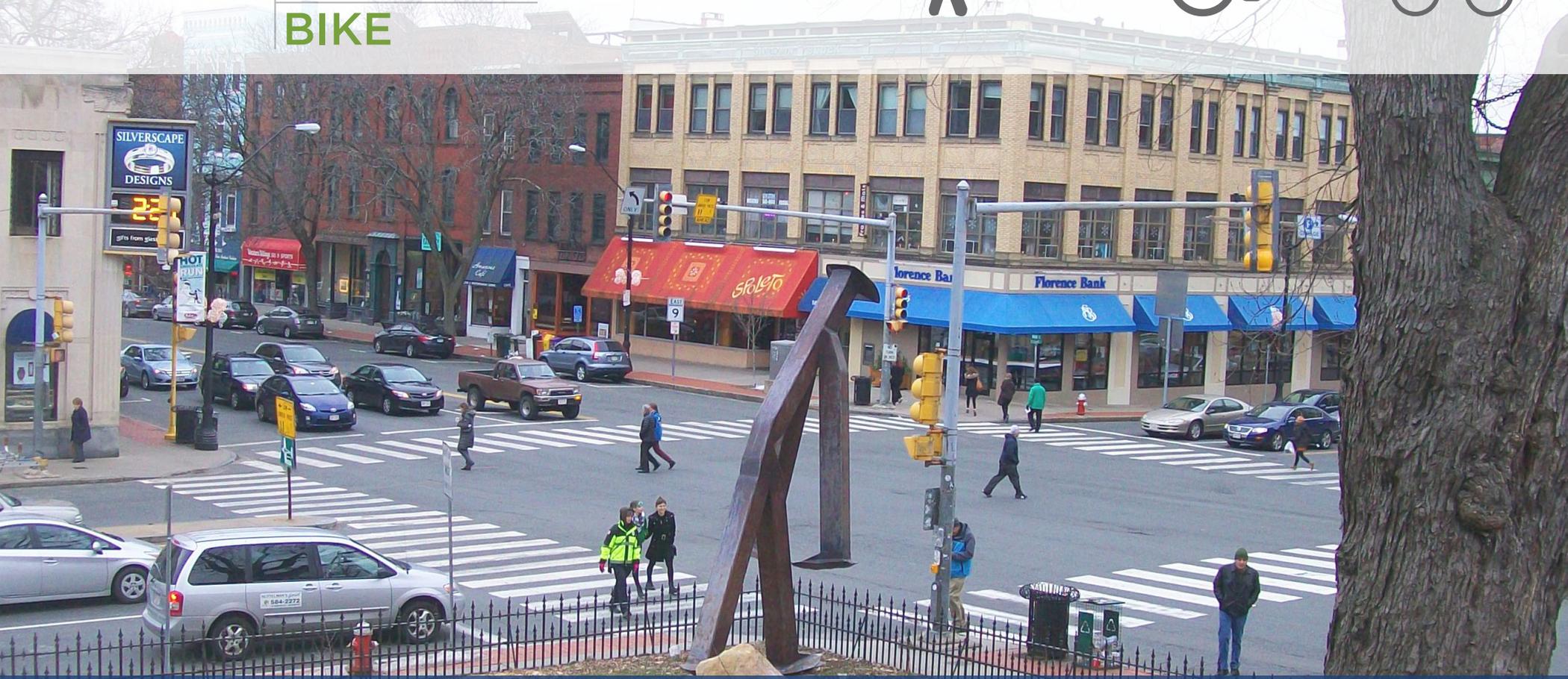


DRAFT

WALK

NORTHAMPTON

BIKE



PEDESTRIAN & BICYCLE COMPREHENSIVE PLAN



OCTOBER

2016

PREPARED FOR THE CITY OF NORTHAMPTON BY
ALTA PLANNING + DESIGN WITH WATSON ACTIVE



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CHAPTER ONE

EXISTING CONDITIONS



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1. EXISTING CONDITIONS

Introduction

This chapter includes summaries of pertinent existing studies, reports and policies that will inform the plan's future infrastructure, program and policy recommendations. In addition, it provides an assessment of current walking and bicycling conditions, including gaps in the walking and bicycling network. Other maps show transit routes in Northampton, as well as traffic volumes on key streets. A combination of GIS-based data, field work, and input from the City's Project Advisory Committee was used to develop the analysis. The City's Bicycle and Pedestrian Subcommittee served as the project advisory committee. The map analysis was be used to create recommendations for an integrated network of sidewalks, crosswalks, enhanced intersections, rail trail improvements and on-street bicycle facilities presented in Chapter 2.

Plans, Reports & Policies

The following section contains a synopsis of six reports that rely on common themes of creating a safer and more pleasant streetscape

environment for the citizens and visitors of Northampton. The reports include a Wayfinding Pilot Program, Walk/Bike Assessment, Parking Management Study, Feasibility Study for Regional Bike Share, Open Space and Recreation / Multi-Use Trail Plan, and the Sustainable Northampton Comprehensive Plan. In each of the reports, common themes of adding appropriate signage for pedestrians, motorists, and cyclists, reducing motor vehicle congestion downtown, increasing the ability, safety, and comfort of cyclists and pedestrians on sidewalks, roads, and crosswalks, providing safe access to rail trail corridors. The Bike Share Feasibility Study recommends introducing a regional Bike Share system in key locations through-out the city and extending into the Pioneer Valley. The Open Space plan has been adopted by 10 municipal boards and provides a blueprint for the long term development and infrastructural upgrades in the future, including providing sidewalks within a mile of all schools and creating a detailed map available to the public of the City's existing and planned bicycle network.



2. ADOPTED PLANS, REPORTS & POLICIES

2.1 Summary of Adopted Plans + Reports

Wayfinding Pilot Program for Enhanced Walking Connections (Winter-Spring, 2016)

Prepared For: City of Northampton

Plan Overview: Boston-based Pedestrian advocacy and consulting group WalkBoston worked with City’s Office of Planning and Sustainability on a pilot pedestrian wayfinding program designed to encourage utilitarian walking and to show how quickly one can reach a destination on foot. Signs were placed at specific locations along the Northampton’s rail trails to indicate the amount of time (in minutes) it takes to walk or to bike to key destinations in the downtown area, and to other locations along the rail trails (schools, commercial centers, housing, etc.). The signs are metal and affixed to existing kiosks or posts.

The project was funded by the MA Department of Public Health through 1422 – which is related to the Mass in Motion program.

Key Findings and Recommendations: Ongoing

Northampton Walk / Bike Assessment: Main Street, Northampton, MA (January 2016)

Prepared for: Massachusetts Department of Transportation Bicycle and Pedestrian Safety Awareness and Enforcement Program

Prepared by: Toole Design Group, WalkBoston, MassBike

Plan Overview: Northampton is one of 18 communities participating in MassDOT multi-disciplined program to improve bicycle and pedestrian safety in Massachusetts. A component of the program is to conduct walk and bike assessments, identify challenges, and make short and long-term recommendations. For this effort, WalkBoston, MassBike and Toole Design Group conducted the assessment of pedestrian and bicycle



Walk/Bike Assessment
Main Street
Northampton, MA
January 18, 2016

Prepared for the Massachusetts Department of Transportation Bicycle and Pedestrian Safety Awareness and Enforcement Program

infrastructure along Main Street (Route 9) in October 2015. Overall, the team found that pedestrian and bicycle movement along Main Street is compromised by the width of the roadway, multiple undefined travel lanes, poor sight lines adjacent to parked cars, long crosswalks, complex intersections and head-in angled parking (for bicyclists). Of note is that there have been several crashes involving pedestrians and bicyclists along the corridor, including one fatality.

Key Findings and Recommendations:

General Improvements:

- Reroute truck traffic on a different route to bypass Main Street through downtown
- Reconfigure the roadway width and, in places, geometry of travel lanes to provide a safer and more-coherent environment for pedestrians and bicyclists

Pedestrian Improvements:

- Narrow Main Street to shorten crossing distances by installing curb extensions and refuge islands, install bike lanes
- Remove parking within 20 ft. of crosswalks
- Evaluate signal timing for consistency and accessibility (including count-down timers)
- Enforce ordinances to keep sidewalks clear of intrusions into the pedestrian thru-zone
- Upgrade curb ramps and install detectable warning strips

Bicycle Improvements:

- Install bike facilities along Main Street (with both short and longer term options), ideally separated from motor vehicle traffic
- Install bike parking and way-finding signage

More detailed recommendations were provided at the following intersections:

- Elm/West/State/New South intersection
- Cracker Barrel Alley/Crafts Ave intersection
- Old South Street to Gothic Street segment
- King/Pleasant Street intersections
- Main/Crackerbarrel Alley: converting the latter to 'pedestrian only' would have little impact on access to the parking lot but reduce one significant conflict point

Parking Management Study, Downtown

Northampton, MA (April 2015)

Prepared for: City of Northampton.

Plan Overview: Although downtown is pedestrian oriented, the combination of newly planned developments and the ongoing presence of motor vehicles and the ability to meet parking demand is important to the success of downtown businesses. The three elements of this plan are: (1) to determine how parking is being utilized now and whether there is capacity to accommodate current needs. (2) To project the impact of future development on the parking system. (3) To review the City's parking management approach and offer recommendations for improvements.

Key Findings and Recommendations:

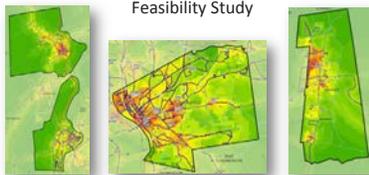
- Slowly increase price of parking on Main Street over time, from \$0.75/hr today to \$1.50/hr over the next few years
- Allow two-hour parking on Main Street, install signage prohibiting "re-parking" or exceeding the maximum
- Delay meter enforcement start times until 9:00am, allow three-hour parking in Armory Lot
- As single-space meters require replacement, consider upgrading to accept credit cards or pay-by-plate
- Retain a signage and graphics consultant to improve wayfinding to better facilitate access to the parking lots by car and on foot



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Regional Bike Share in the Pioneer Valley



Feasibility Study



- Explore feasibility of a parking app, a valet service for downtown businesses, and an inexpensive permit in peripheral lots for students of downtown trade schools
- To encourage turnover, step-up enforcement of meter violations

Feasibility Study for Regional Bike Share in the Pioneer Valley (March, 2015)

Prepared For: Pioneer Valley Planning Commission in collaboration with the Bike Share Feasibility Study Advisory Committee and municipalities of Northampton, Amherst, Holyoke and Springfield.

Plan Overview: From the report: “The Pioneer Valley region and its member communities are committed to creating more livable communities and downtowns, as well as reducing single occupancy vehicle trips and the resulting air pollution and greenhouse gas emissions. The region is working to increase alternative modes of transportation, including expanding infrastructure for biking, walking, bus and rail service. The region is also seeking to establish commuter rail service along the north-south Amtrak rail line serving Springfield, Holyoke and Northampton, and a bike share program could provide a complementary ‘last mile’ component to this service.” The Feasibility Study has been supplemented by a follow-up report in 2015-16 by Alta Planning + Design. The report includes more-detailed recommendations for a business model, recommended equipment, cost estimates over a 5-year period, a phasing plan for deployment and preliminary site plans for four bike share stations in each of the four municipalities that are part of PVPC’s study.

Key Findings and Recommendations:

- Systems should serve as an extension of public transit, and station phasing is important
- Casual riders are important; daily, weekly, and monthly users comprise a significant factor of overall ridership. Locate stations near major tourism destinations.

- Operating 3 seasons / year minimizes snow-removal issues.
- Implement a pricing structure that allows for multi-hour rentals. This allows built-in flexibility for recreational trips where a user would want to rent a bike for more than one hour without paying additional fees.
- Smart-lock or non-kiosk based systems greatly reduce the up front and maintenance costs of system operation. Continue to monitor the success of the Phoenix, AZ bike share program to evaluate whether a public non-kiosk system would be practical for the Pioneer Valley.
- Provide discounted student memberships. Targeting the large student population for use of the bike share system will help increase its overall use, and many students who do not reside in Northampton during the summer months will have trouble justifying the membership fee for a 3-season system.
- Explore alternatives to credit card requirements. Credit-card requirements are common in order to prevent theft or vandalism to the bicycles, but present a major barrier to participation among low-income residents or those who do not have a credit card.
- Partner with other organizations to expand service to low-income individuals and locate stations in areas that have affordable housing and disproportionately low rates of bicycling. Financial assistance should be offered to low-income individuals seeking a membership.
- Explore feasibility of integrating fare payment with PVTA payment system to increase convenience of using both systems.



Open Space, Recreation & Multi-Use Trail Plan (2011)

Prepared For: City of Northampton.

Plan Overview: From the report: “The plan provides guidance on how the City of Northampton can best use limited resources to meet the City’s open space, agriculture, conservation, multi-use trail, and recreation needs.” The City engaged public participation and has received the endorsement of 10 municipal boards to adopt this plan in an effort to meet the needs of citizens and become one the most sustainable cities in Massachusetts.

Key Findings and Recommendations (within 13 broad categories of open space, recreation, and multi-use trail actions):

- Reclaim pavement for parks as appropriate. Report acknowledges that while “few sites are appropriate”, the effect on those sites can be dramatic. Potential sites include: Historic Mill River mixed-use development and park at Pleasant Street / Hockanum Rd., an urban park along Main St. / Crafts Ave in front of City Hall, and at historically filled wetland sites in the Montview neighborhood and the Industrial Dr. traffic circle area.
- Maintain well-managed conservation areas to preserve natural systems and make areas available for visitors, including those with disabilities
- Identify places for fishing, hunting, snowmobiling, off-road vehicles, horseback riding, and mountain biking
- Acquire conservation areas to enhance neighborhoods and urban areas
- Develop a Connecticut River Boathouse
- **Connect the MassCentral / Norwottuck Rail Trail gap between Woodmont Road and King Street (funded)**
- **Extend the Connecticut River Greenway Trail 1.3 miles to Hatfield**
- **Utilize Village Hill development to extend a trail around the north edge of the campus**
- **A staircase ramp from the MassCentral / Norwottuck Rail Trail to Look Restaurant**

- **A ramp from the MassCentral / Norwottuck Rail Trail to the VA Hospital signal (develop a VA Park & Ride lot)**
- **A spur from JFK Middle School to Morningside Drive**
- **An access ramp in Haydenville to provide a northerly terminus of the MassCentral / Norwottuck Rail Trail**
- Develop a park at the triangle formed between Wright Avenue, Hockanum Road, and Pleasant St.
- **Develop a very small park in front of City Hall by reclaiming some land from Main Street and Crafts Avenue (which are unsafe for pedestrians as they are too wide)**
- Handicap Accessibility along the Nagel Walkway downtown
- The development of a handicap accessible ramp near the Jackson Street School to connect with existing rail trail (complete)
- Future projects should take environmental and cultural uniqueness into account, providing locations for specific activity within open spaces. For example, Northampton has a significant Hispanic population, so park designs should allocate space for traditional Mexican, South American, and Puerto Rican recreation.

“Develop more multi-use trails, bike paths, bike lanes, bike routes and bike linkages to provide access to active and passive recreation and to create a healthy lifestyle and provide an alternative to single-occupancy vehicles.”

- From part 7, Analysis of Needs: Resource Protection, Community, and Management Needs, # 16

Sustainable Northampton Comprehensive Plan (January, 2008)

Prepared For: City of Northampton

Plan Overview: A comprehensive planning effort intended to “ensure the city can continue to meet its current and ongoing environmental, social and economic needs without compromising the future for succeeding generations.” It is also intended to provide a blueprint for long-term infrastructure and development projects within the city. Ultimately, the goals, objectives, and recommendations sections found in the Walk/Bike Northampton report will become a new chapter within the Sustainable Northampton Comprehensive Plan.



SUSTAINABLE NORTHAMPTON
Comprehensive Plan, January 2008

Key Findings and Recommendations:

- Ensure the safe and efficient transportation of goods and people by motor vehicles, bicycle, foot, and any other means
- Maintain an efficient transportation system that reduces air pollution and minimizes congestion
- Reduce use of single occupancy vehicles
- Ensure that safety is a primary goal in transportation improvements, to reduce crashes and ensure that all modes of traffic are safe and attractive to all users on all roads
- Ensure that the needs of transit services, bicycle, pedestrian, and wheelchairs are considered in every project affecting the transportation system
- When designing for truck movements, utilize mountable curbs, pedestrian islands, raised pedestrian crossings, and alternate truck routes where feasible
- Ensure that all new traffic signals incorporate audible pedestrian signals, and create a prioritized list of existing traffic signals where pedestrian signals are desired
- Examine all unsafe intersections, areas of excessive speeds, and areas where neighborhoods perceive a loss of quality of life to consider traffic calming efforts, ensure that the design of all new and reconstructed streets considers incorporating appropriate traffic calming measures
- Provide sidewalks on all roads within one mile of all schools
- Improve circulation system to accommodate development and encourage bicycle and pedestrian transit
- Ensure pedestrian, bicycle, non-motorized travel, and transit are addressed in every development project
- Replace all catch basin covers that are not bicycle-friendly
- Develop a citywide bicycle system including existing and planned off-road bicycle paths, on road-bike lanes, and safe on-road bike routes. On-road bike routes and lanes that provide direct access to the growing rail-trail network and to urban core areas should receive a high priority. The system should include supporting

services, such as signage, bicycle storage, and bicycle system maps and information.

- Provide appropriate bicycle and vehicle parking to support local businesses

Main Street and King Street Transportation

Charrette (March 2011)

Prepared For: City of Northampton

Prepared By: Nelson / Nygaard

Plan Overview: In 2011, a 3-day design charrette worked to identify issues and opportunities along the Main St. and King St. corridors in Northampton. The impetus for this study was Northampton's desire to enhance the bicycle and pedestrian environments without decreasing the vehicle throughput, as well as preserve or improve access to downtown businesses.

Key Findings and Recommendations:

- Critical issues identified: 1) over-designed 4-lane cross sections, 2) large intersections, 3) inhospitable bicycling environment. An over-designed street is defined as one that is "over-scaled as compared to the needs of traffic volumes and adjacent land uses. The cross-section of these roads is too wide, allowing cars to travel at excessive speeds and creating unsafe conditions for bicyclists and pedestrians."
- Lowering speeds through a road-diet identified as critical solution during charrette
- Studies referenced that show a direct correlation between street width and rate of injury in collisions, "with a very steep upward curve for streets wider than 44 feet."
- Shrinking the intersection size and width with compact design treatments have a number of benefits: "reducing vehicle speeds, particularly at the end of signal phases; less wasted space, especially where right-turn lanes are poorly utilized today; stretching of vehicle queues away from

multiple approach lanes linearly towards mid-block areas, with no additional vehicle delay; far more frequent pedestrian crossing phases, which are also longer in duration; significantly shorter crossing distances that reduce the barrier of intersections like Main & King; and more predictable driver and bicyclists expectations through clearly channelized movements.”

- Long street widths and large intersections create “very long crossing distances for pedestrians, putting them in the path of cars for a long period of time.”
- Large intersections result in additional time required for each car to pass through, reducing the number of cars that can pass through in each signal cycle.
- Pull-in angled parking spaces on Main St. limit drivers’ field of view when backing out
- Additional connections are needed in places where bicycle facilities do exist but are lost at street crossings and intersections
- There is a general lack of quality bicycle parking in Northampton
- Solutions offered include road diets of four lanes to two lanes, shared bicycle boulevard style treatments, reverse angled parking on Main St., raised crossings on slip lanes, a textured crossing plaza in front of City Hall, curb extensions, new sidewalks under rail trail crossing, and widened sidewalks elsewhere

Main St. / State St. / Elm St. / West St. / New South St. Preliminary Intersection Design (July 2010)

Prepared For: City of Northampton

Prepared By: Nelson / Nygaard

Plan Overview:

In 2011, the city of Northampton brought in Nelson Nygaard to analyze the State / Main / New South intersection and to develop recommendations for redesigning the intersection to better accommodate traffic flow and pedestrian and bicycle safety. Their work resulted in three alternative options, including:

Alternative A:

- Right turn “boulder style” slip lanes
- New NB left-turn lane
- Single EB through lane
- Lengthened storage
- New on-street parking

Alternative B:

- Right turn “Boulder style” slip lanes
- New NB left-turn lane
- Single EB through lane
- Lengthened storage
- New on-street parking
- Two EB receiving lanes retained
- No northwest curb extension on Main St.

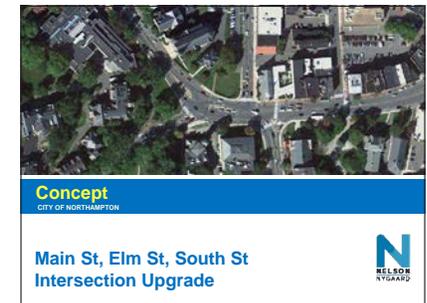
Alternative C:

- Right turn “Boulder style” slip lanes
- New NB left-turn lane
- Two EB through lanes
- Lengthened storage
- Two EB receiving lanes retained
- No northwest curb extension on Main

After the completion of the three design options the city of Northampton then decided to hold back on moving forward with final design due to issues related to truck turning movements and to await the recommendations on the redesign of Main St developed during this Walk Bike Northampton effort.

“Develop more multi-use trails, bike paths, bike lanes, bike routes and bike linkages to provide access to active and passive recreation and to create a healthy lifestyle and provide an alternative to single-occupancy vehicles.”

- From part 7, Analysis of Needs: Resource Protection, Community, and Management Needs, # 16



2.2 Review of Current Policies

Zoning Ordinances (includes site plan review)

Prepared by: City of Northampton

Policy/Program Overview: Chapter 350 of the Code of Ordinances of the City of Northampton governs zoning in the City. Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

Defines short- and long-term bicycle parking (§350-2.1 General).

Defines “cycle track”, a physically separated bicycle facility (§350-2.1 General).

Important note: Definition of “motor vehicle” could potentially apply to and limit use of electric-assist bicycles (“e-bikes”) (§350-2.1 General).

Prohibits obstruction of sightlines at intersections and driveways (§350-6.8 Other general dimensional and density provisions).

Sets minimum vehicle parking space requirements for different types of structures and uses, based primarily on square footage, with residential caps but no caps for businesses or institutions (§350-8.1 Off-Street parking requirements).

- Businesses can reduce parking up to 20% with an employee trip-reduction plan (§350-8.6 Shared parking)
- In the Central Business District, can meet parking requirement by paying \$2,000 per parking space into Downtown Parking Reserve Account (§350-8.10 Special provisions in Central Business District for meeting off-street parking requirements). This only applies to very few uses (places of assembly). For the majority of the

Central Business District uses there are no parking requirements.

Bicycle parking required for “any new building, addition or enlargement of existing building, or, except for in the Central Business District, for any change in the use of a building” (§350-8.11 Bicycle parking).

- Based on number of units for dwellings, square footage for businesses, number of classrooms for schools.
- 50% long-term bicycle parking required for residential, hotel, motel, bed & breakfast
- Refers to Northampton Bicycle Parking Guide for graphics and examples.
- Important note: There are inconsistencies in the requirements and specifications between the bike parking ordinance and the bike parking guide. (Bike parking guide is not regulatory.)
- Questions: Look at alternative formulations for bike parking requirements, and provision of end-of-trip facilities (showers and lockers).

Specifies site plan requirements (§350-11.5 Procedures)

- Requires estimated vehicle (but not bicycle or pedestrian) trip data.
- Traffic patterns for vehicle and pedestrian access.
- Traffic safety plan, which, for new commercial, office, and industrial buildings, must “evaluate alternative mitigation methods to reduce traffic by 35%”, including “Encouraging pedestrian and bicycle access to the site”.
- Assessment of traffic safety impacts on adjacent roadways.
- “An interior traffic and pedestrian circulation plan designed to minimize conflicts and safety problems.”

Sets up site plan approval criteria (§350-11.6 Approval criteria)

“Safe and adequate pedestrian access, including provisions for sidewalks and/or bike paths to provide access to adjacent properties and adjacent residential neighborhoods, as applicable, and between individual businesses within a development.”

- From §350-11.5 Procedures

- Important quote: “The requested use will promote the convenience and safety of vehicular and pedestrian movement within the site and on adjacent streets, cycle tracks and bike paths, minimize traffic impacts on the streets and roads in the area.”
- Important quote: “The project, including any concurrent road improvements, will not decrease the level of service (LOS) of all area City and state roads or intersections affected by the project below the existing conditions when the project is proposed and shall consider the incremental nature of development and cumulative impacts on the LOS. The project proponent must demonstrate that all cumulative and incremental traffic impacts have been mitigated.”
- Mitigation can include payments to fund improvements for off-site traffic impacts, public transit, and pedestrian or bicycle paths. It is expected that developers mitigation even incremental impacts of their projects with improvements or payment in lieu of improvements. Mitigation payments are an important and major source of funding for Northampton projects. This system includes incentives for development in the most walkable and bikeable places. \$1,000 to \$3,000 per peak afternoon trip.
- Specific mitigation payments are set based on type of location and estimated peak trips.
- Important quote: “Rear and/or side wall facades within 50 feet of a completed or planned section of a cycle track or bike path shall have features that invite pedestrian access from that side of the building”.
- Important quote: “Pedestrian, bicycle and vehicular traffic movement on site must be separated, to the extent possible, and sidewalks must be provided between businesses within a development and from public sidewalks, cycle tracks and bike paths. All projects shall include sidewalks and tree belts abutting the street,

except where site topography or other limitations make them infeasible. In such cases where the sidewalk is infeasible, the developer shall install an equal number of feet of sidewalk and/or tree belt in another area of the community as deemed by the Planning Board or Office of Planning and Sustainability.”

- Establishes technical specifications for sidewalk design:
 - » Concrete.
 - » Minimum six feet in commercial and industrial districts.
 - » Minimum five feet in residential district.
 - » Specs for ramps, cross-slope, etc.
 - » Allows, but does not require, curb extensions.
 - » Curb extensions must not impede bicycle traffic.

Provisions for vehicles and pedestrians must be at or near grade if at or below the 100-year floodplain in the SC or Floodplain District (§350-13.6 and §350-14.6 Development conditions).

Special permit approval for business park requires both open space and pedestrian access to the open space (§350-16.3 Criteria for special permit approval).

Establishes Sustainable Growth Overlay District to encourage smart growth developments, including “a variety of transportation options” (§350-20 Sustainable Growth Overlay District (SG))

- Parking requirements are the same as for other development (§350-20.9 Parking requirements).
- Plan approval criteria with respect to transportation (including bicycle and pedestrian) are similar to regular site plan criteria.

Highway Business District:

Bike parking: “1 bike rack per 10 parking spaces up to 15 required (indoor or outdoor). Storage must allow locking of

“Access by non-motorized means must be accommodated with facilities such as bike racks, sidewalk connections from the building to the street, cycle tracks, and bike paths that are clearly delineated through materials and/or markings to distinguish the vehicular route from the non-vehicular route.”

- From §350-11.6

bicycles to racks or inside storage containers.” (Chapter 350 Attachment 12)

Sidewalks: (Highway Business District Design Standards attachment)

- “At least one 6’ wide principal sidewalk leading either from the street or public bike path to the principal structure on site”
- “Continuous internal pedestrian walkways, no less than six feet (6’) in width, shall be provided from the principal sidewalk to the main customer entrance of all other buildings on the site.”
- “Walkways shall connect focal points of pedestrian activity, such as but not limited to transit stops, street crossings, building and store entry points.”
- “Sidewalks, no less than eight feet in width, shall be provided along the full length of the building along any facade featuring a customer entrance, and along any facade abutting public parking areas.”

Entranceway Business District:

Bike parking: “1 bike rack per 10 parking spaces up to 15 required (indoor or outdoor). Storage must allow locking of bicycles to racks or inside storage containers.” (Chapter 350 Attachment 10)

Sub-Division Regulations

Prepared by: City of Northampton

Policy/Program Overview: Chapter 290 of the Code of Ordinances of the City of Northampton governs subdivision of land in the City. Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

In addition to governing the subdivision of land, these are the technical specifications that apply for site plan approvals.

Purpose does not expressly include pedestrian or bicyclist access or safety (§290-2 Purpose): It reads, in part (emphasis added), “The powers of the Planning Board and the Board of Appeals under these rules and regulations shall be exercised with due regard for the provision of adequate access to all of the lots in a subdivision by ways that will be safe and convenient for travel; for lessening congestion on such ways and in the adjacent public ways; **for reducing danger to life and limb in the operation of motor vehicles....**”

Definitions include subdivision street types (§290-4 Terms defined):

- Private Alley: private, narrow, one-way vehicular and pedestrian route with green infrastructure for stormwater runoff, no curbing or sidewalks.
- Residential Shared Street: private, narrow, low-speed, two-way street where vehicles and pedestrians share the same space, no sidewalks or curbing, green infrastructure, parking pockets and street furniture for traffic calming, not appropriate for main through streets.
- Residential Yield Street: low-speed, two-way street with sidewalks, alternating parking pockets to slow speeds and require oncoming traffic to yield, intersections have crosswalks with curb extensions.
- Mixed Use/Commercial Street: low-speed, two-way street with sidewalks, on-street parking to slow traffic, curb extensions shorten crossing distance and reduce vehicle turning speed.

Traffic study submittal requirements include pedestrian and bicycle modes (§290-23 Additional subdivision submittal requirements):

- Estimated daily and peak-hour trips for vehicles and pedestrians; does not specifically include bicycles.
- Traffic safety plan, including alternatives to single-occupancy motor vehicles, and evaluation of methods to

reduce traffic by 35%, including “Encouraging pedestrian and bicycle access to the site”.

- Network analysis showing how project enhances flow of existing network.
- Pedestrian components: interior circulation plan to minimize conflicts and safety problems, and adequate pedestrian access including sidewalks connecting to adjacent properties and businesses within the development.
- School bus and public transit stops, as appropriate.
- A focus is on maintaining LOS: Demonstrate that project will not decrease LOS below existing conditions at time of proposal and considering future development and impacts.
- Proponent must mitigate off-site traffic impacts, or may request to pay to fund necessary off-site improvements, including public transit and pedestrian or bicycle paths.

Adopts Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges and its supplements (§290-28 Controlling standards).

Design specifications for the four street types, as relevant to pedestrian and bicycle use (§290-29 Streets and ways):

- Right-of-way
 - » Private Alley: N/A
 - » Residential Shared Street: N/A
 - » Residential Yield Street: 60’
 - » Mixed Use/Commercial Street: 70’
- Pavement width
 - » Private Alley: 14’
 - » Residential Shared Street: 20’
 - » Residential Yield Street: 20’ within 30’ of intersection; 24’ elsewhere

- » Mixed Use/Commercial Street: 22’ within 30’ of intersection; otherwise 30’ when street serves <25% commercial by sq. ft.; 38’ all other
- Limit of dead-end streets, measured along the center line, from the nearest public (non-alley) street that is not itself a dead-end street: 500’
- Length of block between 3+ way intersections
- Length of block if broken up at least every 500’ by a walking or bicycling trail and connects permanently to protected open space
- Pavement Type: Hot mix asphalt, with textural changes for Private Alley or Residential Shared Street.
- Vehicle flow: Two-way, except Private Alley may be one-way.
- Sidewalk (cement concrete only, including where it crosses driveway)
 - » Private Alley: none
 - » Residential Shared Street: none
 - » Residential Yield Street: 5’ wide, both sides, except that LID street with no curbs on one side may eliminate sidewalks on the curbless side with additional crosswalks at least every 200 feet.
 - » Mixed Use/Commercial Street: 6’ wide both sides
- Crosswalks (to be located at all street and trail intersections and no other locations): Raised to elevation of sidewalk (or pedestrian path for Alley or Residential Shared Street).
- Shoulders
 - » Private Alley: not allowed
 - » Residential Shared Street: not allowed
 - » Residential Yield Street: bike facilities as necessary for arterials

“...the design shall make every effort to reasonably calm the traffic within the subdivision and on surrounding streets to ensure pedestrian- and bicycle-friendly design and to prevent a decrease in traffic safety as a result of the additional traffic the project will generate. Bicycle and pedestrian pathways are encouraged within large developments and should be linked to adjacent properties, pathways, sidewalks, and transit stops wherever feasible..”

- From §209-29

- » Mixed Use/Commercial Street: bike facilities as necessary depending on functional type
- Curbs: 30’ from each intersection and on sides whenever there are no rain gardens, bioretention areas, or curb cuts.
- Stopping sight distance (considering vertical alignment, slopes, and obstructions)
 - » Private Alley: 80’
 - » Residential Shared Street: 80’
 - » Residential Yield Street: 115’
 - » Mixed Use/Commercial Street: 155’
- Design speed:
 - » Private Alley: 15 mph
 - » Residential Shared Street: 15 mph
 - » Residential Yield Street: 20 mph
 - » Mixed Use/Commercial Street: 25 mph
- Street lighting (must be LED): Intersections and crosswalks.

Location (§290-29.A):

- **“All streets and ways shall be designed so that, in the opinion of the Planning Board, they will provide safe vehicular travel”.**
- “The proposed streets shall be consistent with the goals of Sustainable Northampton”.
- Requires provision “for the proper projection of streets, or for access to adjoining property that is not yet subdivided or developed”.
- Dead-end/cul-de-sac: “A right-of-way from the end of all culs-de-sac and dead-end roads to adjoining property must be part of the street layout and must be shown on street acceptance plans and deeds unless there is

compelling evidence that the adjoining property will never be developed.”

- Requires bicycle and pedestrian access to adjoining undeveloped property: “If the adjoining property shall never be developed, there shall be a pedestrian and bicycle trail up to the property line, unless wetlands and grade make that impossible.”

Cul-de-sac or dead-end streets (§290-29.B):

- “It is the Board’s policy not to approve streets that do not connect to existing neighborhoods or do not provide for connections in the future. The applicant must show a scenario of how a street connection can be made. Further, the developer shall make every effort to avoid the creation of dead-end streets and must connect its subdivision to existing dead-end streets whenever reasonably possible. Dead-end streets are more expensive to maintain, limit emergency access, and reduce the sense of connection and equality that comes from interconnecting street grids.”
- Bicycle and pedestrian connectivity required when dead-end allowed (emphasis added): “Dead-end streets are only appropriate when the surrounding property will never need a street connection, because of extremely sensitive and permanently protected natural resources, and the project provides a viable alternative pedestrian and bicycle connection to the surrounding property, and the street connection will not aid the transportation network that serves the subdivision, and the dead-end street will not serve more than 20 housing units.”
- Less than 500 feet from a connected street: “Every street in the proposed subdivision shall be laid out in such a manner that every portion of every street is less than 500 feet, as measured along the center line of construction of the street from the nearest connected existing public street which is not itself a dead-end street. Culs-de-sac

or dead-end streets shall be allowed only on residential streets.”

Street cross sections (§290-29.C): representative cross sections are shown for the four street types.

Traffic calming and pedestrian and bicycle access (§290-29.E):

- Traffic calming may utilize methods detailed in ITE’s Traditional Neighborhood Development or Traffic Calming: State of the Practice, and “complete streets” principles from the National Complete Streets Coalition, but must utilize methods that will not make snow plowing or road maintenance especially burdensome for the City.”
- Unclear what “especially burdensome” means with respect to snow clearance and maintenance of physically separated bicycle facilities.

Shared streets (§290-29.F):

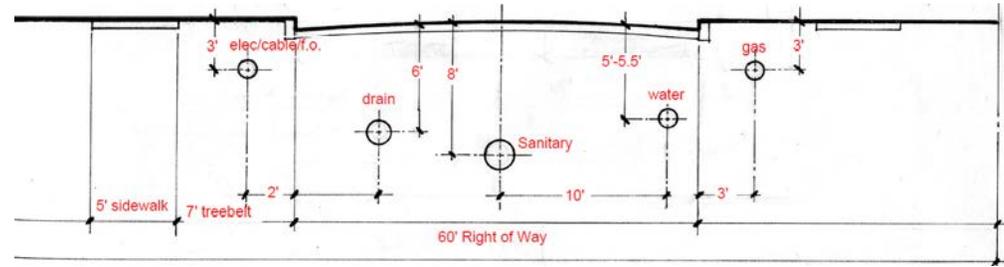
- Traffic calming to reduce vehicle speeds to 15 mph.
- Use chicanes to reduce speeds.
- Narrow to one travel lane at entryways, using excess space for at-grade sidewalks.

Sidewalk standard (§290-35 Sidewalk standards and school bus stops):

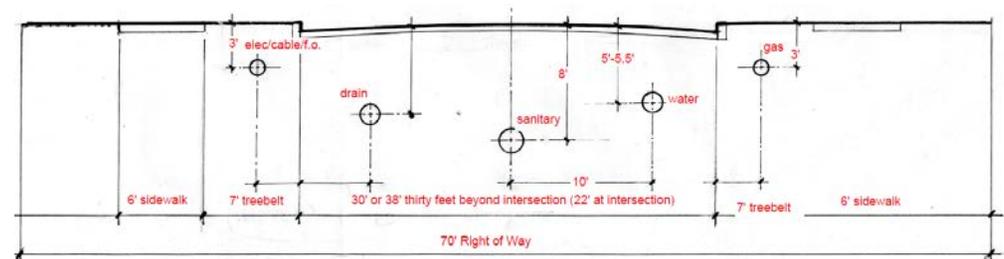
- HOA covenants must require that HOA clear snow from all sidewalks.
- With approval, sidewalks may be built in common areas rather than right-of-way, but HOA must still do snow clearance.
- Shared streets should have paved pedestrian area on both sides, from 3-12 feet, but a pedestrian area on only one side is permissible with approval.
- Paving as indicated in §290-29, with textured pervious paving and flush granite curbing on shared streets. Bollards may be required to separate pedestrian areas

Four Subdivision Street Types

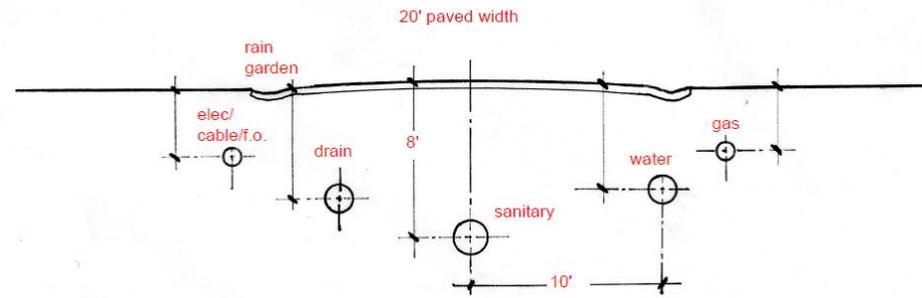
Residential Yield Street



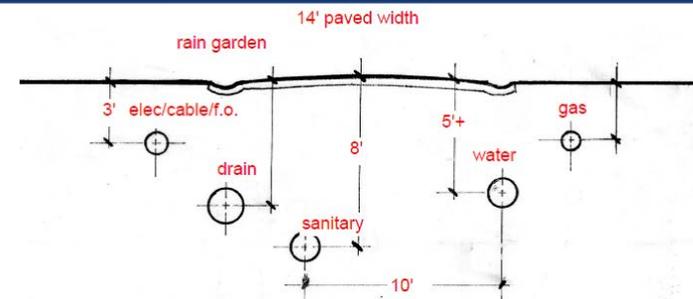
Mixed Use Street



Shared Street



Green Alley



Various Walk / Bike Related Policies

Policy/Program Overview: Chapter 312 of the Code of Ordinances of the City of Northampton governs vehicles and traffic in the City. Section 312-78 establishes rules specifically for “the bikeway”. Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

- Unclear from context which “bikeway” is referred to, as there are currently multiple bikeways serving Northampton.
- No motorized vehicles allowed; could limit use of e-bikes.
- Bikeway is closed from dusk to dawn; inconsistent with using the bikeway as a transportation corridor.
- Bikeway users required to:
 - » Stop at all street crossings.
 - » Yield to vehicles in the road.
 - » Keep to the right.

Policy/Program: Bike Lane Ordinance

Policy/Program Overview: Chapter 312 of the Code of Ordinances of the City of Northampton governs vehicles and traffic in the City. Section 312-80 defines and regulates use of bike lanes in the City. Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

- Bike lanes are for preferential, but not exclusive, non-motorized bicycle use.
- Bike lanes to be designated by “painted lines, pavement coloring or other appropriate markings.”
- Vehicle parking in bike lanes is prohibited, subject to a \$25 fine.
- Motor vehicles must use “due caution and care” before entering or crossing a bike lane.

- City Council designates bike lanes based on recommendation of Transportation and Parking Commission, with concurrence of Department of Public Works (all three bodies must agree).
- The bike lanes specifically designated in the ordinance can be found in the Appendix.

Policy/Program: “No Skitching” Ordinance

Policy/Program Overview: Chapter 312 of the Code of Ordinances of the City of Northampton governs vehicles and traffic in the City. Section 312-61 prohibits clinging to motor vehicles. Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

“It shall be unlawful for any person traveling upon a bicycle, motorcycle, coaster, sled, roller skates, or any toy vehicle to cling to, or attach himself or his vehicle to any moving vehicle or street car upon any roadway.”

Policy/Program: Bicycling Prohibited at Schools and Recreational Facilities

Policy/Program Overview: Chapter 233 of the Code of Ordinances of the City of Northampton governs parks and recreation in the City. Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

- “No person shall operate a motor vehicle, including, but not limited to a skimobile, minibike, trailbike, automobile, or other powered vehicle, or a bicycle, on any school grounds or in any park, playground, or recreation field operated by the Recreation Department, except on driveways and in parking lots.” (§233-1 Operation of Vehicles, emphasis added)

Enforcement of Ordinances

Policy/Program Overview: Chapter 40 of the Code of Ordinances of the City of Northampton governs enforcement of City ordinances by criminal complaint, civil action, and noncriminal disposition (fine). Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

- Covers all violations of city ordinances, including zoning.
- Fines are not specified for every ordinance:
 - » Where a fine is not specified for a criminal complaint, the default fine is up to \$300 (§1-17 General penalty).
 - » Where a fine is not specified for a noncriminal disposition, the default fine is \$20 for the first offense and \$50 for subsequent offenses.
 - » Each day a violation continues is considered a separate offense.
- Fine for zoning violation (Chapter 350) is \$100.
- Fine for snow/ice removal violation (§285-17) is \$50.
- Fine for obstructing a street or sidewalk (§285-29) is \$50.

Important Note: It is unclear to what the following section references at the end of the table in §40-5 refer: “VIII-B, 1”; “IX-E”; “III, V, VI, or IX”.

Policy/Program: Complete Streets Policy

Policy/Program Overview: Section 285-51 of the Code of Ordinances of the City of Northampton contains the City’s new Complete Streets Policy, passed by the City Council on December 3, 2015, and approved by the Mayor on December 7, 2015. Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

- The City’s Complete Streets Policy ensures that pedestrian, bicycle and transit facilities are fully integrated into a safe and efficient transportation system.
- If the Complete Streets Policy is approved by MassDOT, the City can submit a Complete Streets Prioritization Plan and request funding for up to five Complete Streets projects for a maximum total of \$400,000. Program details can be found at: <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/LocalAidPrograms/CompleteStreets/FundingProgram.aspx>.
- Details of the Complete Streets Policy’s text can be found in the Appendix.

Policy/Program: Street and Sidewalk Ordinances

Policy/Program Overview: Chapter 285 of the Code of Ordinances of the City of Northampton governs various aspects of construction, maintenance, and use of streets, sidewalks, and public property in the City. Analysis based on code version linked from City website at <http://ecode360.com/NO2226>.

Key Provisions:

- Sidewalk snow clearance (§285-17 Removal of snow and ice from sidewalks):
 - » Owner of any building, structure, or lot with a sidewalk must clear snow within 24 hours after snowfall ceased.
 - » Owner must remove or cover with sand or other suitable substance any ice within 24 hours of its appearance.
 - » Full width of sidewalk must be cleared.
 - » Sidewalk must be rendered safe and convenient for travel.
 - » Special timing for Central Business District: within 24 hours or 9:00am the next business day, whichever is sooner.
 - » Violation to move ice or snow onto paved street or gravel shoulder.

- » \$50 fine for violation, new fine each 24-hour period of violation.
- » DPW may clear violator's sidewalk, at owner's expense.
- Preventing tire damage (§285-8 Placing items liable to damage tires on streets prohibited): illegal to place anything on a street that can damage the tires or wheels of bicycles, automobiles, or other vehicles with rubber or pneumatic tires.
- Prohibited activities (§285-12 Certain activities on streets and sidewalks prohibited):
 - » No sidewalk surfboards, skateboards, roller skates, or in-line skates on certain public area, public ways, and sidewalks (§285-12.A)
 - » Use of bicycles (§285-12.B Provisions for bicycles):
 - Bicycles allowed on all streets.
 - Bicycles allowed on all sidewalks except specific sidewalks in the Downtown Business District and the Florence Business District:
 - Bicycles not allowed to be "driven" in Pulaski Park.
 - Important Note: Bicycling further prohibited from "any school grounds or in any park, playground, or recreation field operated by the Recreation Department, except on driveways and in parking lots" by §233-1 Operation of Vehicles (in Chapter 233: Parks and Recreation).
- Sidewalk sweeping (§285-18 Sweeping of sidewalks abutting business premises): owners of business premises must sweep sidewalk "at the opening of each business day", and must pick up the sweepings, not sweep them into the street.
- Gratings (§285-24 Gratings in streets): specifies certain dimensions of grates – no more than 2 inches between

bars, and no more than 18 inches from a building; does not meet requirements for bicycle-safe grate, and does not otherwise limit size or shape of grate.

- Obstructing sidewalks (§285-29 Obstructions to sidewalks): No obstructions allowed to sidewalks, or the pavement edge or shoulder where there is no sidewalk, including protruding vegetation. Owner must remove obstruction within 14 days of notice, or City will remove at owner's expense.

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2.3 Walk Bike Programs Review

As a community that has strived to achieve its status as a very walkable and bikable city, Northampton has initiated a number of Active Transportation Programs. The mix of Education, Encouragement, Enforcement and Evaluation programs give residents important tools to better integrate walking and bicycling into their lives, and increase the number of both modes. This is especially critical with children as Safe Routes to School efforts will instill lessons and habits that can be used for a lifetime. The sections below give a summary of the various programs, which in aggregate have helped the City achieve designation as a walk-friendly and bicycle-friendly community.

Program: Safe Routes to School (Education and Encouragement)

Source: Erin Reed, Statewide Coordinator, Massachusetts Safe Routes to School Program

Safe Routes to Schools Overview: Safe Routes to School (SRTS) is a federally-funded, MassDOT-managed program that “promotes healthy alternatives for children and parents in their travel to and from school.” SRTS has education, encouragement, and infrastructure components.

Key Activities:

- All four Northampton elementary schools and the middle school are SRTS partner schools.
- According to SRTS: “Northampton Schools have various walking clubs/activities within their gyms and/or on school grounds. During 2014 and 2015, SRTS met with the head nurse of K-12, twice with the transportation director, and once with the Superintendent. A handful of meetings were held with Northampton’s Mass in Motion organizer about plans to increase walking and walking/bicycling safety. There was a big concern expressed regarding walking school bus creation and walking promotion in general: the number of local child offenders/predators in the community.”

- Northampton schools have not participated in SRTS bicycle or pedestrian safety trainings.
- The Jackson Street Elementary School received a SRTS infrastructure project completed in 2010. Leading up to the project, the school conducted student travel tallies and parent surveys annually.
- Northampton Public Schools added travel safety information to the school district website (<http://www.northampton-k12.us/traveling-to-school-safely>):

Northampton Public Schools has employed crossing guards at the following intersections:

- Jackson Street & Barrett Street
- Florence Street and Leeds
- Prospect Street & Massasoit Street
- Florence Street & Arch Street
- Bridge Street & Hawley Street
- Parson Street & Union Street
- Bridge Street near Pomeroy Terrace
- Brookside Circle & Deerfield Drive
- JFK Middle School
- Mulberry Street & Main Street
- Ryan Road & Matthew Drive

Program: Encouragement

Sources: Wayne Feiden, Northampton Director of Planning and Sustainability; Sean Condon, President, MassBike Pioneer Valley Chapter; Craig Della Penna, Co-President, Friends of Northampton Trails and Greenways; MB/PV website (<http://massbikepv.org/>); Bay State Bike Week website (<http://baystatebikeweek.org/>); Friends of Northampton Trails and Greenways website (<http://fntg.net/>); Northampton Cycling Club website (<http://www.nohobikeclub.org/nccwp/>)

Encouragement Overview: Activities to encourage bicycling and walking in Northampton are ongoing and multi-faceted, relying on various nonprofit organizations, with very limited government funding.

Key Activities:

- Trail and bike maps: Produced by the Friends of Northampton Trails and Greenways, available for download on the FNTG website, hardcopy at local businesses.
- Wayfinding/Signage:
 - » City installed approximately 12 bike paths kiosks 12-13 with signage, funded by a Recreational Trails Grant obtained by MassBike and the City.
 - » City installed a large graphic art sign on the bike path bridge over Main Street (helps define downtown and draw people to path).
 - » City is working with WalkBoston to install wayfinding signs with distances to key destinations, 100 total, 20-30 on bike path.
 - » City plans to install mileage markers on bike paths, starting with salvaged granite marker at Union Station, with flush granite markers on bike paths.
- Trail information is available on City website at: <http://www.northamptonma.gov/1346/BikeWalk-Trails>.
- Bay State Bike Week: annual statewide celebration of bicycling, coordinated by MassDOT, MassBike, and MassRIDES. The Pioneer Valley is host to many Bike Week events each year. Bay State Bike Week traces its roots to Pioneer Valley Bike Commute Week, which started in 1999 and is now in its 17th year, coordinated by the Pioneer Valley Planning Commission and the MassBike Pioneer Valley Chapter.
- Northampton Cycling Club (NCC) BikeFest: annual bike tour and festival.

- MassBike/Pioneer Valley chapter is interested in holding Open Streets events in Northampton, but has not identified funding.
- National recognition for Northampton's programs (and infrastructure): recognized as a Bronze-Level "Bicycle Friendly Community" by the League of American Bicyclists and a Bronze-Level "Walk Friendly Community" by the Pedestrian and Bicycle Information Center.

Program: Education

Sources: Anne-Marie Moggio, Director, Northampton Parks & Recreation Department; Sean Condon, President, MassBike Pioneer Valley Chapter; Ruthy Woodring, Co-founder, Pedal People Cooperative; MB/PV website (<http://massbikepv.org/>); Bay State Bike Week website (<http://baystatebikeweek.org/>)

Education Overview: A variety of local programs provide education on bicycling and walking safety, and related topics, led by the City, nonprofits, Smith College, and other organizations.

Key Activities:

- Safety Village: The Parks & Recreation Department runs a summer program for 4-6 year olds that teaches various safety topics, including bicycle, pedestrian, and traffic safety, in a replica of Northampton with storefronts, streets, sidewalks, and signs. The program consists of three, two-week sessions per year, reaching up to 120 children. It has been in operation for approximately 25 years. Representatives from the police, fire department, hospitals, and other agencies participate. The children ride bicycles with training wheels and walk the sidewalks to learn traffic safety. See details at <http://www.northamptonma.gov/905/Safety-Village>.
- Teen Camp: The Parks & Recreation Department also offers occasional bike safety training, bike rides, and bike maintenance training at its teen camps, but less regularly than the Safety Village program.



Kids participate in the Safety Village summer program



- City distributes “Watch for Bikes” stickers for car mirrors, but not in an organized program.
- Road Cycling 101: bicycling skills class offered jointly by MassBike Pioneer Valley Chapter and Northampton Cycling Club, 14 participants in 2015
- Smith Bike Kitchen: Smith College has an on-campus bicycle repair, education, and rental organization.
- Pedal People education programs: Pedal People is a cooperative whose primary activity is delivery and cargo hauling by bicycle, and they provide training to their employees covering bike safety and maintenance, and operation of cargo trailers. Pedal People also provides educational programs to the public. The Saturday Bike Lab consists of regular workshops and classes in bicycling skills and bicycle maintenance. Since December 2014, Pedal People has partnered with Berkshire Driving School in Easthampton to offer a monthly, one-hour training to student drivers (mostly teenagers) including sharing the roads as drivers and cyclists, safe interactions between drivers and cyclists, common cyclist concerns, and cyclist behavior.
- As noted in the Safe Routes to School section, Northampton schools have not participated in bicycle and pedestrian safety trainings offered by SRTS.

Program: Enforcement

Sources: Bonnie Polin, Chief Safety Analyst, Traffic and Safety Engineering Section, MassDOT Highway Division; Gary Roux, Principal Planner/Traffic Manager, Transportation, Pioneer Valley Planning Commission; Wayne Feiden, Northampton Director of Planning and Sustainability

Enforcement Overview: A collection of target enforcement activities intended to enhance pedestrian and bicycle planning.

Key Activities:

- Northampton is currently participating in the MassDOT bicycle and pedestrian safety program, which includes an enforcement component funded through the Pioneer Valley Planning Commission. This funding has included occasional helmet giveaways by Northampton Police Department.

Program: Evaluation

Sources: Friends of Northampton Trails and Greenways, Pioneer Valley Planning Commission (PVPC), Central Transportation Planning Staff (CTPS)

Evaluation Overview: Involved a series of trail counts between 2005 and 2011 on the three rail trails within the City of Northampton. A summary of the data collected can be found on the following page.

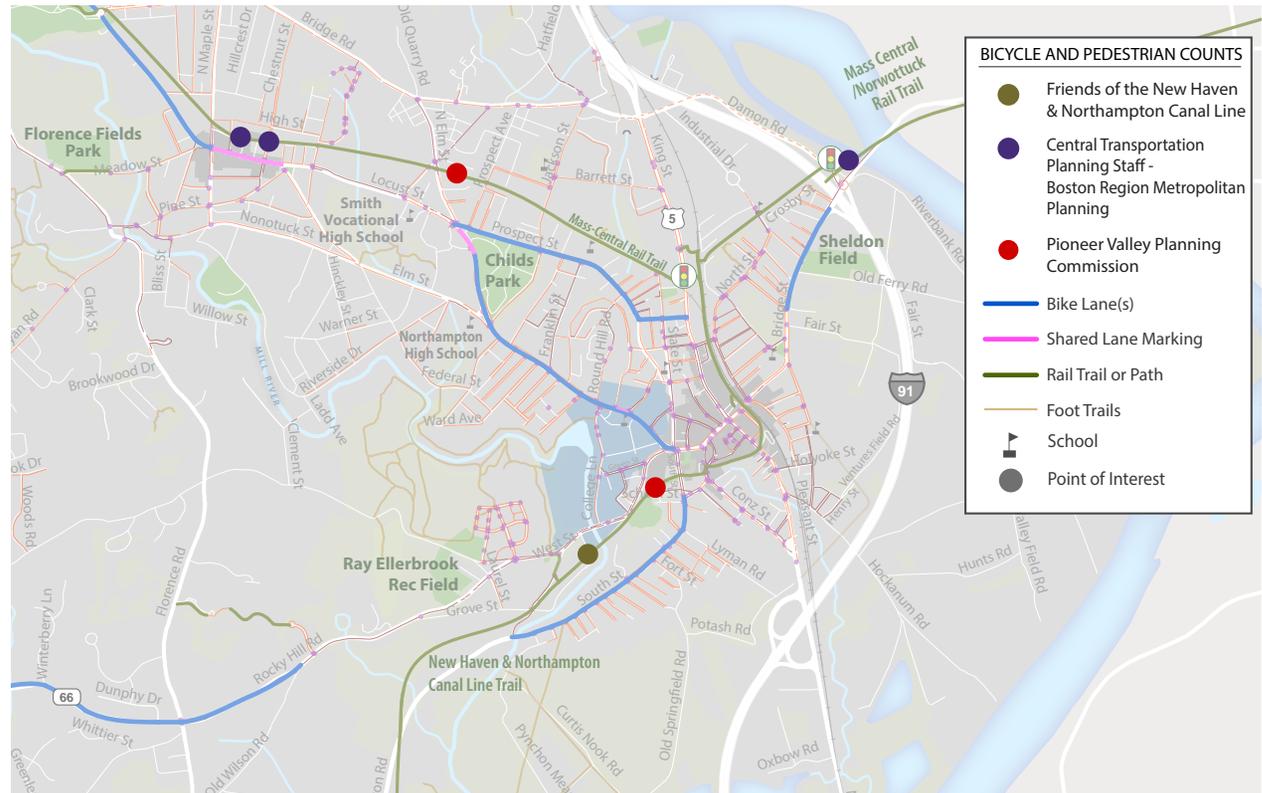
Bicycle and Pedestrian Counts - Rail Trails

Counted	All users	All users	All users	All users	Bikes	Bikes	Bikes	All users	Bikes	All users	All users	All users	All users
When	2005	2005	2005	2005	2005	2007	2008	2008	2008	2008	2008	2010	2010
Where	Mass Central Rail Trail	MassCentral Rail Trail / Norwottuck Rail Trail	MassCentral Rail Trail / Norwottuck Rail Trail	New Haven & Northampton Canal Line	New Haven & Northampton Canal Line	New Haven & Northampton Canal Line							
Average	301	280	417	470	514	341	-	-	-	-	-	650	286
Count	-	-	-	-	-	-	35 / hour	68 / hour	109 / hour	129 / hour	450 / day	-	-
Month	April	November	-	-	-	-	September	September	September	September	April - September	May, July, September	May, July, September
Day	Weekday	Weekday	Weekday	Weekend	-	-	Weekend	Weekend	Weekend	Weekend	Weekend	Weekend	Weekday

Pedestrian and bicycle counts on other streets and sidewalks on next page.

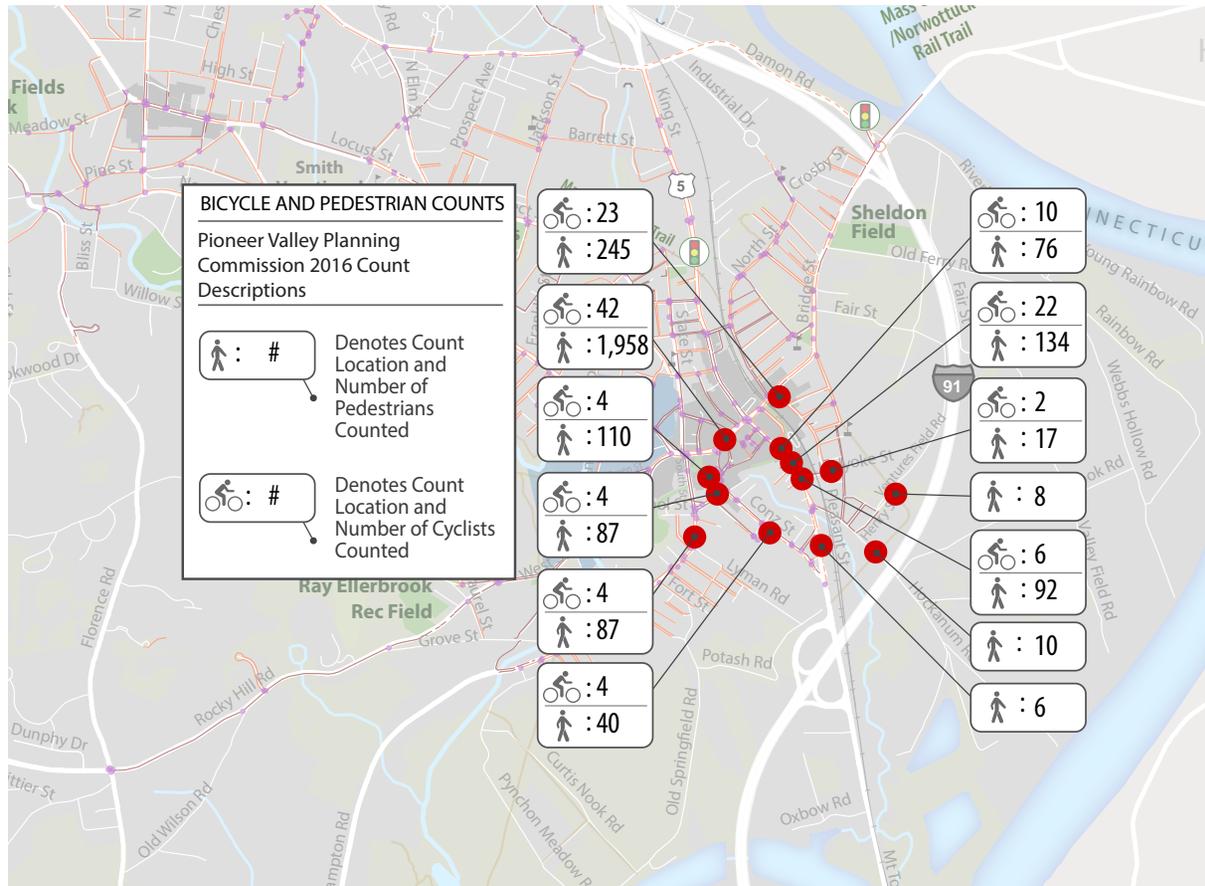
Trail Counts

The map graphic to the right displays the rail trail count locations described in the table above. The friends of the Northampton Trails & Greenways conducted five separate manual counts on Tuesdays and Saturdays. The Pioneer Valley Planning Commission utilized automated count devices, and recorded a peak number of users in summer and early fall, and as expected, a low of 170 users per day during rain. The Central Transportation Planning Staff utilized both manual counts and automated count devices, conducting counts across a wide variety of times throughout the day, recording the peak hour for cyclists between 3:00 and 4:00 pm and the peak hour for all trail users between 9:00 and 10:00 am.



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PVPC 2016 BICYCLE AND PEDESTRIAN COUNTS - DOWNTOWN LOCATIONS



Street and Sidewalk Counts

The map graphic to the left displays the street and sidewalk count locations conducted by the PVPC in 2016. The counts record data over a two hour timeframe, evenly split between mornings and afternoons, and typically on weekdays in February and March. An important statistic present in the data is the 1,958 pedestrians counted over a two-hour span on Main St. just east of Center St.

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3. EXISTING CONDITIONS ANALYSIS

The analysis of existing conditions has been divided into two sections: Current Conditions and System Gap Analysis. Current Conditions includes a graphic description of existing bicycle facilities, transit routes and the sidewalk/crosswalk network, while the System Gap Analysis inventories gaps in the bicycle and pedestrian network and/or missing facilities for bicyclists and walkers.

3.1 Current Conditions

Alta conducted an analysis of current conditions based on field work, comments from City staff and the Project Advisory Committee, online resources, and through the examination of multiple sets of data.

Northampton's bicycle facilities include an extensive rail trail system comprised of four legs:

- The MassCentral / Norwottuck Rail Trail from downtown out to Hadley and extends to Williamsburg and Belchertown. This trail will eventually reach Boston
- The Mass Central Rail Trail from downtown to the city limits

- The New Haven & Northampton Canal Line from downtown Northampton extends to Southampton and will eventually reach New Haven
- Rocky Hill Greenway from Ice Pond Drive to Blackbirch Trail / Rocky Hill Cohousing

Most rail-trails are 10 feet wide and paved. Many have a broken yellow divider line. In most instances, the trail crosses the various intersecting streets at grade, with connecting ramps where the trail passes above or below road grade at Jackson Street, Easthampton Road and over Main Street. In addition to the rail trail network, Northampton has a modest network of on-street bicycle facilities, which include:

- **Main Street / Elm Street / North Elm Street** bike lanes are between State Street and Prospect Avenue, between South Street and Prospect Avenue, and with shared lane markings for a short stretch between Bedford Terrace and Prospect Street
- **Prospect Street** bike lanes from Finn Street to the intersection with North Elm

- Shared lane markings along Main Street in Florence, transitioning to striped bike lanes on North Main Street from Cosmian Avenue to Hayward Road and the Norwottuck Rail Trail to Haydenville Road
- **Bridge Street** bike lanes from the on-ramp access to I-91 southbound to Parsons Street
- **South Street** bike lanes from Old South St. to the Earle St. intersection, with most of the segment including a green striped buffer area for additional width and a rumble strip for vehicular separation
- **West/Chapel/Rocky Hill Road (Route 66)** striped shoulder from Belmont Avenue to the Westhampton City line. (No bike lane markings along this corridor)
- Locust Street bike lanes
- **North Main Street Florence** from North Maple to Haydenville Road

From a pedestrian infrastructure point of view, Northampton's sidewalk network is quite complete downtown, in the adjacent historic neighborhoods and along the radial road network extending away from downtown. Most sidewalks on residential streets are buffered from the adjacent roads by grassy strips, with sidewalks along narrow corridors and downtown separated from the roadway only by a curb. A number of streets in these areas lack a sidewalk on one side, with a handful lacking sidewalks entirely. Downtown, the retail environment and generous sidewalks along Main Street and the adjacent side streets create a strong sense of place that draws shoppers, diners and music lovers from throughout the region.

Inventory of Ped. / Bike Infrastructure

ON-STREET BIKE FACILITY DISTANCES*	
Bike Lanes	8.5 miles
Shared Lane Markings	0.4 miles
ARTERIALS & COLLECTORS*	
Total Length of Northampton Arterials & Collectors	32.4 miles
Bike Lanes on Arterials & Collectors	5.1 miles
Percentage of Bike Lanes on Arterials and Collectors	16%
Bike Lanes on Other Streets	3.4 miles
RAIL TRAILS*	
MassCentral / Norwottuck	1.7 miles
MassCentral Rail Trail	5.1 miles
New Haven & Northampton Canal Line	2.7 miles
Rocky Hill Greenway	.3 miles
Total	9.8 miles
SIDEWALKS	
Total sidewalks	77.8 miles

*Per City of Northampton GIS data



With additional space available, the City striped green buffered bike lanes along South Street to provide a more comfortable environment for bicyclists



Most sidewalks outside of downtown are five feet wide with grass strips between them and the adjacent roadway



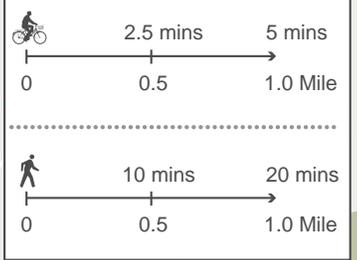
Wide sidewalks in the heart of downtown help to create a strong sense of place

EXISTING RAIL TRAIL NETWORK

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WILLIAMSBURG

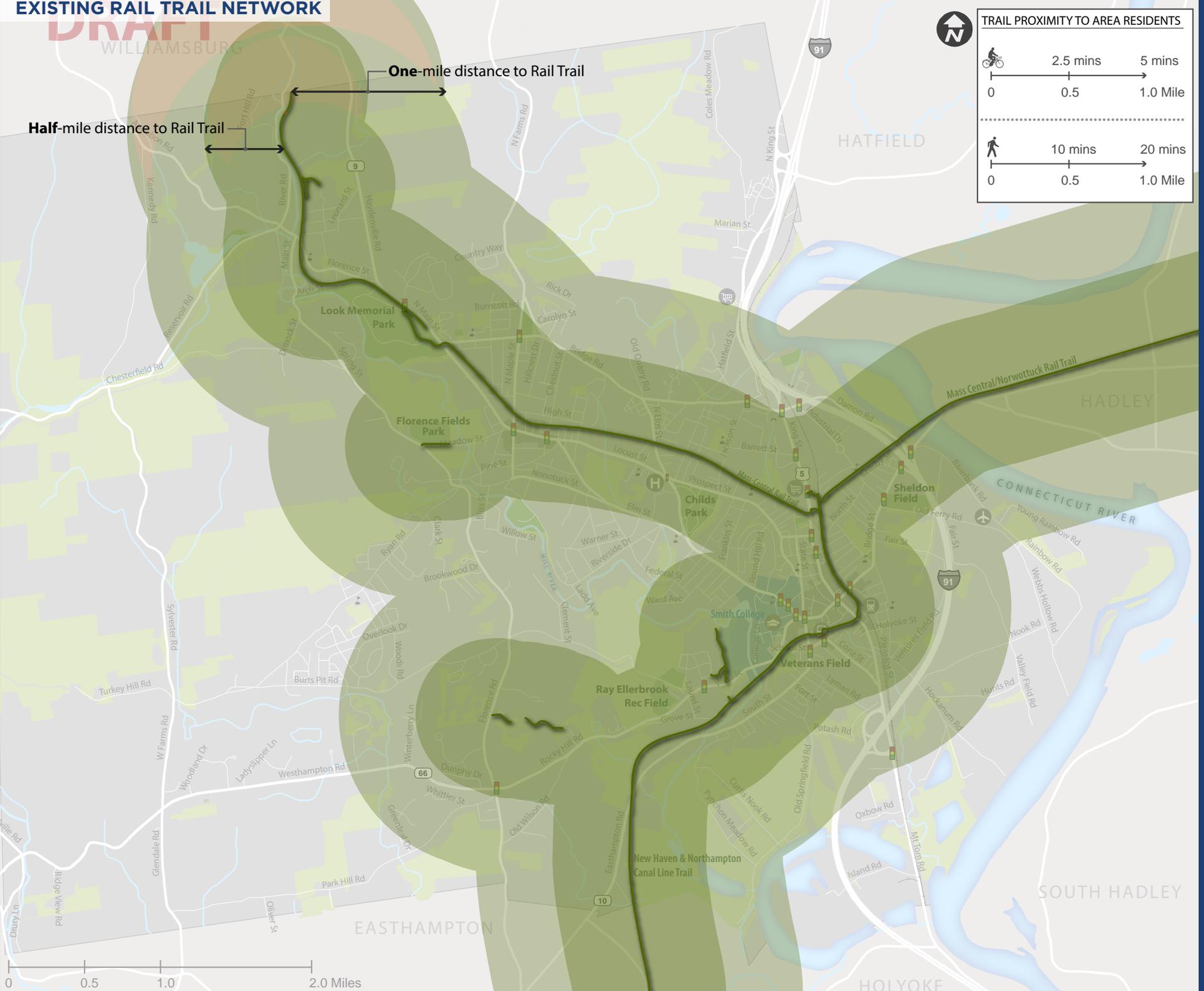


TRAIL PROXIMITY TO AREA RESIDENTS



Half-mile distance to Rail Trail

One-mile distance to Rail Trail



Proximity to Rail Trail Network

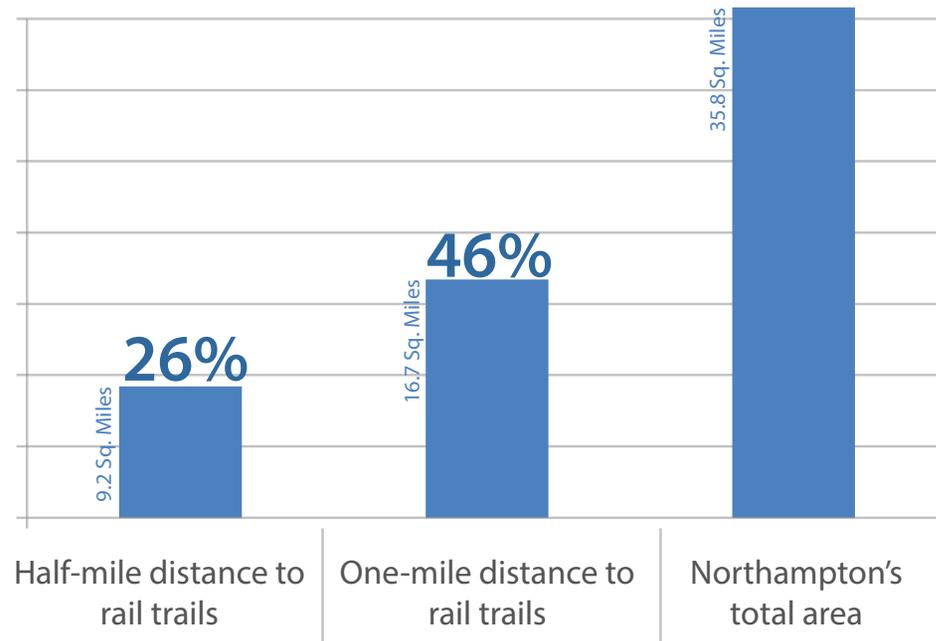
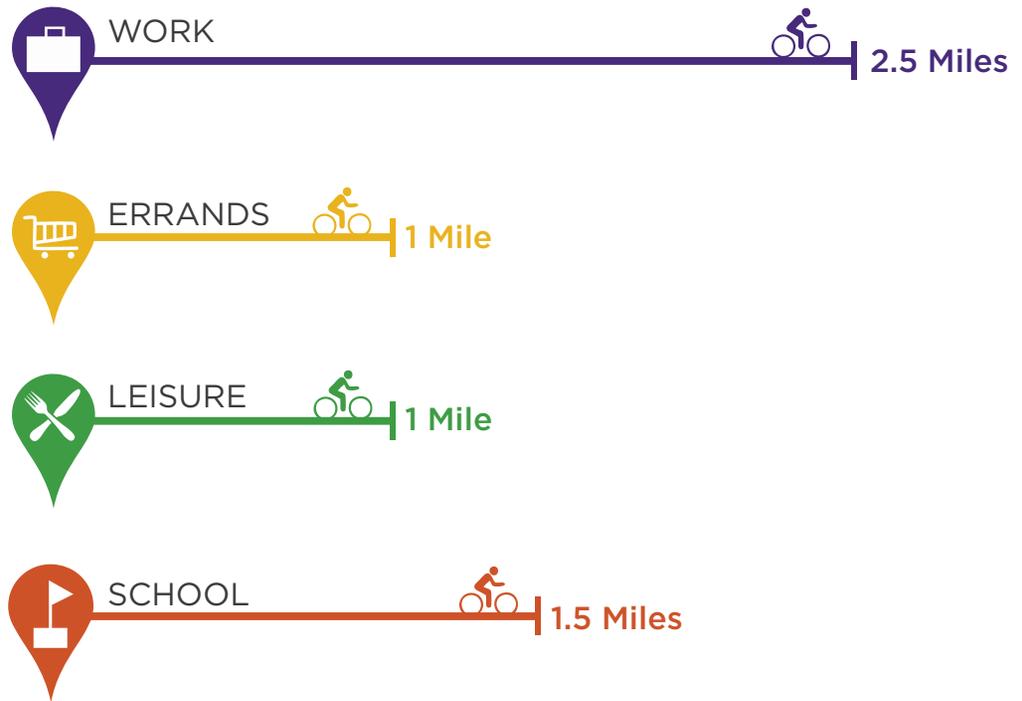
Approximately 26% of Northampton's total area lies within a half mile of a rail trail.

Approximately 46% of Northampton's total area lies within one mile of a rail trail.

Based on national statistics from NHTS (National Household Travel Survey) data, survey respondents are willing to travel the following distances by bicycle:

- 2.5 miles to get to work
- 1 mile to run errands
- 1 mile for leisure activities
- 1.5 miles to get to school

This bodes well for Northampton where a large percentage of the population lives within a half-mile of a rail trail, and nearly the entire cities population resident within one mile of a rail trail.



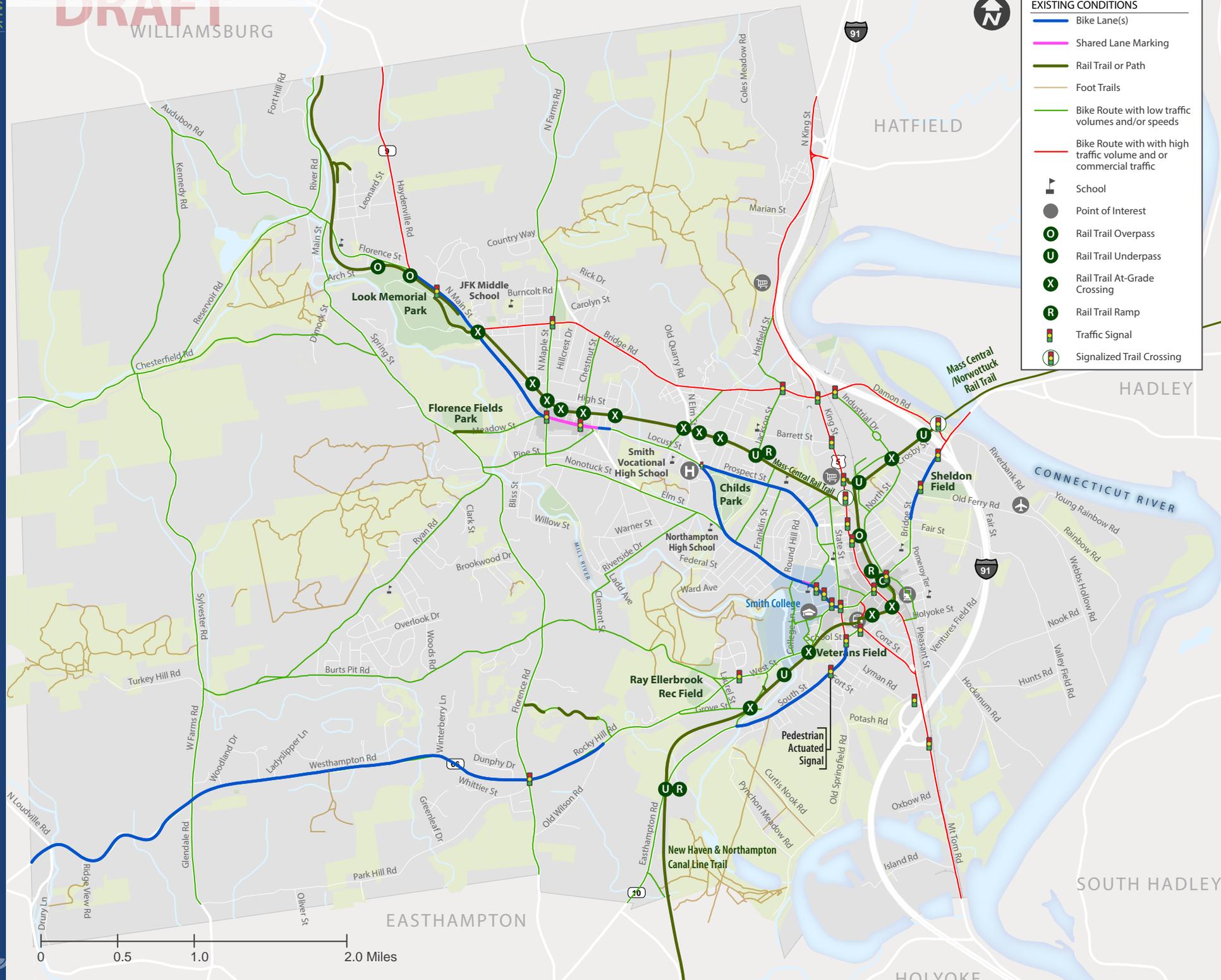
EXISTING BICYCLE NETWORK

DRAFT
WILLIAMSBURG



EXISTING CONDITIONS

- Bike Lane(s)
- Shared Lane Marking
- Rail Trail or Path
- Foot Trails
- Bike Route with low traffic volumes and/or speeds
- Bike Route with with high traffic volume and/or commercial traffic
- School
- Point of Interest
- Rail Trail Overpass
- Rail Trail Underpass
- Rail Trail At-Grade Crossing
- Rail Trail Ramp
- Traffic Signal
- Signalized Trail Crossing

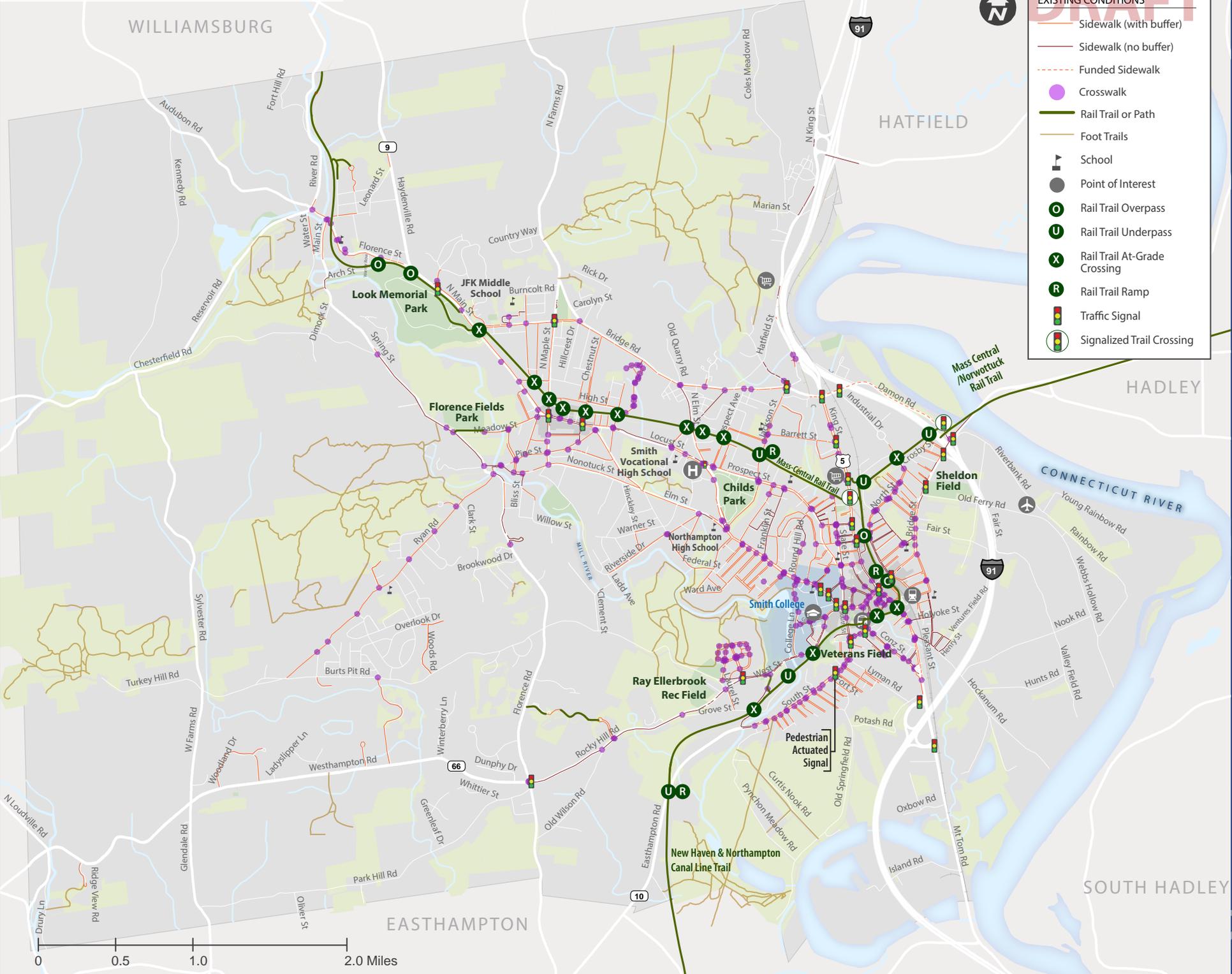


EXISTING PEDESTRIAN NETWORK



EXISTING CONDITIONS

- Sidewalk (with buffer)
- Sidewalk (no buffer)
- Funded Sidewalk
- Crosswalk
- Rail Trail or Path
- Foot Trails
- School
- Point of Interest
- Rail Trail Overpass
- Rail Trail Underpass
- Rail Trail At-Grade Crossing
- Rail Trail Ramp
- Traffic Signal
- Signalized Trail Crossing

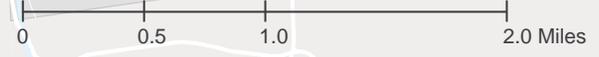
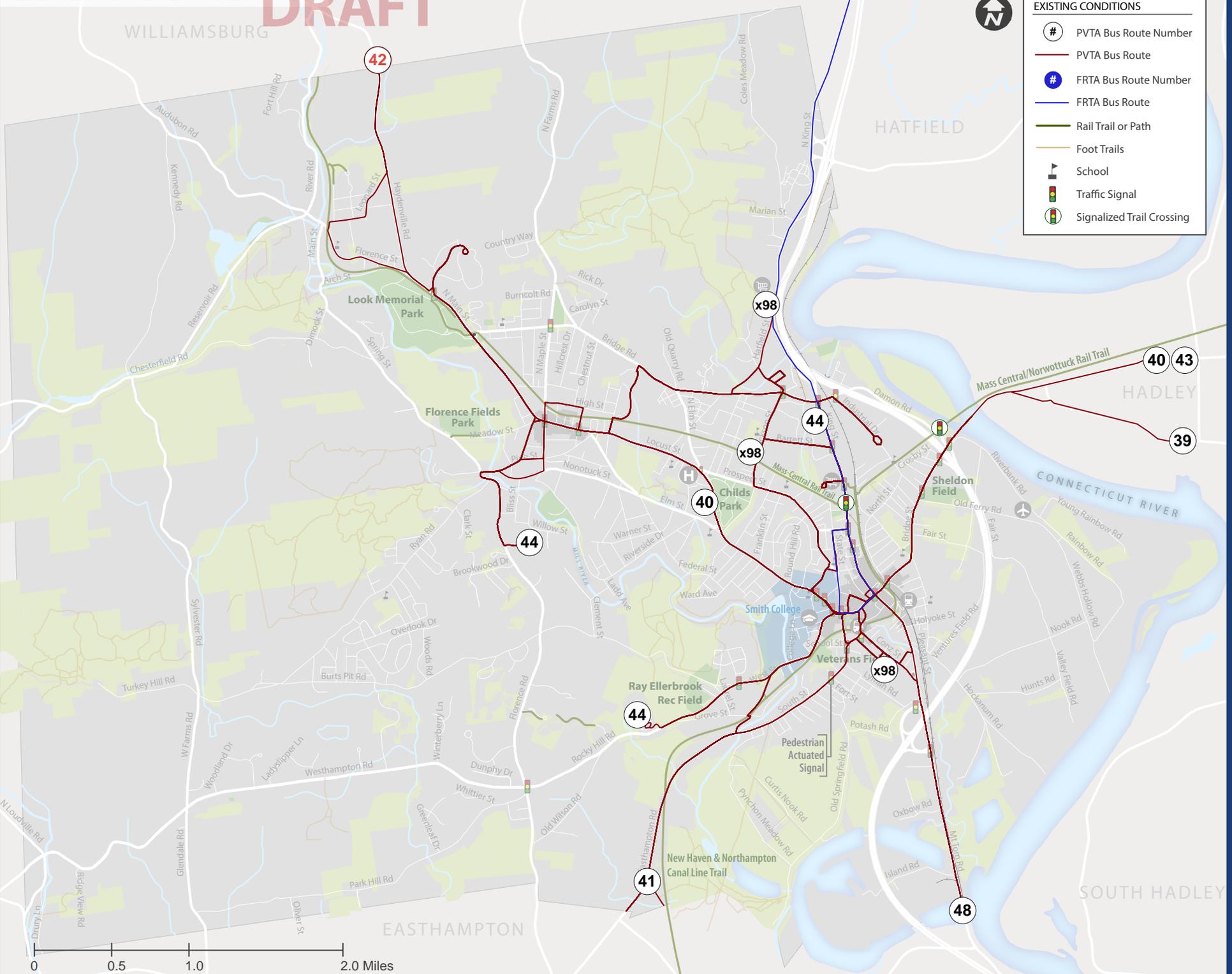


EXISTING PVTA BUS NETWORK

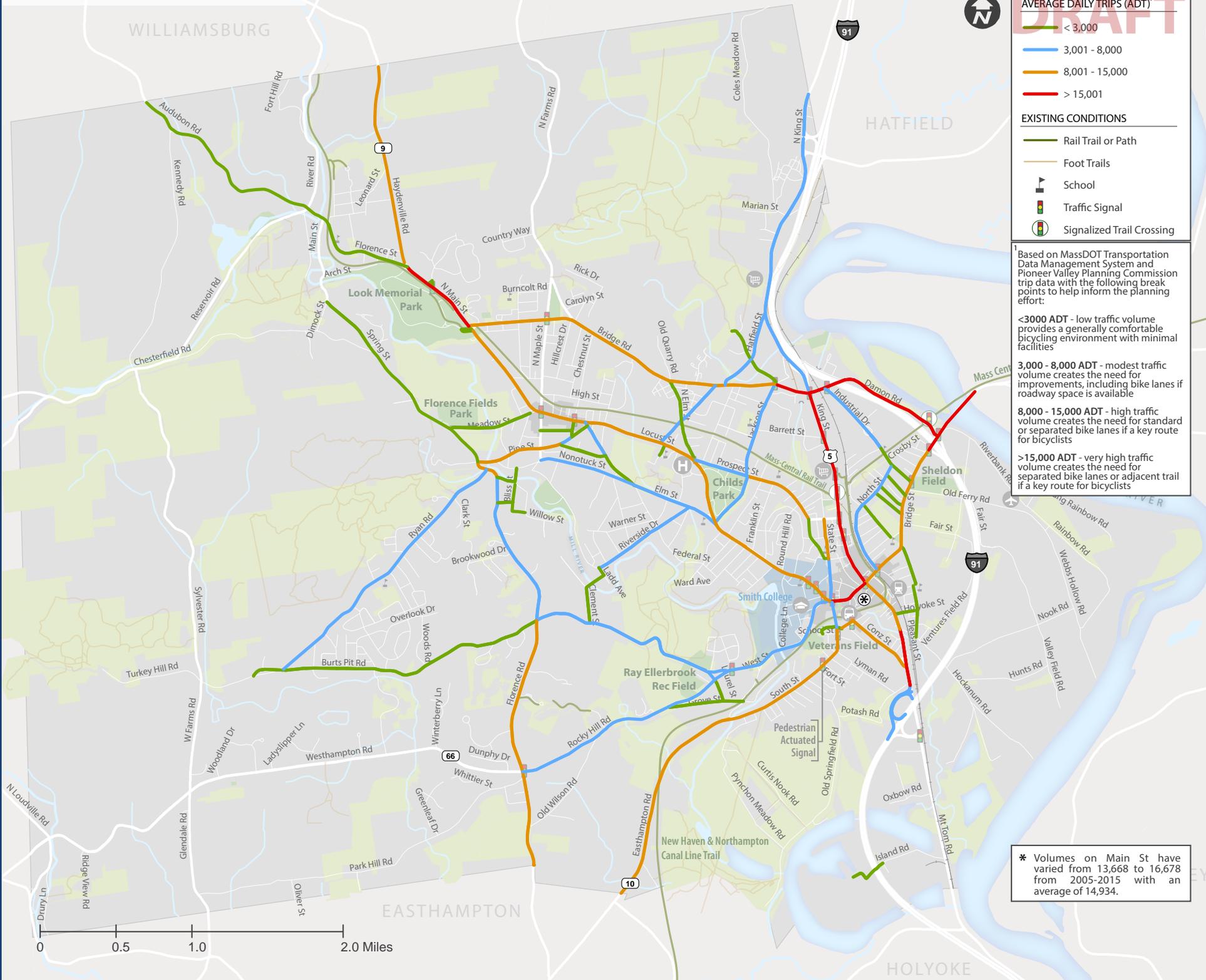
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EXISTING CONDITIONS

- # PVTA Bus Route Number
- PVTA Bus Route
- # FRTA Bus Route Number
- FRTA Bus Route
- Rail Trail or Path
- Foot Trails
- 🏫 School
- 🚦 Traffic Signal
- 🚶 Signalized Trail Crossing



EXISTING ROADWAY VOLUMES



AVERAGE DAILY TRIPS (ADT)

- < 3,000
- 3,001 - 8,000
- 8,001 - 15,000
- > 15,001

EXISTING CONDITIONS

- Rail Trail or Path
- Foot Trails
- School
- Traffic Signal
- Signalized Trail Crossing

Based on MassDOT Transportation Data Management System and Pioneer Valley Planning Commission trip data with the following break points to help inform the planning effort:

- <3000 ADT** - low traffic volume provides a generally comfortable bicycling environment with minimal facilities
- 3,000 - 8,000 ADT** - modest traffic volume creates the need for improvements, including bike lanes if roadway space is available
- 8,000 - 15,000 ADT** - high traffic volume creates the need for standard or separated bike lanes if a key route for bicyclists
- >15,000 ADT** - very high traffic volume creates the need for separated bike lanes or adjacent trail if a key route for bicyclists

* Volumes on Main St have varied from 13,668 to 16,678 from 2005-2015 with an average of 14,934.

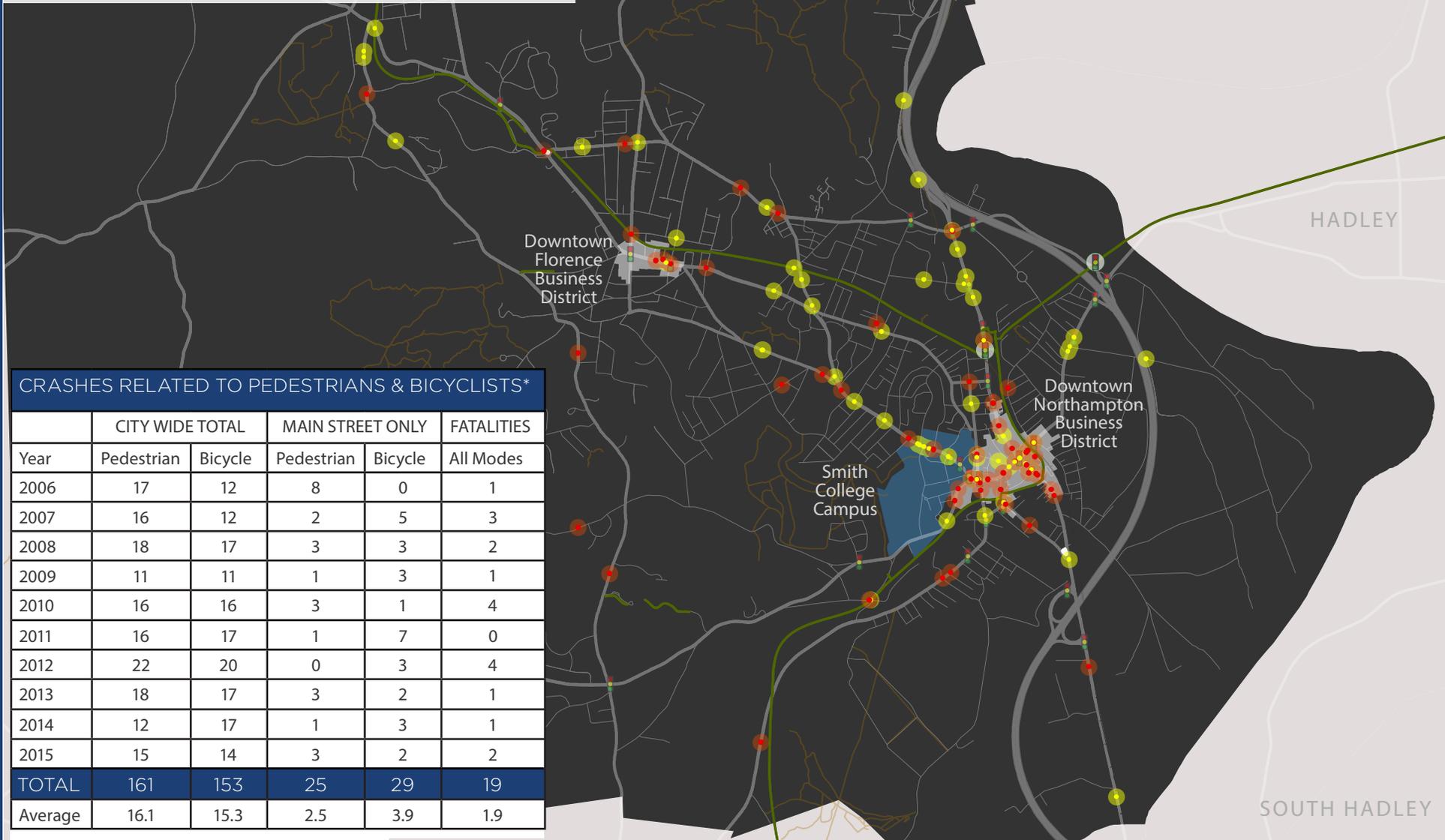
PEDESTRIAN + BICYCLE CRASHES & FATALITIES

The dots on the map represent data from 2009 - 2013. The crash data displayed here included X and Y coordinates, and are therefore presented in the map graphic below. The table in the bottom left contains a summary of 10 years of crash data provided by the Northampton Police Department. While the police department data did include the street name where the crash occurred, no address or cross streets were included, and therefore this data was not mapped.

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CRASHES (2009 - 2013)

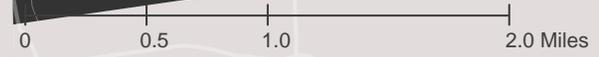
- Cyclist
- Pedestrian
- Traffic Signal
- Signalized Trail Crossing



CRASHES RELATED TO PEDESTRIANS & BICYCLISTS*

Year	CITY WIDE TOTAL		MAIN STREET ONLY		FATALITIES
	Pedestrian	Bicycle	Pedestrian	Bicycle	All Modes
2006	17	12	8	0	1
2007	16	12	2	5	3
2008	18	17	3	3	2
2009	11	11	1	3	1
2010	16	16	3	1	4
2011	16	17	1	7	0
2012	22	20	0	3	4
2013	18	17	3	2	1
2014	12	17	1	3	1
2015	15	14	3	2	2
TOTAL	161	153	25	29	19
Average	16.1	15.3	2.5	3.9	1.9

*Source: Northampton Police Department 1.1.2006 - 12.31.2015



3.2 Gap Analysis

As part of the existing conditions analysis, Alta conducted a qualitative system gap analysis based on field observations, existing planning documents and through the examination of GIS data, aerial imagery, and on-line mapping websites. The analysis includes existing rail trail and on-street networks and features Corridor Gaps, Linear Gaps, Spot Gaps, and intersections that are particularly challenging for bicyclists and pedestrians. This analysis provides an understanding of which areas have the greatest need for improvements, which areas can benefit most from strategic investment, and which areas pose the greatest challenges to further developing a bicycling and walking network.

Corridor Gaps – These gaps are missing links of significant length, typically a half mile or more, where bicycle/pedestrian facilities are desired but do not exist, or are not adequate based on existing or future demand. They may correspond to a street corridor or a desirable route connecting neighborhoods, popular destinations, or to adjacent communities.

Linear Gaps – These gaps are missing segments in an otherwise connected facility, typically ¼ mile or less. Linear gaps may also be barriers between destinations and routes. Significant linear gaps occur in the sidewalk network in many parts of Northampton, especially the more suburban/rural areas where homes were developed in the 1960's through the first decade of the 21st century. (More-recent housing development is required to have sidewalks, as part of current sub-division regulations.) A key linear gap in the bicycle network include the gap between the bike lanes and shared lane markings in central Florence and the bike lanes along Elm St. and Prospect St. For the sidewalk network, one critical linear gap runs along the west side of State Street from Main Street to Trumbull Road.

Spot Gaps – These gaps are point-specific locations lacking facilities or other treatments to accommodate safe and comfortable travel for walkers and bicyclists. This could range from a lack of crosswalk at a key location to a missing spur connection

from a rail trail to an adjacent street of open space. There are various spot gaps within the pedestrian network throughout Northampton: a block lacking a sidewalk, a missing crosswalk at the end of a sidewalk stub, a worn path between a rail trail and adjacent street, and a wide roadway with an unnecessarily long crosswalk. Many streets that dead-end at a rail trail lack proper ADA curb ramps and comfortable connections to the rail trails.

Challenging Intersections – These are intersections that are particularly difficult or unsafe for pedestrians and/or bicyclists. This may be due to wide intersecting roadways, free right turns, large turning radii, confusing geometry, long crossing distances, lack of crosswalks, or inadequate traffic controls. There are challenging intersections sprinkled throughout the city, with some of the most prominent being the West Street/ Elm Street intersection, King Street/Damon Road, Elm Street/North Elm Street and Park Street/Meadow Street/North Main Street.

In aggregate, the various gaps form a key challenge to improving bicycling and walking conditions in Northampton. The following series of maps represent gaps, opportunities and challenges, citywide and within Florence and downtown Northampton.



The lack of bicycle facilities and continuous sidewalks along N Maple St. creates a corridor gap between the Mass Central Rail Trail, Arcanum Field and the trails at the Fitzgerald Lake Conservation Area

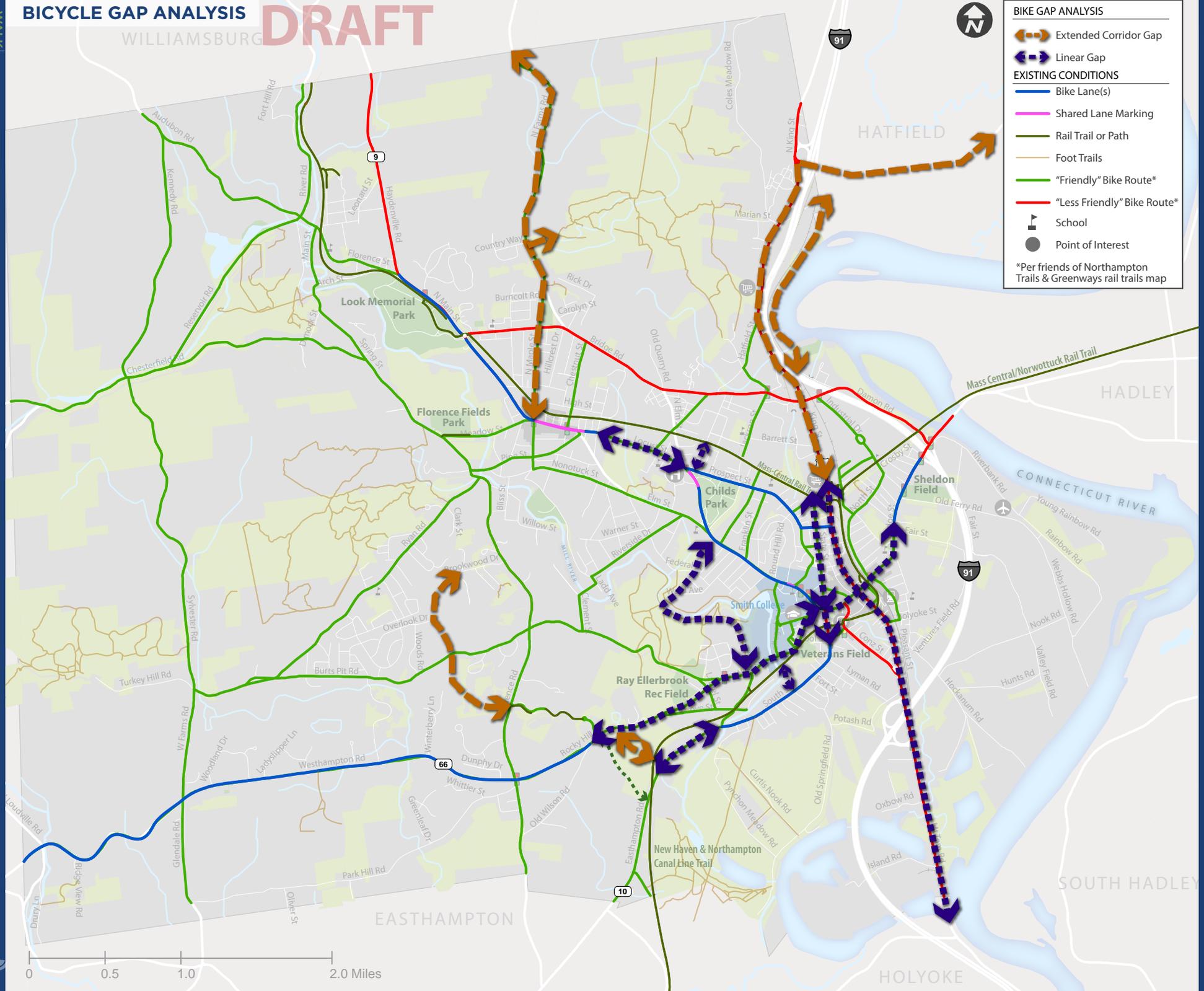


The west side of State St. is a linear gap in pedestrian connectivity downtown



*Along the MassCentral Rail Trail, there are desire lines in spots indicating the need of easement rights across National Grid's utility corridor**

**NOTE: This trail access is designed and planned for 2016 or 2017 construction*



BIKE GAP ANALYSIS

- Extended Corridor Gap
- Linear Gap

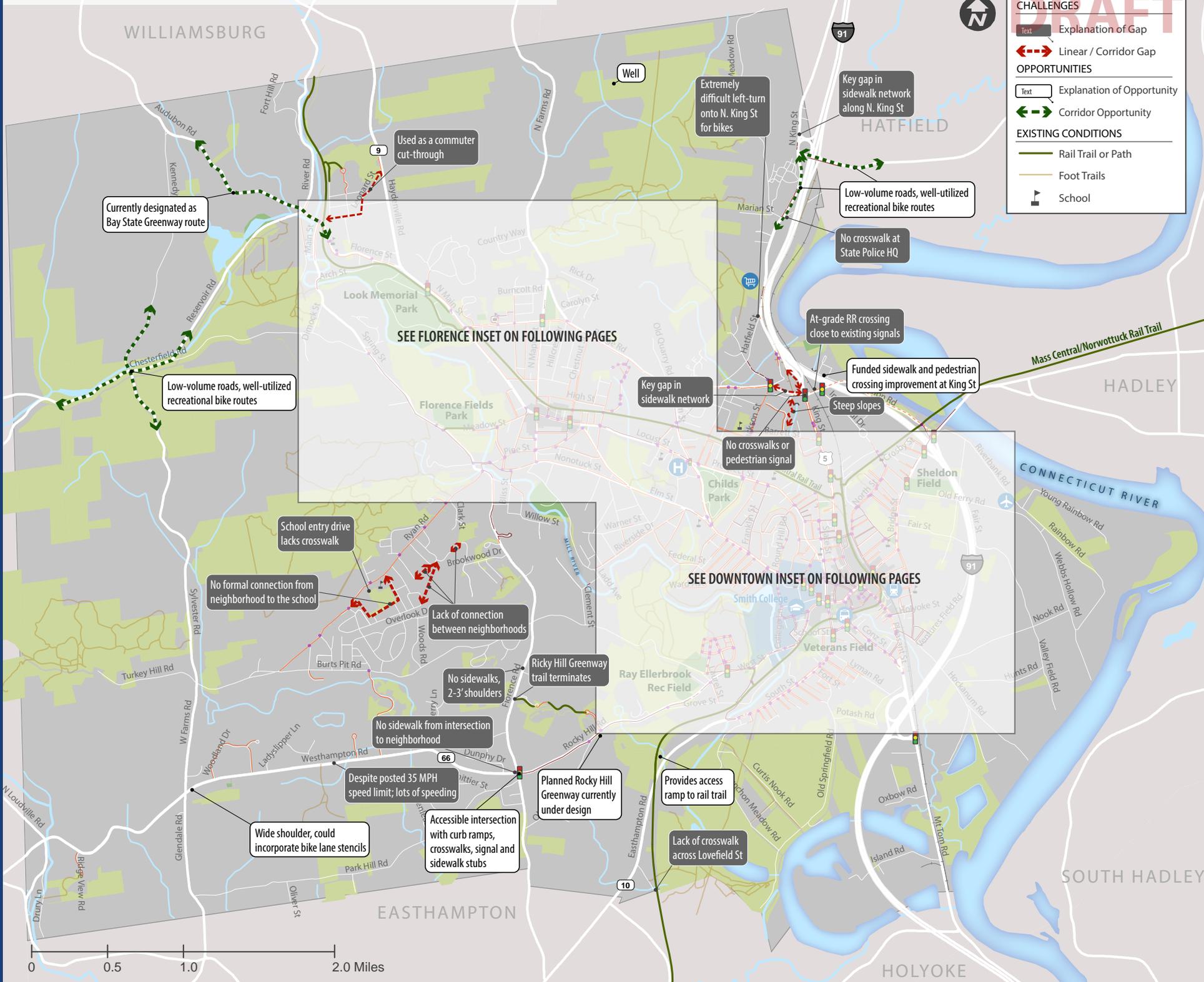
EXISTING CONDITIONS

- Bike Lane(s)
- Shared Lane Marking
- Rail Trail or Path
- Foot Trails
- "Friendly" Bike Route*
- "Less Friendly" Bike Route*
- School
- Point of Interest

*Per friends of Northampton Trails & Greenways rail trails map



PEDESTRIAN & BICYCLE OPPORTUNITIES & CHALLENGES



CHALLENGES

- Text: Explanation of Gap
- Red dashed arrow: Linear / Corridor Gap

OPPORTUNITIES

- Text: Explanation of Opportunity
- Green dashed arrow: Corridor Opportunity

EXISTING CONDITIONS

- Green line: Rail Trail or Path
- Orange line: Foot Trails
- Black square: School

SEE FLORENCE INSET ON FOLLOWING PAGES

Callouts in this inset include:

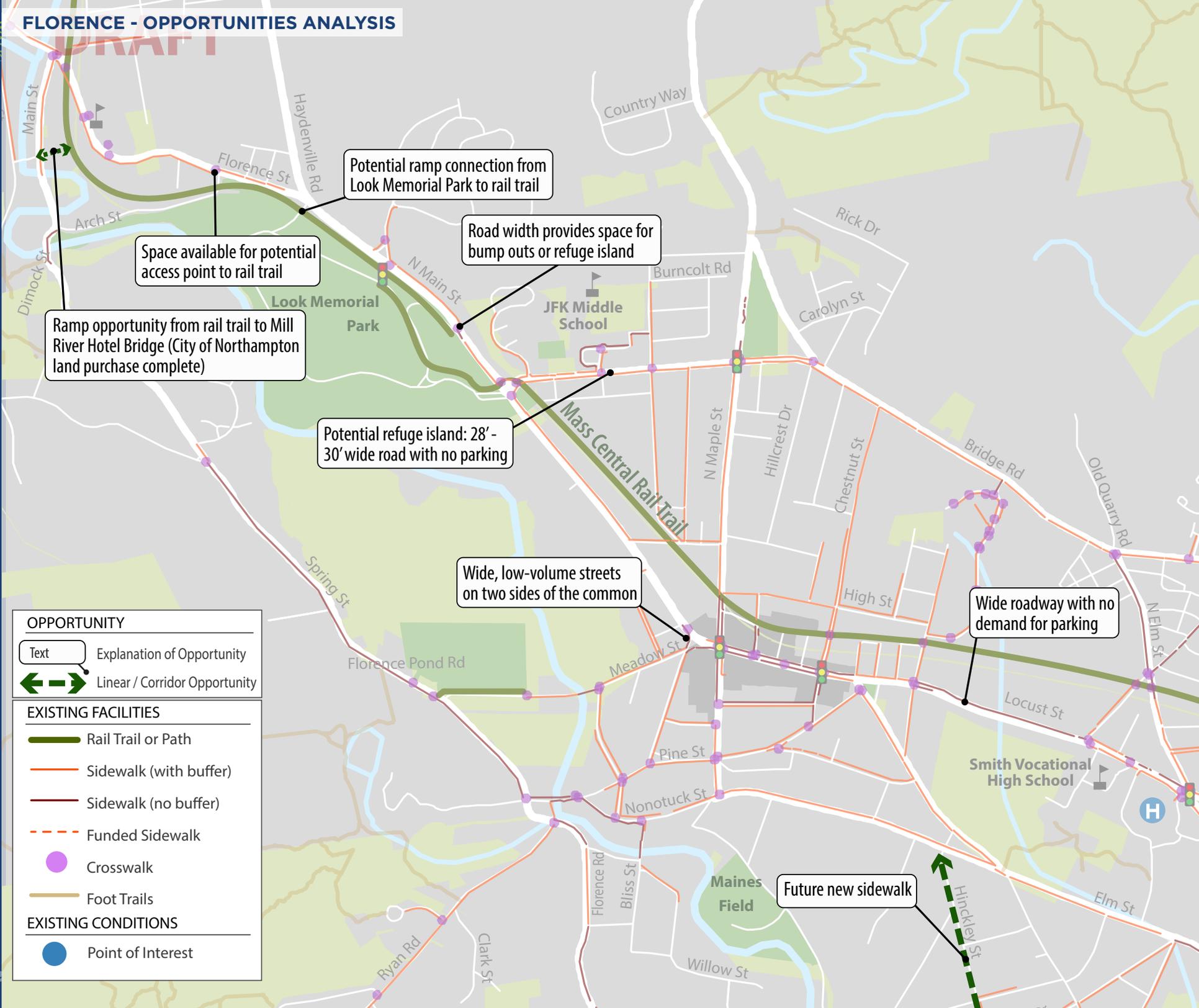
- Used as a commuter cut-through
- Extremely difficult left-turn onto N. King St for bikes
- Key gap in sidewalk network
- At-grade RR crossing close to existing signals
- Funded sidewalk and pedestrian crossing improvement at King St
- Steep slopes
- No crosswalks or pedestrian signal

SEE DOWNTOWN INSET ON FOLLOWING PAGES

Callouts in this inset include:

- School entry drive lacks crosswalk
- No formal connection from neighborhood to the school
- Lack of connection between neighborhoods
- No sidewalks, 2-3' shoulders
- Ricky Hill Greenway trail terminates
- No sidewalk from intersection to neighborhood
- Despite posted 35 MPH speed limit; lots of speeding
- Planned Rocky Hill Greenway currently under design
- Provides access ramp to rail trail
- Lack of crosswalk across Lovefield St

FLORENCE - OPPORTUNITIES ANALYSIS



Potential ramp connection from Look Memorial Park to rail trail

Space available for potential access point to rail trail

Ramp opportunity from rail trail to Mill River Hotel Bridge (City of Northampton land purchase complete)

Road width provides space for bump outs or refuge island

Potential refuge island: 28' - 30' wide road with no parking

Wide, low-volume streets on two sides of the common

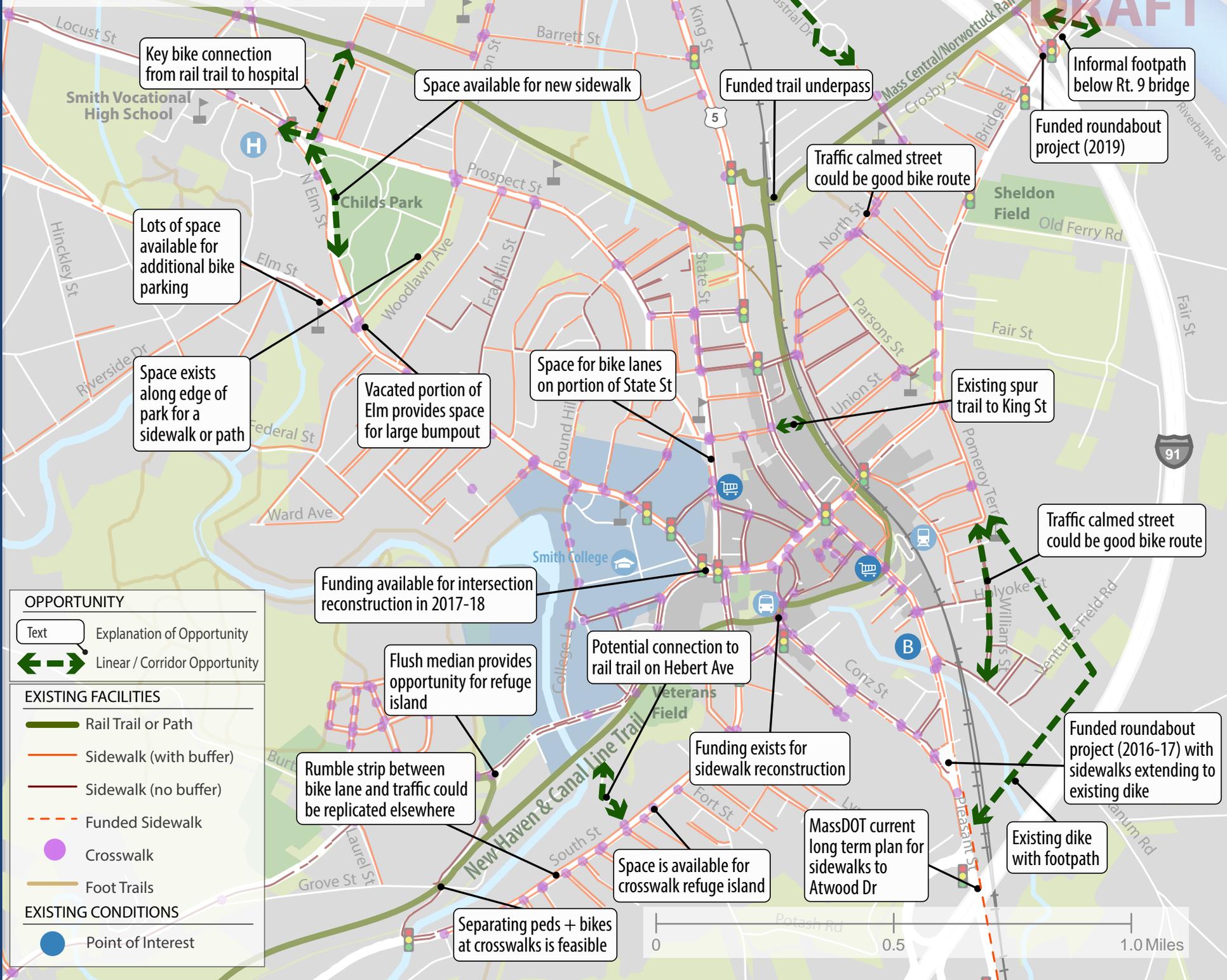
Wide roadway with no demand for parking

Future new sidewalk

OPPORTUNITY	
Text	Explanation of Opportunity
←-→	Linear / Corridor Opportunity
EXISTING FACILITIES	
	Rail Trail or Path
	Sidewalk (with buffer)
	Sidewalk (no buffer)
	Funded Sidewalk
	Crosswalk
	Foot Trails
EXISTING CONDITIONS	
	Point of Interest

DOWNTOWN - OPPORTUNITIES ANALYSIS

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Key bike connection from rail trail to hospital

Space available for new sidewalk

Funded trail underpass

Informal footpath below Rt. 9 bridge

Funded roundabout project (2019)

Traffic calmed street could be good bike route

Lots of space available for additional bike parking

Space exists along edge of park for a sidewalk or path

Vacated portion of Elm provides space for large bumpout

Space for bike lanes on portion of State St

Existing spur trail to King St

Funding available for intersection reconstruction in 2017-18

Flush median provides opportunity for refuge island

Potential connection to rail trail on Hebert Ave

Traffic calmed street could be good bike route

Funded roundabout project (2016-17) with sidewalks extending to existing dike

Rumble strip between bike lane and traffic could be replicated elsewhere

Funding exists for sidewalk reconstruction

MassDOT current long term plan for sidewalks to Atwood Dr

Existing dike with footpath

Space is available for crosswalk refuge island

Separating peds + bikes at crosswalks is feasible

OPPORTUNITY

- Text Explanation of Opportunity
- Linear / Corridor Opportunity

EXISTING FACILITIES

- Rail Trail or Path
- Sidewalk (with buffer)
- Sidewalk (no buffer)
- Funded Sidewalk
- Crosswalk
- Foot Trails

EXISTING CONDITIONS

- Point of Interest

Challenges that exist in the pedestrian and bicycle network in Florence. (See map on previous page.)



Challenges that exist in the pedestrian and bicycle network in downtown Northampton. (See map on previous page.)



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DOWNTOWN - BICYCLE NETWORK CHALLENGES ANALYSIS

GAP ANALYSIS: BIKE NETWORK, DOWNTOWN



GAP ANALYSIS

- Text Explanation of Issue
- Linear / Corridor Gap
- Spot / Area Gap
- Traffic Cut Through

EXISTING FACILITIES

- Rail Trail or Path
- Sidewalk (with buffer)
- Sidewalk (no buffer)
- Funded Sidewalk
- Crosswalk
- Foot Trails

EXISTING CONDITIONS

- Point of Interest
- Traffic Signal
- Signalized Trail Crossing

Only six bike racks that meet standards with a much higher level of demand present

No crosswalk

No curb cut at crosswalk

Lack of plowing creates a gap in winter

Lack of signage to Main St from rail trail

Crosswalk needed at Allen Pl intersection

Right turns create conflict with pedestrians

Poor sight lines for cyclists at trail crossing

South St suffers from speeding traffic

Large curb cuts compromise sidewalk

Path gap between park path and crosswalk

Lack of plowing creates a gap in winter

Long stretch with no crosswalks

Desire line from rail trail to North St

Wide intersection with no crosswalk

Underlit crosswalk

Uncontrolled crosswalk to a school

Limited sight lines

Cut-through traffic issues

Key gaps in pedestrian and bicycle connectivity + urban tree canopy along Pleasant & King Streets

Narrow street without sidewalks

Signal lacks bicycle detector loop

Complex intersection with long crosswalk and blind spots





VISION

The Vision for the Walk/Bike Northampton Plan is to make Northampton one of the top leaders in walk and bike friendly streets of any small city in New England. Pedestrians and bicyclists will be integrated into the City's projects, policies and programs. Planning, design and implementation of roadway, public works and transit projects will accommodate pedestrians and bicyclists of all abilities. The non-motorized transportation system in the city will encourage mode shift and improve safety, the environment, health, and quality of life for residents, visitors and businesses. A bicycle and pedestrian-friendly Northampton will be a more green, affordable and sustainable city with improved mobility and economic vitality.

4. VISION, GOALS, & OBJECTIVES

Introduction

The City of Northampton aims to increase walking and bicycling by residents and visitors of all ages and abilities. The goals and objectives of the Walk/Bike Northampton Plan will guide the development and implementation of the City's sidewalk, trail and bicycle network and programming for years to come. Collectively, they support the City's vision, and are consistent with and build upon the City's current transportation goals and objectives found within Sustainable Northampton Comprehensive Plan.

A Vision is a broad inspirational statement for the desired future state of the city.

Goals are general statements of what the City and residents hope to achieve over time.

Objectives are more specific statements that mark progress towards the goal.

Vision

The Vision for the Walk/Bike Northampton Plan is to make Northampton one of the leaders in walkability and bikability in New England. Pedestrians and bicyclists will be integrated into the City's projects, policies and programs. Planning, design and implementation of roadway, public works and transit projects will accommodate

pedestrians and bicyclists of all abilities. The non-motorized transportation system in the city will encourage mode shift and improve safety, the environment, health, and quality of life for residents, visitors and businesses. A bicycle and pedestrian friendly Northampton will be a more green, affordable and sustainable city with improved mobility and economic vitality.

Goals and Objectives

Goal T-1: Ensure the safe and efficient transportation of goods and people by motor vehicles, bicycle, foot, and any other means

Objectives:

1. Maintain an efficient transportation system.
2. Maintain a transportation system that reduces air pollution and minimizes congestion.
3. Ensure that environmental impacts are considered and adverse effects are minimized on all transportation projects.
4. Reduce use of single occupancy vehicles.
5. Ensure that safety is a primary goal in transportation improvements, systems, and operations, both to reduce crashes and to ensure that both vehicular and non-vehicular modes of traffic are safe and attractive to all users on all roads.
6. Participate in regional efforts to improve utilization of intelligent transportation systems.
7. Develop a public transit plan in coordination with Pioneer Valley Transit Authority and Pioneer Valley Planning Commission.
8. Ensure that the needs of transit services, bicycle, pedestrian, and wheelchairs are considered and addressed in the design, construction, and management of every project affecting the transportation system.

9. Ensure that bicycle infrastructure incorporates current best practices such as separated bike lanes into the planning and design of the facilities

10. Improve the design of key intersections with tighter turning radii, well-designed crosswalks and audible signals with countdowns; where space is available, plan to convert appropriate intersections to roundabouts in the long term.

11. Emphasize walking and bicycling infrastructure enhancements in areas that improve connectivity to schools, commercial districts and bus stops.

Goal T-2: Improve circulation system to accommodate development and encourage bicycle and pedestrian transit

Objectives:

1. Ensure that all new privately built streets include sidewalks, consistent with the Northampton Subdivision Regulations. When feasible and practical, concrete sidewalks on two sides of a street are most desirable.
2. Calm traffic to preserve pedestrian safety and encourage pedestrian activity in neighborhoods and villages. See Also: Transportation Goal T-1 Traffic Calming
3. Transform the Northampton Bike Path and Norwottuck Bike paths/multi-use trail into a complete rail-trail network and increase the number of spur connections to/from the rail-trails to adjacent neighborhoods, commercial districts and schools.
4. Ensure that economic development goals are considered and balanced with other City goals in all transportation objectives, decisions, and improvements
5. Upgrade transportation and public utilities to facilitate expansion of the commercial/industrial site inventory in identified growth areas
6. Ensure pedestrian, bicycle, non-motorized travel, and transit are addressed in every development project.

7. Ensure that public transit stops are located at industrial parks and commercial centers.
8. Close gaps in the pedestrian and bicycle network and address barriers to walking and cycling with new sidewalks, crosswalks, bike lanes, and improved shared lanes where striped bike lanes are not feasible.
9. Target walking and bicycling infrastructure treatments for all ages and abilities.
10. Target walking and bicycling planning and investment that reach a wide variety of neighborhoods regardless of economic status or demographics.

Goal T-3: Improve and expand public transit

Objectives:

1. Leverage regional collaborations to increase funding for provision of public transit services, including shuttles where appropriate.
2. Consider transportation associations that include memberships of local businesses and government to support public transit.
3. Develop Transit Oriented Development guidelines with incentives.
4. Encourage increased use of transit options.
5. Provide reasonable options for public transit based on need, cost, and funding.
6. Develop a public transit plan in cooperation with the PVRTA and PVPC to expand and enhance the transit system to the level that it is economically viable and supported by ridership.
7. Participate in regional efforts to consider the expansion of passenger rail service along the North-South rail links with service to Northampton.

Goal T-4: Support federal and State investments in transportation improvements

Objectives:

1. Compare the State Transportation Improvement Plan and regional Transportation Improvement Program with the goals and objectives of Sustainable Northampton to ensure compatibility.
2. Review the State Transportation Improvement Plan and regional Transportation Improvement Program to ensure investments are programmed for the City.
3. Ensure the plans can provide support to all sectors and areas of the City.

Goal T-5: Provide appropriate bicycle and vehicle parking to support local businesses

Objectives:

1. Create additional spaces to meet current and future anticipated parking demands for vehicles and bicycles while also applying demand management solutions for better utilization.
2. Utilize strategies to minimize parking demand and maximize alternative transportation.
3. Develop parking structures or decks north of Main St. to meet parking needs.
4. Improve the operation of parking in the downtown and village centers.
5. Ensure reasonable access to businesses and services is available to all residents and visitors.
6. Ensure plentiful bike parking in all commercial districts of the city, at schools, public buildings, transit hubs and key destinations

Goal T-6: Increase walking and bicycling trips through education, encouragement, enforcement and evaluation programs

Objectives:

1. Support the establishment of a walk/bike safety education curriculum in schools, as well as through recreation and commuter programs for adults that focuses on bicycle safety.
2. Work with advocates and business interests to promote walking and bicycling through events (e.g. walk/bike to work day, community bike rides), friendly competitions (e.g. walk/bike commute challenge) and awards (e.g. Mayoral recognition to bike friendly businesses)
3. Target walking and bicycling education and encouragement programs in neighborhoods throughout Northampton, with particular focus on those that have not traditionally been involved with such programs.
4. Conduct annual trainings with public safety staff, planners, engineers, parks and recreation and other staff on policies and programs related to walking and bicycling.

5. Establish a city-wide bike share program in coordination with other regional jurisdictions, and with a focus on equitable distribution of stations.
6. Track the number of people walking and bicycling in the spring and early fall, using automated counters at key locations on city streets and on the rail trails.
7. Train local police to ensure proper enforcement of laws related to walking and bicycling; promote compliance to these laws through education efforts such as printed materials, mailers, PSA's, and through social media outlets to the wider community.
8. Designate a part-time Pedestrian and Bicycle Coordinator position to focus on the implementation of pedestrian and bicycle-related policy, program and project recommendations.
9. Gather key data metrics related to the number of miles of designated bike facilities, the bike commute mode share and crashes involving injury and death in order to provide back-up material for Bike Friendly Community applications (see aspirational evaluation measures below).

Aspirational Evaluation Measures

	Desired Outcomes for Northampton			
	Current Conditions	Bronze Level	Silver (2109)	Gold (2025)
Bike Network Mileage / Road Network Mileage	9%	26%	30%	43%
Arterial Streets with Bike Lanes	16%	33%	45%	65%
Bike Commute Mode Share	3.8%	1.2%	3.5%	5.5%
Annual Crashes per 1,000 Daily Bike Commuters	21.2	37	18	10
Annual Fatalities per 1,000 Daily Bike Commuters	0.83	0.4	0.14	0.06