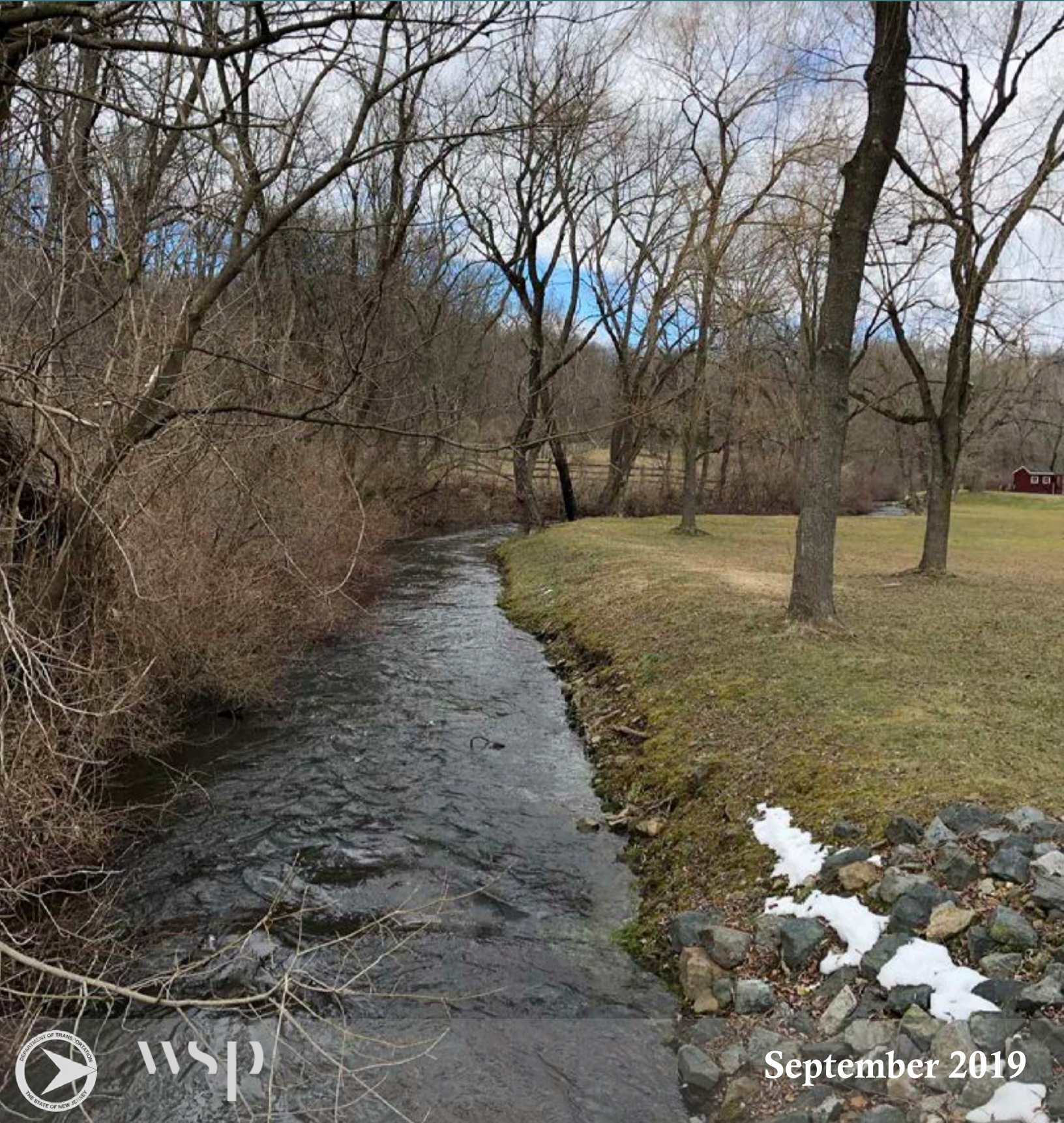




Oxford Township

Active Transportation Plan



wsp

September 2019

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MUSEUM
ENTRANCE ↗
OFFICE ENTRANCE ↖
DELIVERIES ↙

EXECUTIVE SUMMARY

Biking and walking are becoming increasingly popular modes of transportation in Oxford Township. The compact downtown serves civic and retail uses with a school, library, churches, shops, and food establishments. This downtown is surrounded by areas for recreation and open space, including Furnace Lake, Oxford Mountain, and the Oxford Bikeway.

However, sidewalks are sporadic and bike connections between destinations are lacking. NJ 31 acts as a high-speed barrier, bisecting the town with only one traffic light at Wall Street allowing a controlled crossing of NJ 31. It is recommended that Oxford work with New Jersey Department of Transportation (NJDOT) Traffic Engineering and NJDOT Office of Bicycle and Pedestrian Programs to investigate lowering the speed limit on NJ 31 as it passes through Oxford. Throughout other areas of town, difficult street crossings, sidewalk gaps, narrow street widths, and high speed, wide vehicular turning radii result in safety concerns, discouraging more people from choosing these modes.

The purpose of this study is to provide support to an ongoing NJDOT culvert replacement project at Furnace Brook Bridge at NJ 31, address the safety and mobility needs of the residents, and identify

improvements to the pedestrian and bicycle networks that can be made to achieve those goals. The engineering improvements recommended within this report are intended to direct pedestrians and bicyclist from different parts of town to the one signalized crossing location at Wall Street and NJ 31, where they can most safely cross from one side of town to another to reach their destination. This is particularly important for children who walk and bike to Oxford Central School from the opposite side of NJ 31. Key bike connections are intended to build upon Warren County's proposed trail network to provide continuous bike accessibility from Furnace Lake to Pequest Road.

This Active Transportation Plan defines a vision for the future of bicycle and pedestrian mobility in the township and provides a framework to guide future investment decisions. The plan identifies key bicycle network connections, priority infrastructure improvement concepts, and policies and programs that support and encourage biking and walking. Implemented over time, the plan will help Oxford make walking and biking safer, more comfortable, and more convenient for people of all ages and abilities.



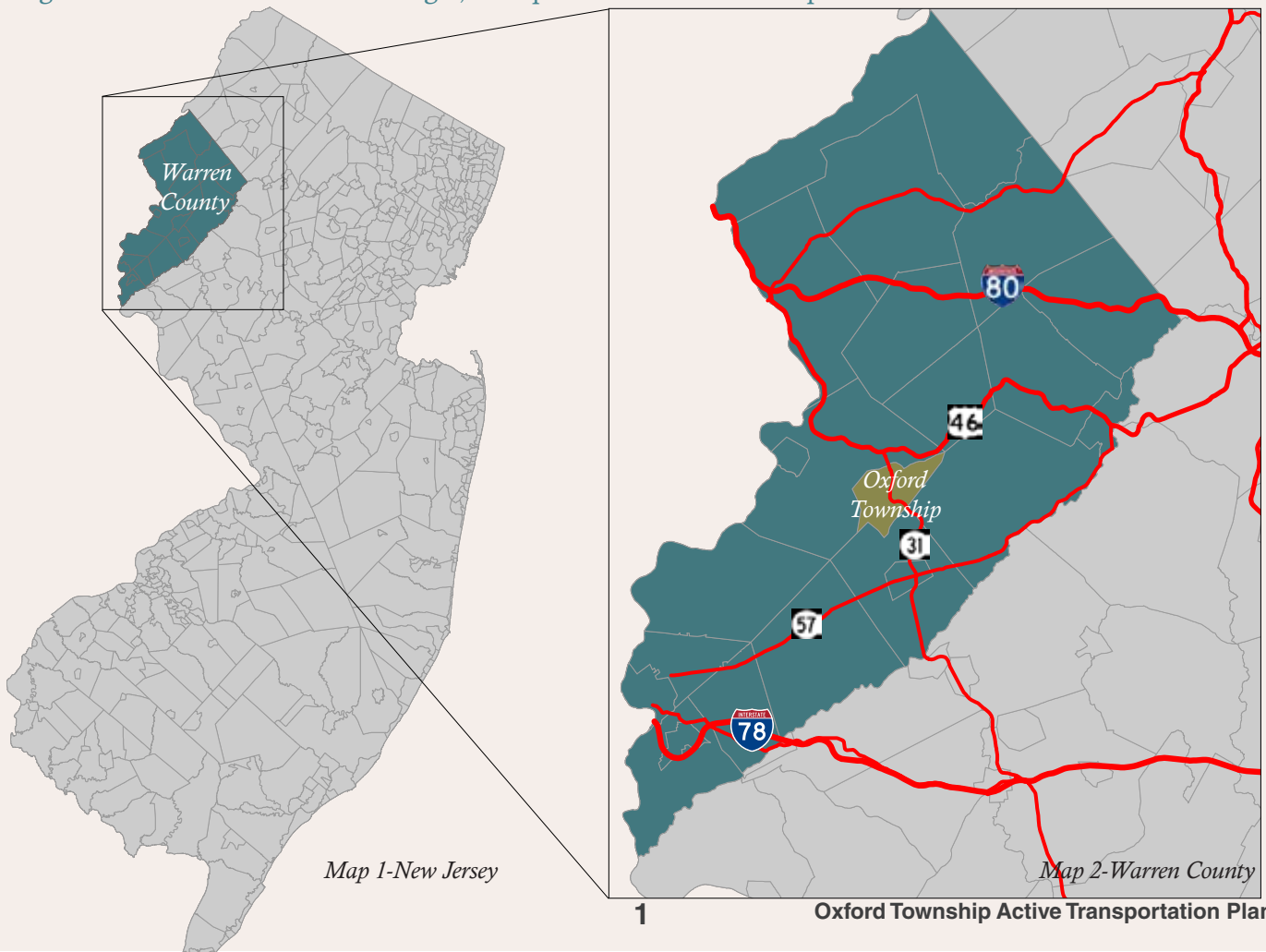


01 BACKGROUND

Oxford is an historic, rural town centrally situated in Warren County, NJ. This Active Transportation Plan is dedicated to improving walking and biking within the community. The report was guided by an extensive analysis of existing conditions, crash records, base mapping, sidewalk inventory, bicycle level of traffic stress analysis, public engagement, and site visits resulting in a groundwork for future improvements.

Slightly larger than 5.8 square miles, Oxford is the sixth smallest municipality in Warren County by land area, and has the fifth lowest population (out of 22). The Township is bounded to the west by White Township, the south by Washington Township, the east by Mansfield Township, and the north by Liberty Township. It lies four miles east of Pennsylvania and the Delaware River. The township's relative location is presented below in Maps 1 and 2.

A sparsely populated (1,000 households) agricultural town, Oxford boasts rural mountainous landscapes, a compact downtown, and large stretches of open and recreational space. Most of the township lies within the Highlands Preservation area covering 1,250 square miles in 88 municipalities.





Context

As of 2016, Oxford Township had a total population of 2,522 and a population density of 428 people per square mile, greater than the 299 people per square mile average across the County, but significantly lower than the 1,210 people per square mile average

in New Jersey. The area's low population density and vast open spaces present unique opportunities for scenic and recreational hiking and biking within Oxford Township and Warren County. Oxford's land use is presented in Map 3.

Demographics

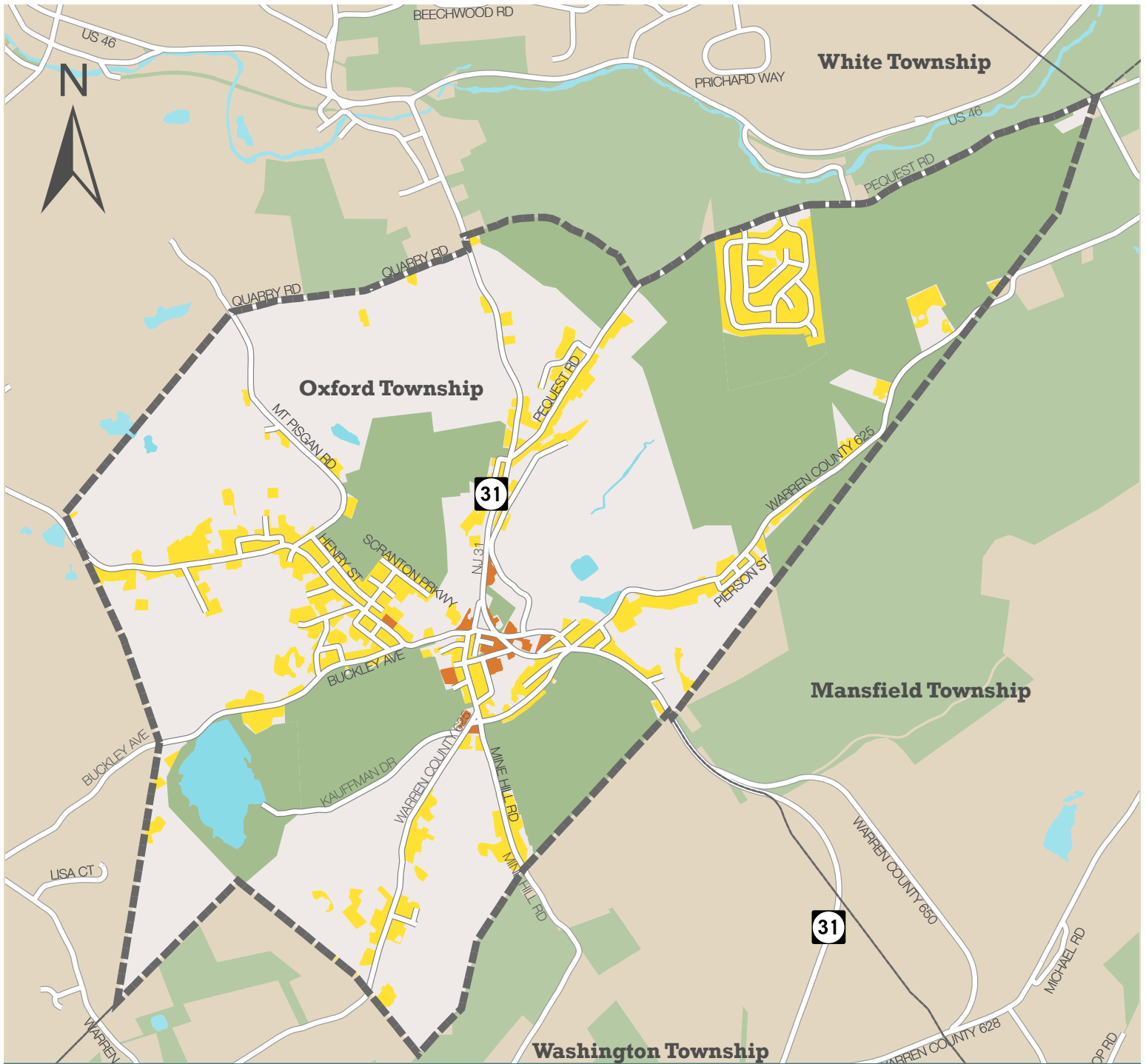
Approximately 20.5% of the population is younger than 18 years old, slightly lower than the average in Warren County and the state (21.4% and 22.5% respectively). Children are vulnerable road users who walk and bike at higher rates and are thus important stakeholders ensuring safe routes to schools, parks, downtown and connections among and between residential neighborhoods.

U.S. Census Journey to Work data (2016) indicates that 95.1% of Oxford residents commute to work by car, truck, or van. Warren County and New Jersey have less car dependence, with 90.1% and 79.8%

of workers commuting by this mode, respectively. 2% of Oxford commuters traveled by public transportation, higher than 1.2% for the County and significantly lower than the 11.2% statewide. There is no public transit service in Oxford; Hackettstown provides the nearest New Jersey Transit station, 20 minutes to the northeast. Only 0.9% of residents report walking or biking as their primary means of commuting to work though 7.9% of households do not have access to a car. Additionally, Oxford's poverty rate of 4.4% is significantly lower than that of the County (7.9%) and State (10.9%).



Wall St at NJ 31, looking west



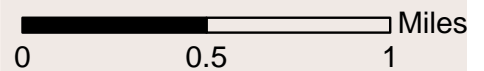
MAP 3: LAND USE

Land Use

Most of Oxford consists of forest and wetlands. Only 0.78 square miles, or 12.8% of the township is dedicated to residential uses and 0.04 square miles, or less than 1% of the town's land are for commercial uses. Residential and commercial uses are concentrated near the town's center.

Legend

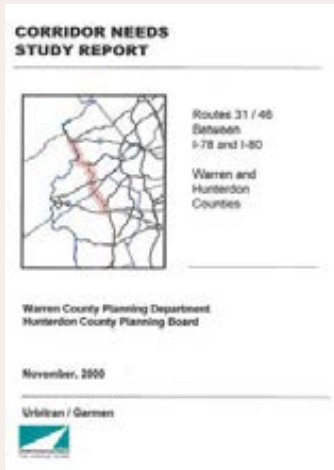
- Residential
- Commercial
- Open Space
- Water





Previous Studies, Policies, and Programs

To build upon existing knowledge, the project team consulted several planning studies undertaken throughout Oxford in recent years. These resources provide valuable information and fuel for analysis. This synergy will produce a more comprehensive and expansive bicycle and pedestrian network.



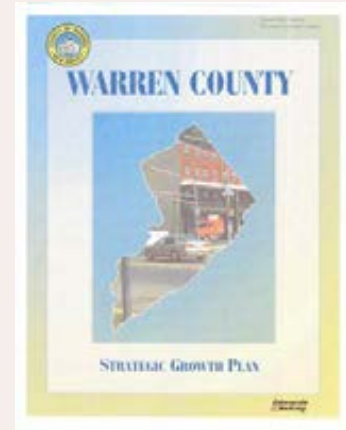
In November of 2000 a **Corridor Needs Study** was undertaken for NJ 31 and Route 46 between I-78 and I-80 by the Warren County Planning Department and Hunterdon County Planning Board. Traffic analysis was conducted along the corridors and determined that traffic volumes increase

along NJ 31 from Oxford entering Washington Township toward I-78. In Washington, southbound morning peak volumes can exceed 1,300 vehicles, at or above the capacity for a two-lane road. In the northbound direction, traffic volumes thin out entering Oxford as vehicles exit to local streets.

Ultimately, the study did not propose any changes at major intersections within Oxford Township, but presented multiple alternatives for improvements throughout the corridor. However, there were a few travel demand management strategies recommended to reduce congestion along the corridor such as;

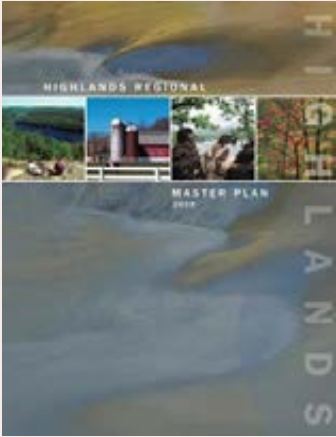
- Enhancing transit services to encourage mode-shift from automobile use
- Establishing ride-sharing programs, carpool parking lots, and high occupancy vehicle lanes

The Warren County Smart Growth Plan Transportation Technical Study was developed by the Warren County Planning Department in 2004 with Edwards and Kelcey in association with Medina Consultants, P.C.



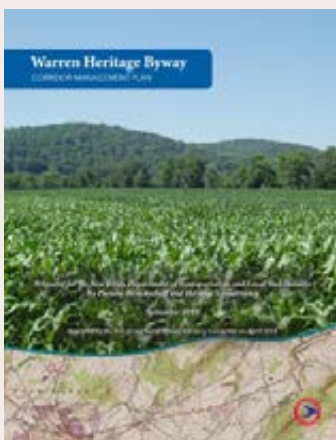
The Transportation Technical Study used alternatives analysis based on the transportation and land use growth model developed by the County Planning Department. Key recommendations included:

1. A “mid-county” bus transit service from Washington Township to Phillipsburg Borough through Oxford Township following NJ 31
2. Reducing congestion
3. Encouraging mixed uses and higher densities at key locations within centers such as Oxford, planning for an integrated community street network linking to adjacent areas
4. Using design guidelines to produce a desired community character
5. Instituting site design guidelines for parking lot and driveway location and design
6. Accommodating pedestrians and bicyclists by installing mid-block crossings on major streets, connecting parking lots to building entrances, limiting width of service roads and curb radii, and minimizing the number of conflict points
7. Planning for a new street network
8. Align driveways to create regular offsets
9. Restricting direct parking access from a parking space to arterials or collector streets



Being located within the New Jersey Highlands Region, Oxford Township agreed to a voluntary conformance of the Highlands Regional Master Plan adopted by the Highlands Council on July 17th, 2008, which became effective on September 8th, 2008. The Highlands Element helps guide the policy formulation for future

land use and development of the Highlands Area within Oxford Township. As part of the Highlands Regional Master Plan's Circulation Element the Planning Board has identified the need to modify a few portions of the transportation system located within the Highlands Area, such as installing bicycle lanes or bike trails, improving pedestrian safety, providing multi-modal linkages between or to community facilities, and enhancing sidewalk and lighting infrastructure. The circulation element also promotes smart growth principles and efficient land use beneficial to both the municipality and the Highlands Region together in expanding access to the multi-modal transportation system which would in effect help protect environmentally sensitive areas and Highlands resources.



The Warren Heritage Corridor Management Plan for the Route 57 byway, completed by WSP, and approved on April 2011 recommends an initiative for heritage tourism which closely ties to the Oxford Furnace heritage site.

The Highlands Council approved Oxford Township's Petition for Plan Conformance for both areas of Highlands Preservation on August 3rd, 2011.



A significant piece of the plan is the Oxford Highlands Center Designation which will require certain modifications to reflect the anticipated designation of its Highland Center, as shown in the map below. The New Jersey Highlands Council describes a Highlands Center as "an area where development and redevelopment is planned and encouraged. Highlands Centers are intended to support balance in the Highlands Region by providing for sustainable economic growth while protecting critical natural and cultural resources." These modifications will, in large part, supplant the provisions currently included in Oxford's draft Highlands Master Plan element and include:

- In cooperation with NJDOT, take actions to the maximum extent practicable to address the safety issues associated with NJ 31 and pedestrian safety. This effort shall consider the development of a "complete streets" approach for the section of NJ 31 traveling through Oxford Township, particularly the downtown area
- Oxford Township shall develop a plan for an interconnected open space and recreation network system to serve the entire Township, as well as serving as a recreation destination within the Highlands region





02 STUDY METHODOLOGY

Community Involvement

The project's Study Advisory Committee (SAC) provided overall guidance throughout the project including defining the vision and goals of the plan, reviewing and commenting on interim work products, assisting in prioritizing recommendations and serving as a resource for local information during the data collection and inventory phases. Committee members include representatives of the Township Engineering, Planning, School and Police offices, local elected officials, Warren County Engineering and Planning, and local bicycle and pedestrian advocates.

Two SAC meetings initiated and concluded the study process.

SAC Meeting 1

This kickoff meeting occurred on the evening of January 24th, 2019 at the Oxford Township Municipal Building. A representative from the New Jersey Department of Transportation introduced the project to the committee and a member of the project team gave a presentation showing the roles of the committee and reviewing existing conditions analyzed thus far. The SAC and project team then discussed the wants and needs of the town.

The following points (also shown in Map 4) were discussed as desires of the community, subsequently fueling the direction of the project and ultimately, the recommendations:

- Slowing down traffic on NJ 31
- Connecting the town center with Furnace Lake Recreation Area
- Connecting the residential developments in the northeast part of town with the existing trail along Pequest Rd
- Providing bike and pedestrian accommodations along Mine Hill Rd
- Improving crossing of NJ 31 at Academy/Axford Sts
- Improving crossing of NJ 31 at Wall St/Port Colden Rd
- Slowing down vehicles making right turn from Wall St to NJ 31
- Improving crossings of Wall St west of NJ 31
- Improving pedestrian facilities at intersection of Washington/Belvidere Aves
- Improving walking and biking conditions to Oxford Central School





Pedestrian Bridge opposite of Oxford Central School

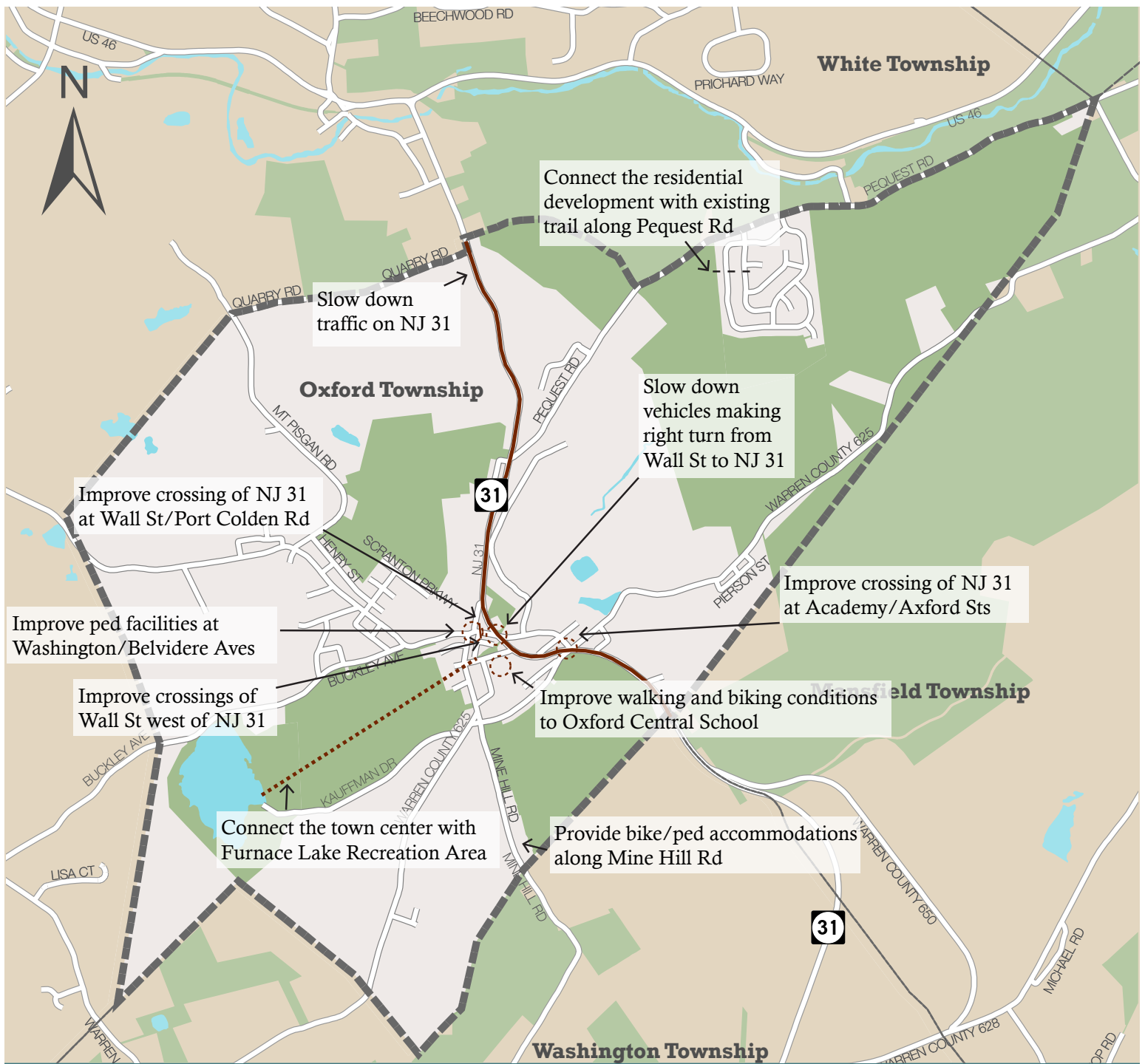
Vision

Developed collaboratively with the SAC, the Oxford Township Active Transportation Plan defines an aspirational vision for the future of walking and biking in the town:

Oxford Township wishes to improve off-road connections between residential, commercial, and recreational uses in the town and provide a safe, accessible pedestrian network within the town center.

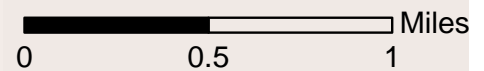


Furnace Lake



MAP 4: GOALS AND OBJECTIVES

Much of the issues raised from the first SAC meeting involve improving the pedestrian accommodations between residential neighborhoods and destinations such as Furnace Lake Recreation Area, and the Oxford Central School. Issues were also raised concerning improving pedestrian crossings of high-speed roads such as NJ 31. As subsequently detailed in Chapter 5, recommendations were formulated in part to respond to these concerns and three focus areas were delineated based on these comments.





03 EXISTING CONDITIONS



Base Mapping

Key Destinations

Locations likely to attract a high number of pedestrian or bicycle trips were inventoried and mapped, as shown in Map 5. Key destinations were grouped into the following categories:

Schools

Oxford Central School on Kent St has 413 students in Pre-K through 8th grade. High school students in Oxford attend Warren Hills Regional High School located on NJ 31 in adjacent Washington Township.

Recreation Areas

Furnace Lake Recreation Area on Kauffman Dr provides open space and a lake with canoeing and a beach. A municipal baseball field is on NJ 31 in downtown. With improved bike facilities, these recreation areas can cater to more bike trips.

Municipal Buildings

The one-room Oxford Public Library is on Washington Ave southwest of the intersection of CR 624 (Belvidere Ave) and NJ 31. Both the Township Municipal Office and Volunteer Fire Department are on Port Colden Rd east of NJ 31. The town's Post Office is on NJ 31 at the intersection with Wall St.

Commercial

All of the town's commercial businesses are centered around the intersection of NJ 31 and Wall St.

Cultural Destinations

Though a small community, Oxford boasts several cultural destinations including Oxford Furnace on

Washington Ave, Shippen Manor Museum on Belvidere Ave, and Lake Marquerite Wildlife Refuge on CR 625 (Jonestown Rd) at Oxford's southwest corner bordering Washington Township.

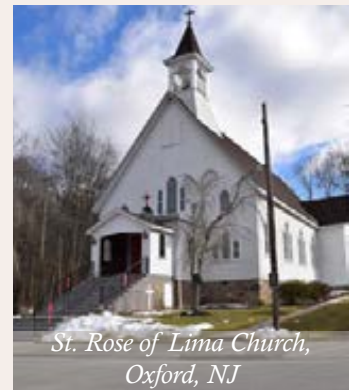
Houses of Worship

Oxford's four houses of worship are Oxford Second Presbyterian Church and Oxford Colonial Methodist Church on Washington Ave, St. Patrick and St. Rose Lima Catholic Church on Academy St, and the Ministry of Salvation Fellowship on Belvidere Ave.

Regional Destinations

There are numerous regional destinations in relatively close proximity to Oxford. Washington Borough and Township provide cultural, business, healthcare, dining and shopping establishments. There are also several other regional commercial centers along NJ 57 in Phillipsburg, Hackettstown, and Lopatcong.

Nearby recreational areas include Jenny Jump State Forest Park, Beaver Brook Wildlife Management Area, Worthington State Forest, the Delaware Water Gap, Roaring Rock Park, Voorhees State Park, and Ken Lockwood Gorge Wildlife Management Area.












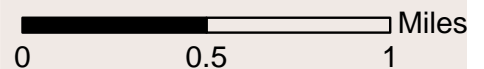


MAP 5: POINTS OF INTEREST

The points of interest detailed on Page 13 were mapped to pinpoint locations with high pedestrian demand and where pedestrian and bicycle improvements would be most beneficial. Oxford's municipal, education, commercial, cultural, and religious institutions are concentrated downtown, creating a need for improved active transportation accommodations in this area.

Legend

	Municipal Building		Cultural Destinations
	School		Commercial
	Cemetery		Park
	Church		School Playground
			Open Space



Regional Trails

There are numerous existing trails in the region for cyclists and hikers including Oxford Bikeway, Pequest Wildlife Management Area Trail, Meadow Breeze Park Trails, and Paulonskill Valley Trail.

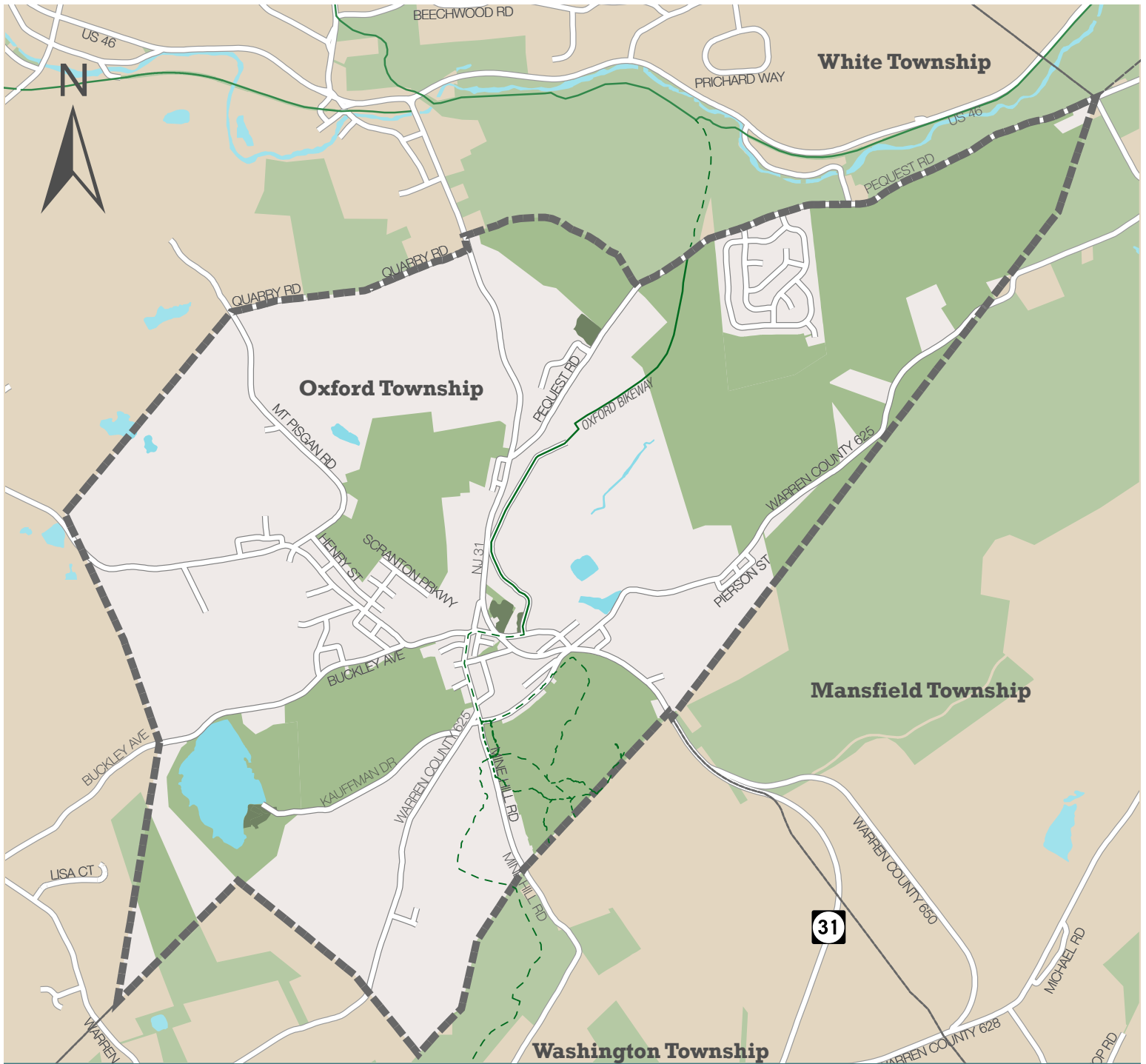
The existing Oxford Bikeway and trails proposed by Warren County are presented in Map 6. These planned County trails have been incorporated into the recommendations of Chapter 5.



Oxford Bikeway at Pequest Rd



Unnamed Trail south of Pequest Trail, White Township, NJ

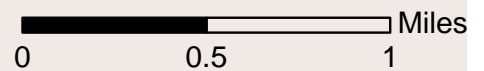


MAP 6: EXISTING AND PROPOSED COUNTY TRAILS

There is one existing trail in Oxford: the Oxford Bikeway which terminates at Pequest Rd and travels south to Lower Denmark Rd. Warren County has proposed the northern terminus of the Oxford Bikeway be extended north to the Pequest Wildlife Management Area Trail in White Township. Additional trails east of Mine Hill Rd are proposed by the County, separate from, but included in this report.

Legend

- - - County Proposed Trails
- Existing Trails
- Park
- Open Space



Existing Road Network

One state route and three county routes traverse Oxford (shown in Map 7) - NJ 31 (Port Colden Rd), CR 624 (Belvidere Ave/Wall St), CR 625 (Jonestown Rd/Academy St/Axford Ave), and CR 631 (Washington Ave). These four roads along with several local roads provide multiple points of access to as well as through the Township and serve both local and regional trips.

With a 40-45 mph speed limit, NJ 31 passes through the center of the town and is the busiest roadway in the Township, with an average annual daily traffic (AADT) of nearly 12,000 vehicles (2015) providing a major north-south linkage. In the center of town the road provides two lanes in each direction, and elsewhere one.

CR 624 (Belvidere Ave/Wall St) has one travel lane in each direction and a 30 mph speed limit within downtown, increasing to 35-40 mph as it leaves the town center.

CR 625 (Jonestown Rd/Academy St/Axford Ave) has one travel lane in each direction and a 30-35 mph speed limit.

CR 631 (Washington Ave) has one travel lane in each direction and a 25 mph speed limit.

All of the major roadways of the Township either intersect each other near the town center or within a couple of blocks of it.

The local street network provides a varying degree of connectivity for pedestrians, bicyclists, and motor vehicles. The eastern and central neighborhoods tend

to have a meandering, yet somewhat interconnected network, but most of the Township has an historic radial street network centered around the main commercial town center. The steep slopes of the Oxford Mountains to the southeast, Furnace Lake Recreation Area to the southwest, Lake Marquerite Refuge to the south, and Conservation Priority Areas to the northeast create natural barriers further limiting connectivity.

From a regional perspective, Oxford is also close to several major arterial roadways including US 46, NJ 57, CR 519 (South Bridgeville Rd), CR 623 (Brass Castle Rd), and CR 647 (Harmony Brass Castle Rd). This proximity to such a dense network of major roadways in a scenic and agricultural community effectively connects Oxford to the regional destinations across northern and central New Jersey, and northeastern Pennsylvania. There are no limited-access highways within Oxford or the surrounding communities, so the State and County routes serve as primary corridors with significant amounts of traffic traveling through Oxford in pursuit of their destination.

An inventory of traffic controls (stop signs and signals) was conducted. Map 8 presents the location of traffic controls in Oxford.

As subsequently detailed, Oxford and the surrounding area's sparse network of narrow, high-speed roads pose a challenge for safe and comfortable biking and walking.



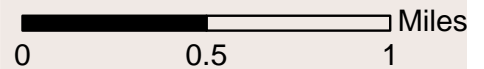


MAP 7: ROAD JURISDICTION

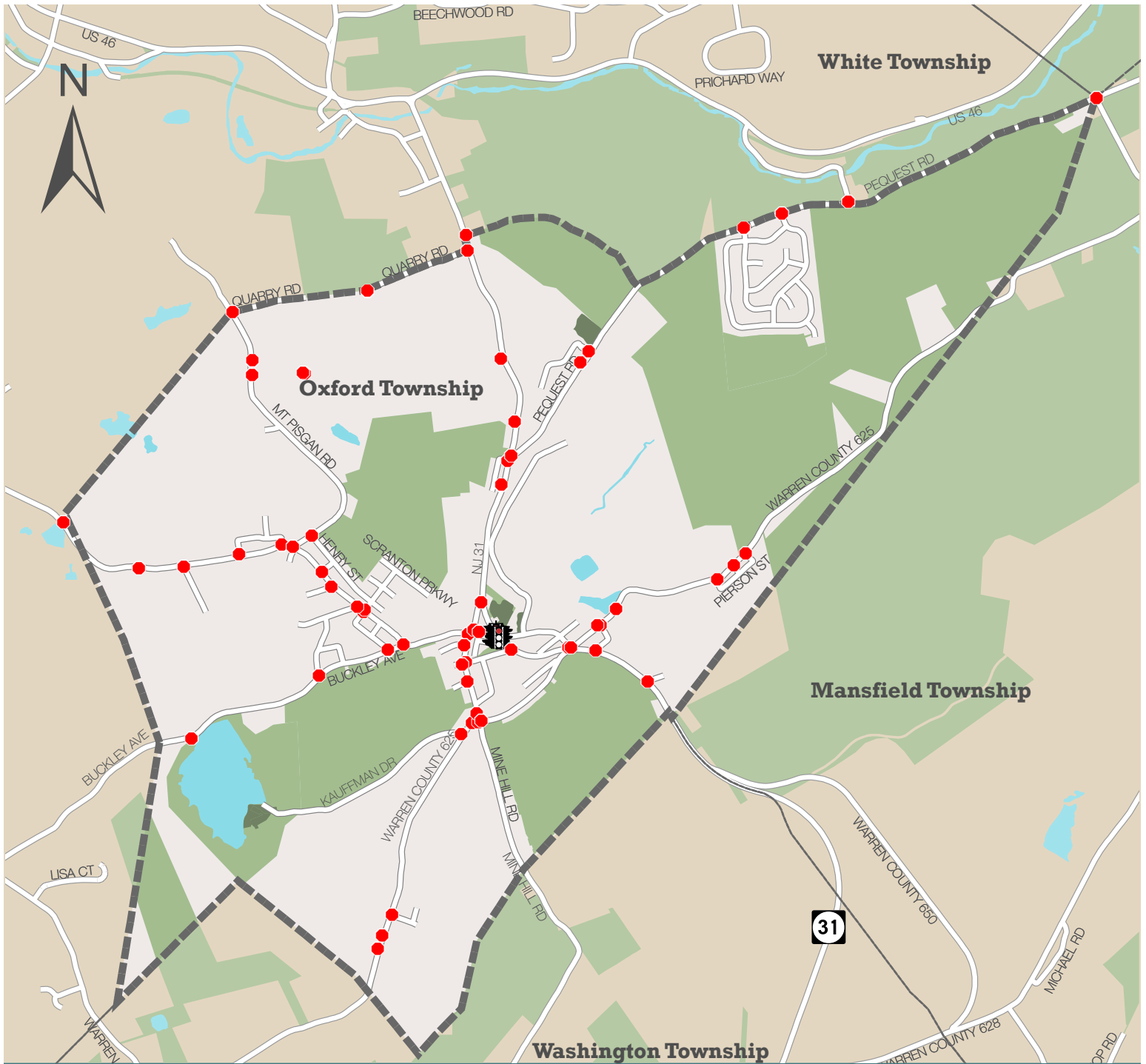
All major roads in Oxford Township meet in downtown. These higher speed roads are used to reach nearby communities. NJ 31 is a highly trafficked route to travel north to US 46 and south to Washington Township, and Interstate 78.

Legend*

- Local Road
- County Route
- State Route



*Route Jurisdiction is only mapped for roads within Oxford Township

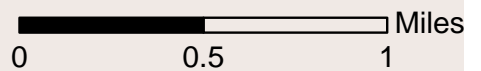


MAP 8: TRAFFIC CONTROLS

The only traffic signal in Oxford Township is on NJ 31 at Wall St/Port Colden Rd. Most other intersections in town have stop controls for the minor roads.

Legend

- Stop Controlled
- Signalized



Sidewalk and Crosswalk Inventory

As part of the existing conditions analysis, the project team conducted an inventory of the pedestrian infrastructure along the Township's street network.

These roadways were examined for the presence of sidewalks and pedestrian crossing facilities (shown in Map 9). Each inventoried roadway was documented as having either no sidewalks, sidewalks on one side, or sidewalks on both sides of the street. In addition to sidewalk connectivity, the project team also looked for deficiencies in crossings linking the sidewalks. These deficiencies can include lack of curb ramps, lack of detectable warning surfaces, lack of crosswalk striping, or lack of accessibility to pedestrian push buttons at signalized intersections. These conditions can discourage walking, contribute to unsafe crossing conditions, reduce driver awareness and expectation of pedestrian activity, and/or create mobility impediments.

Major roadways in Oxford lacking sidewalks include Academy St, Buckley Ave, Port Colden

Rd, Jonestown Rd, Pequest Rd/ Janes Chapel Rd, Mountain Rd, Mt Pisgah Ave, Axford Ave, and portions of Belvidere Ave. Generally, the neighborhoods in the western portion of the Township lack sidewalks or have significant network gaps, while sidewalk facilities are more common in the central and eastern neighborhoods of the Township.

Almost all roadways lack visible crosswalks at intersections and/or ADA-compliant curb ramps, including Belvidere Ave, Jonestown Rd, NJ 31, Academy St, Pequest Rd/ Janes Chapel Rd, and Axford St/Axford Ave. While a lack of marked crossings may be a lower priority at the intersection of low traffic, residential streets, there is a need for crosswalks at higher demand, higher speed intersections near recreational facilities, retail and Oxford Central School. ADA-compliance issues are common and can range from a complete lack of a curb ramp to the simple absence of a textured warning surface to help alert the visually impaired.









Port Colden Rd at NJ 31, looking east

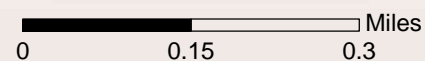


MAP 9: EXISTING PEDESTRIAN NETWORK

Portions of several intersections in Oxford have existing crosswalks. In some instances, these crosswalks are faded and difficult for motorists to see. A significant piece of the recommendations detailed in Chapter 5 involve upgrading and installing new high visibility crosswalks to better connect destinations.

Legend

-  Crosswalk
-  Trail
-  Sidewalk
-  School
-  Municipal Building
-  Open Space

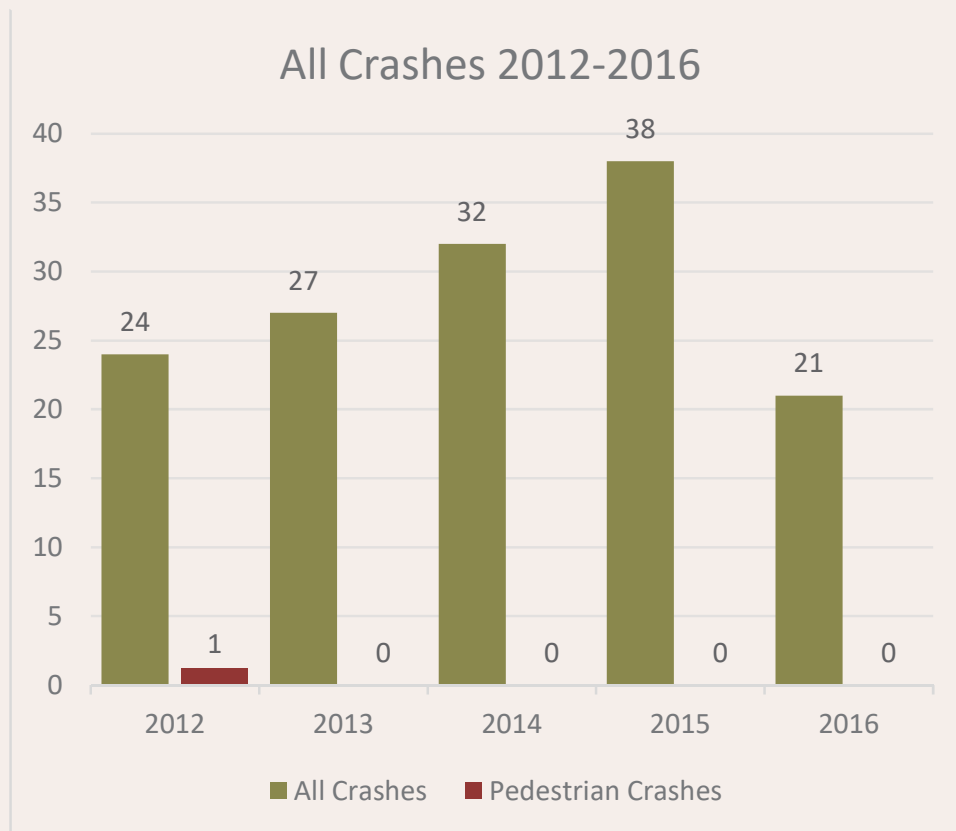


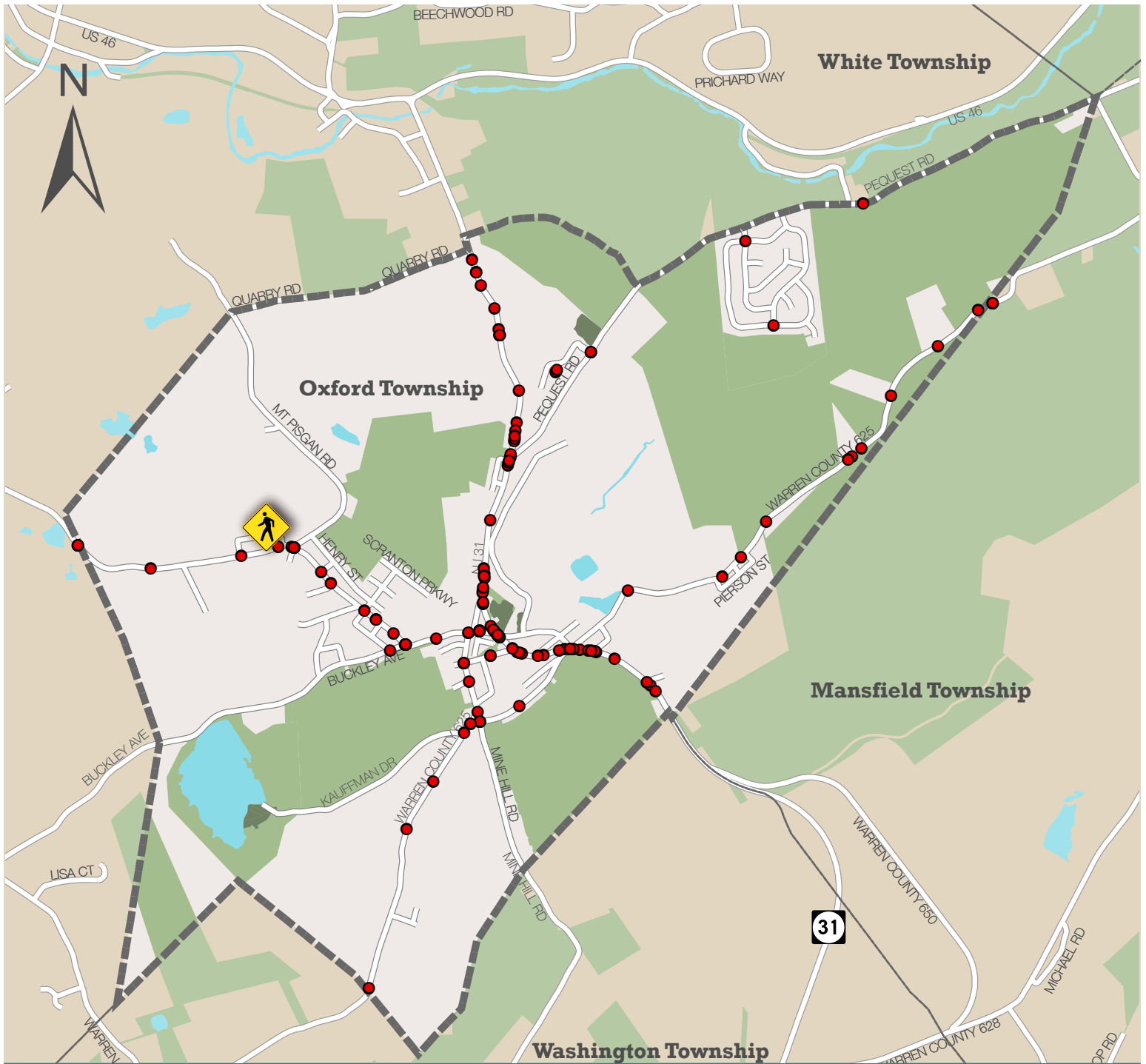
Crash Analysis

Analysis of reported crashes provides information concerning trends in the location and characteristics of crashes. However, it is important to recognize the limitations of the data. Bicycle and pedestrian crashes are widely regarded as under-reported. Crashes not resulting in injury, have minimal property damage, or not involving a motor vehicle are less likely to be reported to the police, whereas most crash data is collected and tracked. Therefore, a lack of reported crashes does not necessarily indicate a safe bicycling or walking environment. Perceived safety issues and conflicts with motor vehicle traffic are often indicated as the highest concerns deterring more people from bicycling or walking. Thus, a road perceived as “unsafe” may have few actual reported crashes in part because few people choose to walk or bicycle along it. These issues are exacerbated in a small municipality like Oxford where very few pedestrian and cycling crashes occur. Crashes within the Township are shown in Map 10.

Despite the known limitations, analysis of reported crashes can provide important insights. If several crashes in the same area were severe enough to be reported, it can indicate a potential safety issue and problem area for further assessment.

According to NJDOT crash records, only one pedestrian crash was reported in Oxford between 2012 and 2016. The crash occurred at the intersection of Bush St and Delta Pl, in the west portion of town, and resulted in a minor pedestrian injury. There were no reported cyclist crashes during the analysis period. However, during the same period, there were 142 total crashes reported in Oxford accounting for 63 injuries, including 14 moderate injuries. 81% of crashes occurred on roads with speed limits greater than 25 mph. 15% occurred on municipal roads, 35% on one of the three County roads, and 44% on NJ 31. The remainder occurred on private property. Due to the small sample size, few conclusions or statistics concerning bike and pedestrian crashes in Oxford can be gleaned from the data.





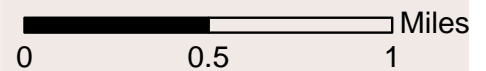


MAP 10: CRASHES (2012-2016)

Nearly half of all crashes in Oxford Township during the analysis period were on NJ 31, and more than half of crashes resulting in at least moderate injury were along this corridor. With only one bike/pedestrian crash during the study period, it is difficult to generalize about the crash characteristics.

Legend

-  Pedestrian Crashes
-  All Crashes



Bike Network

Oxford currently has no roadways with a designated bicycle facility. The only publicly available bike parking rack is on the Oxford Bikeway at Pequest Rd.

Off-Road Paths

The Highlands Area and Oxford Mountain area contain a network of walking and biking trails. While these paths enhance the north/south connectivity and access for both pedestrians and

bicyclists to parks and other trail systems, they are unpaved and predominantly serve a recreational purpose.

Warren County has proposed an extension of the Warren Highlands Trail that parallels NJ 31 for most of its alignment through Oxford. The trail would extend south from the Oxford Bikeway on Lower Denmark Rd around downtown, southwest to Washington Township, connecting to the regional trail network.

Bicycle Level of Traffic Stress

Bicycle level of traffic stress (LTS) measures a cyclist's expected comfort based on roadway conditions. Each bicyclist has 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 lower speeds and traffic volumes. Higher stress environments generally involve cyclists riding in close proximity to traffic, multi-lane roadways, and higher speeds or traffic volumes, a condition undesirable for most cyclists. Based on an analysis of the criteria, the LTS for a given roadway segment is classified into one of four categories. The four categories build open one another, so all LTS 4 cyclists would tolerate an LTS 1-4 roadways, LTS 3 cyclists would tolerate LTS 1-3 roadways, etc. Additionally, the high-stress intersections were factored into the analysis, resulting in a higher LTS for those roads intersecting with an LTS 2, 3, or 4 roadway.

Four levels of traffic stress were used to evaluate Oxford's roadways:

Level of Traffic Stress 1: tolerated by most users (including children and seniors)

Level of Traffic Stress 2: tolerated by most adults

Level of Traffic Stress 3: tolerated by "enthusiastic" riders who might still prefer dedicated space

Level of Traffic Stress 4: tolerated by only the most

experienced riders

The LTS was evaluated for all roads in the Township. The project team assessed the roadways using a variety of data sources, including base mapping, GIS data files and NJDOT Straight Line Diagrams and traffic data. 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, such as traffic volumes and roadway width. Additionally, LTS includes factoring in the posted speed limit of a corridor, but not the actual (or prevailing) speed limit. The results of the LTS analysis are presented in Map 11.

Many of the streets in Oxford are residential streets with low traffic speeds and volumes, making them LTS 1 roadways comfortable for all users. There are twelve roadway segments classified as LTS 2, including portions of Zulauf La, Jonestown Rd, Spruce St, Renners Rd, Scharrers Place, Hill St, and Buckley Ave. These roads have higher turning movements and interface with a higher LTS roadway.

High stress (LTS 3 and LTS 4) roadways within Oxford include the higher speed and/or volume NJ 31, Jonestown Rd, Axford Ave, Mt Pisgan Rd, Pequest Rd, Hill St, Kent St, Snyders St, Belvidere Ave, Upper Denmark Rd, Van Nest St, and Pierson St.

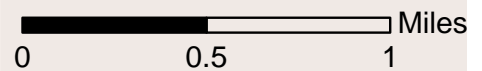


MAP 11: BICYCLE LEVEL OF TRAFFIC STRESS (LTS)

From the perspective of LTS 1 cyclists, such as children cycling to school, Oxford has a fair number of LTS 1 roadways. However, several key gaps create low stress “islands” with limited connectivity to destinations beyond. NJ 31, for example, is a barrier between the residential neighborhoods to the west and east, while Belvidere Ave is a barrier to major destinations to the south such as the school. Similarly, the major roadways connecting the town center and residential neighborhoods are LTS 3 or 4 roadways with no LTS 1 or 2 roads providing continuous, low-stress connections.

Legend

- LTS 1
- LTS 2
- LTS 3
- LTS 4
- Existing Trail





04 PROGRAMS AND POLICIES

Education

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

Specific recommendations for the study area include:

- Work with North Jersey Transportation Planning Authority (NJTPA) and TransOptions TMA Management Association (TMA) to distribute public service announcements (PSAs) and brochures concerning topics such as speeding, safe bicycling, how to bicycle with traffic, proper helmet usage, bicycle routes, and safe pedestrian behavior.
- Utilize materials from NJTPA’s Street Smart program. This includes webinars, fact sheets, and posters encouraging safe road sharing practices for all users.
- Materials can be posted or distributed at Oxford Central School, the public library, the municipal office and/or community events.
- PSAs can also be printed in the local newspaper or posted on the Oxford Township

website or social media site. Resources with safety information and brochures include: TransOptions TMA, NJDOT’s Bicycling in New Jersey and Pedestrian Safety websites, the Pedestrian and Bicycle Information Center: a national clearinghouse of information related to walking and bicycling sponsored by the FHWA and operated by the University of North Carolina Highway Safety Research Center, and the National Highway Traffic Safety Administration.

- Emphasize distribution of information to parents of Oxford children who walk and bike to school. Coordinating with school officials is the most effective way to distribute safety information.
- Work with nearby municipalities, along with the TMA to develop a brochure tailored to the regional needs of bicyclists and pedestrians and how they can travel seamlessly between municipalities to their destinations.
- Integrate bicycle and pedestrian educational programs into school curriculums. Educational programs tailored for children is a vital element of the overall community campaign to support and foster lifelong safe bicycling and walking habits. 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 ongoing 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://bianj.org/prevention/childhood-safety/pedestrian-safety/> and Grade 9-12 lesson plans at <http://teensafedriving.bianj.org/submit-a-lesson-plan/>.

- Other programs, such as the NJ Safe Routes to School Resource Center’s curriculum based on Bikeology is available on the New Jersey Safe Routes to School website, WalkSafe®, BikeSafe™, and Safe Kids also offer educational materials and other activities focused on school-aged children.
- The New Jersey Safe Routes to School Initiative website also provides numerous resources concerning policies and cost estimates for pedestrian improvements.
- 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 abilities. These interactive training courses are a good way to educate cyclists on traffic rules and safety equipment, as well as practice cycling skills enabling novices and experts to ride confidently and safely with traffic.
- Work on passing municipal and county Complete Streets policies. Provide training for local officials, planners, engineers, and public works staff to support Complete Streets implementation. Providing training on effective implementation and maintenance would reinforce and further Township policy and help make it part of all future transportation investments in the study area. NJDOT has resources available online and periodically provides training workshops.
- TransOptions TMA also provides technical expertise and educational resources to support local Complete Street initiatives, including:
 - Information about Bicycle Friendly Businesses
 - Bike Right Adult Workshops
 - Bike Commuting Benefits
 - Bike Lockers
 - Bike Right Commute Route Planning
 - Age-specific educational programs
 - Safe Routes to School recognition program
 - Bike to Work Challenge
 - New Jersey State Bike Tours
 - Bike Right Classes
 - Pedestrian Safety program to senior citizens
 - School travel plans and audits laying out suggested steps toward increasing walking and bicycling for a school. A typical travel plan includes the following elements:
 - School description
 - Working group and partnership
 - Walk/bike barriers and opportunities
 - Map of school neighborhood
 - Goals and proposed actions
 - Program evaluation and monitoring
- Utilize the Ambassadors in Motion program (AIM) at the Alan M. Voorhees Transportation Center at Rutgers University as a resource for bicycle and pedestrian education. AIM provides training on helmet fittings, bicycle skills, bike safety checks, and other topics related to bicycling and Complete Streets.
- Organize and participate in an NJDOT sponsored senior mobility workshop to discuss barriers to bicycling and walking in Oxford’s senior citizen community and context sensitive solutions to removing these barriers.

Encouragement

Encouraging active modes of transportation has a host of benefits for residents and the community, including better health, reduced road congestion, support for local businesses, reduced environmental impact, 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 residents to walk and bike more regularly. Recommendations include:

- Encourage the use of “Walking School Buses” to promote physical activity for children and parents traveling to and from schools. Walking school buses provide an organized and supervised way for children to walk and to school, particularly for younger children, and can make walking a fun, social activity. Work with school staff, parent volunteers, and the police department to organize the events. Assistance is available through the TransOptions TMA.
- Utilize resources through SRTS and the TMA to provide activities encouraging bicycling and walking at local schools, such as bike rodeos and other events.
- Create and publish an online bike map on the Oxford municipal website and social media account, highlighting the location of preferred bicycle facilities, and major destinations (schools, businesses, etc). Providing information on Oxford’s bicycle facilities and best routes can encourage more people to bike.
- Highlight pedestrian and bicycle improvements accompanying transportation projects through press releases, websites, and social media. By focusing on these elements and improved conditions, more people would be encouraged to walk and bike.
- Publicize and participate in Bike Month, including events such as Bike to School Day, Bike to Work Day, and Bike to Work Week.
- Participate in Park(ing) Day or other temporary implementation events as a way to pilot an idea and demonstrate different ways to utilize public space. Typically held annually in September, cities and towns around the world use Park(ing) Day to temporarily convert a parking space into a parklet. A parklet is a small public space that can include planters, greenery, or street furniture, among other things. Like any “tactical urbanism” event, Park(ing) Day is an opportunity to collaborate with and engage residents, businesses, and other interested stakeholders to think creatively about the community’s streets and public spaces and test ideas using temporary materials. This allows residents to visualize other uses of the street and see first-hand how the street would function. Temporary installations can spur new ideas or refine initial concepts, and lead to more permanent installations. In New Jersey, communities such as New Brunswick (pictured below) and Morristown have participated in Park(ing) Day, while Princeton and Rahway have implemented longer-term parklets.



Enforcement

When combined with education, enforcement is a key element to ensuring safe travel for all roadway users. While police departments cannot always dedicate a significant amount of resources to enforce traffic regulations, targeted enforcement campaigns, through warnings and tickets, are effective at correcting unsafe behaviors. Safety is a shared responsibility among all roadway users, and enforcement should apply to both motorists (speeding, failure to stop for pedestrians) and cyclists (riding on the wrong side of the street, failure to adhere to traffic control devices). Potential strategies for Oxford include:

- Implement a pedestrian safety enforcement (PSE) program. 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. NJDOT provides additional information about PSE programs and resources in its Pedestrian Safety Action Plan Toolbox.
- Institute a community-oriented traffic calming campaign to help raise awareness about speeding and safety.
- Distribute safe behavior tickets to children to positively reinforce their good bicycle and pedestrian behaviors.
- Implement variable message signage and mobile radar units on NJ 31 and near Oxford Central School to make motorists more aware of their travel speeds.



Princeton, NJ

Policies

Supportive local policies can help create avenues to advance infrastructure improvements and facilitate implementation of the plan. This section summarizes several potential policy initiatives.

- **Land Use and Development Review:** Continue to use the land use and development review process to ensure new development includes appropriate bicycle and pedestrian accommodations. Leveraging private development activity provides an opportunity for the Township to advance planned improvements and preferred design standards by requiring their integration in development site plans. Potential elements addressed through site plan review include streetscape improvements, filling sidewalk gaps, repairing existing sidewalks, driveway access modifications, and installing bicycle parking. Large scale projects can also include intersection or roadway improvements.
- **Bicycle Parking Ordinance:** Adopt an ordinance requiring bicycle parking with new development. The ordinance should define minimum short-term and long-term bicycle parking facilities based on land use and size, and define appropriate design standards. Bike parking should also be mandated in vehicular parking facilities.
- **Sidewalk Program:** To implement sidewalk maintenance and construction projects, the Township should require sidewalk repair or installation as part of new development or major renovation. For properties where

sidewalks are not necessary, the developer should contribute to a Township sidewalk fund used to support sidewalk repair and construction projects in other areas of Oxford. This dedicated sidewalk fund can be supplemented with grant funding and other funding sources. Where applicable, sidewalk improvements should be bundled into other roadway projects to reduce costs.

- As illustrated on page 47, driveways designed and modified in the future should allow safe pedestrian movement and extend the sidewalk material and grade across driveways.

Another common funding mechanism for sidewalk projects used in New Jersey municipalities is to require abutting property owners to contribute to the costs of sidewalk repairs. Rather than require individual property owners to make repairs themselves, the Township can consider administering a program where they bundle improvements together to reduce costs. Abutting property owners can be asked to contribute a percentage of the cost, with the Township covering the remainder through other funding sources.

The Township should consider partnering with local business owners through a Public-Private Partnership to sponsor and maintain bicycle parking, bicycle corrals, and/or parklets near their businesses. These partnerships benefit the business owner through increased patronage and visitors and residents through improved infrastructure.



Kent St in front of Oxford Central School



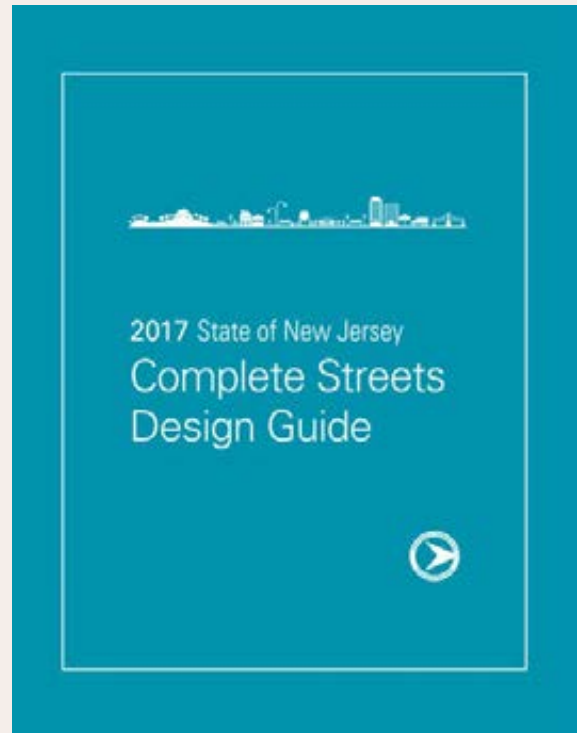
05 RECOMMENDATIONS

Bicycle Facility Design

There are several types of on and off-road bicycle facilities providing various levels of comfort and utilizing different rights-of-way. In this section only those bicycle facility types relevant for Oxford Township will be discussed. For more detailed information about other bicycle facility guidelines, the New Jersey Complete Streets Design Guide (particularly the section beginning on page 89), accessible for free online, is a valuable resource. Cost estimates for recommended bicycle facilities are detailed in the implementation matrix beginning on page 78. These estimates are intended to convey the level of investment proposed concepts would require for implementation. The cost estimates are based on industry standards for per-unit material costs, and do not include the cost of right-of-way acquisition, relocation of utilities or drainage, engineering design, permitting, or contingencies.

Regardless of facility type, the larger bicycle network should follow current best practice guidance from the following guides:

- NACTO Urban Bikeway Design Guide
- FHWA Small Town and Rural Multimodal Networks



- AASHTO Guide for the Development of Bicycle Facilities
- New Jersey Complete Streets Design Guide

Additionally, the larger bicycle network should follow the Five C's (shown below) to ensure bicycle routes accommodate cyclists of all ages and abilities.

The Five C's

Bicycle routes should be:

- ✓ *Continuous*
- ✓ *Connected*
- ✓ *Convenient*
- ✓ *Complete*
- ✓ *Comfortable*



Following the "Five C's" approach helps ensure that bicycle routes accommodate cyclists of all ages and abilities.

Shared-use Path

Shared-use paths are bikeways distinctly separate from the roadway. Located outside of the cartway, they are physically separated from motorist traffic by either open space or a barrier. Shared-use paths are sometimes referred to as “trails.” However, the term “trail” often refers to an unimproved recreational facility. Shared-use paths are designed to facilitate both utilitarian and recreational trips.

Shared-use paths are typically designed for two-way travel. They help provide low-stress bicycle accommodations in a variety of circumstances: a shortcut through residential neighborhoods, a commuting route from residential to commercial centers, a recreation route in a park or greenway, or as a side path along a roadway in lieu of (or in addition to) an on-road bicycle facility.



Shared-use Path, Somers Point



Sidepath, Princeton

Shared-Lane Markings

On roadways infeasible or inappropriate for dedicated bicycle facilities, shared-lane markings can be used to indicate a shared environment for cyclists and automobiles. Shared-lane markings alone do not reduce bicycle level of traffic stress or create an “all ages and abilities” facility; however, they can provide several benefits, including:

- Assert the legitimacy of bicyclists on the roadway
- Provide directional and wayfinding guidance
- Direct bicyclists to ride in the most appropriate location on the roadway
- Provide motorists with visual cues to anticipate the presence of bicyclists

Shared-lane markings can be used to complete gaps in a bicycle network and provide connections to major destinations where there is limited cartway

width or other constraints limiting implementation of other bicycle facilities.

Shared-lane markings are typically applied on streets with a speed limit of 25 mph or less. The markings generally consist of a bicycle and chevron symbol. Shared-lane markings should also be paired with traffic calming treatments (discussed in more detail on pages 44-45) to reinforce the low speed limit and support a more comfortable environment conducive to sharing the roadway with multiple types of road users.

To increase the visibility and effectiveness of the marking, the marking can be applied on a green background. This “enhanced” or “green back” shared-lane marking is particularly useful on streets with higher traffic volumes and more activity, which benefit from the improved visibility.



Newark, NJ



Princeton, NJ

Bicycle Boulevard

Bicycle boulevards, also referred to as neighborhood greenways or quiet streets, are traffic calmed streets prioritizing bicycle travel and creating a more comfortable bicycling environment. While bicyclists share the street with motor vehicles, the low-speed and low-volume character of a bicycle boulevard creates a low-stress facility for bicyclists of all ages and abilities.

Many neighborhood residential streets provide the basic components of a bicycle boulevard. These streets can be enhanced to create a bicycle boulevard by a variety of design treatments deterring high vehicle speeds and discouraging through-trips by motor vehicles. Many of these treatments benefit not only bicyclists, but by creating a safe and quiet environment, benefit pedestrians and motorists.

Where constraints prevent bicycle improvements on arterial roadways, utilizing parallel neighborhood streets as bicycle boulevards provide convenient, attractive alternative routes for bicyclists.

- **Reduced Speed Limits:** The preferred speed limit of a bicycle boulevard is 20 mph, five miles-per-hour slower than most Oxford residential streets
- **Signage and Markings:** Pavement markings and wayfinding signage highlight the corridor as a priority route for bicyclists and the intention for the roadway as a shared, slow street
- **Speed Management:** Traffic calming elements appropriate for the context, such as curb extensions, speed cushions, chicanes, or mini-roundabouts should be used to reinforce the low speed limit and discourage cut-through traffic
- **Access Management:** Depending on the context, elements such as diverters or medians can be used to deter or prevent vehicular through-traffic, while still accommodating local access and prioritizing bicycle through-trips
- **Intersection Crossings:** Appropriate intersection treatments, especially at crossings with major streets are crucial to minimize bicyclist delay and ensure a safe, comfortable street for bicyclists of all ages and abilities

No bicycle boulevards are recommended for Oxford as part of this report though the Township may wish to implement them on local, low-volume roads in the future.

According to NACTO's Urban Bikeway Design Guide:

Bicycle boulevards should have 85th percentile speeds at 25 mph or less (20 mph preferred)



Ocean City, NJ

Bike Parking

Bicycle parking facilities extend bicycle use from an opportunity for recreation to a feasible mode of daily transportation. Providing adequate, secure bicycle parking is an important measure to accommodate and encourage cycling. Proper parking facilities increase the convenience of cycling for commuting, utilitarian, or recreational purposes while also alleviating the threat of theft.

Rack Siting and Design

Parking should be conveniently located, well-lit, and easily visible for cyclists arriving at a destination. Racks are available for different capacity needs and space constraints.

The ideal racks meet the following qualities:

- Be intuitive to use
- 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
- Accommodate a variety of bicycles and attachments, including bicycles without a diamond shaped frame and horizontal top tube
- 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

Bike racks should also be properly spaced to allow easy, independent access to each bike. This includes providing sufficient space between racks and buildings, walls and parked cars, and between bikes. Additional guidance on bike rack design and placement can be found in the Association of Pedestrian and Bicycle Professionals' (APBP) guide, *Essentials of Bicycle Parking* (2015).

In addition to a bicycle rack already located on the Oxford Bikeway near Pequest Rd, bicycle racks are recommended for the following locations, as illustrated in Map 12:

- Oxford Central School
- Oxford Township Municipal Office
- Oxford Public Library
- Oxford Furnace
- Baseball field behind Post Office
- Along Wall St in downtown
- Furnace Lake Recreation Area
- Shippen Manor
- Oxford Second Presbyterian Church











Bicycle Corral Dimensions from the New Jersey Complete Streets Design Guide

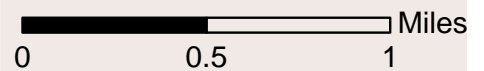


MAP 12: PROPOSED BIKE PARKING LOCATIONS

The above map illustrates locations where bicycle parking should be considered. Precise locations of bike parking facilities depends on community input and site conditions.

Legend

- | | | | |
|---|--------------------|---|--------------------------|
|  | Municipal Building |  | Proposed Bicycle Parking |
|  | School |  | Park |
|  | Commercial |  | School Playground |
|  | Church |  | Open Space |





Recommended Bike Rack Designs

Preferred Design



Inverted U

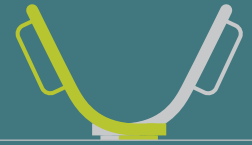
Common style appropriate for many uses; two points of ground contact. Can be installed in series on rails to create a free-standing parking area in variable quantities. Available in many variations.

Other Acceptable Designs



Post and Ring

Common style appropriate for many uses; one point of ground contact. Compared to inverted-U racks, these are less prone to unintended perpendicular parking. Products exist for converting unused parking meter posts.



Wheelwell Secure

Includes an element that cradles one wheel. Design and performance vary by manufacturer; typically contains bikes well, which is desirable for long-term parking and in large-scale installations (e.g. campus); accommodates fewer bicycle types than other recommended designs.



Racks to Avoid

Wave

Not intuitive or user-friendly; real-world use of this style often falls short of expectations; supports bike frame at only one location when used as intended.



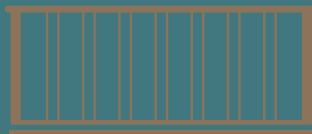
Wheelwell

Racks that cradle bicycles with only a wheelwell do not provide suitable security, pose a tripping hazard, and can lead to wheel damage.



Schoolyard (comb)

Does not allow locking of frame and can lead to wheel damage. Inappropriate for most public uses, but useful for temporary attended bike storage at events and in locations with no theft concerns.



Coathanger

This style has a top bar that limits the types of bikes it can accommodate.



Spiral

Despite possible aesthetic appeal, spiral racks have functional downsides related to access, real-world use, and the need to lift a wheel to park.



Bollard

This style typically does not appropriately support a bike's frame at two separate locations, which limits its framelock capability and bicycle stability.



Images and descriptions courtesy of APBP Essentials of Bicycle Parking

Pedestrian Design Elements

The proposed improvements are intended as conceptual recommendations likely requiring varying levels of design or further analysis, depending on the magnitude of the improvements. Many concepts are intended to be easily implementable and emphasize low-cost options, where applicable, such as re-stripping of existing roadways or enhanced signage.

Projects can be implemented over time as funding allows. The recommendations can be used to support grant applications, integrate pedestrian projects into the capital improvement pipeline and/or incorporate pedestrian improvements into routine roadway maintenance and resurfacing projects or

development activity to minimize additional costs.

The recommendations are also summarized in an implementation matrix in the appendix on page 78. Where practical, order-of-magnitude cost estimates are included for each improvement based on average material rates for sidewalks, crosswalks, striping, etc. These estimates are intended to convey the level of investment proposed concepts would require for implementation. The cost estimates are based on industry standards for per-unit material costs, and do not include the cost of right-of-way acquisition, relocation of utilities or drainage, engineering design, or contingencies.

Pedestrian Design Elements

Pedestrian design elements include more general engineering improvements implementable throughout Oxford as well as specific priority intersection recommendations. Many of the tenets of the intersection improvement concepts can be utilized elsewhere as well.

Pedestrian design elements applicable throughout Oxford include:

- Enhanced pedestrian crossings
- Traffic calming

The following sections briefly summarize key

elements of these pedestrian treatments. As the Township implements various roadway projects, pedestrian facility design should refer to current best practice guidance for more detailed information, including:

- New Jersey Complete Streets Design Guide
- NACTO Urban Street Design Guide
- FHWA Small Town and Rural Multimodal Networks
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities



Pequest Trail Bridge, White Township, NJ

Enhanced Pedestrian Crossings

Based on the surrounding context, traffic volumes, and traffic speeds, enhanced pedestrian crossings utilize a variety of design elements to improve pedestrian visibility, enhance user comfort, increase driver compliance with the State’s “stop for pedestrians” law and/or decrease the crossing distance for pedestrians. Typical crosswalk designs are illustrated above.

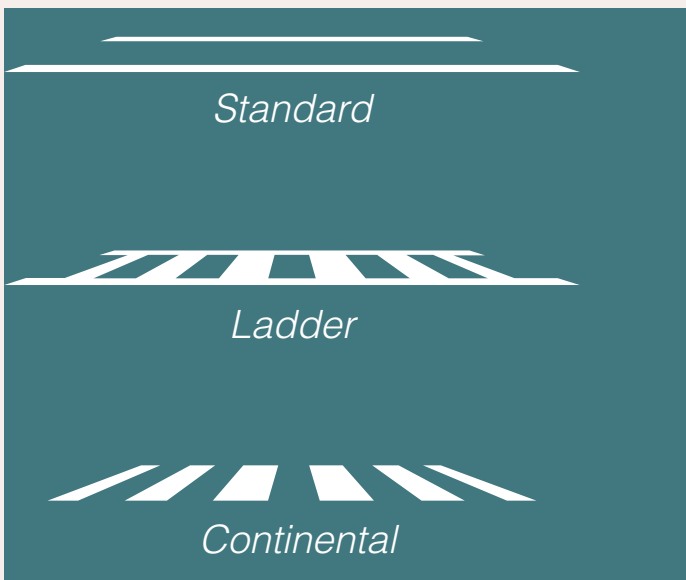
On low-volume and low-speed roadways, crosswalk striping alone is often sufficient. However, on higher volume and/or higher speed roadways, additional pedestrian treatments are recommended to enhance the crossing and supplement crosswalk striping.

Elements of an enhanced pedestrian crossing can include:

High Visibility Crosswalk Striping

Striping design can significantly enhance the visibility of a crosswalk. Transverse striping, typically a pair of parallel lines oriented perpendicular to the driver, has a very limited visual profile to motorists. Conversely, longitudinal striping (often referred to as “continental” striping) is oriented parallel to motor vehicle travel, which significantly improves the visibility of the crossing to motorists.

Pavers or stamped brick crosswalks are often incorporated into downtown streetscape designs. While these designs may provide additional aesthetic value consistent with an overall streetscape program, they generally do not have the same visibility benefits as the continental striping due to the low color contrast between the pavers and the asphalt. If the brick aesthetic is preferred, it can be combined with higher visibility striping patterns to enhance visibility.



Left: Typical crosswalk striping designs

Above: Example of incorporating high-visibility striping with brick/paver material aesthetic (www.atlanticpaving.com)



Ladder crosswalk in Westfield, NJ

Leading Pedestrian Intervals

Where there are pedestrian signals, signals for pedestrians and motorists typically change simultaneously, so that as motorists are beginning to turn, pedestrians are beginning to cross the street. A leading pedestrian interval (LPI) provides time at the beginning of each cycle when pedestrians are able to begin crossing and increase their visibility before corresponding vehicles are allowed to move. The National Association of City Transportation Officials (NACTO) recommends 3 to 7 seconds for LPI's.

Crosswalk Daylighting

Daylighting refers to improving the visibility of a crossing by removing obstacles blocking the view of either the pedestrian or approaching motorists. On-street parking too close to an intersection (i.e., closer than 20 feet, per design standards), for example, is a common obstruction to visibility.

Daylighting treatments can include seasonally removed short-term installations, pilot projects demonstrating a design concept, interim treatments until a long-term improvement can be implemented, or permanent, raised curb extensions.

Short-term or interim daylighting treatments can utilize low-cost, quickly implementable materials to reinforce the clear zone around a pedestrian crossing and deter parking or loading, as pictured below. This serves to improve safety by enhancing visibility, reducing the crossing distances, and

calming traffic. Elements include a surface treatment to define the space, such as striping, paint, or epoxy gravel coating. A vertical element, such as flexible delineators, bollards, or planters, deters vehicles from entering the space and narrows the crossing.

Long-term solutions involve installing a curb extension. This extends the sidewalk and streetscape into the parking lane and/or narrows the travel lane. In addition to improved visibility and safety, curb extensions also provide an opportunity to integrate green stormwater management strategies and/or enhance the streetscape with street furniture, plantings, or other amenities.

Pedestrian Crossing Signage and Beacons

Signage can further enhance the visibility of a pedestrian crossing and reinforce driver compliance with the State's "stop for pedestrian" law. Signage options include in-road "Stop for Pedestrian" (MUTCD R1-6a) and pedestrian crossing (W11-2) signs. Both options improve motorist awareness of the crossing and their obligation to stop for pedestrians.

Crossings with higher vehicle speeds, higher vehicle volumes, or a higher volume of pedestrians may also be suitable locations for beacons. Pedestrian-actuated rectangular rapid flashing beacons (RRFBs) further improve the visibility of the crossing by combining signage with flashing amber LED lights, as pictured below.



Daylighting on NJ 12 in Frenchtown, NJ

Daylighting treatments can include the use of quickly implementable, inexpensive materials in order to shorten crossings, improve visibility, and slow traffic, such as the example to the left from Frenchtown, NJ. They can be used as an interim treatment until a permanent curb extension is installed, or maintained longer term in order to permit more flexible use of the street.



RRFBs in Highland Park, NJ

Integrating Public Art into the Streetscape

Community crosswalk programs provide opportunities to integrate public art into the streetscape. They engage the creativity of local residents to design crosswalks or paint an entire intersection to encourage community building and transform public roadway space into neighborhood assets. Designs must abide by requirements of the MUTCD or other regulating standards related to paint color and patterns, and should follow the principle of using high-contrast to enhance visibility and improve safety. Community crosswalk programs have been implemented in municipalities across the U.S. including Ocean City, NJ, Fort Lauderdale, FL, and Seattle, WA.



Top: Residents installing a painted intersection in Boulder, CO (www.bouldercolorado.gov); Bottom: painted intersection in Ft. Lauderdale, FL (www.fortlauderdale.gov)

Traffic Calming

Traffic calming strategies aim to reduce motor vehicle speeds. Lower speeds support a more bicycle and pedestrian-friendly environment by reducing instances of vehicles overtaking bicycles, enhancing the drivers' ability to see and react to bicyclists and pedestrians, and reducing the severity and likelihood of crashes for all street users. Reducing vehicle speeds also improves bicyclist comfort by reducing the speed differential between motor vehicles and bicyclists, and is a critical element of a bicycle boulevard.

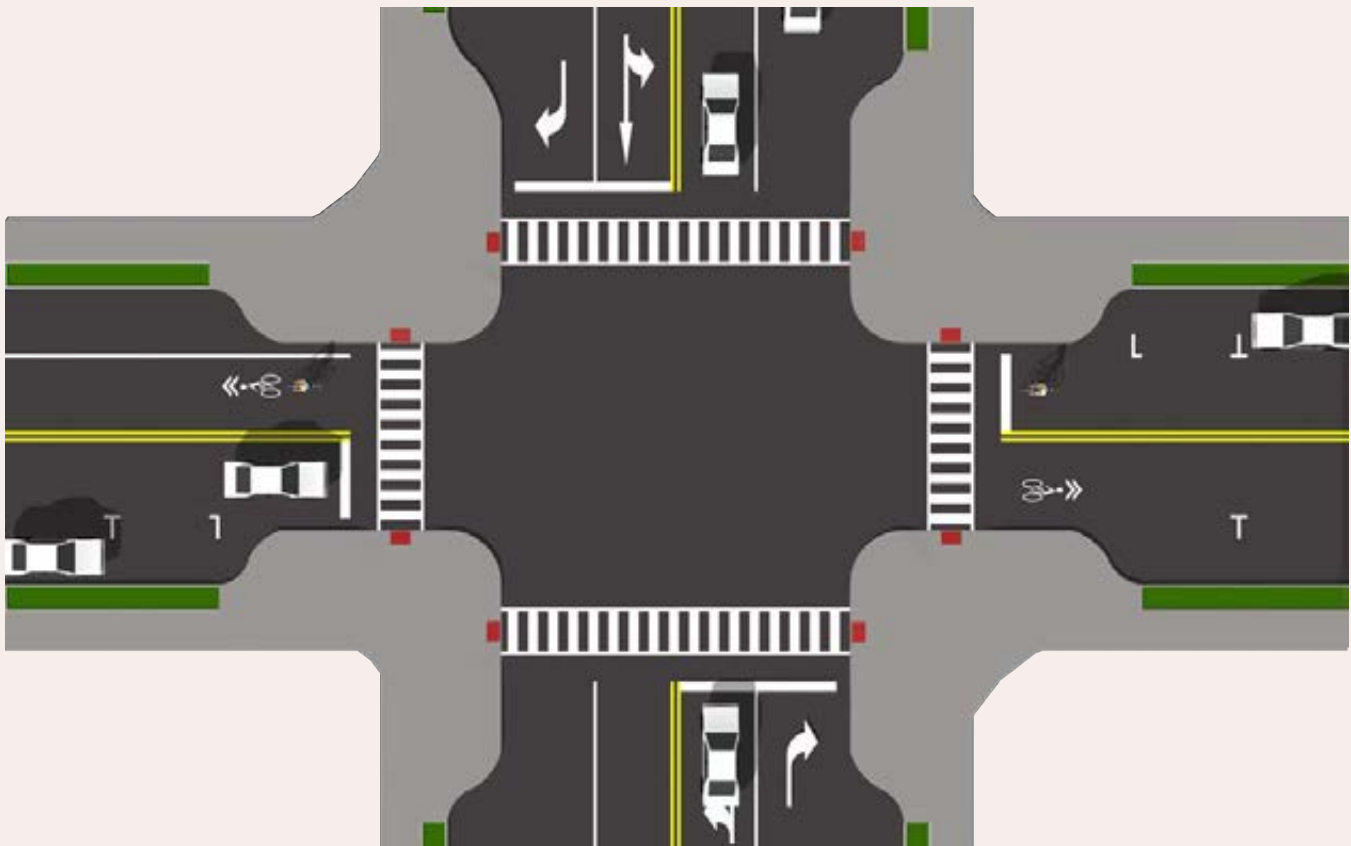
Benefits of traffic calming techniques include:

- Decreased motor vehicle speeds
- Decreased crash likelihood and crash severity for all street users
- Improved bicyclist and pedestrian comfort
- Improved conditions for pedestrians, cyclists and all residents by reducing vehicle speeds
- Establishes and reinforces bicycle priority on bicycle boulevards
- Provides opportunity for landscaping and other community features, such as benches,

communal space, and artistic painted intersections, benefiting all roadway users and residents. Speed management treatments can be divided into two types: horizontal and vertical deflection. These treatments can be implemented individually or in combination to increase their effectiveness. Examples of traffic calming strategies are described on the following pages.

As with all roadway features, traffic calming elements should be designed to consider the context and needs of the street.

Enhanced signing strategies can also support lower traffic speeds. Radar speed signs or driver feedback signs, for example, alert drivers of their speed and the actual speed limit. These relatively low-cost, easily implementable tools have been shown to have a moderate impact on reducing 85th percentile speeds, and a significant impact on reducing high-end speeds – those exceeding the speed limit by 10 MPH or more (Spotlighting Speed Feedback Signs, Public Roads/FHWA, 2016).



Horizontal Deflection

Horizontal speed control devices are used to slow motorists by either visually narrowing the roadway or deflecting motorists through an artificial curve.

Curb Extensions

Curb extensions, or bulb-outs, extend the sidewalk or curbside into the parking lane at an intersection. Curb extensions narrow the roadway at intersections, contributing to lower motor vehicle speeds, and reducing pedestrian crossing distances and increasing the amount of space available for street furniture and

Where possible, sufficient space should be provided for bicyclists to pass around the outside of the elements.

green stormwater management features. They are typically applied at locations with on-street parking and should not extend into bicycle lanes. Temporary painted curb extensions can also be installed at a reduced cost though they are not as effective.

Vertical Deflection

Vertical speed control measures are composed of wide, slight changes in pavement elevation that self-enforce a slower speed for motorists. Narrow and

abrupt speed bumps often used in private driveways and parking lots are not recommended for public streets and are hazardous to bicyclists.

Speed Humps

Speed humps are 3-4 inches high and 12-14 feet long with an intended vehicle speed of 15-20 mph. Speed hump design should adhere to the guidelines of the New Jersey “Speed Hump Law,” C.39:4-8.9, C.39:4-8.11), which adopted the Institute of Transportation Engineers design standards.

Speed Tables

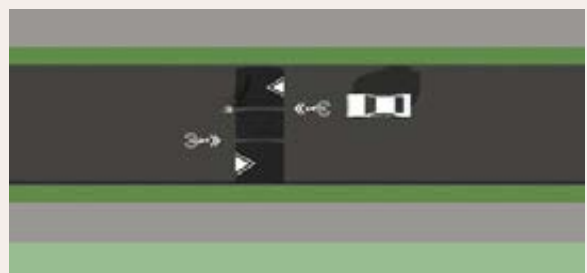
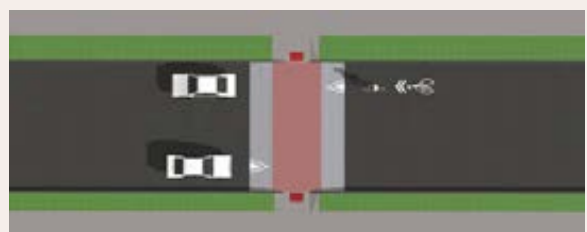
Speed tables are longer than speed humps and have a flat top, with a typical height of 3-3.5 inches and a length of 22 feet. Intended vehicle operating speeds range from 25-35 mph, depending on the spacing. Speed tables can be used on collector speeds, transit, and/or emergency responder routes.

Raised Crosswalk/Raised Intersection

A raised crosswalk is a speed table signed and marked as a pedestrian crossing. It extends the full width of the street and is typically 3 inches high. At minor intersections the entire intersection can be raised to reduce motor vehicle speeds in all directions.

Speed Cushions

Speed cushions are speed humps that include wheel cutouts allowing larger vehicles to pass unaffected, but reduce passenger vehicle speeds. They are often used on key emergency response routes to allow emergency vehicles to pass unimpeded. Speed cushions should be used with caution, however, as drivers often seek out the space in between the humps to maintain their speed.



Pedestrian Signals

Per the Manual on Uniform Traffic Control Devices, signalized intersections should include pedestrian signal heads with countdown timers. These accommodations provide clarity to pedestrians and enhance safety by clearly indicating when it is appropriate to cross the intersection and how long they have to do so.

Adequate clearance time should be provided so all pedestrians, including those who walk more slowly than average, can cross the street. For most locations, a walk speed of 3.5 feet per second is adequate, though in locations commonly used by slower pedestrians, such as near senior centers, 3.0 feet per second should be used.

At intersections with regular pedestrian traffic, the pedestrian phase should be provided for all crossings

during each cycle. Though dedicated pedestrian phases are preferred, the use of pedestrian actuation signals such as push buttons can be installed in locations with low pedestrian volumes. Where pedestrian volumes are low and vehicular volumes are high, three strategies should be considered before resorting to full pedestrian actuation:

- Provide pedestrian signal phasing during hours of high pedestrian activity
- Reduce the length of a crossing by installing curb extensions
- Reduce the total cycle length at the intersection



Pedestrian Signals at NJ 31 and Port Colden Rd

Pedestrian Network Improvements

Sidewalks

Sidewalk improvements should be targeted where they are most needed and should take into account the character of Oxford's neighborhoods. Based on the sidewalk inventory conducted during the existing conditions analysis, opportunities were identified to expand the sidewalk network. Projects can be prioritized based on:

- Proximity to major destinations (e.g. walking routes to schools, parks, or downtown)
- Whether the street is a primary roadway within the Township; carrying relatively high traffic speeds and/or volumes, thereby increasing the need for pedestrian facilities

Sidewalk construction can also be coordinated with future land development.

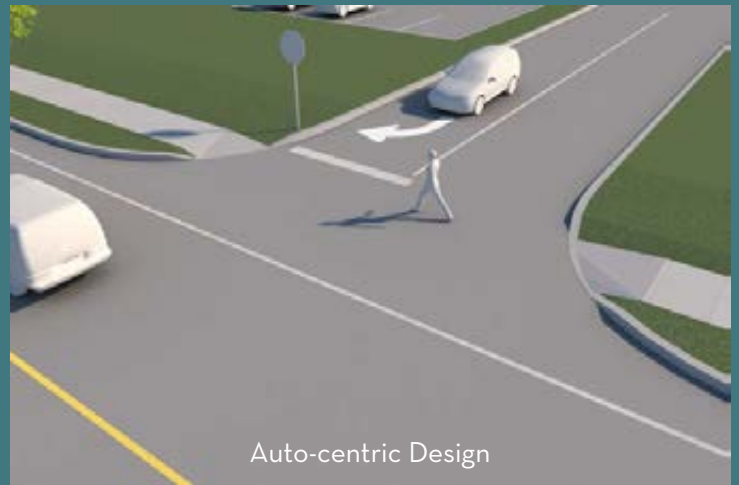
New sidewalks with a minimum 5' width are generally sufficient for most neighborhoods. Where right-of-way allows, a planting strip between the

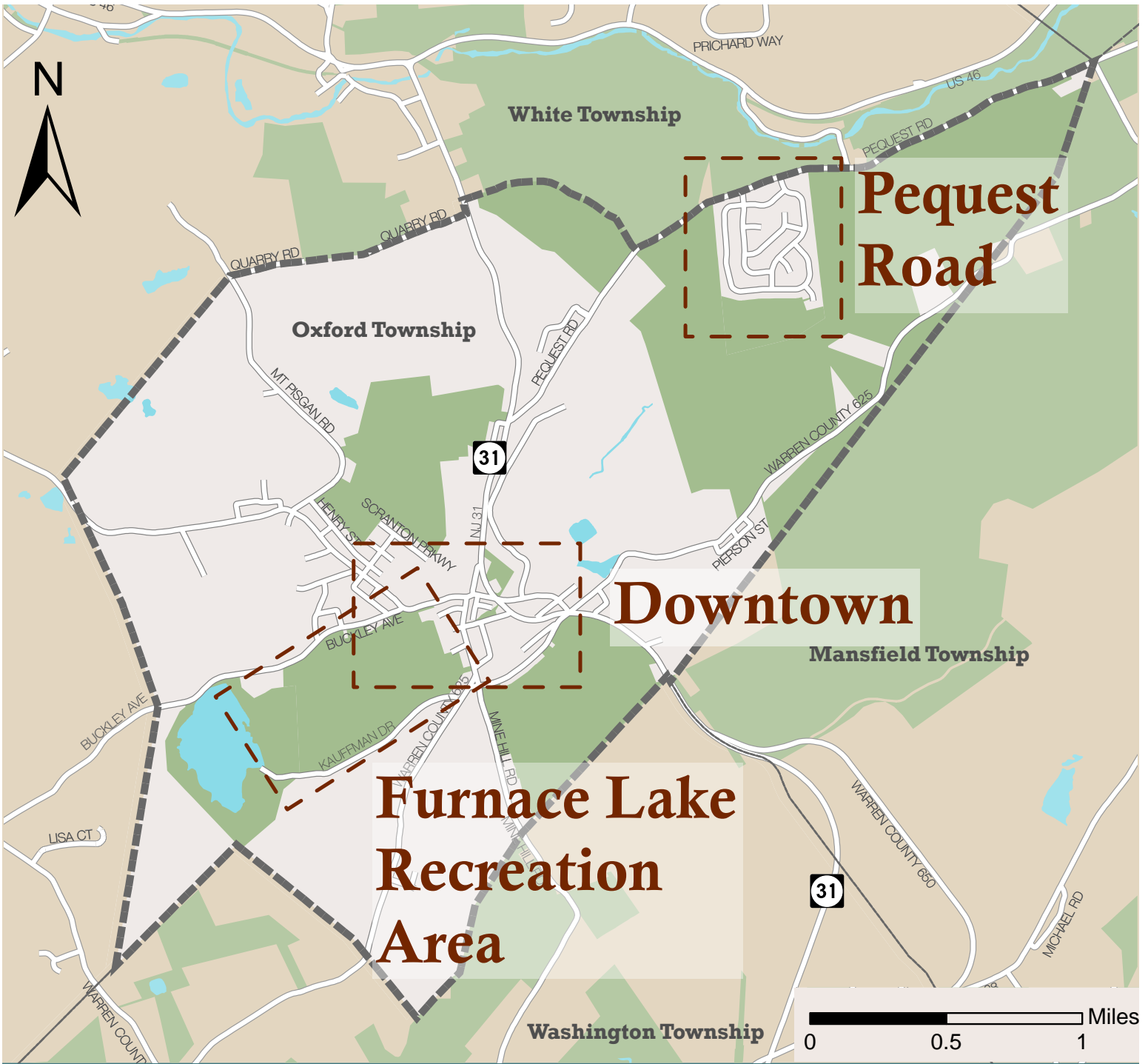
sidewalk and curb should also be considered to provide an additional buffer between pedestrians and the roadway, a tool considered a best practice.

During sidewalk construction, curb ramps compliant with the Americans with Disabilities Act (ADA) must also be constructed to ensure the sidewalk network is accessible for everyone, including seniors, children, people with strollers, and those in wheelchairs or with other mobility impairments.

At driveway crossings, designs should make it clear and intuitive that the pedestrian has the right-of-way. As illustrated in the images below, the sidewalk material and grade should continue across the driveway. A continuous, level sidewalk, requires the vehicle to cross at sidewalk grade, prioritizing pedestrian movement and encouraging turning motorists to stop for pedestrians. Most sidewalks at commercial locations in Oxford do not prioritize pedestrians.

Sidewalk and Driveway Design





MAP 13: FOCUS AREAS

Focus Area Recommendations

Pedestrian recommendations are broken down into three focus areas, each serving a different geography. These focus areas were chosen based on comments from the SAC.

Pequest Road

In the northeast corner of Oxford is a 194-home residential development off of Pequest Rd/Janes Chapel Rd. Nearly 20% of Oxford's population resides in this neighborhood of single family homes and all must access Pequest Rd/Janes Chapel Rd from the two entrances to the development, Robeson Ridge and Van Nest. 0.24 miles to the west of the

Recommendations

Warren County has proposed a 0.5 mile extension of the Oxford Bikeway north from Pequest Rd to connect to the Pequest Wildlife Management Area Trail in White Township. As shown in Map 14, this land is owned by the New Jersey Department of Environmental Protection.

This report also recommends a 0.29 off-road trail along the powerline right-of-way immediately north of the residential development to connect the neighborhood with the proposed trail extension. This trail would partially run through land owned by Jersey Central Power & Light Co. and would require coordination with the utility. A Highlands development exemption, NJDEP permits,

Recommendations for each focus area are not solely for the immediate area, but will better connect the area to the rest of Oxford Township.

development along Pequest Rd/Janes Chapel Rd is the northern entrance of the Oxford Bikeway, a 0.87 mile bike path terminating at the dead-end of Lower Denmark Rd. Presently, cyclists must then continue 0.9 miles along the 30-foot wide Lower Denmark Rd to Port Colden Rd in the town center.

and agency coordination may be necessary as described in the Furnace Lake Recreation Area recommendations.

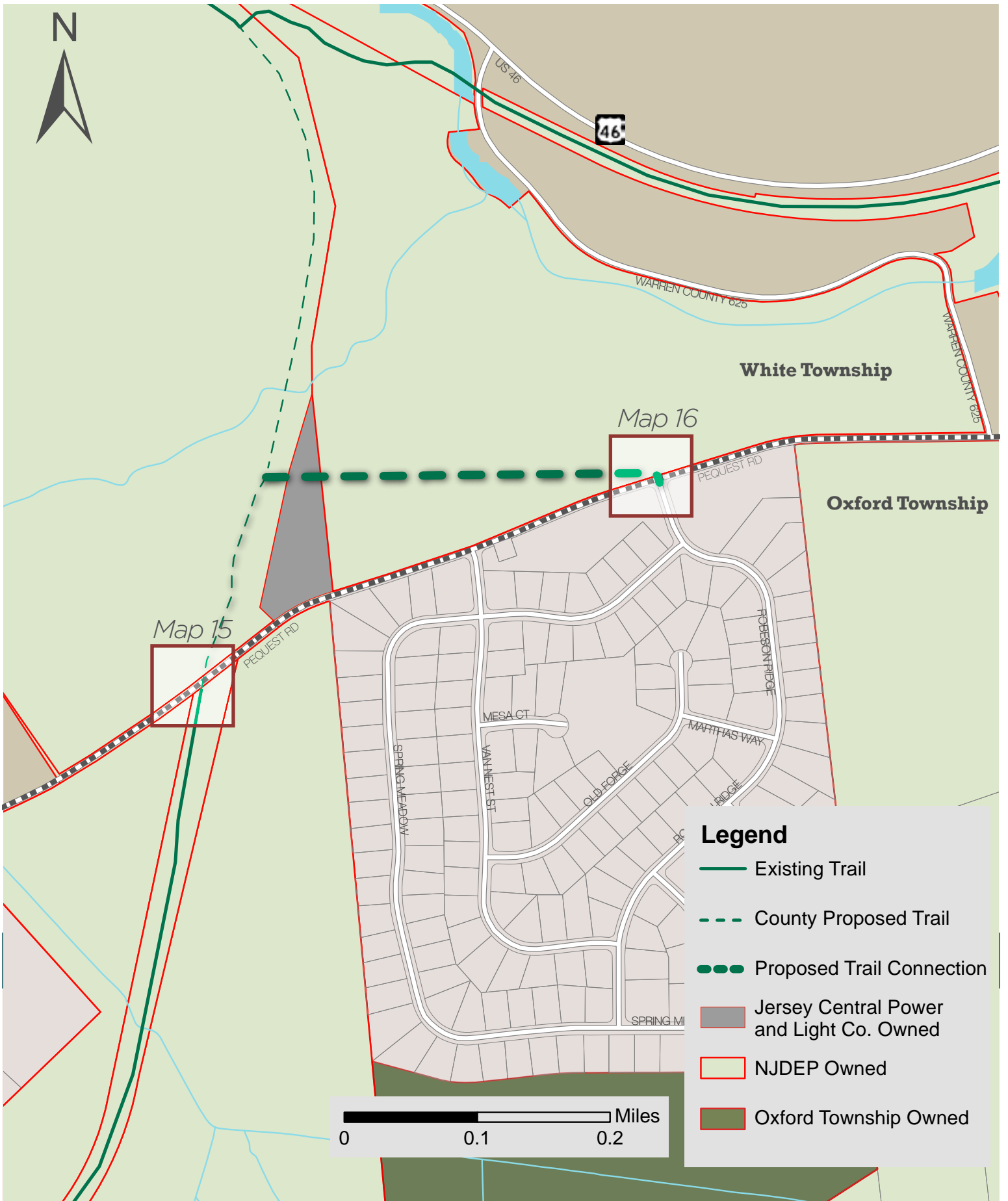
Due to the high motor vehicle speed on Pequest Rd, both crossings of the trail should have high visibility crosswalk markings, and RRFBs (see pages 41-42) and signage to notify motorists of crossing pedestrians.

The proposed County trail is illustrated in Map 15 and the proposed local trail in Map 16.

This would provide hundreds of people with improved, off-road biking and walking access to the downtown and recreational opportunities provided by the Pequest Trail.

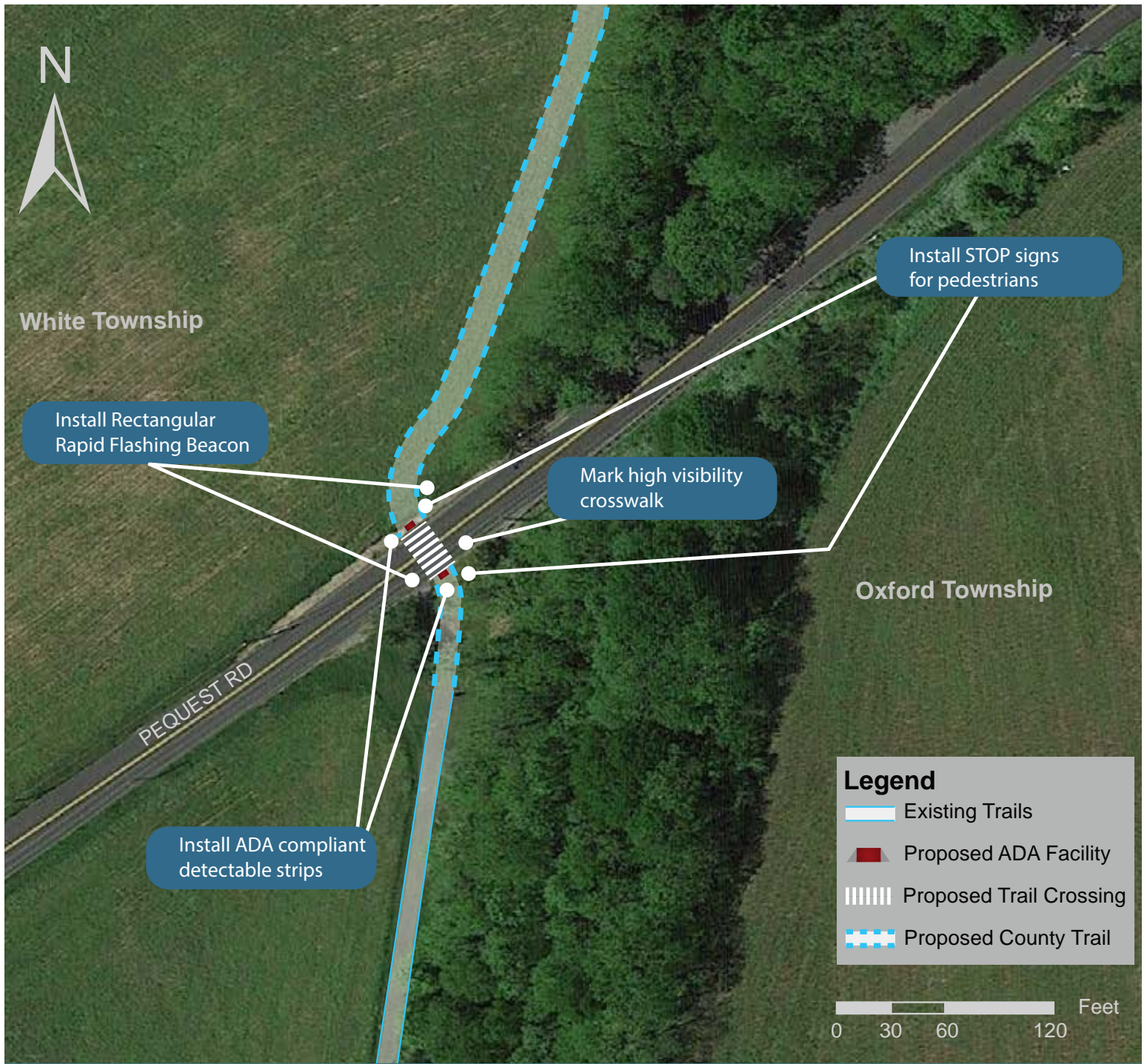


Residential Development off of Pequest Rd

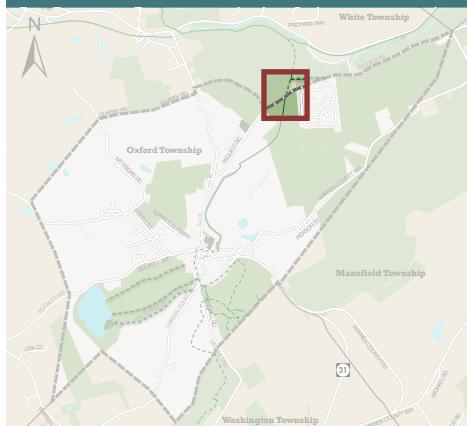


MAP 14: TRAIL CONNECTIONS AT PEQUEST RD



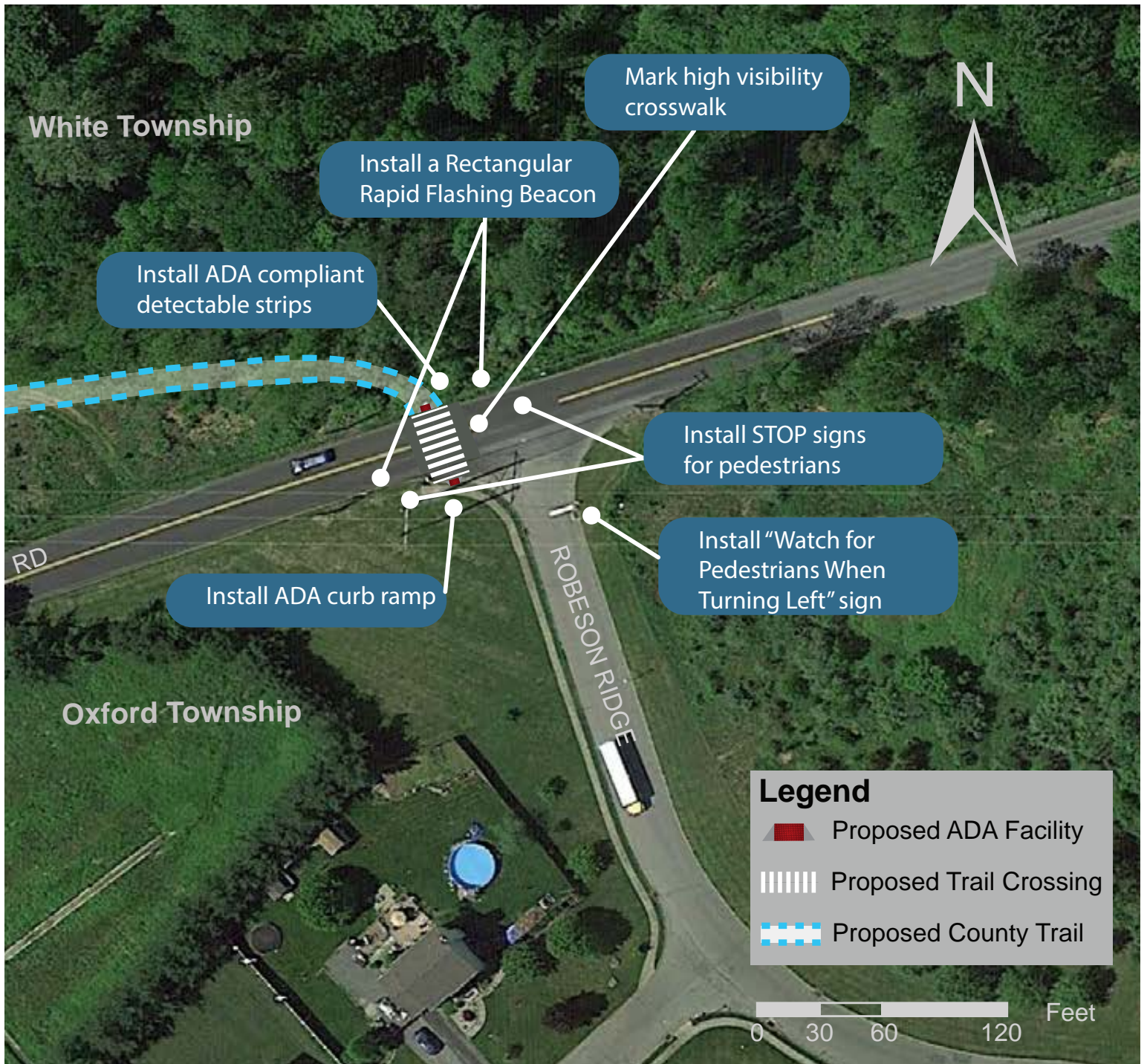


MAP 15: TRAIL CROSSING (WEST) AT PEQUEST RD



Recommendations

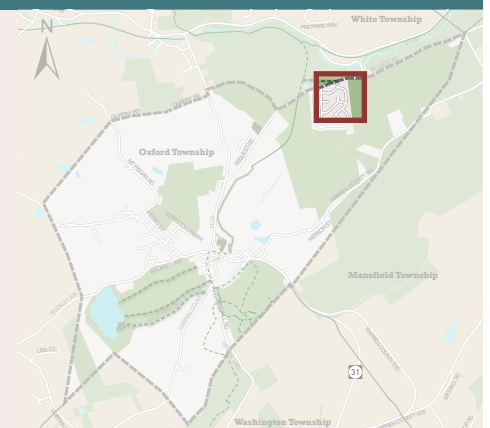
- Mark high visibility crosswalk, resulting in greater visibility for pedestrians and slower vehicle speeds
- Install ADA compliant facilities on both sides of proposed crosswalk
- Install STOP signs at both ends of the trail crossing
- Install a Rectangular Rapid Flashing Beacon, facilitating a safe, visible crossing



MAP 16: TRAIL CROSSING (EAST) AT PEQUEST RD

Recommendations

- Mark high visibility crosswalk
- Install ADA compliant facilities on both sides of proposed crosswalk
- Install STOP signs at both ends of the trail crossing
- Install a Rectangular Rapid Flashing Beacon, facilitating a safe, visible crossing
- Install "Stop for Trail Crossing Here" signs for westbound vehicles on Pequest Rd, and northbound on Robeson Ridge





Furnace Lake Recreation Area

Furnace Lake is a 56 acre artificial lake providing recreational activities. Presently, the only access to the lake is provided by Kauffman Dr from Jonestown Rd. Kaufman Dr is a narrow road with no sidewalks and two-way traffic. The Recreation Area is the only

land use on the road, but during the summer when the lake is highly frequented the presence of cars can pose a challenge for cyclists and pedestrians along Kauffman Rd. Potential recommendations for this area are shown in Map 17.

Recommendations

Three options are presented in Map 17 for providing a trail corridor to Furnace Lake Recreation Area. Each option would provide a differing level of comfort and connectivity. The trails would travel on Township owned-land and thus not require right-of-way acquisition, but would necessitate approval from the New Jersey Highlands Council and the New Jersey Department of Environmental Protection (NJDEP).

To accomplish this, Oxford should have an environmental screening performed and then create a conservation easement along the preferred trail option. The next step would be to apply to the Highlands Council for a development exemption on the basis of Exemption #8, *Trails on public or private lands: The construction or extension of trails with non-impervious surfaces on publicly owned lands or on privately owned lands where a conservation or recreational use easement has been established.* Two NJDEP permits may need to be obtained—a Freshwater Wetlands

General Permit 17A for non-motorized, multiple use paths, and a Flood Hazard Area Individual Permit. The project would likely need to be constructed with pervious materials. Additional coordination may be necessary with NJDEP Green Acres, or United States or New Jersey Fish and Wildlife.

The Kent Street Trail would involve constructing a trail from the terminus of Kent St to Furnace Lake. The Church Street Trail would involve constructing a trail perpendicular to Jonestown Rd, roughly extending from the terminus of Church St. The Kauffman Drive Trail would require constructing a shared-use path (also known as a side path) along the existing Kauffman Dr. This would require cyclists and pedestrians traveling from downtown to ride along both Washington Ave (CR 631) and Jonestown Rd (CR 625) in mixed traffic. The trail could also travel north to the proposed Church St Trail to better connect to the County's proposed shared-lane markings on CR 631.



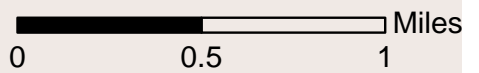
Furnace Lake



MAP 17: FURNACE LAKE TRAIL ALTERNATIVES*

Legend

- County Proposed Trail
- Proposed Trail Options
- Oxford Township Owned Parcels



**Only one of the proposed Furnace Lake trails would be chosen from the three alternatives*

Wayfinding and Signage

Wayfinding signage can be installed to promote access to bike facilities such as trails or bike parking, or certain places, such as downtown or Furnace Lake. The MUTCD provides guidelines for the formatting of wayfinding signs. Wayfinding signage can be placed in tandem with bike and pedestrian facilities to further promote active transportation. Relevant signage graphics are presented in Figure 1.

Additionally, appropriate signage can enhance the safety and well-being of cyclists, particularly in locations where motorists are not accustomed to seeing cyclists. Signage should be installed at trail crossings. This signage alerts motorists of the potential for crossing cyclists and vice versa. The graphic in Figure 2 presents a diagram of appropriate trail crossing signage. This signage can be placed at any proposed trail crossings.



Figure 1: Wayfinding Signage

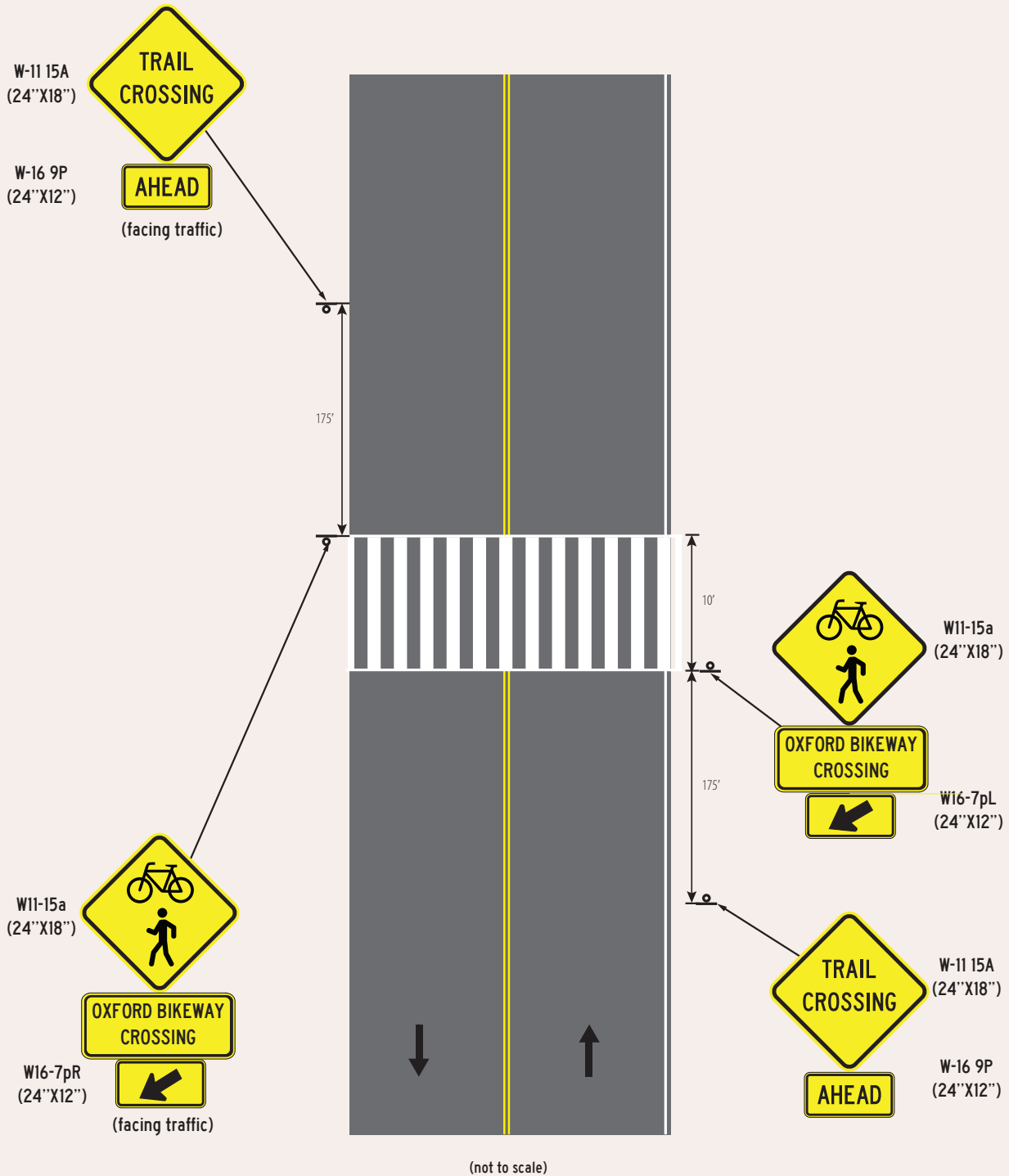


Figure 2: Trail Crossing Signage and Striping

Bicycle Network Improvements Summary

The bike recommendations for the three focus areas will complement the trail network proposed by Warren County as shown in Map 18. Together, these trails connect and improve safe, off-road bicycle connections between Oxford’s residential neighborhoods, the cultural destinations in downtown, and the recreational opportunities available at Furnace Lake. Additionally, the trails

will connect to the adjacent White and Washington Townships, expanding scenic and recreational bicycling opportunities to the Pequest Wildlife Management Area Trail. Cyclists will be able to safely bike within and through the community. The township should work with the County to translate these plans into a reality.

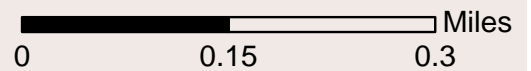


MAP 18: BICYCLE NETWORK IMPROVEMENTS*

Legend

- - - County Proposed Trails
- - - Active Transportation Plan Proposed Trails
- Existing Trails
- 31 Park
- Open Space

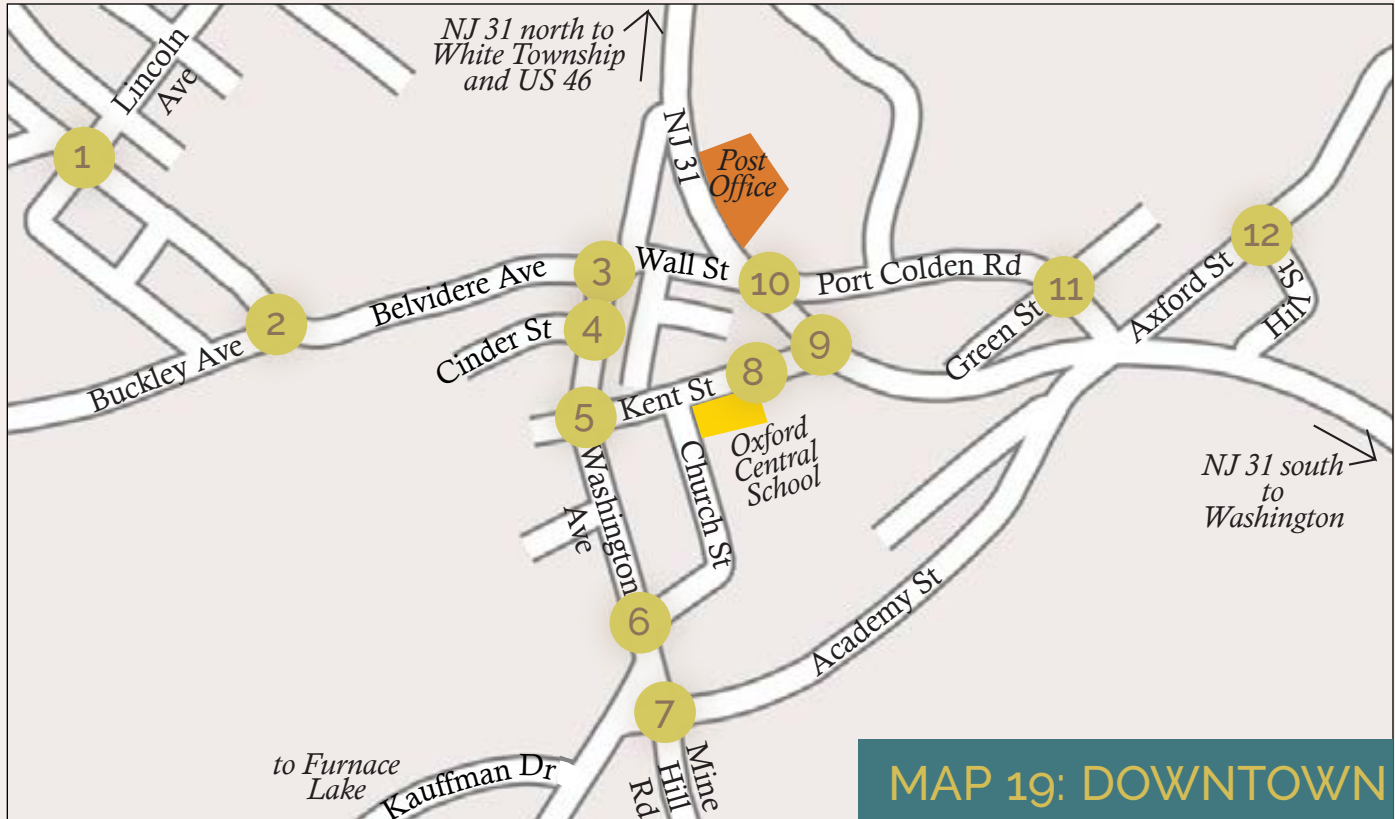
*Only one of the proposed Furnace Lake trails would be chosen from the three alternatives



Downtown

Oxford's downtown, centered around the intersection of NJ 31 and Wall St/Port Colden Rd is the township's municipal, cultural, and social center. Despite this and the demand for safe walking and biking opportunities, many streets here lack sidewalks

and NJ 31 poses a high-stress barrier between the two sides of town. The location of the subsequently detailed intersections are presented in Map 19, and a summary of the recommendations in Map 20.



NJDOT Furnace Brook Project

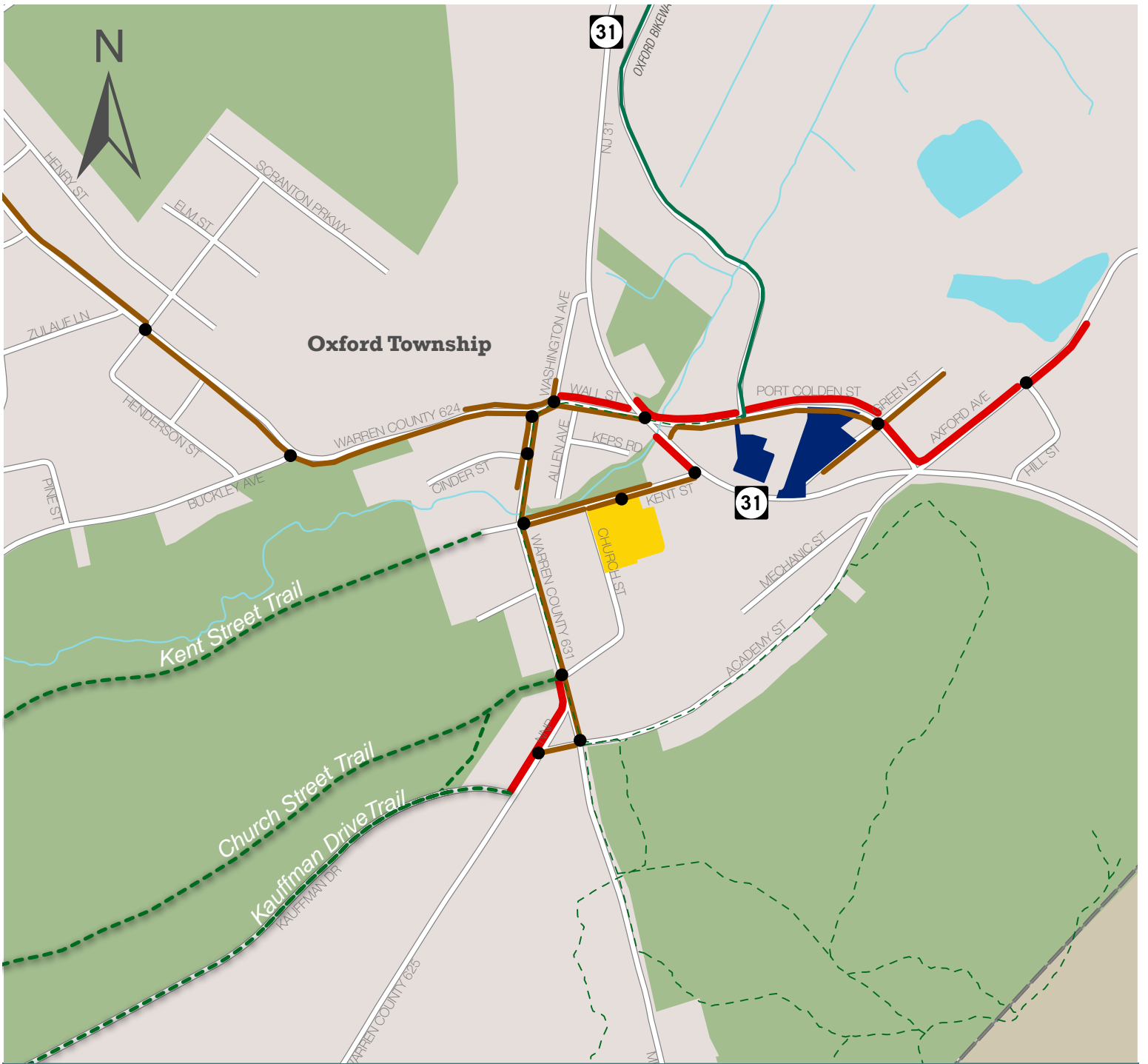
NJDOT is in the final stages of preliminary engineering to replace the NJ 31 bridge over Furnace Brook, located at the intersection with Wall St. As part of the project, driveway access, markings, grading and traffic and pedestrian signals will be upgraded. This future work has been incorporated into intersection recommendations on pages 62-73 and include:

- Closing the central of the three driveways from Spartan gas station onto NJ 31 and replacing it with a planted area
- Replacing the guardrail in front of Golden Rule Karate & Fitness with a planted area
- Re-marking southbound NJ 31 between Kent St and Wall St as one lane

Pedestrian Network Improvements

The following pages present the pedestrian intersection recommendations within and near downtown Oxford. Recommendations include

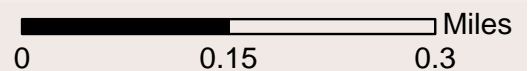
restriping and installing new crosswalks, installing ADA-compliant pedestrian ramps, and in some instances, installing painted and/or concrete



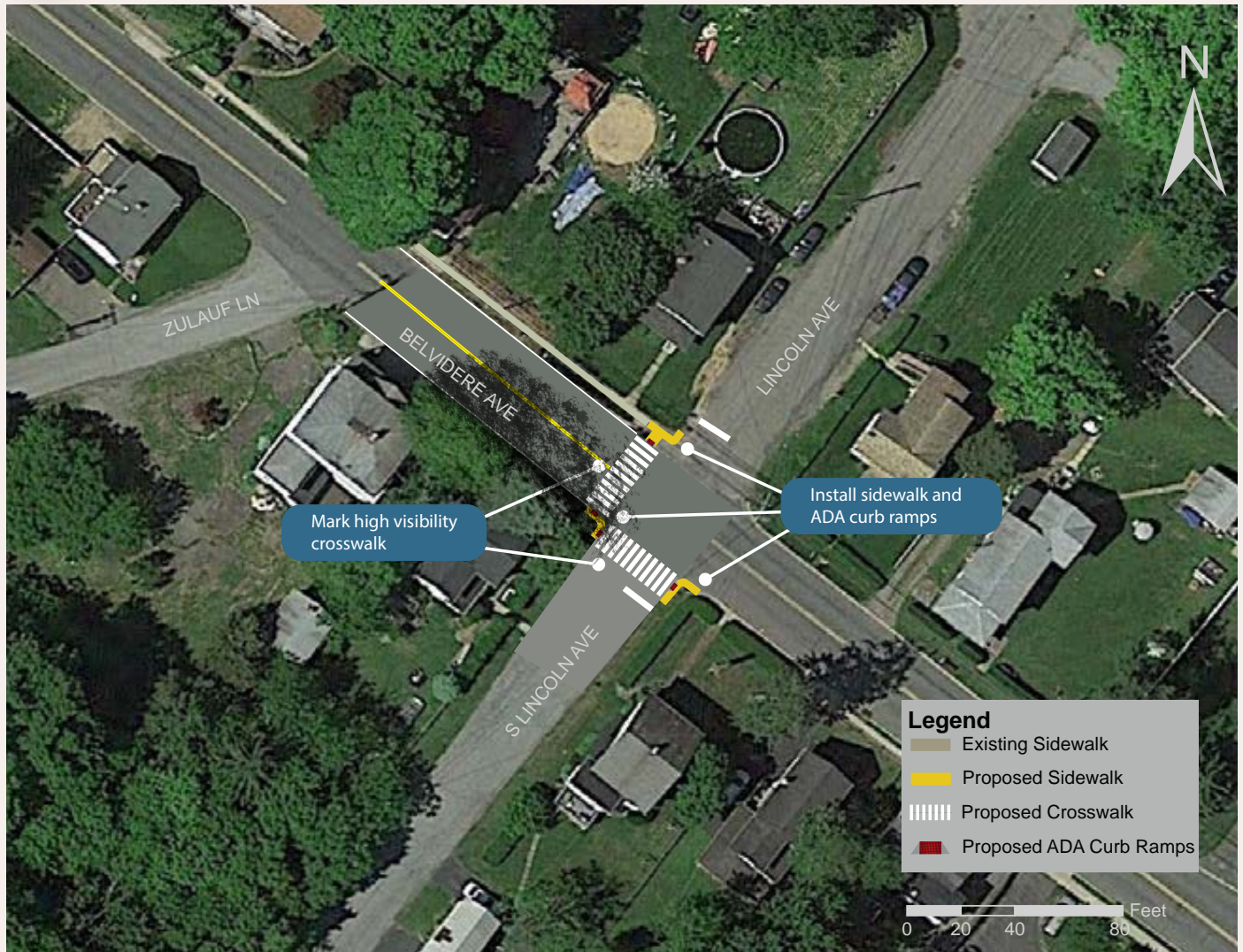
MAP 20: PEDESTRIAN NETWORK IMPROVEMENTS

Legend

- Crosswalk Upgrade
- School
- Municipal Building
- Open Space
- Existing Sidewalk
- Proposed Sidewalk
- Existing Trail
- - - County Proposed Trail
- Proposed Trail Options

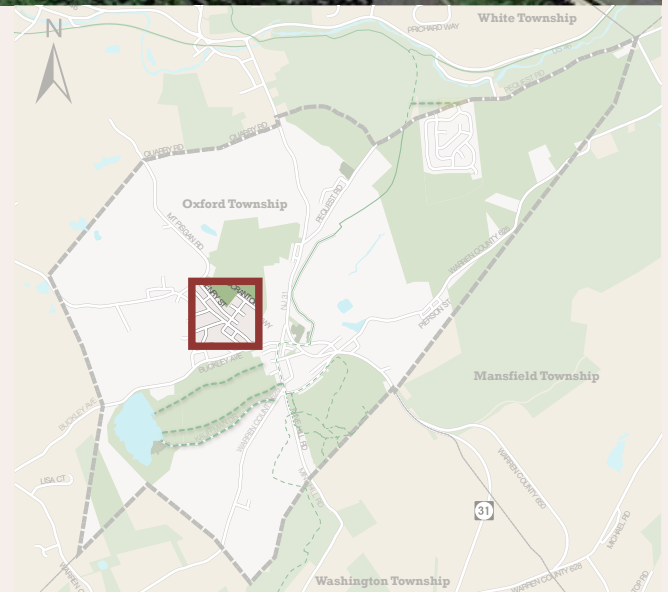


1 Belvidere Ave at Lincoln Ave

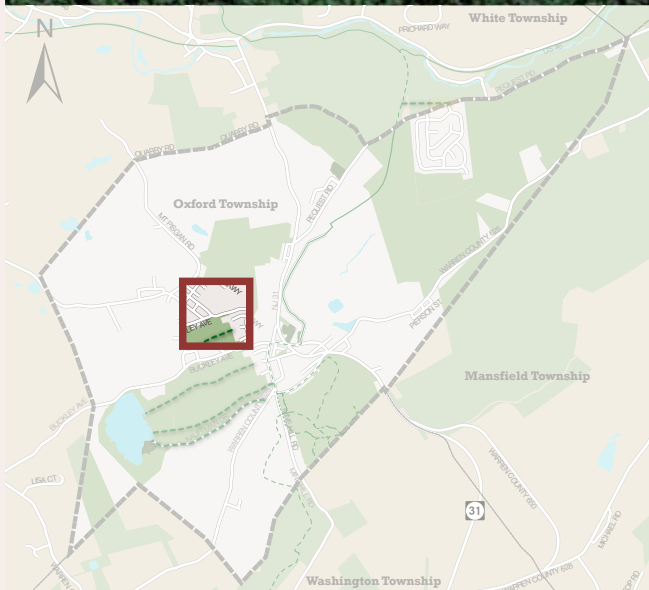
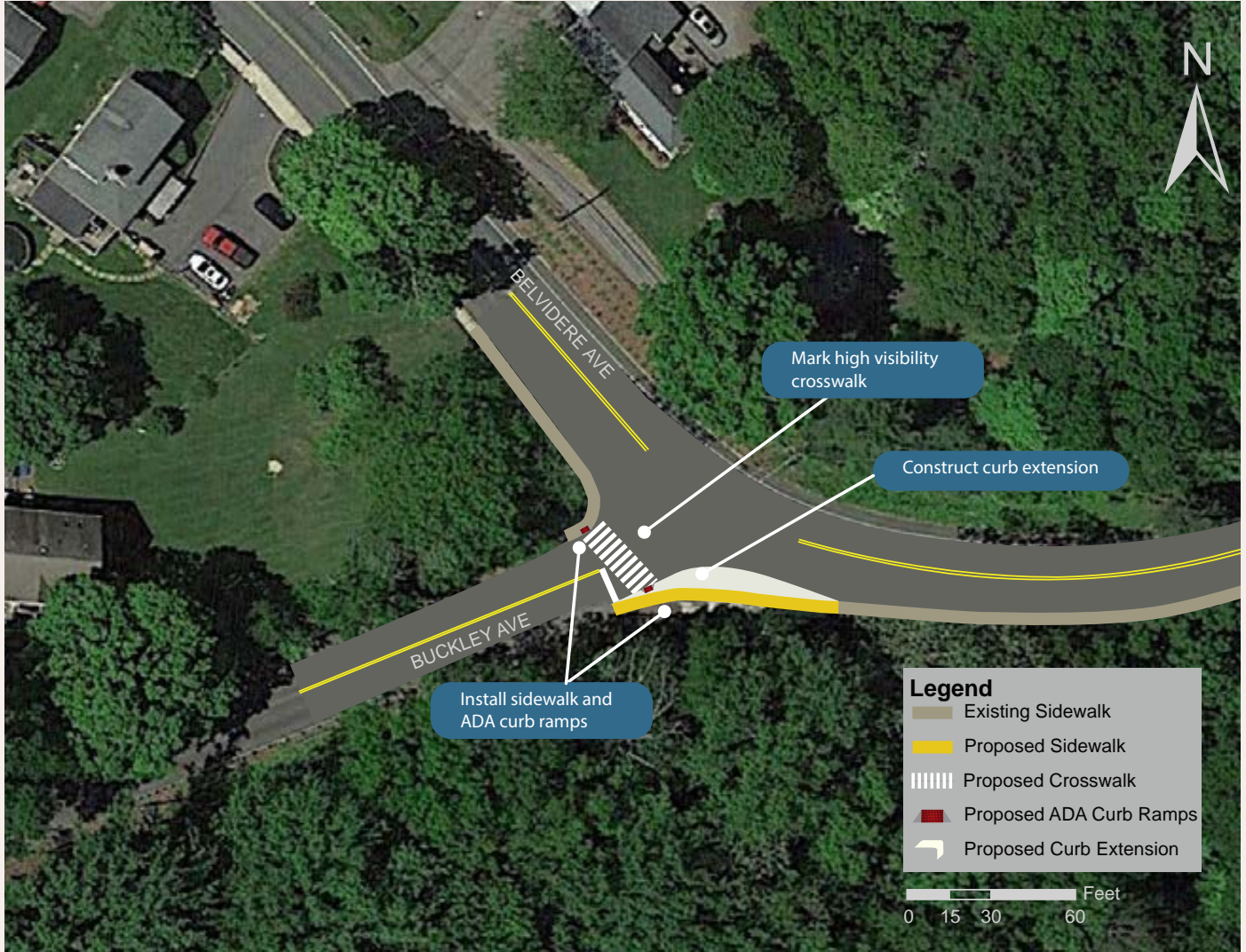


Recommendations

- Install sidewalk segments with ADA curb ramps on northwest, southwest, and southeast corners, providing safe pedestrian access to the existing sidewalk on the north side of Belvidere Ave west of the intersection
- Mark (2) high visibility crosswalks between new sidewalks



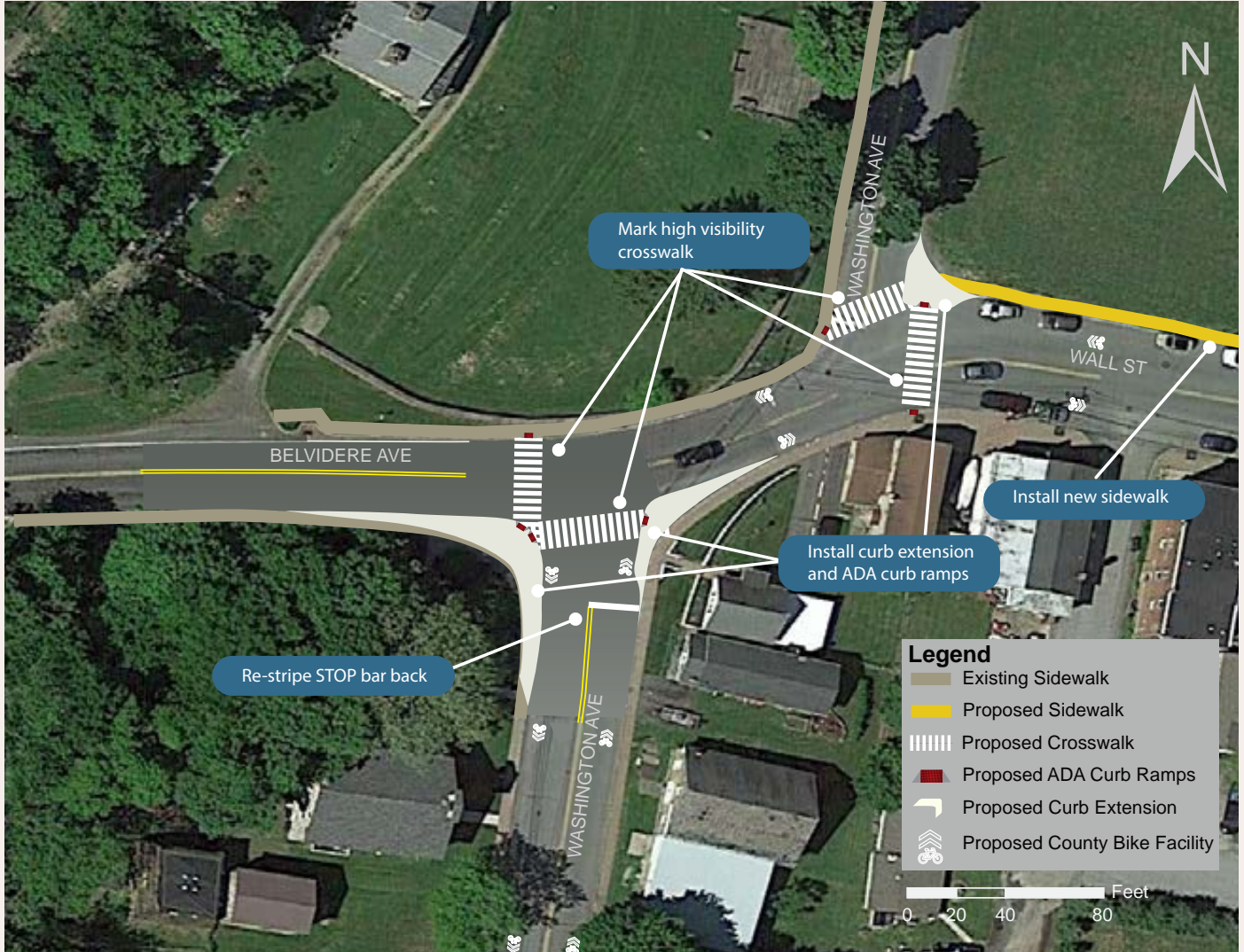
2 Belvidere Ave at Buckley Ave



Recommendations

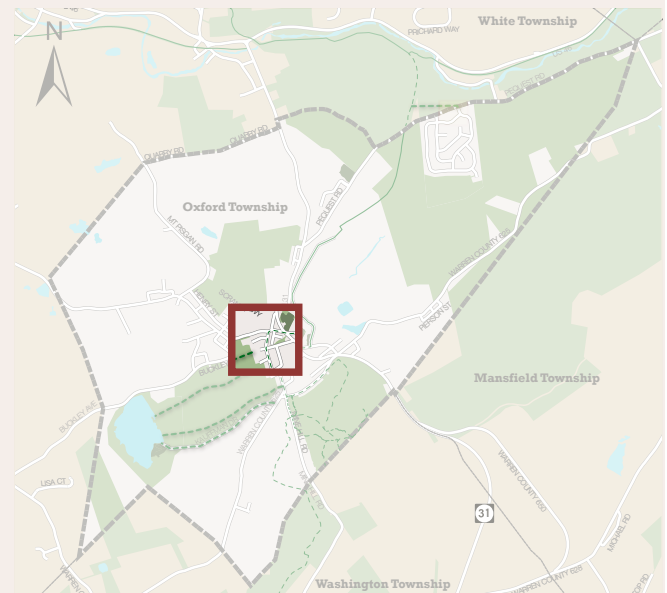
- Install curb extension on south corner
- Install sidewalk with ADA curb ramp on southern end of intersection to connect to existing sidewalk
- Mark high visibility crosswalk on Buckley Ave leg to connect existing sidewalk on southwest side of Belvidere Ave with proposed sidewalk

3 Belvidere Ave at Washington Ave

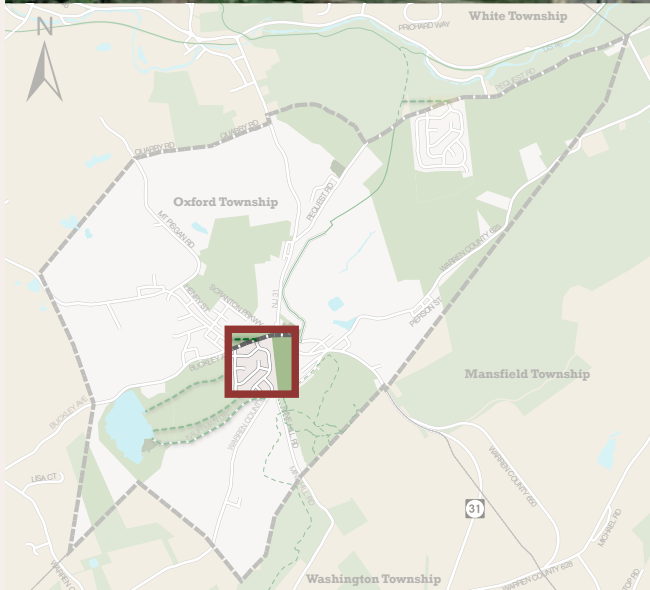
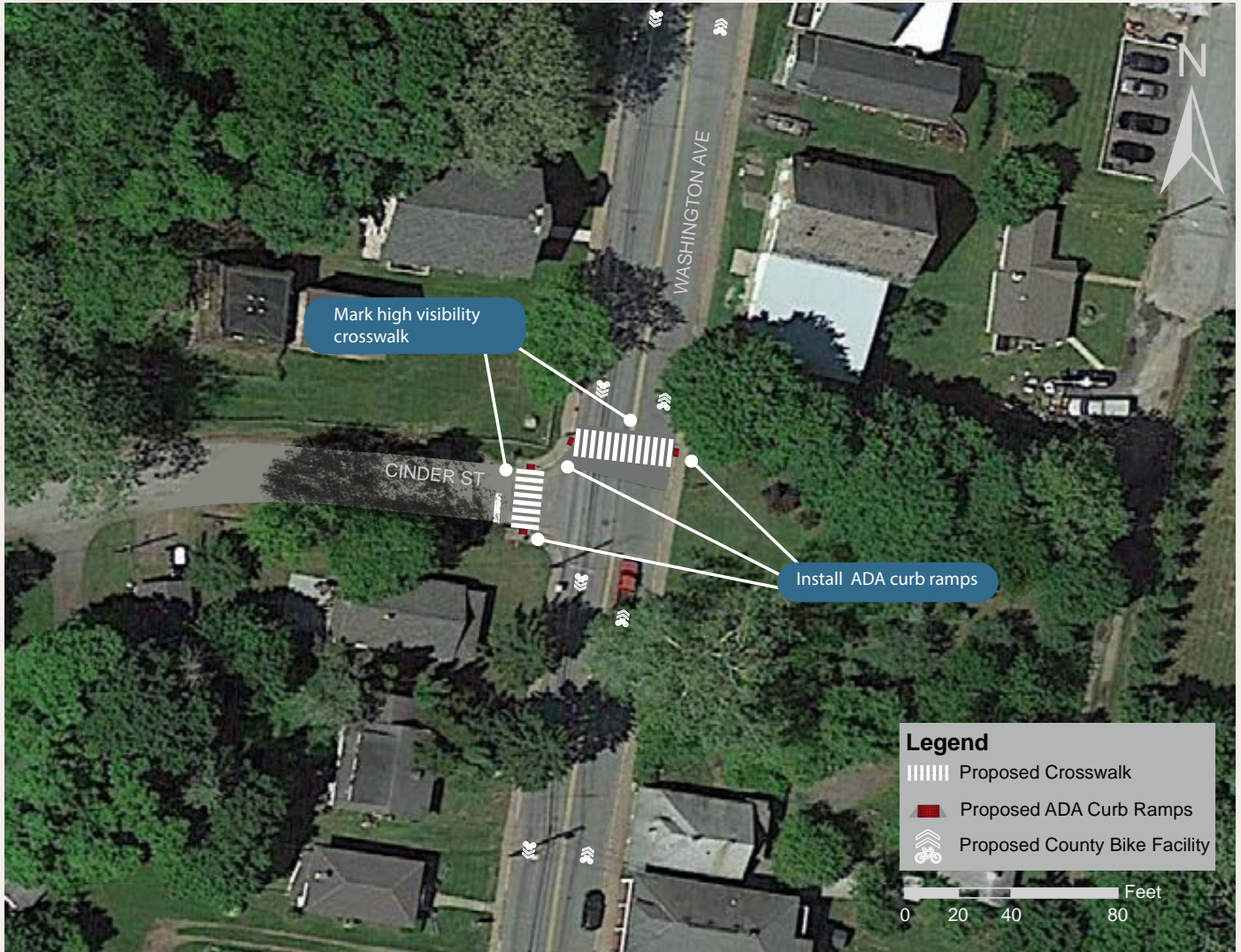


Recommendations

- Install curb extension on southwest, southeast and northeast corners
 - Upgrade existing crosswalk on south leg to high visibility and mark new high visibility crosswalk on the west leg, both with ADA curb ramps on either side improving pedestrian access to Shippen Manor Museum north of the intersection
 - In the long-term stripe new high visibility crosswalk on the north and east legs, both with ADA curb ramps on either side of Wall Street to improve pedestrian access to Shippen Manor Museum
 - In the long term, construct sidewalk on north side of Wall from Washington Ave to NJ 31
 - Install bike facilities between Oxford Bikeway and trail to Furnace Lake as per Warren County Plan
- Oxford Township Active Transportation Plan**



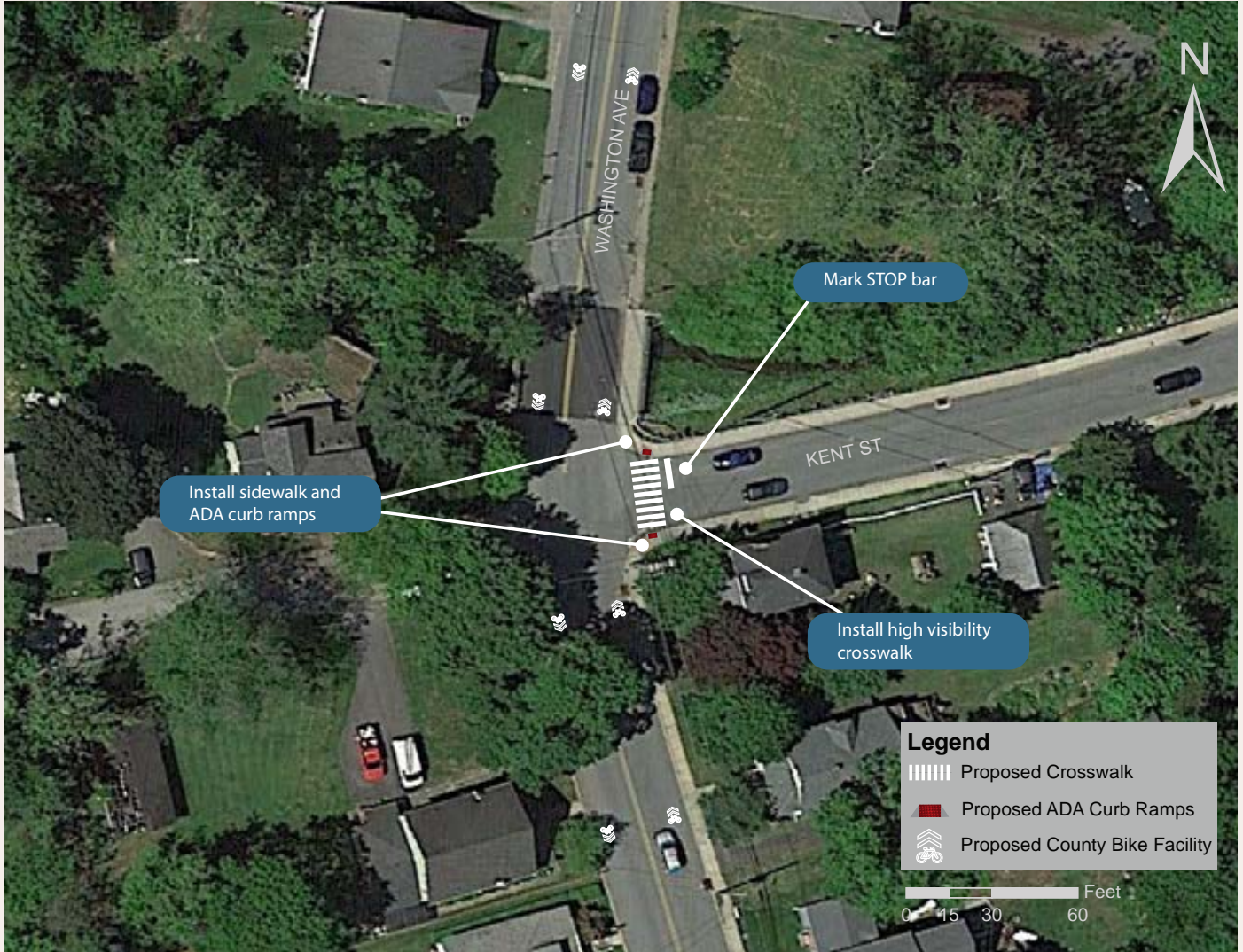
4 Washington Ave at Cinder St



Recommendations

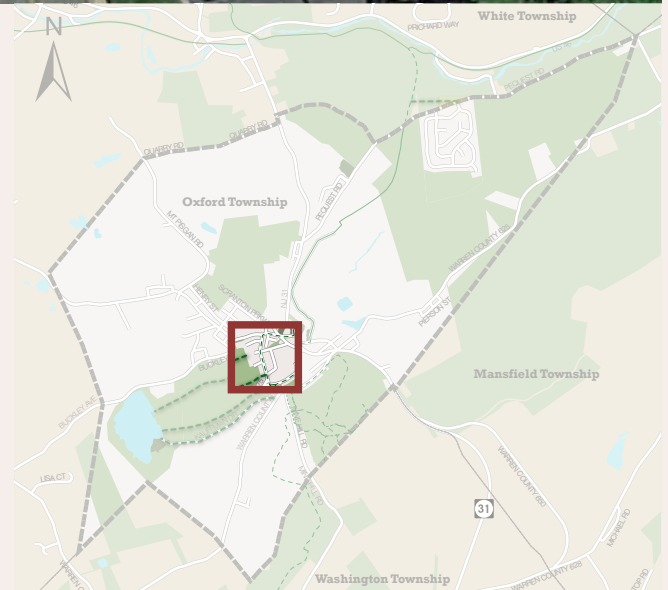
- Upgrade existing crosswalk on north leg of intersection to high visibility, and mark high visibility crosswalk on west leg improving pedestrian access to the library south of the intersection
- Install ADA curb ramps on both sides of proposed crosswalks
- Install bike facilities between Oxford Bikeway and trail to Furnace Lake as per Warren County Plan

5 Washington Ave at Kent St

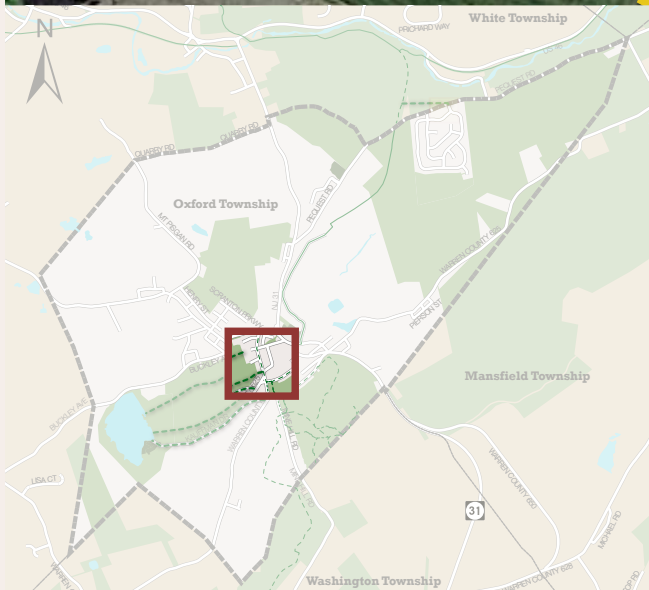
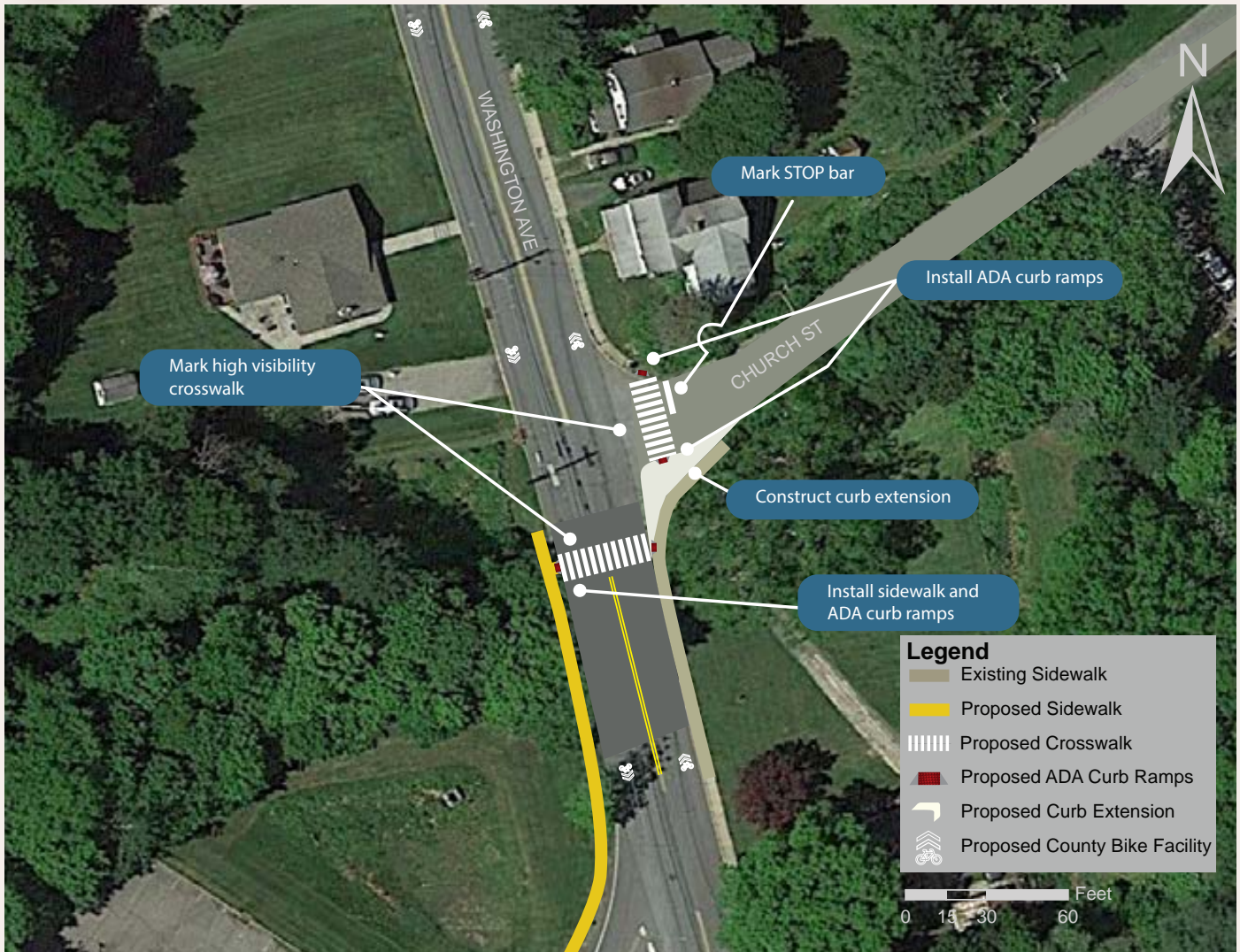


Recommendations

- Upgrade existing crosswalk on east leg of intersection to high visibility, promoting walking to the nearby Oxford Central School
- Install bike facilities between Oxford Bikeway and trail to Furnace Lake as per Warren County Plan



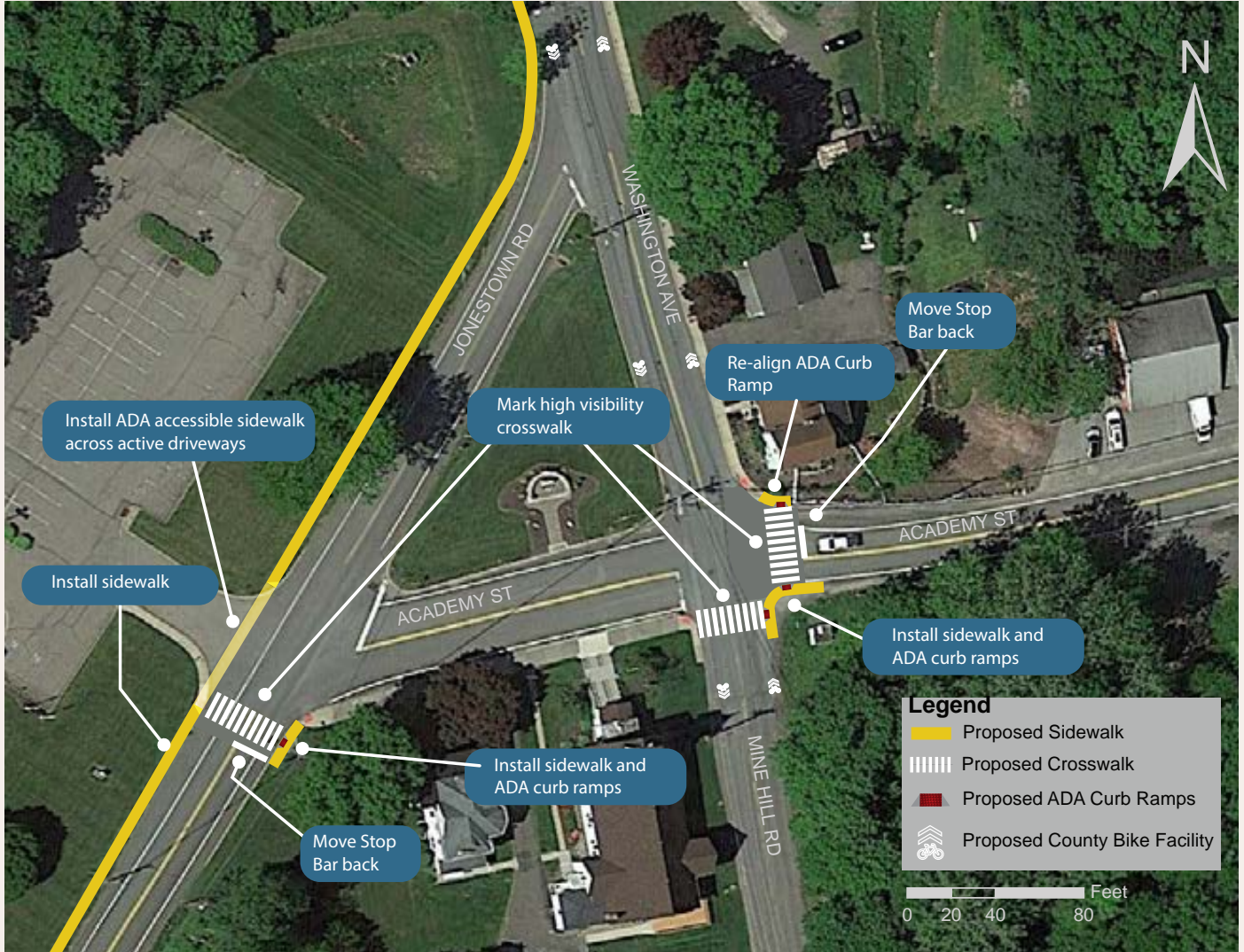
6 Washington Ave at Church St



Recommendations

- Install curb extension on southeast corner
- Install sidewalk along west curb of Washington Ave south from Church St to Kauffman Dr, improving pedestrian access to Furnace Lake Recreation Area and providing pedestrian connections north of Oxford Central School and the downtown
- Mark (2) high visibility crosswalks on south and east legs of intersection
- Install (4) ADA curb ramps on southwest, southeast, and northeast corners of intersections
- Install bike facilities between Oxford Bikeway and trail to Furnace Lake as per Warren County Plan

7 Washington Ave/ Mine Hill Rd at Academy St

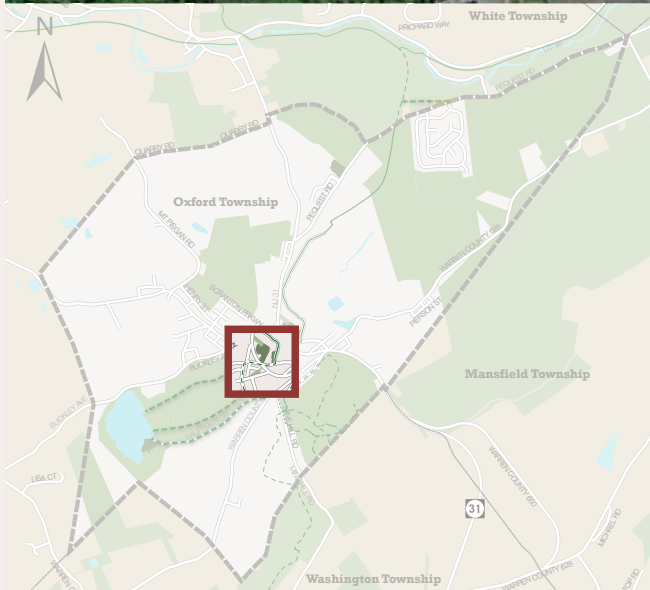


Recommendations

- Install sidewalks on west side of Jonestown Rd/ Washington Ave north to Church St, on northeast and southeast corners of intersection of Washington Ave at Academy St, and on southeast corner of Jonestown Rd at Academy St
- Install (4) new ADA curb ramps on new sidewalks at northeast and southeast corners of Washington Ave at Academy St, and southeast corners of Jonestown Rd at Academy St
- Move back (2) stop bars on westbound Academy St at Washington Ave and northbound Jonestown Rd at Academy St
- Mark (3) high visibility crosswalks on east and south legs of Washington Ave at Academy St, and south leg of Jonestown Rd at Academy St
- Install bike facilities between Oxford Bikeway and trail to Furnace Lake as per Warren County Plan



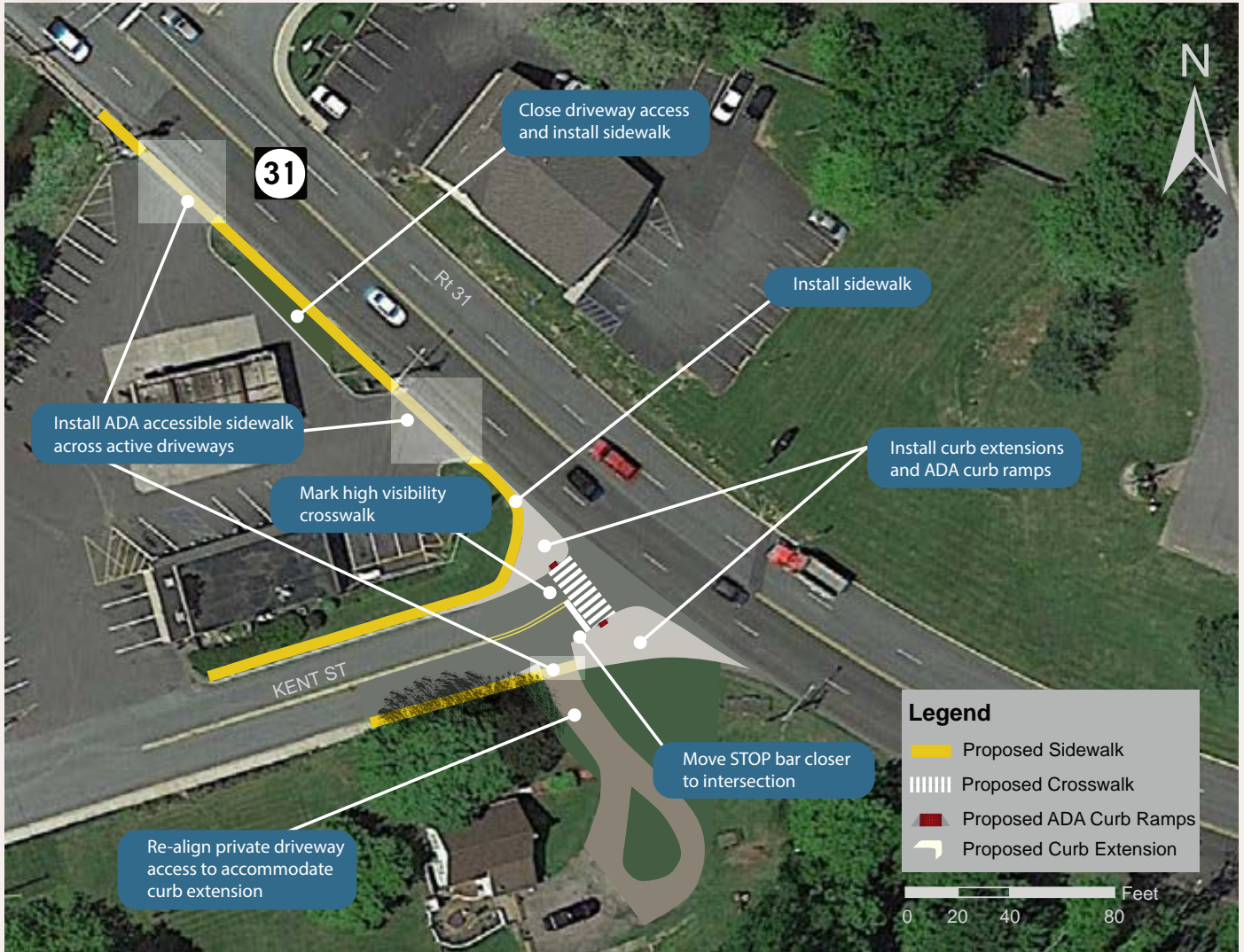
8 Kent St at Oxford Central School



Recommendations

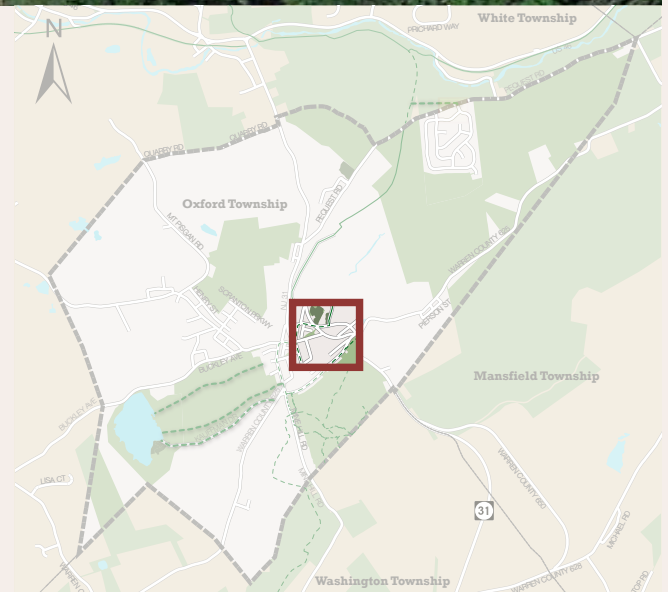
- Install high visibility crosswalk on Kent St between Oxford Central School and parking lot
- Upgrade existing curb cut in front of Oxford Central School parking lot to ADA accessible, and construct ADA curb ramp in front of Oxford Central School to parking lot

9 NJ 31 and Kent St

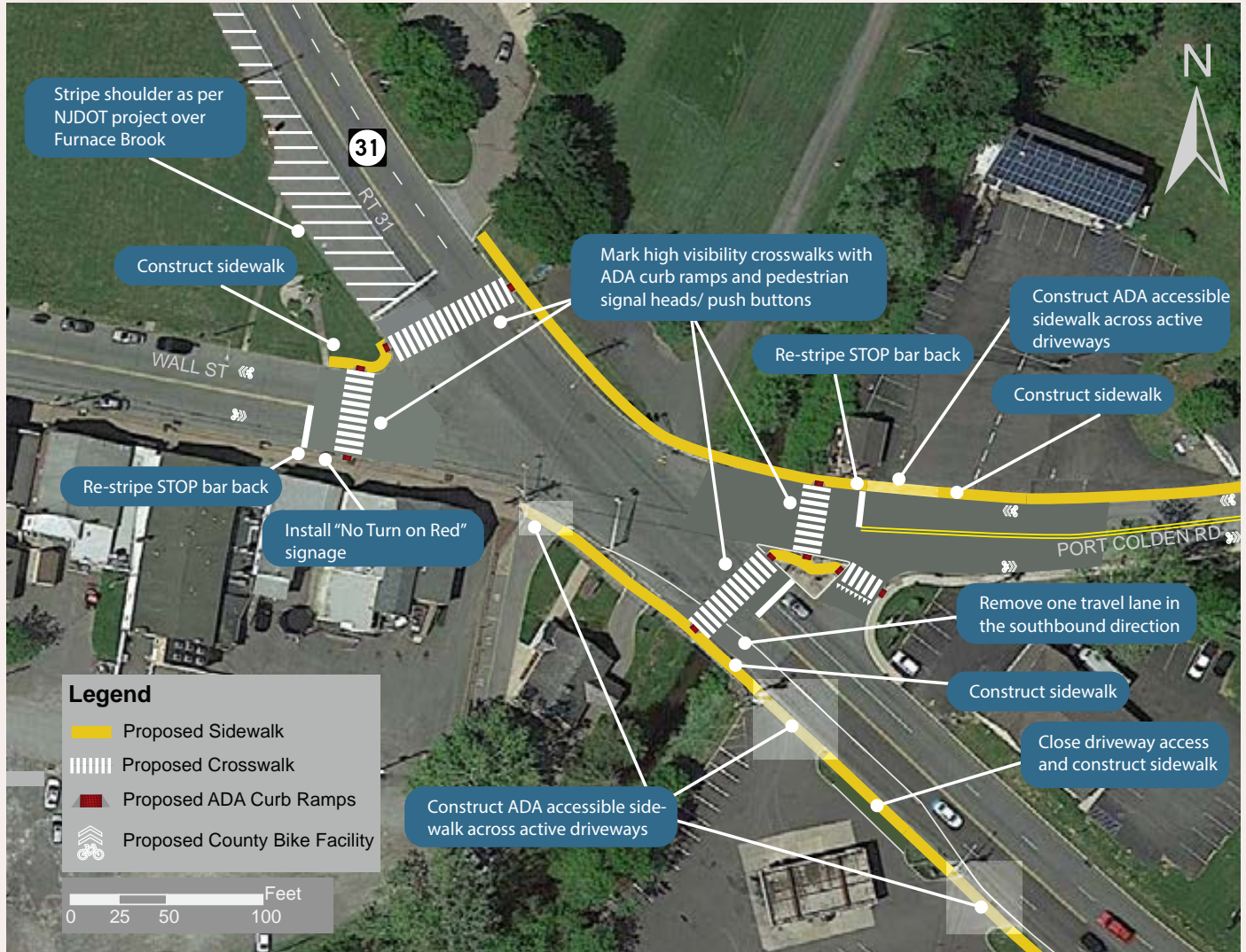


Recommendations

- Install sidewalk on west side of NJ 31 between Kent St and Wall St, and on north and south sides of Kent St, improving pedestrian access to Oxford Central School to the west
- Mark high visibility crosswalk across Kent St
- Install curb extensions on northwest and southwest corners of intersection, maintaining driveway access to home on Kent St
- Install ADA curb ramps on both sides of proposed crosswalk
- Close central driveway on NJ 31 to gas station and install pedestrian friendly sidewalk across other entrances on NJ 31

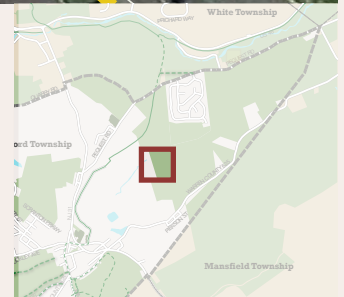


10 NJ 31 at Wall St/ Port Colden Rd

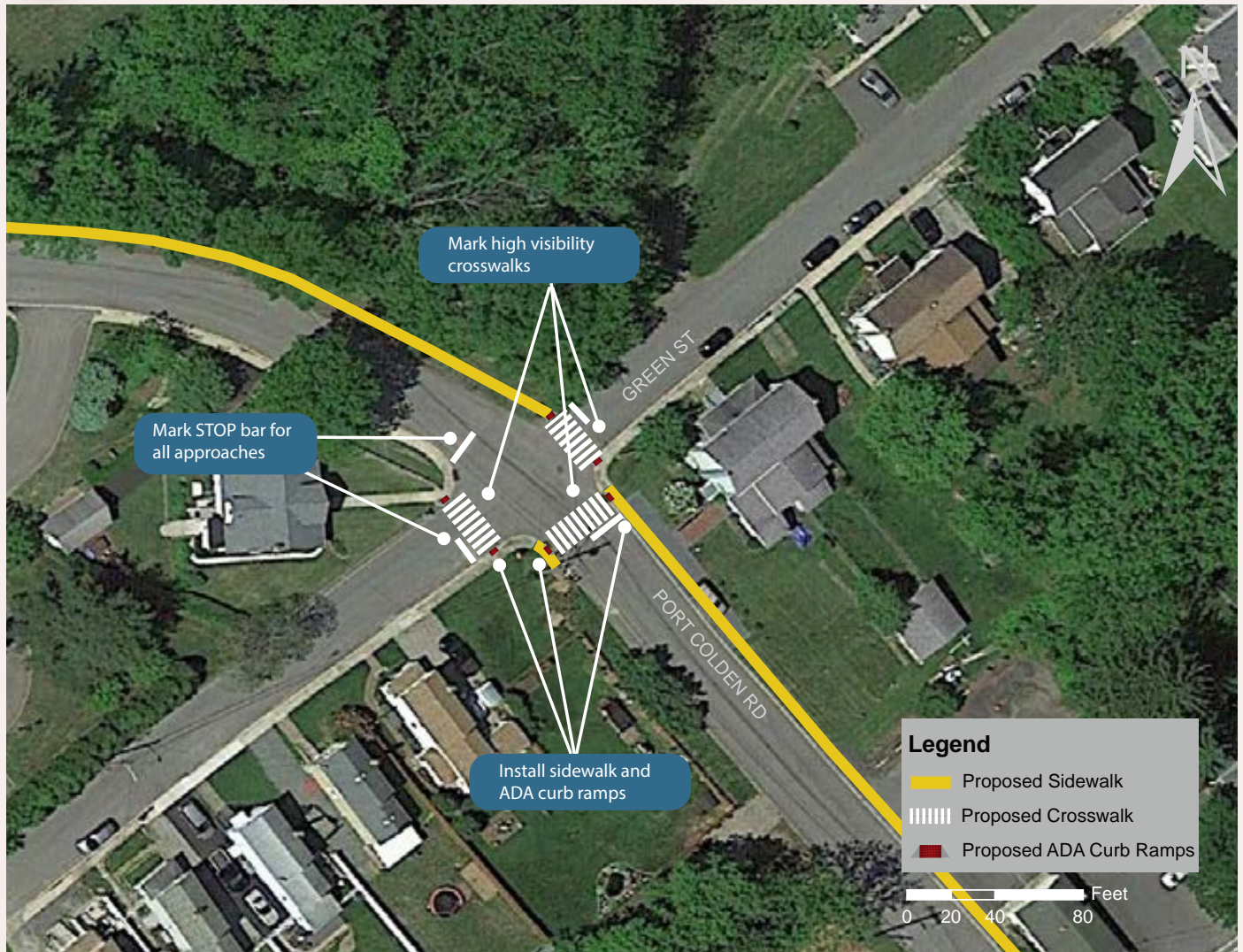


Recommendations

- Stripe channelized shoulder on NJ 31 north of Wall St
- Remove one travel lane on southbound NJ 31 south of intersection, as part of NJDOT Furnace Brook Project
- Install sidewalks on west side of NJ 31 between Wall St and Kent St, north side of Port Colden Rd eastward, northwest corner of intersection, west side of NJ 31 south to Kent St and on pedestrian refuge island on northbound NJ 31 at Port Colden Rd
- Restripe stop bar on eastbound lane of Wall St at NJ 31, and westbound lane of Port Colden Rd at NJ 31
- Upgrade existing crosswalks on north and south legs of NJ 31 to high visibility
- Mark new high visibility crosswalks on west leg of NJ 31 at Wall St, slip lane from northbound NJ 31 to eastbound Port Colden Rd, and east leg of Port Colden Rd at NJ 31
- Install (11) ADA curb ramps to connect all proposed sidewalks and curb ramps
- Install bike facilities between Oxford Bikeway and trail to Furnace Lake as per Warren County Plan
- Install “No Turn on Red” signage

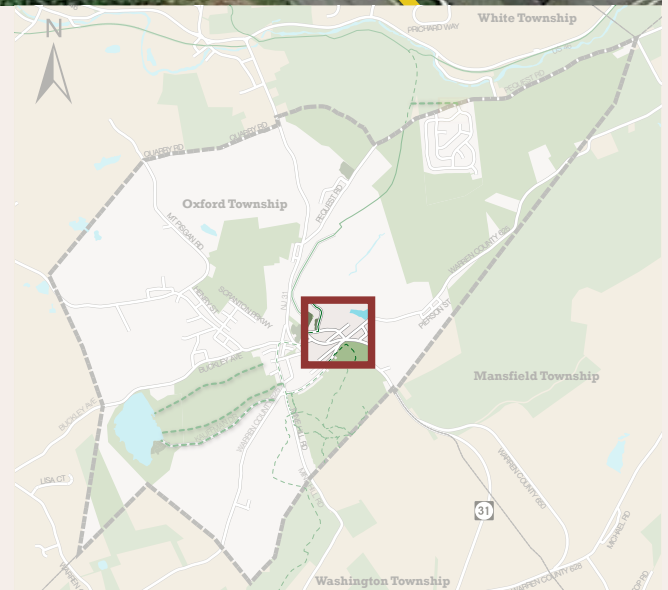


11 Port Colden Rd at Green St

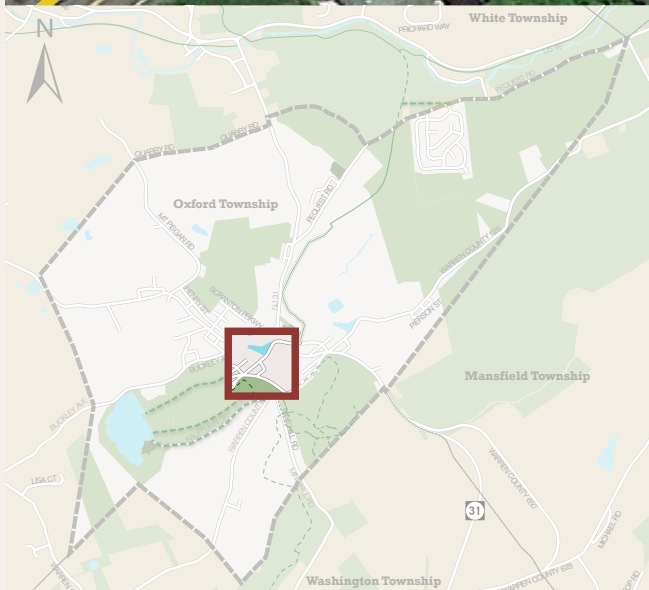
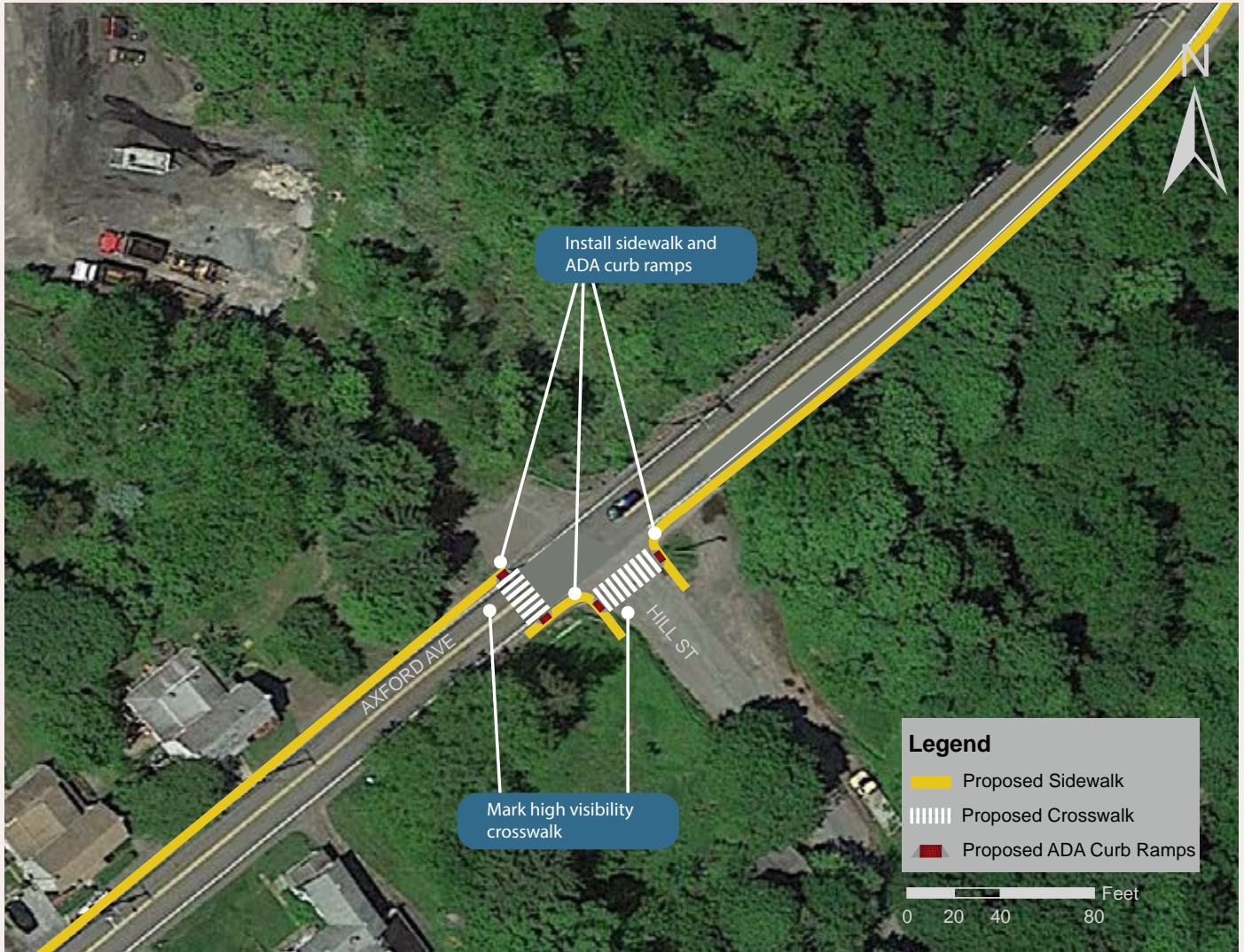


Recommendations

- Install sidewalk on east side of Port Colden Rd north and south to NJ 31, and southwest corner of intersection
- Install high visibility crosswalks on southwest, southeast, and northeast legs of intersection
- Install ADA curb ramps between proposed sidewalks



12 Axford Ave at Hill St



Recommendations

- Install sidewalks on west side of Axford Ave south of Hill St, east side of Axford Ave north of Hill St, and south corner of Axford Ave at Hill St
- Install high visibility crosswalks on south and east legs of intersection
- Install ADA curb ramps on both sides of proposed crosswalks



06 NEXT STEPS

The recommendations in this Plan provide a roadmap for improving walking and bicycling in Oxford Township. Prioritized and implemented over time, they outline a blend of infrastructure improvements and supportive policies and programs to help the Township realize its vision to “improve off-road connections between residential, commercial, and recreational uses in the town and provide a safe, accessible pedestrian network within the town center.”

The pedestrian and bicycle infrastructure improvements presented in Chapter 5 are intended to be conceptual in nature, and may require varying levels of design, survey, or further analysis, and/or coordination with residents, businesses, or other stakeholders, depending on the magnitude of the improvement. As the concepts advance through engineering design, they should reflect the current best practices and guidelines referenced in the previous chapters. The recommendations are summarized in an implementation matrix in Appendix A1, which also identifies a time-frame for the improvement (short/medium/long), potential implementation partners, and order-of-magnitude cost (where practical).

The Township should use this Plan to integrate additional improvement recommendations into

planned projects and identify and prioritize future projects. The Plan can also help bolster applications for grant funding to support implementation efforts.

Oxford should also work with NJDOT, NJTPA, and Warren County to help advance proposed improvements, leverage other projects, and identify resources and funding opportunities. Other entities, such as TransOptions TMA, may also be able to support non-infrastructure strategies, such as Safe Routes to School activities. Development activity provides another avenue for implementation, leveraging private investment to construct elements of the Plan and enhance bicycle and pedestrian mobility.

Finally, the Plan should be shared with neighboring municipalities to help inform and advance efforts to create a regional, interconnected bicycle network.



07 APPENDIX



A1 Implementation Matrix **78**

A2 Bicycle LTS Criteria **80**

Implementation Matrix

Implementation Matrix - Trails

Location	Treatment	Cost	Time Frame	Agencies
Pequest Road - trail crossings (2)	Stripe high-visibility crosswalks (2), install ADA-compliant curb ramps (4), install trail crossing signs, and install Rectangular Rapid Flashing Beacon (2 pairs)	\$32,800	Medium Term	County, Oxford Township, and White Township
Pequest Trail Connection	Shared Use Path including Trail Crossings (2)	\$127,700	Medium Term	NJDEP, County, Oxford Township, White Township, Jersey Central Power and Light Co.
Kauffman Drive Trail Alternative	Construct Shared Use Path	\$165,400	Medium Term	NJDEP, County, Oxford Township
Church Street Trail Alternative	Construct Shared Use Path	\$161,500	Medium Term	NJDEP, County, Oxford Township
Kent Street Trail Alternative	Construct Shared Use Path	\$155,600	Medium Term	NJDEP, County, Oxford Township

Implementation Matrix- Bike Parking Locations

Location
Oxford Township Municipal Building
USPS Post Office on James Burns Drive
Downtown Oxford on Wall Street
Kent Street at Oxford Central School
Oxford Public Library on Washington Ave (CR 625)
Oxford Furnace on Washington Ave (CR 625)
Shippen Manor
Jonestown Road (CR 625) at Kauffman Drive
Furnace Lake Recreation Area

Implementation Matrix - Intersections

#	Intersection Location	Treatment	Cost	Time Frame	Agencies
1	Belvidere Ave (CR 624) at Lincoln Ave	Stripe high-visibility crosswalks (2), install ADA-compliant curb ramps (4), and stripe STOP bars (2)	\$5,900	Short Term	County, Township
2	Belvidere Ave (CR 625) at Buckley Ave	Stripe high-visibility crosswalks, install ADA-compliant curb ramps (2), and stripe STOP bar Construct Curb Extension	\$3,100 \$12,000	Short Term Medium Term	County, Township
3	Belvidere Ave (CR 624) at Washington Ave (CR 625)	Stripe high-visibility crosswalks (3), install ADA-compliant curb ramps (6), and stripe STOP bar Construct Curb Extensions (3)	\$6,700 \$24,000	Short Term Medium Term	County, Township
4	Washington Ave (CR 625) at Cinder St	Stripe high-visibility crosswalks (2), install ADA-compliant curb ramps (4), and stripe STOP bar	\$4,600	Short Term	County, Township
5	Washington Ave (CR 625) at Kent St	Stripe high-visibility crosswalk, install ADA-compliant curb ramps (2), and stripe STOP bar	\$2,400	Short Term	County, Township
6	Washington Ave (CR 625) at Church St	Construct Sidewalk, Stripe high-visibility crosswalks (2), install ADA-compliant curb ramps (4), and stripe STOP bar Construct Curb Extension	\$11,400 \$12,000	Short Term Medium Term	County, Township
7	Washington Ave (CR 625)/ Mine Hill Rd at Academy St	Construct Sidewalk, Stripe high-visibility crosswalks (3), install ADA-compliant curb ramps (4), and stripe STOP bars (2)	\$29,100	Short Term	County, Township
8	Kent St at Oxford Central School	Stripe high-visibility crosswalk and install ADA-compliant curb ramps (2)	\$2,300	Short Term	Township
9	NJ 31 at Kent St	Construct Sidewalk, Stripe high-visibility crosswalk, install ADA-compliant curb ramps (2), and stripe STOP bar Construct Curb Extensions (2)	\$16,300 \$24,000	Short Term Medium Term	NJDOT , County, Township
10	NJ 31 at Wall St/ Port Colden Rd	Construct Sidewalk, Stripe high-visibility crosswalks (5), install ADA-compliant curb ramps (10), and stripe STOP bars (3)	\$43,100	Short Term	NJDOT , County, Township
11	Port Colden Rd at Green St	Construct Sidewalk, Stripe high-visibility crosswalks (2), install ADA-compliant curb ramps (4), and stripe STOP bars (4)	\$14,500	Short Term	Township
12	Axford Ave at Hill St	Construct Sidewalk, Stripe high-visibility crosswalks (2), and install ADA-compliant curb ramps (4) Construct Sidewalks (4)	\$4,700 \$34,200	Short Term Medium Term	Township

Bicycle LTS Criteria

Criteria for Level of Stress in Mixed Traffic

Posted Speed Limit	Street Width		
	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
Up to 25 mph 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

Speed Limit of Street Being Crossed	Width of Street Being Crossed		
	2-3 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

Criteria for Bike Lanes Alongside a Parking Lane

	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Street width (through lanes per direction)	2	(no effect)	4 or more	(no effect)
Sum of bike lane and parking lane width (includes marked buffer and paved gutter)	15 ft. or more	14 ft.	13.5 ft or less	(no effect)
Speed limit or prevailing speed	25 mph or less	30 mph	35 mph	40 mph or more
Bike lane blockage (typically applies in commercial areas)	rare	(no effect)	frequent	(no effect)

Note: (no effect) = factor does not trigger an increase to this level of traffic stress

Criteria for Bike Lanes Not Alongside a Parking Lane

	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Street width (through lanes per direction)	2	4, if directions are separated by a raised median	5, or 4 without a separating median	(no effect)
Bike lane width (includes marked buffer and paved gutter)	6 ft. or more	5.5 ft. or less	(no effect)	(no effect)
Speed limit or prevailing speed	30 mph or less	(no effect)	35 mph	40 mph or more
Bike lane blockage may apply in commercial areas)	rare	(no effect)	frequent	(no effect)

Note: (no effect) = factor does not trigger an increase to this level of traffic stress

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

Volume Adjustment

Volume Threshold	Min. LTS
-	1
5,000	2
10,000	3
15,000	4

