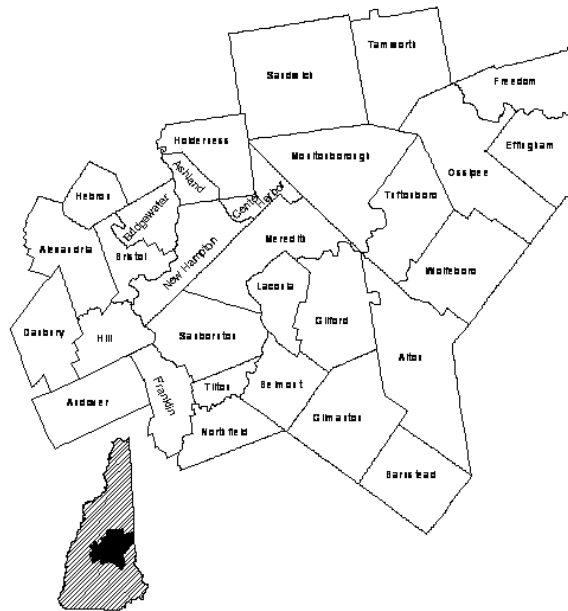


April 2007

Prepared by: Lakes Region Planning Commission  
with assistance from Fay, Spofford, and Thorndike, Inc.

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# NH Route 104 Access Management Study Meredith and New Hampton, New Hampshire April 2007

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## **NH 104 Study Committee**

The Lakes Region Planning Commission would like to thank the following persons for participating on the NH 104 Study Committee.

### **Town of New Hampton**

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Barbara Lucas, New Hampton Town Administrator

Nathaniel Sawyer, New Hampton Police Chief

Kendall Hughes, New Hampton Fire Department

### **Town of Meredith**

Bill Bayard, Meredith Planning Board

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John Edgar, Meredith Town Planner

William Oldenburg, Chief of Preliminary Design, Bureau of Highway Design, NHDOT

Craig Green, Administrator of Bureau of Highway Design, NHDOT





## 1. Introduction

In consultation with officials from the towns of Meredith and New Hampton, the Lakes Region Planning Commission (LRPC) sought funding from the New Hampshire Department of Transportation (NH DOT) 2004 State Planning and Research (SPR) program to conduct a corridor access management study along the NH Route 104 corridor from the junction of U.S. Route 3 in Meredith westerly through New Hampton to the Bristol town line. The project was initiated in early 2006 and completed in April 2007.

The intent of the New Hampshire Route 104 Corridor Study is to assess current conditions, identify potential safety improvements, assess future traffic demand related to potential land use development, and outline future strategies related to access management along the corridor.

A wide variety of information was compiled to assess the current conditions along the NH Route 104 corridor. Members of the NH Route 104 Corridor Study Committee, residents, business owners, and representatives of local government were queried regarding safety and land use issues, traffic and speed counts were undertaken, the location of existing access points were mapped, and data necessary to complete a buildout analysis of the corridor were collected.

These data together highlight a growing corridor that has existing safety and access issues. These issues are sure to intensify as local and regional through traffic increases at the same time that additional commercial and residential uses seek to locate along NH Route 104.

To identify potential safety improvements the LRPC and NH Route 104 Corridor Study Committee sought pre-engineering and graphics support from Fay, Spofford, Thorndike, Inc. (FST). FST staff provided assistance in both the identification of short to medium-term improvements as well as the production of the project specific graphics included within this study.



*NH Route 104 near Chase Road in Meredith*

While these graphics are planning level only and are not intended to represent final design solutions, it is hoped that the potential projects detailed in this study lead to future implementation. The identified safety improvement locations include:

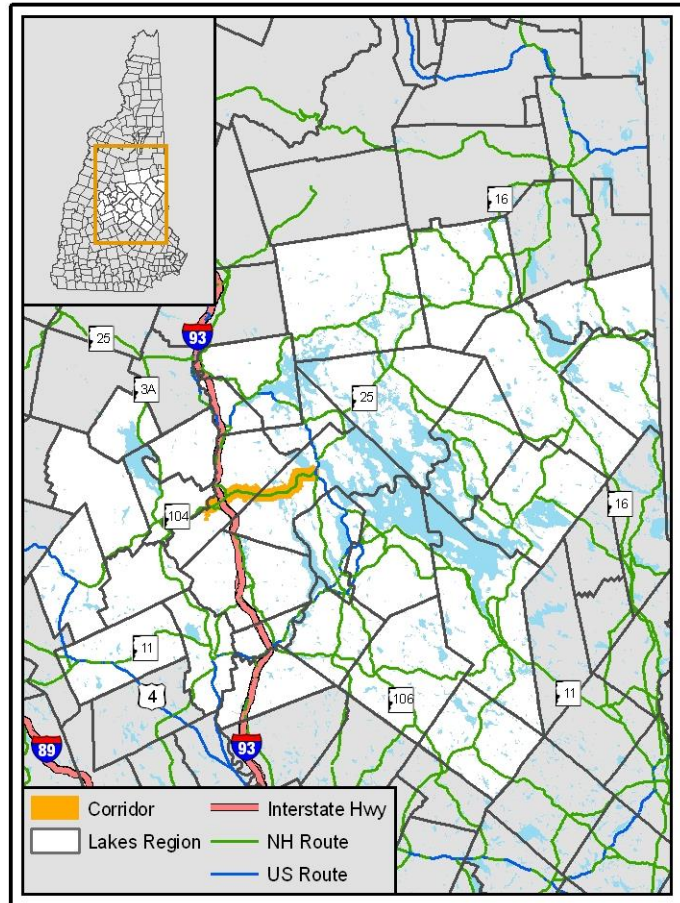
- Residential/Commercial Area (Bobby’s Girl Diner) at NH Route 104 (New Hampton)
- Meredith Woods/Clearwater Campgrounds Crossings (Meredith)
- NH Route 104 at Shingle Camp Road and I-93 Off-Ramp (New Hampton)
- Chase and Meredith Center Roads at NH Route 104 (Meredith)
- Town House Road (east) at NH Route 104 (New Hampton)
- Main Street at NH Route 104 (New Hampton)

Finally, a variety of strategies to address access management in both Meredith and New Hampton are outlined. Access management is defined by the Federal Highway Administration as “the process

that provides access to land development while simultaneously preserving the flow of traffic on the surrounding system in terms of safety, capacity, and speed.” Methods to improve this process include the provision of access management-related sections in each community’s subdivision and site plan review regulations, the consideration of incentive-based zoning initiatives, and the approval of a memorandum of understanding (MOU) between NHDOT District 3 and each respective planning board related to necessary communications during the development review process along state highways. Also included in the discussion of access management strategies is the potential acquisition of access rights of specific parcels along NH Route 104.

### Other Current and Recent Planning Efforts

Both New Hampton and Meredith have recognized the importance of the NH Route 104 corridor through their own local planning processes. The *New Hampton Master Plan: 2002 Update*, identified the town of New Hampton’s concerns about strip commercial zoning along NH Route 104 and the possible consequences of increased curb cuts, impediments to traffic flow, increased accidents, and diminished pedestrian safety and use. The Master Plan also recognizes that the NH Route 104 Corridor between I-93 and Meredith is highly desirable for commercial development, and recommends that the community take an active role in access management along the corridor. This would include the integration of land use and transportation principles in the development of a new town office complex, potentially to be located directly off NH Route 104 west of I-93. Since the development of the Master Plan, the town has updated its zoning in the area immediately to the east of Interstate 93 along NH Route 104 to allow for mixed uses, updated the Planning Board’s Site Plan Review Regulations, and made plans for the update of the Planning Board’s Subdivision Regulations in 2007.



*The Lakes Region*

The town of Meredith also recently updated their Master Plan, called the *Meredith Community Plan* (2002). Similar to New Hampton, the community recognizes the dangers of allowing the Land Use and Transportation Cycle to continue along major highway corridors such as NH Route 104. Specifically, that plan identified the goal to improve traffic flow, efficiency, and safety on highway networks, and recommended that Meredith work with New Hampton to preserve the capacity of the Exit 23/NH Route 104 corridor. Working together with the town of



New Hampton on the NH Route 104 Access Management Study was a logical continuation of the planning process initiated by the Master Plan.

The current Lakes Region Transportation Plan, *PLAN 2000: A Lakes Region Transportation Plan Update for the Year 2000* (LRPC, 2000), identified east-west corridors as top transportation planning priorities. NH Route 104 was further identified as a “Lifeline Corridor” having critical importance for the State and the Region. *PLAN 2000* identified two specific recommendations regarding the NH Route 104 Corridor:

- New Hampton and Meredith should work together to discourage sprawl.
- The purchase of access rights should be a priority on NH Route 104 in New Hampton and Meredith.

Shortly after the adoption of *PLAN 2000* by the LRPC, the NH Office of State Planning embarked on a multi-agency, multi-jurisdictional study called *Managing Growth in New Hampshire: Change and Challenges* (NH Office of State Planning, 2000). New Hampton-Meredith-Moultonborough was selected as one of four (4) case studies in New Hampshire to examine statewide growth indicators and the impacts of growth on communities and regions. The selection of these communities for the case study, and the resulting final report, clearly recognized the unique challenges facing these communities with respect to high traffic volumes and the substantial influx of seasonal residents and visitors. Overall, the study raised concern about potential commercial development along NH Route 104 and the impacts such development could have on traffic flow and safety due to increased access points. Specific recommendations included the need to develop buildout analyses along major highway corridors, including NH Route 104.



*NH Rte. 104 at Meredith Woods/Clearwater Campgrounds*

*transportation needs in the Town of Meredith that is compatible with the town’s vision to maintain a village character for its downtown area along US Route 3 and a rural character along NH Route 25.”* To meet this goal, the study has made use of context sensitive solution (CSS) design considerations, highlighted by an emphasis on seeking assistance from stakeholders from the area to help lead the study and the use of the “Placemaking” process to involve members of the community in the ultimate design of the project that has the support of the community as a whole. The overall study is a CSS pilot project, and could serve as a model for future implementation projects along NH Route 104.

Another significant planning process currently underway is the Meredith US 3/NH 25 Improvements Transportation Planning Study. The stated goal of the study is “to develop a solution to the specific traffic and

In addition to the planning processes underway that affect the corridor, there is a project contained in the State of New Hampshire Transportation Improvement Plan (10 Year Plan) to

reconstruct NH Route 104 from I-93 east to Meredith Center Road (approximately four miles) to improve horizontal and vertical alignment and to widen shoulders. The project is currently slated for construction in 2015 in the 10 Year Plan, with preliminary engineering planned for 2008-2010 and right-of-way acquisition currently scheduled for 2012. The overall estimated cost of the project is \$9 million. Many projects contained in the 2007-2016 Ten Year Plan were moved to later years due to a variety of reasons, including increased costs of major projects already underway in New Hampshire (notably the I-93 Salem to Manchester improvements); general cost increases due to energy costs and inflation, and updated statewide priorities. The NH Route 104 project was no exception, with proposed construction delayed one year from 2014 in the previously adopted 2005-2014 Ten Year Plan.

### **New Hampton NH 104 Access Management and Interconnection Plan**

At the same time the NH Route 104 Access Management Study has been under development, a committee comprised of local property owners and representatives, New Hampton officials and staff, NHDOT staff, and LRPC staff have met to discuss approaches to preserving and improving access to commercial properties along the south side of NH Route 104 between Exit 23 and Drake Road in New Hampton. This study was identified as a high priority at the start of the study and received added emphasis due to imminent development pressures.

The results of this process has been the preparation of the *New Hampton NH 104 Access Management and Interconnection Plan*. The plan and associated graphic developed by NHDOT staff follows:

#### *New Hampton NH 104 Access Management and Interconnection Plan*

In recent years NH 104 in the area east of the Exit 23 interchange with I-93 has seen an increase in development demand. On NH 104 there has been an Irving “Blue Canoe” gas station and convenience store constructed, the Dunkin Donuts satellite shop has been replaced with a full service store and the New Hampton Post Office has been constructed. All of this development has occurred within the short distance on NH 104 between Exit 23 and the intersection with NH 132. Additional development is now under consideration that will place greater demand on the transportation system in this area. There is currently a proposal (Hilshar Development) to construct an office/retail building with a gas station/convenient store opposite the existing Irving Station on NH 104. Also proposed is a large home improvement center (KGI Properties, LLC) that is planned to be constructed behind Munce’s Kwik Stop and the Exit 23 Plaza. Access to this home improvement center would be the fourth leg of the NH 104 intersection with NH 132. This intersection is anticipated to be signalized. As part of this development will be construction of smaller outparcels, one being a possible restaurant on the vacant lot between Munce’s and the Exit 23 Plaza.

At the behest of the Town of New Hampton, the Lakes Region Planning Commission facilitated several meetings between the Town of New Hampton, the New Hampshire Department of Transportation, and several area property owners. The major point of discussion of these meetings was how to accommodate the existing and future development demands being placed on NH 104 without allowing the transportation system to become over capacity, congested, and unsafe.

One possibility to decrease the amount of turning traffic from NH 104 into the developments and vice versa, is the construction of an interconnecting roadway system between the various parcels. This interconnecting roadway could be constructed behind the developed lots, with connections to the various parking lots, and then tie into the development drive to the KGI Properties site. This interconnecting road would allow vehicles entering one site from NH 104 to patronize other

businesses without going back out onto NH 104. With a connection to the KGI Properties drive this will allow those seeking to turn left onto NH 104 to make that maneuver at a signalized intersection, in a much safer and easier manner. This type of interconnecting roadway will decrease the number of vehicles on NH 104, decrease the number of vehicles turning to and from NH 104, reduce congestion, reduce traffic delay, and increase safety. With the modest improvement of the interconnecting roadway the longevity of NH 104 could be increased and lessen the impact the developments have on the transportation system.

During the numerous discussions concerning this issue a concept plan was developed to attempt to visualize the intent of these interconnecting roadways. As shown in the attached graphic the interconnecting roadway could be constructed in phases. The Phase 1 improvement would interconnect the Hilshar site with Dunkin Donuts, connect Dunkin Donuts with Munce's and construct the interconnecting roadway from Hilshar site to the KGI Properties drive. This interconnecting roadway would have a direct connection to Munce's and the future restaurant. As the properties behind Dunkin Donuts and the Hilshar site are developed these properties could also tie into the interconnecting roadway.

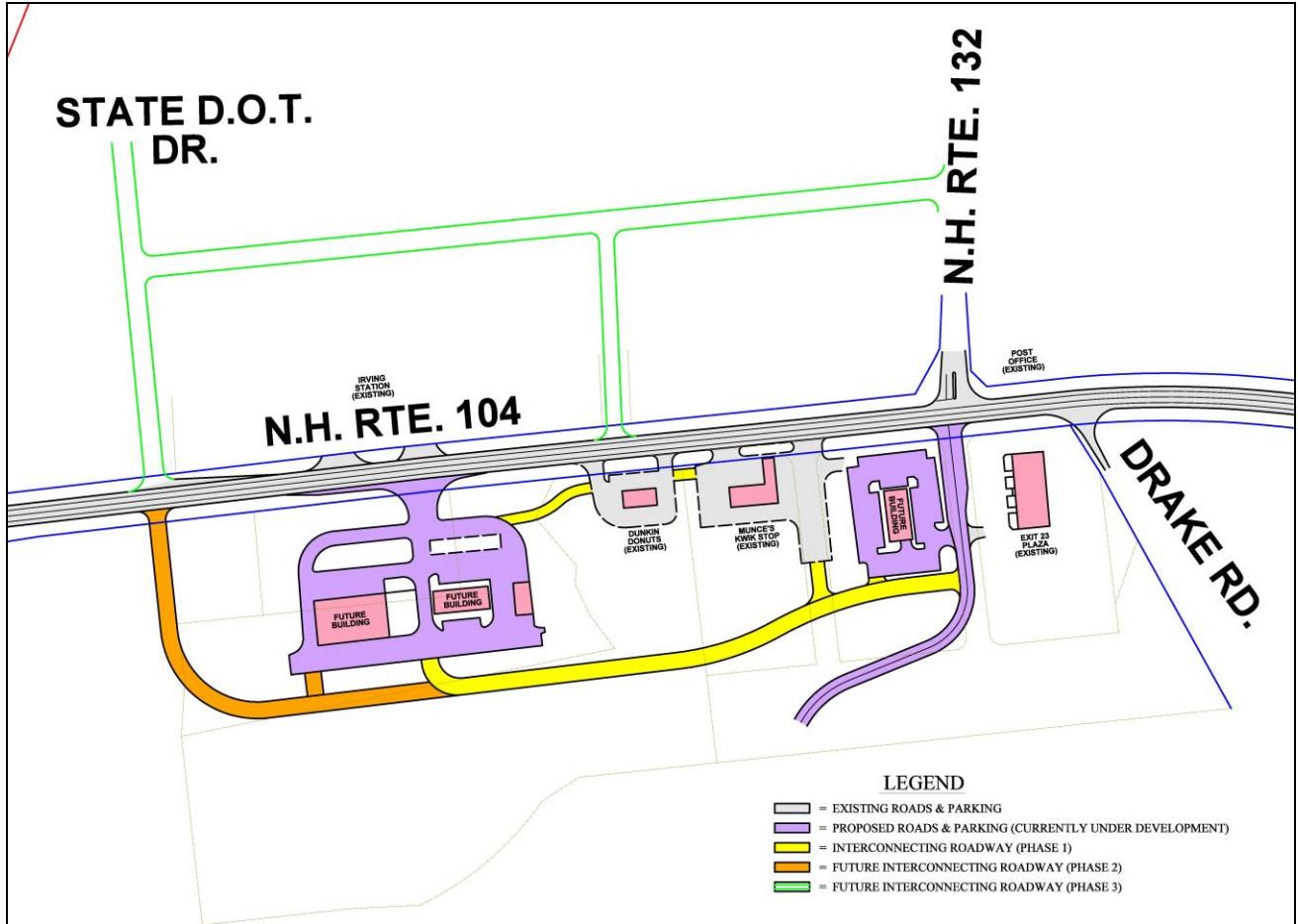
Phase 2 of the interconnecting roadway could include a continuation of the Phase 1 roadway to the west tying back to NH 104 opposite the DOT drive (to the Park and Ride lot). This Phase 2 connection would create a loop road allowing access to the various businesses along the south side of NH 104 without having to re-enter the highway. This additional interconnection would also provide a future access point for any future development that occurs to the south west of the Hilshar site.

A future Phase 3 interconnecting roadway is also shown that could possibly be constructed through State and Town lands on the north side of NH 104 and allow connections to the existing Irving station, those sites just west of NH 132. This Phase 3 roadway would have the same benefits as the Phase 1 and 2 roadway, and would allow a connection to NH 132 and access to the signal at NH 104 and NH 132.

Some of the issues that would have to be taken into consideration when these interconnecting roads are being designed are as follows: 1. The Dunkin Donuts septic system is in the area of the interconnecting drive to the Hilshar property. 2. The terrain is very steep behind the Hilshar site and may make the construction of the Phase 2 roadway problematic. 3. Some portions of the interconnecting roads are within delineated wetlands or the associated wetland buffer. 4. The owner of Dunkin Donuts mentioned the possibility of modifying their access by making the westerly access an "enter only" and the easterly access an "exit only" to limit the number of conflict points on the roadway.

All those in attendance expressed their belief that the interconnecting roadway systems as outlined above would be a good approach to manage the traffic and ensure continued access to all the businesses in the future.

*New Hampton NH 104 Access Management and Interconnection Plan*



*Source: New Hampshire Department of Transportation*

## 2. Existing Conditions



The NH Route 104 corridor is one of the more heavily traveled highway corridors in the Lakes Region. In 1995, the Annual Average Daily Traffic (AADT) count was 10,327 measured at the NHDOT permanent traffic counter location at Wicwas Lake. By 2005, this figure had grown to 12,406, an approximate increase of 20%. The highway also experiences some dramatic fluctuations in seasonal traffic volumes as shown in *Figure 2.1, NH Route 104 @ Wicwas Lake Monthly Traffic Counts*.

NH Route 104 east of Exit 23 in New Hampton

Figure 2.1, NH Route 104 @ Wicwas Lake Monthly Traffic Counts

<b>January</b>					
<b>Year</b>	<b>Average Sunday</b>	<b>Average Weekday</b>	<b>Average Saturday</b>	<b>Adjusted Ave. Day</b>	<b>Annual Gain/Loss</b>
2000	7,763	8,834	8,310	8,561	-
2001	7,719	9,229	8,439	8,932	4.3%
2002	7,126	9,455	9,058	9,103	1.9%
2003	7,902	9,828	7,936	9,335	2.5%
2004	7,475	9,910	8,920	9,358	0.2%
2005	7,394	9,969	8,347	9,334	-0.3%
2006	7,284	10,470	9,088	9,778	4.8%
				10,378	
2010	<b>Adjusted Average Day Projection (January):</b>			11,219	
2015				12,060	
2020				12,901	
2025					
<b>July</b>					
<b>Year</b>	<b>Average Sunday</b>	<b>Average Weekday</b>	<b>Average Saturday</b>	<b>Adjusted Ave. Day</b>	<b>Annual Gain/Loss</b>
2000	16,386	15,149	18,042	15,815	-
2001	16,654	15,643	18,659	16,195	2.4%
2002	17,391	16,039	18,997	16,595	2.5%
2003	17,381	16,262	18,939	16,838	1.5%
2004	16,851	16,363	18,493	16,786	-0.3%
2005	17,050	16,816	18,298	17,093	1.8%
2006	16,365	16,334	17,977	16,604	-2.9%
				17,649	
2010	<b>Adjusted Average Day Projection (July):</b>			18,427	
2015				19,204	
2020				19,982	
2025					

Source: NHDOT Automatic Traffic Counter Reports (January and July, 2000-2006) and LRPC Analysis (Projections)

The 2006 adjusted average daily traffic count was 16,604 in July, as compared to 9,778 in January 2006, a dramatic seasonal traffic increase of nearly 70%. As shown in Figure 2.1, other than several exceptions, overall traffic on NH Route 104 at Wicwas Lake has increased gradually on an annual basis in both the winter and summer since 2000.

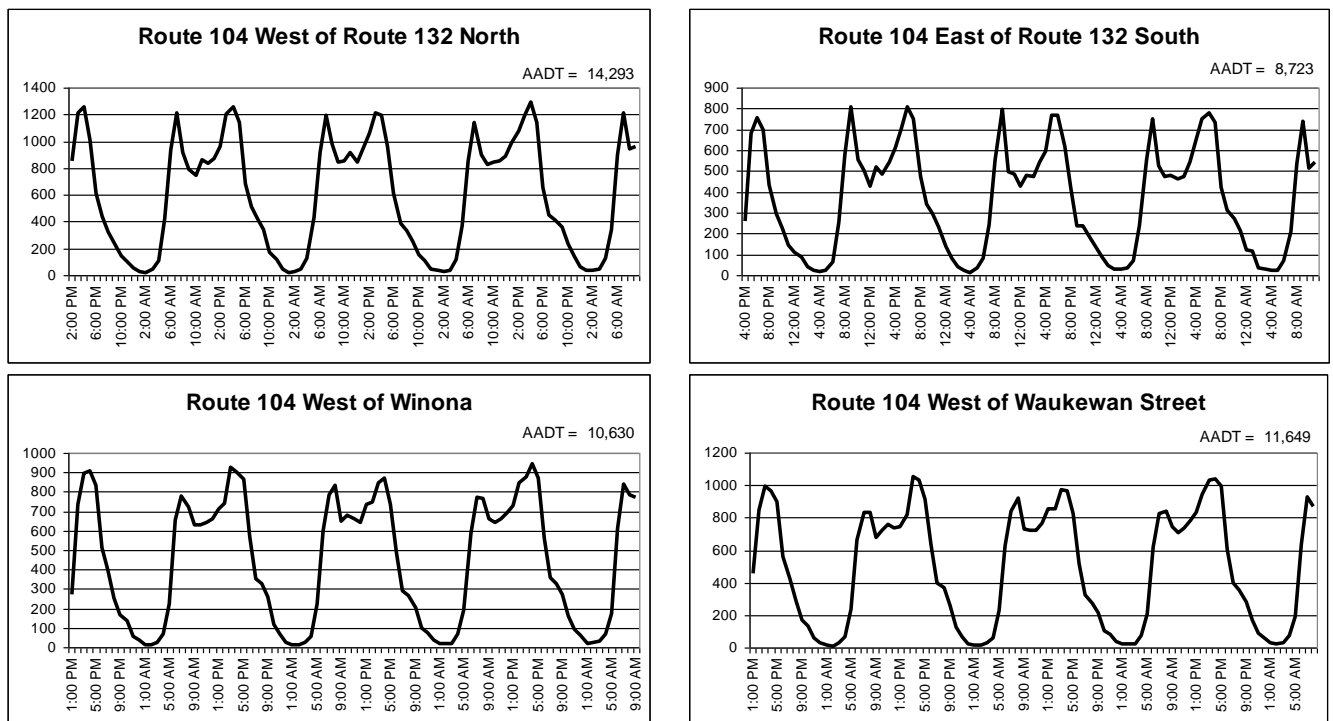
The LRPC has projected traffic counts on a five-year basis through 2025. Following the trends, the LRPC projects traffic counts to reach approximately 12,900 vehicles in January 2025 and over 19,900 vehicles in July 2025.

Using 2004 traffic data from along the corridor, NHDOT has classified the NH Route 104 along the entire study area as having a level of service (LOS) of E-F, based upon travel at the 30<sup>th</sup> highest hour of the year. This level of service indicates congestion. With traffic counts projected to continue to increase the corridor will continue to strain its capacity, especially if additional access points due to development continue to be sited along the corridor.

### Summer 2006 Traffic, Speed, and Turning Counts

Average Daily Traffic volumes were calculated at four locations in the study area using 7-day hourly automatic traffic recorder data collected during the summer of 2006. *Figure 2.2, Summer 2006 Traffic Volumes* displays the count data for each location and indicate the AADT.

Figure 2.2, Summer 2006 Traffic Volumes



Source: Lakes Region Planning Commission

Traffic volumes peaked predictably during prime commuting hours along the corridor. Peak volumes were experienced at 7:00 – 8:00 a.m. and at 4:00 p.m. The period of greatest traffic during the course of the day was consistently between 3:00 – 5:00 p.m. at all locations where

volume counts were conducted. The greatest volume of traffic was experienced near the I-93 interchange, west of NH 132 north. At this location an Average Annual Daily Traffic (AADT) of 14,293 vehicles was determined.

Speed data were collected at three locations to further assess safe travel patterns at posted speed limits. A radar gun was used to clock vehicle speeds at Outlet Road, east of Meredith Center Road, and at the junction of NH Route 104 and NH 132 South (Main Street). The length of recording time ranged from ½ to one-hour intervals, where at each location approximately 250 vehicles were clocked at two recording periods over the week of July 17-21, 2006. *Figure 2.3, Speed Count Data* displays the results of the speed counts collected. Vehicles clocked at Outlet Road and Meredith Center Road exhibited speeds generally consistent with the posted limits, where the average speed was below 55 mph. At these locations one vehicle was clocked at an excessive speed (more than 15 mph over the speed limit).

*Figure 2.3, Speed Count Data*

	Outlet Road Posted: 55 mph		Meredith Center Road Posted: 55 mph		Route 132/104 Posted: 40 mph	
	AM	PM	AM	PM	AM	PM
Average Recorded Speed	51	50	52	52	43	46
Percent of Vehicles Over Posted Limit	12%	8%	27%	33%	70%	90%
Highest Recorded Speed	65	68	66	74	60	59
Percent of Vehicles 5+ mph Over Limit	2%	1%	6%	8%	37%	57%
Excessive Speeds (15 mph Over Limit)	0%	0%	0%	< 1 %	2%	5%

Source: Lakes Region Planning Commission

At the intersection of NH 132 South and NH Route 104, the average speed of all vehicles recorded was greater than the posted limit during both intervals when the data was collected. As displayed in Figure 2.2 the vast majority of these vehicles were traveling at speeds above the posted limit and excessive speeds were observed in 2-5% of the vehicles. It is noteworthy that the first recording period took place during the peak a.m. traffic hour.

Turning movements were recorded at locations at six main intersections within the corridor. The locations were the intersection of Route 104 and: NH 132 North, Chase Road, Meredith Center Road, Dow Road, Corliss Hill Road, and Waukegan Street. Turning movements were recorded between 6:00 - 9:00 a.m. and 3:30 - 6:30 p.m. for each location. *Appendix C, Turn Count Details* contains graphics that depict vehicle movements observed during each three-hour period.

Meredith Center Road, which serves as a connector between NH Routes 104 and 106, introduced to and accepted from NH Route 104 the greatest amount of traffic of the six intersecting roads where turning movement data were collected. At this intersection, 38 percent of the eastbound traffic on NH Route 104 made a right turn onto Meredith Center Road. This movement was reversed in p.m. hours between 3:30 – 6:30 when the same number of vehicles (548) turned left from Meredith Center Road to head westerly on NH Route 104. Based on the data collected, on average, this left hand turning movement represents an automobile every 20 seconds where cars pass in either direction on NH Route 104 every 4.6 seconds on average. Gaps in NH Route 104 traffic can be observed in both directions. These gaps, likely caused by existing traffic signals, allow more time for safe passage for vehicles turning onto NH Route 104 than the averages indicate. The averages are used here to illustrate the potential for conflict exists and is consistent

with the Meredith Chief of Police's historical review of accidents in the corridor. According to this review, the intersection of NH Route 104 and Meredith Center Road generated the greatest percentage of the motor vehicle accidents town-wide.

Other significant turning movements noted were at the intersection of NH Route 104 at: NH 132 North, Chase Road, and Corliss Hill / Hatch Corner Roads. At the Chase Road intersection, while the number of turning movements are significantly less than at Meredith Center Road, alignment and slope issues present challenges for vehicles turning in either direction from Chase Road onto NH Route 104. Observations of these movements are best described as "chancy;" where site limitations decrease the operator's ability to accurately assess safe entry onto the highway. Corliss Hill Road represents another connection to NH 106 via Meredith Center Road.

### **Safety Concerns**

Early in the NH Route 104 Study process LRPC staff worked with the Study Committee and representatives of numerous businesses located along the highway to identify key safety concerns and other issues along the corridor. These locations are portrayed on *Map 2.1, Identified Safety Concerns*, with many described further in *Appendix B, NH Route 104 Business Survey Comments*. The map serves to highlight the many issues that affect the corridor, from key safety concerns such as the access to Bobby's Girl Diner in New Hampton and the section of NH Route 104 in the vicinity of Chase Road and Meredith Center Road in Meredith.

Other issues noted include the locations of potential development, residential development and commercial enterprises that generate traffic onto NH Route 104 that are outside the 1,000' boundary on either side of the highway centerline used in the development of the buildout analysis, and other activities along the corridor such as the NHDOT maintenance facility and gas pumps just to the east of Interstate 93.

### **Existing Land Use**

Land uses along the corridor are identified in *Map 2.2, Existing Land Use*. The stretch of NH Route 104 between the New Hampton/Bristol town line and US 3 in Meredith varies widely, from commercially developed in the vicinity of Interstate 93 and along the easternmost section of the corridor (east of Pease Road) in Meredith to areas more rural in nature. Much of the corridor can be suitably described as rural highway, with varied commercial uses and residences intermixed with wooded areas and wetlands.

Please note that the land use designations found in Map 2.2 denote the main use of that property. In some cases, especially in the larger residential parcels, the entire parcel was considered as residential while only a portion of that property actively in residential use.

### **Existing Zoning**

The differences in land uses along NH Route 104 in each of the two communities are clearly reflected in the marked differences in how the corridor is zoned. These differences are detailed in *Map 2.3, Existing Zoning*. With changes adopted in March 2006, New Hampton now has a mixed use (MU) zoning district in place that encompasses the commercially developed area to the east of Interstate 93. In addition, much of the remainder of the New Hampton section of the corridor



progressing easterly to the Meredith town line is classified as either Business Commercial - 2 (BC-2) or Business/Commercial - 3 (BC-3). The majority of the corridor to the west of Interstate 93 in New Hampton is classified as Village District except for a small area of General Residential near I-93.

The section of NH Route 104 between Interstate 93 and the Meredith town line contains the primary commercial land area in New Hampton. As stated in the New Hampton Zoning Ordinance, the purpose of the MU district is to “allow increased density in a limited area...” with permitted uses that include residential uses and a wide variety of commercial uses at a “traditional village scale.” The BC-2 and BC-3 districts are somewhat more traditional highway commercial zoning districts with lower densities and more conservative maximum lot coverage requirements while still permitting a range of commercial activities including professional offices, banks, restaurants and medial facilities. This emphasis is counter to the lower densities and rural uses permitted along much of the corridor in Meredith. As shown in Map 2.3, much of the corridor is zoned as Forestry and Rural, with smaller areas zoned as Shoreline and Residential. Areas zoned as Business and Industrial and Commercial Business are located to the east of the Pease Road/Winona Road intersection.

**Right-of-Way Status**

Right-of-Way (ROW) access types along NH Route 104 were determined with the assistance of NHDOT in Concord and the District 3 office in Gilford, see *Map 2.4, Access Points, Speed Zones, and Right-of-Way*. It was determined that Limited Access (LAROW), the most restrictive ROW typically allowing no access, stretches from NH 132 South to the eastern most on/off ramp on I-93. A short stretch from the Bristol/New Hampton town line to NH 132 South is also Limited Access on the north side of NH Route 104, but is Controlled Access (CAROW) along the south side.

Access points within a controlled access right-of-way area are granted as part of the public hearing process requires during the development of a highway project. Although the access points have been previously been identified, anyone seeking access to the highway in a CAROW area must follow the NHDOT driveway permitting process. A key point in a CAROW area is that although the location of the access points have been identified previously, they may be moved during the permitting process if the number of access points remains the same.

*Figure 2.4, Right of Way Length by Type\**

	New Hampton (miles)	Meredith (miles)	Total (miles)
CAROW	0.22	7.14	7.36
LAROW	2.21	0	2.21
ROW	5.74	3.66	9.40
			<b>18.97</b>

**Key:**  
 CAROW – Controlled Access right-of-way  
 LAROW – Limited Access right-of-way  
 ROW – right-of-way

*\* Based on a review of ROW status of each side of the highway*

The area from the easternmost on/off ramp of I-93 to just past the Chase Road/NH Route 104 intersection is classified as Right-of-Way, which is less restrictive than controlled access, but still requires the NHDOT driveway permitting process. The remainder of the corridor is Controlled Access. The length of right-of-way by type on each side of the corridor is shown in *Figure 2.4, Right of Way Length by Type*.

Detailed descriptions of the various right-of-way types as well as an outline of the requirements of the NHDOT driveway permitting process are contained in *Appendix F, Right-of-Way Types*.

### **Access Points**

Access point locations were initially identified using GPS and later verified at the NHDOT District 3 office through the review of access permit files and NH Route 104 mapping. The access points on *Map 2.4: Access Points, Speed Zones, and Right-of-Way*, represent those whose permanent existence and location were verified as well as those identified and mapped through field research but not found in NHDOT records or found to be a temporary access. Factors limiting the ability to verify all access points along the corridor include the following: maintenance regulations were amended in 1971, the available access permits post-dated this event; the number of access permits that were available in an automated database were few; and temporary access permits were often difficult to locate.

Despite the limitations of the data, the access points (together with existing speed zone data) represented on Map 2.4 underscore the key issue of numerous access points along a rural highway that can experience high rates of speed along specific stretches, especially in the area of the corridor from Exit 23 to the New Hampton/Meredith town line, and to a lesser extent further east to Chase Road in Meredith. It is interesting to highlight how this pattern of dense access points covers the same area of the corridor that is controlled by standard right-of-way regulations, while areas to the east and west are classified as limited access and controlled access, respectively. Upon review of these data, the need for a variety of access management strategies as described in chapter 5 of this study is readily apparent.

### **Environmental Constraints**

Environmental constraints along the NH Route 104 corridor such as hydric soils, wetlands, steep slopes in excess of 25% are presented on *Map 2.5, Environmental Constraints*. In addition, conservation lands protected by fee simple ownership or easement are shown as well. As expected, many existing and potential access point locations along the corridor are affected by environmental issues, especially along much of the town of Meredith section of the study area.

### **Parcels for Sale, December 2006**

A final indicator of activity along the NH Route 104 corridor compiled for this study is the location of parcels for sale. As shown in *Map 2.6, Parcels for Sale*, thirteen parcels accounting for nearly 190 acres were for sale in December 2006. The fact that so many parcels are for sale at this time again calls further attention to the need for the various access management strategies as the corridor continues to be developed.

### 3. Buildout Analysis

An important element of the NH Route 104 Access Management Study was the preparation of a buildout analysis based upon existing zoning, land use regulations, and environmental constraints in Meredith and New Hampton. This analysis provides information that can provide valuable input for Planning Board decisions by providing details about future land use, development capabilities, and the amount of additional traffic that could be generated if the corridor was developed to its full potential. The buildout analysis can also further quantify the need for future improvements to the transportation network.

The following is a description of the data collected, the analysis process, an estimate of potential residential lots and commercial square footage if the corridor were to be fully developed, and an estimate of trips generated if full buildout were to occur. The results of this analysis portray a condition along NH Route 104 if each residential and commercial parcel was developed to its ultimate density under current zoning. The buildout serves as a tool to be used to consider future needs and possible improvements to the corridor as well as potential access management strategies.

#### Data Development

The following is a description of the data development portion of the buildout analysis. As noted below, variations in available data resulted in differences in the process to compile data in similar formats for each community.

##### *Tax Parcel Polygon Development*

The town of Meredith provided their parcel data in a Geographic Information Systems (GIS) based format for use in this project. The town of New Hampton previously contracted with Cartographic Associates, Inc. to develop digital parcel data in Computer Aided Design (CAD) format. Considerable work was conducted by LRPC to convert the New Hampton CAD data into a suitable GIS format. This included minimizing errors inherent in this process, such as spatial alignment and polygon completeness.

##### *Assessor Information*

Assessor data were obtained from Meredith and joined to the GIS data using each parcel's unique identifier; this was an important step because the assessor parcel acreage was more accurate than what was stored in the GIS data. Assessor data were also obtained from New Hampton and joined using the same method, but acreage data from the tax parcel information did not exist in the assessor database. Acreage for each parcel in New Hampton was calculated using the LRPC's GIS software and then compared with acreage figures contained on the tax maps provided by the town.

##### *Additional Attributes*

Attributes that were excluded in the assessor data were added to the database using GIS overlays, aerial photograph interpretation, through field collection, or other processes. These additional data that were necessary for the buildout analysis include the underlying zoning district, minimum lot

size, water and sewer service availability, current land use type, total land area currently being used, and the number of existing residential units.

### *Environmental Constraints and Other Available Data*

Existing data from various sources were used including the National Wetlands Inventory, steep slopes and conservation lands from The Society for the Protection of New Hampshire Forests, Natural Resources Conservation Service soils, and 2003 USGS digital orthoquad (DOQ) color photographs. Detailed wetlands data for Meredith were provided by the town.

## **The Buildout Process**

### *Building Constraints*

Based on current zoning ordinances, an environmental constraints GIS layer was created. This layer represented all the areas that were considered not buildable due to town building restrictions regarding the following: wetlands, hydric soils, slope, conservation lands, and waterbody setbacks, see *Map 2.5: Environmental Constraints*. Soils based lot sizing was also factored for each parcel. Areas that were environmentally constrained were subtracted from the total area of each parcel. Also, through aerial photograph interpretation, areas that were currently in use, such as buildings and parking lots, were identified. These areas were also considered unsuitable for further development for the purpose of this analysis. After all building constraints were calculated, the remainder was defined as the parcel's buildable area.

Parcels that are built on and could not be subdivided further were considered "built-out." Also considered built-out were parcels not likely to be developed due to their ownership status, such as conservation lands, the New Hampton School, and Public Service of New Hampshire land, see *Map 3.1, Development Status*.

A description of the assumptions used during the preparation of the buildout analysis can be found in *Appendix D - Buildout Analysis Assumptions*.

### *Existing Units*

The number of existing residential units for each parcel was determined by field research and a review of each community's assessor data. The maximum number of potential units was calculated based on permitted uses in the zoning ordinances. For example, if a zone permitted both single-family and two-family residences, the two-family value was applied to produce a maximum number of potential units. However, existing single-family homes were not recalculated to meet maximum permitted uses (i.e. two-family homes), they remained as is. The number of potential units was calculated to 1 unit for each potential lot in single-family zones, 2 units for each potential lot in two-family zones, and equaled 1 unit per acre in multi-family zones, see *Figure 3.1, Permitted Uses/Maximum Lot Coverage*.

Figure 3.1, Permitted Uses/Maximum Lot Coverage

Meredith			New Hampton		
Zoning District	Permitted Residence Type	Maximum Lot Coverage	Zoning District	Permitted Residence Type	Maximum Lot Coverage
Business and Industrial (BI)	Not allowed	75%	General Residential (GR)	Single-family	20%
Central Business (CB)	Two-family	65%	Business/Industrial (BI)	Single-family	50%
Forestry and Rural (FR)	Single-family	25%	Mixed Use (MU)	Multi-family	50%
Residential (R)	Two-family	25%	General Business and Commercial 2 (BC-2)	Single-family	40%
Shoreline (S)	Single-family	30%	General Business and Commercial 3 (BC-3)	Single-family	30%
			Village Precinct (V)	Two-family	Not defined

*Potential Lots*

The next step was to calculate the number of potential residential lots for each parcel. Potential lots were defined as the number of lots a parcel could be subdivided into, not including the parcel’s existing lot. This calculation was based on the amount of non-environmentally constrained land and minimum lot size or soils and slopes based lot sizing. Total lots include potential lots and the existing lot. Existing and total lots are portrayed in *Map 3.2, Total Lots and Potential Future Use*.

*Developable Non-Residential Square Footage*

Developable square footage was calculated for parcels that have commercial or industrial future land use potential, see *Map 3.2, Total Lots and Potential Future Use*. Two calculations were conducted, the first, where maximum lot coverage and a factor to account for parking, driveway, and landscaping were multiplied. The resulting value was then multiplied by total square footage of parcel. The second calculation, multiplied buildable square footage (*excluding environmentally constrained area or “built” existing lots*) and a factor to account for parking, driveway, and landscaping.

The more conservative of the two calculations was used to determine the amount of land suitable for non-residential development and was later used to calculate potential trip generation, see *Figure 3.2, Buildout Totals by Zone, Non-Residential* section. It is important to note that within this study area only a few parcels exist within the BI zone in New Hampton, and all are considered built-out. Also, the V and GR zones in New Hampton and the FR, R, and S zones in Meredith do not permit commercial development.

Figure 3.2, Buildout Totals by Zone

**New Hampton**

Zone	Lots				Units				Acreage				Total Potential Non-Residential Square Footage
	Existing Lots	Potential Lots	Total Lots	Existing Lots as % of Total Lots	Existing Units	Potential Units	Total Units	Existing Units as % of Total Units	Zone	Total Acreage	Non-constrained Acres	Buildable Acres	
BC2	16	41	57	28%	22	43	65	34%	BC2	92.3	78.8	56.5	395,196
BC3	25	55	80	31%	17	56	73	23%	BC3	112.6	96.8	75.5	300,467
BI	4	0	4	100%	55	0	55	100%	BI	64.9	57.7	21.0	0
GR	178	569	747	24%	131	585	716	18%	GR	1,642.9	1,101.1	1,001.0	228,807
MU	32	83	115	28%	29	91	120	24%	MU	190.0	152.9	131.7	732,672
V	56	29	85	66%	49	66	115	43%	V	145.5	125.7	88.7	0
<b>TOTAL</b>	<b>311</b>	<b>777</b>	<b>1,088</b>	<b>29%</b>	<b>303</b>	<b>841</b>	<b>1,144</b>	<b>26%</b>	<b>TOTAL</b>	<b>2,248.2</b>	<b>1,612.8</b>	<b>1,374.2</b>	<b>1,657,141</b>

Key: BC2 and BC3 = General Business and Commercial, BI = Business/Industrial, GR = General Residential, MU = Mixed Use, V = Village Precinct

**Meredith**

Zone	Lots				Units				Acreage				Total Potential Non-Residential Square Footage
	Existing Lots	Potential Lots	Total Lots	Existing Lots as % of Total Lots	Existing Units	Potential Units	Total Units	Existing Units as % of Total Units	Zone	Total Acreage	Non-constrained Acres	Buildable Acres	
BI	46	23	69	67%	35	0	75	47%	BI	192.6	109.7	62.1	1,090,888
CB	6	2	8	75%	8	4	12	67%	CB	10.2	10.1	5.3	60,026
FR	162	144	306	53%	131	164	295	44%	FR	1,464.7	754.7	497.2	408,053
R	146	41	187	78%	202	122	324	62%	R	330.7	250.8	116.9	0
S	40	18	58	69%	36	21	57	63%	S	78.0	46.3	24.0	0
<b>TOTAL</b>	<b>400</b>	<b>228</b>	<b>628</b>	<b>64%</b>	<b>412</b>	<b>311</b>	<b>763</b>	<b>54%</b>	<b>TOTAL</b>	<b>2,076.2</b>	<b>1,171.6</b>	<b>705.5</b>	<b>1,558,966</b>

Key: BI = Business and Industrial District, CB = Central Business District, FR = Forestry and Rural Residential, R = Residential District, S = Shoreline District

Source: LRPC Analysis

*Daily Trip Generation*

The Institute of Transportation Engineers publishes a manual containing the average vehicle trips generated for many land uses.<sup>1</sup> This manual was referenced and an average daily trip generation value was applied to the corresponding existing use of each parcel. A high level of detail was used when identifying existing land uses and non-residential building sizes because the manual's values are specific. For example, some commercial trip generation values are based on 1,000 square feet of gross floor area or number of pumps at a gas station. This process led to the calculation of total existing residential and existing non-residential trip values, see *Map 3.3, Existing Trips Generated*.

Total potential trips generated at buildout were also calculated; see *Map 3.4: Potential Trips Generated*. This calculation was based on assumptions developed by each town and the report's authors from LRPC. Each town was questioned about future development of each parcel, in hopes of determining if a parcel would be used for residential, commercial, or other purposes.

<sup>1</sup> Institute of Transportation Engineers, *Trip Generation, 6th Edition, 1997*.

Parcels that were still in question after this process were classified by LRPC according to their location in the corridor, existing use, and surrounding parcels uses, see *Map 3.2, Total Lots and*

*Potential Future Use.* Where available, detailed knowledge of potential future uses were applied through discussions with representatives of each community. For example, specific trip generation values were applied to a parcel in New Hampton for a planned development of a home improvement store, a supermarket, and a high turnover restaurant.

**Buildout Analysis Results**

Following the completion of the initial estimates of potential lots, the NH Route 104 Study Committee reviewed the results at a public meeting. LRPC staff also met with town representatives who were asked to provide further information about each parcel, so that the estimates could be refined. This review provided detailed information about built-out lots, current and future uses, new subdivision plans, and ownership.

The buildout was further refined and expanded to include the following: potential units, developable non-residential square footage, and existing and potential trips generated by each parcel.

*Figure 3.3, Trip Generation Totals*

	Existing			Potential		
	Trips Generated from Existing Residential Units	Trips Generated from Existing Non-Residential Facilities	Total Existing Trips Generated	Trips Generated from Existing and Potential Residential Units	Trips Generated from Existing and Potential Non-Residential Facilities	Total Existing and Potential Trips Generated
New Hampton	1,961	6,275	8,236	8,872	86,069	94,942
Meredith	3,127	8,400	11,527	5,920	54,221	60,140
<b>Total</b>	<b>5,089</b>	<b>14,675</b>	<b>19,763</b>	<b>14,792</b>	<b>140,290</b>	<b>155,082</b>

**Totals By Zone**

	Existing			Potential		
	Trips Generated from Existing Residential Units	Trips Generated from Existing Non-Residential Facilities	Total Existing Trips Generated	Trips Generated from Existing and Potential Residential Units	Trips Generated from Existing and Potential Non-Residential Facilities	Total Existing and Potential Trips Generated
<b>New Hampton</b>						
BC2	167	117	284	167	22,497	22,664
BC3	87	240	326	230	17,255	17,485
BI	343	52	395	343	52	395
GR	934	758	1,692	6,726	6,427	13,153
MU	77	4,977	5,053	469	39,676	40,145
V	354	131	485	938	162	1,100
<b>Total</b>	<b>1,961</b>	<b>6,275</b>	<b>8,236</b>	<b>8,872</b>	<b>86,069</b>	<b>94,942</b>
<b>Meredith</b>						
BI	10	6,585	6,595	10	48,958	48,967
CB	14	233	247	14	3,632	3,646
FR	1,176	799	1,975	2,697	957	3,654
R	1,622	783	2,405	2,692	674	3,366
S	305	0	305	506	0	506
<b>Total</b>	<b>3,127</b>	<b>8,400</b>	<b>11,527</b>	<b>5,920</b>	<b>54,221</b>	<b>60,140</b>

**Key:**

New Hampton: BC2 and BC3 = General Business and Commercial, BI = Business/Industrial, GR = General Residential, MU = Mixed Use, V = Village Precinct

Meredith: BI = Business and Industrial District, CB = Central Business District, FR = Forestry and Rural Residential, R = Residential District, S = Shoreline District

*Source: LRPC Analysis*

The results provide an insightful look at parcels in each community along this important east-west corridor in the Lakes Region. New Hampton has the potential to create 777 more lots and Meredith 228 along this 4,324 acre, 9.5-mile corridor. As shown in Figure 3.2, both towns have the combined potential to develop approximately 3.2 million square feet of non-residential land.

Total existing daily trips generated equal 8,236 in New Hampton and 11,527 in Meredith; see *Figure 3.3, Trip Generation Totals*. Total potential trips increase to 94,942 in New Hampton and 60,140 in Meredith at buildout. At buildout, as defined in this study, total daily trips for the corridor would increase dramatically from 19,763 to 155,082. These numbers only include estimated corridor study area trips generated. As noted earlier, the Study Committee expressed concern about potential commercial and residential development on large parcels just outside the study area. Seasonal variations and traffic generators outside of the corridor if considered would significantly impact the corridor as well.



#### 4. Safety Concerns – Potential Short and Medium-Term Improvements

Potential safety improvement strategies are listed by priority based on field observations by Fay Spofford and Thorndike, Inc. (FST) and LRPC staff and input from the NH Route 104 Corridor Study Committee. The following concepts were prepared by FST and *are planning level only and are not intended to represent final design solutions*. Data required for moving these concepts into design solutions including lane warrant analyses and right of way/easement requirements must be completed prior to implementation. All concepts require further study and information to determine implementation feasibility. Existing and proposed concept plans for the initial five locations described in this chapter can be found in *Appendix E, Safety Improvement Existing and Proposed Concept Plans*.

##### 4.1. Residential/Commercial Area (Bobby’s Girl Diner) at NH Route 104



*Bobby’s Girl Diner looking east on NH Route 104*

NH Route 104 in this area is posted at a 55 miles per hour speed limit and has narrow 2-3 foot wide shoulders. This location involves three ‘T’ intersections with driveways located within approximately a quarter mile along NH Route 104. Two of the three driveways are within a few hundred feet of one another and serve the Bobby’s Girl Diner. The furthest west driveway also serves a six-lot subdivision currently under construction in addition to the Bobby’s Girl Diner.

The third furthest east driveway serves Applewood Estates, an existing single-family development with the potential for an additional 23 units. There has been at least one fatal rear-end fatal crash involving eastbound traffic in this area and may have been other crashes involving injuries. The existing two ‘Bobby’s Girl’ Diner two-way driveways are connected by a loop road parallel to NH Route 104. This parallel driveway provides access to a 90° angle parking bay serving the Bobby’s Girl’s Diner. Motorists are able to enter and leave from either driveway.

The paved NH Route 104 cross-section is constrained by ledge outcrops on both sides as above. To the west of the diner, wetlands constrain the ability to widen NH Route 104.

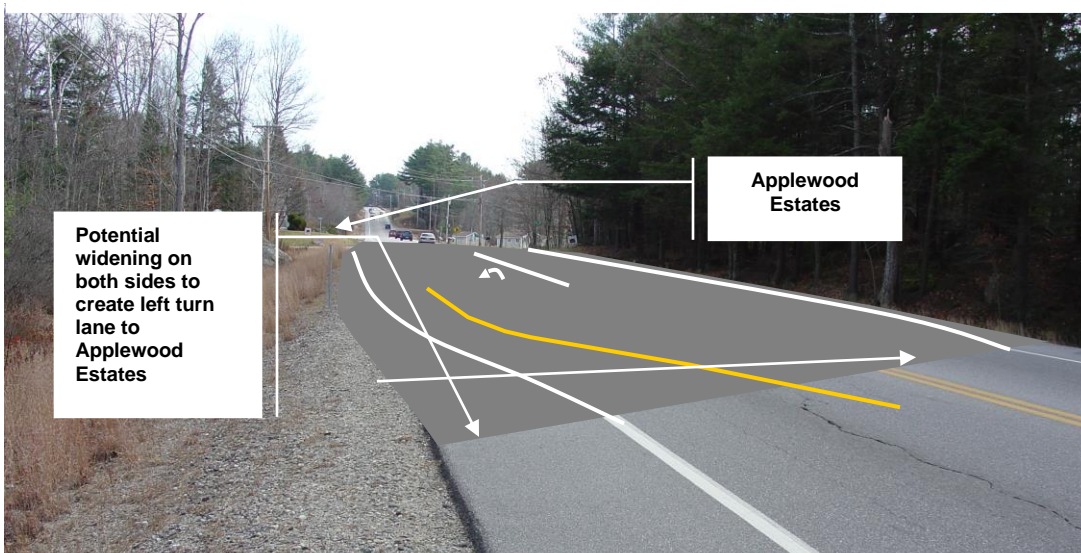
##### Improvement Strategy – NH Route 104 in the Bobby’s Girl Diner Area

To address the issue on NH Route 104 in front of the Bobby’s Girl Diner, if warrants are met, a dual-purpose left turn lane should be considered to provide access to the furthest east driveway at the Diner; the center of the three driveways. The six-unit single-family residential subdivision under

construction to the immediate west of the Bobby's Girl Diner should, ideally, share this access. As envisioned, the westerly driveway would be *an exit only* (as depicted below) while the easterly driveway could either be a two-way driveway or *an entrance only*. The potential exclusive left turn lane would involve a maximum widening of approximately 12 feet, either on one side of NH Route 104 in front of the Bobby's Girl Diner, or a preferred six-foot widening on both sides with proper transitions for the speed of traffic on NH Route 104. Approximately 700-800 feet to the east of the center driveway, the third driveway might also be served by a left turn lane. Alternatively, the left turn lane might extend all the way to the Applewood Estates driveway without creating two separate widenings of NH Route 104. Following the Applewood Estates driveway, NH Route 104 would transition back to its existing two-lane roadway cross-section.



*Bobby's Girl Diner NH Route 104, New Hampton, NH conceptual widening modification (not to scale)*



*Conceptual widening modifications looking east on NH Route 104 east of Bobby's Girl Diner on the approach to Applewood Estates (not to scale)*

#### 4.2. Meredith Woods/Clearwater Campgrounds Crossings

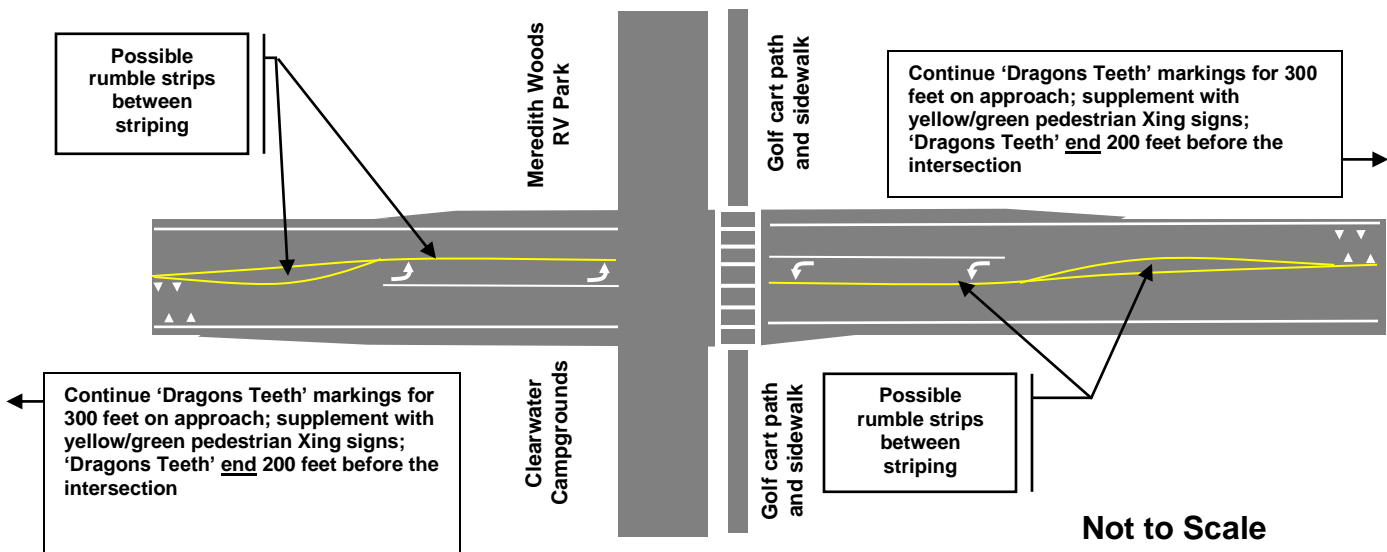
The Meredith Woods RV Park driveway creates a four-way intersection on NH Route 104 opposite the Clearwater Campgrounds site. The speed limit on NH Route 104 through this area is 55 miles per hour. NH Route 104 slopes through this intersection on a 4-5% downgrade from west to east. The Meredith Woods RV park and Clearwater Campgrounds approaches to the intersection have a sidewalk on the east side (see photo below) and the intersection is controlled by a flashing hazard beacon -- flashing yellow for NH Route 104 and flashing red for Meredith Woods and Clearwater Campgrounds approaches that are augmented by stop signs. A crosswalk is not provided. So daunting is the pedestrian crossing in this area, that a sign on the Clearwater campgrounds sidewalk approach warns pedestrians, golf cart drivers, and trail walkers that children under 16 years of age must cross with an adult. NH Route 104 in this area has two lanes with 6-8-foot wide shoulders on both sides. The hazard beacon is the primary warning given to motorists traversing this intersection.



*Meredith Woods RV Park /Clearwater Campgrounds Pedestrian and golf cart crossing looking south at NH Route 104 from Meredith Woods approach*

## Improvement Strategy – Meredith Woods RV/Clearwater Campgrounds Crossing

To improve this pedestrian crossing in an effective manner will involve the potential implementation of traffic calming measures. For example, shoulder pavement markings (e.g., Test European ‘dragon teeth’ slow markings), and a crosswalk with potential left turn lanes going in and out of Meredith Woods and Clearwater Campgrounds. A crosswalk could be considered, assuming volume warrants are met during the peak summer crossing season. Pedestrian warning signs should continue to be posted on the sidewalks to alert pedestrians and golf cart drivers about the danger of crossing. Consider rumble strips in the painted median and in the centerline to slow traffic as it crosses the intersection.



*Existing conditions looking west on NH Route 104 from the centerline between Meredith Woods RV Park and Clearwater Campgrounds*

### 4.3. NH Route 104 at Shingle Camp Road and I-93 Off-Ramp and Construction Road

Shingle Camp Road intersects the south side of NH Route 104 to form a ‘T’ intersection very close to the I-93 southbound mainline. The intersection is located on the opposite side of the I-93 southbound on/off-ramps and offset by approximately 150 to 200 feet as shown on the photo below.

Additionally, a service road developed during the construction of Interstate 93 is located to the west of the I-93 southbound on/off-ramps. This service road will present driveway spacing issues if retained for future use. The speed limit on NH Route 104 in this area is posted at 40 miles per hour.

Upon further investigation of the status of the service road, it has been determined that the road was classified by NHDOT as a Class VI road in 1963. It is understood that in its current location it would be very difficult to gain a driveway permit from NHDOT to utilize this access due to its close proximity to the Exit 23/NH Route 104 westerly exit ramp.

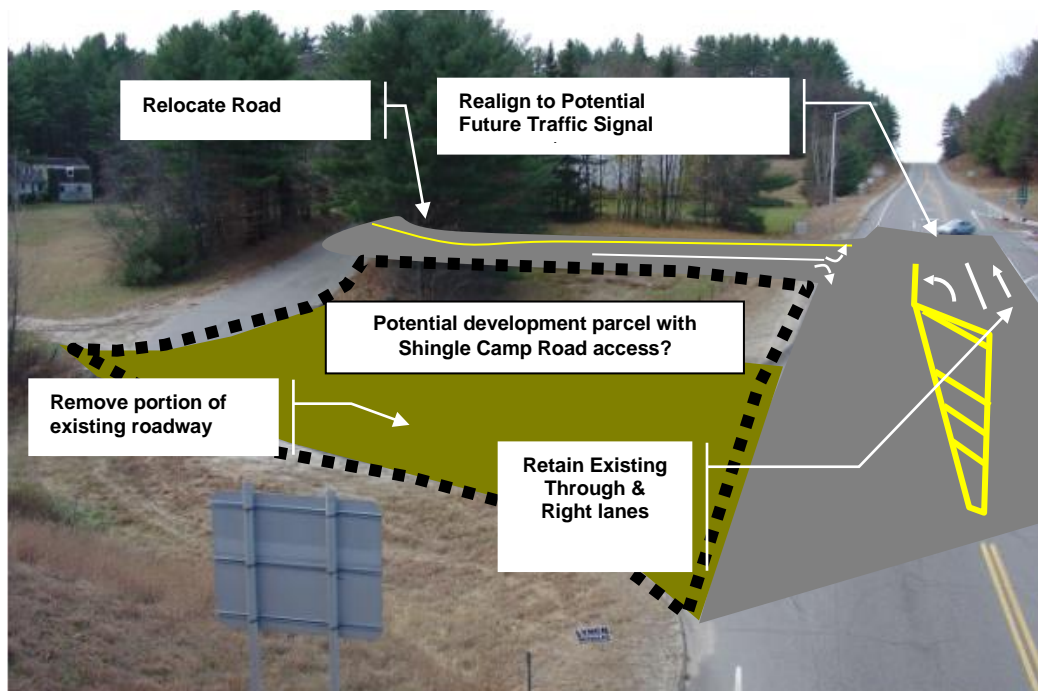


*Looking west on NH Route 104 at Shingle Camp Road and I-93 Southbound On/Off-ramps*

## Improvement Strategy – Shingle Camp Road near I-93

Ideally, in the long term, the Shingle Camp Road should be re-aligned directly opposite the I-93 southbound on-ramp and off-ramp. This should be done *only if* the combination of the Shingle Camp Road and I-93 southbound off-ramp intersection is found to warrant traffic signalization. The realignment of Shingle Camp Road will require filling, but would create an opportunity for the creation of a new development parcel in the location of the existing Shingle Camp Road layout that would be eliminated. NH Route 104 westbound at the new four-way intersection would be re-striped to provide an exclusive left turn lane to Shingle Camp Road opposite the existing exclusive left turn lane on eastbound NH Route 104 to the southbound I-93 on-ramp. The existing eastbound exclusive right turn lane to the I-93 southbound on-ramp would also be retained. If signalized, the relocated Shingle Camp Road would provide an exclusive right turn lane to NH Route 104 eastbound and a shared through/left lane to the I-93 southbound on-ramp and NH Route 104 westbound.

Concurrently, the service road entrance onto NH Route 104 could be redirected westerly to Riverwood Road located approximately ¼ mile to the west of the I-93 on/off-ramps intersection. As envisioned, the relocated construction road could intersect Riverwood Road on the northern edge of a parcel that abuts NH Route 104 between Riverwood Road and the construction easement way. The new road could intersect Riverwood Road approximately ¼ mile north of its intersection with NH Route 104. The relocation of Shingle Camp Road also provides the opportunity to extend the eastbound left turn lane on the approach to the I-93 northbound on-ramp.



Potential Future Traffic Modifications – NH Route 104 at Shingle Camp Road and I-93 on/off-ramps (not to scale)

#### 4.4. Chase and Meredith Center Roads at NH Route 104

The aerial below illustrates the relative locations of the Meredith Center and Chase Road intersections with NH Route 104. Chase and Meredith Roads each form ‘T’ intersections with NH Route 104 and are located approximately 750 feet apart. Chase Road intersects NH Route 104 at an angle skew less than 60° and serves a limited residential area. Chase Road carries much lower traffic volumes than Meredith Center Road, a cross-town connector. During peak hours, approximately 135-210 vehicles use the right turn lane to turn onto Meredith Center Road, while 100-215 vehicles turn left out of Meredith Center Road. Meredith Center Road therefore carries approximately 3,500-4,000 vehicles per day or approximately 310-345 vehicles per hour during peak hours. During the morning peak hour, the right turn from NH Route 104 is the predominant turning movement, while the left turn onto NH Route 104 is the predominant movement from Meredith Center Road in PM peak hours. Meredith Center Road may be a candidate for future signalization in the long term. It is suspected that crashes may be occurring due to left turns out of Meredith Road conflicting with the traffic on NH Route 104 continuing east or west.



Base Plan Source: Lakes Region Planning Commission



*Looking northwest to Chase Road from the south side of NH Route 104*



*Looking east on NH Route 104 to Meredith Center Road and exclusive right turn lane*

### **Improvement Strategy – Meredith Center Road/Chase Road at NH Route 104**



A possible improvement for the Chase Road intersection with NH Route 104 involves the potential re-orientation of Chase Road to reduce the angle skew of the intersection and the potential addition of an eastbound exclusive left turn lane or creation of a bypass lane, particularly if rear-end crashes have been recorded on the eastbound approach to Chase Road (see sketch below). Warrants need to be checked prior to installing an exclusive left turn lane to Chase Road.

The eastbound approach to the right turn lane approaching Meredith Center Road should be delineated better to ensure that through traffic does not accidentally enter the exclusive right turn lane. In the long term, this intersection may meet traffic signal warrants, particularly if the NH Route 104 corridor experiences significant growth in traffic volumes; the intersection may already meet signal warrants during the summer months when traffic volumes are substantially higher than on an average annual basis.

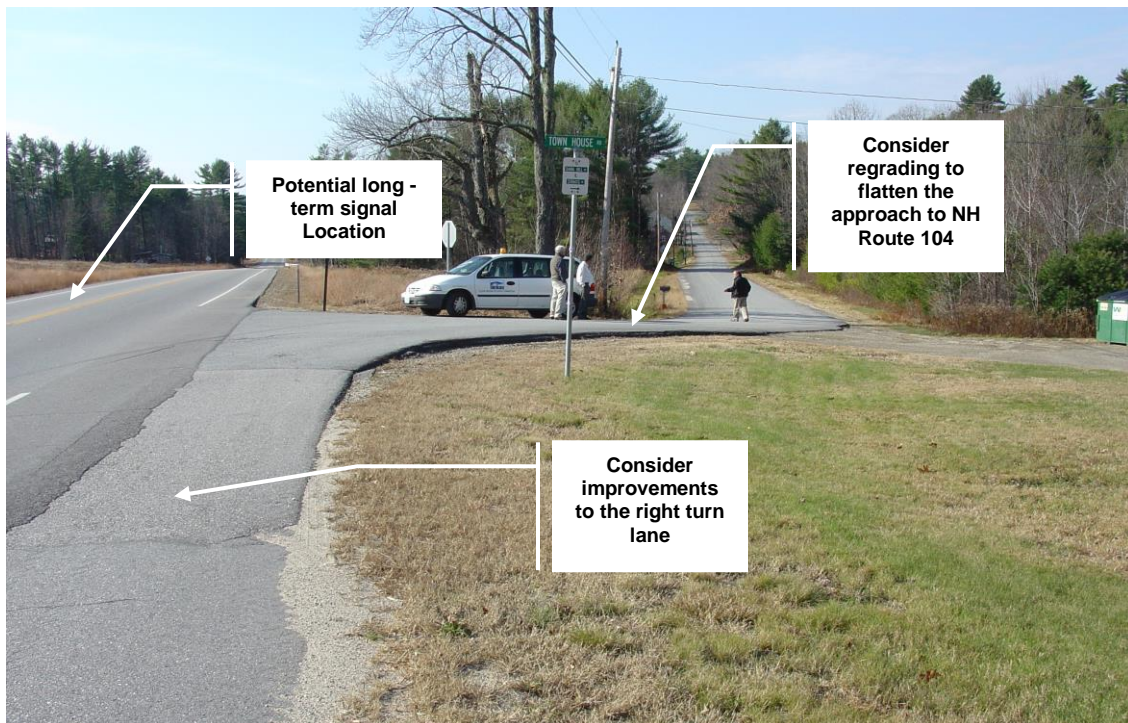


*Potential modifications looking northwest to Chase Road from the south side of NH Route 104*



#### 4.5. Town House Road (east) at NH Route 104

Town House Road (east) at NH Route 104 creates a three-way ‘T’ intersection with NH Route 104. Due to the orientation of Town House Road vis-à-vis NH Route 104, the predominant turning movements of Town House Road (east) at NH Route 104 are right turns into and left turns out of Town House Road (east). Town House Road (east) provides access to Dana Hill and Strait Roads and is stop sign controlled on its approach to NH Route 104. Town House Road (east) is missing a leveling area on its approach to NH Route 104 (see photo below), as vehicles prepare to make a left turn movement on an upgrade. Because the speed limit on NH Route 104 through this area is 55 miles per hour, accelerating from a stop on an upgrade can represent a hazard, particularly during slippery weather conditions. NH Route 104 curves southerly approximately a quarter mile east of this intersection. The NH Route 104 eastbound approach to this area has one lane with 2-3-foot wide shoulders. Left turns are the predominant turning movement out of Townhouse Road (east), as right turns can be readily made at Town



*Looking west on NH Route 104 at Townhouse Road (east)*

House Road (west) which intersects NH Route 104 approximately 0.68 mile west of Town House Road (east). The NH Route 104 westbound approach has been widened to create an unmarked right turn lane into Townhouse Road. This provides a slowing lane for westbound right turn traffic into Town House Road (east).

#### **Improvement Strategy – Town House Road (east) at NH Route 104**

Modifying the Town House Road profile to the intersection to create a leveling area at least 60 feet in length and better delineation of the exclusive right turn lane would benefit safety at this intersection. A leveling area would allow easier acceleration onto NH Route 104. Creating the

leveling area would involve filling and regrading Town House Road (east) at least 200 feet on its approach to NH Route 104.

The intersecting driveway shown on the photo on the previous page would also need to be regraded on its approach to the modified Town House Road (east) profile. Regrading the Town House Road (east) would also provide a long-term opportunity to signalize this intersection. Depending on how much development occurs on roads feeding into Town House Road, this intersection may warrant signalization in the long term.

To counterbalance potential modifications to the Town House Road (east) intersection with NH Route 104, the Town House Road (west) intersection with NH Route 104 has an exclusive left turn lane on its eastbound NH Route 104 approach. Directly opposite the Town House Road (east) intersection, the predominant turning movements at Town House Road (west) are right turns out and left turns in; it is unlikely that these movements will warrant traffic signalization in the long term.

A key issue related to the any improvements at Town House Road (east) intersection is the future development of lot R04-066-000 located directly across NH Route 104 from the intersection. As described in Chapter 5, Access Management Strategies, lot R04-066-000 has been identified for consideration of the future acquisition of access rights. If the acquisition of access rights were to move forward, it would be imperative that any improvements be coordinated with the location of any future access to that lot.



*Looking north at Town House Road (west) from the south side of NH Route 104*

#### 4.6. Main Street at NH Route 104

NH Route 104 forms a four-way intersection with Main Street and Firehouse Lane in the Town of New Hampton. An 11-foot wide left turn lane is provided in both directions of the highway to accommodate left turns into both Main Street and Firehouse Lane. The intersection has a flashing hazard beacon above the intersection - flashing yellow for NH Route 104 and flashing red for Main Street and Fire House Lane. Travel speeds approaching Main Street and Firehouse Lane are rather high from observations (see *Figure 2.3*). NH Route 104 has a curved alignment on the eastbound approach to this intersection and Main Street is slightly offset from Firehouse Lane.



*NH Route 104 at Main Street and Firehouse Lane – Potential Striping Improvement Concept*

#### **Improvement Strategy – Main Street and Firehouse Lane at NH Route 104**

Potential improvements to this intersection could involve possibly restriping to move the through traffic around the left turn lane and reduce the potential for rear end collisions. Possibly, Firehouse Lane could be signalized with an emergency actuated traffic signal from the firehouse driveway. This would require four new signal heads and a traffic signal controller.

## 5. Access Management Strategies

The NH Route 104 corridor between the junction of US Route 3 in Meredith westerly through New Hampton to the Bristol town line ranges from rural highway to commercially developed in the vicinity of Interstate 93 and the easternmost section of the corridor in Meredith. With varied speed limits and development patterns, as well as two local governments that must work with NHDOT to manage the state highway and the surrounding land uses that affect it, a wide range of approaches to access management may be applied.

Applicable tools include local land use regulations and zoning approaches, enhanced communication between each respective planning board and NHDOT District 3, parcel-specific access management plans, and potential future purchases of right-of-way along the corridor.

The following language is recommended for inclusion in the subdivision and site plan review regulations for both the towns of Meredith and New Hampton. The zoning incentive language is most appropriate for the New Hampton section of the corridor as the incentives are more applicable to New Hampton’s commercial development patterns.

The recommendation to adopt a Memorandum of Understanding (MOU) between each Planning Board and NHDOT District 3 is applicable to both communities, while the future purchase of access rights along NH Route 104 is only recommended for parcels within New Hampton.

### 5.1. Site Plan Review Regulations

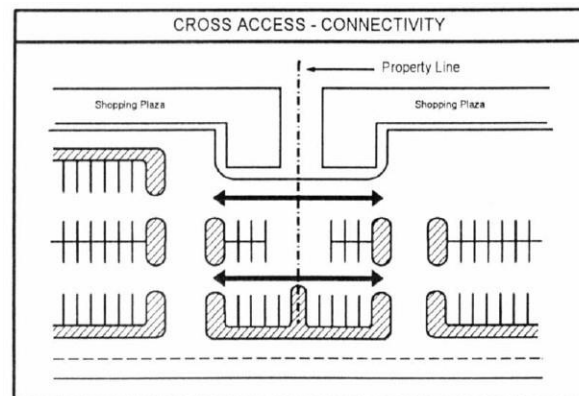
The following model language is recommended for inclusion in each community’s Site Plan Review Regulations:

#### *Maximum number of driveways per lot*

Lots which have frontage on one highway only shall be allowed a single driveway, except that two, one-way driveways may be substituted for a single driveway, provided that the minimum required distance between driveways can be met.

#### *Interconnecting Driveways*

The Planning Board may require the use of cross access drives, and other access management techniques to reduce the number of access points on to public roadways. A system of joint use driveways shall be established wherever feasible, along all state roads, and roads with minor collector classification or higher. The location, width, and pavement treatment of all driveways and access points within 200



Source: Rockingham Planning Commission - Local Access Management Manual

feet of the site shall be shown on the site plan. The applicant is encouraged to discuss with the Planning Board their plans to minimize access points and provide for joint use driveways and cross easements prior to submitting a formal site plan application.

Where cross access arrangements are proposed or requested by the Planning Board, the site plan design shall incorporate the following:

1. A least one (1) cross-easement or right-of-way to each abutting parcel, whether developed or not. Said easement or right-of-way shall be recorded with the deed of each parcel allowing for shared or cross access to and from other properties by the joint use driveways and/or access drives;
2. Connecting drives shall be constructed with a design speed of 15 mph and sufficient cart-way width of at least 22 feet to accommodate two-way travel;
3. The applicant will record an agreement with the deed that remaining access rights along the roadway providing frontage to the development will be dedicated to the Town and pre-existing driveways will be closed and eliminated after the construction of the joint-use driveway; and
4. All agreements will be recorded with the deed, including but not limited to maintenance agreements and shall be reviewed and approved by the Town Attorney. Cost of legal review of all documentation will be borne by the Applicant. All costs shall be paid by the applicant prior to the signing of the final plat.

#### *Access to lots with multiple frontages*

Lots with frontage on both an arterial highway and an adjacent or intersecting road shall not be permitted to access the arterial highway, except where it can be proven that other potential access points would cause greater environmental or traffic impacts.

#### *Driveway Width*

Commercial driveways shall not exceed 36 feet in width, measured perpendicular to the driveway at its narrowest point. The driveway shall be flared at the property line with minimum radii of 25'. All commercial driveway entrances (regardless of the presence of curbing on the highway) shall be curbed from the edge of the highway to at least the end of the radii at the driveway throat.

## **5.2. Subdivision Regulations**

The following model language is recommended for inclusion in each community's Subdivision Regulations:

*Interconnecting Driveways*

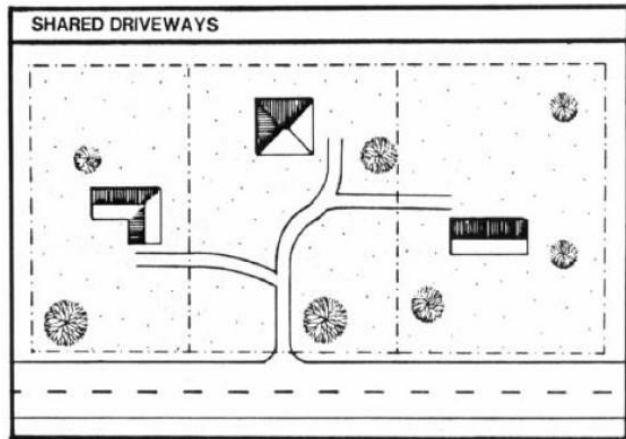
All projects subject to Subdivision Review shall provide interconnecting driveways or easements for future construction of driveways that will provide and promote vehicular and pedestrian access between adjacent lots, without accessing the highway to all property lines, and shall be designed to provide safe and controlled access to adjacent developments where they exist. Every effort should be made by the Planning Board to require construction of these driveways in anticipation of future developments.

*Access to lots with multiple frontages.*

Lots with frontage on both an arterial highway and an adjacent or intersecting road shall not be permitted to access the arterial highway, except where it can be proven that other potential access points would cause greater environmental or traffic impacts.

*Shared Driveways*

In order to minimize the number of driveways along arterial highways, shared driveways shall be encouraged for adjacent residential sites.



Source: Rockingham Planning Commission - Local Access Management Manual

**5.3. Zoning Strategies - Incentives**

As described in the Existing Conditions section of this study, the towns of New Hampton and Meredith have different approaches to zoning along NH Route 104. While the town of Meredith has zoned much of the corridor as Forestry and Rural that limits permitted uses or uses allowed by special exception to “agriculture, forestry, rural residential and certain other non-intensive land uses,” much of the corridor in New Hampton, especially east of Interstate 93, allows a variety of commercial and residential uses.

The following language provides examples of incentive-based zoning to encourage access-management related activities such as the provision of shared access drives. In addition, language recently approved by the town of Warner is also included below. It is understood that the adoption of this incentive-based language is more suitable for the New Hampton section of the NH Route 104 corridor as much of the zoning within this section allows varied commercial uses.

Front Setback

1. An incentive bonus standard has been developed wherein front structure setback requirements may be relaxed for those who choose to develop sites utilizing one of the following options:

- a. Placement of all parking and circulation pavements to the side and rear of proposed buildings.
  - b. Provision of shared access drives and parking.
  - c. Development of a landscaped berm within the front setback area, with a height no less than 8 feet.
2. Those who choose to take advantage of this Incentive Bonus Standard may reduce their required front structure setback by fifty percent (50%) of that otherwise required within this District, subject to the minimum front structure setback dimension. In effect, use of this Incentive Bonus Standard expands the envelope of available building area on any given site.

### Maximum Impervious Coverage

1. No more than 50% of the lot may be covered by impermeable surfaces, such as buildings and paved areas.
2. An incentive bonus standard has been developed wherein Maximum Impervious Coverage may be increased for those who choose to develop sites utilizing one of the following options:
  - a. Placement of all parking and circulation pavements to the side and rear of proposed buildings.
  - b. Provision of shared access drives and parking.
3. Those who choose to take advantage of this Incentive Bonus Standard may increase their allowable maximum impervious coverage up to 60% of the gross lot area, provided all landscape strips, parking lot landscape requirements, and other screening is provided as required by this ordinance.

### Shared Driveways

In order to minimize the number of driveways along highways, shared driveways shall be encouraged for adjacent sites.

The following dimensional requirements may be reduced if shared driveways are provided as follows:

1. The minimum lot size and the minimum road frontage shall be reduced by a total of 10% if the entire site is accessed by a single shared driveway with an adjacent site.
2. The minimum lot size and the minimum road frontage shall be reduced by a total of 20% if the entire site is accessed by a single shared driveway with an adjacent site on a highway other than the main arterial, and which is appropriately zoned for the use.



***Model incentive language approved by Town of Warner, March 2006 for incorporation in the Commercial (C-1) District:***

Front Setback: The Planning Board may reduce front setback requirements to not less than 50% of that which is allowed in the underlying zoning district for applicants, provided the following conditions are met:

- a. Parking and circulation are located to the side and rear of proposed buildings(s). No parking may be located within the front yard of the building(s) excepting handicapped parking convenient to a building entrance;
- b. On-site shared access arrangements with adjoining properties, for both vehicular and pedestrian movements, are made and sufficient documents have been filed for review and approval of the Planning Board; and
- c. The siting and orientation of the building(s) is determined by the Planning Board to be consistent with the scale and character of the Town of Warner. The applicant is encouraged to consult with the Planning Board in developing alternative site layouts to duplicate historic patterns of development and avoid conventional strip development patterns.

Maximum Impermeable Coverage: No more than 70% of the lot may be covered by impermeable surfaces, such as buildings and paved areas. The Planning Board may increase the allowable maximum impermeable coverage up to 80% of the gross lot area, provided all landscape strips, parking lot landscape requirements, and other screening are provided as required by this ordinance, and provided the following three conditions are met:

- a. Parking and circulation are located to the side and rear of proposed building(s). No parking may be located within the front yard of the building(s) with the exception of handicapped parking.
- b. Where appropriate, on site shared access arrangements with adjoining properties, for both vehicular and pedestrian movements, are made and sufficient documents have been filed for review and approval of the Planning Board.
- c. The siting and orientation of the building(s) is determined by the Planning Board to be consistent with the scale and character of the Town of Warner. The applicant is encouraged to consult with the Planning Board in developing alternative site layouts to duplicate historic patterns of development and avoid conventional strip development patterns.

**5.4. Memorandum of Understanding between NHDOT District 3 and Local Planning Boards**

A draft Memorandum of Understanding (MOU) between the NHDOT and local communities to better coordinate the local/state highway access management process is attached as Appendix A.

The MOU is intended to mandate timely communication between NHDOT and the Planning Board during the development review process.

Approval of the MOU by the towns of Meredith and New Hampton and NHDOT can play a large role in promoting a cooperative approach to the development of the NH Route 104 corridor. In addition, it is hoped that this cooperative approach will extend to all state highways in each community. It is understood that representatives of the New Hampton Planning Board have preliminarily discussed the adoption of the MOU.

### **5.5. Potential Right-of-Way purchases along NH Route 104**

As noted previously, an expressed recommendation of the LRPC's *PLAN 2000: A Lakes Region Transportation Plan Update for the Year 2000* was the future acquisition of access rights along the NH Route 104 corridor as an element of a future access management strategy. To move this concept further, data compiled during the preparation of this study were used to identify potential locations for the future purchase of right-of-way if funding becomes available, possibly as an initial phase of the New Hampshire Ten Year Plan project to reconstruct NH Route 104 between Interstate 93 and Meredith Center Road presently scheduled for construction in 2015.

To assist in the identification of suitable parcels LRPC staff reviewed the right-of-way classification (see Appendix F) and utilized specific criteria defined for this study as follows:

- 1) Proximity to identified safety issues or other concerns such as limited sight distance;
- 2) Overall developability of the parcel, i.e., if a parcel consists mainly of environmentally constrained lands the need for future right-of-way acquisition is lower;
- 3) Alternative access to NH Route 104 is available (abutting local/collector road access);  
and
- 4) Proximity to an area along the corridor with multiple access points, i.e. the higher the prevalence of existing access points, the greater the need for preservation of existing right-of-way in that localized area and/or the necessity of combining points between adjoining lots or locating future access points directly across from access currently provided on the opposite side of the highway.

Using the above criteria as a guide, LRPC staff identified the following parcels for consideration of future acquisition of access rights. Again, it must be emphasized that this is in no way a finalized list of parcels, but instead more information to continue the discussion regarding the purchase of access along NH Route 104 in the future. It is also important to note that two of the parcels were for sale as of December 2006.

The location of the parcels listed below are also shown on *Map 5.1, Potential Access Right Acquisition Locations*.

Parcel R04-097-000, New Hampton  
Parcel R04-079-000, New Hampton

Parcel R04-066-000, New Hampton  
Parcel R05-003-000, New Hampton

## 6. Summary/Implementation

This study has made an effort to quantify current and future transportation and land use pressures on the NH Route 104 corridor between the Bristol town line and US Route 3 in Meredith. The corridor is one of the most heavily traveled corridors in the Lakes Region, with traffic counts expected to continue to increase in the future. Conflicts between through traffic and numerous access points along the corridor, especially in the area between the Exit 23 interchange at I-93 and Chase Road in Meredith, impede both safety and traffic flow.

The information contained within this study emphasizes the need to use a variety of approaches to improve safety and ensure that the NH Route 104 corridor continues to operate in a relatively efficient manner in the future. Implementation recommendations range from key safety improvements and acquiring access rights for specific parcels along the corridor, to changes in land use regulations and zoning. In addition, a key issue is that of improved communication between local planning boards and NHDOT. A step in this direction is the implementation of a Memorandum of Understanding between NHDOT District 3 and each community regarding highway access management.

Key issues discussed in the *NH Route 104 Access Management Study*:

- Key access management issues were identified by New Hampton town officials, commercial property owners, and the NHDOT in the area east of the Exit 23 interchange with I-93 and Drake Road in New Hampton. The group proposed a conceptual interconnecting looped roadway system, which would ultimately connect properties north and south of NH Route 104. Such a system in this area would reduce congestion, reduce traffic delay, and increase safety.
- Land uses vary widely, from relatively dense highway commercial to very rural. The differences in zoning are also notable, with considerable differences between the business and mixed commercial uses allowed in New Hampton to the more rural uses allowed in much of the corridor in Meredith.
- The differences in land use patterns and zoning are further emphasized by a much denser pattern of access points in New Hampton east of Exit 23 to Chase Road in Meredith. These changes are due in large part to the standard right-of-way classification found in this section of the corridor. Limited access or controlled access, as found in much of the remainder of the corridor, is a more restrictive classification.
- An analysis of full buildout provides a noteworthy look at what the corridor could look like if developed to its highest potential density. Also, the potential trips generated by that development were estimated. LRPC staff, with guidance from the NH Route 104 Study Committee and representatives from New Hampton and Meredith, completed the analysis of potential buildout by compiling parcel based data for each community (including information on land uses, zoning, and environmental constraints), and developing a method to estimate the extent of future residential and commercial growth along the corridor under current zoning. These figures were then used to estimate the number of potential trips.

While the buildout is strictly a planning tool, and a number of assumptions were necessary during the process (see Appendix D), the results may be used to gain insight into what might possibly occur along the corridor in the future. The results highlight the potential for 777 more lots in New Hampton and 228 in Meredith along the corridor, with both towns having a combined potential to develop approximately 3.2 million square feet of commercial property. The number of trips that could then be generated in a full buildout condition would total 155,082, dramatically higher than the estimated 19,763 trips that currently exist.

- Key safety issues were also identified by the NH Route 104 Study Committee and representatives of local businesses (see *Map 2.1, Identified Safety Concerns and Appendix B, NH Route 104 Business Survey Comments*). The identification of issues and work undertaken by the project's consultant Fay Spofford and Thorndike, Inc. resulted in conceptual plans for short and mid-term improvements at the following locations along the corridor:
  1. Residential/Commercial Area (Bobby's Girl Diner) at NH Route 104 (New Hampton)
  2. Meredith Woods/Clearwater Campgrounds Crossings (Meredith)
  3. NH Route 104 at Shingle Camp Road and I-93 Off-Ramp (New Hampton)
  4. Chase and Meredith Center Roads at NH Route 104 (Meredith)
  5. Town House Road (east) at NH Route 104 (New Hampton)
  6. Main Street at NH Route 104 (New Hampton)

In summary, current and future projected traffic flows, safety issues, existing patterns of access and potential development pressures as outlined in the buildout analysis reveal that the NH Route 104 corridor is an appropriate candidate for a variety of access management implementation strategies. This study of the corridor has shown that a shared approach to implement access management and safety strategies between the communities, NHDOT, and local property owners promise effective long-term results.

## **Implementation Strategies**

The following is a summary of the implementation strategies as described throughout the NH Route 104 Access Management Study.

- The towns of Meredith and New Hampton should work closely with NHDOT District 3 and local property owners to move towards the implementation of the short and medium-term safety improvements as outlined in Chapter 4, and Appendix E of this study.
- Revise Subdivision and Site Plan Review Regulations in both communities to incorporate access management-related language pertaining to the maximum number of driveways per lot, interconnecting driveways, shared driveways, access to lots with multiple frontages and driveway width as described in Chapter 5, Access Management Strategies.
- The town of New Hampton should consider the adoption of zoning incentives related to access management as found in Chapter 5, Access Management Strategies.
- Foster improved communications between NHDOT District 3 and local planning boards/planning staff through the adoption Memorandum of Understanding (MOU). A draft MOU can be found in Appendix A.

- The town of New Hampton, in conjunction with NHDOT and local property owners, should continue the development of the phased *NH 104 Access Management and Interconnection Plan* for the area of NH Route 104 between the Exit 23 interchange at Interstate 93 and Drake Road. The recently completed Plan is included in its entirety in Chapter 1, Introduction.
- Improved access for communities to NHDOT driveway permit records for parcels along NH Route 104, as well as other state highways, would serve to simplify the driveway permitting process at the planning board level and clarify the availability and limits on access for property owners. The NHDOT should work to institute a streamlined recordkeeping procedure to automate this process in the future.
- Continue to monitor the progress of the State of New Hampshire Transportation Improvement Plan (10 Year Plan) project to reconstruct NH Route 104 from I-93 east to Meredith Center Road (approximately four miles) to improve horizontal and vertical alignment and to widen shoulders. With the ever-increasing demand on funding transportation projects in New Hampshire, emphasis should continue to be placed on retaining funding for future improvements to NH Route 104 in the regional Transportation Improvement Program and future editions of the State 10 Year Improvement Program. Options to prioritize the timing of improvements identified in this study should also be explored at the regional and state levels.
- In addition to monitoring the progress of the NH Route 104 improvements in the 10 Year Plan, the consideration of future purchase of access rights along NH Route 104 as a precursor to the project should continue as described in Chapter 5, Access Management Strategies.
- With NH Route 104 not scheduled for reconstruction until 2015, Context Sensitive Solutions (CSS) may be an appropriate means of defining corridor problems and screening alternative solutions at the point in time that project design is initiated. The CSS approach is currently being used in the US 3/NH 25 Improvements Transportation Planning Study. CSS attempts to illustrate the breadth of balance required in the preservation of scenic, aesthetic, and environmental corridor resources, as well as the need for further linkages between land-use and transportation. The CSS planning process would further this study by “using place making tools to identify strong felt community values and special places for protection in the project development process.”