Windham NH 111 Corridor and Wall Street Extension Feasibility Study

State Project No. 15501

Corridor Study Report

July 2011

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Resource Systems Group, Inc.

ROCKINGHAM PLANNING COMMISSION

"OLD VALUES - NEW HORIZONS" TOWN OF WINDHAM - NEW HAMPSHIRE - INCORPORATED - 1742

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List of Acronyms

AADT	Average Annual Daily Traffic
CSS	Context Sensitive Solutions
DHTV	Design Hour Traffic Volume
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
ITS	Intelligent Transportation Systems
GRANIT	Geographically Referenced Analysis and Information Transfer System
LUST	Leaking Underground Storage Tank
MJ	McFarland-Johnson, Inc.
NHDES	New Hampshire Department of Environmental Services
NHDOT	New Hampshire Department of Transportation
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
PPS	Project for Public Spaces
RPC	Rockingham Planning Commission
RSA	Revised Statutes Annotated
RSG	Resource Systems Group
TAZ	Transportation Analysis Zone
TDM	Travel Demand Management
TSM	Transportation System Management
USACOE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency

1.0 Project Description

1.1 Introduction

The Town of Windham, New Hampshire (Town) with assistance from the Rockingham Planning Commission (RPC) and the New Hampshire Department of Transportation (NHDOT) has conducted a planning level corridor study of NH Route 111 (NH 111) in the vicinity of the Town Center and a feasibility study regarding extending Wall Street to benefit NH 111. The purpose of the study is to define the problems that exist along the corridor and at the Town Center and to develop recommendations to address both the problems and opportunities to enhance its Town Center.

NH 111 is one of the few major east to west highways in New Hampshire. It is the southernmost of these highways running from Route 1A in North Hampton on the Seacoast to Hollis before entering Pepperell, Massachusetts, a distance of approximately 50 miles. NH 111 intersects Interstate 95, NH Route 101, NH Route 107, NH Route 125, NH Route 28, Interstate 93, NH Route 102, and US Route 3 (F.E. Everett Turnpike) and passes through the communities of Exeter, Kingston, Danville, Hampstead, Derry, Salem, Windham, Hudson, and Nashua. NH 111 is a vital regional corridor that provides a link between all of these communities and the roadways mentioned above in southern New Hampshire. Figure 1.1 shows both the regional context and the local project location.

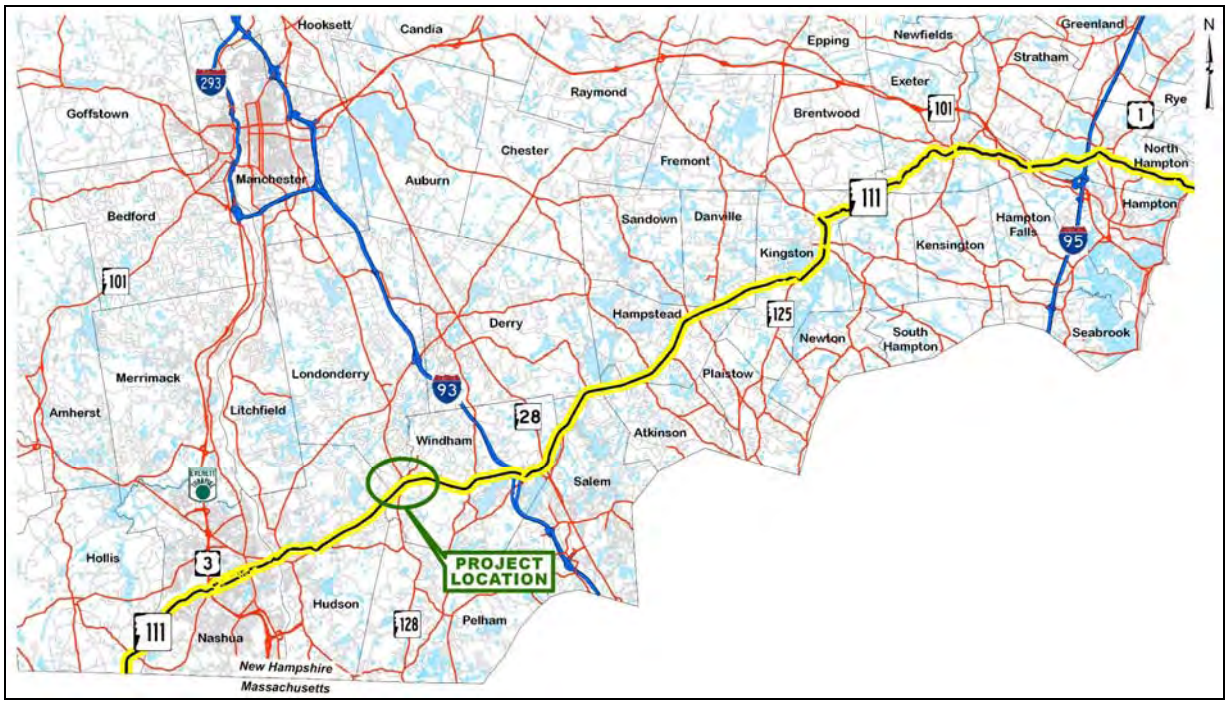

Figure 1.1 – Project Location

This study covers the portion of NH 111 from just west of the Lowell Road/Hardwood Road intersection to the Wall Street intersection, a distance of approximately one mile. In addition to these two signalized intersections, there are traffic signals at the North Lowell Road/Fellows Road intersection and at the Windham Village Shops/U.S. Post Office intersection. Figure 1.2 shows the project limits. It should also be noted that the study limits overlap with the planned relocation of NH 111 east of Wall Street as part of the broader project that will widen and reconfigure Interstate 93 from Salem to Manchester. The shift of northbound Interstate 93, the new configuration of Exit 3, and the relocation of NH 111 are shown in yellow on Figure 1.2.

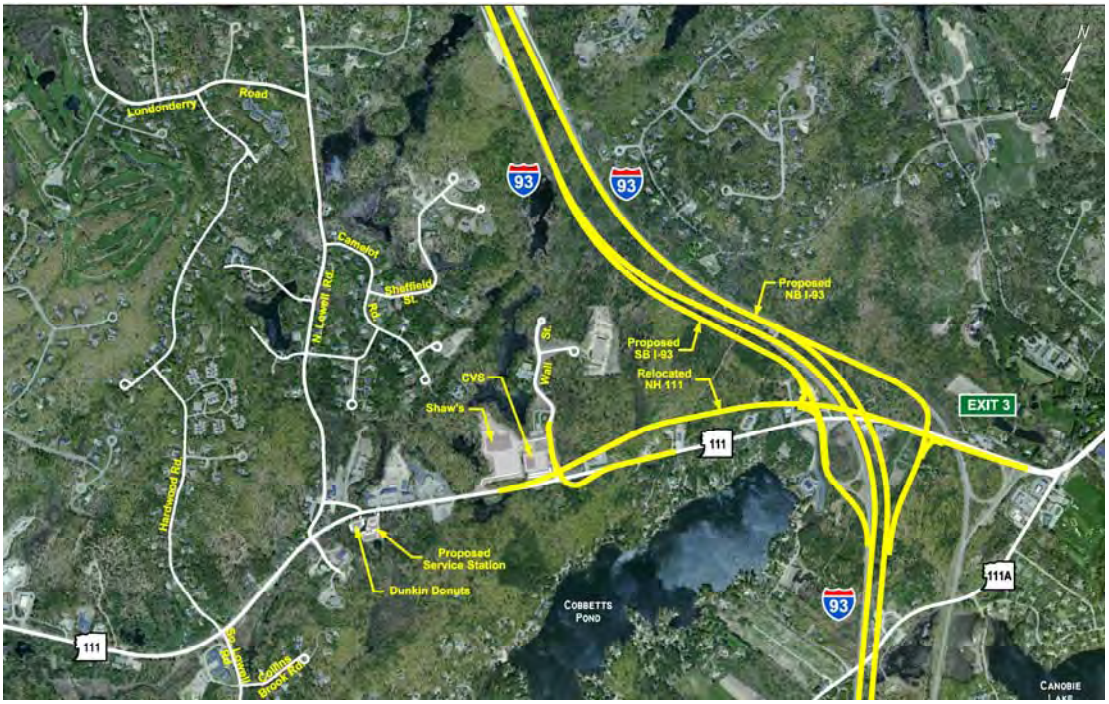

Figure 1.2 – Project Limits

This is a conceptual study of the NH 111 corridor to determine the preferred configuration of NH 111 and other roadways as they pass through or near the Town Center. It will not, in and of itself, result in the short term programming, engineering, or construction of the roadway improvements that are recommended. Rather, it provides the necessary planning, feasibility assessment, and local consensus building to enable the project to be identified as a priority for programming in the RPC MPO and State Ten Year planning process.

1.2 Project History and Overview

The need to improve NH 111 through the Windham Town Center was first studied in the 1990's as part of the overall Windham-Salem Route 111 Project. Alternatives considered in that study included bypasses that carried NH 111 north of the Town Center as well as a widening of the existing NH 111 to a five-lane section through the

Town Center. These alternatives were rejected and the project resulted in improvements to NH 111 east of Interstate 93 only.

The widening of Interstate 93 from Salem to Manchester was also studied in the 1990's and included improvements to Exit 3 and NH 111. The improvements to NH 111 ended at Wall Street. The concept of extending Wall Street to North Lowell Street was first proposed as mitigation for the increased traffic between North Lowell Road and NH 111 that would occur as a result of the widening of I-93 and NH 111 east of Wall Street. The NHDOT did not consider construction of the Wall Street Extension to be a necessary component of the I-93 widening. However, the NHDOT did agree that the extension deserved to be studied further and agreed to fund the study through the RPC.

In that same timeframe, the Town of Windham was also evaluating the future of NH 111 in the Town Center. In 2005, a Conceptual Master Plan of the Town Center was developed that included a potential bypass for NH 111 south of the existing corridor. The intent of the master plan was to move the through traffic on NH 111 away from the Town Center and allow the old NH 111 to function as a new Main Street for the Town Center.

The RPC agreed to administer the NHDOT sponsored study of NH 111 and the Wall Street Extension on behalf of the Town. In developing the scope for this Study, a local advisory committee was established and defined the project to consist of three inter-related components. These are:

- Wall Street Extension
- NH 111 Bypass
- NH 111Corridor

An overall evaluation of the NH 111 Corridor was appropriate to determine the short-term and long-term needs for NH 111, especially in light of the widening of I-93, reconstruction of Exit 3, and the increased traffic volumes expected to result. Figure 1.3 depicts the project area and the three components.

The RPC and the local advisory committee selected a consultant team led by McFarland Johnson, Inc. (MJ) to conduct the study. The MJ Team includes highway, environmental, traffic, roundabout, aesthetic, architectural, and planning experts. In addition to MJ, the team includes Carol R. Johnson Associates Inc. (CRJA) for aesthetic and architectural expertise, Project for Public Spaces (PPS) for public outreach and village planning, and Resource Systems Group (RSG) for traffic modeling. The Project Team includes the MJ Team experts along with Town staff, RPC staff, and NHDOT staff. Appendix B contains the Project Team including names and expertise.

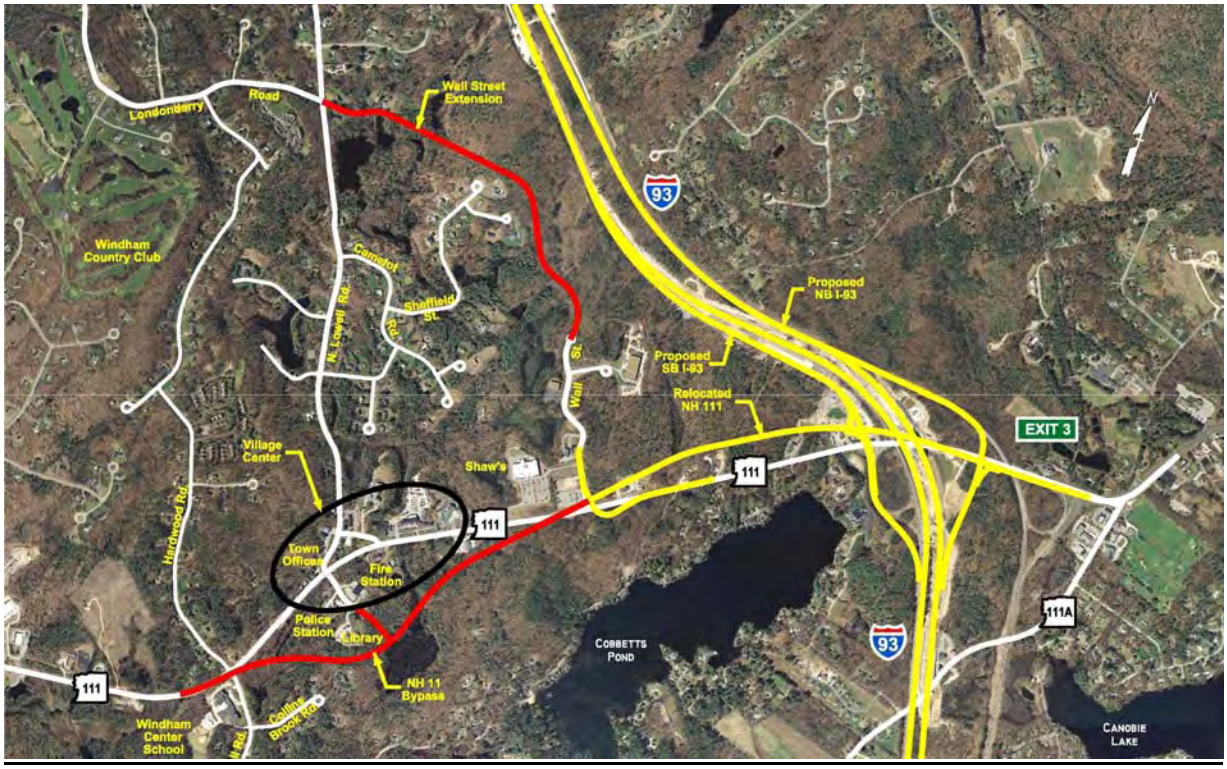

Figure 1.3 – Project Components

1.3 Existing Roadway System

The NH 111 corridor within the project limits provides a vital east-west highway in southern NH and serves as a major corridor for regional traffic. It provides direct access to Interstate 93, the principal north-south interstate in NH. North Lowell Road and Wall Street are the other key roadways studied.

1.3.1 NH Route 111

The existing NH Route 111 (NH 111) corridor within the study limits is a two-lane Urban Principal Arterial that conveys approximately 21,000 vehicles per day (2010). It is the most southerly east-west New Hampshire State Route highway and therefore serves as a major corridor for regional traffic. Peak traffic flow travels eastbound towards Interstate 93 (I-93) in the morning and westbound from I-93 in the afternoon. The speed limit is posted as 40 mph but with wide shoulders and minimal roadside features, the roadway has the feeling of a highway, encouraging vehicles to travel at higher speeds. The corridor has one lane in each direction with a center turn lane in several locations and right turn lanes at several intersections and entrances. Within the study limits there are a limited number of driveways, which reduces conflicts for NH 111 traffic. There are no sidewalks or bike paths along the roadway, but crosswalks and concrete sidewalk ramps are present at the signalized intersections.

NH Route 111 Looking West from No. Lowell Road

NH Route 111 Looking East from Church Street

There are four traffic signals along NH 111 within the project limits located at following intersections.

- Wall Street
- Village Green Mall/U.S. Post Office
- North Lowell Road/Fellows Road
- Lowell Road/Hardwood Road

The four signals are coordinated to optimize the flow of east-west traffic. Three of the signals are interconnected via radio transmission while the Wall Street intersection is coordinated by time.

1.3.2 North Lowell Road

North Lowell Road north of NH 111 is an Urban Collector Road that conveys approximately 5,100 vehicles per day (2009). It provides access to I-93 via NH 111 for the residential areas in northern Windham, southern Derry, and southern Londonderry. Peak traffic flow travels southbound in the morning and northbound in the afternoon, coinciding with the peak flows directed to I-93. The alternate route for these commuters is to use Exit 4 on I-93, which is 6 miles further north. The posted speed limit is 35 mph with one lane in each direction and shoulders 1 to 2-feet in width. There are no sidewalks or bike paths along the roadway and the narrow shoulders make pedestrian and bicycle use difficult.

North Lowell Road looking North from NH 111

North Lowell Road

1.3.3 Wall Street

Wall Street is a dead-end local road that provides access to commercial properties. It is connected to NH 111 via a signalized intersection. Wall Street provides access to a shopping mall that includes a Shaw's supermarket, a state park and ride lot, a bank, an office building, and an industrial business via International Road. There is direct access to the shopping mall from NH 111, however, only for westbound traffic. All eastbound traffic heading to the shopping mall must use Wall Street. There is no posted speed limit along the roadway and there are no sidewalks or bike paths.

Looking at Wall Street from NH Route 111

Wall Street, Looking North

1.3.4 Traffic Conditions

Southern NH has experienced a great deal of growth over the past several decades and this has created increased traffic on all roadways, especially key regional routes like NH 111. This traffic growth is related to both the population growth and to growth in business and commercial destinations, roughly measured by change in employment both in Windham and Rockingham County, over the past 40 years. Table 1.1 shows the population growth in Rockingham County and Windham since

1970, where the number of people in Windham has quadrupled and doubled in the county. Table 1.2 shows the employment growth in Rockingham County and Windham since 1970, where the number of jobs in Windham has nearly tripled and more than doubled in the county.

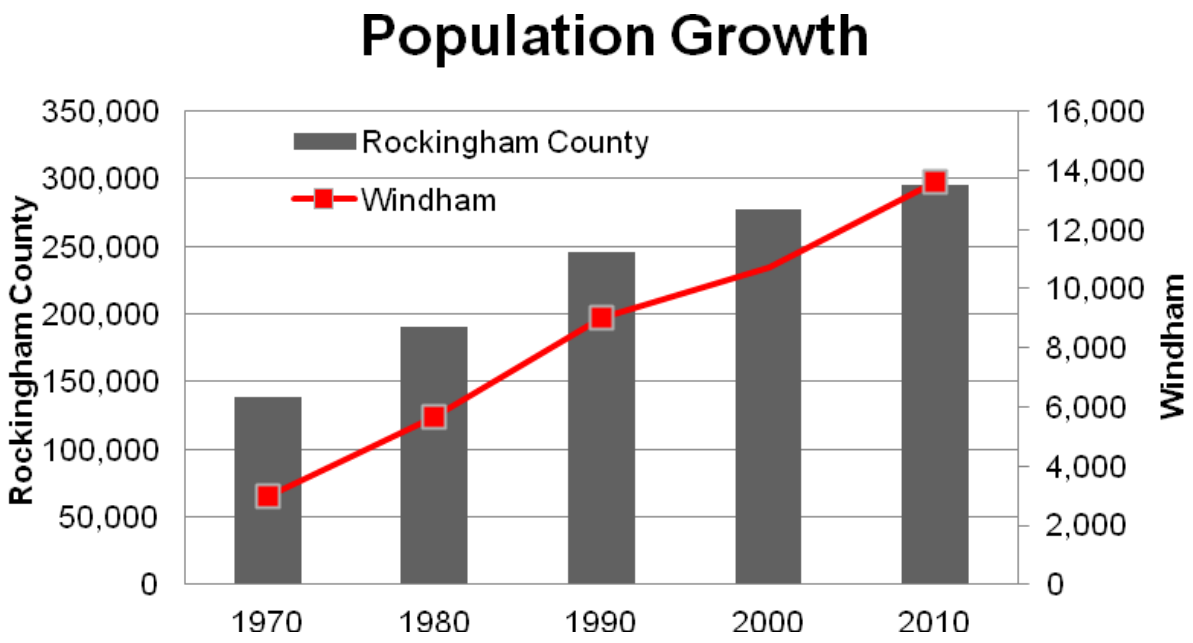

Table 1.1 – Windham and Rockingham County Population Growth

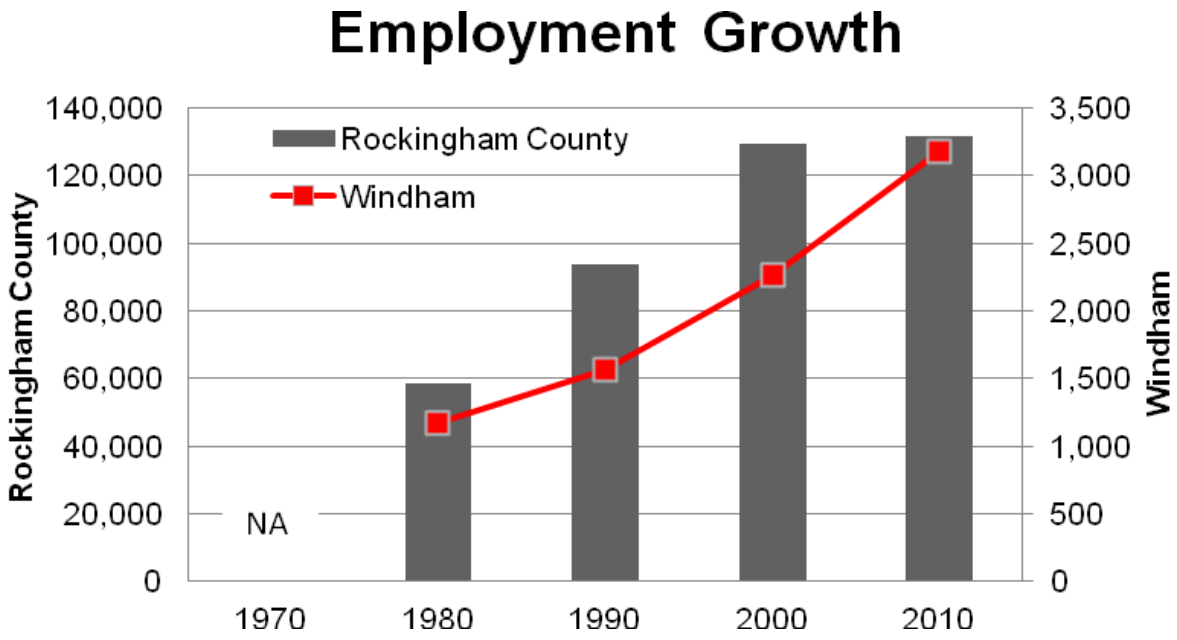

Table 1.2 – Windham and Rockingham County Employment Growth

During the forty years since 1970 only a few improvements have been made on NH 111 within the project limits. The major intersections have been improved with turn lanes and upgraded traffic signals. No significant capacity improvements were made to NH 111 or I-93, while the demand has increased significantly. The overall increase in traffic volumes is best illustrated by the permanent counter located between Exits 3 and 4 on I-93. Table 1.3 shows the average annual daily traffic volume (AADT) on I-93 between Exits 3 and 4 from 1970 to 2010.

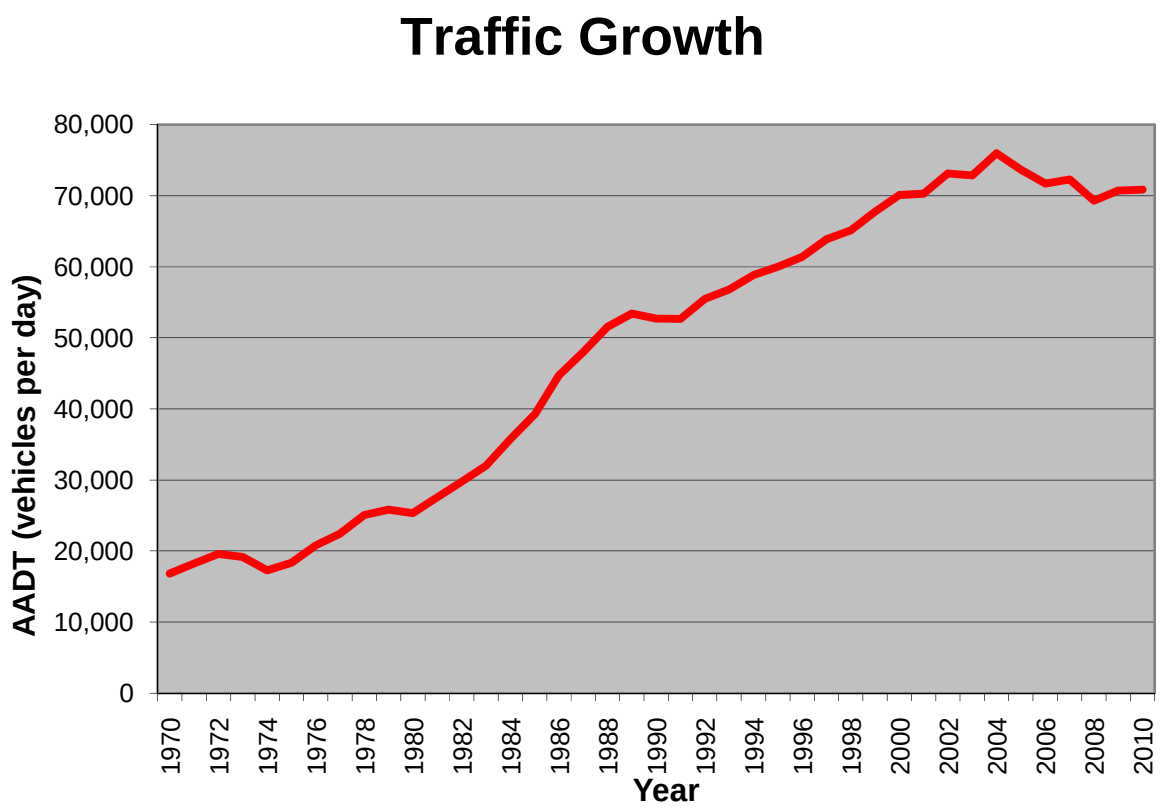

Table 1.3 – AADT on Interstate 93 between Exits 2 and 3

While the traffic volume on I-93 has experienced a slight decline since its peak in 2004 due to the slow economy, the traffic volume between 1970 and 2010 still quadrupled.

1.3.5 Safety Issues/Crash History

Crash data along the corridor was collected and it was found that the majority of crashes along NH 111 can be attributed to driver inattention, distraction, or error. A high percentage of these crashes were rear end collisions. Typically, these types of crashes indicate congestion in the area. A majority of the crashes along the corridor occurred at the signalized intersections.

The data analyzed in this study dates from January 2004 to December 2010. The data was collected along NH 111 from the Lowell Road/Hardwood Road intersection to the Wall Street intersection. A total of 210 crashes were reported during that timeframe. Of these crashes, 38 resulted in a total of 48 injuries. There were 147 rear end collisions, 70% of the total number of crashes. The congestion during peak periods appears to contribute to the high percentage of rear end collisions. Most crashes have been categorized as property damage only.

Table 1.4 summarizes the time of day for all of the reported crashes between 2004 and 2010. While the two peak commuting periods account for about 17% of the day and 30% of the traffic volume, 39% of the crashes occurred during these four hours. This again suggests congestion plays a role in these crashes. Also, 83% of the crashes occurred during the day.

Morning Peak (7 AM – 9 AM)	**Day time (9 AM – 4 PM)**	**Afternoon Peak (4 PM – 6 PM)**	**Night Time (6 PM – 7 AM)**
28	93	54	35

Table 1.4 – Time of Day Crash Summary

Each intersection within the project limits was evaluated in an attempt to identify any safety issues that may exist. The NH 111/Lowell Road/Hardwood Road intersection reported ten crashes, with one resulting in an injury. Seven of these crashes were rear end collisions and involved vehicles approaching the signal. The restricted sight distance due to the horizontal curve at the intersection may conceal vehicles in the westbound left turn lane queue and the congestion during peak periods may also contribute to the number of rear end collisions.

The NH 111/North Lowell Road/Fellows Road intersection reported 77 crashes, with 17 crashes resulting in 20 injuries. Most of the crashes (63) were rear end collisions caused by inattentive drivers. The high percentage of rear end collisions are most likely the result of congestion. There was an even distribution of crashes for traffic approaching from the east and approaching from the west, indicating congestion in both directions.

The NH 111/Wall Street intersection reported 41 crashes, with nine of the crashes resulting in ten injuries. A large number of the crashes were rear end collisions which, again is indicative of congestion in the area. There were also crashes that occurred while making turning movements and merging with other vehicles. These crashes can sometimes be attributed to improper sight distance or poor intersection design. Specifically, when traffic is exiting Wall Street and looking towards the east there is a crest vertical curve that may hinder the ability to see approaching traffic. Combining this poor sight distance with the high rate of speed in this area creates an unsafe right hand turn for vehicles stopped at the red light exiting Wall Street. Prohibiting the right

turn on red movement when exiting Wall Street may reduce the crash rate at this intersection.

There were 51 crashes located in front of the post office and shopping plaza along NH 111. Seven of these crashes resulted in 12 injuries. Of these crashes, 34 were the result of rear end collisions, which indicates congestion in the area. The low percentage of injury related accidents is also a sign of congestion as vehicles are usually operating at low speeds.

There were 31 crashes where no major intersections were located. Four of these crashes resulted in five injuries. These remaining crashes along NH 111 had no apparent pattern and were caused by driver error or weather conditions. Another contributing factor to crashes through the corridor is sun glare which is a result of the east/west direction of NH 111. Table 1.5 summarizes the crash history for the various road segments.

Two of the crashes occurring in 2005 resulted in fatalities. One of the fatalities was the result of an impaired driver. The other was a motorcycle rider whose vision may have been impaired by the glare of the sun. The rider skidded as he attempted to stop behind queued vehicles. This crash occurred in the westbound direction at 5:00 pm when the sun was setting.

Segment	Number of Crashes	Injury Crashes	Number of Rear End Collisions (Percentage of Total)
NH 111/Lowell Road/ Hardwood Road Intersection	10	1	7 (70%)
NH 111/North Lowell Road/Fellows Road Intersection	77	17	63 (82%)
NH 111/Wall Street Intersection	41	9	28 (68%)
NH 111/Church Street-Shopping Plaza Area	51	7	34 (67%)
NH 111 Remaining Roadway	31	4	15 (48%)
Totals	**210**	**38**	**147 (70%)**

Table 1.5 – Crash Summary

1.4 Context Sensitive Solutions Approach

NHDOT has formally adopted and implemented the Context Sensitive Solutions (CSS) approach into its project development process. The CSS approach is a community driven process that looks for solutions that match the context of the location. CSS is defined by the Federal Highway Administration (FHWA) as

> *"a collaborative interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic and environmental resources, while maintaining safety and mobility"*.

The *Windham NH 111 Corridor and Wall Street Extension Feasibility Study* was initiated in 2006 with the intent of utilizing the CSS approach. The scope of work and project team was specifically developed to follow the CSS approach.

One of the CSS guidelines is to involve all stakeholders in the process. A stakeholders group, known as the Project Advisory Committee (PAC), was formed in early 2009. The CSS process outlines specific steps in the planning process that are used to gain a better understanding of the project. The steps are shown below in Figure 1.4 and described in more detail in the following sections.

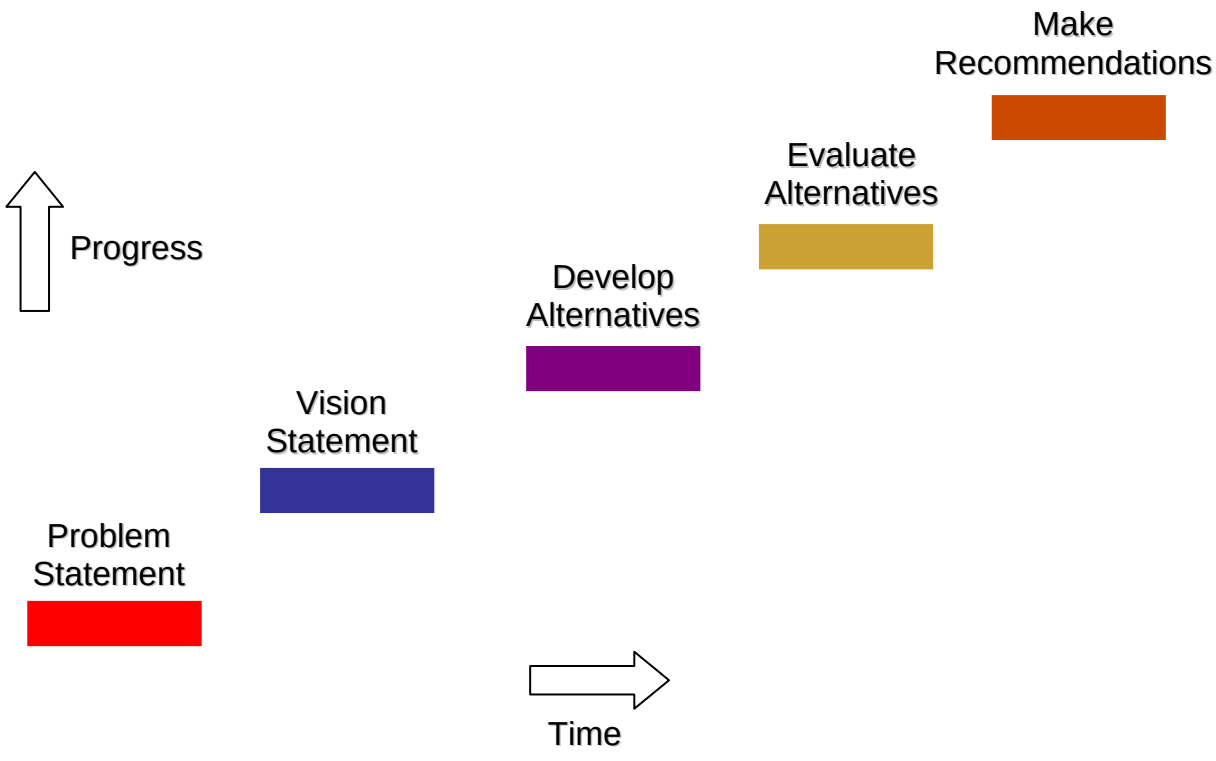

Figure 1.4 – CSS Planning Steps

1.4.1 Project Advisory Committee

An essential aspect of the CSS approach is to involve all stakeholders at every step of the process. The Project Advisory Committee (PAC) was assembled with stakeholders representing varied community, environment, and transportation interests. Each agency or group appointed its own representative(s) to the PAC. Below is a list of the agencies and groups and their representatives on the PAC.

Project Advisory Committee

Windham Board of Selectmen	Bruce Breton (2009-2011), Ross McLeod (2009-2011), and Roger Hohenberger (2011)
Windham Planning Board	Sy Wrenn
Windham Historic District Commission	Kay Normington, Lorri Kimball, and Carol Pynn
Windham Town Administrator	David Sullivan
Windham Highway Department	Jack McCartney
Windham Police Department	Chief Gerald Lewis
Windham Fire Department	Chief Tom McPherson
Windham Conservation Commission	Jim Finn
Windham Community At-Large	Bob Winmill & Robert Ashburn
Rockingham Planning Commission	Lee Maloney
NH Department of Transportation	William Rose
Southern NH Planning Commission	Matt Caron

The PAC completed each of the CSS Planning Steps of the project development process. The presentations, discussions, brainstorming, and questions during PAC Meetings were all necessary in order to progress through the steps. There were 15 PAC Meetings held from September 2009 to March 2011 to complete the CSS Steps.

One of the important distinctions regarding the PAC involved the way decisions were handled. The PAC is an advisory group, but its opinions and direction are thoughtfully considered by the consultant team, RPC, and the project's funding agency, the NHDOT. The distinction is that the PAC functioned on the basis of consensus. For each step of the process, consensus was sought from the PAC. The definition of consensus used by the group stated:

"Consensus does not mean that everyone agrees, but that principal groups and individuals can live with a proposal"

The objectives of consensus are for the PAC to work together to make progress in the project development process and to take ownership of the decisions.

1.4.2 Problems and Vision

The first two CSS steps involve gaining a better understanding of the project and what the stakeholders want to see come out of the process. First, it is crucial to have a clear picture of the problem the project is attempting to address. The problems need to include the obvious transportation issues such as capacity, safety and maintenance. They should also include those functions the project is not currently providing, but which the stakeholders believe it should.

Understanding the existing problems along NH 111 is important, but equally important is the long-term vision the community has for the corridor and the Town Center. The solution for the corridor should address the problems identified, but with an understanding of and direction towards achieving the overall vision for the corridor.

To gain a full understanding of the problems and vision for the project, the public must be consulted. On November 5, 2009, a public Project Kick Off Meeting was held. At this meeting, which is described in more detail in Section 1.4.4, several questions were asked of the public. The purpose of these questions was to hear opinions directly from the citizens of Windham and the users of the corridor. The questions posed were:

What are the problems along the NH 111 Corridor near the Windham Village Center?

What is your vision for the NH 111 Corridor in the Windham Village Center?

What is the link between the Extension of Wall Street and a Windham Village Center?

The discussion that took place after the first question resulted in a list of issues the public considered problems. The list included traffic issues regarding traffic volumes and delay, a lack of places to go in the village, a lack of municipal utilities, zoning issues, and resource constraints. From this list, the project team prepared several problem statements for consideration by the PAC. The PAC reviewed each and reached consensus on a Problem Statement. As a "living document", the statement has been revised several times to reflect new information and/or insight. The final Project Problem Statement is:

Project Problem Statement

The Town of Windham, NH, lacks a vibrant town center. While zoning has been put in place to create a town center with a variety of civic, commercial and residential uses, as well as community gathering spaces, the high volume of traffic on local roads and on the state highway that bisects the town center have impeded its development. Improvements to Interstate 93 will further increase this traffic and prevent the desired development. Additional obstacles to success include a lack of connectivity between existing commercial uses, the lack of public water and sewer, natural resource constraints, lack of public transportation, the high volume of truck traffic, and the trend towards vehicle dependency.

The discussion that took place regarding the second two questions resulted in a list of desires and goals for the Town Center. The list included items such as making the area more walkable, balancing commercial and residential development, creating community gathering places, and separating the village from the highway. The Project Team also developed several vision statements for consideration and the PAC reviewed each and reached consensus on a Vision Statement. After several revisions, consensus was reached on the following final Project Vision Statement:

Project Vision Statement

The historic town center of Windham, NH will become a vibrant village center with an improved NH 111 corridor that serves multiple modes of travel more safely and efficiently in an aesthetically pleasing form. Community gathering spaces, new retail and civic destinations, and a range of housing options will enhance the quality of life and sense of community for residents and will attract visitors from around the region. Planning and development will be sensitive to the environment, to adjacent historic districts, and to residential neighborhoods while improving connectivity between existing and new development.

1.4.3 Alternatives Development and Evaluation

The intent of alternatives development is to identify any and all alternatives, concepts or options that could be considered for the NH 111 corridor in Windham. It is important that all alternatives get fair consideration so that in the future, the recommended alternative can be defended.

The evaluation of an alternative is based on its ability to meet the Project Vision Statement. It is not expected that any alternative can completely meet the vision, but how close it comes will determine the recommended alternative. The process used by the PAC to evaluate alternatives was to review and discuss each one and develop a consensus as to which met and which did not meet the project vision.

The range of alternatives established for the project in large part relied on concepts developed locally before this study began. As described in Section 1.2, alternatives for this portion of NH 111 began as part of the NH 111 Bypass Project, the I-93 Widening Project, and the *Windham Village Center District Conceptual Master Plan*.

The idea of a Wall Street Extension began as a way to address the impacts on the Town Center caused by the high volume of traffic that uses North Lowell Road to access NH 111 and I-93. A detailed description of the Wall Street Extension can be found in Section 4.2.

A potential bypass for NH 111 around the Town Center was envisioned by the *Windham Village Center District Conceptual Master Plan* in 2005. A detailed description of the NH 111 Bypass can be found in Section 4.3.

The future for the existing NH 111 corridor was also considered as it relates to the other alternatives being considered as well as an alternative itself. A detailed description of the In-Corridor NH 111 Alternatives can be found in Section 4.4.

1.4.4 Public Participation Activities

A fundamental aspect of a planning study is a comprehensive public participation program. The CSS process promotes the role of stakeholders, but it also emphasizes the need to bring a project to the people and the users. There were several opportunities and mechanisms used during the Study for the public to participate. These activities corresponded to key milestones in the project where public comment beyond that provided by the PAC was needed. The public participation opportunities included a project Kick-Off Meeting, the project website, and two public informational meetings. These are discussed in more detail below. Figure 1.5 depicts where in the CSS process the public meetings occurred.

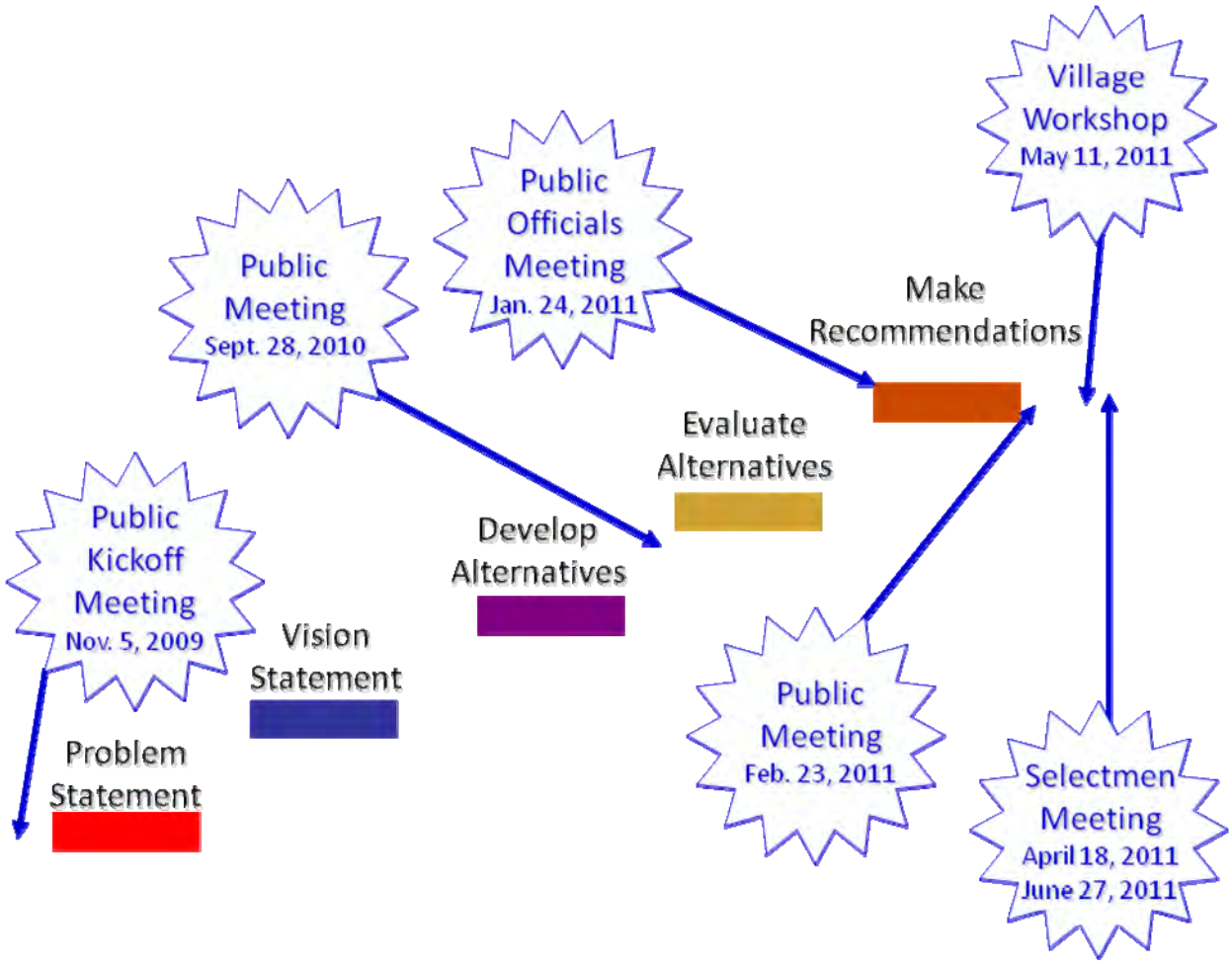

Figure 1.5 – Public Participation Activities

Project Website

To ensure that all information was available to PAC members, project team members, and the public, a project website was created and hosted on the Town's website. The website, www.windhamnewhampshire.com/updated/wallstreet.htm, is located on the Town of Windham website under the Committees tab. The site contains project information including:

- Project Background
- Project Scope of Work
- Project Advisory Committee (PAC) Members
- PAC Meeting Notes
- PAC Meeting Presentations
- Public Meeting presentations
- Project Graphics
- Project documents
- Informational Videos

The website is shown below on Figure 1.6.

Figure 1.6 – Project Website

Project Kick-Off Meeting

A Project Kick-Off Meeting was held at the Searles School and Chapel on Thursday, November 5, 2009. The objective of the kick-off meeting was to inform the public about the study and get their opinion about the problems and vision, as discussed above in Section 1.4.2. A presentation was given that gave a brief introduction of the project including its origin, purpose, and scope, a discussion on the CSS process, the overall project schedule, and future opportunities for public input. The last half of the meeting was a group discussion about the perceived problems and the future vision of the NH 111 Corridor, including the potential role of a Town Center bypass and Wall Street Extension.

Public Informational Meeting #1

The first Public Informational Meeting (second public meeting) was held at the Windham High School Auditorium on Tuesday, September 28, 2010. There were a significant number of topics presented at the meeting and a great deal of discussion from the public. Approximately 50 members of the public attended. The meeting notification is shown in Figure 1.7.

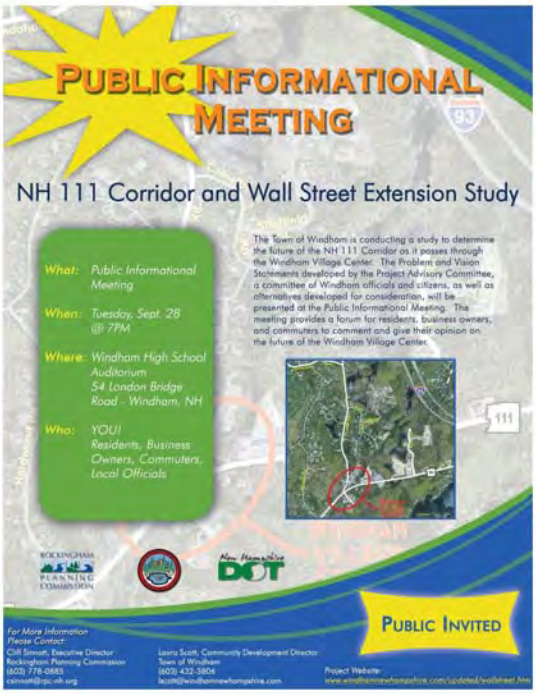

Figure 1.7 – Public Informational Meeting Notice

The main objectives of the meeting were to get confirmation on the Project Problem and Visions Statements and to hear the public's opinion on the alternatives under consideration. After a brief introduction and project background, the Project Problem and Vision Statements were presented for comment. Several members of the public commented that the Vision Statement sounded great, but that they doubted a village center would ever develop as envisioned given the nature of NH 111. Other topics presented at the meeting included the method for developing traffic projections and resource information.

The presentation on Alternatives began with an explanation of roundabouts. The slide presentation included a definition of a Roundabout, their components, how they operate, their safety features, aesthetic benefits, and examples of Roundabouts in New Hampshire. The Corridor Alternatives under consideration were then presented. The information presented included an overall alternative description, plan views, a typical section of NH 111, and pictures of similar corridors. A lengthy public discussion followed. A detailed description of all corridor alternatives can be found in Section 4.

Public Informational Meeting #2

A second Public Informational Meeting was held at the Windham High School Auditorium on Wednesday, February 23, 2011. The primary objective of the meeting was to give the public the opportunity to comment on the recommended alternative. Additional concepts for creating a village beyond the NH 111 corridor were also presented for information only. Approximately 25 members of the public attended.

After a brief introduction and project background, the study approach, Project Problem and Vision Statements, and the alternatives developed were presented. The recommended alternative was then presented along with the reasons why the PAC felt it best met the Project Vision. The public was then asked to comment on the recommended alternative. The comments and questions varied from concerns about roundabouts to why certain alternatives were rejected. These are discussed in more detail in Section 4.0.

The meeting concluded with a presentation on Village Concepts developed by Project for Public Spaces. These are described further in Section 4.8.

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2.0 Transportation Modeling and Analysis

2.1 Introduction

This section summarizes the transportation forecasting model used to analyze transportation and land use scenarios for this study. The Seacoast Regional Travel Demand Model ("the Model") is an integrated set of travel demand and land use models developed by Resource Systems Group (RSG) for the Rockingham Planning Commission (RPC) and the Strafford Regional Planning Commission (SRPC) which are the designated Metropolitan Planning Organizations (MPO's) for their respective regions. (MPO's are federally mandated inter-jurisdictional agencies that plan, prioritize, and coordinate the use of federal transportation funds in their region.) The Model was originally developed in the early 1990's in conjunction with the redevelopment of Pease Air Force Base. It was later expanded to incorporate the RPC and SRPC MPO areas to function as a traffic forecasting and air quality modeling tool. More details concerning the data collection, model structure, model calibration, and land use adjustments are included in Appendix C.

2.2 Model Boundaries

2.2.1 Model Overview

The Seacoast model area consists of the following 45 towns in New Hampshire.

Atkinson	Hampton Falls	Nottingham
Barrington	Kensington	Plaistow
Brentwood	Kingston	Portsmouth
Brookfield	Lee	Rochester
Danville	Madbury	Rollinsford
Dover	Middleton	Rye
Durham	Milton	Salem
East Kingston	New Castle	Sandown
Epping	New Durham	Seabrook
Exeter	Newfields	Somersworth
Farmington	Newington	South Hampton
Fremont	Newmarket	Strafford
Greenland	Newton	Stratham
Hampstead	North Hampton	Wakefield
Hampton	Northwood	Windham

The model boundary encompassed by these 45 towns was divided into 533 internal Transportation Analysis Zones (TAZs). The TAZ boundaries are based on population and transportation model characteristics and the TAZ system was updated in 2007. There are also 51 external TAZs representing roads that enter and exit the Seacoast region. Figure 2.1 shows the town boundaries and TAZ boundaries of the Seacoast Regional Travel Demand Model.

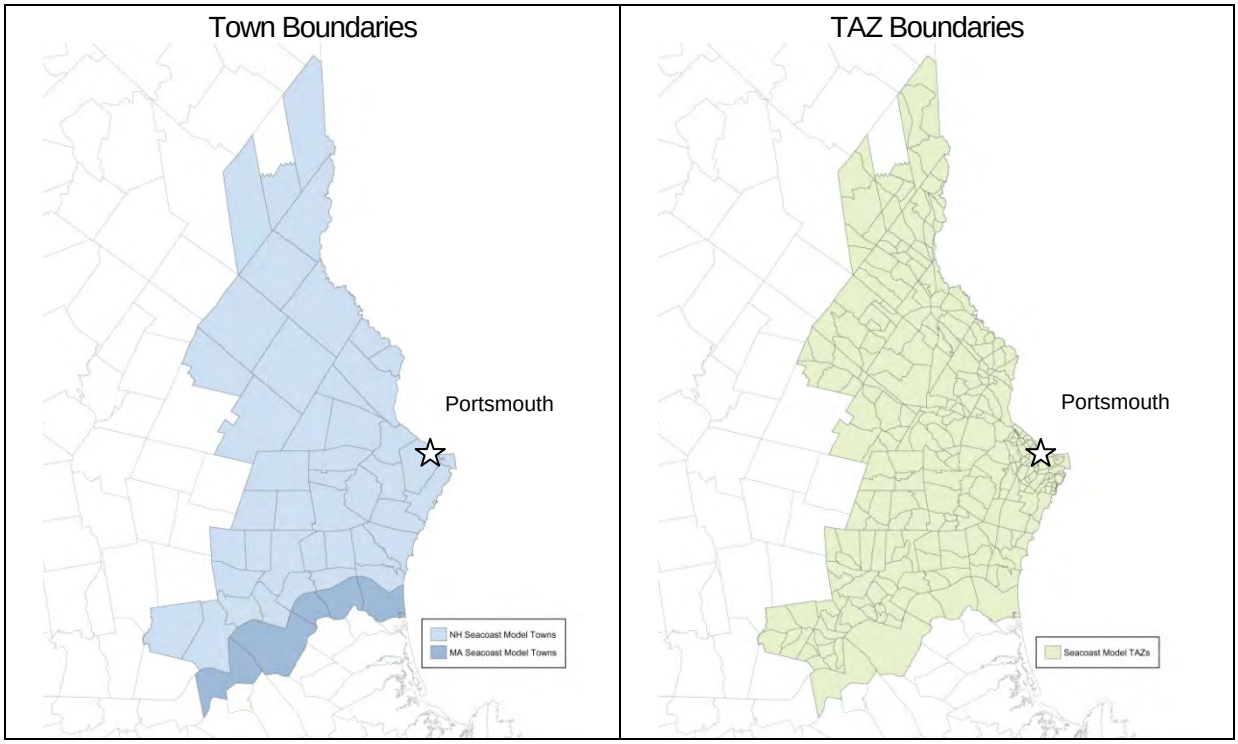


Figure 2.1 – Seacoast Model Town and TAZ Boundaries

2.2.2 Study Area Boundaries

The previous section described the Seacoast model region as consisting of 45 towns in the southeastern corner of the State of New Hampshire which makes up the Rockingham Planning Commission and Strafford Regional Planning Commission planning jurisdictions. The regional travel model therefore produces model outputs for this entire model geography when executed for a particular base or forecast analysis year.

For this study, the model results in the Town of Windham are of particular interest. The study area was therefore defined as the geography bounded by the Windham Traffic Analysis Zones that follow the town boundaries. Figure 2.2 shows the Town of Windham in relation to the full Seacoast Regional Travel Model region. Windham is represented by 9 Traffic Analysis Zones (TAZ's) located in the southwestern most corner of the model region. Because Windham is at the edge of the model boundary, additional traffic counts were collected to enhance the Model. Figure 2.3 shows an aerial image of the Windham study area overlaid with the roadways included in the Model (roadway links) and the TAZ's.

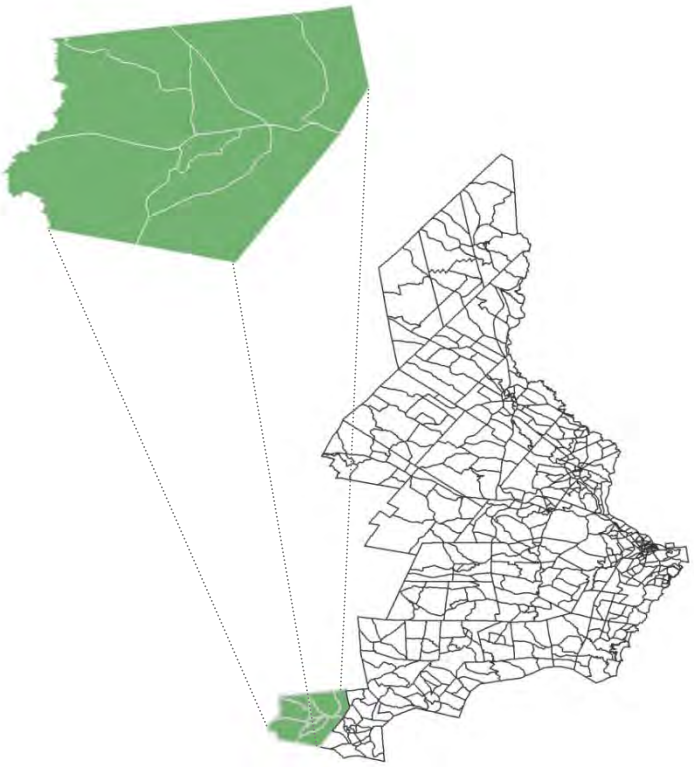


Figure 2.2 – Town of Windham TAZ's

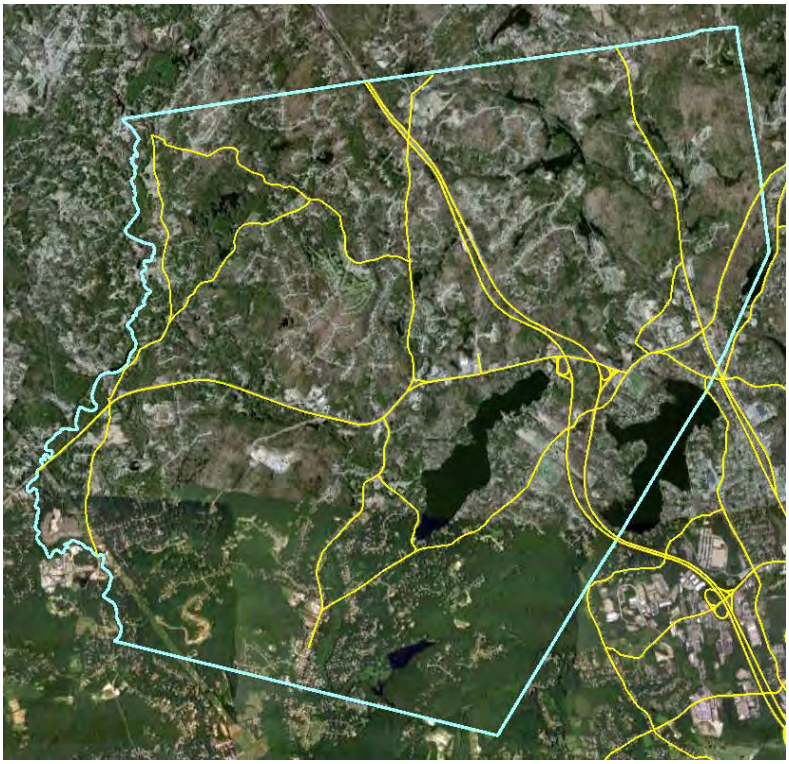


Figure 2.3 – Windham Study Area with Model Links

2.3 Base Case 2009 Scenario

Version 3.2.0 of the model was used for the analysis, which is the most current version of the model, and is the version used by the MPO for their 2008 Conformity Determination process. The two most critical inputs to the travel demand are: 1) the zonal socio-economic land use inputs and 2) the highway and transit network inputs. The first describes and defines the number, location and type of households and employment in the model region. The second describes and defines the roadway infrastructure system.

For a base year like 2009, developing the input highway network is a straight forward exercise. The network simply includes all the roadway facilities already contained in the Seacoast model base year highway network. That is, no additional roadway improvements add/or new facilities are included in the Town of Windham.

Likewise, no changes were made to the 2009 base year land use already assumed in the travel model for the Windham traffic analysis zones. The land use inputs are developed by the Rockingham Planning Commission and the Strafford Regional Planning Commission in close coordination and consultation with both regional planning professionals and member town agency representatives. The land use assumed in the 2009 land use model database for the traffic analysis zones which make up the Town of Windham is presented in Figure 2.4.

	Land Use	
TAZ	Households	Employment
504	829	279
505	460	41
506	128	326
507	412	373
508	266	383
509	809	249
510	617	149
511	140	56
512	797	231
TOTAL	**4,459**	**2,086**

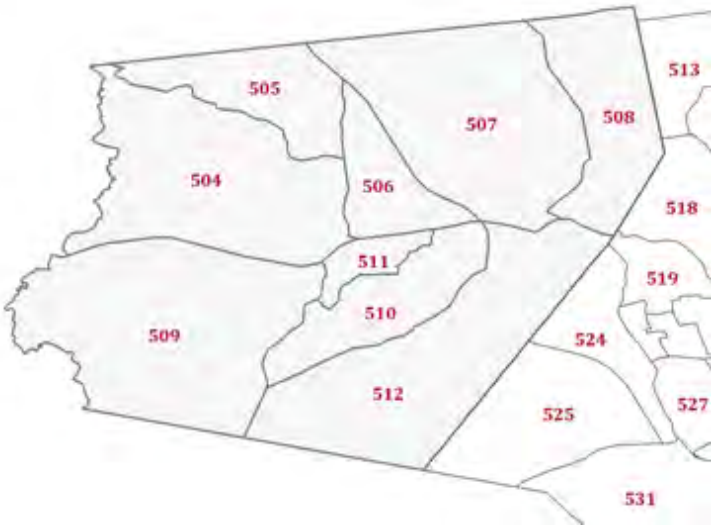


Figure 2.4 – Assumed 2009 Base Year Land Use – Windham TAZs

2.4 Design Year 2035

2.4.1 No Build Scenario

The No-Build Scenario models the 2035 design year using the existing future year "inputs" developed for forecasting future travel patterns and traffic volumes with the Model. Model inputs include expected roadway improvements and expected land use changes (housing, employment, and special generators of traffic). The 2035 highway network includes a number of roadway improvement projects relative to the 2009 highway network. Most significantly in the Windham study area is the expansion of I-93, reconfiguration of the I-93 on/off ramps as well as the relocation of certain segments of NH Route 111. Figure 2.5 below illustrates these projects by displaying the 2009 and 2035 highway networks.

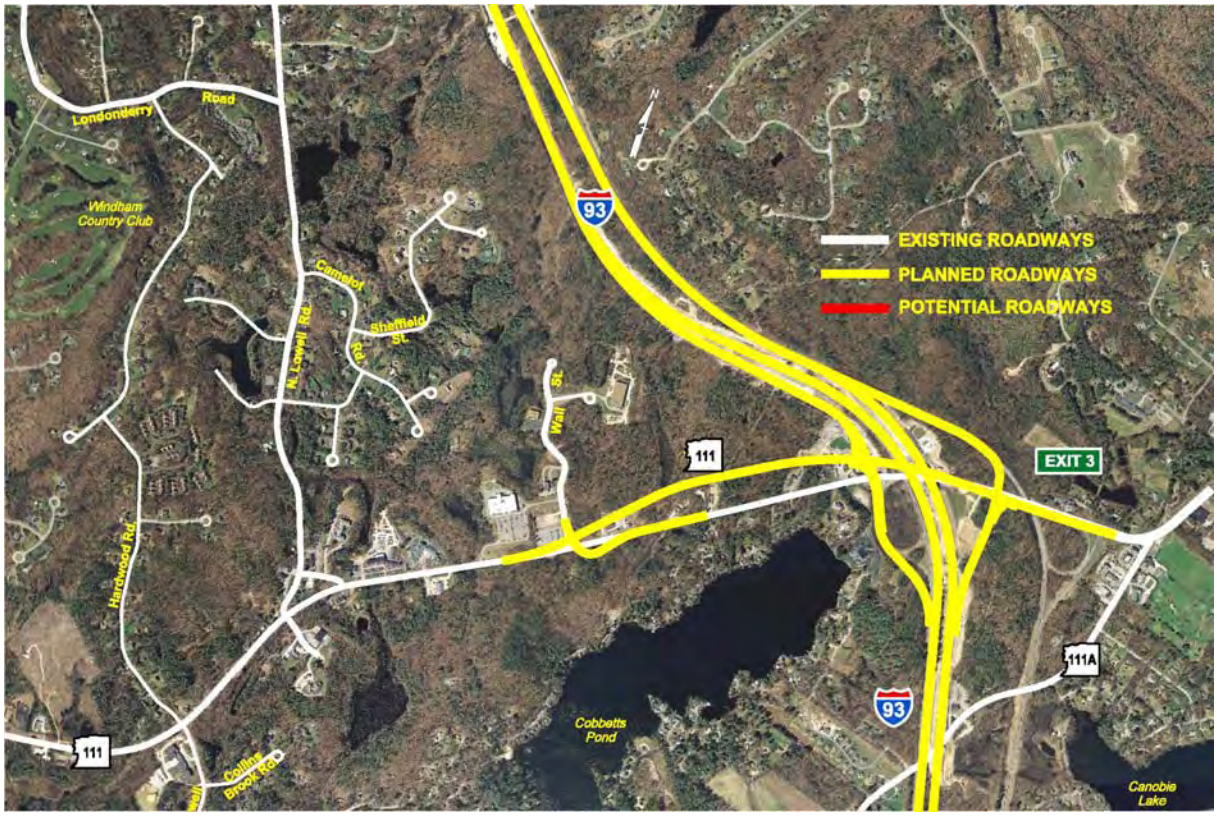


Figure 2.5 - 2035 No-Build Highway Network -- Exit 3 and NH 111 Reconfiguration

Early analyses during the study relied on future year land use for 2035 already developed by the MPO. However, during review by town officials, local business and developers, the assumed increase in employment between 2009 and 2035 in the Town of Windham was deemed to be too low. In response, the number of total employees was increased from 2,655 employees to 5,000 employees in 2035. The 2,400 additional employees were allocated to traffic analysis zones based on feedback from Edward N. Herbert Associates, Inc. and The Dubay Group. The type of employment was based on the distribution of employment by category already

assumed in the MPO 2035 forecasts. No modifications were made to the assumed households, since the 2035 number already approaches the current residential build-out for the Town.

A sensitivity analysis was performed to evaluate the impact of the additional assumed future year employment in the Town of Windham. The model was run for the 2035 No-Build Scenario with 5,000 Windham employees and compared to the results produced using the original MPO employment forecasts (2,655 employees). The additional employment was found to have only a slight impact on the total vehicle volumes on the model links within the study area. The amount of travel demand is dictated by the number of households which were deemed acceptable and therefore left unchanged. The additional 2,400 jobs added in the sensitivity test compete with all the other employment in the model region to attract trips which explains why only marginal increases in Windham area vehicle volumes were produced.

The revised 2035 land use assumed for the traffic analysis zones which make up the Town of Windham that was used as input for the 2035 No-Build Scenario sensitivity test is presented in Figure 2.6.

	Land Use	
TAZ	Households	Employment
504	1,184	512
505	580	65
506	227	1,365
507	1,064	675
508	574	500
509	1,485	403
510	691	218
511	197	98
512	1,152	1,164
TOTAL	**7,155**	**5,000**

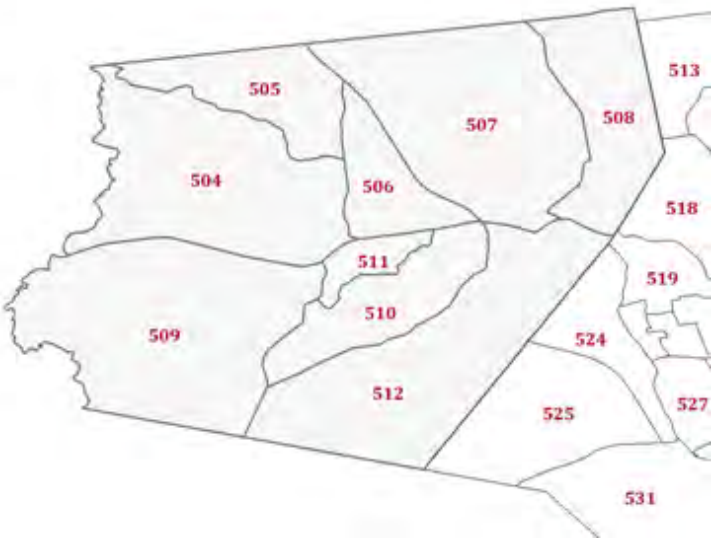


Figure 2.6 - Assumed 2035 Future Year Land Use – Windham TAZs

2.4.2 Wall Street Extension Scenario

In the Wall Street Extension Scenario, the same 2035 land use forecast from the 2035 No-Build scenario is used as input. The same 2035 No-Build highway network is also used with one notable exception. In this scenario, Wall Street has been extended from its current terminus and is connected to North Lowell Road at the intersection of Londonderry Road / North Lowell Road / Pine Hill Road. Figure 2.7 below illustrates the Wall Street Extension with the 2035 highway network.

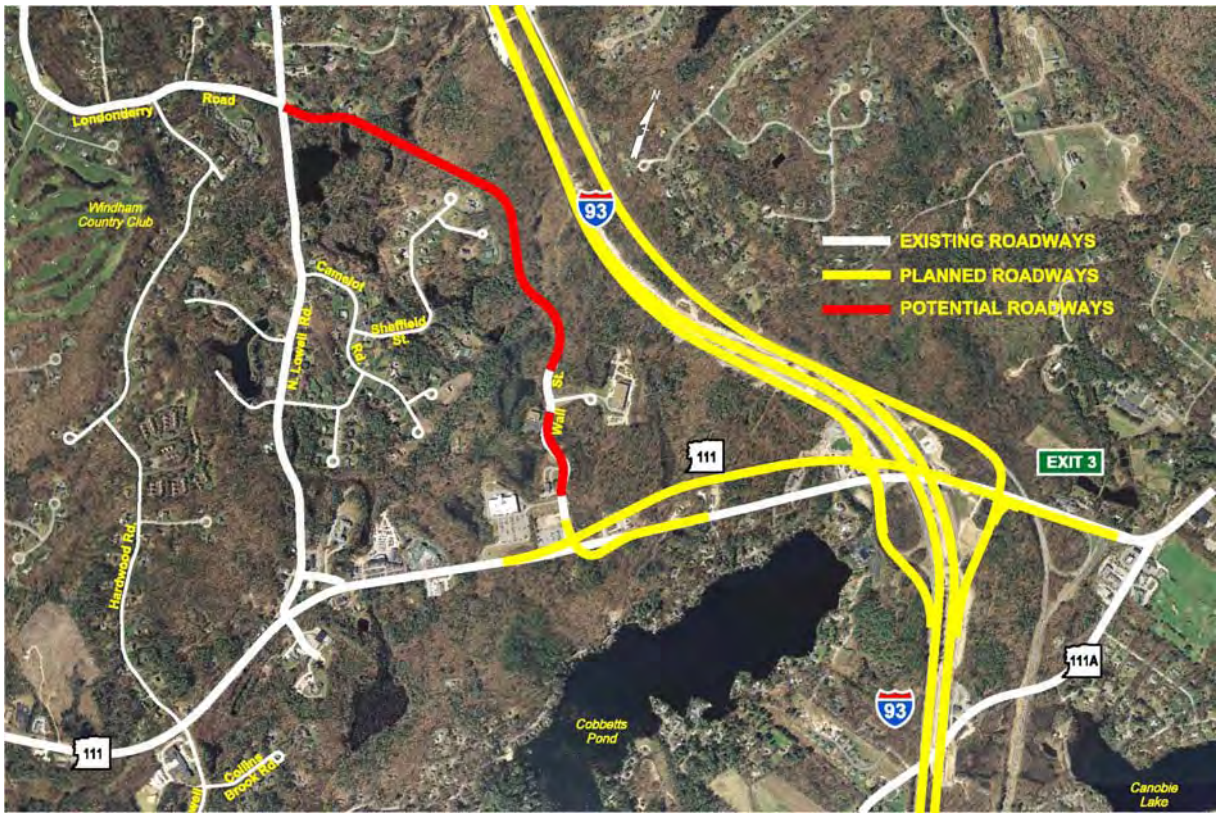


Figure 2.7 - 2035 Highway Network with Wall Street Extension

2.4.3 NH 111 Bypass Scenario

In the NH 111 Bypass Scenario, the same 2035 land use forecast from the 2035 No-Build scenario is used as input. The same 2035 No-Build highway network is also used with two notable exceptions. In this scenario, the NH 111 Bypass has been added which creates a new linkage between Lowell Road and Wall Street which bypasses the town village. In addition, the free-flow speed on the existing NH 111 alignment has been reduced to reflect traffic calming measures which will likely be applied and to make the proposed bypass a more favorable route for the major east-west through traffic. In addition, the Wall Street Extension is also included in this scenario since these two projects are inter-related as they both seek to reduce traffic flow through the Town Center. Figure 2.8 below illustrates the NH 111 Bypass and the Wall Street Extension with the 2035 highway network.

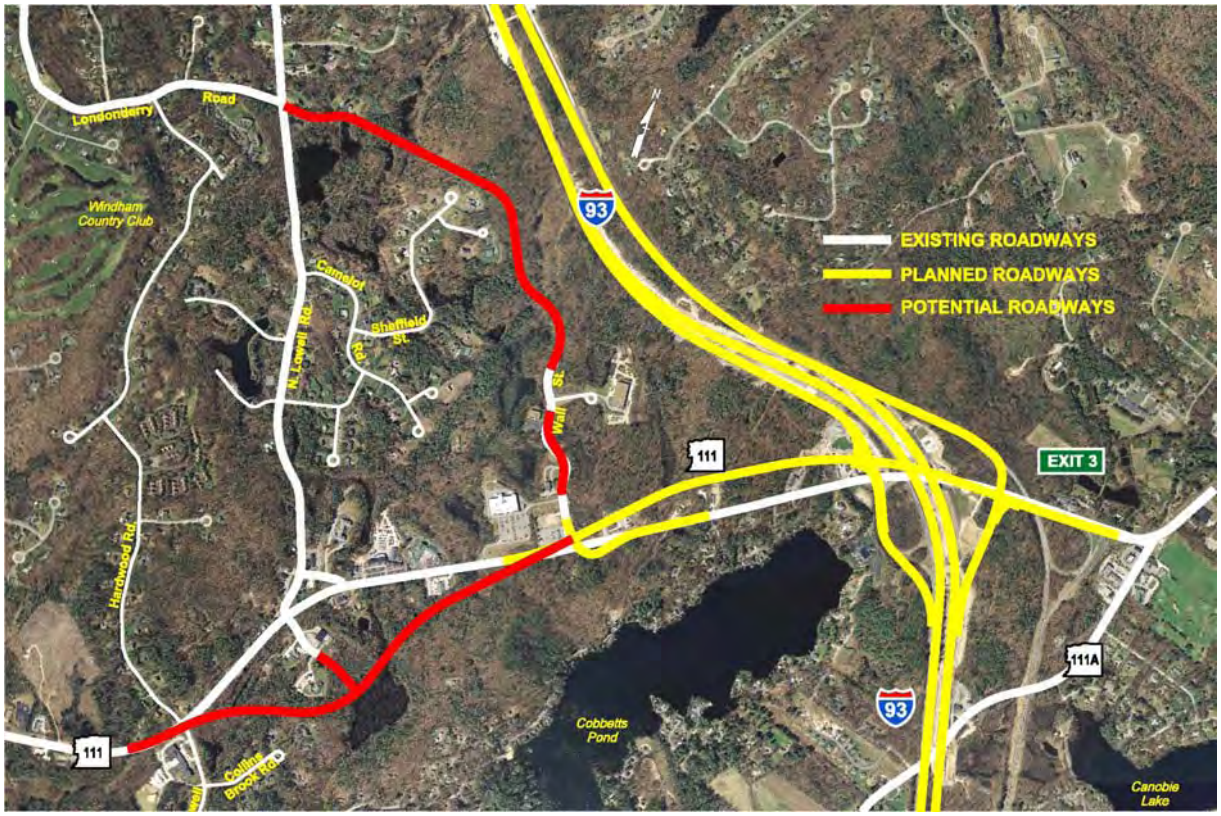


Figure 2.8 - 2035 Highway Network with NH 111 Bypass & Wall Street Extension

2.5 Model Results

The results described in the following sections and depicted on Figures 2.9 through 2.16 reflect the peak hour volumes derived from the Model. A description of the performance characteristics of the proposed alternatives can be found in Chapter 4.

2.5.1 Base Year 2009

The Model was first run for the 2009 base year (AM peak hour and PM peak hour) using the input land use and highway transportation networks described in the previous section. Turning movement volumes were analyzed for the same 10 intersections for which traffic counts were collected in December 2009. A review of the model's performance in and around the Town of Windham was conducted whereby the model volumes were compared to the actual observed count volumes. Slight refinements and modifications are then made including how/where centroid connectors load traffic to enhance the fit between the model volumes and the observed counts. The raw 2009 model turning movement volumes are not especially useful in and of themselves. They are mainly used to identify and address where the model is predicting far too many or far too few vehicles as compared to the observed counts. The "pivoting process" by which the 2009 model volumes are applied during the traffic analysis is described in detail in Appendix C.

The regional travel model is calibrated to 2007 conditions based on defensible practices outlined by the USDOT, which is discussed more thoroughly in the Seacoast Regional Travel Demand Model Documentation. On average, the modeled traffic volumes are within 1.5% of traffic counts, and the overall correlation of these is .92, each of which exceeds federal guidance. For this study, the regional travel model is used to understand the growth in traffic from 2009 to the forecast year, and the diversion in traffic with proposed improvements. The growth and diversion in traffic is applied to actual 2009 traffic counts, so the use of the model is to forecast the change in traffic but actual counts are used as the basis for the forecast.

The AM and PM peak hour turning movement volumes for the Existing 2009 condition are illustrated in Figure 2.9 and Figure 2.10. Note that the figures to not depict Fellows Road, Hardwood Road or Pine Hill Road because they are not specifically part of the model highway network.

2.5.2 2035 No Build Scenario

The Model was run for the 2035 design year (AM peak hour and PM peak hour) using the input land use and highway transportation networks unique to the No-Build Scenario described in a previous section. Turning movement volumes were analyzed for the same 10 intersections for which traffic counts were collected in December 2009. The count data for the 10 intersections was used to calibrate and validate the base year model results. The study is primarily concerned with the traffic flows at four key intersections in the study area, specifically:

- NH 111 / Wall Street
- NH 111 / North Lowell Road / Fellows Road
- NH Route 111 / Lowell Road / Hardwood Road
- North Lowell Road / Londonderry Road

Final future year turning movement volumes were derived using the pivoting process described in Appendix C. The final AM and PM peak hour turning movement volumes for the No-Build Scenario are illustrated in Figure 2.11 and Figure 2.12. Note that the figures to not depict Fellows Road, Hardwood Road or Pine Hill Road because they are not specifically part of the model highway network.

2.5.3 2035 Wall Street Extension Scenario

The Model was run for the 2035 design year (AM peak hour and PM peak hour) using the input land use and highway transportation networks unique to the Wall Street Extension Scenario described in a previous section. Turning movement volumes were analyzed for the same 10 intersections for which traffic counts were collected in December 2009. The final AM and PM peak hour turning movement volumes for the Wall Street Extension Scenario are illustrated in Figure 2.13 and Figure 2.14.

2.5.4 2035 NH 111 Bypass Scenario

The Model was run for the 2035 design year (AM peak hour and PM peak hour) using the input land use and highway transportation networks unique to the NH 111 Bypass Scenario described in a previous section. Turning movement volumes were analyzed for the same 10 intersections for which traffic counts were collected in December 2009. The final AM and PM peak hour turning movement volumes for the NH 111 Bypass Scenario are illustrated in Figure 2.15 and Figure 2.16.

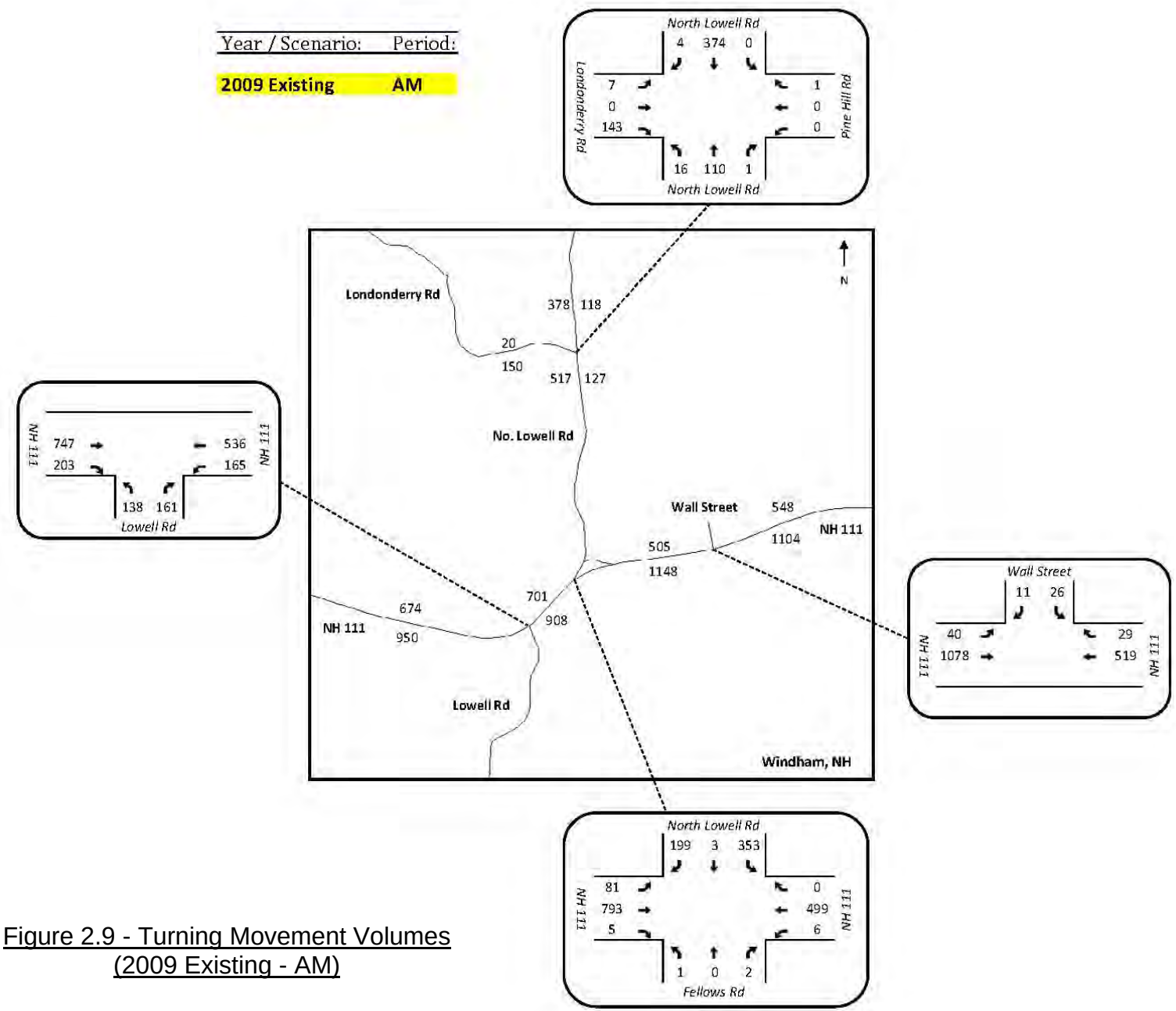


Figure 2.9 - Turning Movement Volumes (2009 Existing - AM)

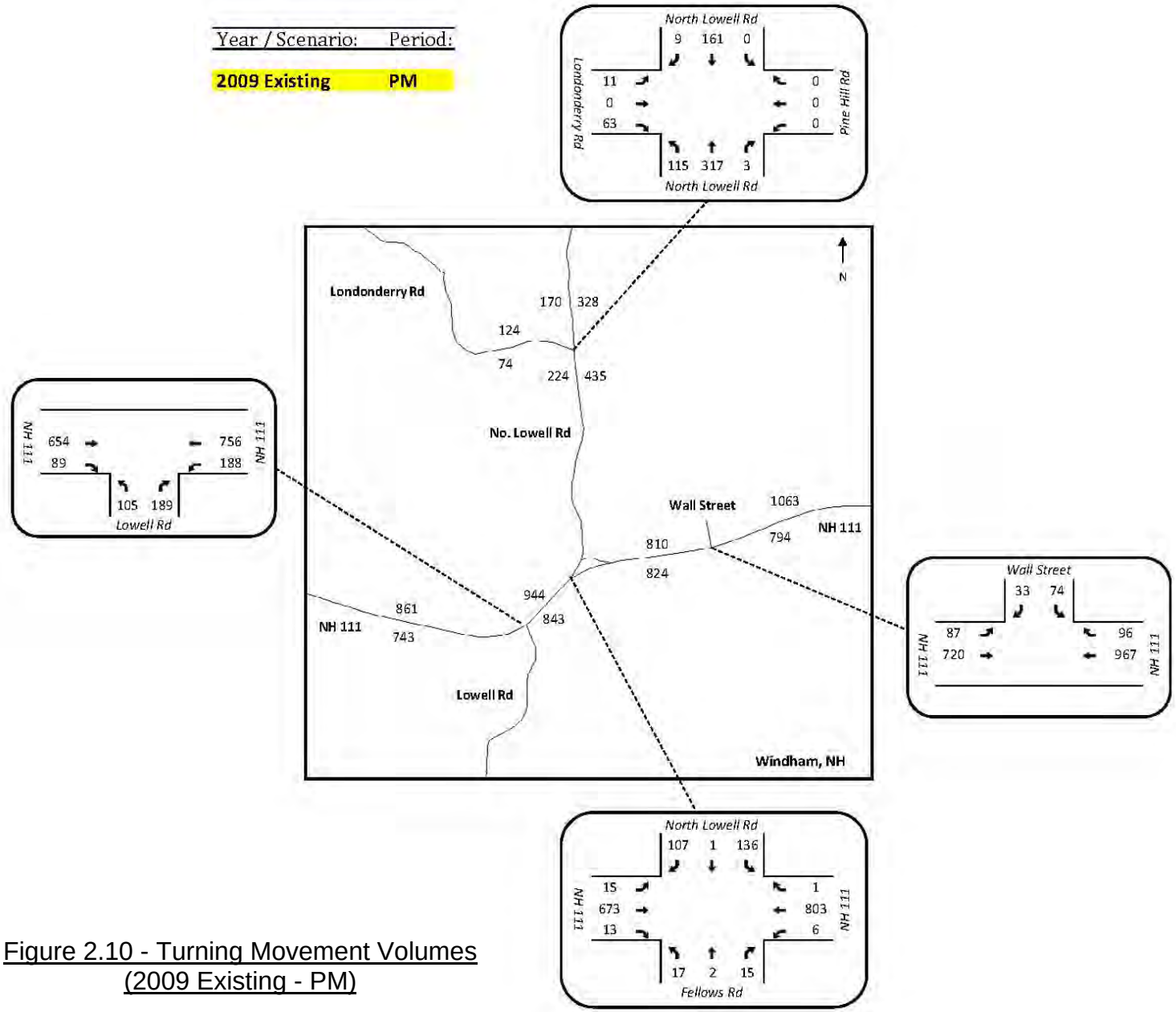


Figure 2.10 - Turning Movement Volumes (2009 Existing - PM)

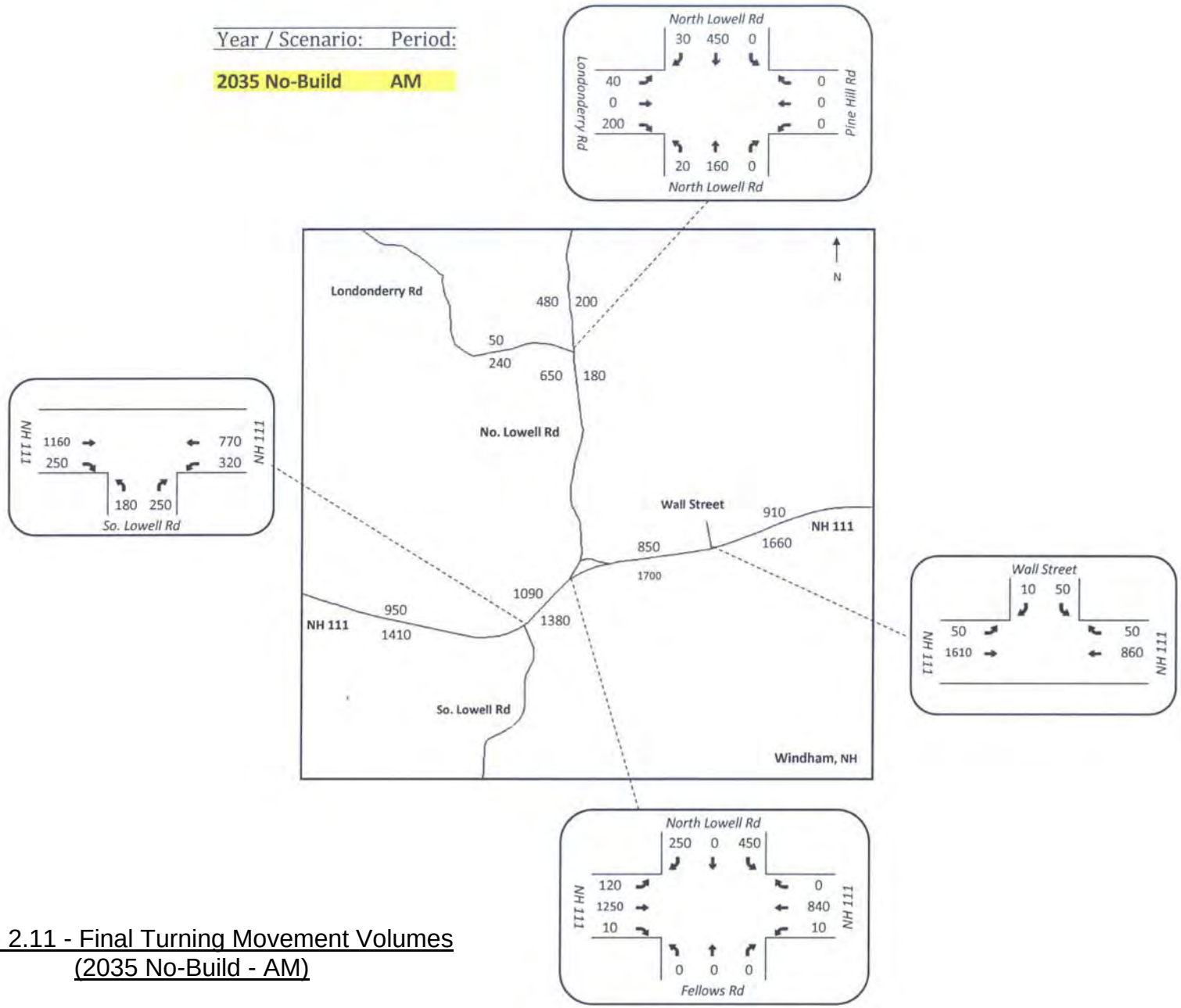


Figure 2.11 - Final Turning Movement Volumes (2035 No-Build - AM)

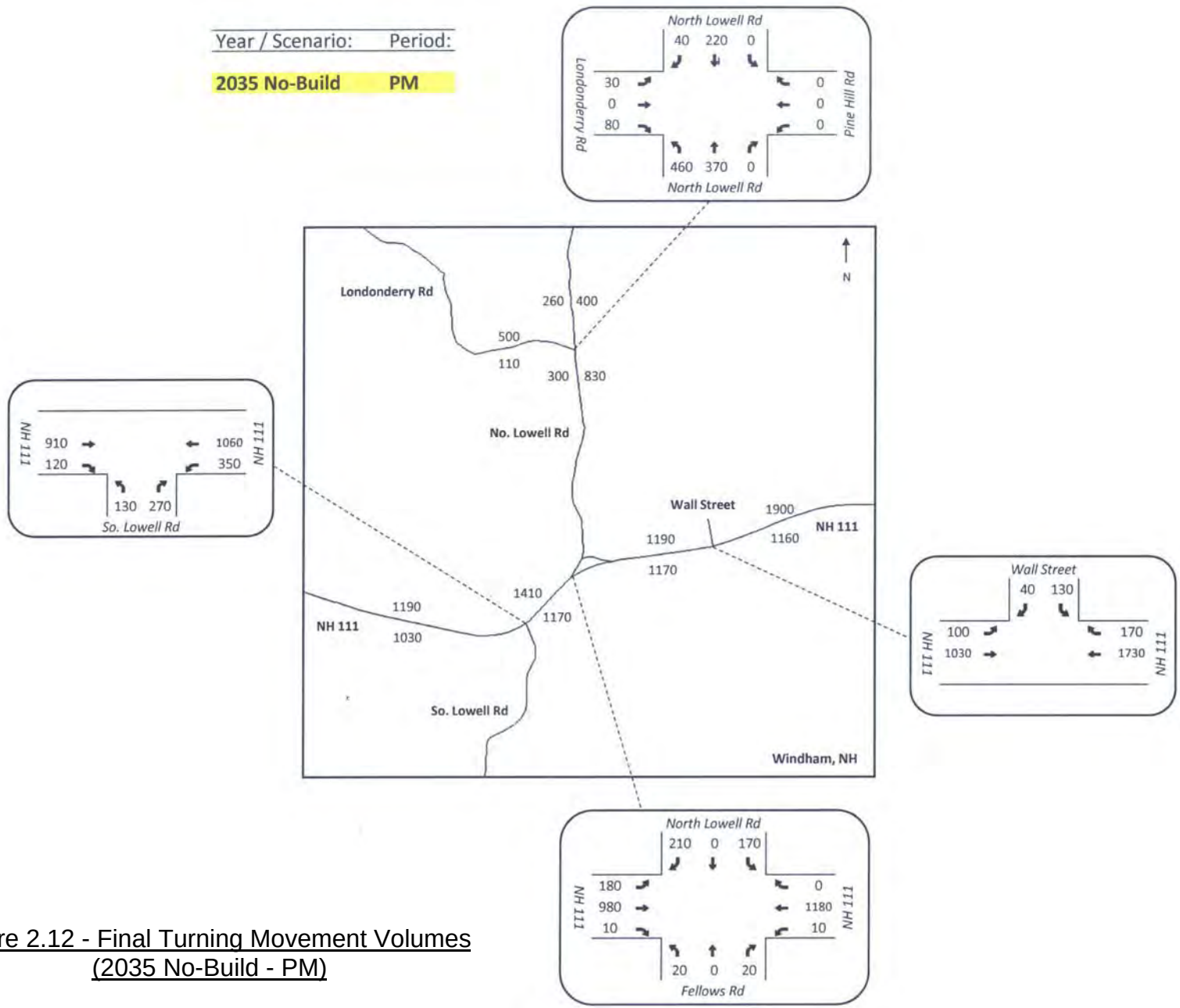


Figure 2.12 - Final Turning Movement Volumes (2035 No-Build - PM)

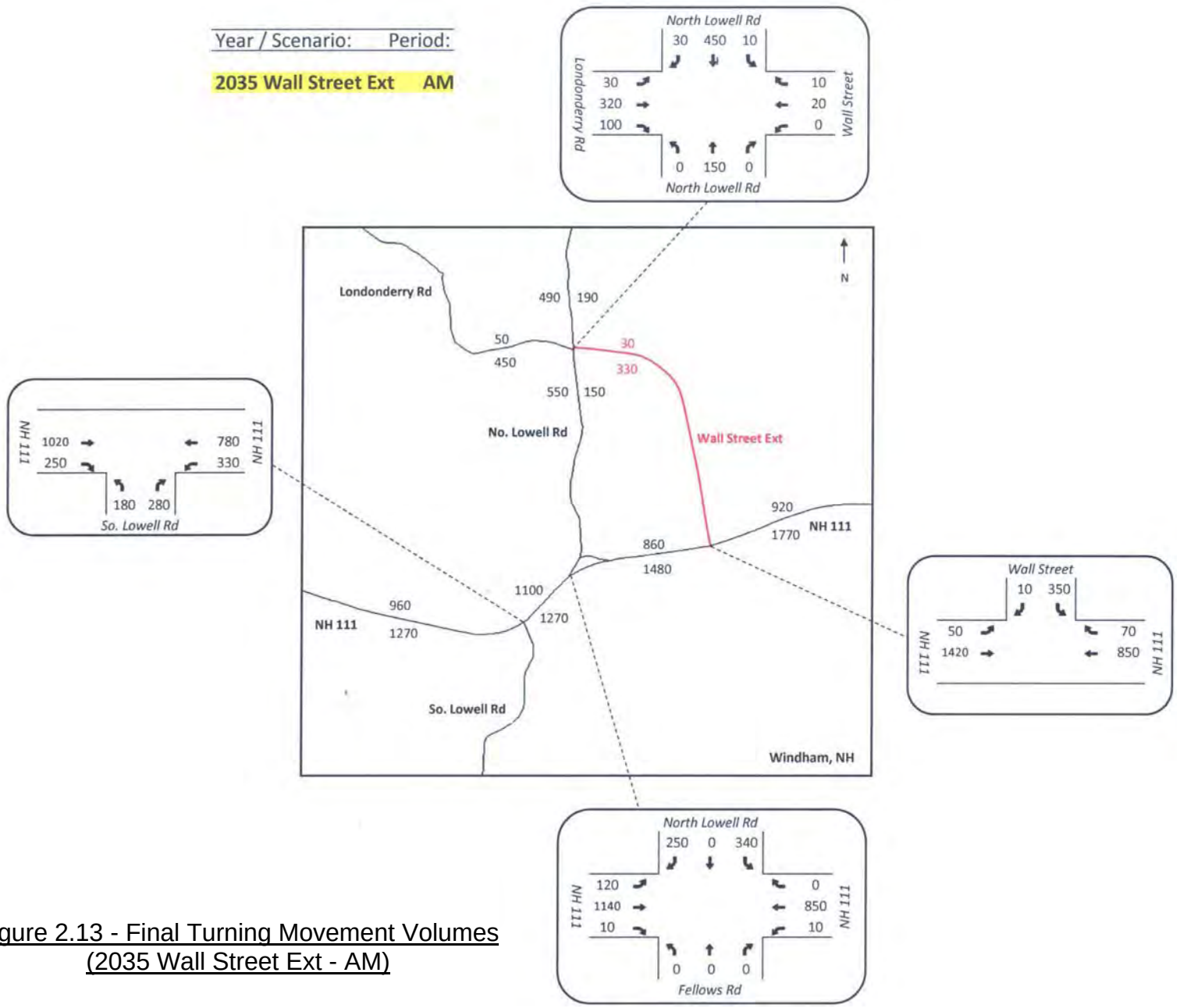


Figure 2.13 - Final Turning Movement Volumes (2035 Wall Street Ext - AM)

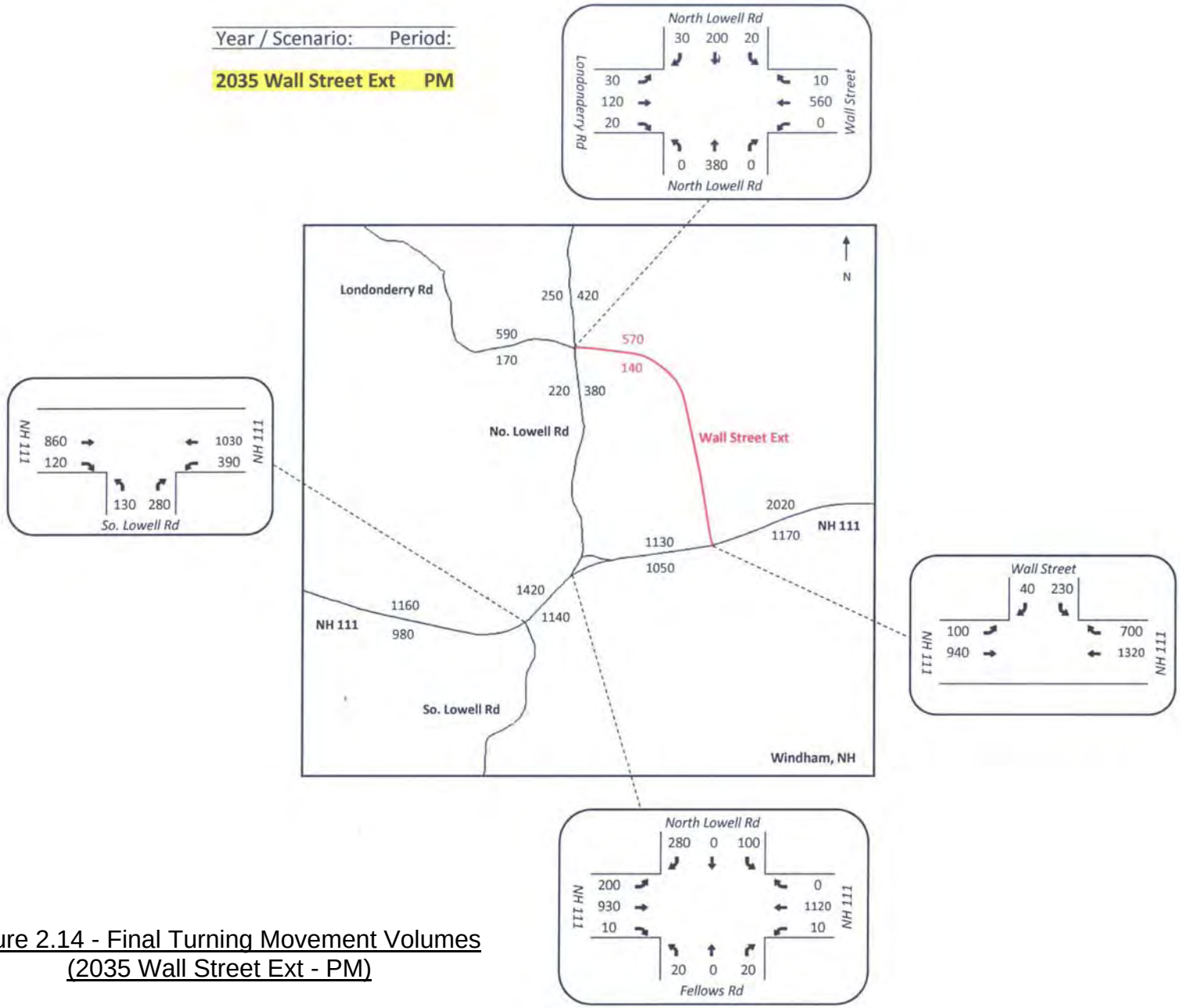


Figure 2.14 - Final Turning Movement Volumes (2035 Wall Street Ext - PM)

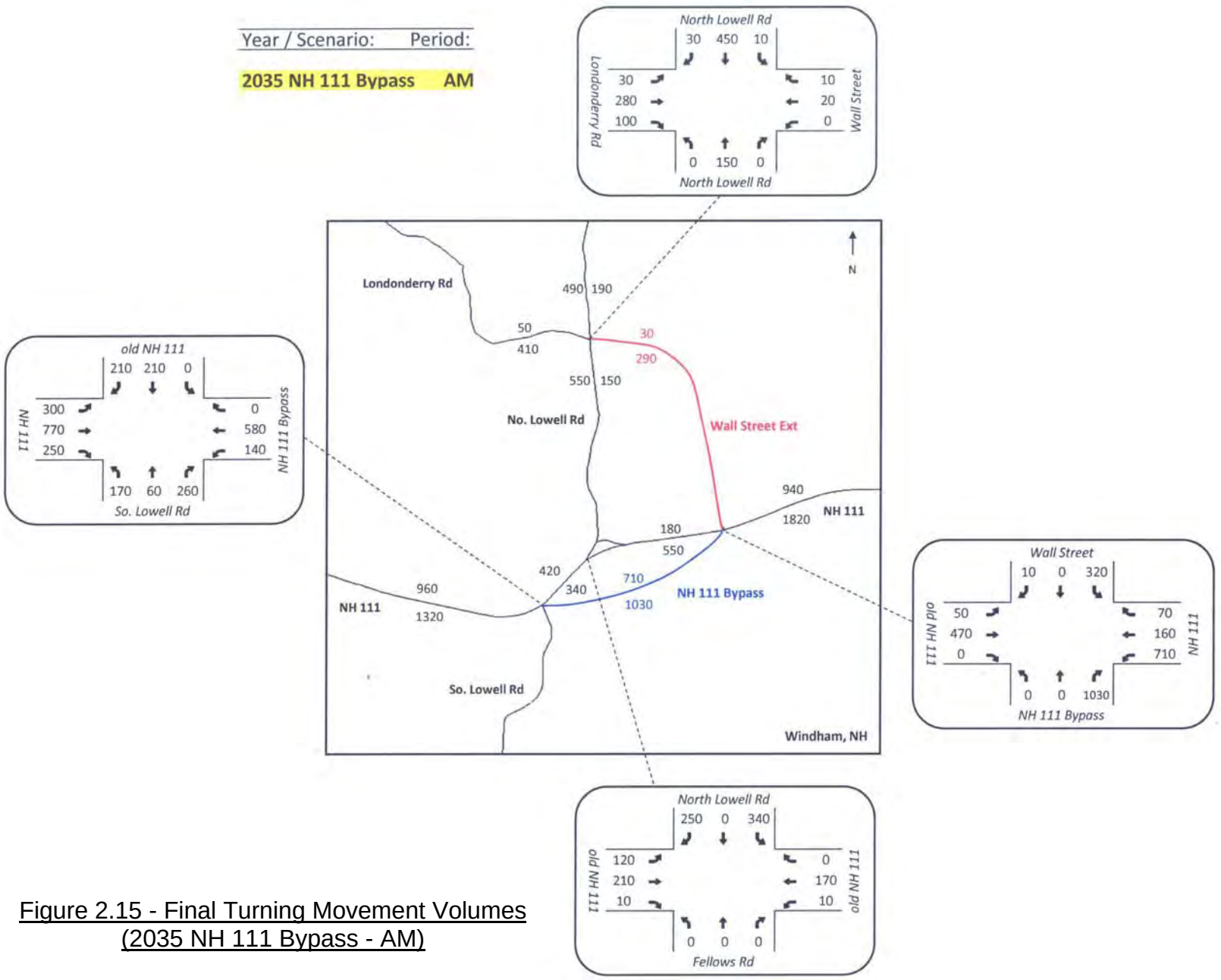


Figure 2.15 - Final Turning Movement Volumes (2035 NH 111 Bypass - AM)

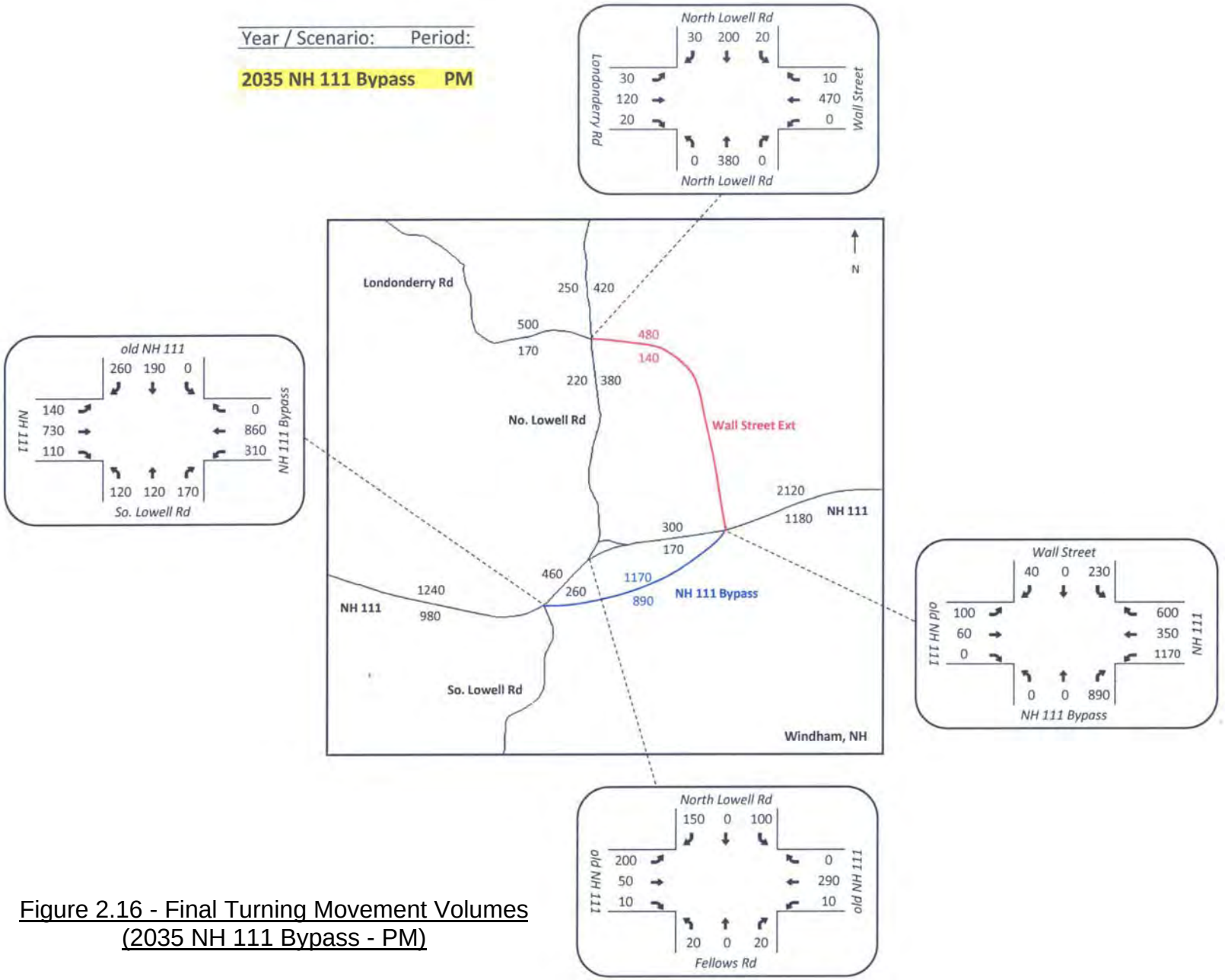


Figure 2.16 - Final Turning Movement Volumes (2035 NH 111 Bypass - PM)

3.0 Environmental and Community Resources

3.1 Introduction

The following section provides an overview of environmental and community resources within the study area of the "NH 111 and Wall Street Extension Study". The resource inventory used existing maps and published material supplemented by field reviews conducted in 2009. Potential impacts to the resources present were used to evaluate the overall feasibility of an alternative. However, no specific impacts were calculated. An assessment was made as to the significance of the resource and the potential severity of the impact, which leads to the likelihood of acquiring the necessary permits to construct. The Figures in this section are found in Appendix A. The photos referenced are found in Appendix D.

3.2 Landscape Setting

The study area lies in southeastern New Hampshire, in Rockingham County. This region of New Hampshire is characterized by hills, low mountains, and broad valleys, between the coastal lowlands and the eastern New England upland. Windham drains generally south and west toward the Merrimack River. The geology of the town is characterized as granofels and granodiorite–schist of the Ordovician and Silurian period[1]. As with all of New Hampshire, surficial geology was formed by the most recent glaciation, with drumlins generally oriented in the direction of glacial movement, and bedrock ridges that have a thin layer of glacial till. Low lying valley soils are characterized by glacial outwash. Elevation in Windham ranges from about 200 feet above sea level to about 500 feet above sea level. (Figure 3.2-1)

3.3 Soils

Soils in the study area are described in the publication "Soil Survey of Rockingham County" (USDA Natural Resource Conservation Service, 1994) and depicted on Figure 3.3-1, "Soils". Soils are depicted generally in the Soil survey of Rockingham County as "Canton – Chatfield – Hollis" soils, which are "Well drained and somewhat excessively well drained, very deep to shallow, loamy soils that are gently sloping to steep". Soils units depicted on Figure 3.3-1 are listed below.

W	Water
97	Greenwood and Ossipee soils, ponded
67C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony
66C	Paxton fine sandy loam, 8 to 15 percent slopes
657B	Ridgebury very fine sandy loam, 3 to 8 percent slopes, very stony
547B	Walpole very fine sandy loam, 3 to 8 percent slopes, very stony
547A	Walpole very fine sandy loam, 0 to 3 percent slopes, very stony
495	Ossipee mucky peat

[1] "A New Bedrock Geologic Map of New Hampshire"; Geological Society of America, 1991

447B Scituate-Newfields complex, 3 to 8 percent slopes, very stony
43C Canton gravelly fine sandy loam, 8 to 15 percent slopes, very stony
43B Canton gravelly fine sandy loam, 3 to 8 percent slopes, very stony
42D Canton gravelly fine sandy loam, 15 to 25 percent slopes
42C Canton gravelly fine sandy loam, 8 to 15 percent slopes
42B Canton gravelly fine sandy loam, 3 to 8 percent slopes
395 Chocorua mucky peat
314A Pipestone sand, 0 to 5 percent slopes
29B Woodbridge fine sandy loam, 3 to 8 percent slopes
298 Pits, sand and gravel
295 Greenwood mucky peat
141E Hollis-Rock outcrop-Chatfield complex, 15 to 60 percent slopes
140D Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, very stony
140C Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, very stony
140B Chatfield-Hollis-Canton complex, 3 to 8 percent slopes, very stony
12B Hinckley fine sandy loam, 3 to 8 percent slopes
12A Hinckley fine sandy loam, 0 to 3 percent slopes
129B Woodbridge fine sandy loam, 3 to 8 percent slopes, very stony
125 Scarboro muck, very stony

3.4 Surface Waters

Surface Waters within the study area include Golden Brook, which flows generally north – south through the study area. There are several small unnamed ponds associated with the brook within the study area. Cobetts Pond, a 1.2 square mile pond raised by damming, lies just south of the study area (Figure 3.4-1).

3.5 Wetlands

Wetlands within the study corridor include palustrine forested, scrub shrub, and emergent wetlands. Wetlands mapped by the National Wetland Inventory are depicted on Figure 3.5-1 and Figure 3.5-2. Wetlands along the proposed alignments were field reviewed in November, 2009. Major wetland features in these corridors are described below.

3.5.1 Wall Street Extension

The northern Wall Street alignment has two large wetland complexes, both of which flow generally southwest and under NH 111.

Just east of the southern end of the proposed alignment there is a small isolated potential vernal pool. It is likely that the pool was created by the impoundment from the gravel road construction (possibly it was a gravel pit), however, it still may provide vernal pool habitat for wood frogs, spotted salamanders, and other non-vernal pool dependent species (photo 1).

A palustrine wetland to the east of the proposed alignment (photo 5) drains southwest to a palustrine forested and scrub shrub wetland southwest of the proposed alignment (photo 6). A second larger palustrine wetland lies south of this wetland (photos 2,3), and both wetlands drain southwest toward NH 111. The wetland is beaver impounded, with the beaver dam close to the proposed alignment at the southwest corner of the open water wetland. The dam has recently been breached which is changing the vegetative composition of the pond, as emergent vegetation takes hold in the exposed soils.

West of the proposed alignment, a small forested wetland supporting red maple, black ash, and hop hornbeam drains toward the beaver pond to the east (photo 7).

To the northeast of the proposed alignment, another beaver pond with several standing dead pine trees supports what appears to be an active great blue heron rookery (photo 12). The pond is connected to two other wetlands, also beaver impounded (photos 9, 10, 11).

3.5.2 NH 111 Bypass

On the south side of NH 111, the proposed bypass passes through a phragmites – dominated palustrine marsh (photo 13). The marsh is fed by Golden Brook (photo 14), which drains southward under Collins Brook Road. East of this wetland a large beaver pond – open marsh extends over approximately nine acres (photos 16, 17, 18). The proposed alignment lies north of the beaver marsh, but would have to cross the inlet at the north end.

At the northeast end of the proposed alignment, another forested/scrub scrub lies close to NH 111 (photo 19). This wetland may have formed in an old gravel pit, as evidenced by signs of excavation around the margins. East of this wetland is another marsh with standing dead trees that may also be beaver impounded (photo 20).

3.6 Floodplains

Floodplains have been mapped by the Federal Emergency Management Agency (FEMA) and are displayed on Figure 3.6-1. There are mapped floodplains associated with Golden Brook in both the Wall Street Extension and NH 111 Bypass portions of the study area. There are no FEMA mapped floodways for Golden Brook.

Flood zones depicted on Figure 3.6-1 are described below.

A Areas with a 1% annual probability of flooding. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.

AE Areas with a 1% annual probability of flooding. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

X – 500 Areas outside the 100-year floodplain or SFHA, areas of 100-year sheet flow flooding where average depths are less than one foot, areas of 100-year stream flooding where the contributing drainage area is less than one square mile or areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

3.7 Aquifers

Aquifers in New Hampshire were identified in a study of groundwater resources in the state conducted by the US Geological Survey. The study identified a large aquifer south of the project area, but no aquifers directly in the project area (Figure 3.7-1).

3.8 Water Quality

Water quality is a collective term describing an assemblage of physical, chemical, and biological characteristics of a waterbody. New Hampshire has established water quality standards for waters in the state, with separate standards for Class A and Class B waters. NH Surface Water Quality Regulations provide thresholds for dissolved oxygen, bacteria, and pollutants. All waters in the state are Class B unless otherwise designated. Canobie Lake, east of I-93 and east of the project, is a public drinking water supply and is designated Class A. All other waterbodies are Class B.

Canobie Lake is impaired for aquatic life by dissolved oxygen saturation. Cobbetts Pond is impaired for aquatic life by chlorophyll from unknown sources, by dissolved oxygen and phosphorous from unknown sources, and for primary contact recreation by Cyanobacteria hepatotoxic microcystins from unknown sources. Beaver Brook is impaired for aquatic life by pH from unknown sources. Golden Brook, which flows through the study area, is not identified as being impaired by any pollutants.

3.9 Wildlife

The extensive wetlands in the study area provide habitat for a wide range of waterfowl, mammals, reptiles, and amphibians. The New Hampshire Fish and Game Department has developed a ranking system for wildlife habitat in the state. The 2010 “Wildlife Action Plan” identifies the wetlands on the north side of NH 111 (in the vicinity of the proposed Wall Street Extension) as Tier 1, or top ranked habitat in New Hampshire. The area around Cobbett’s Pond, on the south side of the bypass, and Golden Brook, at the west end of the proposed bypass, are all identified as top-ranked habitat. (Figure 3.9-1)

3.10 Rare Species

Rare plants and animals are protected in New Hampshire under the Native Plant Protection Act of 1987 (RSA 217-A), and the Endangered Species Conservation Act of 1979 (for wildlife). A request for rare species records within the study area was made to the New Hampshire Natural Heritage Bureau. The response, attached to

this document, indicates that there are records of Blanding's Turtle about a half mile west of the project area in an unnamed stream that crosses under NH 111.

3.11 Fisheries

New Hampshire fish and game identifies the Golden Brook watershed, (which includes the entire study area as well as Cobbett's Pond) as supporting the following:

American Eel
Bluegill
Pumpkinseed
Common White Sucker
Chain pickerel
Finescale dace
Fallfish
Largemouth Bass
Yellow Bullhead
Yellow Perch

3.12 Agriculture

There are no active agricultural operations within the study area. There are, however, some areas within the study area that are mapped by the Natural Resource Conservation Service as prime farmland or farmland of statewide or local importance within Windham, but none of these areas presently support active agricultural operations. See Figure 3.12-1.

3.13 Conserved and Public Lands

There are three parcels of town-owned vacant land in or near the Wall Street Extension corridor; the Sheffield street parcel, a 12+ acre parcel of woods and wetland west of the Wall Street Extension alignment; the Pine Hill Road parcel, a 12+ acre parcel of woods and wetland that lies directly within the alignment, and a third landlocked parcel measuring 4.9 acres at the southern end of the alignment. These parcels are not identified in the town's assessment database as having any recreational or conservation easements. Two other areas are identified as "recreational municipal land" in the town's database. The Camelot Road parcels, three parcels totaling about ten acres which follow Golden Brook for about ¾ of a mile north-south west of the Wall Street Extension corridor, and the Pine Hill Road-Brook parcel, a 7.4 acre parcel south of the Wall Street alignment. It is not clear if these town owned areas are protected by conservation easements. See Figure 3.13-1.

Along the NH 111 Bypass, the municipal lot that houses the town library and police station extends across part of the proposed alignment. There is no other publically owned or conserved land along the NH 111 Bypass alignment.

If federal funds are to be used for any of the project's proposed alternatives, impacts to public lands are governed by Section 4 (f) of the Department of Transportation Act. Section (4f) requires that federal agencies shall not approve a transportation program or project requiring the use of any public park or recreation area unless there is no feasible and prudent avoidance alternative and the program or project includes all possible planning to minimize harm.

3.14 Bicycle and Pedestrian Trails

There are no public pedestrian trails within the study area. The Wall Street Extension follows an old trail, possibly a logging road, from a point at the northern end of Wall Street, to a point east of the alignment. Pine Hill Road, an abandoned road, extends from North Lowell Road to a point east of Interstate 93. There are no established trails along the bypass alignment. The NHDOT recognizes NH 111 as a "Recommended Bicycle Route". See Figure 3.14-1.

3.15 Socioeconomic Setting

Executive Order 12898 requires that federal actions address Environmental justice in minority and low-income populations. Therefore, projects that are federally funded must take into account the effects of the project on these populations. The U.S. Census provides information on the percentage of population groups that fall below the poverty level and on the racial composition of states and counties. As of the 2000 census 4.5 percent of the population of Rockingham County was living below the poverty level, compared with 6.5% of the New Hampshire population, and 12.4% of the US population. The Census also provides the information that the United State was 75% non-minority populations in 2000, whereas Rockingham County was 98% non-minority. The corridors are sparsely populated with residences along the fringes of the corridor. If the project were federally funded, it is unlikely that it would disproportionally affect minority or low-income populations.

3.16 Air Quality

Air quality standards set by the federal Clean Air Act provide thresholds for particulates, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, and lead. No air quality monitoring for this project was undertaken. Windham is in a non-attainment area for ozone under the eight hour standard. Additional analysis would be undertaken in permitting stages of this project.

3.17 Cultural Resources

No archeological or historical survey has been undertaken for this project. Figure 3.17-1 depicts the study area on the 1904 USGS topographical map. The alignment corridors were undeveloped, with the exception of the Pine Hill Road, which crossed the Wall Street Extension corridor.

However, much is known about the historic properties that exist along the NH 111 Corridor. During the NH 111 Bypass Project, extensive survey work was done along the NH 111 Corridor within the study area. Several of the structures in or adjacent to the Town Center were deemed eligible for the National Register of Historic Places. These include the following:

- Windham Presbyterian Church, 1 Church Road
- Windham Town Hall, 3 North Lowell Road
- Old Nesmith Library, North Lowell Road
- James Cochran House, 21 Indian Rock Road (NH 111)
- Rev. Loren Thayer House, 1 Indian Rock Road (NH 111)

Figure 3.17-2 below depicts the historic properties in the Town Center.

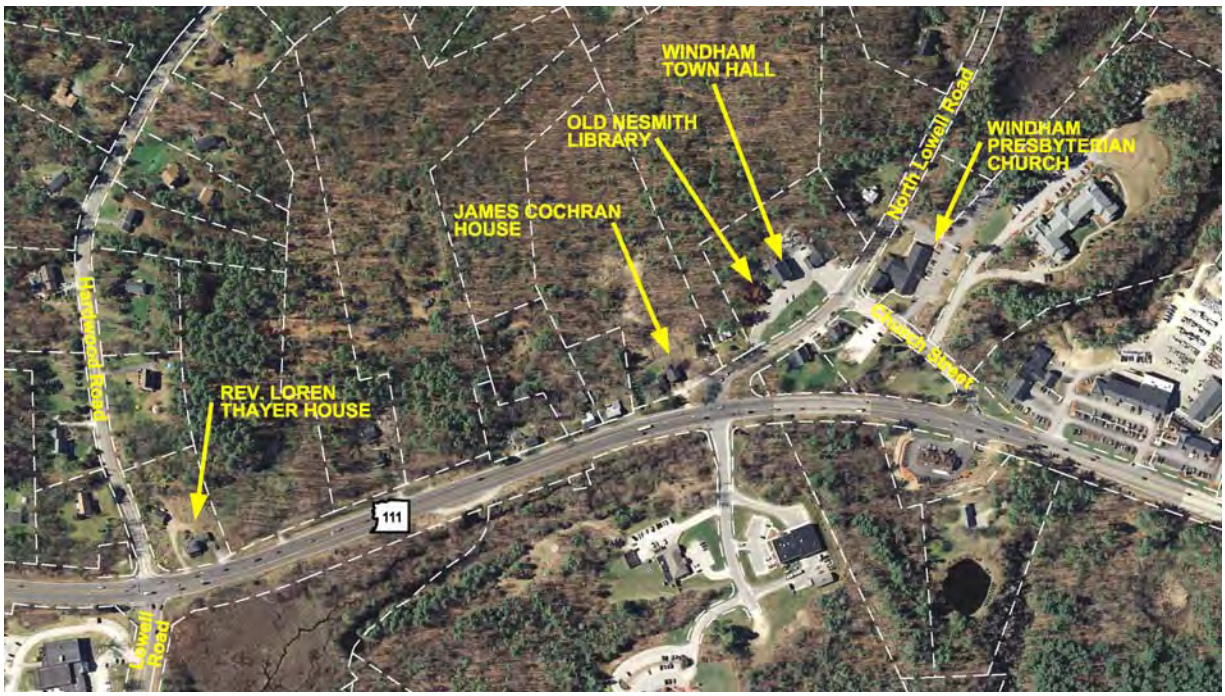


Figure 3.17-2 Historic Properties

If federal funds are to be used for any of the project's proposed alternatives, impacts to historic properties are governed by Section 106 of the National Historic Preservation Act of 1966 and Section 4 (f) of the Department of Transportation Act. Section 106 requires federal agencies to take into account the effects of their proposed projects on historic properties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Section (4f) requires that federal agencies shall not approve a transportation program or project requiring the use of any historic site unless there is no feasible and prudent avoidance alternative and the program or project includes all possible planning to minimize harm. Archaeological and historical survey would therefore be undertaken in the permitting phase of this project.

3.18 Hazardous Materials

A review of the existing hazardous material information available from NHDES data was undertaken. Known hazardous material sources are displayed on Figure 3.18-1. The resources mapped are:

Site Remediation and Groundwater Hazard Inventory - This coverage represents the locations of NHDES program interests (such as leaking underground storage tanks, landfills, etc.).

Underground Storage Tank Site - The coverage contains locations of regulated underground storage tanks and/or facilities.

Aboveground Storage Tank Site - The coverage contains locations of registered above ground storage tanks.

RCRA Hazardous Waste Generators - The coverage contains locations of facilities generating hazardous waste for the State of New Hampshire, regulated under EPA's Resource Conservation and Recovery Act (RCRA) program.

Local Potential Contamination Source Inventory – The coverage contains potential contamination sources within a source water protection area. These are located by public water systems applying for a sampling waiver, or during windshield surveys performed by NHDES staff.

NPDES Outfalls - The coverage contains the locations of outfalls for facilities registered with the National Pollutant Discharge Elimination System (NPDES) program. Under this program, established by Public Law 92-500, all facilities which discharge any pollutant from point sources to surface waters (directly) are required to obtain a federal permit from the US Environmental Protection Agency. The New Hampshire Department of Environmental Services (NHDES) also issues a State Water Discharge Permit for most of these discharges.

None of the known hazardous material sources or remediation sites falls directly within the alignments, however, a more detailed screening of potential hazardous material involvement would be undertaken in the permitting phase of this project.

4.0 Alternatives Development and Evaluation

4.1 Introduction

This section provides a summary and description of the alternatives developed for the NH 111 Corridor and Wall Street Feasibility Study. All of the alternatives were developed to help achieve the Project Vision. The Wall Street Extension, the NH 111 Bypass, and the In Corridor Improvements are all transportation alternatives designed to deal with the traffic that travels through and around the Town Center. Other components and ideas to help achieve the vision are also presented. The discussion of each alternative includes the traffic analysis conducted, cost estimates developed, and the impacts associated with each alternative. The discussion concludes with the decision made by the Project Advisory Committee (PAC) pertaining to each alternative.

The traffic analysis for each alternative is comprised of two elements. First, the traffic modeling performed for the alternative using the Seacoast Regional Travel Demand Model ("the Model") will be summarized. The traffic modeling was discussed and presented in Chapter 2. The forecasted travel demand for the Year 2035 was determined for each alternative. This represents the amount of traffic that is assumed to be present in 2035 based upon assumed levels of housing and job growth in the region.

Second, the operational conditions of each element of the transportation system were evaluated using the forecasted traffic volumes. Level of Service (LOS) is the term used to characterize the operational conditions of a section of roadway or intersection. Numerous factors contribute to the LOS including travel delay, speed, congestion, driver discomfort, convenience, and safety based on the road or intersection's ability to handle the forecasted demand. The alphabetic designations A through F define the six levels of service. LOS A represents very good traffic operating conditions with minimal delays while LOS F represents poor traffic operating conditions with excessive delays and queues. The LOS will be used in the following sections to characterize how well the alternative handles the future travel demand.

SIGNAL
LOS AM/PM

For each alternative in the following sections, a conceptual plan will be presented that shows the elements of the alternative including the LOS along NH 111 and the intersections within the project limits. The LOS indicated on the figures is the morning peak period (AM) and the afternoon peak period (PM) as shown here. Traffic volumes and changes in traffic volumes are also shown for some of the alternatives. These values are AM and PM peak period volumes for the forecast year of 2035. The volumes presented were generated by the model and then factored to account for the sensitivity analysis described in Section 2.4.1. In most cases, these volumes were slightly higher than the model generated volumes.

4.2 No Build

The No Build Alternative is the "do nothing" scenario where no improvements are made to NH 111 other than those currently planned as part of other projects. The existing problems identified for the corridor would continue and in some cases worsen as growth in the region continues. The No Build Alternative serves as a baseline for comparison against the other alternatives.

The *Interstate 93 Improvements from Salem to Manchester Project* will relocate and widen NH 111 between Wall Street and I-93 and will have a significant impact on NH 111 in Windham. NH 111 will be shifted north on a new alignment where it will be a four-lane divided arterial highway. The four lanes will be carried west just past the Wall Street intersection where the proposed four lane divided section will be reduced to meet the existing two lane section. I-93 will be widened from its current four lanes to eight lanes as part of the project. The expanded capacity of I-93 and NH 111 is projected to serve the increased traffic expected within the region.

The remainder of the NH 111 corridor would remain as it exists today. Figure 4.1 is a conceptual aerial plan of the project limits showing the No Build Alternative. The planned work as part of the I-93 Widening Project is shown in yellow.

The traffic modeling performed for the No Build Alternative forecasts the volume of traffic on NH 111 in the Windham Town Center to increase between 40% and 70% between the years 2009 and 2035. The increased volume places additional pressure on the existing signalized intersections at North Lowell Road/Fellows Road and Lowell Road/Hardwood Road. The LOS for each of these intersections indicates less than ideal conditions in the future. Both intersections would operate at LOS F during the morning peak period and LOS D during the afternoon peak. The LOS at the Wall Street intersection is better because this intersection will be improved as part of the I-93 Widening Project.

The consensus from the PAC is that the No Build Alternative is not acceptable. Doing nothing along the corridor is not sustainable given the expected increases in traffic volume and the subsequent delays for both residents of Windham and commuters passing through town.

Figure 4.1 – No Build Alternative

4.3 Wall Street Extension

The Wall Street Extension aims to reduce the amount of traffic that travels through the Town Center by diverting a portion of it. Specifically, cars traveling between areas north and west of the Town Center and I-93 would be serviced by this extension. The alternate route is an approximately one mile extension of Wall Street that connects Wall Street to North Lowell Street near the existing Pine Hill Road. A new four-way intersection would be created at Londonderry Road. A fundamental goal of the study is to determine the feasibility and ultimately the benefits of this extension.

The extension would be a two-lane arterial roadway with a design speed of 40 mph. Figure 4.2 is the proposed typical section for Wall Street. The alignment of the Wall Street Extension is challenging due to the undulating topography and the presence of wetlands and ponds in the area. The existing segment of Wall Street near NH 111 would also be upgraded to meet the design speed of 40 mph. It was determined that the Wall Street Extension is feasible as a two-lane collector road. Figure 4.3 is the conceptual aerial plan of the Wall Street Extension. A detailed plan of the Wall Street Extension can be found in Appendix A.

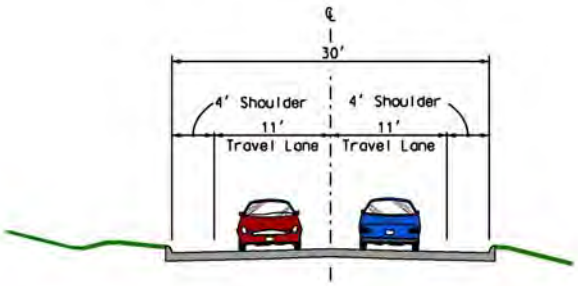


Figure 4.2 – Wall Street Extension Typical Section

The goal of the Wall Street Extension is to attract the vehicles that are currently traveling from North Lowell Road to NH 111 and ultimately I-93. Those vehicles could use the Wall Street Extension and reduce the volume of traffic that travels on North Lowell Road near the Town offices and NH 111 in the Town Center. The extension would be a two-lane collector road utilizing the signalized intersection at NH 111 and a stop controlled intersection at North Lowell Road across from Londonderry Road. There are existing driveways along Wall Street that would remain open and a potential residential development at the end of Sheffield Court that could also be connected.

The traffic modeling performed for the Wall Street Extension forecasts that the peak direction of traffic flow will be 340 vehicles per hour (vph) eastbound for the morning peak and 590 vph westbound for the afternoon peak using the new road in 2035. The peak direction volume of traffic on North Lowell Road would be reduced by 105 vph southbound in the morning and 475 vph northbound in the afternoon. These traffic volumes suggest that traffic would divert to the Wall Street Extension. The total peak hour volumes for both directions forecasted to use the extension are 370 vph in the morning and 735 vph in the afternoon.

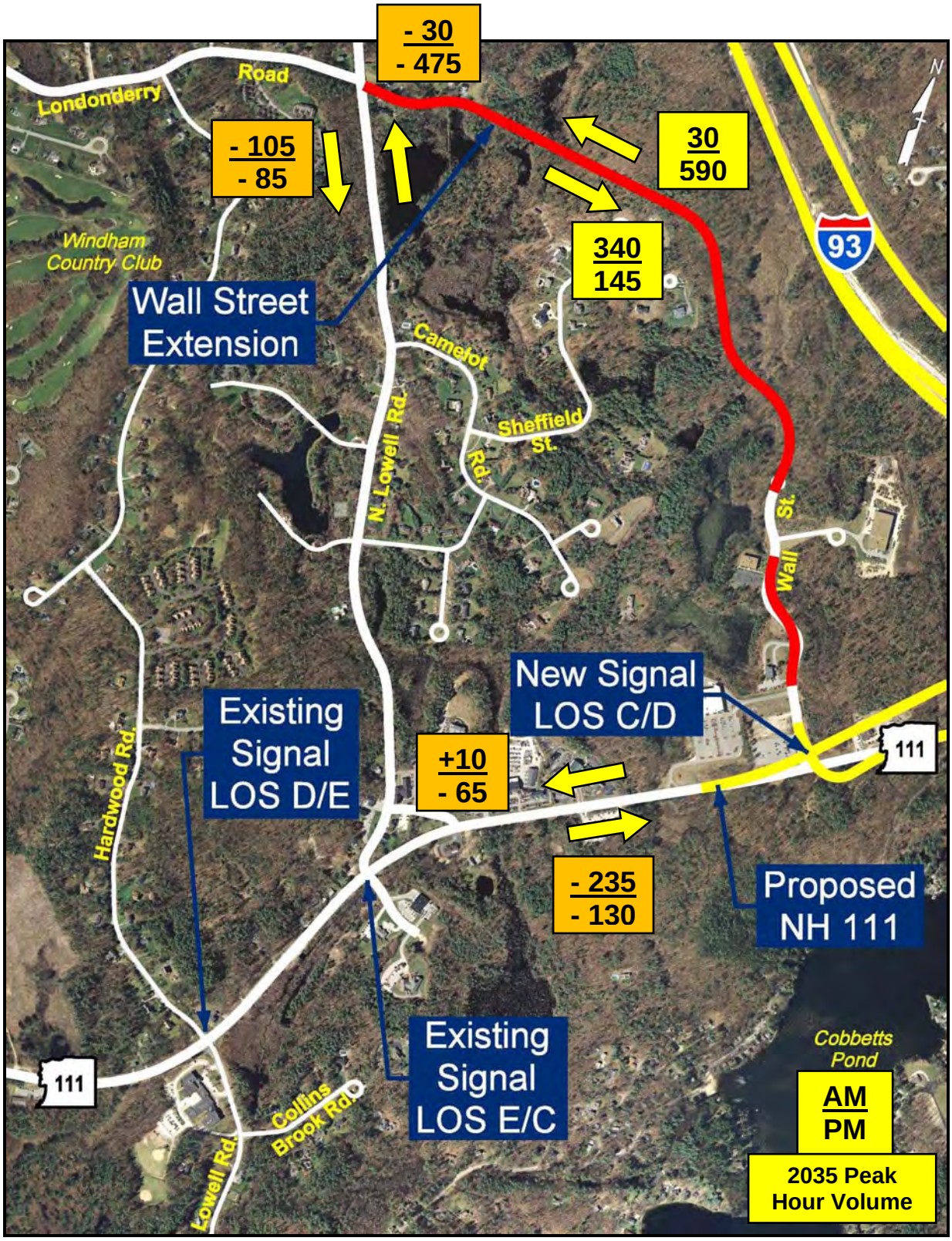


Figure 4.3 – Wall Street Extension

However, while the extension does attract peak hour vehicles (590 vph in the afternoon peak) and reduce the traffic volume on North Lowell Road (- 475 vph in the afternoon peak), the volume of traffic on NH 111 in the Town Center is only reduced by 65 vph in the afternoon peak period. While there is a decrease in traffic volumes on NH 111 near the Town Center, there is an increase in traffic volumes on NH 111 east of Wall Street. Furthermore, there is an overall increase in traffic for the Wall Street Extension Alternative as compared to the No Build Alternative. The addition of a new collector road draws more traffic into the study area because there is additional capacity. By 2035 there is a great deal of demand for east to west travel in the region. For example, the current eastbound traffic volume in the morning, east of North Lowell Street, is 1,148 vph (2009). The demand at this location increases to 1,700 vph by 2035, an increase of 48%.

As presented in Chapter 3, there are significant natural resources along the proposed Wall Street Extension alignment. Wetlands and floodplains would be crossed and these impacts would be considered significant. Wildlife resources would also potentially be impacted by the extension. Impacts of this nature would require the project to demonstrate there is no other solution that has fewer impacts. Avoidance must be attempted before mitigation would be considered.

A conceptual cost estimate was developed for the Wall Street Extension Alternative. Table 4.1 below shows the breakdown of the estimated costs. The construction cost includes a bridge over one of the wetlands.

Element	**Cost**
Design and Permitting	$400,000
Mitigation	$500,000
Right of Way Acquisition	$750,000
Construction & Construction Engineering	$4.5 million
Total	**$6.0 to $6.5 million**

Table 4.1 – Estimated Cost of the Wall Street Extension

The PAC considered all of the advantages and disadvantages of the Wall Street Extension. While it does provide an alternate route for regional traffic, there was an overall increase in traffic volumes coupled with significant resource impacts. The PAC reached consensus that, with respect to the vision and objectives of this project, there was not sufficient benefit demonstrated from the Wall Street Extension to warrant the cost and impacts associated with its construction at this time. Therefore, the Wall Street Extension will not be included by the PAC as one of the recommended construction elements for the project.

However, the PAC does not reject the Wall Street Extension entirely. The committee believes that there may be a time in the future when the extension will be warranted. The PAC recommends that the Wall Street Extension remain in the Windham Master Plan and that future developments in the area accommodate the extension and the general right of way alignment developed by this study, shown in Appendix A.

4.4 NH 111 Bypass

The intent of the NH 111 Bypass Alternative is to divert the high volume of traffic that travels on NH 111 away from the Windham Town Center. NH 111 would be shifted to the south behind the Town land that includes the Nesmith Library, Police Station, and Fire Station. A connection would be made from the end of Fellows Road to the NH 111 Bypass. The existing NH 111 Corridor would become a local road providing access to the Town Center and businesses along the road. Figure 4.4 is the conceptual aerial plan of the NH 111 Bypass.

The NH 111 Bypass would be a two-lane principal arterial highway with a design speed of 50 mph. The alignment of the bypass is challenging due to the undulating topography and the presence of wetlands, streams, and ponds in the area. Also, the bypass is aligned near a residential neighborhood along Collins Brook Road. The connections at each end of the bypass where it meets the existing corridor are also difficult. Figure 4.4 shows an additional intersection that would connect the Bypass to the existing NH 111 roadway.

The traffic modeling performed for the NH 111 Bypass forecasts indicate the majority of traffic traveling on NH 111 would divert to the bypass. Of the traffic that would be on NH 111, between 60% and 80% of the vehicles would divert to the bypass, depending on the direction and time of day. The remaining traffic would continue to use the existing roadway. The forecast of afternoon peak traffic traveling westbound on NH 111 near the Town Center indicates that 1,210 vehicles would use the Bypass while only 310 vehicles would use the existing NH 111 roadway. Figures 2.12 and 2.13 in Chapter 2 show the entire distribution of traffic for the NH 111 Bypass. The traffic modeling confirms that the NH 111 Bypass would divert significant traffic away from the Windham Town Center. By diverting traffic away from the town center, this alternative addresses two of the Project Problem and Vision Statement objectives: to reduce the high volume of traffic in the town center and retain a two-lane NH 111 through the town center.

As presented in Chapter 3, there are significant natural resources along the proposed NH 111 Bypass alignment. Wetlands, streams, ponds and floodplains would be crossed and these impacts would be considered significant. Wildlife resources would also potentially be impacted by the extension. Impacts of this nature would require the project to demonstrate there is no other solution that has fewer impacts. Avoidance must be attempted before mitigation would be considered.

Community impacts were raised as a concern by many residents who attended various public meetings. The bypass would be located behind a residential

neighborhood on Collins Brook Road. While no direct impacts are anticipated, noise and air quality impacts would be expected with a highway closer to these homes.

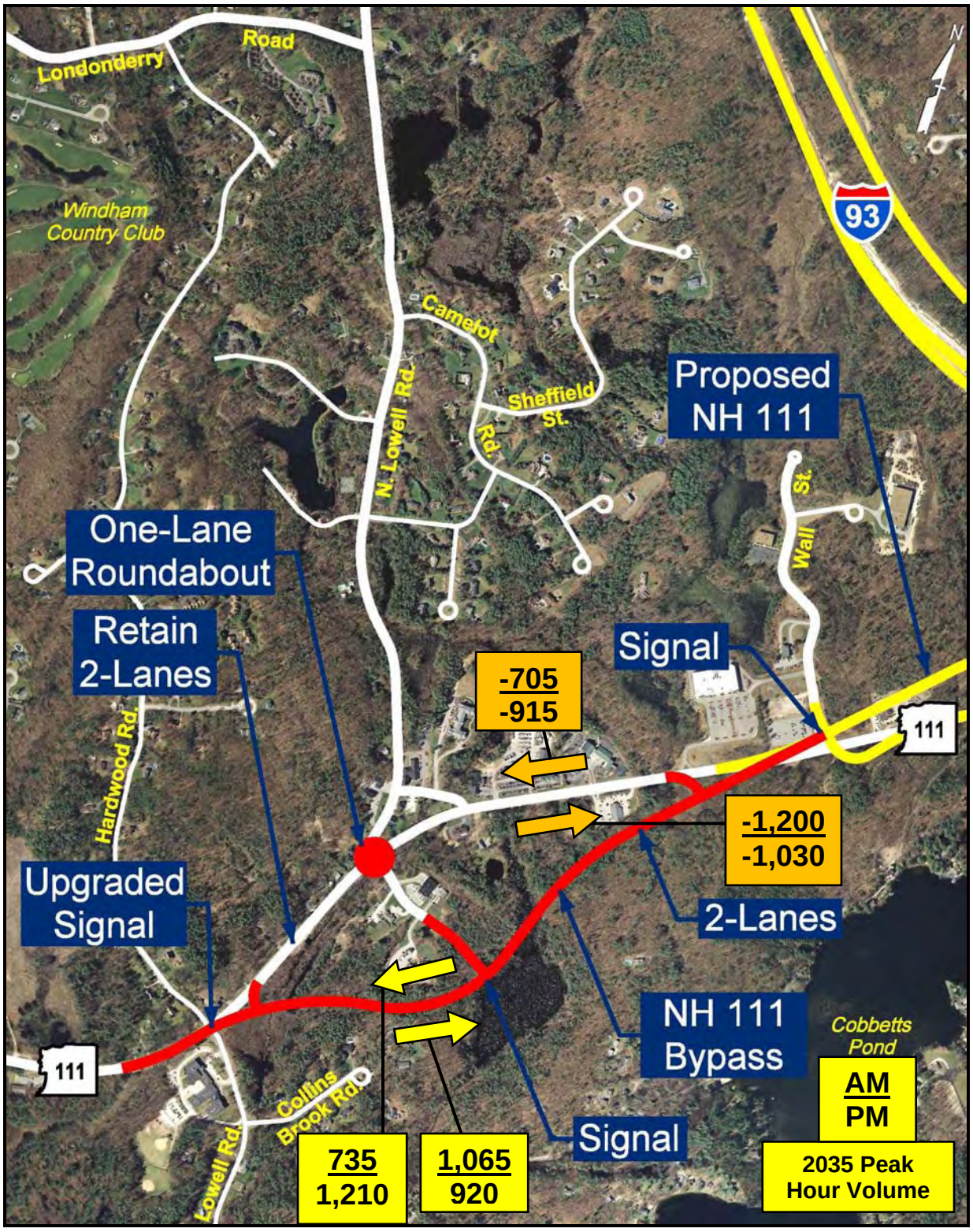


Figure 4.4 – NH 111 Bypass

Also, the diversion of traffic away from the businesses that exist along the existing NH 111 corridor was raised as a concern. If these vehicles bypass the businesses, there was concern raised that the businesses may be harmed and the likelihood that the commercial component of future Town Center development would be diminished.

The PAC considered the advantages and disadvantages of the NH 111 Bypass. While it was very successful in diverting traffic away from the Town Center, the combination of significant resource impacts, high costs for constructing one mile of new highway, the economic impact of diverted customers, and the noise and air quality impacts to adjacent neighborhoods caused the PAC to conclude the alternative was not reasonable for the community. The PAC reached consensus that the impacts were too significant to justify the traffic benefits of the NH 111 Bypass. Therefore, the NH 111 Bypass will not be recommended by the PAC. No cost estimates or detailed plans were prepared for the NH 111 Bypass as the PAC reached their consensus early and felt no additional effort was necessary for this alternative.

4.5 NH 111 In Corridor Improvement Alternatives

Alternatives that would utilize the existing NH 111 Corridor were developed to determine how they would achieve the Project Vision. These In-Corridor Improvement Alternatives included different lane configurations, intersection configurations, design speed, and other design features. The intent for each of these alternatives was to create a Town Center while accommodating NH 111 in its current location.

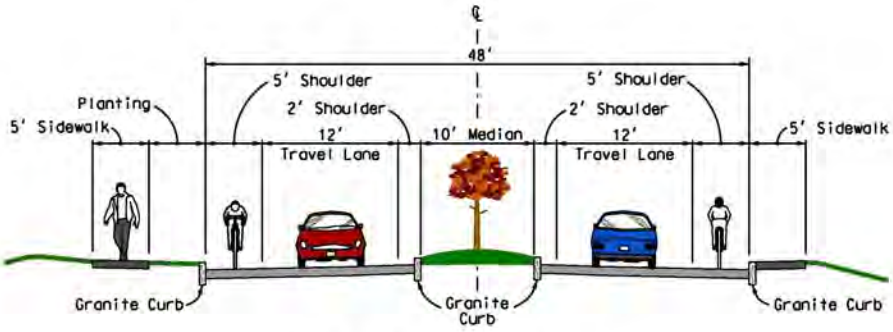
For the purposes of this conceptual design and feasibility study, in each of the In-Corridor Alternatives, the existing NH 111 centerline was used as the default road alignment. This was done because, for this feasibility study, detailed property, topographic, and resource information was not available. When the project is actually designed, such information will be used to adjust the alignment and intersection locations. For those alternatives that propose a widened NH 111, the widening is proposed equally on both sides of the corridor. It is understood that in the eventual full engineering design and construction of the alternatives, the impacts could be balanced to reduce or eliminate the affect on certain resources. At this level there is not sufficient information to make a reasonable determination of which impact is less desirable or what opportunity exists to reduce or eliminate impacts. These determinations will be made in the engineering and permitting phase when more information will be available.

4.5.1 Lane Configuration

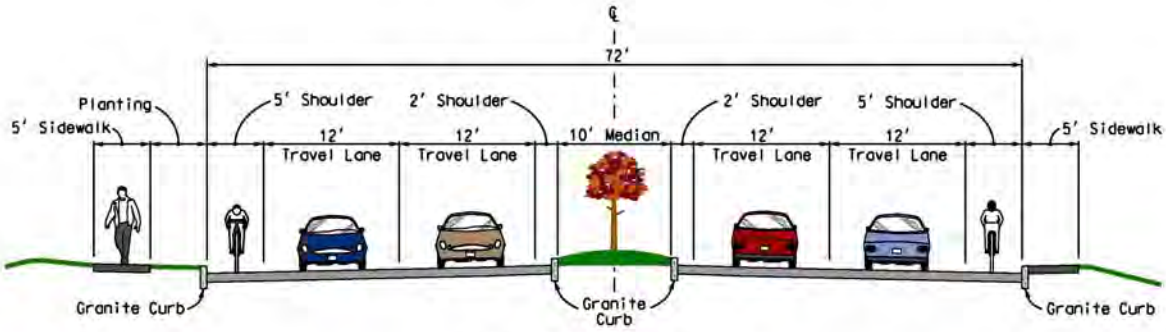
A key element of the NH 111 In-Corridor Alternatives is its lane configuration. The existing corridor is a two-lane undivided urban principal arterial highway. As part of the planned I-93 Widening Project, NH 111 will be relocated and widened from west of Wall Street to I-93. This new section will be a divided four-lane highway. This four

lane section will then transition back to two lanes just west of Wall Street. The other components of this section include shoulders, bike lanes, sidewalks, and medians.

The portion of the NH 111 corridor covered in the report would connect to the section planned as part of the I-93 Widening. Two very similar typical sections were developed. Each is a divided roadway with a landscaped median. Each includes an outside shoulder/bike lane and sidewalks on both sides of the roadway. These elements are all included to present the maximized section that can be modified as needed along the corridor. For example, sidewalks may not be needed or desired on both sides of NH 111 for the entire length of the project. The main difference between the two concepts is the number of lanes. One is a two-lane divided roadway and the other is a four-lane divided highway. Each concept is shown below in Figure 4.5.



2 Lane Divided Section



4 Lane Divided Section

Figure 4.5 – NH 111 Typical Sections

The number of lanes on NH 111 is based on the future demand for travel along the corridor and how much congestion can be tolerated. For instance, the two-lane section would fit within the current roadway corridor, but would not provide adequate capacity resulting in excessive delay. The four-lane section, on the other hand, would provide sufficient capacity with minimal delay, but would create impacts along the corridor. The intersection configuration also plays a role since traffic signals require more storage space than do roundabouts. Specific In-Corridor Improvement

Alternatives are presented in the next two sections with the amount of delay, measured as level of service, identified for each.

4.5.2 Traffic Signal Alternative

The In-Corridor Alternative with Traffic Signals would extend the configuration that is planned for NH 111 east of Wall Street as part of the I-93 Widening project and extend it westward through the Town Center. The intersections that currently have traffic signals would be upgraded under this alternative. A four-lane section would be required on NH 111 through the project limits to accommodate the queues that would develop at the intersections during peak traffic periods. The median along NH 111 would be wide enough to accommodate a left turn lane at the signalized intersections as well as left turn pockets at key points for access into adjacent businesses.

The 40 mph speed limit would likely remain with the Traffic Signal Alternative. The signal timing would be coordinated to provide the least amount of delay for those traveling along NH 111. The approaches to each signalized intersection would provide sufficient storage for traffic queued during peak morning and afternoon periods. The conceptual aerial plan of the In-Corridor Traffic Signal Alternative is shown on Figure 4.6. A detailed plan of the Traffic Signal Alternative can be found in Appendix A.

The traffic modeling performed for the Traffic Signal Alternative indicates that the four lanes have sufficient capacity to handle the traffic demand in 2035. Furthermore, the traffic signals operate at acceptable levels of service with the LOS C or above for all signalized intersections.

There would be impacts to natural and cultural resources as part of this alternative. The widening of NH 111 would impact streams and wetlands that exist along the corridor. Several culverts would have to be lengthened to accommodate the wider NH 111 as it crosses over several streams, including Golden Brook passing through the Town Center. Wetlands and floodplains associated with Golden Brook would also be impacted by the widening.

Impacts to cultural resources are also possible due to the widening of NH 111. Historic buildings in the Town Center along NH 111 are very close to the existing roadway. The widening associated with the Traffic Signal Alternative could potentially impact some of these structures.

The PAC considered the advantages and disadvantages of the Traffic Signal Alternative and reached consensus that it did not meet the Project Vision. The PAC felt that the higher travel speeds associated with a series of traffic signals as well as the lane additions at the intersections necessary for storage were not consistent with the vision to create a vibrant village center. The In-Corridor Traffic Signal Alternative was therefore not recommended by the PAC.

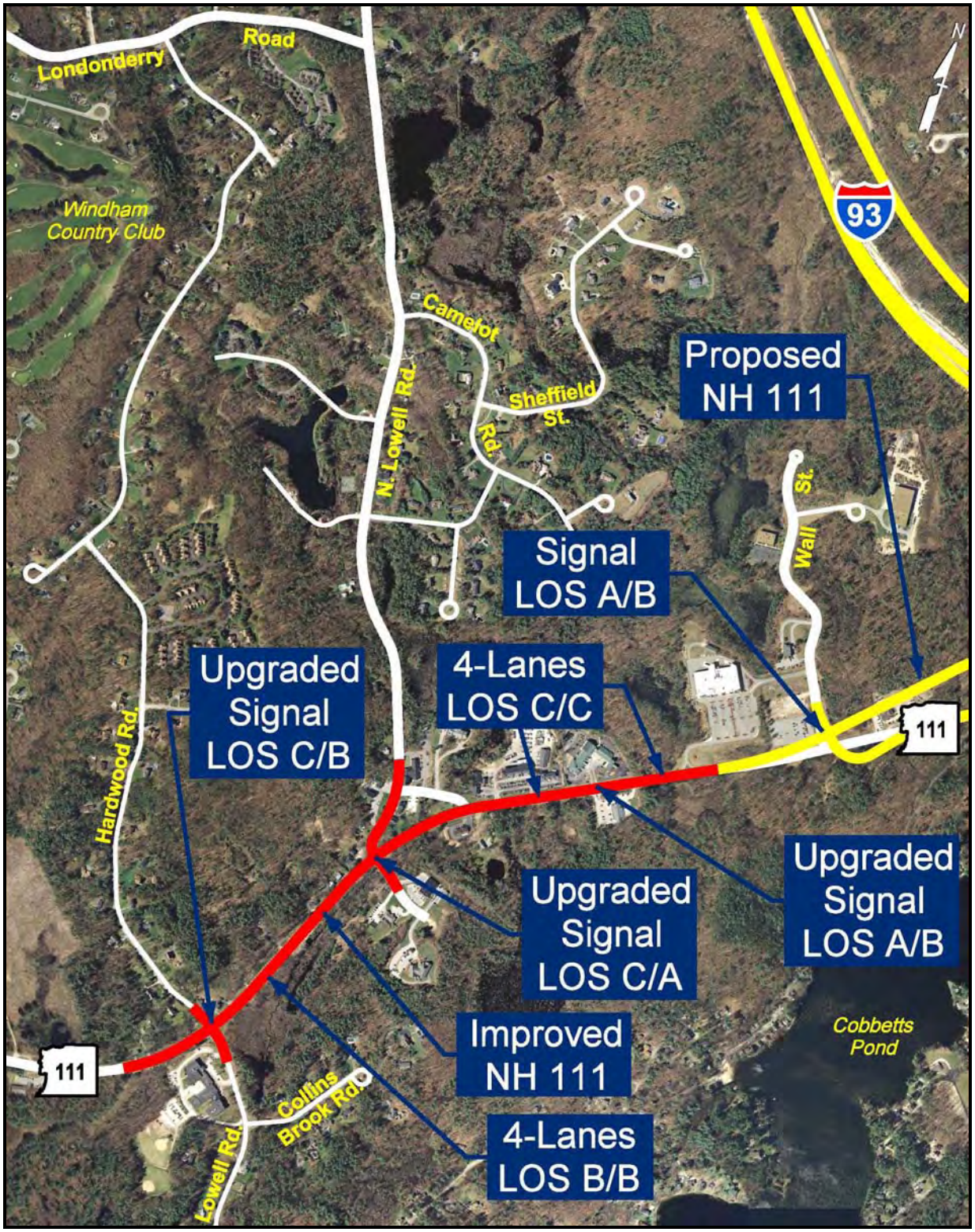


Figure 4.6 – In-Corridor Traffic Signal Alternative

4.5.3 Roundabout Alternatives

The use of modern roundabouts for intersection control has gained favor around the nation and in New England over the last several years. Roundabouts offer improved efficiency and safety while providing opportunity for improved aesthetics. Several concepts for using roundabouts on NH 111 were developed for consideration. Because they can handle high traffic volumes efficiently, yet can be comparatively more aesthetic and pedestrian friendly than conventional intersections, they are viewed as a viable intersection design alternative for the NH 111 Corridor. The following provides information on roundabouts as well as the roundabout alternatives developed for consideration.

A roundabout is a circular one-way intersection. Other common circular one-way intersections are traffic circles and rotaries. A modern roundabout is significantly different than traffic circles and rotaries because of specific design and operational characteristics. Modern roundabouts control their approach, circulating, and exit speeds through geometric design. Roundabouts are generally smaller with smaller radii than traffic circles and rotaries and this helps to slow traffic. The slower speeds associated with modern roundabouts is the key to their success.

Why are modern roundabouts gaining popularity in New Hampshire and the rest of the country? Roundabouts have high capacity, are safe, aesthetic, reduce pollution through reduced fuel consumption, slow traffic, and are safe for pedestrians. Their safety records are impressive. The slower speeds and fewer conflict points reduce crash rates by 35%, injury producing crashes by 75%, and fatal crashes by 90% when compared to signalized intersections[1]. Pedestrian safety is improved because of the slower speeds, reduced conflict points with vehicles, and also shorter crosswalks.

The approach islands (splitter Islands) and center islands in roundabouts provide opportunities for aesthetic treatments. Splitter islands can be landscaped or paved with brick to enhance their appearance. The center islands are landscaped to improve aesthetics but also to make them more visible to approaching vehicles. Center islands are often used as gateway features to announce entry into a village or town. Sculptures, trees, signs, decorative walls, or other treatments can be used. A single lane roundabout at the intersection of NH 111/North Lowell Road/Fellows Road is shown in Figure 4.7 with the specific roundabout elements identified.

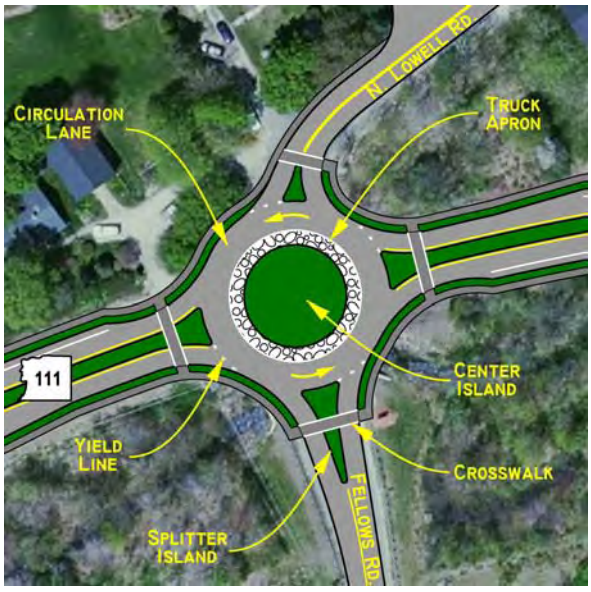


Figure 4.7 – Roundabout Elements

[1] Crash Study *Roundabouts in the United States*. National Cooperative Highway Research Program Report 572, Transportation Research Board

Single Lane Roundabout Alternative

The first roundabout alternative proposes a series of single-lane roundabouts with a two-lane section for NH 111, one lane in each direction. The two-lane section would have a continuous landscaped median that would prohibit all left turns. The roundabouts would be used to make U-turns to access driveways on either side of NH 111. The speed limit of NH 111 would also be reduced to 30 mph. A two-lane roundabout would be required at the NH 111 and Wall Street Intersection to accommodate the four-lane NH 111 that will be constructed as part of the I-93 Widening Project. Figure 4.8 is the conceptual aerial plan of the In-Corridor Single Lane Roundabout Alternative. A detailed plan of the Single Lane Roundabout Alternative can be found in Appendix A.

The continuous median and roundabouts proposed for this alternative eliminates all left turns within the project limits. To access a driveway or business on the opposite side of the corridor, a driver would pass the entrance and use the next roundabout for a U-Turn to reverse direction. Conversely, when exiting a driveway or business a driver must make a right turn to enter NH 111 and use the next roundabout to reverse direction. There is concern that this may harm businesses along NH 111 because it would be more difficult to get to them. However, the high volume of traffic on NH 111 currently makes it very difficult to make left turns during peak periods. While eliminating left turns requires vehicles to travel a longer distance, it may result in reduced travel time. Making right turns is easier because vehicles only need a gap in one direction of travel. Eliminating left turns also reduces the number of conflict points along the NH 111 corridor making it significantly safer while improving overall traffic flow.

The traffic modeling performed for the Single Lane Roundabout Alternative indicates that the two lanes (single lane in each direction) do not have sufficient capacity to handle the traffic demand in 2035. The segment of NH 111 east of North Lowell Road is predicted to function at LOS F in both the morning and afternoon peak periods. This reflects the commuter traffic that uses North Lowell Road to access NH 111 and I-93. This volume cannot be accommodated with the two lanes without excessive delay and vehicle queues. Furthermore, with the exception of the two-lane roundabout at Wall Street, the single lane roundabouts operate at a low level of service with the LOS below D for all intersections. The NH 111/North Lowell Road/Fellows Road intersection operates at LOS F in the morning peak due to the high volume of southbound traffic on North Lowell Road and the high volume of traffic on NH 111.

This alternative would have the least overall impacts to natural and cultural resources. The two-lane section of NH 111 would likely fit within the existing corridor and avoid impacting the streams and wetlands that exist along the corridor. The roundabouts would impact land around the intersections, but this would be minimal. The most likely impact would occur at the NH 111/North Lowell Road/Fellows Road intersection because Golden Brook crosses under NH 111 near the intersection.

Figure 4.8 – In-Corridor Single Lane Roundabout Alternative

Impacts to cultural resources are also possible near the NH 111/North Lowell Road/Fellows Road intersection because of the historic buildings along NH 111.

The PAC considered the advantages and disadvantages of the Single Lane Roundabout Alternative and reached consensus that it did not meet the Project Vision. The PAC felt that while the two-lane section with the single lane roundabouts was most consistent with the vision to create a vibrant village center and offers the advantage of maintaining a two-lane road, the associated traffic queues and congestion was not acceptable and would undermine public acceptance of the project. While there is a strong desire among many in Windham not to further widen NH 111, the consensus at the PAC is that this is not realistic. The In-Corridor Single Lane Roundabout Alternative was therefore not recommended by the PAC.

Two Lane Roundabout Alternative

This alternative proposes a series of two-lane roundabouts with a four-lane section for NH 111, two lanes in each direction. As with the Single Lane Alternative, the four-lane section would have a continuous landscaped median that would prohibit all left turns as with the Single Lane Roundabout Alternative. The speed limit of NH 111 would also be reduced to 30 mph. The advantages relating to the elimination of left turns discussed above for the Single lane Roundabout Alternative all apply to the Two Lane Roundabout Alternative. Figure 4.9 shows the conceptual aerial plan of the In-Corridor Two Lane Roundabout Alternative. A detailed plan of the Two Lane Roundabout Alternative can be found in Appendix A.

The traffic modeling performed for the Two Lane Roundabout Alternative indicates that the four lanes have sufficient capacity to handle the traffic demand in 2035. Furthermore, the two lane roundabouts operate at a high level of service with the LOS above B for all roundabouts.

There will be impacts to natural resources as part of this alternative. The widening of NH 111 will impact streams and wetlands that exist along the corridor. Several culverts would have to be lengthened to accommodate the wider NH 111 as it crosses over several streams, including Golden Brook that passes through the Town Center. Wetlands and floodplains associated with Golden Brook would also be impacted by the widening and two-lane roundabout at the NH 111/North Lowell Road/Fellows Road intersection.

Impacts to cultural resources are also possible due to the widening of NH 111. The degree of impact will depend in part o whether roadway widening shifts to the north or south of the existing centerline. Historic buildings in the Town Center along NH 111 are very close to the existing roadway. The widening associated with the Two Lane Roundabout Alternative could potentially impact some of these structures.

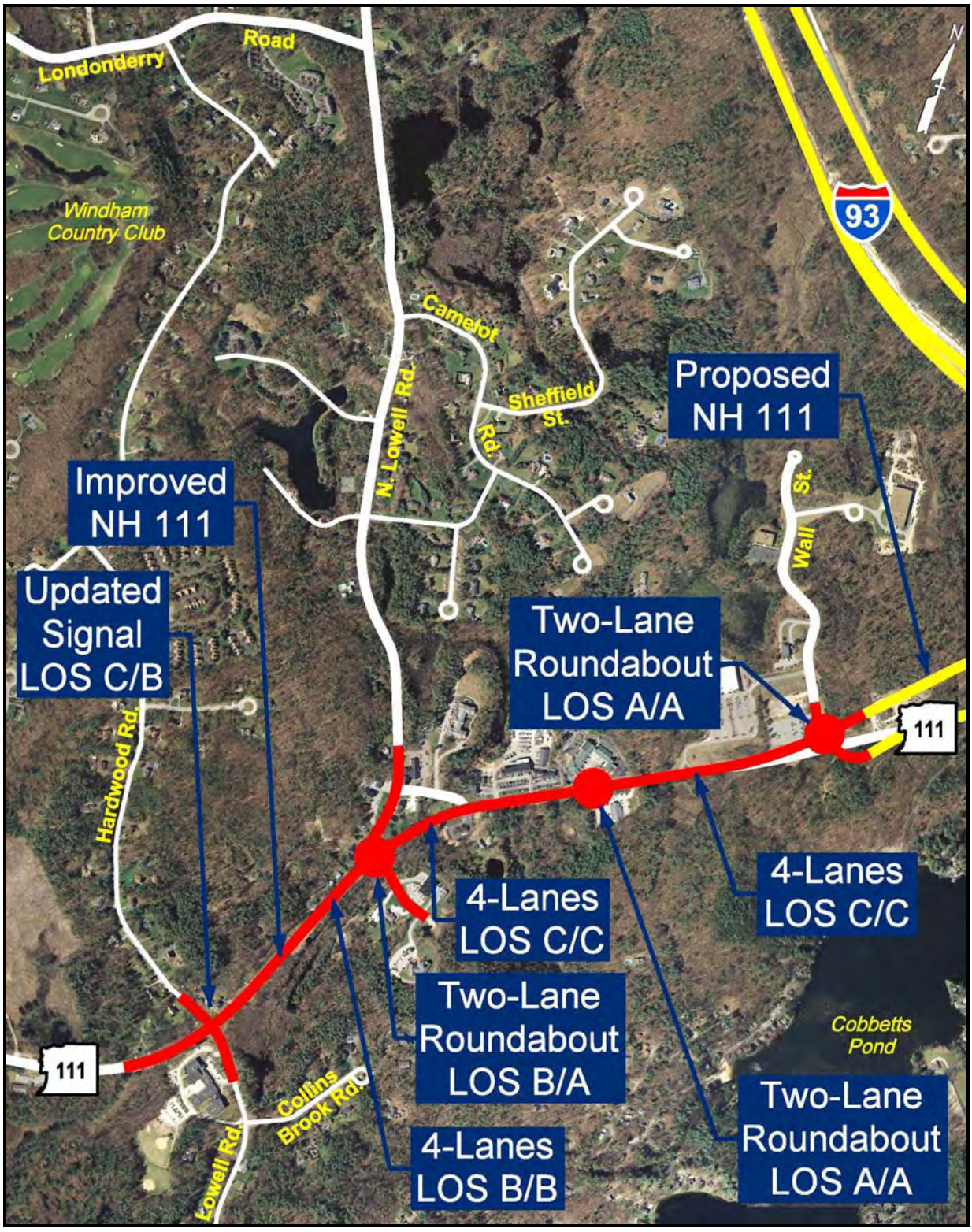


Figure 4.9 – In-Corridor Two Lane Roundabout Alternative

The PAC considered the advantages and disadvantages of the Two Lane Roundabout Alternative. The PAC felt this alternative has most of the advantages of the Single Lane Alternative but provided sufficient traffic handling capacity to adequately address traffic demand. The PAC also felt that the lower speed of the four lane section of NH 111 made it much less of a "highway" and could be made consistent with the vision to create a vibrant village center. The In-Corridor Two Lane Roundabout Alternative was therefore recommended by the PAC.

A conceptual cost estimate was developed for the In-Corridor Two Lane Roundabout Alternative. Table 4.2 below shows the breakdown of the estimated costs.

Element	**Cost**
Design and Permitting	$1 million
Mitigation	$200,000
Right of Way Acquisition	$400,000 to $600,000
Construction & Construction Engineering	$9.5 to $10.5 million
Total	**$11.0 to $12.0 million**

Table 4.2 – Estimated Cost of the In-Corridor Two Lane Roundabout Alternative

Figure 4.9 depicts a corridor with three roundabouts in series. There are roundabouts shown along NH 111 at the intersections with Wall Street, the U.S. Post Office, and North Lowell Road/Fellows Road. The intersection of NH 111 with Lowell Road and Hardwood Road is depicted with an upgraded signal. A fourth two-lane roundabout at the NH 111/Lowell Road/Hardwood Road intersection was also discussed by the PAC. Some feel this roundabout makes more sense than the one at the NH 111/Wall Street intersection because this intersection is much closer to Windham's Village Center District. On the other hand, the Wall Street Roundabout could function as a landscaped "gateway" for the community. The final determination of which intersections should be roundabouts would likely occur in the next phase of the project. The PAC considered either configuration to be acceptable. The detailed plan of the Two Lane Roundabout Alternative in Appendix A shows both the signal and roundabout configurations for the NH 111/Lowell Road/Hardwood Road intersection.

It should be noted that a hybrid alternative utilizing a two-lane NH 111 and two lane roundabouts was considered. In each direction, there would be two lanes approaching and exiting the roundabouts that would transition to a single lane between the roundabouts. However, this alternative was not fully developed because once the roadway was limited to a single lane, the capacity of the corridor would be constrained. The two lane roundabouts would be fed by a single lane roadway that would not have the capacity to handle the traffic demand. Also, there would be no corridor continuity as the roadway would be continually adding and subtracting lanes.

Summary

The traffic performance of each alternative was depicted by the Level of Service (LOS) of the key intersections along the NH 111 Corridor. The LOS is an indication of the amount of delay a vehicle will experience traveling through the intersection. Table 4.3 summarizes the LOS and average intersection delay per vehicle at each of the intersections along NH 111 for the three In Corridor Alternatives along NH 111. The No Build performance is also included for comparison.

Intersection/ Roadway Segment	**Alternative**			
	No Build	Traffic Signals	Single Lane Roundabouts	Two Lane Roundabouts
	LOS AM/PM (2035) Delay AM/PM (seconds)			
NH 111/Lowell Rd/Hardwood Rd	F/E 185/77	C/B 26/19	E/E 74/79	C/B[3] 26/19
NH 111 between Lowell Rd. and North Lowell Rd.	E/E	B/B	E/E	B/B
NH 111/No. Lowell Rd./Fellows Rd.	F/E 111/66	C/A 22/10	F/E 140/67	B/A 12/9
NH 111 between North Lowell Rd. and USPS	F/F	C/C	F/F	C/C
NH 111/USPS/Village Green	F/F 124/155	A/B 10/11	D/E 55/56	A/A 6/7
NH 111 between USPS and Wall Street	F/F	C/C	F/F	C/C
NH 111/Wall Street	B/B[1] 11/17	A/B[1] 8/19	A/A[2] 7/8	A/A 7/8

Notes:

1. The No Build and Signal Alternative include the new signal that will be constructed at the NH 111/Wall Street intersection as part of the I-93 Widening Project.
2. The Roundabout at the NH 111/Wall Street Intersection is a two lane roundabout because it must accept the four lane section that will be constructed east of Wall Street as part of the I-93 Widening Project.
3. The NH 111/Lowell Road/Hardwood Road intersection has been proposed as either an upgraded signal or two-lane roundabout. The performance shown is for the signal. The two-lane roundabout would have LOS B/A.
4. The performance values indicated above are for the Design Year 2035.
5. The LOS for the Four-Lane roadway segments represents the worst case direction for that segment.

Table 4.3 – In-Corridor Alternatives Intersection Performance Summary

It is clear from the results presented in Table 4.3 that all of the proposed alternatives would improve the performance of each intersection compared to the No Build. The Two Lane Roundabout Alternative provides the best performance. The Single Lane Alternative is better than the No Build, but there are several instances where the intersections operate poorly or fail.

Sequencing of Roundabout Construction

A related question deals with the construction of the proposed two-lane roundabout at the NH 111/Wall Street intersection. The I-93 Widening Project will relocate NH 111 east of Wall Street and this requires the reconstruction of the NH 111/Wall Street intersection. The existing NH 111 roadway would be connected to the relocated NH 111 at the Wall Street intersection making this a four-way signalized intersection. The proposed signal is shown below in Figure 4.10.

Figure 4.10 – Proposed Signal at the NH 111/Wall Street intersection

Since the I-93 Widening Project is currently under construction and the relocation of NH 111 is in the final design stage, it was suggested that the intersection with Wall Street should be re-designed as the proposed two-lane roundabout. This would have the advantage of implementing a portion of the recommended solution. However, while the two-lane roundabout would function well at this intersection, there are issues and concerns relative to implementing it without the other components of the recommended alternative. The concern is not with the roundabout, but the existing NH 111 corridor west of the Wall Street intersection.

The afternoon peak period traffic currently causes significant queuing for westbound NH 111 traffic within the project limits. Currently, the queues from the U.S. Post Office/Windham Village Green signalized intersection extend eastward past the Wall Street intersection. The proposed signal presented in Figure 4.10 will help the situation by providing additional storage, but the queues are still projected to extend past the Wall Street extension in the near term. While westbound traffic will continue to experience delay and queuing with the proposed signal, the eastbound traffic and the Wall Street intersection traffic will continue to flow.

The concern with a roundabout at the Wall Street intersection in the near term is that the queues from the westbound traffic would extend back through the roundabout and potentially block all traffic from moving through the roundabout. The NH 111 eastbound and Wall Street intersection traffic could also be delayed as a result of the queues that emanate from the U.S. Post Office/Windham Village Green signalized intersection. Figure 4.11 depicts the two-lane roundabout at the NH 111/Wall Street intersection with the connection to the existing NH 111 corridor.

Figure 4.11 – Proposed Interim Roundabout at the NH 111/Wall Street intersection

While the roundabout at the Wall Street intersection would operate at a high level of service if it were constructed as part of the I-93 Widening Project, there are potential operational issues from the queues along NH 111. If the roundabout were blocked and no traffic was able to move along NH 111, the congestion would be significant. A blocked intersection along NH 111 is a significant safety concern because the

Windham Fire Station and Police Station are located less than a mile away. Emergency response times would be impacted if both directions of NH 111 were blocked. Another concern is that if traffic is blocked by the roundabout because of the queues, the public will blame the roundabout and this could jeopardize the future of the recommended alternative. Because of these issues and concerns, the PAC felt implementing the roundabout at the NH 111/Wall Street intersection was not advisable without the other proposed improvements to NH 111. The recommended alternative could be constructed in phases, but it would need to happen from the center of the corridor moving to the outside. The proposed roundabouts at the NH 111/North Lowell Road/Fellows Road intersection and NH 111/USPS/Village Green intersection could be constructed first followed by the NH 111/Wall Street intersection. The PAC recommends that the NHDOT preserve the necessary right of way required for the roundabout and be willing to reconstruct the intersection as a roundabout in the future when the overall recommended alternative is constructed.

4.6 Access Management Strategies

Access Management is a concept to balance the need to move traffic with the need to access land that has been developed. Transportation corridors must provide access to the driveways and intersections that lie along them, but also maintain capacity for those traveling on them. The benefits of Access Management are improved safety, more efficient use of the transportation system, fewer turning conflicts, improved aesthetics, and more livable communities. It should be noted that the Town currently has an Access Management Overlay district for NH 28. Representatives from the Planning Board on the PAC indicated their intention to propose enacting similar access management regulations for the NH 111 corridor.

There are many strategies to manage access along arterial routes, these include making physical improvements, but also include making policy changes. Policy techniques for achieving access management are described in Table 4.4 below.

Technique	Description
Access Codes	Establish local codes that control how development may access all classes of roadways. The highest class of roadway should have the least number of access points while the lowest class of roadway should have the most access points.
Zoning Regulations	Establish local zoning to ensure development will access the transportation system in a balanced manner.
Advanced Right of Way/ Access Rights Purchase	Advance purchase of land or access rights allows for the implementation of access management design techniques once the land is developed.
Internal Circulation/Site Plan Reviews	Reviewing development proposals allows for an evaluation of the traffic impacts created by the development and ways to mitigate these impacts.

Table 4.4 – Access Management Policy Techniques

Design techniques for Access Management are those that require physical or operational changes to either the transportation system or the developed land. Table 4.5 on the next page lists many of the design techniques and their benefits.

Technique	Description
Intersection Spacing Criteria	Establish minimum spacing between intersections because most corridor delay occurs at the signalized intersections.
Medians	Non traversable medians prevent left turns that improve safety by reducing conflict points and provide more uniform speeds.
Improve Left Turn Lanes	Providing acceleration lanes, deceleration lanes, or center turn lanes improves safety and improves flow by removing left turning vehicles from the through lane.
U Turns instead of Left Turns	Provide U-Turn capability at key intersections instead of left turns at all driveways and intersections.
Improve Right Turn Lanes	Providing acceleration lanes or deceleration lanes improves safety and improves flow by removing right turning vehicles from the through lane.
Consolidate Driveways	Consolidating driveways reduces the number of access points along the roadway improving safety and capacity.
Frontage Roads/Parcel Connections	Frontage Roads and connections provide access between adjacent land uses without using the main roadway, improving capacity and safety.

Table 4.5 – Access Management Design Techniques

NH 111 within the project limits is a prime example of a corridor that would benefit from Access Management. As discussed in earlier chapters of this report, NH 111 is an important regional transportation corridor. Peak hour traffic volumes on NH 111 are high as it provides important connections between communities and access to I-93. There are also many land uses along the corridor that need access. These include Windham Town facilities like the Town Hall, police station, fire station, post office, library, and a school, but also include many retail and commercial properties that provide important goods and services. Striking a balance between the traffic on NH 111 and the access to the facilities and businesses along NH 111 was a key factor in developing alternatives for the corridor.

The policy techniques for achieving Access Management are discussed in more detail in Section 4.8. Several of the design techniques were incorporated into the In-Corridor Alternatives discussed earlier in this chapter. The Recommended Alternative includes several very effective Access Management design techniques. The proposed NH 111 corridor would have a continuous, non traversable landscaped median prohibiting all left turns from and onto the corridor. The roundabouts at key intersections provide the U-Turn capability for reversing direction. In addition, new access points along NH 111 in the Village Center section could be minimized. Instead, access to businesses could be provided through the development of a simple internal street network. This is discussed further in Chapter 5.

The Town is considering adopting an access management zoning overlay district similar to the one already in place for the NH Route 28 corridor which would incorporate many of the techniques described above.

4.7 Transportation System Management

Transportation System Management (TSM) refers to low cost, short term measures to address congestion and safety concerns. These measures typically can be easily implemented and can be accomplished within existing rights of way.

TSM measures include:

- Intelligent Transportation Systems (ITS)
- New Traffic Signals
- Re-timing Traffic Signals
- Turn Lanes
- New Lane Striping
- Signage

The NH 111/North Lowell Road/Fellows Road intersection has two issues that currently impact its operations and safety. First, there have been reports that the detectors in the pavement for the North Lowell Road approach are not working properly, causing improper traffic phasing that potentially decreases the level of service. An example of a TSM measure would be to repair the detectors to improve the operations of the intersection.

There are also sight distance issues at the intersection. For instance, vehicles turning right from Fellows Road onto eastbound NH 111 have restricted views that conceal vehicles on NH 111. Making modifications to the intersection or simply cutting back vegetation could improve safety at the intersection.

Utilizing TSM measures could buy time until the proposed improvements could be completely implemented. Improved management of the existing corridor could help reduce congestion in the near term.

4.8 Summary of Recommendations

The Project Advisory Committee recommends that the long range plan for the NH 111 Corridor should include the elements listed below.

Recommended Alternative

- Four Lane Divided NH 111
  - Four 12-foot travel lanes, two eastbound and two westbound
  - Two 5-foot Shoulders/Bike Lanes, one in each direction
  - Sidewalks where warranted, especially for village connectivity
  - Landscaped median
- 30 MPH Speed Limit
- Three or Four Two-Lane Roundabouts, NH 111 at:
  - Wall Street
  - U.S. Post Office / Windham Village Green
  - North Lowell Road / Fellows Road
  - Lowell Road / Hardwood Road
- Continuous Median with No Left Turns, except openings for emergency vehicles
- U-Turns to Reverse Direction
- Reserve Right of Way for Future Transit Stop Pull Outs at key locations along NH 111 (Town Center)
- Retain and Acquire easements where possible along the Wall Street Extension alignment

In evaluating the use of roundabout in a series, the PAC reviewed examples of their use on other corridors. The primary example was the Route 67 Corridor in Malta, New York. Route 67 is a divided four-lane highway with five two-lane roundabouts. There are no left turns allowed. The Route 67 Corridor and other case studies of roundabouts in series can be found in Appendix F.

To better depict how the recommended alternative would look along the NH 111 Corridor, several photo renderings were developed. Figures 4.12a, b, c, and d depict different ground level views of NH 111 with existing and proposed images. Figure 4.12e is a “bird’s eye” view of the corridor with an existing and proposed image.

Figure 4.12a – NH 111 looking east from Church Street

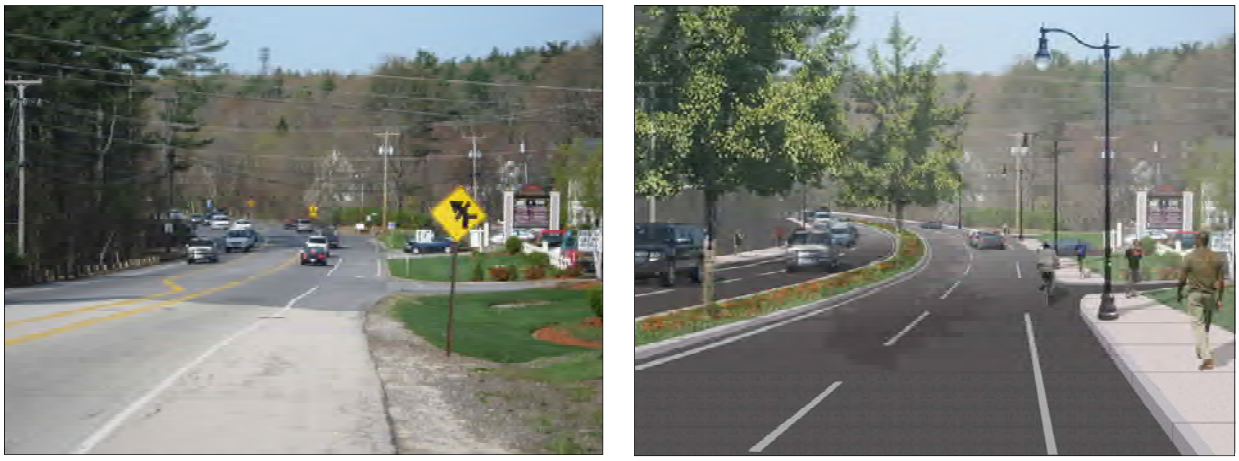


Figure 4.12b – NH 111 looking west from Windham Town Shoppes

Figure 4.12c – NH 111 looking west towards North Lowell Road/Fellows Road

Figure 4.12d – NH 111 looking west at the North Lowell Road/Fellows Road intersection

Figure 4.12e – Bird's Eye view of NH 111 looking from the north above the Windham Village Green and the Windham Town Shoppes

In the short term the PAC recommends the NHDOT construct a traffic signal at the NH 111/Wall Street intersection as currently planned. The PAC requests that the NHDOT reserve adequate right of way at the intersection to accommodate a two-lane roundabout in the future as called for in the recommended alternative.

The recommendations were presented to the Windham Board of Selectmen on Monday April 18, 2011 and Monday June 27, 2011. The presentations included an overview of the project steps and how the PAC reached consensus on its recommendations. After much discussion, the Windham Board of Selectmen endorsed the PAC's recommendations with a vote of four for and one against.

The recommendations were also presented to the NHDOT on Tuesday, June 28, 2011. The presentation included the project overview and a review of the PAC's recommendations. The NHDOT was generally comfortable with the recommendations and felt a roundabout at the NH 111/Wall Street intersection was reasonable to consider in the future.

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5.0 Village Center Alternatives: Creating the Windham of the Future

5.1 Description of Approach

Project for Public Spaces (PPS) was engaged to study alternatives for a future Village Center as part of the NH 111 Corridor & Wall Street Connector Feasibility Study prepared by McFarland - Johnson, Inc. PPS led a workshop in Windham in 2009 to collect information and ideas regarding the Village. In May 2011 PPS led a presentation of preliminary concepts - these were developed from data and ideas brought up in the 2009 workshop plus other input gathered during the corridor planning process and previous master planning studies, including the 2005 Master Plan. PPS uses its "Placemaking" technique, described below, to help understand the issues of a place and the vision the community prefers for its future.

The outcome of the workshop of May 2011 is a preferred alternate plan, The Rural Oasis, which builds on the recommended changes to Route 111 that include four lanes with median and roundabouts.

The overarching goal, reinforcing the 2005 Master Plan, is to make the Town Center of Windham a destination, with an inviting walkable environment and with development that will support this vision. See Appendix G for Selected Case Studies of Village Character.

5.1.1 What is Placemaking?

Placemaking is turning a neighborhood, town or city from a place you are trying to get through to one that is your destination. Project for Public Spaces is a non-profit organization dedicated to helping communities plan for better outcomes, such as advancing the social, cultural and economic vitality of their town or city. PPS calls this "Placemaking" – the art and science of making your community a great place to live. Since its founding, PPS has worked with over 2000 communities in 30 countries around the world to help grow their public spaces and downtowns into vital community places, with programs, uses and people-friendly settings that build local value and serve community needs.

5.1.2 Barriers and Opportunities

Though the Town of Windham currently is lacking a town center, future development energy can be directed in a positive way to achieve a vibrant and pedestrian-focused village center, with civic, commercial, and residential uses and community spaces. All of PPS's recommendations and schematic plans feature a more compact mixed use residential-commercial village center that favors multimodal means of transportation. These elements are highly consistent with the project's vision statement.

What's preventing Windham from being a more walkable place? Barriers to success include high traffic volumes on NH 111 and a likely increase in traffic due to the improvements to Interstate 93 and Exit 3, lack of connectivity between existing commercial parking lots, high volume of truck traffic, and the Town's vehicle-oriented land use policies. Summarized below are a series of general and specific barriers and opportunities.

Barriers

- **No sense of entrance to the Town**
- **Route 111 and North Lowell Road are for traffic, not pedestrians**
- **Few community-oriented destinations in the village**
- **Activities are isolated and reachable only by car – e.g. Library**
- **Lack of crosswalks and sidewalks**
- **Commercial / retail not connected to the Historic District or Civic Cluster**

- Traffic Volume:
  - NH Route 111: the current high volume of east-west traffic through the center of Windham may increase with the widening of I-93 and improvements to Exit 3, and there are now no alternate routes. Traffic is now 21,000 (2010) cars per day, causing long backups at the intersection in the center of Windham, and it is estimated that it will increase to over 30,000 in the future (2035) after I-93 is improved.
  - North Lowell Road: There are long queues at peak times at the intersection with Route 111.
  - Traffic is perceived to be high speed through the town and residents complain about the noise and pollution, especially from the trucks.
  - Alternate routes (new roads) could threaten stable residential neighborhoods and negatively impact sensitive environmental areas (wetlands, ponds and wooded areas).

- Pedestrian Connections:
  - Route 111 and the current town center are not pedestrian-friendly; they lack sidewalks, safe crosswalks and pedestrian amenities. This, together with the speed and volume of traffic, makes an unsafe and unpleasant walking environment.
  - People without cars, e.g. seniors, especially those who live at the assisted living facility adjacent to the Village Center, can't walk to the library or other destinations in the town center.
  - The historic district (Church, Town Hall, museum) is separated by NH Route 111 from the recently-built civic cluster with the Library, Police

Station, and Fire Station; as a result, this civic cluster is not easily accessible on foot or by bicycle.

- Mix of Land Uses, Development, and Destinations:
  - There is a lack of community-oriented destinations in the town center whether public (parks, playgrounds, community gathering places, recreational facilities) or private (cafes, restaurants, coffee shops, Main Street-type retail).
  - There is no mixed-use development in the Town.
  - The Town's land use policies and approval process encourage car-oriented, highway businesses (e.g. strip commercial development).
  - New and proposed development is not consistent with the comprehensive plan that proposes a walkable town center. For example, recently-built Dunkin Donuts is highway-oriented with no sidewalks or pedestrian connections to other commercial or civic uses.
  - Septic systems require significant land adjacent to buildings which may be the biggest barrier more compact development of land use or larger residential development in and around the Village Center.

Opportunities

- **Develop a real entrance and sense of welcome**
- **Mitigate congestion on Route 111**
- **Plan for a mixture of uses**
- **Build pedestrian infrastructure**
- **Create more destinations in town center**
- **Connect Historic District and Civic Cluster to commercial/retail areas**

- There is an acknowledged desire among residents, which is reflected in the Town's 2005 Conceptual Master Plan, to create a walkable, mixed-use "village center" to enhance the quality of life in the Town of Windham.

- The Route 111 corridor study that would widen the road to four lanes has produced a very significant opportunity to address these barriers, since the study includes the current recommendations for revising the transportation network, land use, and policies to create a more walkable town center.
  - The proposed roundabouts create attractive gateway features that address congestion problems and delays (and the related pollution), since they allow slow but steady traffic to move on through the corridor. The final location of the roundabouts is central to the creation of a more village-like network of streets with sidewalks and bike lanes that promote

village development instead of strip development.

- Windham has an existing walking/cycling infrastructure that can be further developed:
  - There is a new rail trail east of I-93 that could be linked to Windham's Town Center by a new trial or bike route along Route 111. Walking or biking along Route 111 is likely to be for the more long distance enthusiast anyway, rather than walking to local shops, and so exploring a multi-use path or greenway instead of traditional sidewalks makes sense.
  - Several other important destinations (the Windham Center School, for example) are already accessible by trails that would perform better if they were incorporated into an official system or plan
  - The town could develop a "complete streets" policy to support the above plan and reduce traffic and needed parking, while improving opportunities for physical and recreational activity. This policy could require new development to connect to the pedestrian network and provide bicycle parking and access. As part of this policy, pedestrian facilities in the Town Center can be targeted to where they are truly warranted and where maintenance costs will be supported by residents.
  - Pedestrian-scaled signage should also be introduced to help with way-finding and encourage pedestrian travel.

- There are a variety of zoning code changes necessary to see to it that future development is done in a way that promotes village, rather than strip development. See below for details.

5.2 Concept Plans

PPS developed two alternative plans that address the proposed roadway changes as well as the long-term development of Windham. The two alternatives, referred to as Alternative A "The Urban Village" and Alternative B – "The Rural Oasis", are outlined below and were presented to the Town at a public workshop on May 11, 2011. Alternative B, "The Rural Oasis", emerged as the preferred plan during the discussion and it is illustrated in the Section 5.2.2.

5.2.1 Alternative A – The Urban Village

In this alternative, both sides of Route 111 are built up into a Main Street type corridor, with additional mixed use commercial and residential uses on parallel streets north and south of this central spine. Community oriented buildings are added to the Civic Campus area. Figure 5.1 is a diagram of the land uses proposed for The Urban Village.

In this scheme the Village has an urban character with commercial and retail buildings along Route 111, which becomes Windham's Main Street. The roundabouts are located farther apart to maximize the Main Street function of Route 111 and to serve the Post Office and future residential developments on the south side of 111. Driving on Route 111 vehicles will "enter" the Town of Windham at the easternmost roundabout, which would become a gateway to the Town Center area, and then drive along "Main Street". Figure 5.2 depicts the street configuration for The Urban Village.

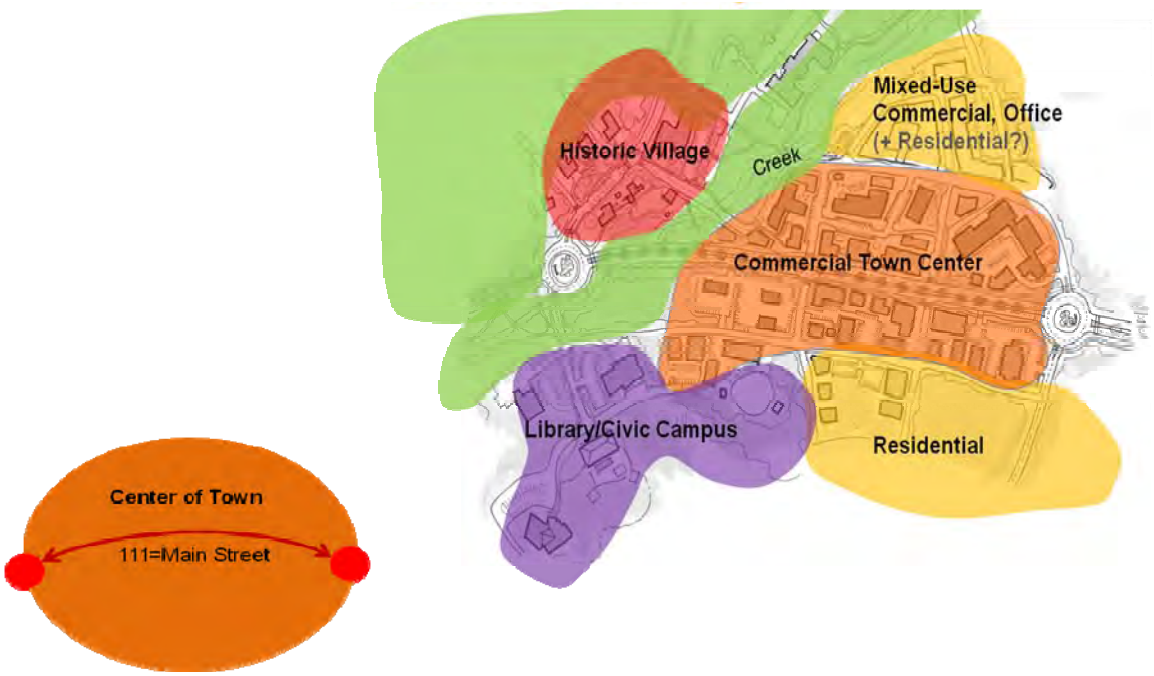


Figure 5.1 – Alternative A – The Urban Village (Diagram of Land Uses)

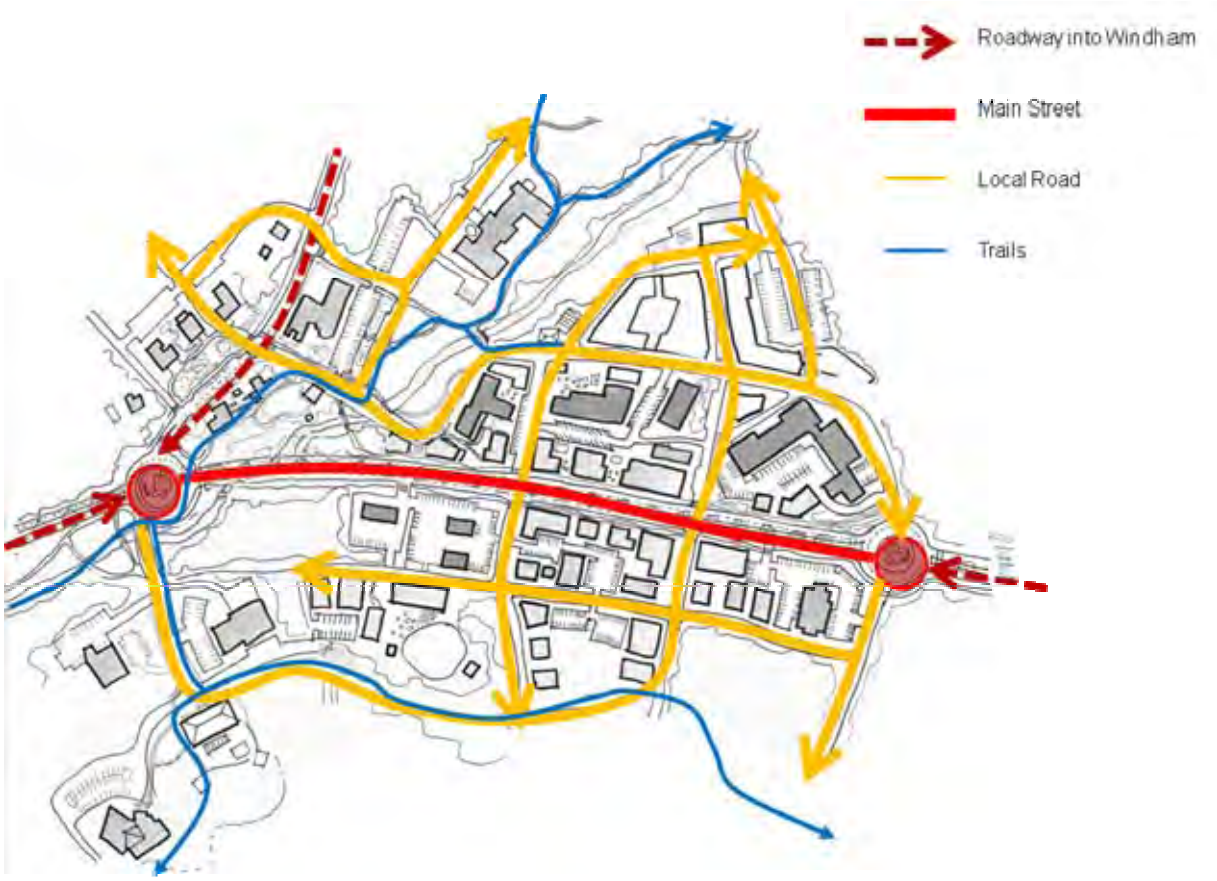


Figure 5.2 – Alternative A – The Urban Village (Street Typology and Connections)

Roadway and roadside elements (See Figure 5.3)

- Route 111 between the roundabouts:
  - commercial buildings are built to the sidewalk
  - metered parking along the sidewalks (no parking during rush hour)
  - sidewalks along both sides of Route 111, wide enough to allow for activities along the sidewalk, as café's, store displays, street furniture
  - street trees
  - street lighting and pedestrian lighting

- North Lowell Road:
  - parallel parking
  - historically appropriate sidewalks with landscaping.
  - crosswalks and sidewalk bulb-outs

- A new network of village-scaled roads north and south of 111 connect to the roundabouts and add walkability, connectivity and vehicle access for more

development to create a Town Center and expand the civic cluster (library complex)

- Church Street is closed to traffic from 111, and becomes a secondary commercial street, with small-scale mixed commercial and residential uses. Several public spaces also face onto this village-scaled street.
- Parking strategies include shared parking, smaller and buffered lots, parking in mixed use buildings, street parking.

Figure 5.3 – The Urban Village Section at US Route 111

Pedestrian circulation

- Sidewalks:
  - Concrete sidewalks should be provided along major roadways,
  - Brick sidewalks in the historic district and the commercial Town Center
  - Sidewalks throughout the historic district, and especially at the Town Center and to the Library.
- Trail system:
  - Should be developed to walk or bike to town from all residential areas to schools, library, Corbett's Pond, and other destinations
  - Trails to connect to the shared roadways and the bikeway proposed on 111.
  - Bike racks provided throughout town center (development requirement?)

Development:

- Additional retail/office and residential mixed-use development is encouraged within a limited district covering both sides of Route 111, creating a Commercial Center district
- Over time, additional civic uses are clustered around the Library to create a Community Campus in a wooded environment. Potential ideas:
  - A destination playground with outdoor classes and reading room, to be used by the local school in conjunction with the Library and connected to the schools via walkable and bikeable trails.
  - A Community Center, with outdoor or indoor Pool.
  - Reduce views of asphalt and parking (hide with wooded landscapes)
- Senior housing can be integrated into the walkable town center south of 111 allowing seniors to walk to shops, library, historic district, etc.

URBAN VILLAGE DESTINATIONS

1. Pedestrian Square
2. Town Hall Complex and Civic Park overlook
3. Village green
4. Market square
5. Creek shorelines with terraces and trails
6. Library and Expanded Civic uses
7. The Pond
8. Commercial Main Street

Figure 5.4 – Alternative A – The Urban Village

5.2.2 Alternative B – The Rural Oasis

In the Rural Oasis[1] Alternative, the village center development is focused on the north side of NH 111 – leaving the south side of NH 111 relatively undeveloped. New development is less urban, of lower density, and trails are oriented to the outdoors and the creek, creating a more rural village character, which blends well with the Historic District. The following is the scheme as presented, followed by a final, with revisions and illustrations, in Section III. Figure 5.5 is a diagram of the land uses proposed for The Rural Oasis.

In this scheme, Route 111 becomes a boulevard with trees in the central median and planting along each side, with a rural character and no new development on the south side, creating instead a public preserve/park. Multi-use paths and trails on each side of the Boulevard will connect natural areas to the civic, historic and commercial centers. The historic district is strengthened with a cluster of additional old buildings that are preserved and moved to this location, including buildings and a barn that are currently threatened at the corner of 111 and North Lowell Road. New "village residential" development is encouraged in two areas (one to the northwest; the other to the southeast) which create options for people to live in a walkable village. The scale of these lots and houses should be in character with other small towns (see selected case studies at the end of report). Natural resources should be connected and enhanced (creek, pond, meadows, and corridors of connecting forested areas). Figure 5.6 depicts the street configuration for The Rural Oasis.

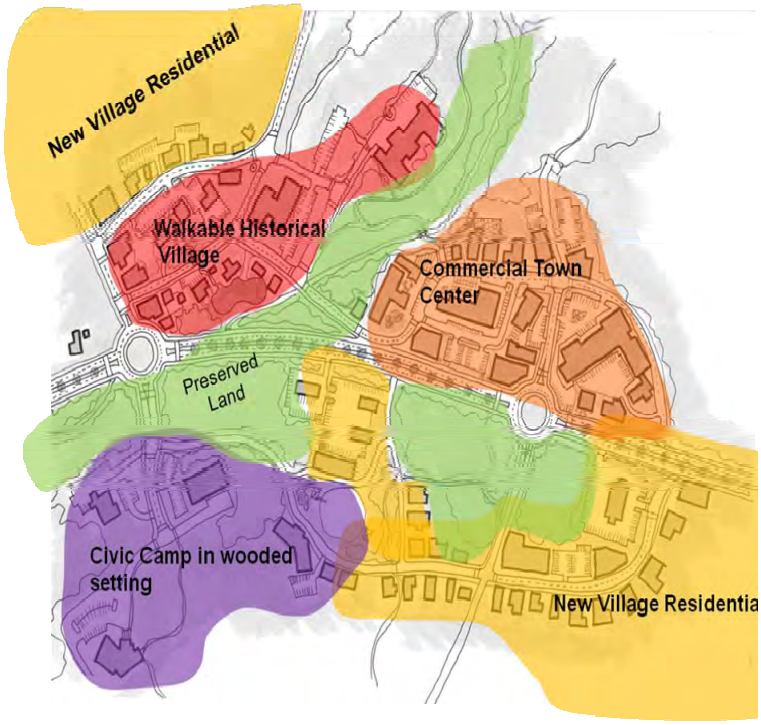
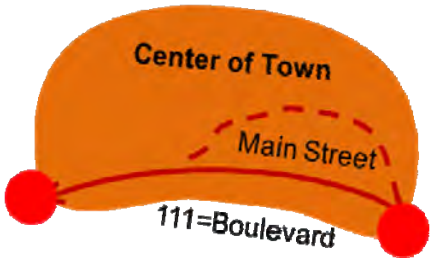


Figure 5.5 – Alternative B – The Rural Oasis (Diagram of Land Uses)



[1] The Rural Oasis title is borrowed from the book: *Rural oasis: History of Windham, New Hampshire, 1883-1975,* published for the Town of Windham in 1975

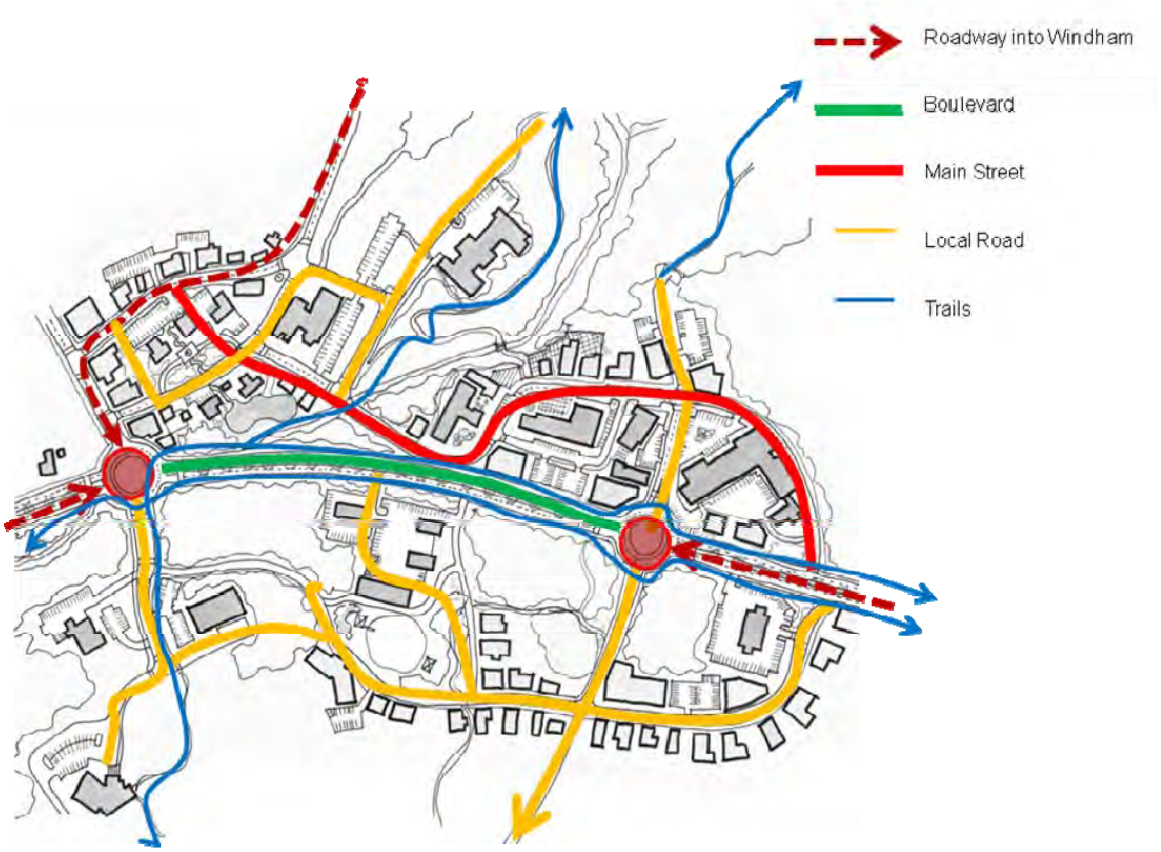


Figure 5.6 – Alternative B – The Rural Oasis (Street Typology and Connections)

Roadway and roadside elements (See Figure 5.7)

- Route 111 through the Village:
  - A scenic boulevard with native plantings, bioswales, median
  - Roundabout islands have special planting and signage, banners at the approaches.
  - Trails on each side, following natural features, meandering from roadway, but adhering to any buildings that face 111
  - Street lighting as well as trail lighting
- A new "Main Street" is created by extending Church Street. This is a village mixed use commercial and residential district, with several destinations along it;
- To keep traffic to local and destination traffic, the connection between Church Street and Route 111 should be closed.

- North Lowell Road realignment to the west of Town Hall complex:
  - Creates more pedestrian friendly environment conducive to exploring/visiting the historic village
  - Encourages strong (walkable) connection between historic district and the new Main Street
  - Also serves new residential development northwest of the Village and connects to existing Eastwood and Hardwood Rd.
- A loop road connects the civic cluster with the other parts of the village.
- Parking strategies include shared parking, smaller and buffered (landscaped) lots. A shared parking strategy should be developed so that the parking gets minimized in extent and maximized in use. Surface parking lots should be articulated with lots of green, trees and buffered and where centrally located could become a flexible space for events.

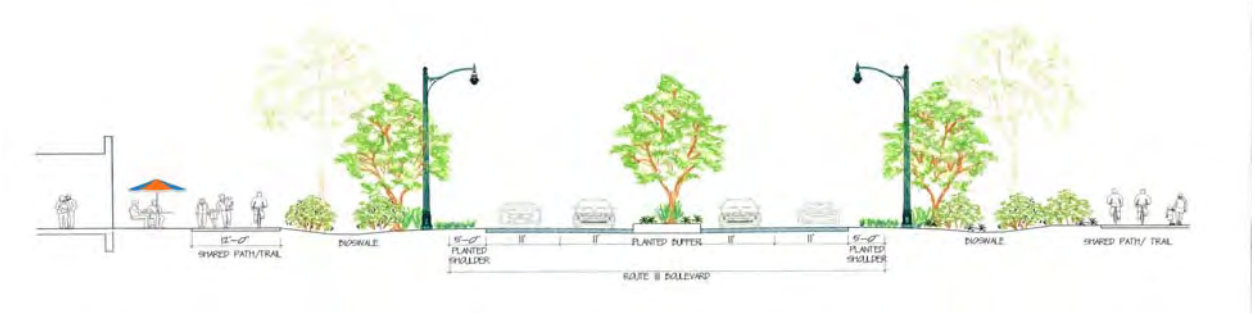


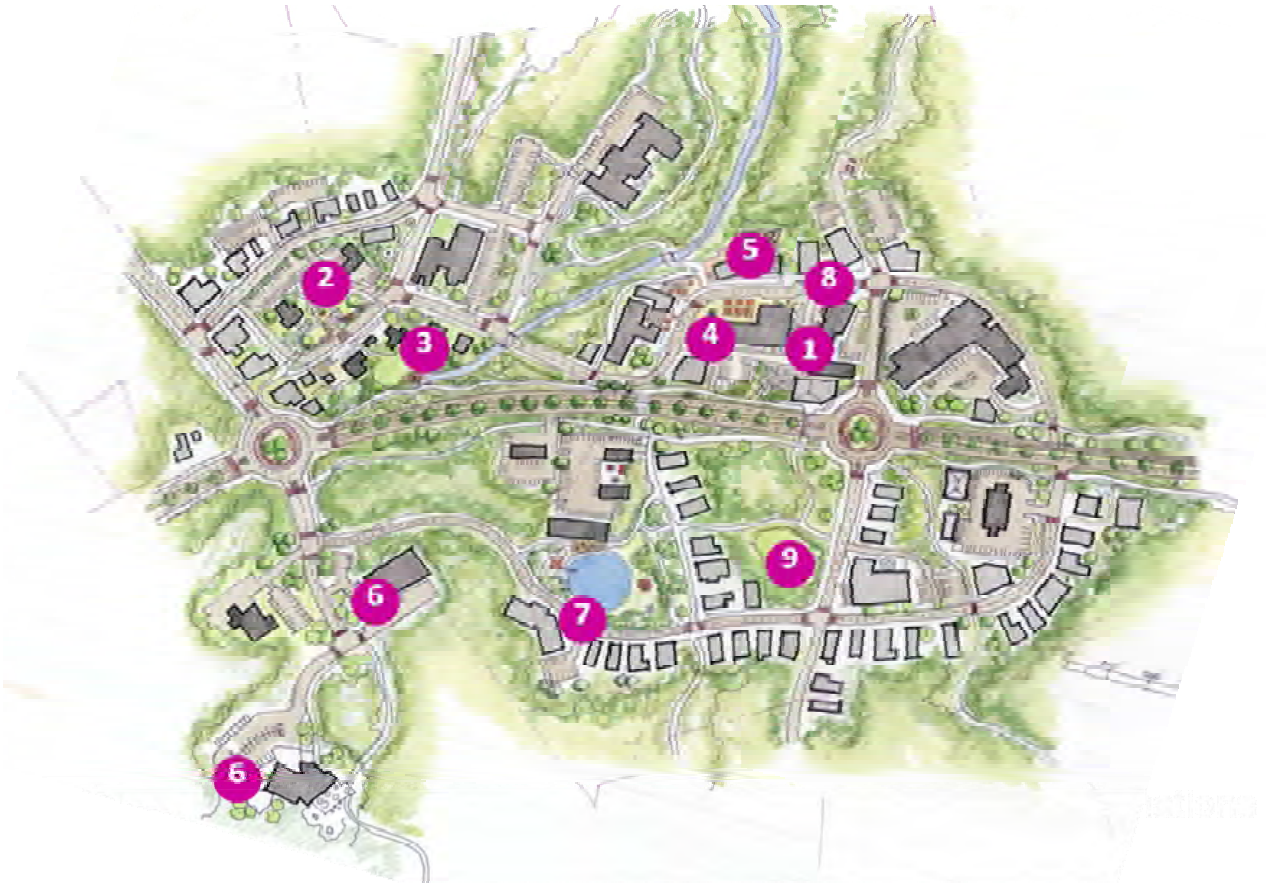
Figure 5.7 – The Rural Oasis Section at US Route 111

Pedestrian circulation

- Trails:
  - Should be developed to walk or bike to town from all residential areas to schools, library, Corbett's Pond, and other destinations
  - A shared bike pedestrian path along NH 111 should be separated from NH 111 with planted bioswales and buffers
  - Trails to connect to the shared roadways and the bikeway proposed on NH 111
  - Bike racks provided throughout town center
- Sidewalks:
  - Sidewalks should be located along Main Street, and where possible should have a trail like character and connect with the trail system.
- Streets in the center of the village (and parts of Main Street) could be a shared space and used for events, markets.
- Crosswalks should be provided:
  - On Main Street
  - On "Old North Lowell Road" between Town Hall and the Village Green
  - Surrounding the civic center cluster

Development

- Along Route 111:
  - No emphasis on new development on the south side of Route 111, creating instead a preserve or public park and preserving rural character
  - New commercial buildings fill in the parking lots that currently face Route 111 at Windham Village Green and The Commons. These new buildings should strive to create an urban edge to the north side of the boulevard, and cover up the parking (some parking can remain, but be hidden behind new buildings; other parking can move to the north side of the new village center). These new buildings can expand the retail footprint of both property owners; we recommend keeping some remaining open space (plazas and parking) between new buildings to allow drivers to see through to the retail that is set back (the existing retail buildings as well as new village center buildings).
- The historic district is strengthened with a cluster of additional old buildings that are preserved and moved to this location, including buildings and a barn that are currently threatened at the corner of 111 and North Lowell Road.
  - These newly relocated buildings could house a variety of interesting destinations that reinforce the village.
  - Village Green can be enhanced with more amenities for gatherings, improved connections to the church, and expanded programs, winter programming.
- Over time, additional civic uses are clustered around the Library are to create a Community Campus in a wooded environment. Potential ideas:
  - A destination playground with outdoor classes and reading room, to be used by the local school in conjunction with the Library and connected to the schools via walkable and bikeable trails.
  - A Community Center, with outdoor or indoor Pool.
  - Reduce views of asphalt and parking (hide with wooded landscapes)
- Future residential development to the northwest of Town Hall and also south of the Post Office.
  - Potential for village-style residential developments and senior housing in walking distance to village center



DESTINATIONS

1. Central pedestrian Square
2. Town Hall Complex and Civic Park overlook
3. Village green and Red barn
4. Market square
5. Creek shorelines with terraces and trails
6. Library and Expanded Civic uses
7. The Pond
8. Commercial Main Street
9. Park

Figure 5.8 – Alternative B – The Rural Oasis

5.3 Revised Plan: Making Windham Walkable

PPS created a revised alternative that kept many of the details and characteristics of the Rural Oasis schematic, while incorporating the community's preferences, ideas and constraints from the May 2011 workshop.

Future development is concentrated in the commericial and historic town centers. Connectivity, including an enhanced network of multimodal trails, is improved between an exapanded recreational and civic center near the library and the Town Hall Historic District. It aims of creating an overall retreat-like character that blends with the Historic District, new development is oriented to the outdoors and to the creek. Figure 5.9 depicts the street configuration for The Revised Rural Oasis.

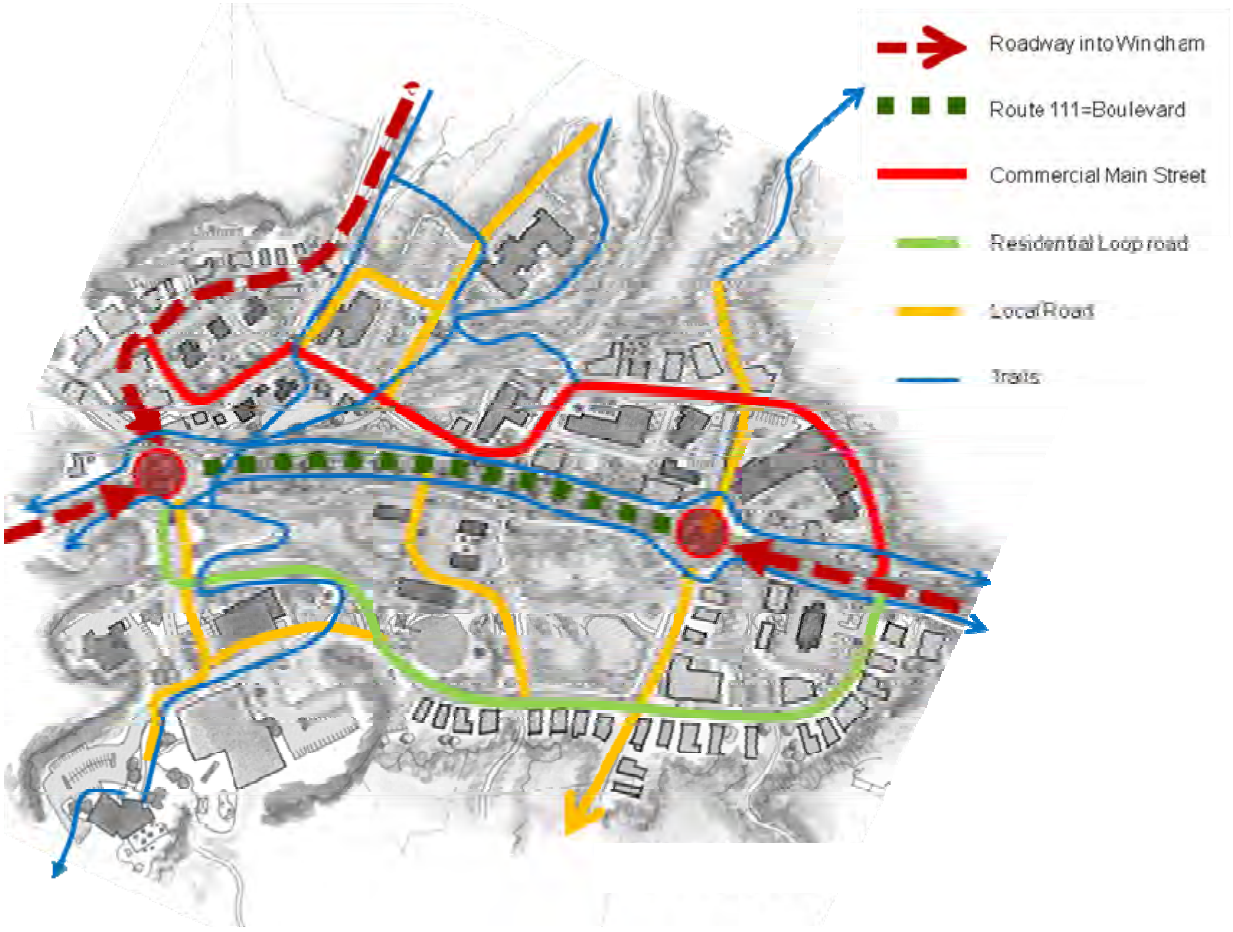


Figure 5.9– The Rural Oasis (Revised) (Street Typology and Connections)

DESTINATIONS

1. The Commons
2. Village Main Street
3. Market Square
4. Town Hall and Historic District – Future
5. Town Hall Lawn
6. Village Green
7. Creek Shorelines with terraces and trails
8. Library, Civic and Recreational Area
9. Future Development and Senior Housing
10. Park

Figure 5.10 – The Rural Oasis (Revised)

5.3.1 The Destinations

1. <u>The Commons</u>

   Shared space with seating and visibility from Route 111 and usable year round. People mentioned examples from NH and closer areas: Chatham, MA First Night Celebration.

Existing

Proposed (Meredith, NH

2. Village Main Street

Enhance sidewalks in Town Center and Historic District to activate retail along Main Street.

3. Market Square

4. Town Hall and Historic District –Future Development

   Strengthen and connect historic district. Enhance historic buildings to create a Hamlet with community oriented destinations. Realign North Lowell Road to serve Hamlet's proposed new parking and additional businesses.

5. Town Hall Lawn

6. Village Green

7. Creek Shorelines with Terraces and Trails

8. .Library, Recreation and Expanded Civic Area

   Develop “rural atmosphere” of this area while strengthening connections to Historic Center.

9. Future Development and Senior Housing

10. Park

5.3.2 Elements of the Vision Plan: Making Windham Walkable

Roundabouts as Gateways

Signage and Visual Markers

Public Transit and Multimodal Transportation Planning

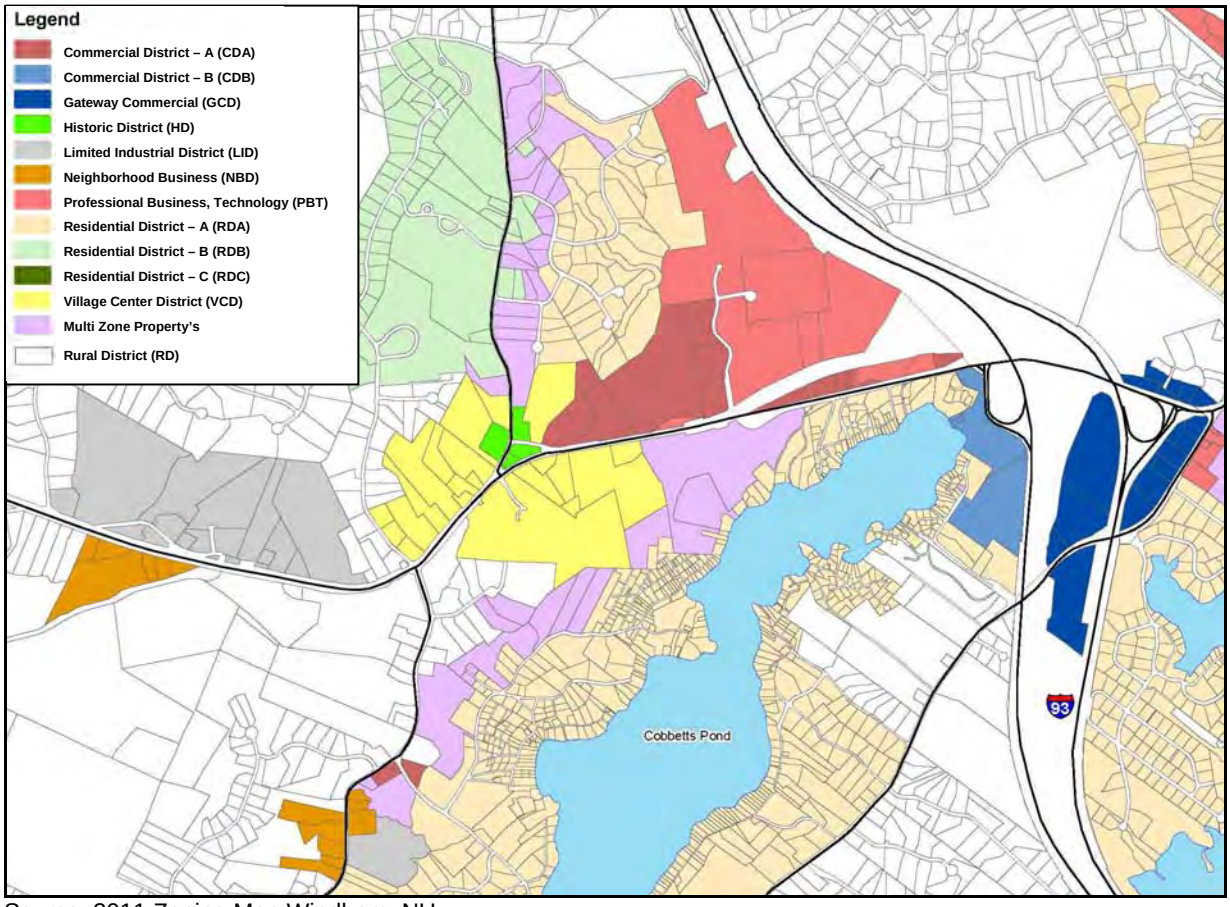
Green Streets and bio-retention (especially along US 111)

5.3.3 Zoning Considerations

Both the Urban Village and Rural Oasis schemes call for changes in development that promote increased clustering of activities in the Town Center changes to the built environment that promote non-motorized transportation. This will entail changes in the development patterns in this area within Windham that may entail, or be bolstered by, changes to those rules and regulations which govern building and development, namely the Zoning ordinance.

PPS recommendations suggest an increased mixing of land uses in the center of town which is typical of a village setting. While this could be achieved by tweaking of the existing zoning districts and rezoning of some areas, it might also be achieved by more comprehensive approaches, such as an update to the zoning ordinance, a multi-use village center overlay district in the study area, or perhaps a reworking and expansion of the existing Village Center District to include areas described in The Rural Oasis Village Alternative. The following recommendations respond to the stated objectives of the 2005 master plan as increasing the mix of uses and density in the commercial town center.

<u>Current Zoning:</u>



Source: 2011 Zoning Map Windham, NH

Recommendations for the following current zoning districts

Rural Oasis / Making Windham Walkable

Recommended	Current Zoning District(s)
Commercial Town Center	CDA, PBT
Walkable Historic Village	HD, VCD, RDB, RDA
Civic Campus in a Park Setting	VCD
Mixed-Use Commercial / Residential	RD, RDA
New Village Residential	RDA, RDB
Preserved Land	Conservation

General Comments / recommendations:

- Expansion of the Village Center District into a greater percentage of the area in question would support many of the desired recommendations; it is in keeping with the suggested "Commercial Town Center", and "mixed use Commercial-Residential" suggested in the recommended scenarios.

- The form based regulations in the Village Center District generally support a walkable, village-like form of development with minimum lot frontages and setbacks. None of the other districts currently support this scale of development as most other minimum frontages are 175 feet or greater, and the minimum setbacks tend to be 50 feet.

- The parking requirements for all districts may make more walkable building and lot design as well as denser land uses difficult. Relaxing some of these parking requirements within the village center district, or in an overlay district created for the town center, would better support many of the recommendations here. There is an existing mechanism for having parking requirements reduced, but it is quite involved, and could be made easier.

- Many of the non-residential districts require vegetated buffers between them and adjacent residential districts. The town should be careful to require and ensure that pedestrian and bicycle connections are made through these buffers in order to enhance the walkability and bikability of the town.

- Minimum open space requirements are critical to supporting sustainability and the rural feel of the town, however, in order to enable areas with denser more village-like development, a system where open space could be added to preservation land or other existing contiguous open space in-lieu of being provided on the lot within the town center should be considered.

- Many of these comments and recommendations suggest an increased mixing of land uses in the center of town. While this could be achieved by tweaking of the existing zoning districts and rezoning of some areas, it might also be achieved by more comprehensive approaches, such as an update to of the zoning ordinance or a multi-use village center overlay district in the study area.

- Many of the density requirements for dwelling units in the existing zoning are driven by a need to provide septic systems. It is extremely difficult to support higher density residential development and denser land uses overall without having a sewage treatment system other than septic, since septic systems require significant land adjacent to the building for infiltration. While this is a significant barrier to realizing the potential of the Village Center, the development may be phased in such a manner that it is possible through the use of smaller scale "package" sewage treatment systems designed only to serve the village area.

Historic District and Village Center District

- Expansion of the village center district into a greater percentage of the area in question would support many of the desired recommendations; it is in keeping with the suggested "Commercial Town Center", and "mixed use Commercial-Residential" suggested in the recommended scenarios.

- The village center district generally supports denser, mixed-use development including retail, office, and residential use at a desired proportion of (40:40:20).

- The village center district now requires a 50 foot setback from rt. 111 for any development. In the case of the Urban Village scheme, this requirement would need to be removed / changed to support the recommended development.

- The village center zoning also currently requires a vegetated buffer between it and adjacent residential developments. While this may help retain a more rural character for some of the adjoining residential areas, it may inhibit connectivity within the town center and isolate residences from desired destinations. The town may want to consider relaxing the buffer requirement. At the very least, it should ensure that good pedestrian and bicycle connections through this buffer between residential and Village center districts are required and implemented, in order to support Windham's goal of being a walkable, livable community.

Professional Business Technology District

- This district is aimed at encouraging office, research, tech, etc. It essentially enables office parks.

- The proposed Rural Oasis plan introduces more commercial and residential development into some of these areas.

- Again, this could be achieved by rezoning the areas adjacent to the center as Village Center District, creating an overlay, or changing the requirements of this area to allow that.

- The form & parking requirements for this area generally support larger, detached building footprints (office park w/ parking lots), so strategies to allow denser, smaller lots, reduce parking, or provide shared parking structures would allow more walkable office etc. development.

- The provision of pedestrian and bicycle connections through any required vegetated buffers should be careful to be required and provided.

- It would be worth evaluating whether there is demand for this district zoning at all, in light of the fact that many businesses now prefer to have their building integrated into a walkable town atmosphere rather than being isolated in the woods with only driving options.

Rural Districts (RD)

- Rural districts permit a variety of uses, but generally allow one structure per lot.

- The recommendations may entail some more intense use of areas now designated rural districts.

- These would be limited to areas close to the center of town, adjacent to commercial, civic and historic districts.

- The rural oasis option would actually require little change to the Rural Districts, while the Urban Center option would likely entail the rezoning of a Rural District Lot south of 111.

- The recommended increase in intensity of use is offset by an increase in the recommended preserved land, and by reliving pressure to develop on rural district lands elsewhere in the town, thus maintaining the spirit of the residential district to maintain the town's rural character in the face of increasing traffic and development pressure.

- This would probably best be achieved by rezoning these areas as a different district, rather than making changes to the rural district since it affects such a large area of the town beyond the central area.

Residence Districts

- Residence districts A, B, and C all allow 1 single family detached dwelling per lot. Residence B additionally allows multifamily residential uses of up 6 units. Residence C additionally allows manufactured housing.

- Rezoning a small area of those Residence District A districts surrounding the town center to Residence District B would allow for a more "town-like" and less suburban feel in the center of town. Additionally it would enable a greater number of residents to live closer, and even within walking and biking distance, to commercial and civic resources, making Windham a more walkable town. This would apply to both plans.

- Allowing some commercial or retail uses in the Residence District B, such as those now permitted in the neighborhood business district would enhance the walkability, livability, and village-like character of these districts, by providing residents additional goods and services within close proximity to their place of residence.

- Revisiting the minimum lot frontages, minimum front yard requirements, and maximum

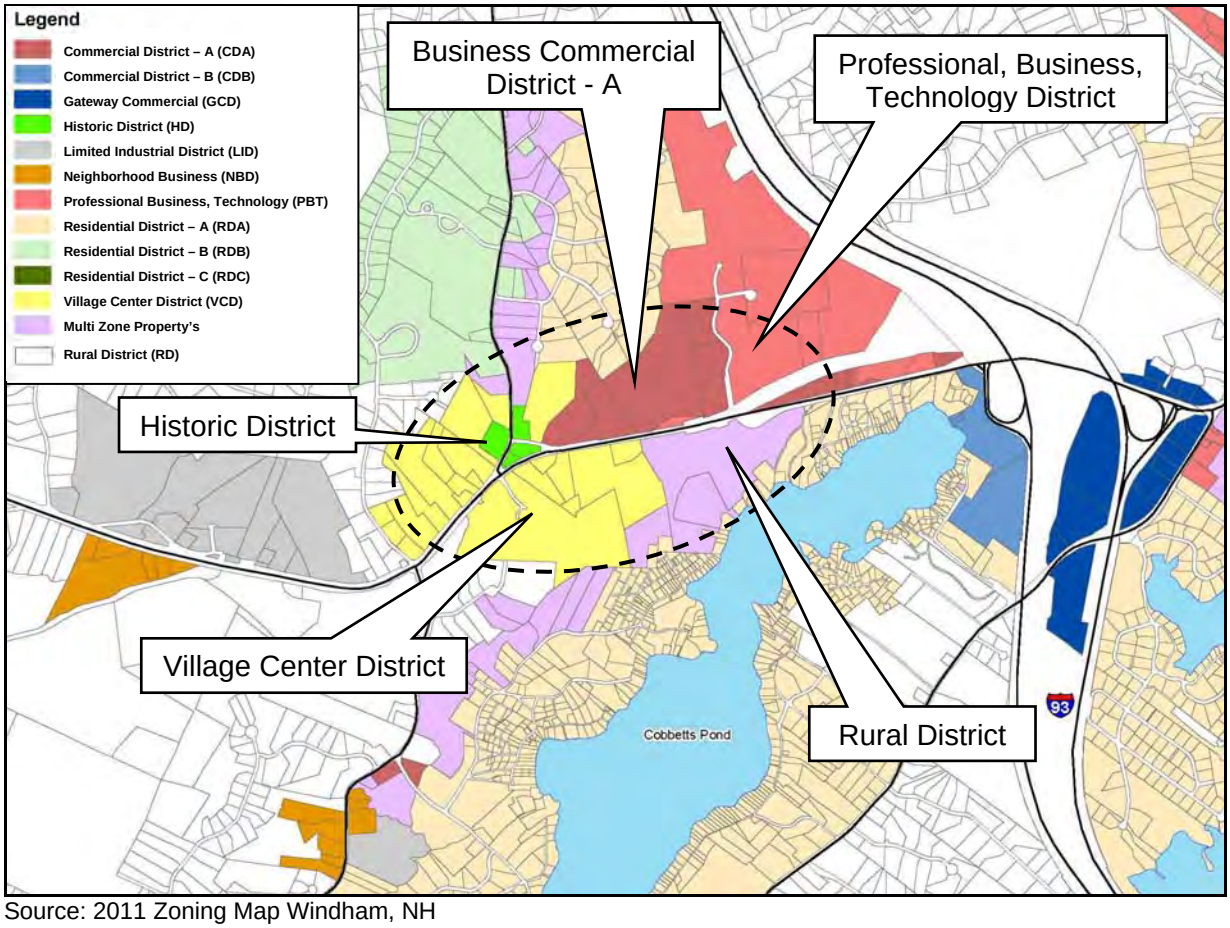
building coverage of the lot in Residence District B, would allow for residential development in a more historic, village-like feel in these areas. Reduced lot frontages and higher maximum building lot coverage would enable greater density and variety along the street, reduced front yard requirements would enable buildings to be constructed closer to the street, establishing a more "village-like" feel to the district.

- An alternative to the previous two suggestions would be to rezone some of these areas as Village Center district, or to create on overlay district for the area in question that addressed some of these issues in and around the town center.

Business Commercial Districts

- This district allows commercial development. There are requirements on the type of commercial development, and the form requirements generally support larger footprint, and more spread out commercial development than shown in the commercial town center suggested.

MAKING WINDHAM WALKABLE – Zoning and Land Use



Source: 2011 Zoning Map Windham, NH

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6.0 Implementation

As was stated in the introduction to this report, the NH 111-Wall Street project described here is a conceptual planning and feasibility study which will not, in itself, result in the implementation of the recommended changes to the corridor or the village center. Those recommendations will require sustained actions taken at the local, regional and state levels if anything is to come of them. This chapter is intended to suggest actions that should be taken to begin implementing the project.

The project recommendations fall into three broad categories – highway corridor improvements, village center improvements and planning, zoning and regulatory changes. The sections below provide information on the potential funding sources, funding strategies and other actions that could be considered to implement the recommended project alternatives.

6.1 NH 111 Corridor

The selected NH 111 Corridor Alternative is eligible to be funded through state and federal funds as the corridor is a major state highway and is Federal-aid eligible. Conversely, many of the Village "Rural Oasis" Concepts are likely to be funded through private and local funds since most of the improvements would occur on private property and what are or will be local roads or streets.

Funding for state highways and roadways in New Hampshire is controlled through both the State 10 Year Plan and the four year Statewide Transportation Improvement Program (STIP). The 10 Year Plan spells out the timeframe and general costs for project planning, design, and construction. Projects enter the 10 Year Plan either by being selected by the NHDOT based on their assessment of statewide highway improvement needs, or, by being proposed and prioritized at the regional level by the MPO and requested for inclusion in the Plan. This process occurs every other year and results in an updated 10 Year Plan. New projects are generally added to the end of the Plan. A graphical depiction of the process is included as Figure 6.1. In addition, once Federal highway funds are in line and programmed to be spent on a project, that project must be included in the adopted STIP. The STIP is jointly approved by the RPC and the NHDOT.

The primary source for potential funding for the Recommended Alternative for NH 111 would be Federal transportation funds through the state's STIP and 10-Year Plan. The regional process for a project making it to the 10-Year Plan begins with a project initiation application that would be submitted by the Town of Windham to the Rockingham Planning Commission (RPC). The RPC is the designated Metropolitan Planning Organization (MPO) for the region with responsibility for selecting, prioritizing and submitting projects to the NHDOT for inclusion in the STIP and 10-Year Plan. The process for prioritizing occurs every other year. The next opportunity for the project to be nominated is 2013 as the process was most recently completed in May 2011. The expected schedule for the next cycle is shown on Table 6.1.

Figure 6.1 - New Hampshire 10 Year Transportation Plan Development Process

The RPC uses formal selection criteria to score and then prioritize all projects in the region. A project's priority in the region is determined through a point system that evaluates six core criteria and several potential score modifiers. These are listed in Table 6.2 on the next page.

Generally, projects that are well defined, have achieved local support and consensus and are the product of a formal needs assessment or corridor study, are most likely to succeed in this process. The Recommended Alternative for NH 111 would likely score very well. In addition to addressing all of the core criteria, the project would likely receive additional modifier points in several categories, and also benefits from being the product of a through planning study. Projects that have been evaluated through a community driven planning process will always score better than projects without one because the project is more complete and local support is more assured. Demonstrated community support for a project allows for more certainly about project outcomes from the NHDOT perspective and promotes efficient implementation of a project.

By Date	Year	Action
Dec. 15	2012	MPOs/RPCs TIP Development Begins (2013-2022 time period)
May	2013	MPOs/RPCs Submit Draft TIP to NHDOT
Aug	2013	NHDOT Submits Draft Ten Year Plan to GACIT
Sept-Oct	2013	GACIT holds public hearings Statewide for public input
Dec. 9	2013	GACIT Submits Draft Ten Year Plan to the Governor
Dec 21	2013	Governor Submits Ten Year Plan to Legislature
June	2014	Legislature Approves Ten Year Plan (2011-2020)
June	2014	NHDOT Submits Ten Year Plan to RPCs/MPOs
July 30	2014	MPO's Approve 4 Year TIP's (2015-2018)
Sept. 1	2014	NHDOT Submits 4 Year STIP to FHWA/FTA for Approval
Oct. 1	2014	Approved 4 Year STIP (2015-2018)

Table 6.1 – Expected Schedule for Next 10 year Plan Cycle

RPC Project Selection Criteria
Core Transportation Evaluation Criteria
1. Improve Mobility for People and Freight
2. Improve Access in the Region
3. Ensure a Safe and Secure Transportation System
4. Support coordination of Transportation and Land Use
5. Preserve Existing Infrastructure
6. Address Congestion
Score Modifiers
1. Protect Natural Resources
2. Protect Historic/Cultural Resources
3. Ensure Equitable Distribution of Benefits and Impacts
4. Support Economic Development
5. Demonstrate Local Support
6. Provide Cost Effective Solutions
7. Leverage Investments
8. Innovation/Discretionary Considerations

Table 6.2 – RPC Project Selection Criteria

There are other funding programs within the federal system that could be tapped to help fund the project. One of these is the Congestion Mitigation and Air Quality Program (CMAQ). CMAQ provides funding for projects that improve air quality by minimizing congestion. The Recommended Alternative for NH 111 includes a series

of roundabouts that are proven to reduce congestion and reduce auto emissions. Many projects to construct roundabouts have been funded using CMAQ funds.

Another opportunity is the Transportation Enhancement (TE) Program. This program aims to develop "liveable communities" by funding projects that preserve the historic elements of a community. For the transportation system, pedestrian facilities are a focus of the TE funds. Projects that construct sidewalks and improve pedestrian facilities often qualify for these funds. The Project Vision statement clearly calls for a "corridor that serves multiple modes of travel". Many of the proposed project elements in the village center will be good candidates for TE funding. These could be proposed by the Town as separate projects that tie into the planned roundabouts and corridor improvements that the NHDOT would be implementing, or, could be proposed by the NHDOT as components in the overall corridor project, with multiple funding elements.

While the project is clearly eligible for state and Federal highway funding from several sources, the State 10 Year Program is underfunded. The greatest capital needs in the transportation system facing the state for the foreseeable future is in the area of maintenance and preservation. Expansion projects such as the NH 111 Corridor improvements will be difficult to fund and competition from around the state will be intense. Depending on future revenue sources, it may take multiple attempts to gain support for this project in the 10 year Plan, and even then, the project may need to be phased.

Summary of Recommended Actions – NH 111 Corridor Elements:

Action	**Responsibility**	**Timeframe**
1. Present project to NHDOT for familiarization and endorsement;	PAC & MJ	June 2011
2. Present project to MPO for familiarization and endorsement	PAC & MJ	July 2011
3. Present project to community organizations and boards for familiarization and support	PAC, RPC, Planning Dept.	Fall 2011 – Summer 2012
4. Work with RPC/MPO to Prioritize project elements	Planning & Devel. Department	Spring-summer 2012
5. Develop access management MOU with NHDOT for NH111 that incorporates the major recommended NH111 corridor elements.	Board of Selectmen & NHDOT with support from RPC/MPO, Planning & Devel. Department,	Spring-summer 2012
6. Develop project initiation form/application for 10 Year Plan project and submit to MPO	Planning & Devel. Department	Fall 2012
7. Present project application to Exec. Councilor and area legislators for familiarization and support	Board of Selectmen, other local officials	Spring – Summer 2013
Repeat 1-5 as needed until successfully funded	*all of above*	*TBD*
8. Once funded, work closely with DOT in the preliminary and final design process to ensure implementation of the project vision.	Board of Selectmen, Town Administration, Planning Dept.	TBD

Once the improvements to NH 111 are included in the State's 10-Year Plan, the timeframe for the planning, design, and construction of the project will be known. The planning efforts will include more refinement of the Recommended Alternative and the preparation of an environmental document. Because the project is not expected to cause significant impacts to resources, it is assumed that a Categorical Exclusion (CE) will be sufficient.

6.2 Rural Oasis Village Concept

6.2.1 Planning, Zoning and Regulatory Elements

As has been described, there are two major components of the Vision for this project, the improvements desired for the NH111 highway corridor, and the transformation desired for the Village Center. While the NH111 corridor improvements are able to stand alone as a functional set of corridor improvement projects, the Village Center improvements are fully dependent on actions taken by the Town. Specifically, zoning and regulatory changes and infrastructure investments will be needed to allow and encourage the redevelopment that is envisioned in this Study.

What is identified in this Study as the "Rural Oasis" for the Windham Village Center is merely the concept plan of what could develop to fulfill the community's vision, and as such it is just the first step. The concept does not have sufficient detail to serve as a plan that can be implemented. Much more work will have to follow. Three 'first' steps are suggested:

- Revise the Master Plan to incorporate the elements of the Village plan and Vision identified in this study, as the Planning Board may agree to;
- Review the general and specific zoning and regulatory changes that are recommended by PPS in Chapter 5 of this document and identify those which the Planning Board and community can support;
- Undertake the development of detailed sub-area plan for the Village (to be incorporated in the Town Master Plan) to provide the necessary detail regarding required zoning modifications and infrastructure investments needed for implementation.

6.2.2 Project Elements

Bringing about the Village Concept will require the creation of a new and modified network of local streets, new sidewalks, public spaces, other amenities, as well as the development of at least limited pubic sewer and water systems if the density of redevelopment that is envisioned for the village is to be achieved. Accomplishing all this will will take many years (likely decades), and require both private and public funds. Much of the proposed improvements occur on private property and will require the owners to fund some of the new construction – probably in conjunction with their own property redevelopment efforts. Creative funding measures, including the

establishment of special districts, the use of public infrastructure grants and other means should be considered to make the vision a reality. (See Appendix H for a description of some of those mechanisms.)

Public/Private Partnerships (PPP) are utilized when a project's success requires commitment and money from both the private and public sector. With the difficulty in securing public money to completely fund projects in the current economic climate, partnerships are now being viewed as a necessary tool to implement projects. The idea is to get the public and private sector to share the risk and cost of the project, thereby encouraging private investment.

One example of a PPP is to use Tax Increment Financing (TIF). A TIF is established where the increased tax revenue from an improved area or district is used to fund its construction. Loans or bonds are secured based on the forecasted tax base increase. These taxes will be this way until the loan or bond is paid off. RSA Chapter 162-K, Municipal Economic Development and Revitalization Districts, includes all the rules and regulations for establishing a TIF in New Hampshire.

Other potential funding sources include federal grants and loans (i.e. DOT, HUD, EDA, CDBG), development impact fees, and property donation as part of development approval.

6.3 Wall Street Extension

As described in Chapter 4 of this document, the recommended alternative does not include the construction of the proposed Wall Street extension to North Lowell Road. In the study's analysis it was determined that the projected traffic benefits that accrue to the Town Center with the extension in place are not sufficient to offset the cost and environmental impact that the construction of the extension would require. However, the Project Advisory Committee believes that, depending of future growth patterns in Windham, Derry and Londonderry, the extension may be needed in the future to mitigate traffic in the Town Center.

Therefore, relative to the Wall Street Extension it is the recommendation of this Study to:

1. continue to include a future Wall Street Extension in the Town's Master Plan, and update the relevant references to show the more detailed and refined alignment developed for the Study;
2. to actively acquire rights-of-way easements along the alignment;
3. to inform property owners in the extension corridor of the possible future road construction; and
4. to discourage future development in the corridor that would be incompatible with a future roadway, and encourage site designs of new or redeveloped property to incorporate buffers between noise or traffic sensitive uses and the proposed alignment.

Appendix A:

Figures

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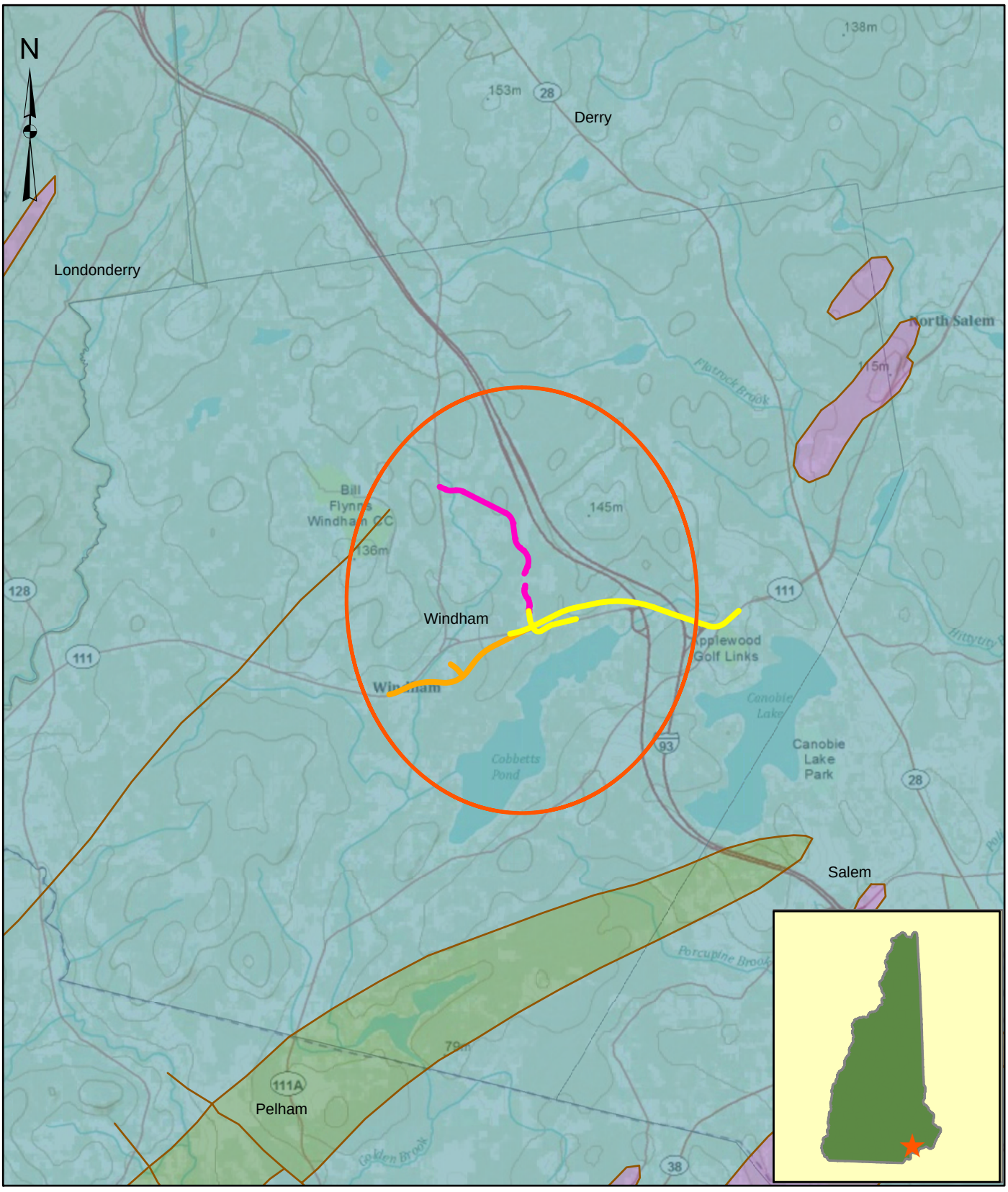


Project Location and Bedrock Geology

- granite
- granofels
- granodiorite
- 111
- Route 111 Bypass
- Wall Street Alignment

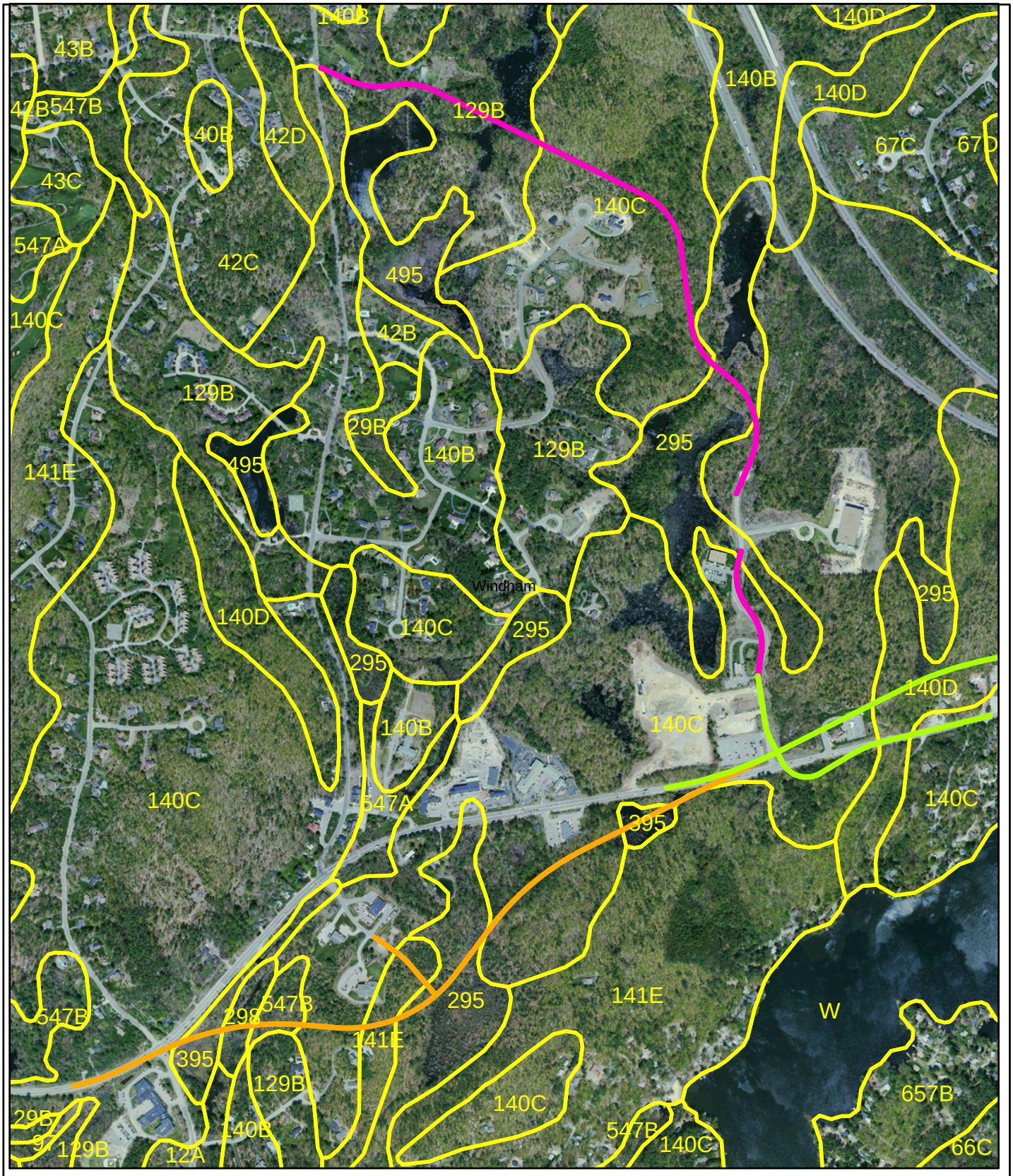
ROCKINGHAM PLANNING COMMISSION
WINDHAM NH
NH 111 CORRIDOR STUDY

PROJECT LOCATION

SCALE :	DATE :	FIGURE :
1:60,000	APRIL 2011	3.2-1

McFarland Johnson

Path



Soils

- 111
- Route 111 Bypass
- Wall Street Alignment

Soil units from Soil Survey of Rockingham County are listed in the accompanying narrative.

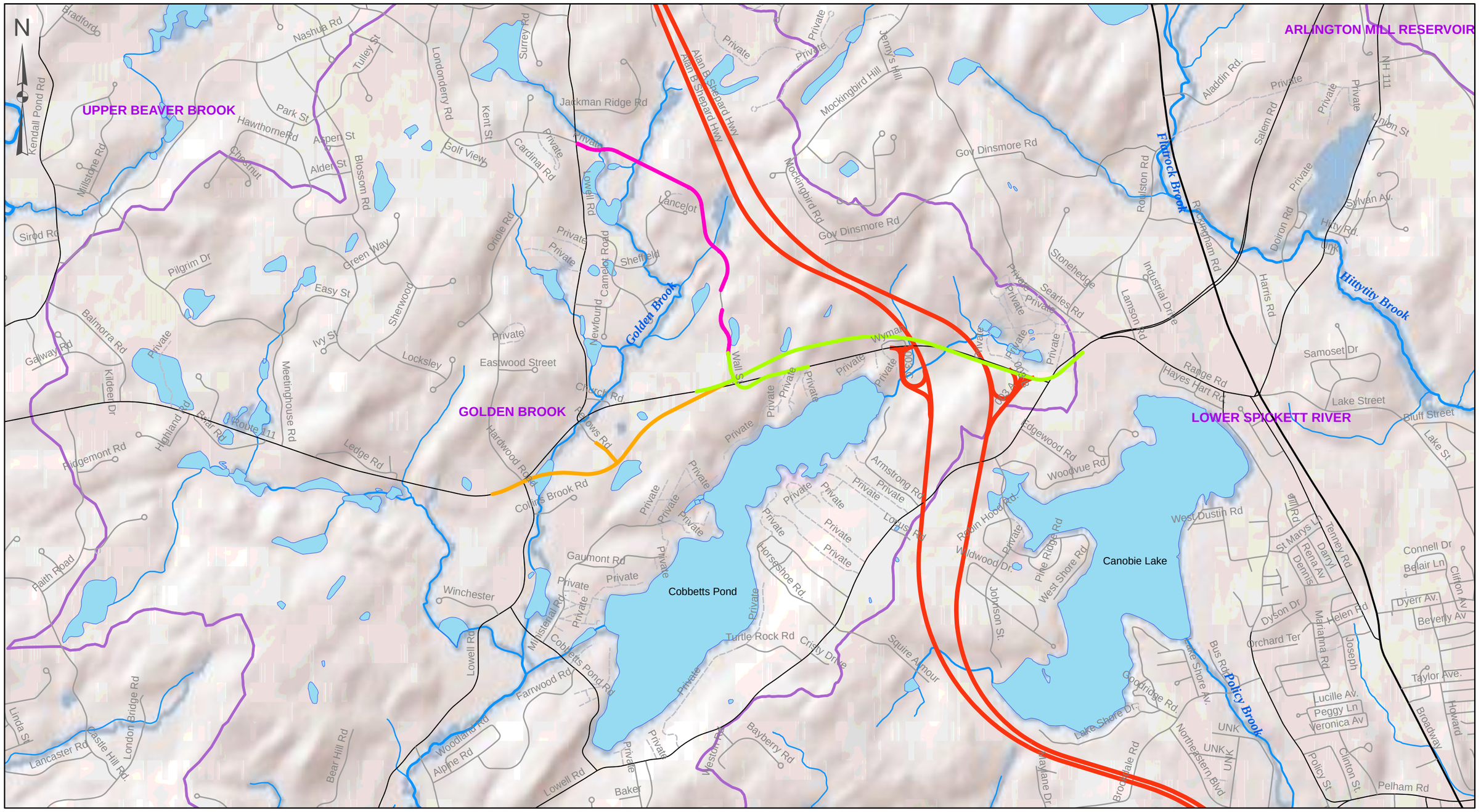
ROCKINGHAM PLANNING COMMISSION
WINDHAM NH
NH 111 CORRIDOR STUDY

SOILS

SCALE :	DATE :	FIGURE :
1:12,000	APRIL 2011	3.3-1

McFarland Johnson

Path



SURFACE WATERS

- 111
- Route 111 Bypass
- Wall Street Alignment
- watersheds

1 inch = 2,000 feet

ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

SURFACE WATERS

SCALE :	DATE :	FIGURE :
1:24,000	APRIL 2011	3.4-1

McFarland Johnson

Wetlands - Wall Street Extension Corridor

National Wetland Inventory Wetlands

- LACUSTRINE
- PALUSTRINE EMERGENT
- PALUSTRINE FORESTED
- PALUSTRINE SCRUB SHRUB
- PALUSTRINE UNCONSOLIDATED BOTTOM

- Town of Windham Wetland Mapping
- Wall Street Extension

0 0.1 0.2 0.4 Miles

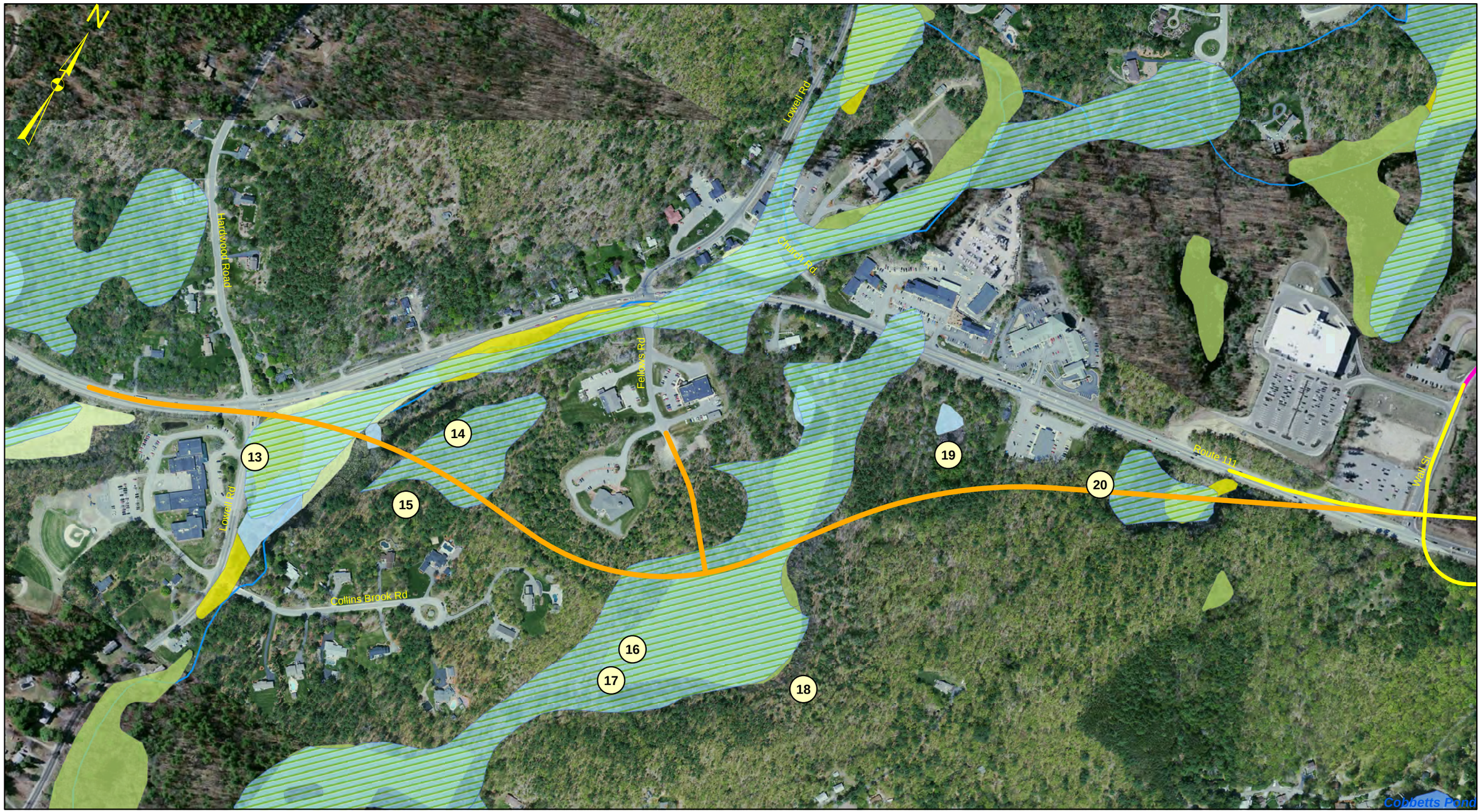
ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

WETLANDS - NORTH

SCALE :	DATE :	FIGURE :
1:4,800	APRIL 2011	3.5-1

McFarland Johnson

Path



Wetlands - Route 111 Bypass Corridor

National Wetland Inventory Wetlands

- LACUSTRINE
- PALUSTRINE EMERGENT
- PALUSTRINE FORESTED
- PALUSTRINE SCRUB SHRUB
- PALUSTRINE UNCONSOLIDATED BOTTOM

- Town of Windham Wetland Mapping
- Route 111 Bypass

0 0.1 0.2 0.4 Miles

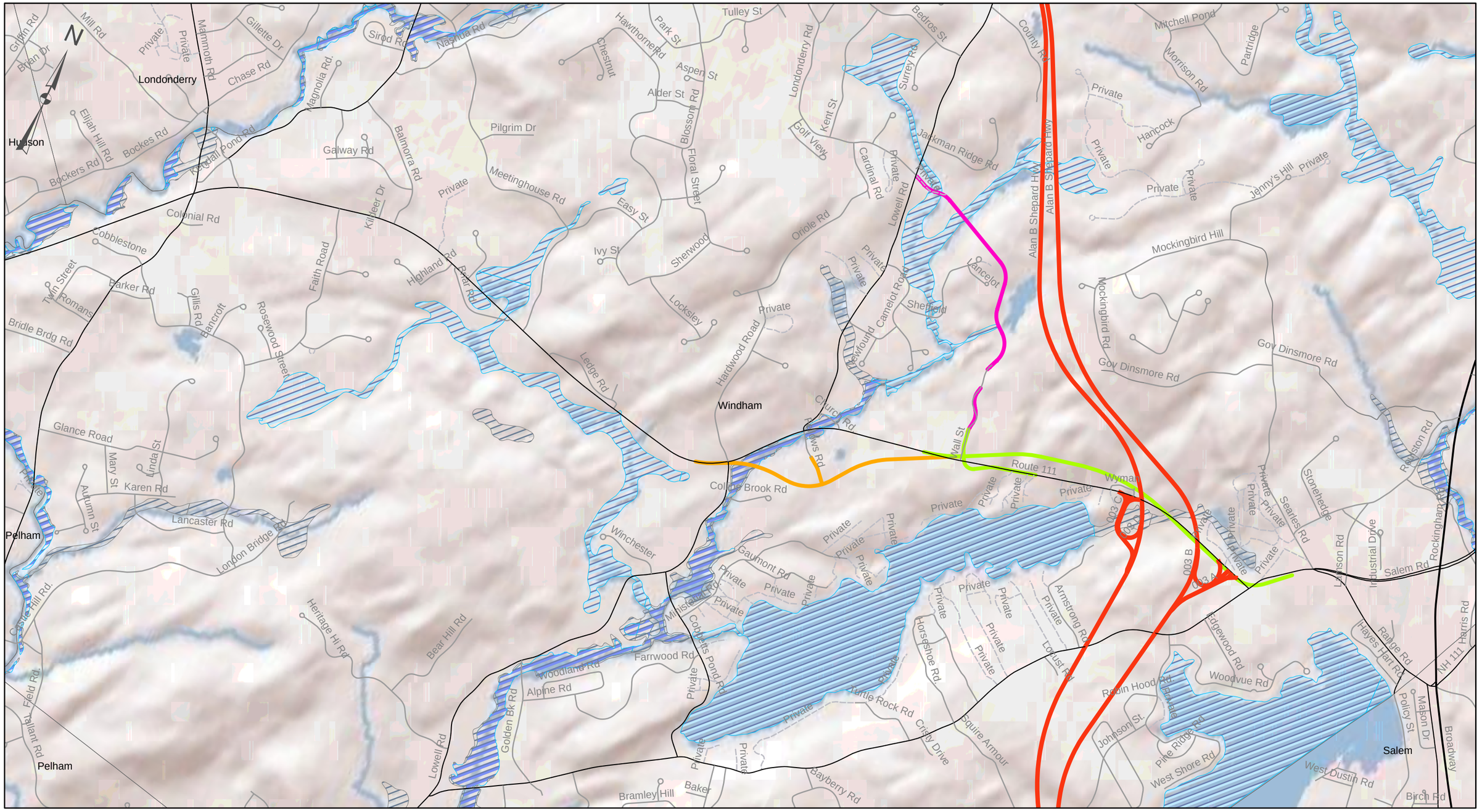
ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

WETLANDS - SOUTH

SCALE :	DATE :	FIGURE :
1:4,800	APRIL 2011	3.5-2

McFarland Johnson

Path



FEMA FLOODPLAINS

ZONE

- A — Areas with a 1% annual chance of flooding
- AE — The base floodplain where base flood elevations are provided.
- X500 — Areas with a 0.02% annual chance of flooding

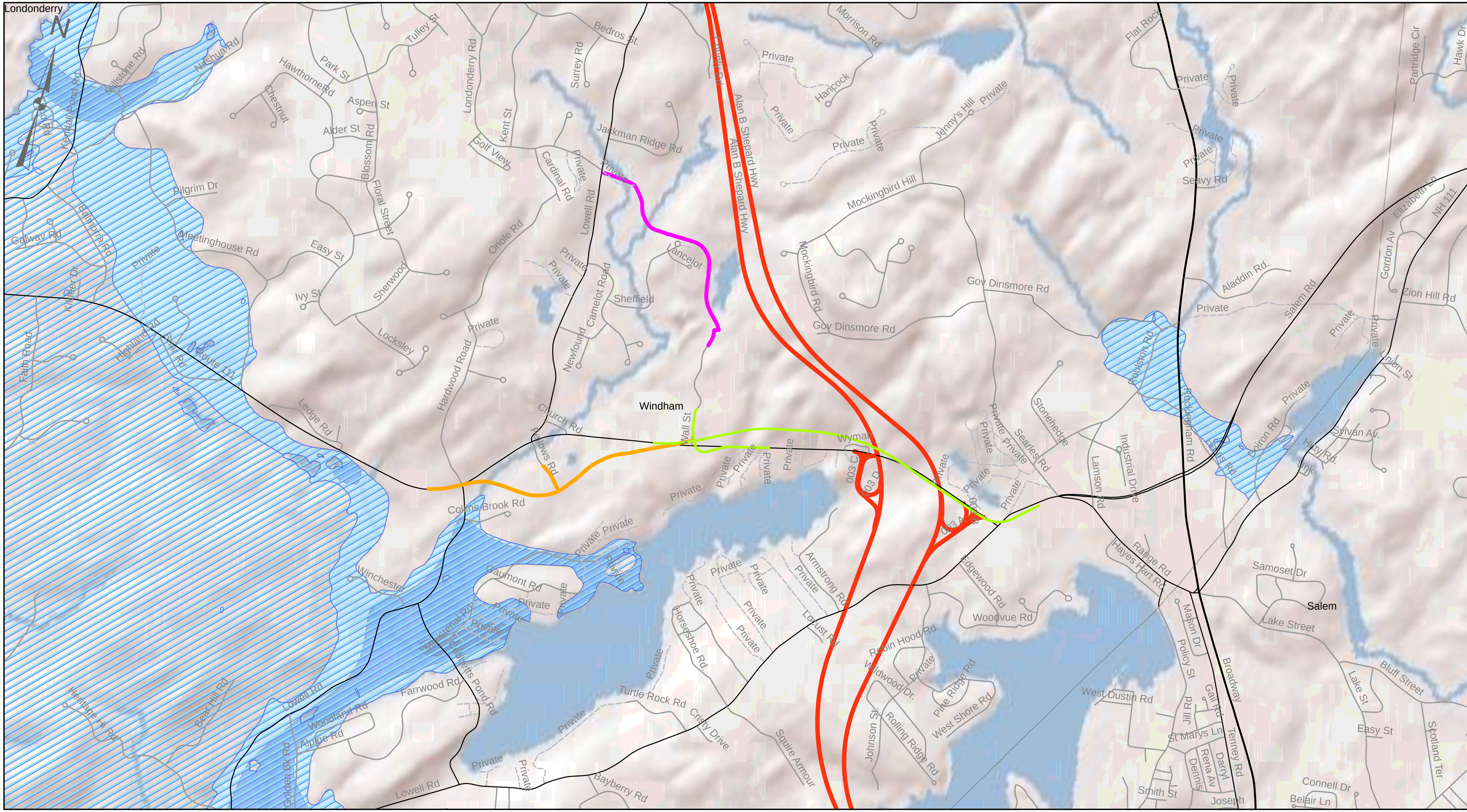
- 111
- Route 111 Bypass
- Wall Street Alignment

ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

FLOODPLAINS

SCALE :	DATE :	FIGURE :
1:24,000	APRIL 2011	3.6-1

McFarland Johnson



Transmissivity (TMAX)

- 0
- 1000
- 2000
- 4000
- Aquifers

- 111
- Route 111 Bypass
- Wall Street Alignment

0 0.5 1 2 Miles

1 inch = 2,000 feet

ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

AQUIFERS

SCALE :	DATE :	FIGURE :
1:24,000	APRIL 2011	3.7-1

McFarland Johnson

N

2010 Wildlife Action Plan Tiers

- Tier 1 EO addin
- Tier 1 EO elevated
- Tier 1 Matrix forest
- Tier 1 Top-ranked in NH
- Tier 2 Matrix forest
- Tier 2 Top-ranked in region
- Tier 2 Top-ranked in wsgroup
- Tier 3
- Tier 3 Matrix forest
- Tier 3 NHB elevated
- Tier 3 Supporting Landscape

- 111
- Route 111 Bypass
- Wall Street Alignment

ROCKINGHAM PLANNING COMMISSION

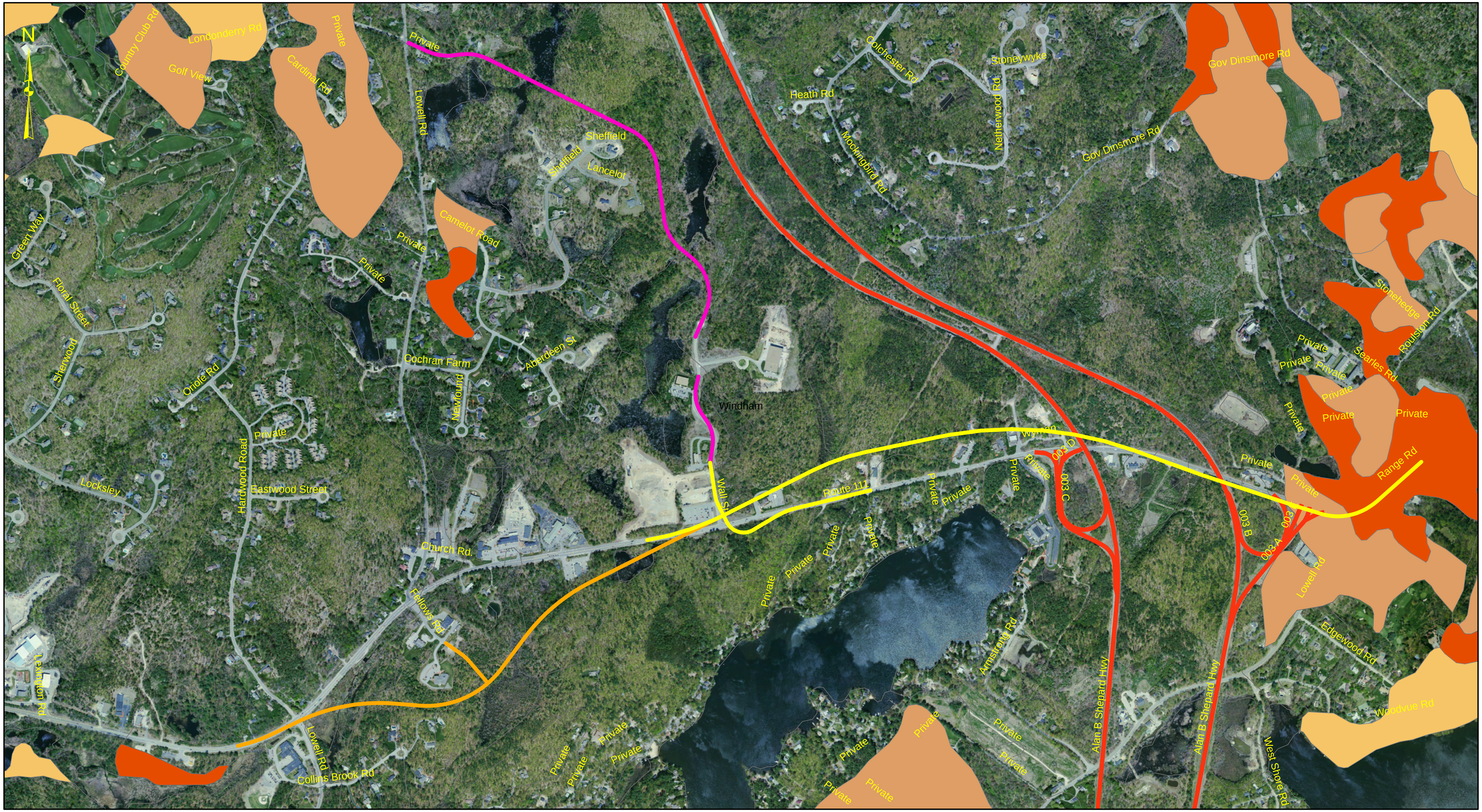
WINDHAM, NH

NH 111 CORRIDOR STUDY

WILDLIFE

SCALE :	DATE :	FIGURE :
1:12,000	APRIL 2011	3.9-1

McFarland Johnson



Famland Soil Class

- All areas are prime farmland
- Prime farmland if drained
- Farmland of statewide importance
- Farmland of local importance
- Not prime farmland

Legend

- Route 111
- Route 111 Bypass
- Wall St Extension

0 0.25 0.5 1 Miles

ROCKINGHAM PLANNING COMMISSION

WINDHAM, NH

NH 111 CORRIDOR STUDY

FARMLAND SOILS

SCALE :	DATE :	FIGURE :
1:12,000	APRIL 2011	3.12-1

McFarland Johnson

Path

Pine Hill Road Parcel

Pine Hill Road - Brook Parcel

Sheffield Street Parcel

Camelot Road Parcels

Town-owned Parcel

Town-Owned Municipal Use land

Public and Conserved Land

- Town-owned - municipal use
- Town-owned - recreation
- Town-owned - vacant

Legend

- Route 111
- Route 111 Bypass
- Wall St Extension

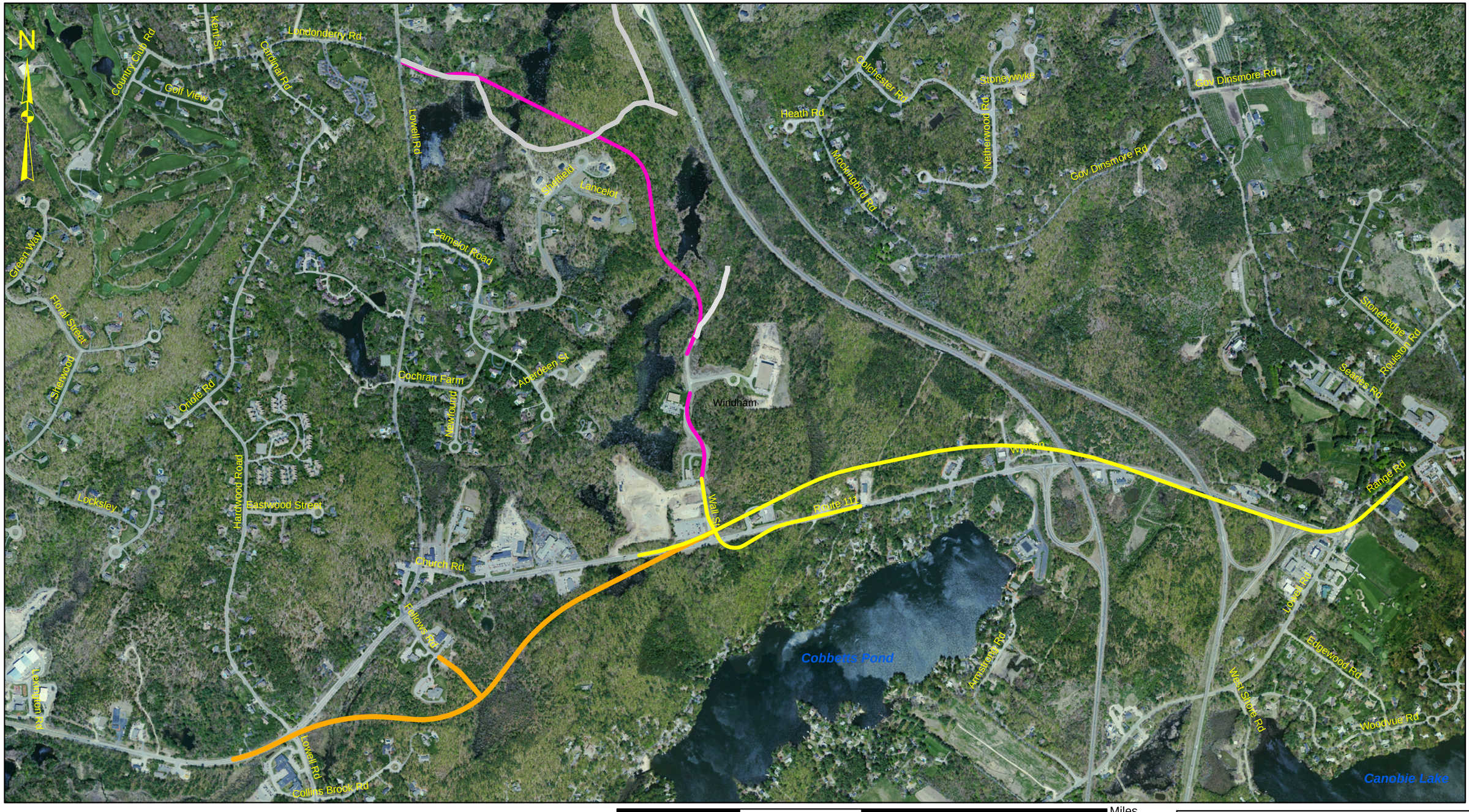
0 0.1 0.2 0.4 Miles

ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

CONSERVED LAND

SCALE :	DATE :	FIGURE :
1:12,000	AUGUST 2011	3.13-1

McFarland Johnson



Trails

- Route 111
- Route 111 Bypass
- Wall St Extension
- Old Roads

0 0.25 0.5 1 Miles

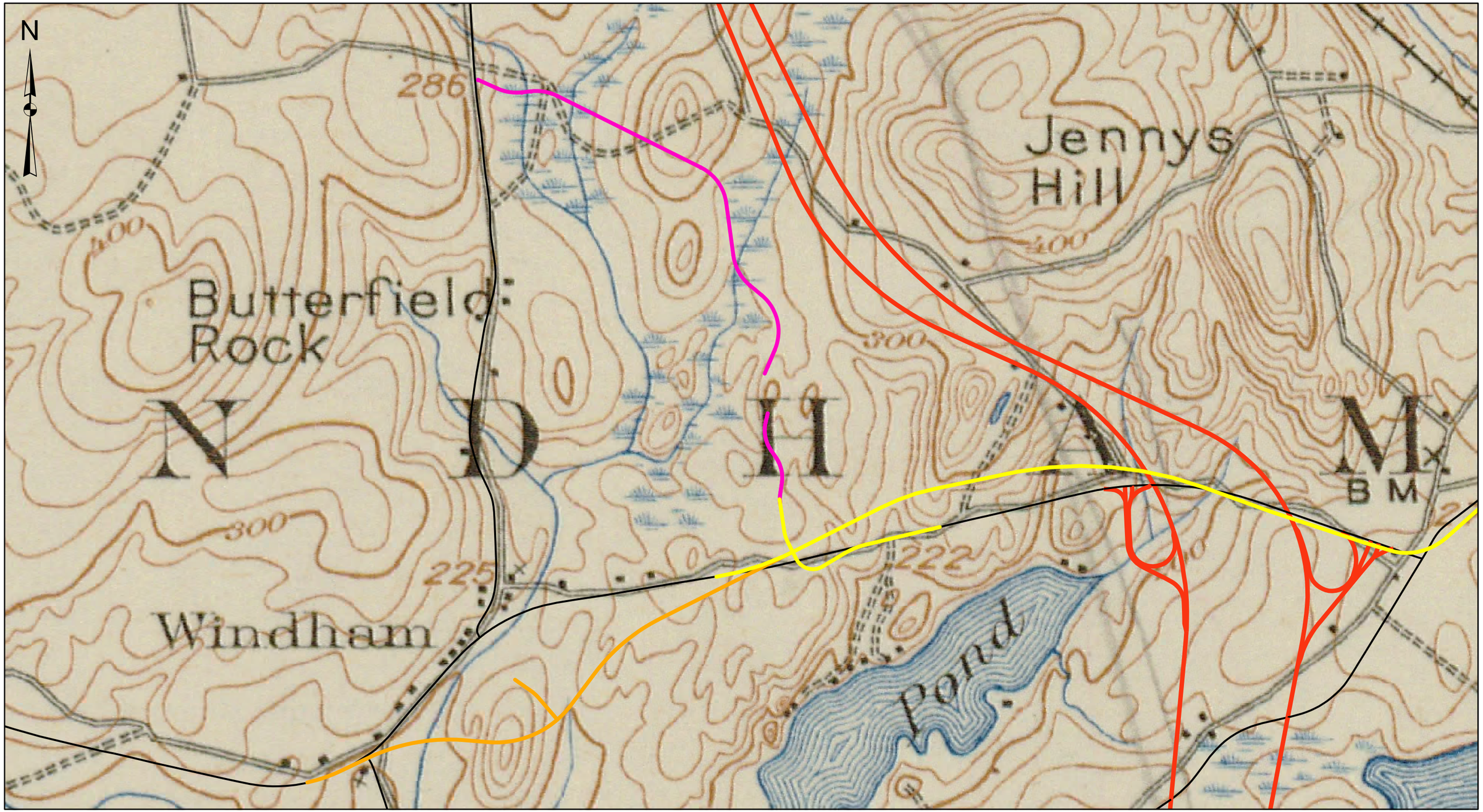
ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

TRAILS

SCALE :	DATE :	FIGURE :
1:12,000	APRIL 2011	3.14-1

McFarland Johnson

Path



Cultural Resources

0 0.25 0.5 1 Miles

Legend

- Route 111
- Route 111 Bypass
- Wall St Extension

1904 USGS Topographical Map

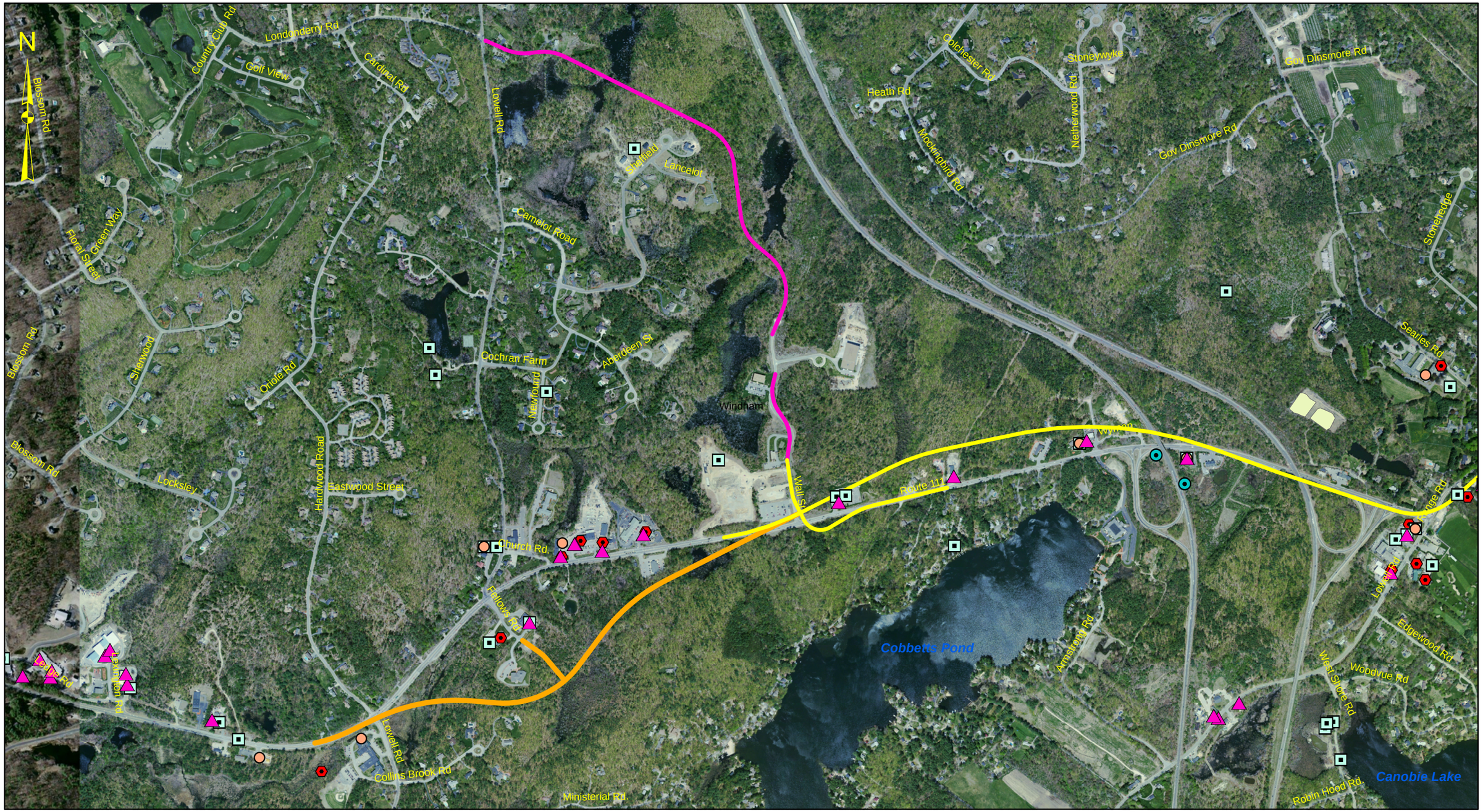
ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

CULTURAL RESOURCES

SCALE :	DATE :	FIGURE :
1:12,000	APRIL 2011	3.17-1

McFarland Johnson

Path



Hazmat

- Site Remediation and Groundwater Hazard Inventory
- Underground Storage Tank Site
- Aboveground Storage Tank Site
- RCRA Hazardous Waste Generator Site
- Local Potential Contamination Source Inventory
- NPDES Outfalls

- Route 111
- Route 111 Bypass
- Wall St Extension

0 0.25 0.5 1 Miles

ROCKINGHAM PLANNING COMMISSION
WINDHAM, NH
NH 111 CORRIDOR STUDY

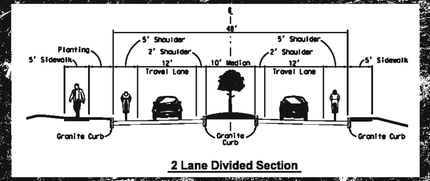
HAZARDOUS MATERIALS

SCALE :	DATE :	FIGURE :
1:12,000	APRIL 2011	3.18-1

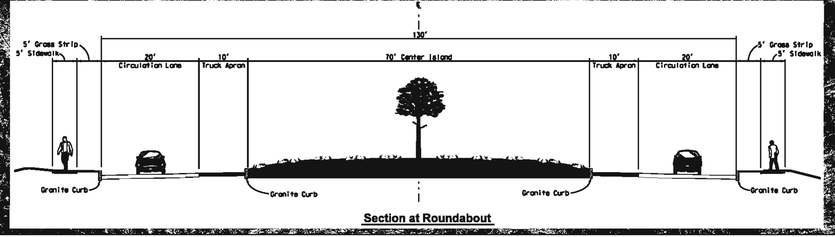
McFarland Johnson

Path

NH 111 CORRIDOR & WALL STREET EXTENSION FEASIBILITY STUDY



2 Lane Divided Section



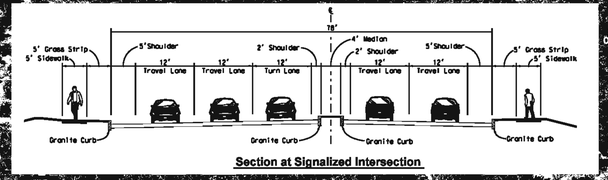
Section at Roundabout

McFarland Johnson

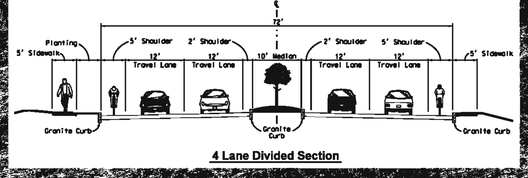
100 50 0 50 100 200
SCALE IN FEET

IN-CORRIDOR SINGLE LANE ROUNDABOUT ALTERNATIVE

NH 111 CORRIDOR & WALL STREET EXTENSION FEASIBILITY STUDY



Section at Signalized Intersection



4 Lane Divided Section

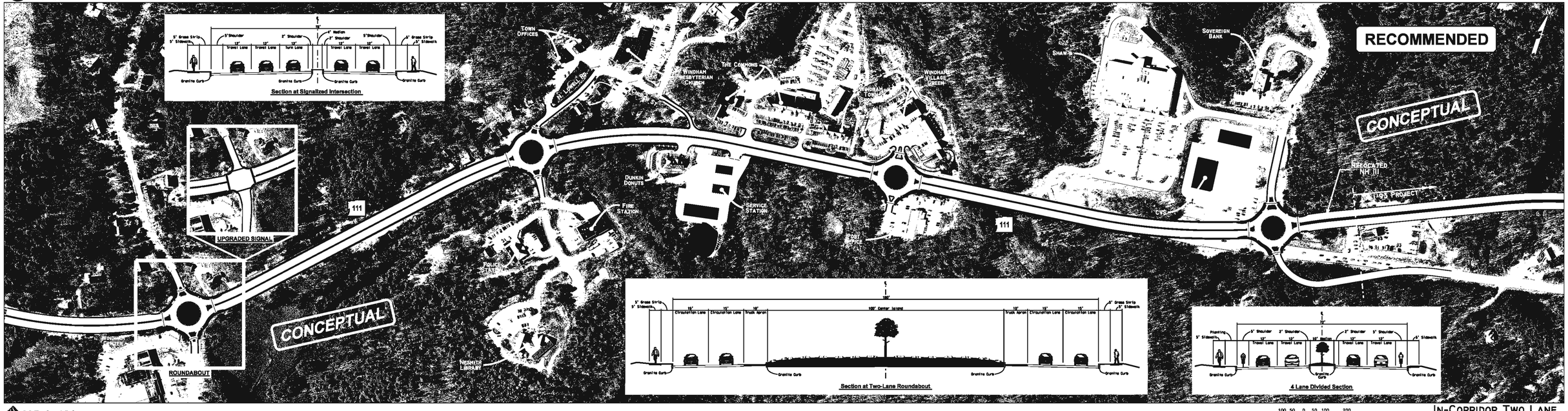
TOWN OFFICES
ST. CAMILLUS DR.
THE COMMONS
WINDHAM PRESBYTERIAN CHURCH
WINDHAM TOWN HALL
WINDHAM VILLAGE GREEN
SHAW'S
SOVEREIGN BANK
CONCEPTUAL
RELOCATED NH 111
DUNKIN DONUTS
SERVICE STATION
FIRE STATION
POLICE STATION
111
CVS
I-93 PROJECT
CONCEPTUAL
WINDHAM TOWN HALL
NESMITH LIBRARY

McFarland Johnson

100 50 0 50 100 200
SCALE IN FEET

IN-CORRIDOR TRAFFIC SIGNAL ALTERNATIVE

NH 111 CORRIDOR & WALL STREET EXTENSION FEASIBILITY STUDY



McFarland Johnson

IN-CORRIDOR TWO LANE ROUNDABOUT ALTERNATIVE

NH 111 CORRIDOR & WALL STREET EXTENSION FEASIBILITY STUDY

N

LONDONDERRY RD.

PINE HILL RD.

N. LOWELL RD.

CONCEPTUAL

WINDHAM WEIGH STATION

93

"PINE HILL ESTATES" (PROPOSED)

CAMELOT RD.

SHEFFIELD ST.

NEWFOUND RD.

CAPITAL TRANSPORTATION SERVICES

WALL ST.

WINMILL EQUIPMENT COMPANY

WINDHAM TOWN SHOPPES

WINDHAM VILLAGE GREEN

SHAW'S

SOVEREIGN BANK

CVS

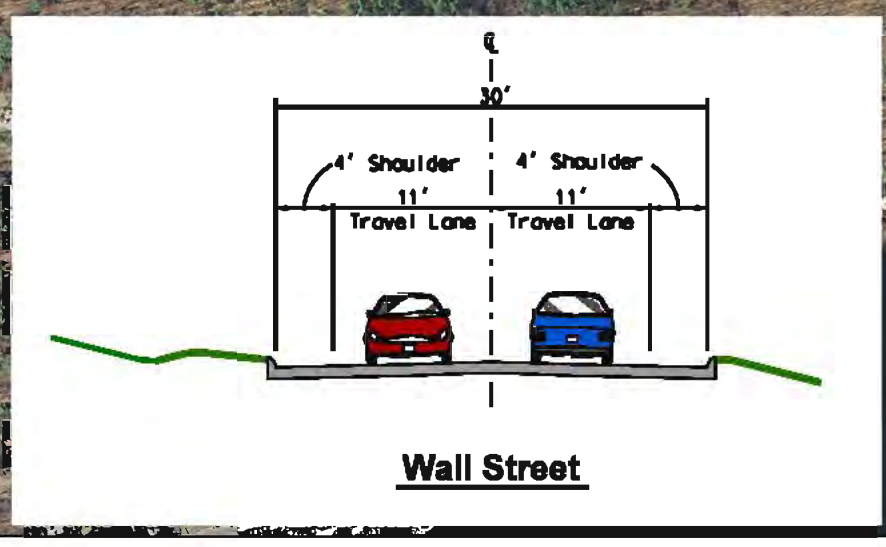
TEMPORARY PARK AND RIDE

111

POST OFFICE

CONCEPTUAL

COBBETTS POND



Wall Street

McFarland Johnson

ROCKINGHAM PLANNING COMMISSION

200 100 0 100 200 400
SCALE IN FEET

WALL STREET EXTENSION

Appendix B:

Study Team

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Appendix B – Project Team

The Project Team consists of staff from the Town of Windham, Rockingham Planning Commission, NHDOT and the consultant team led by McFarland-Johnson, Inc. Below is a list of the Project Team members and their roles on the study.

Town of Windham

Responsible for land use planning, zoning, and public participation activities.

David Sullivan	Town Administrator
Laura Scott	Community Development Director

Rockingham Planning Commission

Cliff Sinnott	Executive Director
Roxanne Rines	Project Administration

New Hampshire Department of Transportation (NHDOT)

Responsible for overall project management and oversight.

William Rose	Senior Planner

McFarland-Johnson, Inc. (MJ)

MJ is the prime consultant for the project and provided overall project management for the team. MJ led the Preliminary Engineering, Environmental and Community Resources, and Public Participation components of the project.

Gene McCarthy, P.E.	Project Manager
Mike MacDonald, P.E.	Roadway/Traffic Analysis
Brian Colburn, P.E.	Roadway/Traffic Analysis
Vicki Chase	Environmental
Jed Merrow	Environmental
Mike Long, P.E.	QA/QC
Martha Fugere	Figures/Graphics
Lori Halle	Graphics
Amber Koskela	Graphics

Carol R Johnson Associates Inc. (CRJ)

CRJ is responsible for the visual assessment.

Jeanne Lukenda	Landscape Architect
Jonathan Law	Graphics

Project for Public Spaces (PPS)

PPS played a key role in developing the problem and vision statements for the project.

Phil Myrick	CSS Expert
Alessandra Galletti	Landscape Architect

Resource Systems Group (RSG)

RSG is responsible for traffic data collection and modeling.

Brian Grady	Traffic Modeling
David Saladino	Traffic Engineer

Appendix C:

Transportation Modeling and Analysis

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Appendix C - Transportation Modeling and Analysis

1 Introduction

The Seacoast Regional Travel Demand Model ("the Model") is an integrated set of travel demand and land use models developed by Resource Systems Group (RSG) for the Seacoast Metropolitan Planning Organization (MPO). The Seacoast MPO, comprised of the Rockingham Planning Commission (RPC) and Strafford Regional Planning Commission (SRPC), is the federally mandated inter-jurisdictional agency that plans, prioritizes, and coordinates the use of federal transportation funds in the Seacoast Metropolitan area.

2 Seacoast Regional Travel Demand Model

2.1 Model Overview

The Seacoast model area consists of the following 45 towns in New Hampshire.

Atkinson	Hampton Falls	Nottingham
Barrington	Kensington	Plaistow
Brentwood	Kingston	Portsmouth
Brookfield	Lee	Rochester
Danville	Madbury	Rollinsford
Dover	Middleton	Rye
Durham	Milton	Salem
East Kingston	New Castle	Sandown
Epping	New Durham	Seabrook
Exeter	Newfields	Somersworth
Farmington	Newington	South Hampton
Fremont	Newmarket	Strafford
Greenland	Newton	Stratham
Hampstead	North Hampton	Wakefield
Hampton	Northwood	Windham

The model boundary encompassed by these 45 towns was divided into 533 internal Transportation Analysis Zones (TAZs). The TAZ boundaries are based on population and transportation model characteristics and the TAZ system was updated in 2007. There are also 51 external TAZs representing roads that enter and exit the Seacoast region. Figure 1 shows the town boundaries and TAZ boundaries of the Seacoast Regional Travel Demand Model.

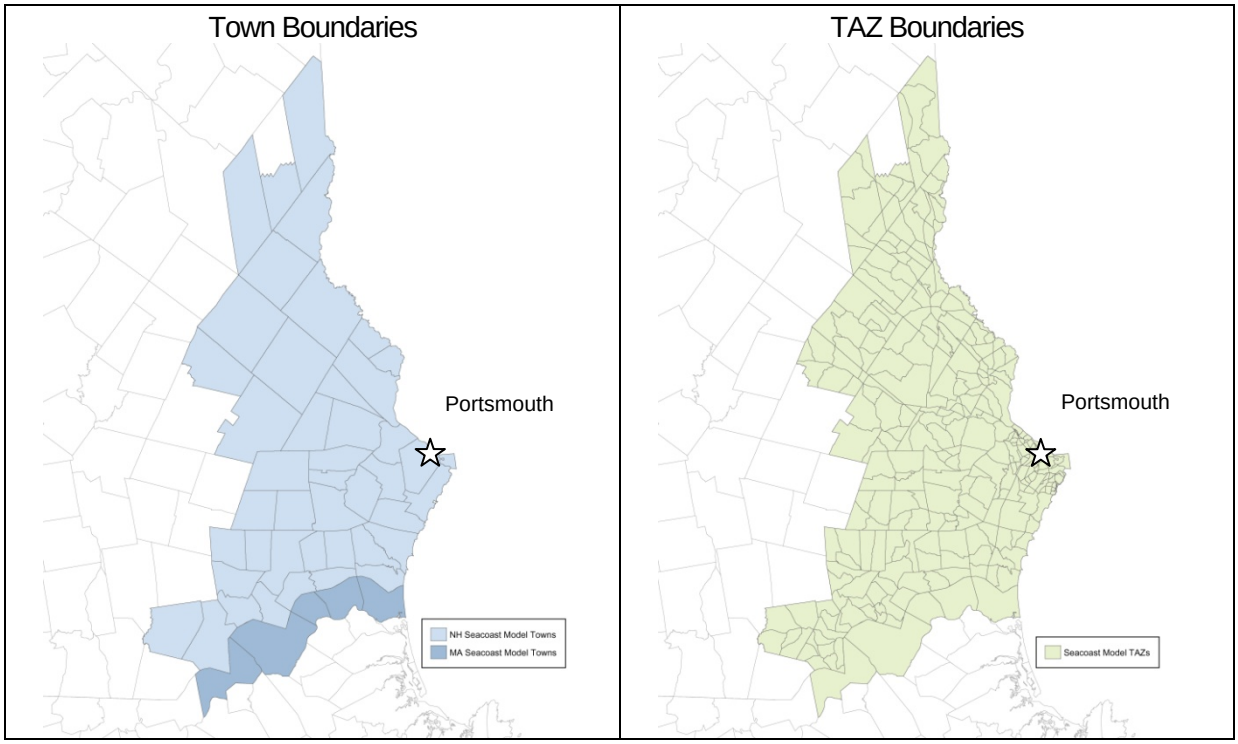

Figure 1 – Seacoast Model Town and TAZ Boundaries

2.2 Model Structure

Regional transportation planning models are generally based on the four-step modeling process, as shown in Figure 2. The Seacoast Regional Travel Demand Model is a traditional 4-step model that uses the commercially available TransCAD transportation GIS software package.

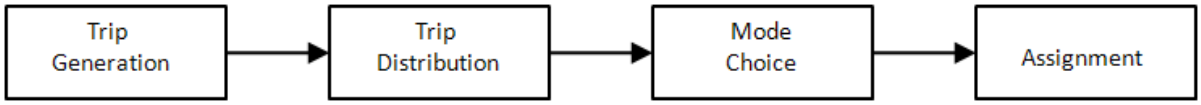

Figure 2 - Four-Step Modeling Process Overview

The travel model is essentially a series of mathematical equations which are used to represent each individual's decision making process related to why, when, where, and how to make a trip and ultimately what route to follow to complete that trip. The model results for these individual choices are combined so that the aggregate regional impacts of these travel decisions can be evaluated.

In a traditional four-step travel demand model these decision points are represented by separate modules commonly referred to as Trip Generation, Trip Distribution, Mode Choice, and Vehicle Assignment. Each step is briefly described below.

- ***Trip Generation***: socio-economic land use data is used to estimate how many trips will be made to and from each traffic analysis zone for different travel purposes. The *Why*?

- ***Trip Distribution***: links the number of trips that begin and end at each zone to form an origin-destination pattern thereby representing the process of destination choice by travelers. The *Where*?

- ***Mode Choice:*** trips between a given origin and destination are split into various travel modes such as automobile, transit and walk or bike. The *How*?

- ***Vehicle Assignment:*** once trips have been split into highway and transit vehicle trips, the specific route path used to travel from the origin to the destination is found. *What* route?

The travel model is ultimately used to predict future travel behavior based on projected changes in household and employment characteristics. The forecasted future travel predicted by the model helps inform long-range transportation and air quality planning. Therefore, the travel model must be able to replicate base year observed travel behavior for which comprehensive travel information is available.

2.3 Highway Model Network Structure

For modeling purposes, major roadways within the modeling region were selected to represent the entire roadway network. In the base year network there are approximately 3,300 road segments represented as links, of which approximately 660 are one-way only, and with approximately 2,250 endpoints or nodes. The network links contain a number of physical attributes such as the number of lanes, length, speed, and capacity. Figure 3 shows a portion of the regional TransCAD network for the Town of Windham.

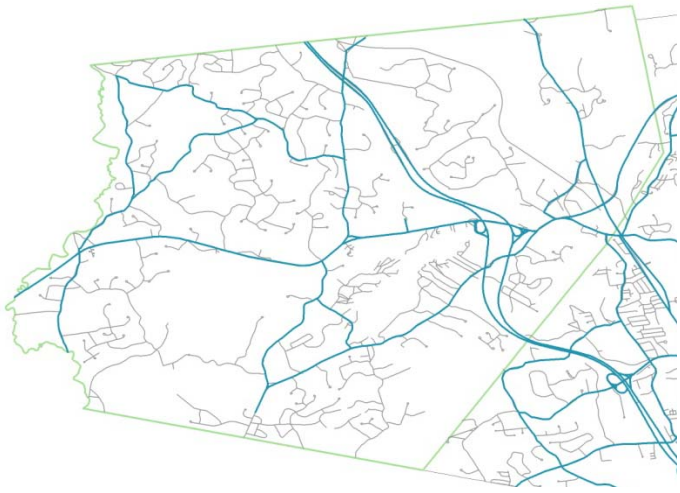

Figure 3 - TransCAD Network – Windham, NH

2.4 Regional Travel Demand Model Uses and Outputs

Transportation planners can use the Model to perform comprehensive regional transportation analyses and to evaluate transportation and traffic impact resulting from:

- Transportation system improvements,
- The provision of new modes of travel and/or enhancements of existing alternative modes,
- Changes in land use activity, and
- Implementation of demand management strategies.

The travel demand model makes use of a significant amount of input data and likewise produces a great deal of output data. Some of the most useful and most commonly sought after model outputs include:

- Directional roadway link volumes (traffic flows),
- Intersection turning movement volumes,
- Vehicular travel times,
- Transit ridership data.

2.5 Model Calibration

The model is designed to accurately reflect reality through an iterative process of estimation, validation, and calibration. Estimation chooses parameters based on "big-picture" empirically observed choices and activities in the study area or similar regions (e.g. the total number of trips). Validation attempts to check the "reasonableness" of these parameters by comparison to other models and investigating the sensitivities of the model to perturbations in these parameters. Finally, calibration compares model results to a set of more detailed observations (e.g. link-level traffic counts or trip-length distributions) and fine-tunes parameters to match those observations.

Estimation, validation, and calibration are performed during all steps of the Model development: land use allocation, trip generation, trip distribution, mode split, and assignment. For the purposes of the Federal Highway Administration (FHWA) and the discussion below, though, "calibration" is typically the measure of how well the assigned vehicle traffic volumes match ground counts.

In order to asses calibration (as defined above), ground counts were obtained for approximately 6% of the links in the network. Figure 4 shows the number of counts obtained divided by road class.

Road Class	# of Ground Counts
Interstates	30
Ramps	50
Major Arterials	88
Minor Arterials	62
Local Roads	33
Collectors	26
Total	289

Figure 4 - Calibration Ground Counts by Road Class

AM and PM peak hour ground counts were adjusted to the design hour volume (DHV). Individual link errors were calculated by subtracting the simulation volume from the adjusted ground count for that link. The model is calibrated when the model-generated road volumes reasonably represent reality. FHWA has published guidelines for calibration standards. A comparison between the FHWA guidelines and the calibration AM, PM, and AADT models are shown in Figure 5. The statistics reported include:

- Correlation coefficient: the overall statistical fit
- Percent Error Region-Wide: the difference of the sum of all assigned and all count volumes
- Sum of Differences by Functional Class: the same percent error as above, but calculated individually for each road class.

2.5.1 Coefficient of Correlation

The coefficient of correlation, “r”, is commonly used to measure the strength and direction between two sets of variables. An r value of 1.0 would indicate a perfect one to one correlation between the two variables, an r value of 0 would indicate a completely random correlation, and an r value of -1 would indicate a perfect inverse correlation. The value of r can be estimated using the following formula.

$$r = \frac{\sum(x \cdot y) - n \cdot \bar{x} \cdot \bar{y}}{\sqrt{\left(\sum(x^2) - n \cdot \bar{x}^2\right)\left(\sum(y^2) - n \cdot \bar{y}^2\right)}}$$

FHWA recommends a minimum r value of 0.880.

2.5.2 Absolute Error

The absolute error is the absolute value of the average, unweighted error. It reflects the average link error in the network and is reflected in the following formula:

$$\text{Absolute Error} = \frac{\sum|y-x|}{\sum x} \times 100\%$$

The PM model has an absolute error of 25%; the AM model has an absolute error of 27%.

2.5.3 Sum of Differences

The sum of differences is the average error of the network. It is similar to FHWA's "percent error region-wide standard"

$$\text{SumDif} = \sum(y-x) \quad \text{or} \quad \frac{\sum(y-x)}{n} \times 100\%$$

This statistic can be summarized for all road segments with counts, or for all road segments of a certain link class with counts.

	FHWA Guideline	AM Peak Hour Model	PM Peak Hour Model	AADT Peak Hour Model
Correlation Coefficient	0.88	0.92	0.93	0.92
Percent Error Region-Wide	+/- 5%	-1.5%	-0.2%	-4.7%
Sum of Differences By Functional Class				
Freeways	+/- 7%	-7.4%	-0.5%	1.5%
Principal Arterials	+/- 10%	6.6%	1.1%	3.7%
Minor Arterials	+/- 15%	4.7%	7.7%	-11.9%
Collectors	+/- 25%	-14.5%	-11.9%	-18.0%

Figure 5 - Seacoast Model Calibration Statistics by Period

It is important to note that the FHWA statistics are guidelines rather than regulations and that model calibration is far more important and more relevant on major roads than minor roads. There are two reasons why minor roads are difficult to calibrate, which are network detail (or lack thereof) and low volumes. When the observed volumes are low, percent differences can seem high even though the absolute difference is actually small (for example, 40 out of 200 is 25%, but it's still only 40 cars). There are a few important network details that affect the calibration of minor roads considerably; most notably, the location of centroid connectors, zone size and the completeness of the network in terms of what roads are represented. The more aggregate a model is, the more difficult it is to accurately represent detail that exists in reality and this can skew calibration for minor roads while still resulting in a very defensible model. Where two minor roads compete closely, it is quite difficult and usually unnecessary to be overly concerned with the modeled assignment to one minor road or the other. However, careful consideration of zone size and centroid connectivity can often improve calibration on local streets.

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Appendix D:

Photo Log

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Photograph No. 1 Small potential vernal pool east of alignment.

Photograph No. 2: – Shrub swamp west of alignment .

Photograph No. 3 Swamp west of proposed alignment.

Photograph No. 4: Early successional upland woods – red oak, white oak, white pine.

Photograph No. 5 Beaver swamp east of alignment.

Photograph No. 6 Stream from beaver swamp. Dam has been breached.

Photograph No 7 Small area of wetland woods with hop hornbeam, red maple, and black ash.

Photograph No. 8 Upland woods with glacial erratic.

Photograph No. 9 Stone wall in swamp north of existing path.

Photograph No. 10 Large marsh west of proposed alignment.

Photograph No. 11 Shrub swamp at north end of large swamp – potential spotted turtle habitat.

Photograph No. 12 – Heron rookery

Photograph No. 13. Large swamp east of Lowell Road

Photograph No. 14 – Golden Brook, view northwest.

Photograph No. 15 Ledge and upland woods along alignment.

Photograph No. 16 South end of large beaver swamp that falls in proposed alignment.

Photograph No. 17 Beaver dams at south end of swamp.

Photograph No. 18 Recent beaver work at east side of swamp.

Photograph No. 19 Shrub swamp north of proposed alignment.

Photograph No. 20 Wetland at east end of proposed alignment.

Appendix E:

Roundabouts

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Roundabouts

Roundabouts are an often misunderstood roadway design feature. As more and more roundabouts are constructed and evaluated around the US, evidence continues to mount about their effectiveness. In fact, if one looks carefully at the data, it is hard to understand why every state DOT and community public works department doesn't do what a number of State DOTs have done: make roundabouts the default solution for any intersection project (1). They are dramatically safer, improve peak hour congestion and often lead to cost savings for roadway infrastructure. When used as a part of a traffic calming device, they generally contribute to reigning in speeding. Yet embedded beliefs are hard to dissolve and several generations of Americans who have grown up with traffic signals, multiple turning lanes and cloverleaf intersections remain skeptical. The purpose of this paper is to assemble and interpret data on roundabouts so you can see for yourself.

Safety

The Federal Highway Administration's Safety website reports that there were 733,000 injury crashes and 7,196 fatal intersection-related crashes in the United States in 2008.

The website further reports that the injury rate would be cut in half if intersections were converted to roundabouts. Elsewhere, research shows that fatalities are reduced by 75% to 90% after roundabouts are installed. This means that 5000 to 6500 lives a year could be saved if we install roundabouts instead of signals and stop signs at intersections, and over 350,000 injuries would be averted.

- Maryland DOT: Injury Crashes reduced by 86%; Fatal /Incapacitating crashes reduced by 100%; for every dollar spent on roundabouts, there is a return of approximately $15.00 to be realized through accident reduction. (2)
- Arizona DOT: Roundabouts reduce injury accidents by 75 percent and fatal accidents by 90 percent (3)
- Insurance Institute for Highway Safety: Injury crashes reduced by 76%; fatal crashes reduced by 90%. (Status Report Vol. 35, No. 5, May 13, 2000) http://www.iihs.org/research/topics/roundabouts.html
- NYSDOT: crashes on State Route 376 in Poughkeepsie reduced by 51% after installation of roundabouts (4)
- NYSDOT: crashes on State Route 114 cut in half after installation of roundabouts (5)
- Injury crashes in Europe reduced by 34% to 76%, depending on the country (6)
- 74 percent reduction in the rate of injury crashes at 73 roundabouts in Victoria, Australia (7)

Operations: Delay and Queue Lengths (backups)

Roundabouts often, but don't always reduce congestion at intersections during peak hour. This is because one of the most significant causes of delays is the need to get back up to speed from a stopped condition. Roundabouts allow many cars to continue flowing through at a reduced speed. Due to the complexity of intersection dynamics from site to site, it is recommended that each specific intersection be examined using a computer simulation model, such as SIDRA. The cost is not very high and can be done for a few thousand dollars per intersection in most cases

- National Cooperative Highway Research Program: Delay measurements at roundabout sites showed reductions in peak hour delays of about 75 percent (8)
- Insurance Institute for Highway Safety: National projections: if just 10% of the 265,000 signalized intersections were replaced, annual vehicle delays would be reduced by 800 million hours. To put this into perspective, the total annual delay for the San Jose Metro area in 2009 was 42 million hours (9)
- New York State DOT Studies
  - Traffic delays decreased by 54% after installation of roundabouts at Vassar College in Poughkeepsie (4)
  - Delays reduced from 32 seconds to 6.5 seconds during peak hour on Route 114 (5)
  - Travel times reduced by 70% along the Route 67 corridor in Malta New York (10)
- Traffic delays reduced by 13% to 26% at three roundabouts; Insurance Institute for Highway Safety (11)
- Delays at Vail, Colorado Interchange Reduced from an average of 60 seconds to a peak of 30 minutes, to zero. (12)
- Substantial reductions of delay at four intersections in Gilbert Crossing, Virginia achieved after installation of roundabouts (13)
- Substantial reduction in delays at Five Corners, Glen Falls New York (14)

Costs

A popular misconception about roundabouts is that they are much more expensive than traffic signals. This is simply not true. The cost comparison of a traffic signal to a roundabout varies depending on the site, however, in general, the costs are in the same ballpark for the initial installation. Some jurisdictions report slightly higher construction costs, some report slightly lower. However, the cost advantages of roundabouts become much more apparent when long term maintenance costs are taken into consideration. Furthermore, many jurisdictions report that roundabouts negate the need for costly widenings, and significant savings can often accrue from that.

- Arizona DOT: Roundabouts cost less than traffic signals and do not require expensive equipment or maintenance. They save even more because they reduce the need for turning lanes. (3)
- The initial cost of roundabouts are in the same range as traffic signals, but maintenance costs are lower: approximately $3k per year versus $15k. (15)
- Alaska DOT: Initial costs about the same, maintenance costs $2k per year versus $15k for signalized intersections. (16)

Sources

(1) State DOTs with Roundabout first policies are New York, Virginia, Washington, Wisconsin and Maryland

(2) (Maryland's Roundabouts: Accident Experience and Economic Evaluation...
Administration, Maryland Department of Transportation, March 2007)

(3) www.azdot.gov/ccpartnerships/Roundabouts/index.asp

(4) Route 376 Raymond Avenue Operations Study, NYSDOT Region 8; contact Howard McCulloch hmcculloch@dot.state.ny.us

(5) Final Evaluation Report Route 114 Traffic Calming; contact Howard McCulloch hmcculloch@dot.state.ny.us

(6) The Use Of Roundabouts:Comparison With Alternate Design Solution
Michael E. Niederhauser, Brian A. Collins, P.E. and Edward J. Myers, P.E.

(7) Troutbeck 1993

(8) NCHRP Synthesis 264: Modern Roundabout Practice in the US

(9) Bergh, Retting and Meyers for the Insurance Institute for Highway Safety 2005

(10) Presentation by Howard McCulloch, New York State DOT hmcculloch@dot.state.ny.us

(11) Insurance Institute of Highway Safety Status Report Vol. 36, No. 7, July 28, 2001

(12) Vail Daily news article January 20, 1996 www.azdot.gov/ccpartnerships/Roundabouts/PDF/Articles.pdf

(13) Video on Senator Frank Wolf's website: http://www.youtube.com/watch?v=jbNdj8f6iRw

(14) Citizen post on Youtube about Glen Falls NY roundabouts: http://www.youtube.com/watch?v=jZNkzgzPeOg

(15) Roundabouts v. Signalized Intersections: A Comparative Analysis; Scott Alisoglu, Kansas Government Journal 2010

(16) http://www.alaskaroundabouts.com/mythfact6.html

Appendix

FHWA Mini-Roundabouts Informational Video
http://www.youtube.com/watch?v=Mr3QAKszLag&feature=related

Roundabouts - Pedestrians and cyclists
http://www.youtube.com/watch?v=Y05qGz5B1Wg&feature=autoplay&list=PLF17268C1DF90AB53&index=3&playnext=2

Kings Beach Highway Project - Webisode 1: Roundabouts Designed To Fail
http://www.youtube.com/watch?v=oAvsB8dE0NA&feature=related

Roundabout and Traffic Engineering, Scott Ritchie,
http://www.roundabouts.us/index.php

Arizona DOT overview:
http://www.azdot.gov/asfroot/CCP/Modern_Roundabouts/Introduction.wmv

Gilbert's Corner Roundabouts: Virginia Senator Wolf PR video on four roundabouts that he helped fund:
http://www.youtube.com/watch?v=jbNdj8f6iRw

Modern Roundabout a Fix for Heathcote 5 Corners? Ask Glens Falls! : Citizen post on YouTube about roundabout in Glen Falls NY:
http://www.youtube.com/watch?v=jZNkzgzPeOg

Modern Roudabouts: A Safer Choice
http://safety.fhwa.dot.gov/intersection/roundabouts/fhwasa10023/wmv_cc_final/10-2124_Roundabouts.wmv

Appendix F:

Selected Case Studies of Roundabouts in Series

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Appendix F – Selected Case Studies of Roundabouts in Series

Route 67 - Malta, NY

- Four and Three Lane Divided State highway
- Five Two-Lane Roundabouts in less than one mile
- Crosses Interstate 87
- No left turns allowed
- Two Roundabouts at ramp junctions from interstate

Source: Google

Prairie Star Parkway – Lenexa, Kansas

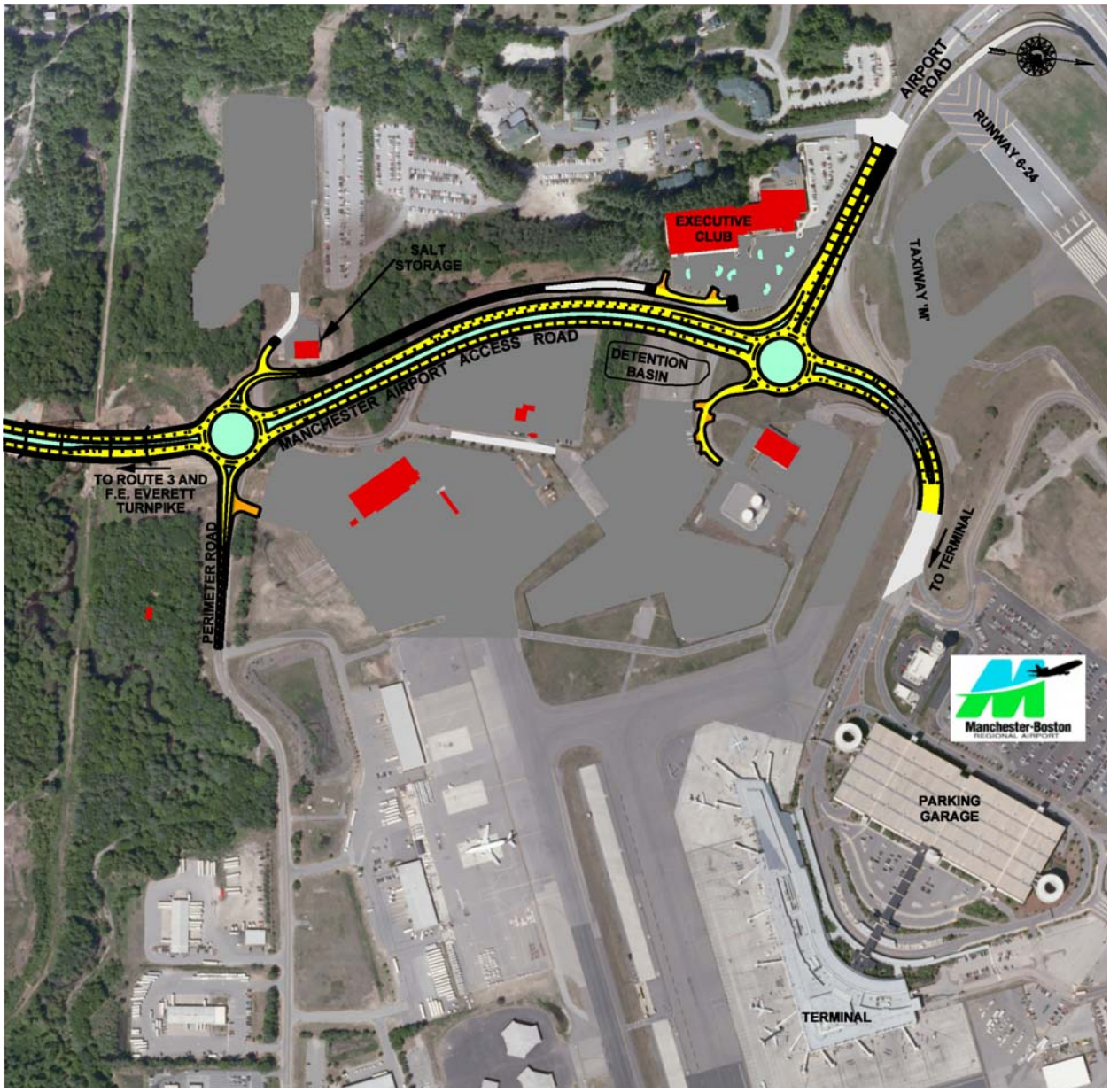
- Four Lane Divided Roadway
- Seven Two-Lane Roundabouts in about 1.5 miles
- No left turns allowed

Source: Google

Source: Google

Airport Access Road – Manchester, NH

- Four Lane Divided Roadway
- Two Two-Lane Roundabouts in about 1/2 mile
- No left turns allowed
- Under construction, due to open end of 2011



Appendix G:

Selected Case Studies of Village Character

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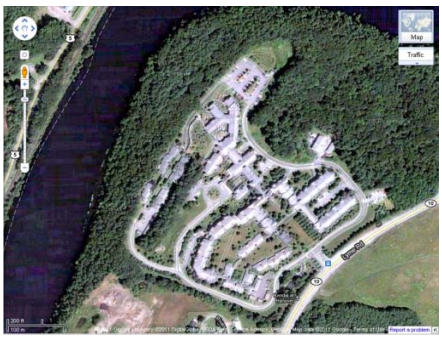
Appendix G – Selected Case Studies of Village Character

Main Street (at Winchester Street) - Keene, NH

- Four-lane Main Street on the edge of downtown Keene
- Roundabouts effectively mitigate congestion
- Safer, more pleasant intersection for pedestrians and drivers

Kendal at Hanover Continuing Care Community – Hanover, NH

- On-site medical center
- Access (including public transportation) to educational and cultural programming at Dartmouth College
- Mixture of larger shared buildings and smaller shared duplexes, among other building types
- Walkable street design with on-site amenities including recreational activities, a library, and several businesses



Chatham, MA First Night Celebration - Destination in tune with New England Winter

- Town-wide festival celebrating visual and performing arts
- Activates town center in the "off season"

Village-scale residential development – Various New England Towns

- Comparatively dense, walkable style of residential development
- Environmentally conscious / "green"
- New England small town feel
- Desired type of new development for many prospective buyers; caters to younger demographics (source: New Urban Network)

Richmond, VT

Hillsdale, New Jersey – residential developments

- Small lot size
- Traditional “cottage style” architecture and village scale

Barrington, Rhode Island – developments in town center

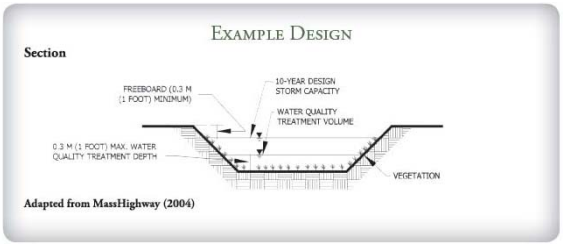
- Village-style atmosphere in its business district
- Expanded housing options
- The town’s new bylaw permits two-story buildings with residences located above commercial spaces

Hollis, NH – Historic District

- Center of town is a designated historic district
- Includes 100+ homes and businesses
- Growth of "cottage industries," small businesses run out of residents' homes (Source)

Bio-swales / vegetated treatment swales / bio-retention

- Manages storm water runoff
- New Hampshire DOT's *Highway Design Manual (64)* offers specific design guidelines and thorough analysis of the benefits of different types of swales and buffers



http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP2525%2853%29_FR.pdf)

East Burke, VT – Route 114/Main Street: mixture of commercial and historic buildings

- Refurbished freestanding homes host variety of businesses including retail and restaurant spaces
- Businesses cater to tourists (nearby Burke Mountain ski area) and locals; locally owned and "unique"

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Appendix H:

Summary of Funding Sources and Mechanisms

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Appendix H – Summary of Funding Sources and Mechanisms

There are a number of methods to finance the transportation system and village center improvements recommended in this study and many are described in this section. The options can be generally classified into local sources (taxes, impact fees and value capture mechanisms) or Federal/State grant programs. With the exception of the grant programs, all of these options included in this document generate revenues locally from those that benefit from the particular transportation improvements. They vary mostly in how broadly they define the geographic area encompassed, the extent of benefits, and who specifically pays to implement the projects.

Property Taxes

Taxes on property have been the historic method of communities paying for infrastructure needs in New Hampshire. These are the most broad-based of methods in that they are applied to all property owners in the community. To apply property taxes to highway improvements, the specific projects must be approved by voters at Town Meeting either via the Capital Improvement Plan or individual warrant article. Another method of funding projects via property taxes is to establish a Capital Reserve account to accrue multiple years of funding toward a specific goal. An example of this is the Capital Reserve fund that the town of Exeter established to fund roadway shoulder improvements. At Town meeting the community set aside $50,000 per year and has accumulated $150,000 which has been proposed to use to match $225,000 in federal Transportation Enhancement funds and construct shoulders on a mile of roadway connecting several residential areas to a recreation area and to the village.

+ ***Technically & legally acceptable***: This has been the historic method of raising funds for local roadway improvements and has been accepted legally and technically as a method of doing so.
+ ***Bond Security***: Funds can be used to secure and/or pay municipal bonds.
+ ***Administration***: Easy for public agency to administer.
– ***Inequitable***: They have a built-in imbalance in that they are assessed to all property owners independent of whether they are users of the transportation system or not.
– ***Political***: Requires approval at Town Meeting which can be a difficult process depending on the public level of support for the particular project and external factors.

Traffic Impact Fees

A onetime fee shared to new developments to pay for the cost of serving the additional traffic generated by the new development. These fees are based on traffic studies and plans, and the fees are calculated based on the number of trips generated by various land uses. The cost of correcting existing deficiencies is usually excluded from the calculation for equity and legal reasons.

+ ***Politically acceptable***: because the fees are seen as being imposed on new residents or businesses, politicians are likely to approve them rather than voting for an increase in taxes.

+ ***Technically & legally acceptable***: They have been largely accepted on both a technical and legal grounds. A fee system based upon a detailed transportation planning study is technically sound and thus is likely to be found legally valid as well.
+ ***Equitable***: They are equitable for all types and sizes of development and so are favored by most developers over negotiated agreements or controls on growth. They are also known in advance and can be figured in the initial financial feasibility studies for a development project.
– ***Inequitable***: They have a built-in imbalance in that they are assessed only on new development and not on existing development which contributes to the traffic problem.
– ***Piecemeal***: Revenues are collected gradually over time as development occurs, and thus may result in a piecemeal pattern of improvements that are made as funds become available. Since fees are based on development occurring over time, they are not reliable as a source of bonding revenue, and so are limited to their uses for major improvements.

Development Agreements

These agreements are negotiated during a project's local approval stage, when the local government is able to request conditions as part of its approval process. These conditions are usually applied during zoning or subdivision approval, when local government has broad discretion in approving a project.

+ ***Politically acceptable***: because the fees are seen as being imposed on new residents or businesses, politicians are likely to approve them rather than voting for an increase in taxes.
+ ***Versatile***: Because the local government has approval authority, it offers a significant inducement for developers to make such "voluntary" improvements.
– ***Piecemeal***: Revenues are collected gradually over time as development occurs, and thus may result in a piecemeal pattern of improvements that are made as funds become available. Since fees are based on development occurring over time, they are not reliable as a source of bonding revenue, and so are limited to their uses for major improvements.
– ***Tough to Balance***: It is difficult to treat all developers equally because of differences in sites, street configurations and other location factors. Large developments are often required to make major improvements, while small developments make few, if any, improvements.
– ***Difficult Enforcement***: Enforcement may prove to be difficult, partly because of the administrative difficulty in coordinating among various city departments for agreements related to a large number of developments. This process is made more complex when phased improvements are required with a phased development, or when traffic monitoring is required as part of a project.

Transportation Development Districts

This type of financing creates a public-private partnership to plan and finance transportation improvements in high growth areas or districts. Properties abutting a designated section of roadway are assessed for their fair share of the cost of the road improvement with fees assessed based on linear frontage, area, or by trip generation and are usually for specific improvements benefiting property within the district. Generally this applies to all properties fronting the roadway to be improved, but can be expanded into a larger district if the improvements or impacts are to a larger area. If the district crosses municipal boundaries, it is considered a Regional Development District. Through an inter-municipal agreement allowed by RSA Section 53-A, the communities along Route 33 could form a district to provide a larger pool of funds for transportation improvements. This can be accomplished by publicly or privately financing the necessary road improvements and then assessing new development fees based on the share of available roadway capacity that they utilize. This pays the investment back instead of looking to collect enough to do the work within the confines of impact fees or other time limited methods.

+ ***Politically acceptable***: because the fees are seen as being imposed on new residents or businesses, politicians are likely to approve them rather than voting for an increase in taxes.
+ ***Technically & legally acceptable***: They have been largely accepted on both a technical and legal grounds. A fee system based upon a detailed transportation planning study is technically sound and thus is likely to be found legally valid as well.
+ ***Equitable***: They are equitable for all types and sizes of development and so are favored by most developers over negotiated agreements or controls on growth. They are also known in advance and can be figured in the initial financial feasibility studies for a development project.
+ ***Balanced***: Based on benefits received by abutting landowners and attributable to transportation improvements.
– ***Inequitable***: They have a built-in imbalance in that they are assessed only on new development and not on existing development.
– ***Piecemeal***: Revenues are collected gradually over time as development occurs, and thus may result in a piecemeal pattern of improvements that are made as funds become available. Since fees are based on development occurring over time, they are not reliable as a source of bonding revenue, and so are limited to their uses for major improvements.
– ***Challenges***: Property owners frequently challenge the establishment of this type of district.

Special Assessment District

In this type, designated areas are assessed for the cost of public improvements that benefit property within the district. The assessments are usually imposed on an ad valorem (according to value) basis, although acreage fees and front footage assessment also have been used. The key point of a special assessment district is that the fees are assessed for specific improvements benefitting property within the district. They are not taxes to be shared with other revenue sources, but must be used for specific items.

+ ***Technically & legally acceptable***: They have been largely accepted on both a technical and legal grounds. A fee system based upon a detailed transportation planning study is technically sound and thus is likely to be found legally valid as well.
+ ***Equitable***: They are equitable for all types and sizes of development and so are favored by most developers over negotiated agreements or controls on growth. They are also known in advance and can be figured in the initial financial feasibility studies for a development project.
+ ***Bond Security***: They can be used to secure bonds
+ ***Administration***: Easy for public agency to administer.
– ***Political***: Requires enabling legislation.
– ***Defining Boundaries***: Difficult to define specific boundaries.
– ***Defining Benefits and Costs***: The use of ad valorem assessments may not accurately represent the benefit derived by various properties or especially the proportion of the cost attributable to them.

Tax Increment Financing

Projected increase in property value is partially taxed for a prearranged time period. Developer pays for initial off-site improvements and the expenditure is recouped from difference in developed and undeveloped tax base. Frequently a TIF District is established.

+ ***Politically acceptable***: because the fees are seen as being imposed on new residents or businesses, politicians are likely to approve them rather than voting for an increase in taxes.
+ ***Equitable***: They are equitable for all types and sizes of development and so are favored by most developers over negotiated agreements or controls on growth. They are also known in advance and can be figured in the initial financial feasibility studies for a development project.
+ ***Consistent***: Taxing authority receives and undiminished source of income until initial costs are reimbursed.
– ***Inequitable***: They have a built-in imbalance in that they are assessed only on new development and not on existing development.
– ***Political***: Requires enabling legislation.

User Tax

Levied on all motor fuel sales, or each vehicle registered within a community's boundary, vehicle registration fees are paid to both the community and the state while fuel sales tax is paid to the state and the federal government. In New Hampshire communities can implement the ***Local Option Fee for Transportation Funding*** as one means of generating additional local funding via vehicle registration fees. HB 648, passed in 1998, allows a municipality to collect an additional motor vehicle registration fee of up to $5.00 for the purpose of supporting a municipal transportation improvement fund. Of the amount collected, up to 10% (maximum of $0.50 of each fee paid) may be retained for administrative costs. The remaining amount is deposited into the municipal transportation improvement fund to pay for improvements in the

local or regional transportation system including roads, bridges, bicycle and pedestrian facilities, parking and intermodal facilities and public transportation.

+ ***Bond Security***: They can be used to secure bonds.
+ ***Administration***: Easy for public agency to administer.
+ ***Offsets Taxes***: Replaces a possible income tax increase.
+ ***Focused Use***: Use is designated for transportation issues only.
+ ***Stable***: Stable source of income.
– ***Political***: Requires approval of fee at Town Meeting, and enabling legislation would be needed to raise the allowable fee to more than $5.00.
– ***Piecemeal***: In smaller communities, revenues may not be collected at a rate great enough to fund larger projects in a reasonable timeframe or to make significant bond payments.
– ***Defining Benefits and Costs***: The use of ad valorem assessments may not accurately represent the benefit derived by various properties or especially the proportion of the cost attributable to them.

State Aid Highway Program

This is a NH DOT run program that provides $2.5 million per year (including match) for reconstruction of Class I, II, and III (all state-owned) highways. These projects are municipally managed, and are funded 2/3^{rds} with State funding and 1/3rd with local dollars. Typical projects are improvements at a town road/state highway intersection on unnumbered state routes that function more like a local roadway. The maximum project total allowable is $1,050,000 or $700,000 of state funds that may be appropriated over multiple years and unnumbered state routes may be reclassified to town roads when complete.

+ ***State Funds:*** Does not use federal funding and is easier to administer
+ ***Upfront funding:*** State pays ½ of its share at the beginning of the bid process for both engineering and construction. Remainder is reimbursement. Most programs are reimbursement only.
– ***Matching Funds:*** Higher match requirements than some programs (1/3rd vs 80/20)
– ***Waiting:*** Popular program for smaller projects and the wait can be long before funding is available.

Transportation Enhancements Program (TE)

The Transportation Enhancements (TE) program provides funding for smaller community-based projects that expand travel choices and enhance the transportation experience by improving the cultural, historic, aesthetic and environmental aspects of our transportation infrastructure. There is a list of 12 types of projects that are eligible several of which would be applicable to Main Street: Pedestrian and bicycle facilities; Pedestrian and bicycle safety and educational activities; Acquisition of scenic or historic easements and sites; landscaping and scenic beautification, Environmental mitigation of runoff pollution and provision of wildlife connectivity, as well as other potential projects. NH receives approximately $2 million per year for this program which it runs on a 2-3 year competitive cycle.

+ ***Matching Funds:*** 80/20 Match of Federal/Local minimizes need for local funding.
+ ***Program Match:*** The program matches well with Main Street projects as it is designed and intended to pay for improvements like those being recommended.
+ ***Quick Implementation:*** TE runs on a 2-3 year cycle however projects can be implemented as soon as one year after approval. The next TE round is anticipated to begin at the beginning of 2012 with project approvals by the end of 2012 and projects programmed for 2013 and 2014.
– ***Federal funding:*** Federal funds have additional and more rigorous administrative and management requirements
– ***Reimbursement based:*** Like all other Federal funding mechanisms, the TE program works on a reimbursement basis, so the community needs to generate the funding for the entire cost of the project locally, construct it, and pay for it, before requesting up to 80% repayment from the Federal Government.
– ***Competitive:*** Projects are determined through statewide competition

Congestion Mitigation and Air Quality Program (CMAQ)

The Congestion Mitigation and Air Quality Program (CMAQ) is a set-aside of federal transportation funding coming to NH that is geared towards transportation projects that reduce pollution and congestion in the area and assist in meeting the National Ambient Air Quality Standards (NAAQS). Projects can include construction, capital investment, and operating assistance for a limited time but must reduce emissions. NH receives approximately $4 million per year for this program which it runs on a 2-3 year competitive cycle.

+ ***Matching Funds:*** 80/20 Match of Federal/Local minimizes need for local funding.
+ ***Program Match:*** The program matches pretty well with Main Street projects as it is designed and intended to pay for improvements that reduce auto travel or make the existing transportation more efficient and less polluting.
+ ***Quick Implementation:*** CMAQ runs on a 2-3 year cycle however projects can be implemented as soon as one year after approval. The next CMAQ round is anticipated to begin at the beginning of 2013 with project approvals by the end of 2013 and projects programmed for 2014 and 2015.
– ***Federal funding:*** Federal funds have additional and more rigorous administrative and management requirements
– ***Demonstrated Air Quality Benefit:*** In order to be eligible, the project must be able to accurately model a reduction in emissions from the improvement.
– ***Reimbursement based:*** Like all other Federal funding mechanisms, the CMAQ program works on a reimbursement basis, so the community needs to generate the funding for the entire cost of the project locally, construct it, and pay for it, before requesting up to 80% repayment from the Federal Government.
– ***Competitive:*** Projects are determined through statewide competition although most of the funding is directed toward the communities that are within the non-attainment Area under the Clean Air Act and the National Ambient Air Quality Standards.

Safe Routes to School (SRTS)

The Safe Routes to School program is intended to encourage a greater percentage of elementary and middle school (K-8) students to bike and walk to school, and to ensure that they can do so safely. The program is designed around an integrated approach summarized as "the 5Es" – Education, Encouragement, Enforcement, Engineering, and Evaluation. SRTS funding is federal, and is passed through NHDOT. Towns or School Districts can access SRTS Start-Up grants of up to $5,000, which are accepted on a rolling basis; and Travel Plan grants of up to $15,000 per school. This is a reimbursement program, though requires no matching funding. Once a Town completes a travel plan, they are eligible to access Project Grants of up to $250,000. The project grants are competitive, as more SRTS programs are being developed by towns and cities around the state, though not yet as difficult to secure as Transportation Enhancement funding.

+ ***Matching Funds:*** 80/20 Match of Federal/Local minimizes need for local funding.
+ ***Program Match:*** The program matches pretty well with Main Street projects as it is designed and intended to pay for improvements that reduce auto travel or make the existing transportation more efficient and less polluting.
+ ***Quick Implementation:*** The town is already involved with the SRTS program and incorporating Pollard School into a travel plan (which Plaistow may be able to get a grant to do) will enable access to the capital project grants which could a variety of improvements that make it safer and more attractive for children to walk or bike to school.
– ***Federal funding:*** Federal funds have additional and more rigorous administrative and management requirements
– ***Reimbursement based:*** Like all other Federal funding mechanisms, the project aspect of the SRTS program works on a reimbursement basis, so the community needs to generate the funding for the entire cost of the project locally, construct it, and pay for it, before requesting up to 80% repayment from the Federal Government.
- ***Competitive:*** Project grants are determined through statewide competition although this program is currently somewhat less competitive than TE or CMAQ.

It is recommended that the Town develop individual projects for implementation within the context of the overall Village development projects, and use different funding sources for the different components of the Plan. For instance, the Transportation Enhancements or Safe Routes to School programs may be an avenue to fund the pedestrian improvements in and around the Village, while Congestion Mitigation Air Quality funding improves another area and a developer agreement improves yet another.

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