 miles from the south border to the intersection of Airport Road and NJ Route 33. The entire section would be off-road with the exception of the crossing of the New Jersey Turnpike. At this point, the trail would run on-road for approximately 0.25 miles along Perrineville Road, which has an existing shoulder and a sidewalk along the New Jersey Turnpike overpass. Additional sidewalk would be constructed to connect the bridge to the trail sections. There are two known stream crossings along the proposed trail between the New Jersey Turnpike and Airport Road; one has a culvert that is intact, while the other would require a short-span bike/ped bridge. Additional short-connector spurs would connect the UTT to the existing Turnpike Park Pathway and Woods Road Community Park.

Former rail bed along proposed Union Transportation Trail, near intersection with Airport Road



Existing path along proposed Union Transportation Trail, near intersection with Old York Road

Phase II Trail Network Improvements

Phase II trail improvements provide additional short links to further knit the trail network together and improve network connectivity within East Windsor. The proposed Phase II trails generally utilize available right-of-way, where possible.

Bear Brook Pathway Extension (Approx 0.80 miles, A on Map 5.2)

Three proposed segments would extend the Bear Brook Pathway to the east and north. One segment extends the path from the library 0.25 miles east to Lindenbrook Way. Shared-lane markings would connect the path along Lindenbrook Way and Maple Stream Road to U.S. Route 130. A third segment would extend north from Maple Stream Road 0.20 miles to One Mile Road via existing Township right-of-way. The segment would connect the residential neighborhood to the north to the pathway, library, and large trail network.

Rocky Brook Pathway Extension North (Approx 0.50 miles, B on Map 5.2)

The proposed trail segment extends the Rocky Brook Pathway north under NJ Route 133 to the residential neighborhood along Hubble Boulevard. It provides a bicycle and pedestrian connection under the NJ Route 133 Bypass, linking the neighborhood to the municipal complex, commercial areas, and the southern portion of the Township. The trail segment primarily uses right-of-way owned by the New Jersey Department of Transportation, and requires coordination with the Hubble Boulevard neighborhood's developer to connect to its existing trail.

Rocky Brook Pathway Extension East (Approx 0.70 miles, C on Map 5.2)

The proposed trail segment extends the Rocky Brook Pathway east across U.S. Route 130 to Hightstown, linking the Pathway with the Roger C. Cook Greenway. West of U.S. Route 130, the trail would require use of existing Township right-of-way and coordination with property owners at an existing mobile home park to Rock Brook Road. The trail would utilize the existing traffic signal at Rock Brook Road/Town Center Road to cross U.S. Route 130.

NJ Route 133 underpass along Rocky Brook

Existing path along potential Rock Brook Pathway Extension East

The proposed segment east of U.S. 130 would formalize an existing path, following the berm between Rocky Brook and a series of detention basins, ultimately connecting with the Roger C. Cook Greenway. Additional connectivity improvements include installing pre-fabricated bicycle and pedestrian bridges across the Rocky Brook, connecting the proposed trail to residential neighborhoods at the Hutchingson Street and Greeley Street cul-de-sacs. A series of stepping stones across the brook at Hutchingson Street indicate existing use of this connection. The trail segment requires coordination with the Borough of Hightstown and property owners along the proposed trail (primarily the Peddie School).

Phase III Trail Network Improvements

Phase III trail improvements are shown in Map 2.2. The potential Phase III trails are intended to be very conceptual in nature, and indicate areas where additional trails may be developed in the future. They typically follow features such as streams, open space, or utility lines and require further study to refine the proposed route layout. The trail concepts focus on potential regional connections beyond East Windsor, such as opportunities to:

- Extend the network west towards the D&R Canal other regional trail systems, with potential routes along utility line rights-of-way, the Millstone River
- Extend the Roger C. Cook Greenway along NJ Route 33, as proposed in the *Route 33 Corridor Revitalization Plan*
- Connect the UTT to the western portion of the Township
- Connect the UTT to the Assunpink Greenway and Mercer County Park
- Expand the trail system in the northwest and northern portions of the Township

5.5 Access to Schools

East Windsor students live within a walkable distance, the majority within a 2 mile radius, allowing for a potential increase in students walking and biking to school. In 2012 and 2014 East Windsor Township submitted Safe Routes to School grant applications in order to seek funding to improve walking and biking near the Township's schools. In these applications, several connectivity issues and other safety barriers were identified. The following section summarizes recommendations at and in the vicinity of the Township's schools to improve bicycle and pedestrian access and mobility.

Perry L. Drew Elementary School and Ethel McKnight Elementary School

These schools are located on high traffic roads, both in Twin Rivers (Drew Elementary School on Twin Rivers Drive North and McKnight Elementary School on Twin Rivers Drive). Students attending the schools live within walking or biking distance of the school but are unable to do so as a result of high traffic volumes in the area and a lack of bicycle facilities. A bike lane along Twin Rivers Drive/Twin Rivers Drive North (between Probasco Road and Lake Drive) is proposed. This connection would allow for bicycle access between the schools and surrounding residential areas as well as the Etra Lake Park. It is proposed that East Windsor Township continue its effort to improve pedestrian safety. The township applied for funding from Safe Routes to School in order to install a school zone flashing beacon radar sign in attempt to lower the amount of speeding vehicles in the area. It would be a good first step to allow students to potentially walk to school.

Melvin H. Kreps Middle School

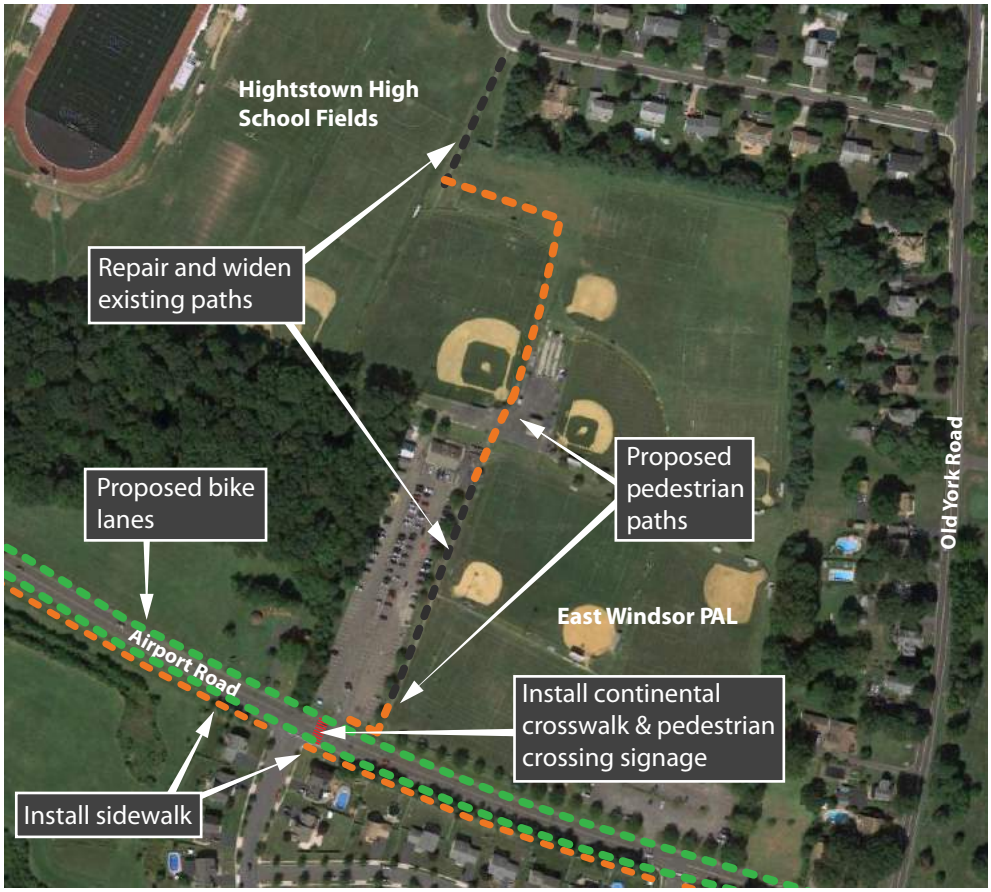
One of the main approaches to the school, Dutch Neck Road, is missing sidewalk connections between Hickory Corner Road and Oxford Drive (approximately 480 feet), which impedes a viable connection to the middle school from the residential neighborhood to the west of the school for any students attempting to walk or bike. As a result busing is provided to accommodate for the existing disconnect. Several improvements could be made on Oak Creek Road in order to make walking/biking to Kreps Middle school a viable option. Under the recommendations in this report, a bike lane is proposed along Oak Creek Road (between Windsor Center Drive and Brooklawn Drive) which will provide better connectivity in the neighborhood and allow nearby students the opportunity to bike to school. Additionally, shared-lane markings are proposed for Yorkshire Drive (between Oak Creek Road and Wiltshire Drive), which would connect the middle school and Bear Brook Pathway. East Windsor Township submitted an application to Safe Routes to School in order to address four key intersections (Dutch Neck Road at Brooktree/Wiltshire Drive, Dutch Neck Road at Oak Creek Road, Oak Creek Road at Yorkshire Drive/Wyndmoor Drive, Dorchester Drive at Devonshire Drive), which were proposed to be enhanced

by upgrading crossings with rectangular rapid flashing beacons and pedestrian refuge islands to allow safe crossing when traveling to and from school. With these developments students will be more likely to explore walking and biking to school, which has the added benefit of reducing high levels of vehicle traffic.

Hightstown High School

There are several gaps in sidewalk connectivity on roads leading to the high school, which could prevent nearby students from walking or biking to school. Within East Windsor, there are missing sidewalk connections along Old York Road and Airport Road. To better link the school with the new residential neighborhoods south of Airport Road, the path network through the East Windsor PAL complex should be repaired and completed. The existing paths should be widened and resurfaced, and gaps in the network filled to provide a continuous path between Airport Road and the Hightstown High School. A continuous sidewalk network should be installed along Airport Road, linking existing sidewalk segments and sidewalks within residential neighborhoods off of Airport Road. The crossing of Airport Road at Strathmore Way/ East Windsor PAL should be striped with a continental crosswalk, and marked with pedestrian crossing signage (W11-2) to improve visibility of the crossing to motorists.

Figure 5.9: East Windsor PAL Connectivity Improvements



6. Next Steps

The proposed recommendations provide a range of engineering, education, enforcement, and encouragement concepts and strategies to improve bicycle and pedestrian mobility throughout East Windsor. Prioritized and enacted over time, with community input and as funding is available, they will foster higher levels of walking and biking activity in the Township, create a more robust network to link residents with the places they want to go, and provide increased local and regional recreational opportunities for residents and visitors.

The Township should work with the Delaware Valley Regional Planning Commission to prepare and submit problem statements to NJDOT to advance improvements along state highways. A variety of funding sources are also available to support local bicycle and pedestrian improvements and programs. The New Jersey Bicycle and Pedestrian Resource Center has compiled a summary of available resources, which is included as Appendix C.

APPENDIX A

BICYCLE ANALYSIS CRITERIA

Table A-1 | Level of Stress Analysis Criteria

Criteria for Level of Stress in Mixed Traffic

	Street Width		
Posted Speed Limit	2-3 Lanes	4-5 Lanes	6+
Up to 25 mph	LOS 1 or 2	LOS 3	LOS 4
30 mph	LOS 2 or 3	LOS 4	LOS 4
35+ mph	LOS 4	LOS 4	LOS 4

Level of Stress for Mixed Traffic in the Presence of a Right Turn Lane

Configuration	Level of Stress
Single right-turn lane with length ≤ 75 ft. and intersection angle and curb radius limit turning speed to 15 mph	(no effect on LOS)
Single right-turn lane with length between 75 and 150 ft., and intersection angle and curb radius limit turning speed to 15 mph	LOS ≥ 3
Otherwise	LOS = 4

Level of Stress for Unsignalized Crossings Without a Median Refuge

	Width of Street Being Crossed		
Speed Limit of Street Being Crossed	Up to 3 lanes	4-5 Lanes	6+
Up to 25 mph	LOS 1	LOS 2	LOS 4
30 mph	LOS 1	LOS 2	LOS 4
35 mph	LOS 2	LOS 3	LOS 4
40+ mph	LOS 3	LOS 4	LOS 4

Source: Low-Stress Bicycling and Network Connectivity, Mineta Transportation Institute, 2012

APPENDIX B

IMPLEMENTATION MATRIX

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
U.S. Route 130 at Hickory Corner Road	Pedestrian	Intersection Spot Improvement	Install detectable warning surface with truncated domes at all curb ramps	$2,100	Short-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Install ADA-compliant pedestrian push button and repair pedestrian signal countdown timer at the SW corner of the intersection	$190	Short-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Install ADA-compliant curb ramp on the NW corner	$700	Short-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Install pedestrian signal heads with countdown timers on the NW and NE corners	$2,050	Short-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Restripe all approaches with continental crosswalk striping	$8,316	Mid-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Install sidewalks to fill gaps in the sidewalk network at the NW corner	$2,833	Mid-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Install pedestrian refuges at the median along U.S. Route 130 along with ADA-compliant pedestrian push buttons	$8,000	Long-Term	NJDOT	Township
U.S. Route 130 at Dutch Neck Road	Pedestrian	Intersection Spot Improvement	Install detectable warning surfaces on all ramps in the intersection	$2,100	Short-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Install ADA-compliant pedestrian push buttons at all corners, as they are currently not accessible from the crosswalk	$1,520	Short-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Restripe all approaches with continental crosswalk striping	$7,955	Mid-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Complete sidewalk network along the North side of Dutch Neck Road	$7,667	Mid-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Install ADA-compliant curb ramps at the NE and SW corner of the intersection	$1,400	Mid-Term	NJDOT	Township

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
U.S. Route 130 at Dutch Neck Road	Pedestrian	Intersection Spot Improvement	Install pedestrian refuge in the median on U.S. Route 130	$8,889	Long-Term	NJDOT	Township
	Pedestrian	Intersection Spot Improvement	Install crosswalk lighting at NW and SE corners of the intersection	$3,659	Long-Term	NJDOT	Township
U.S. Route 130 at Princeton - Hightstown Road (CR 571)	Pedestrian	Intersection Spot Improvement	Install detectable warning surface on curb ramp at the NW corner	$700	Short-Term	NJDOT	Township/ County
	Pedestrian	Intersection Spot Improvement	Install ADA-compliant pedestrian push button access on the pedestrian refuge islands on U.S. Route 130 and on the NW corner of the intersection	$570	Short-Term	NJDOT	Township/ County
	Pedestrian	Intersection Spot Improvement	Restripe with continental crosswalk striping at all approaches	$10,125	Mid-Term	NJDOT	Township/ County
	Pedestrian	Intersection Spot Improvement	Fill gaps in the sidewalk network adjacent to the property along the SE and SW corners	$4,722	Mid-Term	NJDOT	Township/ County
	Pedestrian	Intersection Spot Improvement	Align curb ramps with the crosswalks at the SE corner	$1,400	Mid-Term	NJDOT	Township/ County
	Pedestrian	Intersection Spot Improvement	Install pedestrian refuge islands at median on the South of U.S. Route 130	$6,044	Long-Term	NJDOT	Township/ County
Hickory Corner Road at Dutch Neck Road	Pedestrian	Intersection Spot Improvement	Install continental crosswalk at eastbound approach	$1,356	Short-Term	Township	
	Pedestrian	Intersection Spot Improvement	Establish sidewalk connection to the Anker Park and Bear Brook Pathway at the SE corner	$1,761	Short-Term	Township	
	Pedestrian	Intersection Spot Improvement	Fill sidewalks gaps along Dutch Neck Road	$36,111	Long-Term	Township	
	Pedestrian	Intersection Spot Improvement	Eliminate channelized right-turn island at SW corner, creating a one-lane eastbound approach	$14,375	Long-Term	Township	

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
Hickory Corner Road at Dutch Neck Road	Pedestrian	Intersection Spot Improvement	Provide crosswalk lighting at the intersection	$3,658	Long-Term	Township	
Oak Creek Road at Dutch Neck Road	Pedestrian	Intersection Spot Improvement	Install detectable warning surface on curb ramp at the NE corner	$350	Short-Term	Township	
	Pedestrian	Intersection Spot Improvement	Install continental crosswalk at the westbound approach of Oak Creek Road	$2,170	Short-Term	Township	
	Pedestrian	Intersection Spot Improvement	Install sidewalks along the west-bound side of Dutch Neck Road	$27,500	Long-Term	Township	
	Pedestrian	Intersection Spot Improvement	Provide crosswalk lighting for pedes-trians at the NE and NW corners of the intersection	$3,659	Long-Term	Township	
Oak Creek Road at Hickory Corner Road	Pedestrian	Intersection Spot Improvement	Install continental crosswalks at the eastbound and northbound ap-proaches to the intersection	$2,170	Short-Term	Township	
	Pedestrian	Intersection Spot Improvement	Install missing sidewalk connections to the NE, NW, and SE corners	$89,056	Long-Term	Township	
	Pedestrian	Intersection Spot Improvement	Provide crosswalk lighting for pedes-trians at NE, NW and SE corners	$5,488	Long-Term	Township	
U.S. Route 130 between Birch Lane and Rocky Brook Drive	Pedestrian	Corridor	Install sidewalks and complete side-walk network on the south side	$14,222	Long-Term	NJDOT	Township
NJ Route 33 (Mercer Street) on east and west sides of Hightstown	Pedestrian	Corridor	Install sidewalks on east and west side of Mercer Street	$189,000	Long-Term	NJDOT	Township

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
Princeton-Hightstown Road (CR 571)	Pedestrian	Corridor	Install sidewalk on one-block segment on the WB side of Princeton-Hightstown Road, just east of Lanning Boulevard	$9,111	Long-Term	Township	County
	Pedestrian	Corridor	Install sidewalk on EB side of Princeton-Hightstown Road, surrounding the intersection with U.S. Route 130	$3,806	Long-Term	Township	County/NJ-DOT
	Pedestrian	Corridor	Install sidewalk on EB side, between U.S. Route 130 and the Hightstown border	$14,167	Long-Term	Township	County
Hickory Corner Road	Pedestrian	Corridor	Install sidewalks along the NB side between the Library and One Mile Road South	$51,472	Mid-Term	Township	
	Pedestrian	Corridor	Install sidewalks between U.S. Route 130 and NJ Route 33	$17,306	Mid-Term	Township	
	Pedestrian	Corridor	Install sidewalks between Oak Creek Road and the library	$33,334	Long-Term	Township	
	Pedestrian	Corridor	Install sidewalks between Oak Creek Road and Dutch Neck Road	$60,833	Long-Term	Township	
Dutch Neck Road	Pedestrian	Corridor	Fill gaps in the sidewalk network on EB and WB sides of the roadway between McKinley Court and Hickory Corner Road	$59,472	Long-Term	Township	
	Pedestrian	Corridor	Install sidewalk along both the EB and WB sides of the roadway between Oxford Drive and Hickory Corner Road	$33,333	Long-Term	Township	
Oak Creek Road	Pedestrian	Corridor	Fill sidewalk gaps between Hickory Corner Road and Poplar Road	$47,139	Long-Term	Township	

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
Dutch Neck Road (Oak Creek Road to U.S. Route 130)	Bike	Corridor	Stripe existing shoulder as bike lane	$10,100	Mid-Term	Township	
Hickory Corner Road (Dutch Neck Road to Mercer Street)	Bike	Corridor	Stripe existing shoulder as bike lane	$14,700	Mid-Term	Township	
Dorchester Drive (Hickory Corner Road to Old Trenton Road/CR 535)	Bike	Corridor	Install bike lanes	$5,000	Mid-Term	Township	
Windsor Center Drive (Old Trenton Road/CR 535 to CR 571)	Bike	Corridor	Install bike lanes	$9,600	Mid-Term	Township	
Monmouth Street (Hightstown border to Franklin Street)	Bike	Corridor	Install bike lanes	$7,500	Mid-Term	Township	
Milford Road (Between NJ 33 and Etra Road)	Bike	Corridor	Install bike lanes	$16,400	Mid-Term	Township	
Probasco Road (Twin Rivers Drive N to NJ 33)	Bike	Corridor	Install bike lanes	$7,400	Mid-Term	Township	
Twin Rivers Drive (Milford Road to Lake Drive)	Bike	Corridor	Install bike lanes	$3,800	Mid-Term	Township	

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
Lake Drive (Twin Rivers Drive to southern terminus)	Bike	Corridor	Install bike lanes	$2,800	Mid-Term	Township	
Abington Drive (Between Lake Drive and Twin Rivers Drive)	Bike	Corridor	Install bike lanes	$6,900	Mid-Term	Township	
Dorchester Drive (Between southern terminus and Hickory Corner Road)	Bike	Corridor	Install shared-lane markings	$5,500	Mid-Term	Township	
Hickory Corner Road (Between Dorchester Drive and Dutch Neck Road)	Bike	Corridor	Install shared-lane markings	$4,000	Mid-Term	Township	
Yorkshire Drive (Between Oak Creek Road and Wiltshire Drive)	Bike	Corridor	Install shared-lane markings	$4,000	Mid-Term	Township	
Dutch Neck Road (Between U.S. Route 130 and Hightstown border)	Bike	Corridor	Install shared-lane markings	$2,600	Mid-Term	Township	

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
Woods Road (Between East Windsor border and Conover Road)	Bike	Corridor	Install shared-lane markings	$6,400	Mid-Term	Township	
Huntington Drive (Between Twin Rivers Drive and Harrison Place)	Bike	Corridor	Install shared-lane markings	$14,00	Mid-Term	Township	
Dutch Neck Road (Between South Lane and Oak Creek Road)	Bike	Corridor	Install bike lanes	$14,800	Long-Term	Township	
Oak Creek Road (Between Windsor Center Drive and Brooklawn Drive)	Bike	Corridor	Install bike lanes	$26,200	Long-Term	Township	
Airport Road (Between Mercer St/NJ Route 33 and CR 539)	Bike	Corridor	Install bike lanes	$10,800	Long-Term	Township	
Lake Drive (Between NJ Route 33 and Twin Rivers Drive)	Bike	Corridor	Install bike lanes	$6,000	Long-Term	Township	
Twin Rivers Drive, Probasco Road and Lake Drive)	Bike	Corridor	Install bike lanes	$23,100	Long-Term	Township	

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
Bear Brook Pathway at Oak Creek Road	Pedestrian/Bike	Intersection Spot Improvement	Install high visibility crosswalk, in-street stop for pedestrians sign, and trail crossing sign (MUTCD W11-15)	$1,200	Mid-Term	Township	
Twin Rivers Tunnel Improvements	Pedestrian	Corridor	Pedestrian scale lighting should be installed along approaches to the tunnel at the southern and northern entrances	N/A	Long-Term	Township	
	Pedestrian	Corridor	Wayfinding signage should be installed near approaches to both sides of the tunnel.	$500	Mid-Term	Township	
	Pedestrian	Corridor	Install sidewalk between the northern entrance of the tunnel and the nearby parking	$2,778	Long-Term	Township	
Wyckoff Mills Road (Between Probasco Road and Hightstown border)	Bike	Phase I Trail Network	Install off-road path	N/A	Long-Term	Township	Various
Creek crossing near Etra Lake Park (40.25751, -74.48682)	Pedestrian/Bike	Phase I Trail Network	Install path and bike/ped bridge to connect Twin Rivers neighborhood to Etra Lace Park via Harrison Plan	N/A	Long-Term	Township	Various
Mercer Street (Between Hickory Corner Road and Airport Road)	Bike	Phase I Trail Network	Install off-road path	N/A	Long-Term	Township	Various
East Windsor Green Link	Pedestrian/Bike	Phase I Trail Network	Install off-road path	N/A	Long-Term	Township	Various

Location	Type of Improvement	Category	Improvement	Approximate Material Cost	Implementation Term	Lead Agency	Supporting Agency/ Agencies
Cranbury Station Road & Off-Road Trail (Between Wyckoff Mills Road and North Main Street)	Pedestrian/Bike	Phase I Trail Network	Install off-road path	N/A	Long-Term	Township	Various
Peddie Lake to Etra Lake Trail	Pedestrian/Bike	Phase I Trail Network	Install off-road path	N/A	Long-Term	Township	Various
Union Transportation Trail	Pedestrian/Bike	Phase I Trail Network	Install off-road path	N/A	Long-Term	Township	Various
Bear Brook Pathway Extension	Pedestrian/Bike	Phase II Trail Network	Install off-road path	N/A	Long-Term	Township	Various
Rocky Brook Pathway Extension North	Pedestrian/Bike	Phase II Trail Network	Install off-road path	N/A	Long-Term	Township	Various
Rocky Brook Pathway Extension East	Pedestrian/Bike	Phase II Trail Network	Install off-road path	N/A	Long-Term	Township	Various
North Main Street	Pedestrian	Corridor	Install sidewalk on EB side, between Town Center Road and St James Place	$45,700	Long-Term	Township	
One Mile Road	Pedestrian	Corridor	Install sidewalk on EB side, between- Pierce Road and Old Trenton Road	$104,800	Long-Term	Township	

APPENDIX C

FUNDING SOURCES

PARSONS BRINCKERHOFF