

US Route 1 Corridor Plan



Town of Hampton
Town of Hampton Falls
Town of North Hampton
City of Portsmouth
Town of Rye
Town of Seabrook

November, 2011

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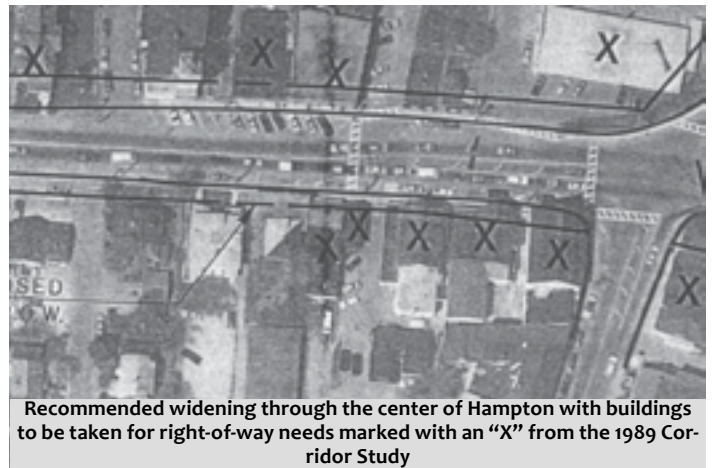
EXECUTIVE SUMMARY

This document presents the corridor study and management plan for US Route 1, locally known as Lafayette Road, in coastal New Hampshire. The study incorporates approximately 13 miles of roadway through 6 communities; Seabrook, Hampton Falls, Hampton, North Hampton, Rye, and Portsmouth, and touches on a seventh (Greenland). The study area begins at the State line with Massachusetts in Seabrook and extends to the intersection of US 1 with Wilson Road in Portsmouth. The segments to the north of Wilson Road are not included because they have either been upgraded in recent years, are currently scheduled and funded for improvements in the near future, or are the subject of other corridor plans, including the Route 1 Bypass Study.

The corridor study was 80 % funded via a State Planning and Research program grant with the remaining 20% provided by the corridor communities and through the Rockingham Planning Commission Unified Planning Work Program (UPWP). Vanasse Hangen Brustlin, Inc. was retained to assist with the project and provided engineering and design services.

CORRIDOR PLANNING PROCESS AND GOALS

The US 1 Corridor study was proposed in 2000 by the Route 1 Coastal Communities Corridor Advisory Committee (a subcommittee of the Metropolitan Planning Organization), and is intended to replace and improve upon the improvement plan completed for US 1 in 1989. The original plan, prepared for the NH DOT by the Kimball-Chase engineering firm, was a feasibility study examining the costs, benefits and impacts of implementing the New Hampshire Department of Transportation's "Route 1 Policy". The Route 1 Policy had been developed a few years earlier by the Department and called for the ultimate improvement of US 1 to a five lane roadway along its entire length. This "ultimate design" would include two travel lanes in each direction with a raised median separating them. At signalized intersections there would be breaks in the median to allow left turns and give drivers the opportunity to reverse directions. This proposal was not well received by the communities due to the lack of local involvement in the development of the plan, the



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severe access restrictions, and the significant property impacts that widening the roadway would cause in many locations. Some components of the 1989 plan have been implemented as several intersections and road segments along the corridor have been improved based on designs from the earlier plan. This has primarily occurred in Seabrook and Portsmouth where much of Route 1 is built to five lanes although without the recommended medians.

The need for a new examination of Route 1 stems directly from the methods and outcomes of the 1989 study. That study had forecast conditions to the year 2000 which had come and gone without many of the recommendations being implemented, and with many of the assumptions about growth in traffic and the resultant conditions appearing to be significantly overstated. The ultimate purpose of this current work is to provide the US 1 communities, the Rockingham Planning Commission (RPC), and New Hampshire Department of Transportation (NH DOT) with a vision for the corridor that is based on updated assumptions about growth, and one that takes local concerns and needs into account in the design. This will benefit traffic and safety conditions, while better integrating Lafayette Road into the communities instead of serving as a dividing element. The recommendations included in this plan are intended to be used as a “blueprint” for the corridor and aid in making future land use and transportation decisions. The plan provides guidance to augment the planning processes, form, and function of the roadway and its surroundings. At the same time, it is expected that there will be some deviation from the recommendations as communities work with developers and the Department of Transportation to design specific projects for implementation. There are several objectives towards realizing this goal:

- Identify and quantify the extent of existing deficiencies.
- Identify conceptual roadway improvements.
- Identify locations where Access Management techniques can be implemented.
- Integrate planning for all modes of travel.
- Identify sources of traffic diversion to local roadways and changes to reduce it.
- Identify potential land use and zoning changes that can help manage traffic growth along the corridor.

Route 1 plays a variety of roles for the corridor communities. For some, it is simply an arterial highway that carries vehicles and people through the area, while for others, it is their Main Street and moves through the heart of their community. For that reason, a community involvement approach to planning for the corridor has been emphasized. The result is a document that incorporates the needs and desires of the communities as well as the Department of Transportation, and produces an “ultimate design” for Route 1 that varies in form between communities, reflecting the different role that the roadway plays in each.

The study was guided by the Route 1 Corridor Advisory Committee, composed of local officials from each of the communities, RPC staff, and the NHDOT. The Committee was a critical element of the study in overseeing the work effort, providing a sounding board for ideas, and helping to develop recommendations and prioritize projects. The advisory committee has taken a regional approach to the project with members very supportive of the needs of the other communities, and also cognizant of the important “through” function that US 1 provides the Seacoast.

The ultimate purpose of this current work is to provide the US 1 communities, the Rockingham Planning Commission (RPC), and New Hampshire Department of Transportation (NH DOT) with a vision for the corridor that is based on updated assumptions about growth, and one that takes local concerns and needs into account in the design.

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That being said, there are some things that have definite impacts on Route 1 but are not within the scope of the current study. The most obvious of these is the influence that congestion on Interstate 95 and the location and cost of the tolls have on the type and volume of traffic on Route 1 on any given day. Although the configuration of this system influences travel in the region, the presence of a toll facility is a State level policy discussion and is not included here.

KEY FINDINGS

Through the development of the study, there have been a number of findings that are important in framing the discussion regarding necessary improvements.

- The corridor averages approximately 263 traffic accidents per year (2005-2009)
- Most signalized intersections are currently operating at an acceptable level of service (LOS). Exceptions to this are the intersection of US 1 with NH 27/High Street in Hampton, the double signal at the intersections with NH 88/Depot Road in Hampton Falls, and the intersection with the Wal-Mart access road in Seabrook.
- Most unsignalized intersections have poor or failing left-turn movement conditions to access US 1.
- Future year analysis indicates that all examined unsignalized intersections will have LOS F (failing) for left turns and some other movements by 2022.
- Growth in retail land use along the corridor has had a significant impact on traffic, particularly in Seabrook but also at other locations along the corridor.
- Public comment has been consistently against extensive widening of the roadway in many of the communities, and greatly concerned with “cut-through” traffic on local roads that offer an alternative to Route 1 such as Mill Road in Hampton and North Hampton, and New Zealand Road in Seabrook.
- While recognized as a growing need, there is no existing or near future planned regular transit service operating along other than the current COAST service in Portsmouth. The intercity (Dover-Portsmouth-Boston) service operating in the I-95 corridor also does not stop anywhere in the study area.
- There are regional influences, such as the I-95 Tolls in Hampton, which effect the traffic conditions on US 1.
- Continuing growth of the type that is being seen in recent years will necessitate widening the roadway in some locations. Aggressive access management, and a consolidation of future growth in defined “nodes” can help to mitigate this need or limit the extent of the corridor where widening is necessary.

SUMMARY OF RECOMMENDATIONS

The recommendations of the US 1 Corridor Study (detailed in Section 4), are wide ranging but are based around balancing the need for additional capacity with respect for community history and character. This will require not only direct improvements to US 1, but also consideration of land use and zoning changes, as well as other policy decisions that can help manage traffic growth. When fully implemented the resulting corridor will have much improved traffic flow without sacrificing the character of the communities that it travels through. The recommendations presented fall into the general categories of Roadway improvements, transit enhancements, land use and zoning changes, streetscape

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and landscaping changes, access management strategies, and financing options. Some of the key recommendations include the following:

- Corridor-wide access management.
- Complete the 5 lane cross section through Seabrook.
- Reconfigure the double signals at NH 88/Lincoln Ave/Depot Road in Hampton Falls to create a single intersection and improve the flow of traffic through this “bottleneck” without impacting the village setting.
- Reconfigure the NH 101 Interchange to meet current standards and construct an intermodal center.
- Eliminate skewed intersections in North Hampton at Fern, Elm, and North Roads.
- Reduce the vertical curve in Rye between Dow Lane and Washington Road.
- Realign Lang Road to Intersect with US 1 at Ocean Road/Longmeadow Drive.
- Complete the 5 lane cross section in Portsmouth between Ocean Road and Wilson Road.

There are also recommendations for further study with the analysis of the feasibility and economic, and environmental impacts of the proposed changes to the 101 interchange foremost as well as the limited access roadway around the Hampton downtown. Another area is in the development of more specific access management plans for each community, design standards, or other integrated transportation and land use planning efforts.

The full recommended list of intersection and roadway segment improvements along the corridor is estimated to cost between \$47 and \$75 million to construct depending upon options, and will need to be implemented on a project-by-project basis. On their own, the roadway improvements will not be enough to correct the traffic problems that are faced on Route 1 and will need to be supplemented with policy changes to manage growth and mitigate the impacts that development has on travel. These decisions must encompass both site level access and coordination, as well as zoning modifications to limit where high traffic generating land uses will be permitted.

Finally, the report discusses potential options for financing the suggested improvements. Given the current status of funding on the State and Federal levels, and the time that it takes to get projects constructed through the State Ten Year Plan process, it will be important for communities to not rely entirely on those resources. Instead, they should examine opportunities to get improvements financed and constructed as part of the land development process.

IMPLEMENTATION

The projects proposed in the Route 1 Corridor Plan create a set of tasks that will require an investment of community effort resources in achieving progress. The success of the Plan rests on this investment and stakeholder’s confidence that projects and other recommendations will be implemented. The following steps establish a process to ensure the implementation of the Plan’s components:

1. Stakeholder endorsement of the Corridor Plan: The approval of the Corridor Plan by the communities, NHDOT, and the RPC provides legitimacy for its proposals.

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2. Integrating the Corridor Plan into community planning efforts: This ensures that the projects, access management principles, and other aspects of the plan become part of the community master plan, zoning, and plan review process, all of which helps to get the projects implemented. This is already occurring in many communities through Master Plan updates and Planning Board reference.
3. Establishing local project financing mechanisms: This helps create a source of local funding for transportation improvements that provides the community, private developers, and NHDOT with alternatives for funding individual improvement projects.
4. Continuing to preserve right-of-way: This protects the corridor from expensive right-of-way costs in areas where additional widening is likely to be necessary.
5. Monitoring growth and traffic on the corridor: Tracking changes in land use, traffic patterns, and safety issues helps to identify problem areas early and determine project priorities.
6. Getting projects built: The projects in the plan can be placed into two categories; those that are necessary immediately, and those that are likely to be necessary at some future time. This also establishes a project triggering mechanism to set conditions where project action becomes necessary.
7. Keeping the public involved: Early and substantive public involvement in the design of projects is critical to their successful implementation. A Context Sensitive Solutions (CSS) style of public participation is recommended.
8. Items for further study: Some of the Corridor Plan's proposals need further study prior to implementation, such as identifying the feasibility of the bypass around downtown Hampton. Other aspects of the Plan can be developed further by individual communities such as the work that Seabrook is completing with their Master Plan update, village design, and landscaping standards for US 1, and the implementation of a Gateway district along Route 1 in Portsmouth.

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**TABLE 4-5
ROADWAY IMPROVEMENT PROJECTS & COST ESTIMATES**

Town	Location	Figures	Cost*	Description
Seabrook	Main St./Walton Rd. (Option 3)	1,2	\$2,300,000	5 lane, 4-way intersection with signal
	North of Walton to north of Gretchen Rd.	2,3	\$2,200,000	5 lane, add medians
	Gretchen Rd. to Lowe's	3,4	N A	no improvement necessary
	North of Lowe's to south of NH 107	5,6	\$800,000	Add southbound lane at Railroad Ave
	NH 107 Intersection	6	N A	no improvement necessary
	New Zealand to North Access Road	6,7	\$2,800,000	5 lane, add 4th leg to North Access intersection
	North Access Road to Hampton Falls Town Line	7,8	\$400,000	Transition to 3 lane section with full shoulder
Hampton Falls	Seabrook Town line to Kensington Road (NH 84)	9-11	\$1,000,000	Continue 3 lane section with full shoulder
	Kensington (Rt.84) to Lincoln Ave (Rt. 88)	11,12	\$2,800,000	Signal at Rt.84, raised median
	Landscaping Improvements	12a	\$300,000	Add landscape improvements to roadway improvements
	Lincoln Ave to Hampton Town Line	13-15	\$1,000,000	Provide full shoulder for 3 lane section
Hampton	Hampton Falls town line to South of NH 101	15,16	\$800,000	Provide full shoulder for 3 lane section
	NH 101 Interchange (aligned with parallel road)	17a	\$18,600,000	New interchange
	NH 101 Interchange (aligned with existing Rt.1)	17b	\$17,300,000	New interchange
	New Road parallel to US 1	18a,19a	\$8,600,000	New Parallel Road
	Winnacunnet Road Intersection	20	\$100,000	3 way signalized intersection
	High St./Exeter Rd. intersection	21	\$2,100,000	Realign Exeter Road, replace bridge
	Landscaping improvements for Hampton downtown area	21a	\$300,000	Streetscape improvements
	High St to North Hampton Town line	22-26	\$100,000	Signal at Post Road. No other roadway improvement specified
North Hampton	Hampton Town Line to Atlantic Ave	26-30	\$7,900,000	5 lanes, add 4th leg to Home Depot int, discontinue Fern Rd.
	Glendale Road to Elm Road	31,32	\$500,000	Provide full shoulder for 3 lane section
	Elm Road (south) to Elm Road (north)	32,33	\$2,900,000	Signal and new connection, Connect Hobbs Rd. with Elm Rd., discontinue north end of Elm Rd.
	Elm Road to North Road	34	\$400,000	Provide full shoulder for 3 lane section
	North Rd. (West)	35	\$2,200,000	5 lane, signal, realign North Road
	North Rd. (East)	35-36	\$2,400,000	5 lane, signal, new connection from North Rd to US 1
	North Rd. (new connection) to Rye town line	36-39	\$2,600,000	Provide full shoulder for 3 lane section, 5 lane section and Signal at Lafayette Terrace
Rye	North Hampton town line to Breakfast Hill Road	39,40	\$600,000	shoulder improvements, realign Dow Lane approach to US 1
	Breakfast Hill Road Intersection	40	\$2,000,000	5 lanes, vertical crest reduction
	Breakfast Hill Road to Portsmouth town line	41-43	\$1,000,000	3 lanes, shoulder improvements
Portsmouth	Rye town line to Ocean Road	43-45	\$900,000	Provide full shoulder for 3 lane section
	Ocean Road to Wilson Road	45-50	\$7,800,000	5 lane with raised median, roadway approach improvements at intersections
Total			\$47,600,000	Not including 101 Interchange
			\$65,000,000	With less expensive 101 Interchange and no bypass
			\$74,800,000	With more expensive 101 interchange & Hampton bypass

* Costs were developed for 2006 and updated to 2010 utilizing the National Highway Construction Cost Index (NHCCI) developed by the Federal Highway Administration (FHWA): <http://www.fhwa.dot.gov/policyinformation/nhcci.cfm>

CHAPTER 1:

INTRODUCTION AND OVERVIEW

This section of the document discusses the purpose and need for the study, the planning process, and the public involvement process utilized for the project. In addition, previous studies involving the Route 1 corridor are described and current corridor issues and opportunities are discussed.

1.1 PURPOSE AND NEED

The US 1 Corridor study was proposed in 2000 by the Route 1 Coastal Communities Corridor Advisory Committee (a subcommittee of the Seacoast MPO), and is intended to replace the 1989 Kimball Chase feasibility study. The original study detailed the requirements of constructing the New Hampshire Department of Transportation’s “Route 1 Policy” which had been developed a few years earlier and called for the ultimate improvement of US 1 to a five lane roadway along its entire length. This policy envisioned an “ultimate” highway configuration of two travel lanes in each direction with a raised median separating them. This top-down approach to planning was not well received by the communities due to the lack of local involvement in the development of the plan, the severe access restrictions, and the tremendous impacts to property that widening the roadway would entail in many locations. Nevertheless, some of the components have been constructed, primarily in Seabrook and Portsmouth although other improvements based on designs from the plan are scattered along the length of the corridor.

The current study, which began in earnest in 2003, has taken an approach that has emphasized community involvement in determining its outcome. The result is a plan that foregoes some capacity improvements to maintain community character and when complete, Route 1 will look and operate somewhat differently in each community. This reflects the cooperative approach to transportation planning and project implementation that did not exist previously.

The purpose of this study is to provide the US 1 Corridor communities and the New Hampshire Department of Transportation with a planning tool that can provide guidance in making future land use and transportation decisions along and adjacent to Route 1. The resulting plan contains a set of conceptual improvements as well as policy and planning recommendations for US Route 1 from the Massachusetts/New Hampshire state line in Seabrook to Wilson Road in Portsmouth.

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The need for this study stems directly from the process and outcome of the Kimball-Chase feasibility study. The top-down approach used at the time did not take into account community concerns and was, in fact, an engineering study of how to implement the NH DOT US 1 Policy rather than a comprehensive examination of the corridor and community needs. Also, the proposed improvements were only partially implemented due to the tremendous impacts on the communities that would have resulted from widening the roadway and eliminating most left turns. Finally, the ten year horizon of the study has been passed and the 3% per year growth projected by the study never materialized.

This is not a construction project in itself and it will not result in any immediate changes in the roadway. Instead it identifies and prioritizes projects for funding in the MPO's Long Range Transportation Plan, the State Ten Year Plan, or through other available means. To meet the study goals, several steps were taken:

1. Identify and quantify the extent of existing deficiencies.
2. Identify conceptual roadway improvements.
3. Identify locations where Access Management techniques can be implemented.
4. Integrate planning for all modes of travel.
5. Identify sources of traffic diversion onto local roadways and ways to reduce it.
6. Identify potential land use and zoning changes that can reduce traffic along the US 1 Corridor.

As illustrated by the impacts of the one-way tolling experiment in 2004-2005, there are conditions on Route 1 that stem from the proximity of the corridor to Interstate 95 and the toll facility in Hampton. These issues are important considerations, but addressing the location of the tolls or exits on I-95 is beyond the scope of this study.

1.2 CORRIDOR PLANNING PROCESS

This study evaluates and prioritizes all expected road improvements and other changes likely to be needed over the next 20 years and provides conceptual designs and estimated costs. It expands and improves upon previous work by including an access management component and bicycle, pedestrian and public transportation, and aesthetic needs as well. A design approach that is sensitive to context is used with alternatives recommended that are appropriate to the communities and surrounding land uses. The study was divided into three phases of work:

1. **Data Collection and Existing Conditions** – This included data collection (volume and turning movement counts, accident data, etc), development of zoning, land use, and resource base maps, and performing capacity and level of service analysis on the existing roadway. Public involvement efforts were initiated with project meetings, discussions with the advisory committee and local planning boards and others.
2. **Development of Project Alternatives** – The existing conditions analysis was utilized to forecast future traffic volumes and patterns and to identify improvements necessary given expected growth. This phase of the project required extensive public involvement to ensure that the design is appropriate for the community. It is hoped that this early coordination with the community will facilitate the construction of the projects in the future.
3. **Corridor Plan** – This is the development and approval of the corridor plan itself. This includes discussion of the recommended infrastructure improvements as well as an access management plan that establishes policies and practices that will maintain and improve traffic flow and safety of the roadway as land use changes occur.

1.3 PUBLIC AND COMMUNITY INVOLVEMENT

The approach to this project has been from the perspective that there is a need for significant safety and capacity improvements, but that these must be developed in conjunction with the communities, and in a manner that is sensitive to the role that Route 1 plays in each. This process serves to facilitate the two different functions that Route 1 serves as both a developed State highway and as “Main Street” in many of the communities. To adequately plan for these needs it is necessary to involve the public early and often. In this regard, there were four public information meetings held as well as meetings with selectmen and planning boards at various times to discuss specific issues. Discussions were also held with business groups and other interested parties and where relevant, comments and input on development proposals along the corridor were provided. The community concerns can be generally categorized as the following:

- **Planning and Growth** — Most participants were experiencing an increase in traffic in their community and were aware of the need for US Route 1 and other roads to serve growth. At the same time, there was a resistance to widening the roadway in many locations and interest in other methods of managing traffic.
- **Scenic/Town Character** — Most were interested in ways to adapt the corridor to changing needs without adversely affecting community character. In many cases there is a desire to better integrate US 1 into the community and have it act as less of a barrier. These objectives can be at odds with the role of US 1 as a major arterial, and thus a balance must be struck between the two.
- **Access Management** — There was interest in finding ways to improve traffic operations without widening. At the same time, there was concern over the impacts of techniques on community character and access to businesses.
- **Safety/Speed** — There is a lot of concern of the number of accidents along the corridor and the need to improve difficult intersections and find other ways to improve safety.
- **Cut through Traffic** — Most have seen increased traffic on secondary roads and wanted to discourage cut-through traffic in residential neighborhoods and keep drivers on Route 1 or even move them onto Interstate 95 and NH 101. The toll system was seen as a major source of traffic diversion onto Route 1.
- **Interstate Exits** — Although outside of the scope of this study, there is no doubt that Interstate 95 and the Hampton Tolls have an impact on traffic along US 1. Concerns over the capacity of the Exit 1 Interchange in Seabrook were discussed, as was the potential of adding another interchange in the vicinity of North Hampton or Rye/Greenland. There was little support voiced for a new interchange and many concerns raised about the impacts on a community that would host any new exit from I-95.
- **Economic Impacts** — The capacity, traffic flow and design of Route 1 was seen as affecting the economic strength of each town. Growing traffic on US 1 presents economic development opportunities for the communities, yet too much traffic can hamper that by crippling the transportation system. Planning for (limited) growth, was seen as a way to maintain a strong economic base and quality of life in the communities.
- **Transit** — Bus and rail transit were discussed as potential services that could be provided within the corridor. While there is some desire for reactivating the existing rail line, it was recognized that this would be likely only in the long term given the expense involved and low expected ridership. Bus transit along the corridor is desired in many locations, as are connections to the greater region through intercity bus service and an intermodal facility.
- **Pedestrian/Bicycle** — All communities saw pedestrian and bicycle facilities as essential, especially in town centers. There is substantial interest in maintaining the abandon B&M Eastern rail line to serve this purpose.
- **Park and Ride** — There is a desire for a park and ride and intermodal station in Hampton to provide satellite parking and shuttles to the beaches, corridor fixed route service, and intercity transit service.

ADVISORY COMMITTEE

The Corridor Advisory Committee for the study was made up of two local officials from each community (one current representative to the MPO and one appointed by the Board of Selectmen/ City Council), representatives from the RPC staff, NHDOT, and the consultant team. This group played a crucial role overseeing the work effort and guiding its outcome, including the development of recommendations and project priorities.

In addition to the Advisory Committee, the Planning Boards, Selectboards, and other public officials have seen draft documents and presentations regarding recommendations and through that have been an important resource in collecting the data and finalizing the proposals contained within the completed US 1 Corridor Plan.

1.4 PREVIOUS STUDIES AND POLICIES

The development of the Route 1 corridor and the changes to the roadway itself have been shaped by local actions, State policies, and the recommendations of a study of the corridor completed in 1989. Collectively, these have influenced the design of improvements as well as the amount of right of way required from development of property along the corridor.

1.4.1 NH DEPT. OF TRANSPORTATION “US 1 POLICY”

In 1984, the then New Hampshire Department of Public Works and Highways, now the Department of Transportation, developed a “US 1 Policy” that established a three phase process for improving US 1:

1. ***Maintenance and Operation Improvements*** — A repaving and restriping program carried out as normal maintenance to preserve the integrity of the existing roadway.
2. ***Interim Improvements*** — A spot-widening program to close short gaps between areas widened by developers. This would provide wider lanes, center turn lane, and shoulders until enough gaps were closed that the roadway could be restriped to four lanes.
3. ***Ultimate Improvements*** — A reconstruction program to achieve the optimum cross-section stated as “the maximum practical number of lanes” or two through lanes in each direction separated by a raised median with provision for left turn lanes at major intersections. This is to be achieved within a 90 ft. right-of-way, with an 80 ft. alternate for severely restrictive areas.

The intent of this policy was and is to attain a consistent 90 foot right-of-way (80 foot in physically constrained areas) to enable the construction of the “ultimate improvements”. In that regard, the Department has required that property owners wishing to develop or redevelop their parcel accessing US 1 provide an easement of approximately 12 feet for roadway expansion. This rule has successfully obtained right-of-way in a piecemeal fashion over the last 20 years and NH DOT intends to keep this practice in place until it is secured along the length of the corridor. At the same time, widening Route 1 in some areas has become prohibitively expensive as well as damaging to the community.

1.4.2 1989 US 1 CORRIDOR “KIMBALL-CHASE” STUDY

The US 1 Policy was followed in the late 1980’s with a study of the corridor to determine the feasibility of implementing the “ultimate improvements”. The NH Department of Transportation contracted with the Kimball Chase engineering firm to complete the study and develop interim and “ultimate design” recommendations. A number of important assumptions guided their analysis of future land use and transportation conditions and determined the scope of the improvements required:

- Population growth of 3% per year for the communities through the year 2000.
- 1066 Developable or re-developable acres abutting the corridor.
- Complete development or redevelopment of under-utilized land along the corridor.
- Projected average annualized daily traffic (AADT) volumes of over 30,000 vehicles per day by the year 2000 for much of the corridor, with North Hampton and Rye somewhat lower levels.

The study recommended 58 short and long-term projects that would implement the Route 1 Policy “ultimate improvements’ at a cost of approximately \$84 million which inflates to approximately \$175 million in 2010 dollars¹.

The study also raised some issues that were not fully addressed within the document, but were determined to be important for future consideration:

- Utilizing the Boston & Maine railroad right-of-way as a potential alternative roadway corridor. This topic was seen by some as an alternative to widening US 1 and was felt to deserve some consideration. There was also an interest in maintaining the rail right-of-way for future rail operations.
- Utilizing parallel side streets to provide additional capacity instead of widening. Areas in Hampton and Portsmouth were believed to provide opportunities to facilitate traffic on side streets with some improvements.
- Monitoring the US 1/ NH 101 interchange for safety and traffic control issues. The study did not look in detail at the operations and safety of the interchange but it was felt that it deserved additional resources in the future.
- Eliminating the rotary around the Seabrook Town Hall by creating a “T” intersection with a traffic signal. It was expected that operationally the intersection would be adequate with the existing configuration but that a redesign would be necessary for safety and capacity reasons not long after the horizon year of the study.

Some of the recommended improvements from the 1989 Plan have been implemented and there are locations along the corridor that reflect the described “ultimate improvement”. In Portsmouth and Seabrook, much of the widening and many of the intersection improvements have been completed. Other improvements are seen in the remaining four communities such as the signalization of Breakfast Hill Road/Washington Road in Rye and of the Home Depot/Shaw’s plaza in North Hampton. That being said, many of the recommended improvements have not been implemented due to community opposition (such as the raised center median), funding limitations, and much slower growth in population and traffic than envisioned in the late 1980’s. The overall impact of the partial implementation has created additional congestion issues in places where lane drops occur, difficult left turns in some areas, and many skewed angle intersections and poorly designed driveways remaining active.

¹ Federal Highway Administration National Highway Construction Cost Index. Located at <http://www.fhwa.dot.gov/policyinformation/nhcci.cfm>

1.4.3 2003-2004 ONE WAY TOLL EXPERIMENT ON I-95

Concern over the lengthy delays experienced at the Hampton Toll facility during peak travel periods in the summer and fall led to a test of one-way toll collection. This ran for 10 weeks in 2003 (August 22-November 1) and again the following summer from the beginning of July through Columbus Day. Tolls were collected at double the rate northbound and not at all southbound. Traffic southbound through the tolls was slowed for safety purposes but was not required to stop. While this change in tolling was very successful in reducing the delays at the southbound tolls, it did nothing to alleviate congestion northbound and in fact created traffic diversion, particularly on US 1. Reports issued after the 2003 test and prior to the 2004 test had the following findings of importance to Route 1:

- Traffic volumes on US 1 increased by as much as 10% northbound and 3% southbound during the 2003 test.
- Total truck traffic volumes were approximately the same as pre-test conditions however the directional split was different. Northbound truck volumes increased on US 1, while southbound truck volumes decreased.
- Off peak truck volumes increased
- The number of motor vehicle collisions increased by 16% in North Hampton during the test period compared to the previous year.

There was no report released regarding the 2004 test, but opposition from the Route 1 communities, the successful implementation of the E-Z Pass electronic toll collection system in 2005 (and open road toll collection in 2010), and a change in State leadership all combined to eliminate the need for further experiments.

1.4.4 OPEN ROAD TOLLING

After several years of successful E-Z Pass operations in which usage rates climbed to over 50% of all vehicles, the addition of high speed toll collection lanes was implemented for the Hampton facility. In June, 2010 the Hampton site became the first in New Hampshire to collect tolls at full highway speeds as the 16 lane site was reconfigured to accept high speed traffic. Two lanes in each direction had the booths removed and were separated from the rest of the lanes by raised barriers. This increased the capacity of each direction from 4400 vehicles per hour to 5800 vehicles per hour and eliminated much of the delay experienced at the site on a day to day basis.

The success of the changes to the tolling system has benefited Route 1 as traffic numbers indicate reduced diversion from I-95 due to the improved functioning of the tolls. Before EZ-Pass, the difference in traffic volume on I-95 between traffic at the tolls and at the state line with Massachusetts (northbound) was approximately 21,000 vehicles per day. Since 2006, the average difference has been reduced to 12,500 and there has been a 20% increase in the average Saturday volume of traffic northbound at the tolls and an 11.5% increase in northbound average weekday traffic. On the other hand, traffic on US 1 south of NH 101 has been relatively unchanged, growing from 9900 to 12,400 between 2004 and 2006 and remaining at that level through the most recent counts in 2010.

1.5 STUDY AREA ISSUES AND OPPORTUNITIES

There are a number of issues that help to define the need for improvements in the US Route 1 corridor. These generally result from the multi-faceted role that the roadway plays as “Main Street”, a gateway to the New Hampshire Seacoast region, a major arterial in the region’s highway system, and as a retail destination:

ROUTE 1 CORRIDOR PLAN

- Conflict between the roles that Route 1 plays as the gateway to the New Hampshire seacoast and as Lafayette Road, “Main Street” for many of the communities.
- Development of retail land use is stressing roadway capacity and creating congestion points.
- Poor access management has reduced capacity, impedes traffic flow, and creates safety concerns.
- There are nearly 700 driveways and access points to US 1 within the study area, many poorly defined and/or too close to others, creating both safety and traffic flow problems.
- Mature and historic development adjacent to the corridor limits opportunities for physical roadway expansion, and making it more difficult and expensive.
- The corridor lacks facilities to support transit, bicycle and pedestrian travel limiting mobility using anything other than a personal motor vehicle.
- Lane drops and inadequate turning capacity at signals create traffic bottlenecks and exacerbate congestion.
- Skewed angle intersections and other substandard geometry cause safety and operational concerns. This includes the rotary in Seabrook, the NH 101 interchange, NH 27/High Street, and Elm Road for example.
- The split intersection at NH 88/Lincoln Ave/Depot Road in Hampton Falls creates additional delay because of two signals in extremely close proximity and the inadequate turning capacity northbound.
- Pan-AM Railways which operates the rail corridor that parallels US 1 no longer actively provides freight service and is actively pursuing the abandonment the remaining portion of rail line due to lack of customers.
- Fixed route bus service on the corridor is limited to the COAST route located within the City of Portsmouth.
- There is no intercity bus service connecting to the corridor although service does operate parallel between Portsmouth and Boston on Interstate 95 and soon to Manchester as well.
- Right-of-way along the corridor is narrow and inconsistent. NH DOT has been successful in acquiring a 90’ right-of-way on a piecemeal basis but the large number of parcels leaves much of the corridor with little or no right-of-way outside of the existing roadway.

In addition to the issues on the corridor, there are a number of opportunities to make improvements. The communities along US 1 have worked together for many years discussing and addressing issues related to the roadway, tourism, and economic development and there is a strong desire to find solutions to problems that fit the needs of each particular community involved.

- Continuing growth of tourism in the region provides a solid economic base.
- Strong development potential provides a funding mechanism for addressing improvement needs.
- The abandon rail line provides an opportunity to utilize that space for bicycle and pedestrian facilities or additional roadway capacity. Pan Am railways has recently initiated the process of abandoning the remainder of that railway which may present additional opportunities.
- Reconfiguring the NH 101 interchange will provide space for an intermodal center that can serve many different types of transit service along the corridor and to other local and regional destinations..

ROUTE 1 CORRIDOR PLAN

- The proximity of residential neighborhoods to the commercial properties that front much of the corridor creates the potential for improved connections, mixed use development, and other enhancements that can reduce the volume of traffic while creating a vibrant community.
- Many of the traffic problems on the corridor can be solved over time using a strong access management approach and avoiding costly widening.

Many of these issues are highlighted in *Map 3-1 and 3-2*.

CHAPTER 2:

AREA PROFILE & EXISTING CONDITIONS

2.1 CORRIDOR SETTING

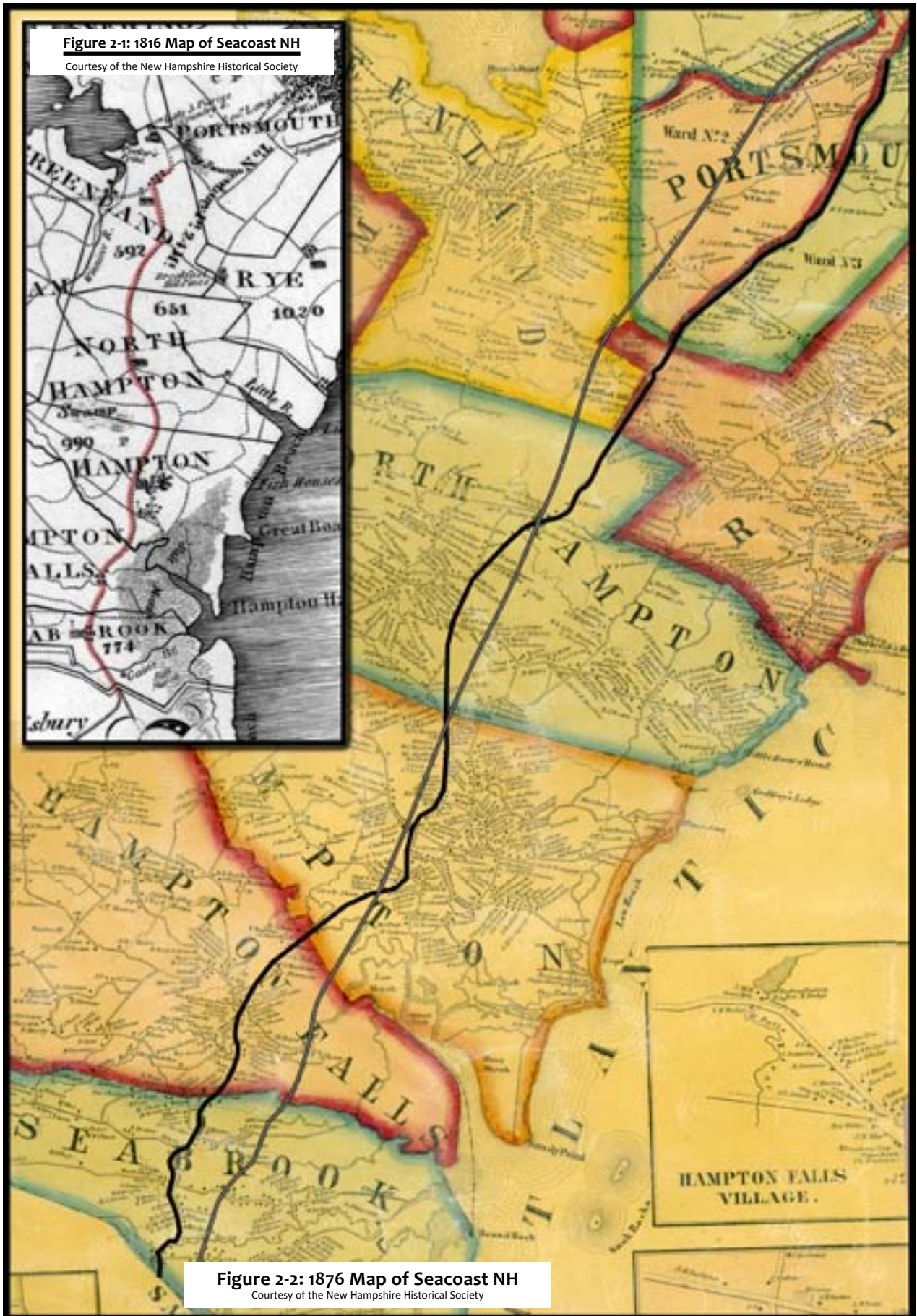
As shown in *Map 1-1*, the Route 1 corridor runs roughly parallel to Interstate 95 in New Hampshire and provides a connection from the interstate and inter-regional roadway network to the beaches at the Seacoast. Starting from Massachusetts in the south, the roadway travels through the communities of Seabrook, Hampton Falls, Hampton, North Hampton, and Rye. The roadway then touches on Greenland before continuing to Portsmouth and across the Piscataqua River to Maine.

2.1.1 A BRIEF HISTORY OF ROUTE 1¹

The current U.S. Route 1 evolved from a stagecoach route between Portsmouth and Boston. This was known alternatively as the “Country Road”, the “Stage Road” and the “Post Road”. From the state line with Massachusetts to the border of Hampton with North Hampton has had the same general alignment for over 350 years. The road was originally constructed in the 1600’s to connect Hampton with Hampton Falls and south to the Massachusetts colony. The first stagecoach service between Boston and Portsmouth ran in this corridor starting in 1761 (Mawson 1968:10). Until the 1830’s, the road ended at NH 151 (Post Road) in Hampton, and followed that roadway through Greenland to Portsmouth (*Figure 2-1*). The current alignment of the northern portion of the corridor was completed in 1830 (*Figure 2-2*).

1 The material for this section comes primarily from 3 sources. “The Way It Was in North Hampton, Second Edition, by Stillman Moulton Hobbs and Helen Davis Hobbs, 1994. Joseph Dow’s History of Hampton, Joseph Dow, 1893 as shown on the Lane Memorial Library (Hampton) website (<http://www.hampton.lib.nh.us/hampton/history/dow/index.htm>). “Hampton: A Century of Town and Beach, 1888-1988” by Peter Evans Randall, 1989 as also found on the Lane Library website (<http://www.hampton.lib.nh.us/hampton/history/randall/index.htm>)

ROUTE 1 CORRIDOR PLAN



ROUTE 1 CORRIDOR PLAN

The “Causeway” across the marsh between Hampton Falls and Hampton was built around 1645. This section of the roadway later was renamed “The Turnpike” in 1810 after it was purchased by a company and people were charged to cross it. This resulted in the construction of “The Shunpike” and a bridge further up the Taylor River that allowed people and wagons to cross between the two communities without paying the toll. In 1826, the “Turnpike” was purchased by the Towns of Hampton and Hampton Falls for \$5000 and made into a free public roadway. At the same time, construction was started on a “direct highway connecting New Hampshire’s seacoast towns” that followed the current US 1 corridor from North Hampton north to Portsmouth. When completed in 1830, the new roadway was renamed Lafayette Road after the French General and Revolutionary War hero who had toured the area a few years before stopping in several communities.

In 1840, not long after the completion of Lafayette Road, the Eastern Railroad constructed a line roughly parallel to it, passing through Seabrook, Hampton Falls, Hampton, North Hampton, Rye, and Portsmouth. The rail corridor runs largely to the East of Route 1 at its Northern and Southern ends, but crosses over to the West in Hampton and Hampton Falls. They soon began service along the seacoast corridor and the first dramatic changes to the corridor came shortly after when the first commuters began to be seen as the rail line offered a quick and inexpensive way to travel between towns on the Seacoast and even to Boston for work.

Electric streetcar service along Lafayette Road began at the turn of the 20th Century. The Exeter Street Railway was constructed between Exeter and Hampton along what is now Route 27 in 1897. In 1899 the Hampton and Amesbury Street Railway was built, following Lafayette road from Hampton south through Hampton Falls and Seabrook, across the State line to Salisbury and Amesbury Massachusetts. Smithtown Square, in the southern part of Seabrook, directly north of the Massachusetts state line, became a major intersection and connection point for other streetcar routes connecting to Seabrook and Hampton Beaches (along the current alignment of Route 1A), and, via Amesbury, west to Plaistow and Haverhill, and from Haverhill west to Lowell and Lawrence. The height of the streetcar era was between 1902 and 1919 (Mawson 1968:23). As private automobile ownership expanded following World War I, streetcar ridership declined. The last streetcars running along Lafayette Road were replaced by bus service by 1923. (Monroe 1995: 24).

As automobiles and trucks became increasingly common, the need for road improvements became apparent. In 1905 the State Legislature passed the State Aid Law to “secure a more uniform system for the improvement of main highways throughout the state, by the cooperation of the municipalities and the state”. The State Highway Engineer, John Storrs, proposed a system of three trunk line state highways to run from the Massachusetts border, up the valleys of the Piscataqua, Merrimack, and Connecticut Rivers, and converge in the White Mountains. The plan was designed to create arteries for commerce connecting the region’s cities and towns, and particularly to improve access to the White Mountains, whose tourism industry was becoming a major economic engine for the state (Garvin and Garvin 1988: 189). This triple trunk system was designated by law in 1909, and Lafayette Road became NH Route 1, which connected to NH Route 16 in Portsmouth and continued north to the White Mountains as the easternmost of the three trunk routes. By the 1920s NH Route 1 in Seabrook was among the most heavily traveled roads in New Hampshire, carrying an average 5800 vehicles a day. (Monroe 1995: 25) The state concentrated resources on improving these trunk routes, and between 1909 and 1926 more two thirds of the 1435 miles in the three road system had been improved to at least a gravel surface. Route 1 between Seabrook and Portsmouth was paved with cement between 1929 and 1931.

The first traffic controls appeared in the 1920’s when voters in Hampton appropriated \$795 for traffic beacons, two of which were on Lafayette Road. Six years later, these beacons were replaced the state designated US 1 as a “Through Highway” meaning that all roads entering Lafayette Road would have stop signs or lights. This led to the beacons being replaced by traffic lights.

ROUTE 1 CORRIDOR PLAN

Construction began on Interstate 95 in 1948 and was completed in 1950, with the road connecting to Route 1 in Salisbury, MA (until Massachusetts built their portion of I-95), and to the traffic circle on the Route 1 Bypass in Portsmouth. This cut traffic on Route 1 from 7,500 vehicles per day to 5000 almost immediately, but within twelve years volumes had returned to pre-turnpike levels. About that same time, concern began over traffic volumes as local population and economic growth began to put pressure on the capacity of the roadway.

Roadside attractions and lodging developed alongside Route 1 to capture business from tourists coming to the beaches on the Seacoast, or passing through on their way north to Maine or the White Mountains. Some evidence of this remains in the form of small cabin courts, motels, and roadside stands, though much has disappeared. Route 1 saw increasingly auto-oriented development through the 1940s-1970s. Between 1968 and 1974, for example, the Town of Seabrook abolished its Zoning Ordinance. During this period numerous historic buildings along Route 1 were demolished and replaced with commercial development (Monroe 1995: 30)

By the time of the Kimball-Chase study in the late 1980's, traffic levels were over 20,000 vehicles per day in some areas and forecast to go over 30,000 per day by the year 2000.

TABLE 2-1: CORRIDOR COMMUNITY DEMOGRAPHIC DATA

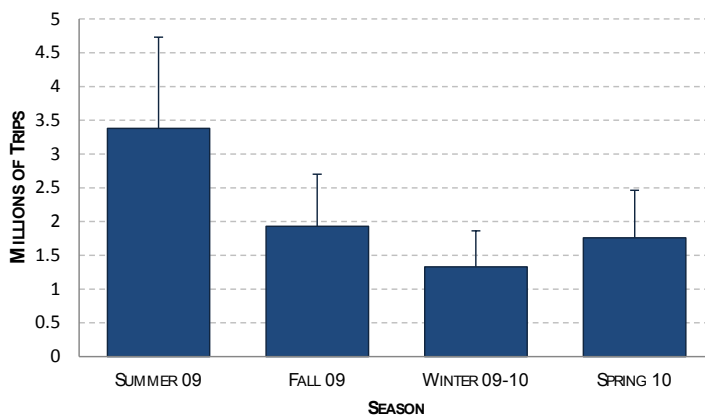
POPULATION	HAMPTON	HAMPTON FALLS	NORTH HAMPTON	PORTSMOUTH	RYE	SEABROOK	TOTAL
2010	15,430	2,236	4,301	20,779	5,298	8,693	56,737
2000	14,937	1,880	4,259	20,784	5,182	7,934	54,976
% Change	3.3%	18.9%	1.0%	0.0%	2.2%	9.6%	3.2%
AAG*	0.54%	2.89%	0.16%	0.0%	0.37%	1.52%	0.53%
EMPLOYMENT							
2009	5,487	416	2,338	27,128	1,221	6,257	42,692
2000	6,227	587	2,099	28,258	1,188	5,184	43,543
% Change	-11.9%	-29.1%	8.8%	-4.0%	2.8%	18.8%	-2.0%
AAG	-2.11%	-5.74%	1.4%	-0.68%	0.46%	2.87%	-0.33%
HOUSING UNITS							
2009 Single Family	5,416	771	1,500	4,224	2,718	1,850	15,947
2009 Multi-Family	4,217	72	146	6,097	357	1,547	12,373
2009 Manufactured	287	12	307	279	75	1,088	2,037
Total 2009	9,920	855	1,953	10,600	2,715	4,485	30,963
2000 Single Family	5,207	665	1,349	4,097	2,213	1,617	15,148
2000 Multi-Family	3,872	54	146	5,815	357	1,411	11,655
2000 Manufactured	270	10	287	274	75	1,038	1,954
Total 2000	9,349	729	1,782	10,186	2,645	4,066	28,757
% Change	6.11%	17.28%	9.60%	4.06%	19.09%	10.3%	7.67%
AAG	0.99%	2.66%	1.53%	0.66%	2.91%	1.63%	1.23%
PROPERTY & BUILDING VALUATION (IN MILLIONS)							
2010	\$2,354	\$363	\$893	\$3,594	\$1,795	\$1,349	\$10,348
2000	\$1,321	\$241	\$453	\$1,408	\$559	\$623	\$4,604
% Change	78.3%	50.9%	97.1%	155.2%	221.2%	116.7%	124.8%
AAG	9.63%	6.86%	11.31%	15.61%	19.45%	12.89%	13.50%

*AAG = Average Annual Growth Rate

2.1.2 DEMOGRAPHICS

As of 2010, approximately 56,700 people live in the six corridor communities, and nearly 43,000 jobs are located there. Generally, these numbers continue to grow from the 2000 census, although the economic downturn in recent years has lowered property valuations and employment numbers from their peaks 4-5 years ago. Population is averaging 0.53% per year growth between, housing units somewhat higher at nearly 1.2% per year, employment at about -0.33% per year over the same period mostly due to the economic changes over the last three years. During the ten years, property values increased dramatically (nearly 70%) however at their peak around 2006, values were approximately 125% higher than in 2000. *Table 2-1* includes community by community details on this demographic information.

FIGURE 2-3: ESTIMATED TOURIST TRIPS TO THE SEACOAST REGION (FY2010)



Error bars indicate that tourism levels could be up to 40% higher than estimated due to visitors traveling to multiple regions during a trip to New Hampshire.

In addition to those living and working in the communities in the US 1 corridor, the Seacoast of New Hampshire receives roughly 8 million visitors per year, with almost half occurring during the summer months (*Figure 2-3*). A large portion of these travelers pass through or along US 1 to reach the beaches increasing traffic volumes along the corridor and in the region greatly. When this volume is added to the daily locally generated traffic, it creates summer traffic levels that are 35% greater than winter levels. Sundays especially see a large amount of growth during summer months, increasing about 46% over winter volumes.

2.1.3 CORRIDOR DESCRIPTION

The study area is slightly over 13 Miles long and includes only a portion of the roadway in Portsmouth as much of the remainder of US 1 in that city has either recently completed construction or is work that is expected to begin within the next several years. *Table 2-2* shows the basic information about the corridor regarding distance, traffic signals, intersections and driveways. Currently, Route 1 varies from a two lane roadway in the more rural portions of the corridor to five lanes in some of the more urbanized segments. Over the years various individual improvements to the corridor have been constructed resulting in a roadway that is inconsistent in design and functionality.

The corridor is heavily urbanized in most areas, but has some sections that remain less developed and more rural in nature. US 1 acts as main street for several of the communities, notably Hampton, Hampton Falls, and Seabrook and is a major consideration in all of the other communities.

PEDESTRIAN AND BICYCLE FACILITIES

There are sidewalks on portions of the corridor, primarily in the more urbanized sections including much of Hampton, parts of Seabrook, and Portsmouth north of the study area. The more rural regions do not have sidewalks but have wider shoulders in many cases. There are some sections of the roadway that currently have no sidewalks

ROUTE 1 CORRIDOR PLAN

TABLE 2-2: CORRIDOR STATISTICS

COMMUNITY	MILES OF US 1 IN STUDY AREA	SIGNALIZED INTERSECTIONS	UNSIGNALIZED INTERSECTIONS	DRIVEWAYS	AVERAGE DRIVEWAYS/ MILE
Portsmouth	2.35	5	7	87	37.0
Rye	1.19	1	2	32	26.8
North Hampton	3.35	2	17	141	42.1
Hampton	2.88	3	11	148	51.4
Hampton Falls	1.71	2	3	106	61.9
Seabrook	2.42	7	12	125	51.6
<i>Totals</i>	13.9	20	52	639	45.97

and narrow shoulders. There are also many segments that have shoulders wide enough for bicycle travel but the large number of driveways and high traffic volumes limit the use of US 1 as a safe and desirable bicycle route.

SCENIC BYWAYS

The American Independence Byway loops from Exeter to Kensington and then into Hampton Falls where it follows US 1 from NH 84 across the marsh to Hampton. The byway turns off of US 1 at Winnacunnet Road where it connects to NH 1A north to NH 27/High Street where it crosses US 1 before returning to Exeter.

Presently there is a study underway (Fall, 2007) to establish a route for the East Coast Greenway that will, in the short term, follow at least a portion of US 1 through the study area, and is looking to utilize a portion of the B&M railroad right of way to construct an off-road facility through the Seacoast in the long term.

TRANSIT FACILITIES AND SERVICES

There is currently a regular transit route that runs along only the most northern portion of the study area. The COAST Trolley service travels along US 1 and turns around just south of Ocean Road at the Hillcrest Estates. There are no transit stops marked or other accommodations along the corridor for buses as there is no scheduled service south of Portsmouth.

In addition to the COAST fixed route service, Lamprey Health Care provides a free demand response service along Route 1 on Fridays only (*Figure 2-4*). The service is open to all but intended mainly to be utilized by seniors, people who are unable to ride the regular bus because of a disability, those who meet low income requirements, and others without access to automobiles. To facilitate that, the bus will make additional stops deviating up to one mile from it's regular route to provide service upon request. This service consists of a single trip northbound in the morning starting in Seabrook and making several stops along the corridor before continuing to Market Square in Portsmouth, and ending at the Fox Run Mall in Newington. The service makes a return trip in the afternoon reversing the same stops from Newington to Seabrook.

FIGURE 2-4: LAMPREY HEALTH COASTAL SERVICE REGULAR STOPS	
Seabrook: <ul style="list-style-type: none"> • Seabrook Community Center • Seabreeze Village • Ocean Mist 	Portsmouth: <ul style="list-style-type: none"> • Hillcrest Estates • Lafayette Prof. Park • Seacoast Mental Health • Margeson Apartments • Feaster Apartments • Market Square • Woodbury Manor
Hampton: <ul style="list-style-type: none"> • Galley Hatch Restaurant • Ross Apartments • Bailey's Beach Resort • Atlantic Heights • Dearborn House • Hampton Arms 	
North Hampton: <ul style="list-style-type: none"> • Village Shopping Center • Shell AI Mobile Estates 	Newington: <ul style="list-style-type: none"> • Crossings @ Fox Run • Fox Run Mall

Intercity bus transit service, provided by C&J Trailways, travels along I-95 between Portsmouth and Boston stopping in Newburyport. This service previously stopped at the NH DOT Park and Ride just off of NH 101 in Hampton, but low ridership resulted in the elimination of service to that location. Regional rail service via the Downeaster stops in nearby Exeter but does not stop in any of the US 1 corridor communities. There has been some discussion of developing a bus service that would connect the Downeaster to the coastal communities, but this has yet to be explored in any detail.

2.2 LAND USE PLANS, ZONING, AND SITE PLAN REGULATIONS

Land use planning plays a critical role in establishing development patterns in a community. This is established through the goals and policies of the Community Master Plan and carried out through the Zoning Ordinance and the subdivision and site plan review processes.

2.2.1 COMMUNITY MASTER PLAN

A municipality's master plan is an integral document to its land use planning process, depicting historic aspects and future visions for the community. The Master Plan is the primary document which provides the reasoning and foundation for zoning ordinances, site/subdivision regulations, Capital Improvement Plans, and serves as the foundation for land use policies in town. Because of this, the documents of communities in the Route 1 corridor are important to review as a component of the transportation corridor study.

There were many common themes in the master plans reviewed. Primarily, it was stressed that Route 1 is a major thoroughfare interconnecting the communities and that it is also seen as a substitute roadway for drivers looking to avoid the tolls and related congestion on Interstate 95. Another common theme was the desire to maintain the "rural character" of the community via preservation and enhancement of open spaces, historic and cultural features, town centers and wooded lots. Many towns addressed the fact that the almost exclusively commercial development along Route 1, and the resulting traffic generated, has negatively impacted community character. Concern regarding traffic safety was the final common theme mentioned, and many of the master plans identified key intersections that are prone to accidents. The safety theme often extended to the issue of pedestrian safety in town centers as they crossed streets between stores.

The following are some community specific concerns and goals from the respective master plans that relate to the Route 1 Corridor Study:

- **Portsmouth:** Lafayette Rd. near Rye Town Line - On Route 1 near Coach Road, there is a section zoned Industrial that has seen little development. The Master Plan acknowledges that rezoning the land to General Business would allow for multi-family units to be built. This land use would fit better with the nature of the surrounding land uses such as Wren Village to the north and the general business zone to the east of Route 1, however the development of this land would add traffic to the corridor.
- **Rye:** Additional development along Rye's portion of Route 1 is supported and interest is expressed in extending Portsmouth's sewer service to aid that development. Current development is close to land use limits, and implementing a user financed system would help support development along this transportation corridor. There is concern about the mobile home park on Route 1 being converted to commercial use as this neighborhood offers approximately 50 affordable housing units for Rye.

ROUTE 1 CORRIDOR PLAN

- **North Hampton:** There is an understanding that Route 1 has a strong influence on transportation patterns for the entire town and that arbitrary and unchecked development will result in significantly increased travel times for everyone. One of the goals is to manage all access to US 1 and keep the corridor from relying solely on traffic signals to control traffic volume.
- **Hampton:** The transportation chapter of the Master Plan identifies three intersections that were failing or had poor traffic conditions; Route 1/Winnacunnet Road, Route 1/NH 27 (High St.) and Route 1/NH 151 (Post Road). Issues such as poor traffic flow and unsightly strip development are concerns for residents in Hampton, as is protecting and enhancing the historical Hampton Town Center as a significant community resource with redevelopment. The Town is interested in developing the section of Route 1 south of downtown extending to Hampton Falls in a controlled manner and it is proposed to extend the sewer system to aid that development.
- **Hampton Falls:** Route 1 is considered the root of traffic congestion concerns in Town and this is largely believed to be due to traffic diverting from Interstate 95 to avoid congestion or the tolls. A primary concern is also the number of intersections which have safety issues, and the Master Plan references the Kimball-Chase study which identifies the intersections of Route 1 with Route 88 and Route 1 with Route 84 as being problematic. At the same time, the Town is very concerned with how major improvements (widening) to those intersections might impact the village.
- **Seabrook:** Traffic congestion and traffic safety hazards along Lafayette Road are among the most pressing transportation issues facing the Town. The Master Plan proposes improving Route 1 northward from Rocks Road to the Hampton Falls town line, and southward from Wal-Mart to the Salisbury town line by widening the roadway to five lanes, and adding sidewalks, crosswalks, and bicycle lanes. Studying the feasibility of constructing north-south alternatives to Lafayette Road is also advocated. Possible corridors include one running parallel to I-95, from Folly Mill road in the south to Fogg's Lane, and on to Hampton Falls. Another would be to connect Folly Mill Road with Whittier Drive which would allow drivers go from the Post Office to Pine Street without using Route 1. A connector road is also recommended from Railroad Avenue to the South Access Road (Provident Way). Such a roadway will eliminate much of the truck traffic from the residential sectors of Railroad Avenue, and will facilitate the development of industrially zoned property along the South Access Road. The Master Plan recommends re-connecting the eastern segment of Folly Mill Road with that road's western segment which would provide a much-needed alternative to Route 107 that is currently Seabrook's only westerly evacuation route during an emergency.

A variety of solutions are offered in the master plans to assist in mitigating the traffic concerns along Route 1. Generally these fall into several categories; Encouraging alternative methods of travel, improvements to the roadway itself, and land use changes. Some specific solutions described are:

- Implement the concepts of nodal development and mixed use areas oriented for pedestrians and transit use (Portsmouth).
- Develop an access management plan, with the goals of being to improve traffic flow, reduce accidents, beautify downtown areas, and shield Route 1 from the consequences of unimpeded access and keep from relying solely on traffic signals to control traffic (North Hampton).
- Implement pedestrian and bicycle access improvements to alleviate the traffic on Route 1 (North Hampton).
- Monitor the need for public transportation, particularly for the elderly and the handicapped, & link service needs into regional transportation plans (North Hampton).
- New development should only occur where existing transportation facilities are adequate or where necessary improvements will be made as part of a development project (North Hampton).

ROUTE 1 CORRIDOR PLAN

- Install a traffic signal at the Route 84 intersection (Hampton Falls).
- The Route 88 intersection should be reconstructed to a standard 4 way intersection with a raised median. It is further suggested that the entire length of Route 1 in Hampton Falls be redesigned into a 5 lane roadway with a raised median and appropriate median openings at intersections (Hampton Falls).
- COAST has identified a need for a fixed schedule system along Route 1 however funding has constrained the program. The towns should encourage the expansion of the system in the community (Hampton Falls).
- A Memorandum of Understanding should be signed with NHDOT to allow the town to have more input into the curb cut applications along state highways (Hampton Falls).
- A zoning amendment should be considered to prohibit or limit development of large shopping centers and other high traffic generators as one solution to help curb the increase traffic congestion on Route 1 (Seabrook).
- Commercial areas should be considered to concentrate that land use away from residential land uses. The Route 1 corridor is identified as the area where all large scale development should be located (Seabrook).
- Traffic signals should be synchronized to increase the efficiency of traffic flow (Seabrook).
- A by-pass for Route 1 in Seabrook should be considered (Seabrook).
- Widening of Route 1 is suggested for two portions of Route 1; from Rocks Road to the Hampton Falls town line, and between Pine St. and Boynton Lane (Seabrook).
- Sidewalks and crosswalks are encouraged for pedestrians within a commercial development and also to connect with adjoining developments (Seabrook).
- Adjacent parking lots for shopping centers should be interconnected. This will reduce congestion by eliminating some of the need to access Route 1 (Seabrook).
- Steps should be taken to preserve the rail corridor for light rail service (Seabrook).

2.2.2 ZONING

Zoning districts along the corridor vary by community, but typically are a mixture of highway commercial and residential areas, with occasional industrial or mixed use seen as well. *Maps 2-1 and 2-2* show the zoning set for the corridor for each community, while *Maps 2-3 and 2-4* follow with the current land use within the study area. *Table 2-3* shows a summary of the basic zone types as well as developed and undeveloped acreage for the study area (1000 feet on either side of Route 1), while *Table 2-4* shows other zoning information for the corridor such as frontage and setback requirements. A detailed listing of the zoning for each community is included as an appendix to the study. Most communities have significant acreage in the study area around US 1, with Greenland being the exception. Greenland has a small commercial district that within the study area that includes two parcels fronting on Route 1, the largest being approximately 18 acres. A third smaller parcel is in close proximity on Breakfast Hill Rd.. North Hampton has the longest stretch of US 1, and most acreage at just over 800 within the study area. Most of the direct frontage on Route 1 is commercial of some type, but the study area is split almost equally between commercial (45.5%) and residential (41.5%) zoning, with a small amount of industrial (3.9%), and nearly 300 acres of mixed use (9.1%).

Overall, the land within the study area is approximately 56% developed (2005 data) based on current zoning standards. However, it is likely that much of the property is not being utilized at the highest intensity allowable. Seabrook is the most “developed” overall within the corridor, at 70% of available land, and 80% of all available

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TABLE 2-3: CORRIDOR LAND UTILIZATION (ACRES)

		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		MIXED USE		ALL USES	
Portsmouth	Developed	100	73.8%	61.5	62.6%	22.6	55.5%	1	100%	185.1	67.2%
	Undeveloped	35.5	26.2%	36.7	37.4%	18.1	44.5%	0	0.0%	90.3	32.8%
	<i>Total</i>	135.5	100%	98.2	100%	40.7	100%	1	100%	275.4	100%
Rye	Developed	31.6	29.7%	39.4	28.9%	—	—	—	—	71	29.3%
	Undeveloped	74.7	70.3%	96.9	71.1%	—	—	—	—	171.6	70.7%
	<i>Total</i>	106.3	100%	136.3	100%	—	—	—	—	242.6	100%
Greenland	Developed	9.6	31.7%	1.3	7.8%	—	—	—	—	10.9	23.2%
	Undeveloped	20.7	68.3%	15.4	92.8%	—	—	—	—	36.1	77.0%
	<i>Total</i>	30.3	100%	16.6	100%	—	—	—	—	46.9	100%
North Hampton	Developed	133	61.0%	380.6	63.8%	—	—	—	—	513.6	63.1%
	Undeveloped	85	39.0%	215.5	36.2%	—	—	—	—	300.5	36.9%
	<i>Total</i>	218	100%	596.1	100%	—	—	—	—	814.1	100%
Hampton	Developed	195.6	46.6%	—	—	—	—	204.5	73.7%	400.1	57.4%
	Undeveloped	224	53.4%	—	—	—	—	73	26.3%	297	42.6%
	<i>Total</i>	419.5	100%	—	—	—	—	277.4	100%	696.9	100%
Hampton Falls	Developed	48.6	34.4%	93.2	34.4%	—	—	—	—	141.8	34.4%
	Undeveloped	82.9	58.7%	174.7	64.5%	—	—	—	—	257.6	62.5%
	<i>Total</i>	141.3	100%	270.7	100%	—	—	—	—	412	100%
Seabrook	Developed	122.9	59.8%	209.1	80.1%	47.7	62.7%	—	—	379.7	70.0%
	Undeveloped	77.4	37.6%	52	19.9%	28.5	37.5%	—	—	157.9	29.1%
	<i>Total</i>	205.6	100%	261.1	100%	76.1	100%	—	—	542.8	100%
Corridor	Developed	641.3	51.0%	785.1	56.9%	70.3	60.2%	205.5	73.8%	1702.2	56.2%
	Undeveloped	600.2	47.8%	591.2	42.9%	46.6	39.9%	73	26.2%	1311	43.3%
	<i>Total</i>	1256.5	100%	1379	100%	116.8	100%	278.4	100%	3030.7	100%

commercially zoned property, being utilized. Portsmouth is only slightly less developed in the corridor at 67%, however nearly 74% of the residential land in the study area is in use. In terms of the percentage of property developed, the segment of the corridor through Rye and touching on Greenland has the at less than 23% and 29% of property being utilized respectively. North Hampton has the most land available for development on the corridor

2.2.3 SUBDIVISION AND SITE PLAN REVIEW REGULATIONS

Subdivision regulations and site plan review are intended to ensure that development of a community is orderly by requiring that subdivisions are served with adequate utilities, appropriate access, and pursue the goals of the community master plan. The purpose of these regulations is to provide for a community review and approval process that is consistent for all property subdivisions and consolidations, lot line adjustments, easement plans, and any subsequent revisions to those. The regulations of each community are intended to promote sound development standards, provide for compatible land uses and proper distribution, minimize congestion and overcrowding, and ensure proper infrastructure.

For the most part along the Route 1 corridor the standard community subdivision and site plan regulations apply although many have additional requirements that must be met. Frontage minimums range from 100-250 feet for the most part although there is a 60 foot frontage minimum zone in Hampton. Rye has specific driveway spacing

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requirements and a 60' setback for commercially zoned properties on US 1 (30' on other roads). *Table 2-4* shows the zoning, subdivision, and site plan regulations that influence traffic flow and safety on Route 1.

With the exception of Portsmouth, the communities on the corridor have driveway design requirements in place that at least set width specifications. Seabrook's ordinance is the most comprehensive, requiring specific width, curve radii, and approach angles. Many of the remaining communities utilize the NH DOT driveway standards both on State Highways and local roadways. In most cases, the Planning Board is responsible for setting the approved driveway width for each particular development although in Hampton, this responsibility is given to the Fire Department.

TABLE 2-4: GENERAL ZONING, SUBDIVISION, AND SITE PLAN REGULATIONS

		PORTSMOUTH	RYE	NORTH HAMPTON	HAMPTON	HAMPTON FALLS	SEABROOK
MINIMUM LOT SIZE	RESIDENTIAL	15,000 sf	66'000 sf	2 Acres	6,000-43,560 sf	2 Acres	15,000-30,000 sf
	COMMERCIAL	3 Acres	44,000 sf	2 Acres	10,000 sf	2 Acres	30,000 sf
	INDUSTRIAL	2 Acres	NA	2 Acres	22,000 sf	NA	30,000 sf
	MIXED USE	1 acre	NA	NA	15,000 sf	NA	NA
FRONTAGE	RESIDENTIAL	100-150'	200'	175'	60'-200'	250'	100'
	COMMERCIAL	300'	150'	250'	100'	250'	125'
	INDUSTRIAL	200'	NA	250'	100'	NA	125'
	MIXED USE	100'	NA	NA	125'	NA	NA
FRONT SETBACK	RESIDENTIAL	30'	40'	30-35'	10-20'	50'	20'
	COMMERCIAL	50'	60' (US 1 Only)	50'	10'	25'	30'
	INDUSTRIAL	70'	NA	50'	30'	NA	50'
	MIXED USE	30'	NA	NA	10'	NA	NA
MUNICIPAL SEWER		Yes	Yes	No	Yes	No	Yes
IMPACT FEE ORDINANCE		Yes	No	No	Yes	No	Yes
ACCESS MANAGEMENT ORDINANCE		No	No	No	No	No	No
PARKING REQUIREMENTS		Yes	Yes	Yes	Yes	Yes	Yes
CORNER CLEARANCE REQUIREMENT		50'	50'	NHDOT Standards	15'	No	25'
DRIVEWAY SPACING REQUIREMENT		50'	100' from intersections	100'	No	No	20'
DRIVEWAY ACCESS ON LESSER STREET		No	Yes	No	No	No	No
INTERIOR ACCESS REQ FOR PLANNED DEVELOPMENTS		No	Yes	No	Yes	No	Yes
SIGHT DISTANCE REQUIREMENTS		400'	500'-600'	NHDOT Standards	No	NHDOT Standards	NHDOT Standards
DRIVEWAY DESIGN REQUIREMENTS		No	Width Only	NHDOT Standards	Width Only	NHDOT Standards	width, curve radii, approach angle
APPROACH ANGLE		90° preferred, no min	No	75° minimum	No	No	90° preferred, 60° min
DRIVEWAY LIMITATIONS		No	1 Unless frontage >300'	1 Unless frontage >300'	No	1 Preferred	1 unless frontage >500'
OFFSET REQUIREMENTS		No	300'	100'	No	No	Yes (200')
TRAFFIC IMPACT ANALYSIS REQUIREMENTS		Yes	Yes	Determined by Planning Board	Determined by Planning Board	Determined by Planning Board	Determined by Planning Board

Setbacks on the corridor range from 10' from the edge of pavement in some sections of Hampton to 70' in some Portsmouth zones.

Many of the communities have set corner clearance standards. Rye and North Hampton have set limitations on driveways within 100' of an intersection, while Portsmouth requires 50' and Seabrook 25'. North Hampton also has driveway spacing standards set at the same 100' distance.

Traffic Impact Analysis (TIA) Requirements have been implemented for subdivision applications in the communities along US 1 to ensure that adequate provisions have been made to address the traffic needs of the new development. The decision to require this type of study is usually based on the issues involved in the particular application such as size, location, or other traffic-generating characteristics of the proposal. A Traffic Impact Analysis usually addresses the following items to some degree: Traffic circulation, access and egress, adequacy of adjacent streets and intersections, entrances and exits, traffic flow, sight distances, accident statistics, curb cuts, turning lanes, and existing or recommended traffic signalization. In addition, pedestrian and bicycle accommodations, parking, emergency access and other aspects can be examined. Often communities employ the services of a consultant to review the TIA (often at developer expense) and to ensure that adequate provisions are made in the development plan to reduce or eliminate those impacts. Most of the communities leave the decision to require a TIA to the Planning Board, however Seabrook and Rye require them for all developments over a certain size. All communities address the general contents of the TIA, but generally not the specific methodologies, thresholds, or requirements for analysis, although Portsmouth does require that level of service "C" is maintained after a development is in place.

2.3 HISTORIC & CULTURAL RESOURCES

The scope of work for the Existing Conditions Analysis component this Corridor Study calls for identification of historic and cultural resources within the corridor study area. While the Corridor Study does not in and of itself trigger a review of cultural resource impacts under Section 106 of the National Historic Preservation Act or Section 4f of the Department of Transportation Act, the individual projects that will eventually stem it will require these reviews. In anticipation this, a preliminary survey was conducted to identify historic resources that should be accounted for in planning to minimize adverse impact.

Accordingly, this section contains several components; A summary of key regulations addressing historic preservation and transportation planning and project development; a description of the survey methodology used and discussion of the survey findings; and overall findings and recommendations.

2.3.1 REGULATORY FRAMEWORK

A number of federal laws govern how federally-funded or federally-permitted transportation project must deal with historic resources. Primary among these are Section 106 of the National Historic Preservation Act, and Section 4f of the Department of Transportation Act. The requirements of these two laws are described below. In addition to federal laws, local historic district regulations can also have purview over how transportation projects may impact historic properties. Local regulations are discussed briefly at the end of the section.

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NATIONAL HISTORIC PRESERVATION ACT & THE REGISTER OF HISTORIC PLACES

The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act (NHPA) of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed on the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture.

The National Register is administered at the national level by the National Park Service (NPS). Here in New Hampshire, the New Hampshire Division of Historic Resources (NHDHR) administers the National Register program. In most cases, listing on the National Register is largely honorific, and has limited impact on private sector development related to the property. However, for federally funded or permitted projects, the National Register has a more specific regulatory role under Section 106 of the NHPA.

Section 106 requires federal agencies to take into account the effects of their activities and programs on any historic district, site, building, structure, or object that is included, or eligible for inclusion, in the National Register of Historic Places. The resources and the effects on those resources are inventoried and evaluated by the State Historic Preservation Office (SHPO) in the New Hampshire Division of Historical Resources as well as the federal agencies having jurisdiction, which in this case is the Federal Highway Administration (FHWA). Prior to the approval of the undertaking, the agency must afford the Advisory Council on Historic Preservation (ACHP), established under Title II of the NHPA, a reasonable opportunity to comment on the undertaking.

The procedures that govern the Section 106 process are set forth in 36 CFR 800, Protection of Historic Properties, and issued by the ACHP. The Council does not have the authority to halt or terminate projects that will affect historic properties but rather consult with the responsible federal agencies, the SHPO, and other interested parties, to identify, evaluate eligibility, determine the potential effect of the project on historic properties, and if possible, to agree upon ways to protect those that are affected.

Only one property in the study area is currently listed on the National Register of Historic places. This is the Governor Mesech Weare House in Hampton Falls which is located on Route 88/Exeter Road at the western end of the Town Common on Hampton Falls. Two additional properties in the study area are known to have been formally determined eligible for inclusion on the Register. These are the Sanborn School and the Old South Meetinghouse in Seabrook, and were identified in the Town-Wide Area Form completed in 1995. Seabrook is the only corridor community for which a Town-Wide Area Form, essentially a comprehensive survey and history of the built environment in the town, has been completed.

There may be other properties in the study area that are eligible for inclusion on the National Register but have not been formally evaluated to make this determination. These evaluations tend to happen as part of the preparation of historic resource inventories, and there has not been one for this study area. A summary of inventories and individual property files in the archives at NHDHR is included in the following section.

DEPARTMENT OF TRANSPORTATION ACT – SECTION 4F

For federally funded transportation project there are also requirements under Section 4f of the Department of Transportation Act of 1966 (49USC 3030). Section 4(f) states that "...special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges and historic sites." Regulations governing 4(f) implementation specify that there can be no taking of public park or recreation lands or impairment of wildlife and waterfowl refuges or historic sites without a thorough investigation into all

“prudent and feasible alternatives”. Such alternatives may range from project modifications to “no-build.” If it is determined that no prudent and feasible alternative exists and that public park or recreational lands, wildlife and waterfowl refuges, or historic sites must be acquired or impaired, the FHWA must demonstrate that implementation or other alternatives would result in extraordinary costs, and/or social, economic, or environmental impacts. In addition, the proposed project or program must include all possible planning to minimize harm to these properties and resources.

LOCAL HISTORIC DISTRICT REGULATIONS

While several of the Corridor Communities have locally-designated Historic Districts and Historic District Commissions (Portsmouth and North Hampton, for example), none overlap with the study area. A historic district encompassing much of Hampton Falls’ Town Center has been proposed in recent years, but not yet enacted. Local Historic Districts can often exert more influence in protecting historic resources than federal rules, as municipalities can enact anti-demolition ordinances and regulate alterations to structures.

2.3.2 INVENTORY AND RELATED RESEARCH

The scope for this preliminary assessment of historic resources in the U.S. Route 1 Corridor included a review of existing materials on file at the NH Division of Historic Resources that document historic properties in the Corridor. In addition, a windshield survey of properties along Route 1 was conducted to update previous inventories, and identify resources in areas not previously surveyed, or that may have attained significance under the criteria of the National Register subsequent to the completion of previous efforts.

REVIEW OF DOCUMENTATION AT THE NH DIVISION OF HISTORIC RESOURCES

Materials in the archives at the NH Division of Historic Resources include nominations of individual structures and districts for National Register designation, or determinations of eligibility for the National Register. Also included are broader cultural resource surveys completed as part of Section 106 reviews for highway, pipeline, cell tower, or other infrastructure projects. Given limited resources for historic and cultural resource inventories, few towns have comprehensive inventories of their cultural resources, known as Town Wide Area Forms. Seabrook is in fact the only corridor community to have a Town Wide Area Form and the inventories that exist are typically limited to the project areas of the particular infrastructure projects that triggered federal mandates.

Inventories for Corridor Communities on file at the NH Division of Historic Resources include the following:

TOWN OF SEABROOK

- Multi-Town Area Form –Eastern Railroad Corridor
- Town-wide Area Form – Town-wide survey completed in 1995
- Individual property forms for two properties

TOWN OF HAMPTON FALLS

- Individual property forms for approximately 5 properties

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TOWN OF HAMPTON

- Multi-Town Project Area Form – NH 101/ NH 51 Project
- Multi-Town Area Form –Eastern Railroad Corridor
- Project Area Form – Hampton Village Intersection Improvement Project
- Town Area Form – Exeter Road Rural Historic District
- Individual property forms for approximately 8 properties

TOWN OF NORTH HAMPTON

- Multi-Town Area Form –Eastern Railroad Corridor
- Project Area Form – NH 111 over B & M Railroad Bridge (#11613)
- Area Form – Little Boars Head Historic District
- Individual property forms for approximately 6 properties

TOWN OF RYE

- Multi-Town Area Form –Eastern Railroad Historic District
- Area Form – Abeniqui Country Club
- Area Form – Seavey Creek/Odiorne Point
- Individual property forms for approximately 12 properties

CITY OF PORTSMOUTH

- Multi-Town Area Form – Eastern Railroad Corridor
- Multi-Town Area Form – Portsmouth Branch Railroad Corridor
- Project Area Form – Greenland Road (#10665)
- Project Area Form – Pipeline in Greenland-Portsmouth NH 33 Area
- Individual property forms for approximately 43 properties

Several of these documents are referenced in this section and the inventory on the following pages. In particular these include the Town Wide Area Form for Seabrook, the Multi-Town Area Form for the Eastern Railroad Corridor, and the Project Area Form for Hampton Town Center. Also useful was a 2003 inventory of buildings in Hampton conducted for the Hampton Historical Society.

WINDSHIELD SURVEY

MPO staff undertook a windshield survey of all properties along Route 1 that appeared to meet the 50 year age threshold for eligibility for the National Register of Historic Places. *Appendix B* contains a table including photographs of each of these properties, keyed to a corridor map. Each property listed in the table includes information on town, street address, historic and/or current property name, approximate date of construction, qualitative assessment of likely eligibility for the National Register, and any notes related to historic significance or

details of the structure and any modifications. If a property has been formally determined eligible for the National Register based on previous inventory work, it is noted in the survey table and the findings section. However, the survey and discussion in this chapter do not make a formal determination of eligibility for the National Register, and consequent requirements that may be imposed by Section 4f.

2.3.3 FINDINGS

Despite a loss of much historic fabric in the Route 1 corridor due to modern construction, a number of individual properties and districts exist in the corridor which could be found eligible for inclusion on the National Register of Historic Places, and therefore should be handled with particular care in planning for highway improvements.

- The only property in the study area listed on the National Register of Historic Places is the Governor Mesech Weare House in Hampton Falls, situated on the Town Common. Two additional properties in the study area have been formally determined eligible for inclusion on the Register. These are the Sanborn School and the Old South Meetinghouse in Seabrook.
- Key areas with concentrations of potentially Register eligible structures include Hampton Falls Town Center, Hampton Town Center and the Smithtown area of Seabrook. Hampton Town Center has been surveyed by NHDHR, and most of the buildings listed in the inventory were identified as contributing to a potential district. Similarly, a local historic district has been proposed for the center of Hampton Falls. While fewer contiguous buildings remain in the Smithtown area of Seabrook, this area will require particular care in designing roadway capacity expansions to minimize adverse impact. As these are the three major zones in the Corridor that also serve as Main Streets for their communities, care is warranted in these areas beyond the historic significance of the buildings themselves.
- Several high style house and barn complexes exist in the corridor which would be readily identifiable to a passerby as historically significant, including the Jonathan Moulton House in Hampton, and the Hobbs Farm and Drake Farm in North Hampton. The Hobbs Farm and adjacent structures that were owned by other Hobbs family members may have potential for a small historic district.
- Numerous less grand farmsteads dating to the 18th and 19th centuries still exist in the corridor and could be found eligible, such as the Smith House in Seabrook, the Towle House in Hampton, and other houses for which names have not been identified.
- Relatively few early 20th century resources remain in the corridor. Examples of early automobile-oriented development are difficult to find. A cabin court in Seabrook is one example of this, but few other examples such as gas stations, motels, or roadside stands remain.

2.4 ENVIRONMENT & NATURAL RESOURCES

There has been extensive effort into identifying lands in New Hampshire that provide important ecological services and which the loss of can affect health, safety, quality of life, or economic consequences. Two sources of natural resource data have been development that provide information for the region: The New Hampshire Natural Services Network, and the Land Conservation Plan for New Hampshire's Coastal Watersheds. The New Hampshire Wildlife Action Plan also provides another important data set useful in identifying high-value resources areas. Both the Wildlife Action Plan and the Natural Services Network contain data at state, regional, and municipal scales

and are therefore available for the entire corridor, as is the Land Conservation Plan which contains data for only the coastal watershed region of New Hampshire. These documents have been utilized as a primary source of first identifying the natural resources present in the vicinity of Route 1, as well as potential opportunities for future mitigation activities that involve habitat protection and resource conservation. The three resource documents cover the following areas:

- ***The Natural Services Network (NSN)*** is a GIS based utility that displays resource information for use at multiple scales (municipal, regional, state), and incorporates additional data, such as resources of local importance. The NSN includes information on water supply, flood storage, economically important soils, significant wildlife habitat, NH Wildlife Action Plan supporting landscapes, local natural resource inventory data, local land protection priorities, land trust protection priorities, class VI roads, recreation trails, active farms, and tree farms. This is organized around four components:
 - Water supply lands include highly transmissive aquifers identified by the US Geological Survey and favorable gravel well sites identified by the NH Department of Environmental Services.
 - Flood storage lands include 100-year floodplains identified by FEMA and lacustrine (associated with lakes), riverine (associated with rivers), and palustrine (other non-tidal) wetlands identified by the USFWS National Wetlands Inventory.
 - Productive soils include prime farmland and farmland of statewide importance identified by the Natural Resource Conservation Service.
 - Important wildlife habitat includes habitat of statewide priority and habitat of eco-regional priority identified by the NH Fish & Game Department Wildlife Action Plan.
- ***The Land Conservation Plan for Coastal Watershed*** contains information on forest ecosystems, freshwater ecosystems, irreplaceable coastal and estuarine resources, critical plant and wildlife habitat, and conservation focus areas.
- ***The NH Wildlife Action Plan*** includes information on wildlife habitat land cover, highest-ranking habitat by ecological condition, conservation focus areas, and species distribution.

All three resources provide information that can help individual jurisdictions understand their natural assets in the regional context. They also provides a framework for open space planning at the regional or local scale, foster collaboration across political boundaries to protect essential ecological resources and provide a rational nexus for zoning districts or overlays. For the Purposes of the Corridor Plan, this information will be utilized to identify resources within and adjacent to the road to identify those areas to avoid when designing specific improvements, and to locate sources of mitigation for impacts that cannot be avoided. ***Maps 2-5 and 2-6*** show the information for the corridor contained in the Natural Resources Network (which includes information from the NH Wildlife Action Plan), and the Land Conservation Plan.

There are a number of natural resources that constrain the type and extent of improvements that can be completed along US 1. Flood storage areas are extensive, although they are generally set back significantly from the roadway. Areas of nearby surface water exist between Lake Shore Drive and Folly Mill Road in Seabrook and between Brimmer Lane and NH 84 (Kensington Road) in Hampton Falls. Water supply areas are adjacent to the corridor along much of US 1 in Hampton as well as smaller areas in North Hampton, Rye, and Greenland. Wildlife habitat lands are extensive through the salt marsh, much of North Hampton (north of Atlantic Avenue), and extending through Rye and Greenland and into Portsmouth. Productive (farmland) soils are prevalent throughout the corridor with most of the larger areas occurring Between Hampton Falls and Rye and some smaller areas in Portsmouth and Seabrook.

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In that regard, the Coastal Conservation Plan establishes Conservation Focus Areas in the region that are considered to be of exceptional significance for the protection of living resources and water quality in the coastal watersheds. There are four of these within the study area boundaries:

- ***The Hampton Marsh*** contains high quality stream watersheds, portions of several major rivers, streams, and tidal channels, over 3000 acres of salt marsh, several important plant and wildlife species and accompanying habitat, as well as sources of fresh water (wells and wellhead protection areas), and agricultural lands. US 1 travels through Hampton Marsh on a narrow causeway that has existed since the 1700s and which constrains the roadway to the current cross-section. Any widening of the roadway in this location would likely require that existing flooding and water flow issues in the area be mitigated.
- ***The Middle Little River*** focus area is located between Atlantic Avenue and North Road in North Hampton and is part of the coastal drainage system. It contains one large block of unfragmented forest and wildlife habitat, important stream reaches (Little River), prime farmlands as well as farmlands of statewide importance. In addition, the area contains wellhead protection sites, access to a high yield aquifer, and flood storage areas. It is closest to Route 1 in the vicinity of Hobbs Road however it is not likely close enough to influence the design of improvements other than raising awareness of the water supply areas around Elm Road and North Road.
- ***Packer Bog*** in Greenland, Rye, and Portsmouth provides 800 acres of forests, tidal and non-tidal streams, a large aquifer and multiple wellhead protection areas. The bog includes important plant and wildlife habitat, prime farmlands and those of statewide importance. The bog approaches US 1 most closely in the vicinity of the Rye-Portsmouth boundary providing both flood storage and wildlife habitat in the area. The productive farmland soils surround the corridor from North Road in North Hampton through Washington Road in Rye.
- ***Upper Little River*** focus area is located on the west side of US 1 in North Hampton from North Road north to the Town boundary with Greenland. This region contains over 100 acres of farmland of statewide importance and another 55 acres of prime farmland. Further, there are nearby wellhead protection areas and important stream reaches. While this area is in the corridor study area, it is not close enough to be directly impacted by roadway improvements.

CHAPTER 3:

CORRIDOR ANALYSIS

The assessment and analysis of the traffic conditions on the corridor is contained within this section of the Corridor Plan. First is a discussion of existing operating conditions and analysis of current traffic volumes and patterns and traffic safety followed with an analysis of expected future year volumes and conditions for the corridor for both a “no-build” and a “build” condition. The no-build assumes that only projects currently programmed for construction are completed, while the build assumes that all recommended roadway improvements are constructed.

3.1 CURRENT OPERATING CONDITIONS

The most recent available traffic data compiled by the Rockingham Planning Commission (RPC) and the New Hampshire Department of Transportation (NHDOT) was utilized to determine the existing traffic volume demands and flow patterns along the corridor. Manual traffic turning counts were conducted at 12 locations during weekday morning and weekday evening, as well as some during Saturday midday peak. To supplement the turning movement counts, 24-hour automatic traffic recorder counts were conducted at 16 locations within the study area and have been expanded on by other counts within the study area as part of development studies and the annual traffic count program that the RPC operates. A summary of the automatic traffic recorder count data is presented in *Table 3-1*.

As shown in the table, the Weekday Average Daily Traffic (ADT) along US Route 1 ranges from a low of approximately 13,200 vehicles per day (VPD) in Seabrook at the Massachusetts state line, to a high of nearly 29,000 just a few miles to the north in Seabrook near the intersection with NH 107. Weekday daily volumes at points on the remainder of the corridor south of the center of Hampton are all over 22,000 vehicles per day, and most of the locations north of the center of Hampton are under 20,000 vehicles per day. The exception to this is in Portsmouth near Heritage Avenue which carries almost 25,000 vehicles on an average weekday. On weekends, there is a split in the pattern between Seabrook and the rest of the corridor. The count locations in Seabrook all show increased volumes on Saturdays compared to weekdays while the rest of the corridor has slightly lower Saturday traffic. The highest volume of traffic is seen just south of the intersection of US 1 with NH 107 in Seabrook and is nearly 29,500 vehicles however that location shows the smallest numeric increase at approximately 500 vehicles over the course of the day. The area around Lakeshore Drive shows the largest numeric increase at almost 3600 vehicles

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TABLE 3-1: EXISTING TRAFFIC VOLUME SUMMARY (NOT ANNUALIZED)

LOCATION	DIRECTION	WEEKDAY				SATURDAY		AVERAGE DAILY TRAFFIC (ADT)			
		MORNING (8:00-9:00 AM)		EVENING (5:00-6:00 PM)		MIDDAY (12:00-1:00 PM)		WEEKDAY		SATURDAY	
		Count	%	Count	%	Count	%	Count	%	Count	%
SEABROOK AT MASS STATE LINE (07/09)	NB	329	53%	470	49%	631	54%	6,588	50%	7,417	51%
	SB	292	47%	484	51%	537	46%	6,696	50%	7,097	49%
Total		621		954		1,168		13,284		14,514	
SEABROOK SOUTH OF LAKESHORE DR (10/09)	NB	516	52%	940	51%	1,206	50%	11,093	50%	12,385	48%
	SB	483	48%	913	49%	1,206	50%	10,997	50%	13,295	52%
Total		999		1,853		2,412		22,090		25,680	
SEABROOK SOUTH OF NH 107 (07/10)	NB	634	47%	1,084	52%	1,265	55%	14,273	49%	15,029	51%
	SB	711	53%	1,012	48%	1,046	45%	14,656	51%	14,449	49%
Total		1,345		2,096		2,311		28,929		29,478	
HAMPTON FALLS AT SEABROOK TOWN LINE (08/06)	NB	606	49%	1,016	58%	719	43%	12,668	53%	10,165	43%
	SB	641	51%	748	42%	969	57%	11,206	47%	13,519	57%
Total		1,247		1,764		1,688		23,874		23,684	
HAMPTON SOUTH OF NH 101 (2010)	NB	601	44%	987	57%	858	53%	11,110	50%	10,495	51%
	SB	754	56%	749	43%	761	47%	11,105	50%	10,033	49%
Total		1,355		1,736		1,619		22,215		20,528	
HAMPTON NORTH OF WINNACUNNET RD(10/09)	NB	891	59%	1,112	60%	1,173	60%	14,225	58%	14,200	60%
	SB	617	41%	729	40%	783	40%	10,466	42%	9,656	40%
Total		1,508		1,841		1,956		24,691		23,856	
HAMPTON NORTH OF ANNE'S LANE (10/10)	NB	542	45%	782	53%	765	48%	9,414	50%	8,638	50%
	SB	666	55%	706	47%	838	52%	9,471	50%	8,606	50%
Total		1,208		1,488		1,603		18,885		17,244	
NORTH HAMPTON NORTH OF NORTH RD (2010)	NB	649	55%	663	47%	738	53%	8,956	50%	8,091	47%
	SB	527	45%	752	53%	657	47%	8,935	50%	8,956	53%
Total		1,176		1,415		1,395		17,891		17,047	
PORTSMOUTH AT RYE TOWN LINE (10/09)	NB	675	58%	661	47%	717	53%	8,857	51%	7,177	50%
	SB	487	42%	752	53%	633	47%	8,569	49%	7,142	50%
Total		1,162		1,413		1,350		17,426		14,319	
PORTSMOUTH NORTH OF HERITAGE AVE (08/10)	NB	845	61%	899	48%	1,050	56%	13,127	53%	11,939	53%
	SB	537	39%	961	52%	827	44%	11,795	47%	10,701	47%
Total		1,382		1,860		1,877		24,922		22,640	
AVERAGE OF ALL SITES	NB	629	52%	861	52%	912	52%	11,031	51%	10,554	50%
	SB	572	48%	781	48%	826	48%	10,390	49%	10,345	50%
Total		1,200		1,642		1,738		21,421		20,899	

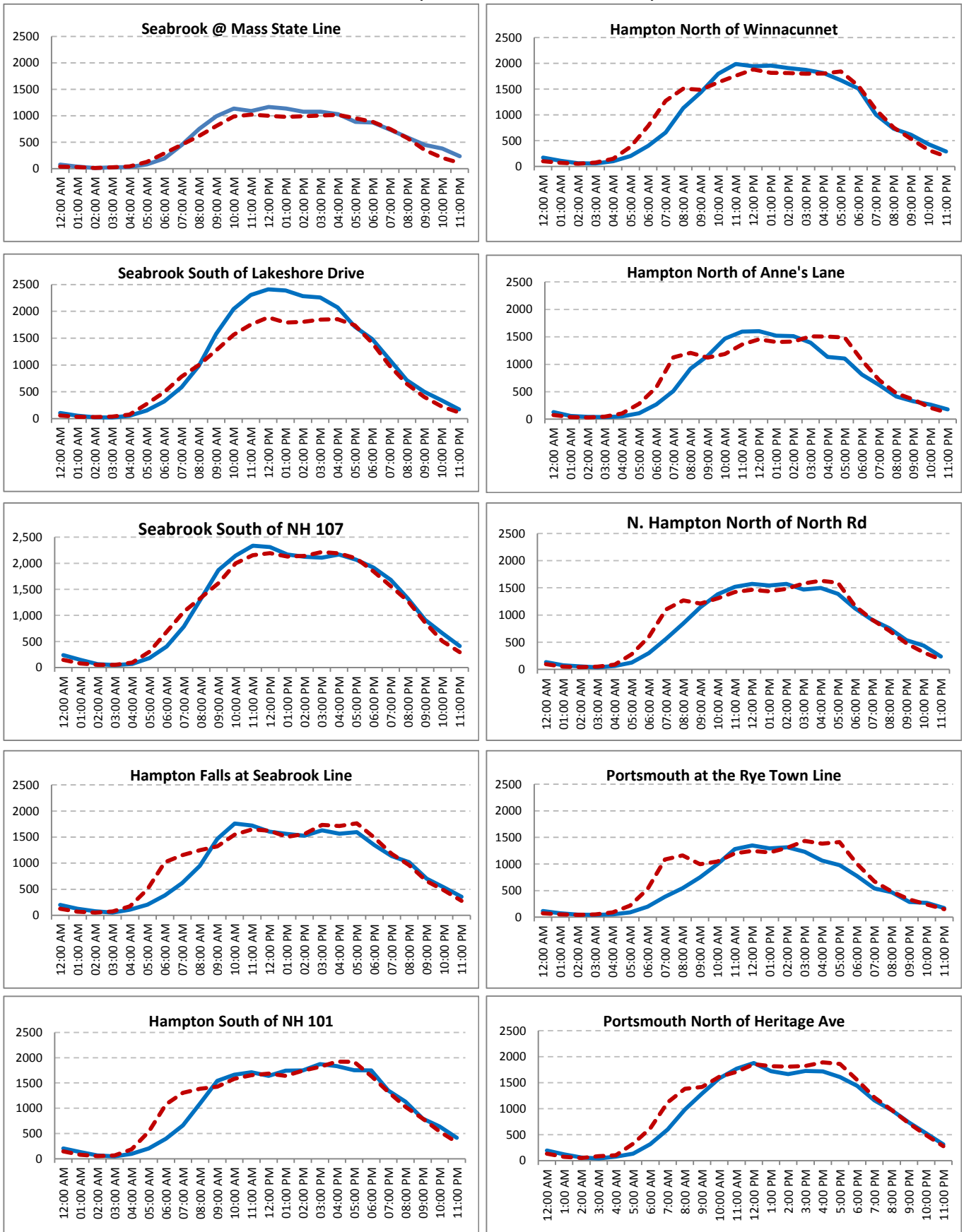
while traffic at the state line increases approximately 1200 vehicles. North of Seabrook, all sites show slightly lower volumes on Saturdays than weekdays. This varies from small decreases such as the 200 vehicle decrease seen in Hampton Falls and the 800 vehicle decrease seen in Hampton near Winnacunnet Road to an over 3100 vehicle per day decrease seen at the Rye/Portsmouth line.

The highest hourly volume along Route 1 was recorded during the Saturday midday south of Lakeshore Drive in Seabrook with approximately 2,400 vehicles passing through that segment. The weekday morning and evening peak hours see the highest hourly volumes on different segments of Route 1, The morning peak is seen north of Winnacunnet Road in Hampton which sees just over 1500 cars during that period while the PM peak traffic volume

ROUTE 1 CORRIDOR PLAN

FIGURE 3-1: HOURLY TRAFFIC VOLUME SUMMARY

— Saturday - - - Ave Weekday



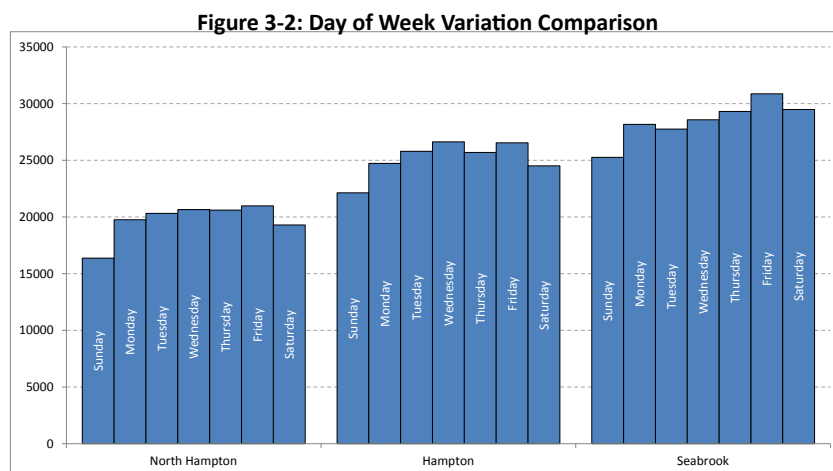
ROUTE 1 CORRIDOR PLAN

is seen in Seabrook south of the intersection of US 1 and NH 107 and carries approximately 2100 vehicles during that period. Portsmouth and Hampton show the next highest weekday peak hour volumes and all sites except for the State line count in Seabrook show both peaks with over 1000 vehicles processed.

Further breaking down the data to look at hourly volumes for an average summer weekday and Saturday at each of the locations is shown in **Figure 3-1** and some differing patterns emerge. While all of the sites see a defined increase in traffic during the PM peak period (generally 5:00-6:00 PM), very few show a strong AM commuter peak period and in those instances, the AM is still much lower volume of traffic than the mid-day levels. This speaks to the nature of the corridor as more of a retail and tourism destination than as a route for commuters. While traffic clearly increases during the traditional morning commute times, volumes continue to grow through the morning and peak at mid-day (11:00 AM – 1:00 PM) as tourist and retail traffic increases on the corridor, especially in Seabrook. Almost all locations show only a slight decrease in volumes during the afternoon until after the PM commuter peak between 5:00 and 6:00 PM after which, volumes quickly drop. The Saturday hourly variation data reveal a midday peak between 12:00 and 1:00 PM but generally steady high levels of traffic from late morning to late afternoon and then tapering off after 6:00 PM.

Examination of the daily traffic volume variations at three locations along US Route 1 (south of NH 107 in Seabrook, south of Route 101 in Hampton, and in North Hampton near the town line with Rye), during the months of July and August revealed little variation during the weekdays and a similar overall pattern of traffic between the three sites. As would be expected, with a greater concentration of retail activity and direct access to I-95, the daily volumes in Seabrook were much higher than at either the Hampton or the North Hampton locations and averaged approximately 28,500 vehicles per day and varied from 27,700 and 30,800 vehicles per day during weekdays. Of the three sites, only Seabrook with traffic approaching 29,500 vehicles per day shows Saturday volumes that are higher than average weekday traffic. This site shows the most day to day variation with a difference of 5,600 vehicles per day between the low (Sunday) and high (Friday). North Hampton presented the lowest and the most consistent weekday volumes varying between 19,700 and 21,000. Weekend volumes dropped to about 19,000 on Saturday and a low of 16,000 on Sunday. There was a very similar pattern at the Hampton location, where volumes were consistent during the week and somewhat lower on the weekend days. At this location the volumes ranged from a low on Sunday of just under 22,000 to a high on Wednesday and Friday of just over 26,000. The daily variations at the three locations are depicted in **Figure 3-2**.

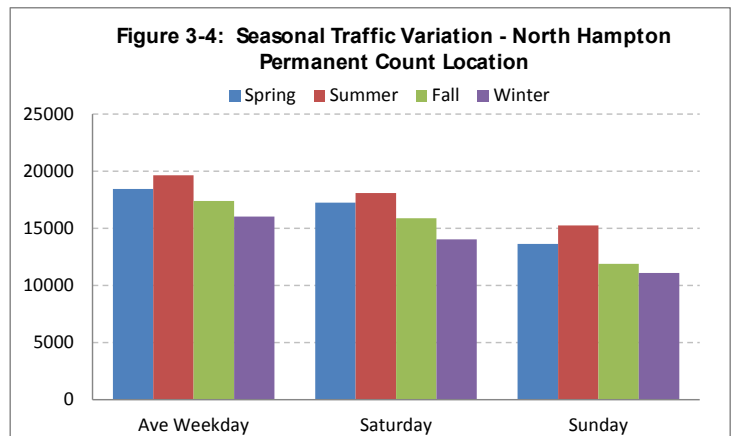
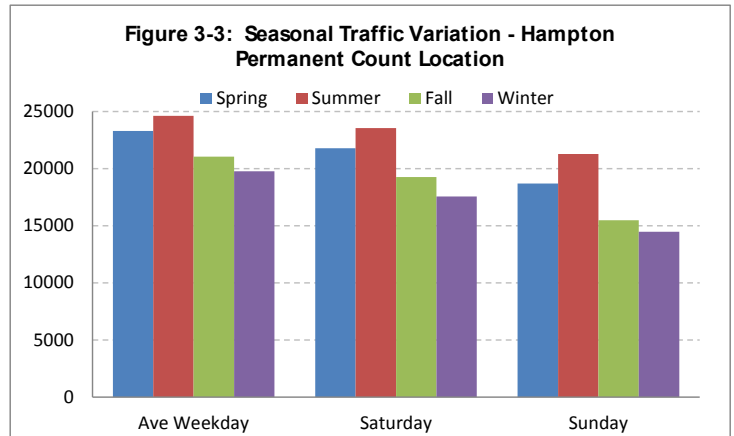
Figure 3-3 and **Figure 3-4** look specifically at traffic volumes from the two permanent count stations in Hampton and North Hampton Station which are able to provide year-round data. Examining the seasonal variation in traffic shows large volume differences for the corridor, particularly comparing the fall and winter months when there is little tourism activity along the seacoast, to the spring and summer when most visitors are here.



3.1.1 DESIGN HOUR VOLUMES

Operational analysis of roadways and intersections focus primarily on peak hour volumes and flows because it represents the greatest stress on the capacity of the system. However, the peak hour volumes are not necessarily consistent from day to day or from one season to the next. To adjust for these variations, a standard was developed that utilizes the “thirtieth highest hour” of traffic over a year to determining capacity needs. In addition to providing a consistent volume measure to base capacity needs on, this also accounts for the economic considerations involved in the planning and design of roadway facilities. State authorities, such as the NHDOT, usually select this design criterion since the thirtieth highest hourly volume generally reflects a “point of diminishing return” in that a substantial increase in design requirements (and cost) occurs beyond this threshold while accommodating only a few additional hourly volumes of traffic higher than the thirtieth highest hour. Examination of historical traffic volume data collected by the New Hampshire Department of Transportation (NHDOT) at the permanent traffic recorder station located along Route 1 in North Hampton near Rye revealed the thirtieth highest hourly volume to be compared with traffic volumes collected as part of the corridor study in June, July, August, and September. What was found was that the thirtieth highest hourly volume for the year, was slightly higher than the weekday peak hour volumes collected in June (4%), July (3%), August (1%), and significantly higher than the weekday peak hour volumes seen in September (10%). The comparison for Saturday peak hours shows similar differences between the peak volumes collected as part of the corridor study, and the established thirtieth highest hour of traffic. For June, the thirtieth highest hour was 12% higher than the Saturday peak hour seen, 5% higher than July, 3% higher than August, and again 12% higher than September.

Therefore, to evaluate the existing travel demands along the corridor, the weekday AM and PM peak hour turning movement counts conducted in June, July, August, and September were adjusted (4, 3, 1, and 10 percent increase respectively) to reflect the thirtieth highest hour volume for the year. Similarly, the Saturday midday peak hour turning movement counts conducted in June, July, August, and September were adjusted (12, 5, 3, and 12 percent increase respectively) to reflect a thirtieth highest hour volume for the base year as well. These adjusted numbers are shown in **Figures 3-5** (AM Peak Hour), **3-6** (PM Peak Hour), and **3-7** (Saturday Peak) [*In Appendix A*] for analyzed intersections along the corridor.



3.2 MOTOR VEHICLE CRASH DATA ANALYSIS

Motor vehicle collision records provided by NHDOT for the five year period of 2005 to 2009 were reviewed and evaluated for the study area. One issue with the crash records database is that many of the accidents for Hampton Falls are missing from the data and others, along with some crashes that occurred in North Hampton, were coded as having occurred in the town of Hampton. Additional data was procured directly from the Hampton Falls Police Department that provided basic information on the location and timeframe of the crashes but not the full set of information that is provided in the State crash database. The result is that many of the details available for the crashes are not available for Hampton Falls and this is noted in the text and tables where appropriate.

As shown in *Table 3-2*, during this period approximately 1300 accidents were reported involving just over 2600 vehicles, 14 pedestrians and 18 bicycles. From the data, the following information was identified (Not including the Hampton Falls crashes):

TABLE 3-2: SELECTED CRASH STATISTICS*

	2005	2006	2007	2008	2009	TOTAL	ANNUAL AVERAGES
Total Crashes	176	287	299	306	248	1316	263.2
Total Vehicles	350	578	584	607	496	2615	523
Pedestrians	3	1	5	5	0	14	2.8
Bicycles	1	6	4	3	4	18	3.6
Injury Crashes	71	76	84	64	63	358	71.6
Total Injuries	96	102	111	77	77	463	92.6
Fatal Crashes	1	0	0	4	1	6	1.2
Total Fatalities	2	0	0	4	1	7	1.4

*Does not include Hampton Falls Data

- Approximately 35 percent of crashes resulted in at least one personal injury. The remaining 65 percent involved property damage only. There were 6 recorded fatal crashes during the period resulting in 7 fatalities.
- The general trend saw increasing numbers of crashes over time with growth from 2005 to 2008 with a peak of 306 crashes within the study area. The number of accidents in 2009 was lower however 2010 data is not yet available to help determine if this is a new trend or an anomaly.
- The greatest percentage of crashes occurred during the summer months of June, July, and August (30.6%). Fall saw the second most with 24.7% of crashes, winter 24.4% and spring the fewest at 20.3%.
- 84% of accidents were collisions between multiple motor vehicles. Another 8% were collisions with fixed objects and 2.5% involved striking a bicycle or pedestrian.
- Nearly 38% of accidents occurred along the roadway while another 36% were intersection related. Most of the remaining accidents (14.7%) were related to driveway access points.
- In terms of the crashes that occurred at intersections or were intersection related, the five most frequent locations along the corridor are (not including the Hampton Falls crashes for which there is cross street data but not whether the crash was intersection related or not):
 - NH 27/High Street in Hampton (35 Accidents)
 - Atlantic Avenue in North Hampton (21 Accidents)
 - Constitution Avenue in Portsmouth (20 Accidents)
 - Kershaw Avenue in Hampton (17 Accidents)
 - Railroad Avenue in Seabrook (15 Accidents)
- There were 193 accidents related to driveways within the study area with the most occurring in Seabrook (72).

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- The Highest Percentage of Accidents take place on Fridays (16.9%) followed by Thursdays (16.5%). Sundays have the lowest percentage (10.4%).
- On weekdays and Saturdays, the peak hours for accidents are between 3-6 PM and almost 57% of crashes on those days occurred between the hours of 12:00 and 6:00 PM.

As shown in **Table 3-3**, the estimated crash rate of 2.7 incidents per Million Vehicle Miles of Travel (MVMT), is somewhat higher than the statewide rate of approximately 2.29 accidents per MVMT. Based on the measures included in that table, some parts of the corridor, particularly Hampton, Seabrook, and Portsmouth are considerably above the statewide rate.

TABLE 3-3: US 1 CORRIDOR CRASH RATES

COMMUNITY	AVERAGE DAILY TRAFFIC	US 1 LENGTH	DAILY VEHICLE MILES OF TRAVEL (VMT)	FIVE YEAR TOTAL CRASHES	AVERAGE CRASHES/ YEAR	CRASH RATE PER MILLION VMT
Seabrook	23,224	2.42	56,202	341	68.2	3.32
Hampton Falls	22,106	1.71	37,801	149	29.8	2.16
Hampton	20,543	2.88	59,215	430	86	3.98
North Hampton	17,047	3.35	57,028	181	36.2	1.74
Rye	15,683	1.19	18,704	48	9.6	1.41
Portsmouth	19,286	2.50	48,215	300	60	3.41
Corridor	20,899	14.05	293,551	1,449	289.8	2.7
Statewide			43,180,000	180,478	36,096	2.29

According to a recent study by the American Automobile Association, each fatality from a motor vehicle crash has a societal cost of \$6 million and each injury crash a cost of \$126,000¹. Applying those numbers to the corridor crash history for the 2005 to 2009 period provides an estimated cost of over \$95,000,000 for Route 1 alone. This is a considerable cost to the public that is likely to continue to rise in the future as travel activity increase. This provides an economic justification for implementing substantial safety improvements to the corridor that to seek to minimize the potential for accidents, especially the more severe types, such as head-on collisions that tend to result in greater injuries and fatalities.

3.3 OPERATIONAL ANALYSIS

Measuring traffic volumes within the study area indicates the importance of the corridor to the regional roadway system, but gives little indication of the quality of traffic flow. To measure the quality of traffic flow, key intersections and roadway segments were analyzed from an operational perspective. The results of this analysis provide a valid indication of how well the roadway system serves the travel demand placed upon it.

Level of service (LOS) is the term used to denote the different operating conditions which occur on a given roadway facility under various traffic volume loads. LOS is a qualitative measure of the effect of a number of factors including roadway geometrics, travel speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of a roadway segment or intersection. The evaluation criteria contained in

¹ http://newsroom.aaa.com/wp-content/uploads/2011/11/2011_AAA_CrashvCongUpd.pdf

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the 2000 Highway Capacity Manual² (HCM) were used to analyze the signalized and unsignalized study area intersections, and the corridor roadway segments.

Level of service is based on a grading system where LOS “A” is the best condition and LOS “F” is the worst condition. In general terms, very little delay is experienced at intersection where movements operating at LOS “A” or LOS “B”. Levels of service “C” and “D” are typically considered average delay conditions. LOS “E” and “F” suggest that motorists experience long delays. The level of service designation is reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for the overall conditions at the intersection. The analysis criteria for unsignalized intersections are based on the expected average delay to side street movements.

The results of the signalized intersection analyses, shown in *Table 3-4*, conducted for the 2002 base year reveal relatively good operating levels of service throughout most of the corridor. The only intersection currently over capacity is the intersection of US Route 1 at NH 27 (Exeter Road/High Street) in Hampton, which operates at a LOS E during the weekday morning and Saturday midday peak hours, and a LOS F during the weekday evening peak hour. All of the other signalized study area intersections operate at a LOS D or better. Note that although the overall Route 1/Lincoln Avenue intersection in Hampton Falls operates under capacity at LOS D, the single northbound through lane operates at capacity and experiences long delay and congestion during the weekday evening peak hour.

TABLE 3-4
SIGNALIZED INTERSECTION CAPACITY ANALYSIS

INTERSECTION WITH US ROUTE 1	2002 BASE CONDITION			2002 BASE CONDITION			2002 BASE CONDITION		
	WEEKDAY AM PEAK HOUR	WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR	WEEKDAY AM PEAK HOUR	WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR	WEEKDAY AM PEAK HOUR	WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR
	v/c*	DELAY**	LOS***	v/c	DELAY	LOS	v/c	DELAY	LOS
Constitution Avenue	No Count Data			No Count Data			No Count Data		
Heritage Avenue / Robert Avenue	0.75	20.1	C	0.81	26.8	C	No Count Data		
Ocean Road / Longmeadow Road	0.69	18.5	B	0.81	28.1	C	No Count Data		
Breakfast Hill Road / Washington Road	0.54	17	B	0.76	22	C	0.67	19	B
NH 111 (Atlantic Avenue)	No Count Data			0.68	24	C	0.42	17	B
Kershaw Avenue	0.57	19	B	0.74	24	C	0.69	23	C
NH 27 (Exeter Road / High Street)	0.96	69	E	1.12	122	F	1.04	77	E
Stickney Terrace	0.54	12	B	0.67	14	B	0.56	12	B
NH 88 Westbound / Depot Street	0.54	12	B	0.76	22	C	0.78	16	B
NH 88 Eastbound	0.48	15	B	0.55 [^]	38	D	0.48	32	C
North Access Road	0.50	9	A	0.77	15	B	0.64	13	B
NH 107 / South Access Road	No Count Data			0.73	29	C	0.83	31	C
Railroad Avenue / Pine Street~	No Count Data			0.64	15	C	0.76	19	B
Southgate Shopping Center / Lowe’s~	No Count Data			0.45	23	C	0.56	25	C
Boynton Lane / Retail~	No Count Data			0.41	15	B	0.53	17	B
Wendy’s Drive / Wal-Mart Drive	No Count Data			0.61	26	C	0.79	45	D
Lakeshore Drive / Home Depot Drive	No Count Data			0.51	19	B	0.64	25	C

* Volume to capacity ratio.

** Average delay (in seconds) per vehicle.

*** Level of service.

[^] NB Through Lane is over capacity.

~ Traffic volumes estimated from Lowe’s TIAS (2006 existing conditions volumes).

² Highway Capacity Manual; Transportation Research Board, Washington, DC (2000).

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TABLE 3-5
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS

2002 BASE CONDITION

INTERSECTION WITH US ROUTE 1 MOVEMENTS	WEEKDAY AM PEAK HOUR DE-			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
	MAND*	DELAY**	LOS***	DEMAND	DELAY	LOS	DEMAND	DELAY	LOS
LANG ROAD [PORTSMOUTH]									
SB left-turn from US 1	75	10	B	175	12	B			No Count Data
WB left-turn from Lang Rd	60	72	F	40	>200	F			
WB right-turn from Lang Rd	185	24	C	120	24	C			
NORTH ROAD (EAST) [NORTH HAMPTON]									
SB left-turn from US 1	15	9	A	20	10	B			No Count Data
All WB movements from North Rd	60	30	D	60	57	F			
North Road (West) [North Hampton]									
NB left-turn from US 1	10	9	A	15	10	A			
All EB movements from North Rd	40	29	D	35	64	F			
NH 151 [North Hampton]									
NB left-turn from US 1	95	9	A	220	12	B			No Count Data
All EB movements from NH 151	195	18	C	240	36	E			
NH 101E (Winnacunnet Road) [Hampton]									
NB left-turn from US 1	5	9	A	15	9	A			No Count Data
SB left-turn from US 1	125	10	B	140	11	B			
WB left/through from 101E	140	>200	F	130	>200	F			
WB right-turn from 101E	160	18	C	135	18	C			
EB left/through from Driveway	10	113	F	10	113	F			
EB right-turn from Driveway	10	12	B	10	13	B			
NH 84 [Hampton Falls]									
NB left-turn from US 1	10	10	A	15	10	B			No Count Data
All EB movements from NH 84	110	56	F	250	>200	F			
Folly Mill Road [Seabrook]									
WB left/through US Route 1	145	20	C	200	>200	F			No Count Data
EB right-turn from Mill Road	45	13	B	75	23	C			
Walton Road [Seabrook]									No Count Data
WB right-turn from Walton Road	160	12	B	155	17	C			

* Demand indicates the number of vehicles making the movement.

** Average delay (in seconds) per vehicle.

*** Level of service.

The results of the unsignalized intersection analyses (*Table 3-5*) indicate that the left-turn exiting movements from nearly all corridor side streets operate at poor levels of service (LOS E or F). Operationally deficient movements include the left-turn exiting movements from Lang Road, North Road, NH 151, NH 101E (Winnacunnet Road), NH 84, and Mill Road.

3.4 CURRENT CORRIDOR DEFICIENCIES

In addition to collecting and reviewing existing traffic volume data, researching accident records, and conducting operational analyses at the study corridor intersections, field observations consisting of both driving and walking the corridor were conducted in an effort to better understand and appreciate corridor deficiencies.

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The results of the operational analyses identified a number of existing and anticipated future study corridor capacity and safety related deficiencies. The problems along Route 1 fall into a few general categories:

- **Roadway geometry issues:** Skewed angle, offset intersections and lane drops, create safety problems as well as impacting capacity and traffic flow.
- **Capacity issues:** Insufficient lanes, inadequate space for queues, and other capacity deficiencies create congestion points along the corridor.
- **Driveway location and design:** Route 1 averages nearly 50 driveways per mile with many of them in close proximity to each other, or intersections. Many are poorly defined or designed creating both safety and capacity problems on the corridor.
- **Little consideration for other modes:** Only in a few places are accommodations made for bicycles, pedestrians and transit vehicles.
- **Aesthetics:** The highway commercial development on the corridor, utility poles, signs and volume of concrete and pavement that surround Route 1 overwhelm the historic features and natural landscapes of the corridor.

The southern segments of the corridor in Seabrook are characterized by high traffic volume demand resulting from the close and direct access to Interstate 95, and the proximity to Massachusetts. Much of the corridor south of the NH 107 intersection, has a more urban feel with major intersections under traffic signal control with two through lanes and an exclusive left-turn lane in each direction along Route 1. The southernmost segment of the corridor, in the vicinity of the Town Hall, can be somewhat confusing and problematic as several streets intersect in a circular one-way pattern. North of Town Hall, the roadway drops to two lanes before widening again at the Lakeshore Drive signalized intersection where an area of heavy retail use begins. This wider section continues through much of the much of the segment between Lake Shore and NH 107 only dropping back to a smaller cross-section in the vicinity of Railroad Avenue. This lane drop only occurs in the southbound direction between the new signalized intersection at the Lowe's/Market Basket Plazas and NH 107 it results in traffic congestion and delay. The NH Accident Records database shows 522 accidents related to US 1 in Seabrook between 1999 and 2004, although around 30% had no more identifiable locations. Around 20% of the accidents that could be placed occurring between Lake Shore Drive and NH 107 and another 20% were related to driveways although no specific location could be determined from the information available. The NH 107 intersection itself is currently performing well due to a recent expansion, however problems with the Interstate 95 interchange and the lane drop (to 3 lanes) immediately north of NH 107 and many uncontrolled curb cuts creates congestion points that not only adversely impacts the efficient movement of traffic, but can be potentially hazardous.

The two closely spaced traffic signals at Exeter Road (Route 88) and at Lincoln Avenue in Hampton Falls are problematic as motorists can experience substantial delay and congestion particularly in the northbound direction during the weekday evening peak hour. Left-turn movements entering Route 1 from Kensington Road (Route 84) also experience long delays given the heavy through volume on Route 1. The three lane section north of Lincoln Avenue, like the section in Seabrook, has numerous uncontrolled curb-cuts. Roadway shoulders in this area are minimal ranging from no more than 2 to 4 feet in width.

In Hampton, the NH 101/Route 1 interchange is both confusing and potentially hazardous as there were 26 accidents related to the interchange from 1999-2004 placing it among the highest along the corridor during that period of time. Sight lines are poor as motorists travel through short weave sections – often times at high travel speeds. The ramps to NH 101 have very short approaches and intersecting streets in close proximity to the interchange create additional points of conflict. North of the interchange, in the downtown area, the two lane roadway sees heavily congested traffic flow as through traffic, including truck activity, is intermixed with more local

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traffic as well as high levels of pedestrian activity. Motorists experience difficulty turning left onto Route 1 from the unsignalized Winnacunnet Road intersection and this helps to make this one of the higher accident locations on the corridor with 36 over the 5 year period studied. The “Y” approach to this intersection creates a wide pavement area with a sweeping right-turn lane from US 1 onto Winnacunnet Road, and combined with the absence of well defined walkways, contributes to the difficulty pedestrians have walking in this area.

The Exeter Road/High Street signalized intersection operates inefficiently due primarily to the poor geometry of the two intersection approaches which are slightly off-set and skewed. Narrow lanes, short or nonexistent turning lanes, on street parking, a large number of driveways, and minimal building setbacks also contribute to the congestion in this area. Motorists often experience long delays at this intersection due to driveway related turns, parking maneuvers, limited access to left turn lanes, and significant pedestrian activity. This intersection and its surroundings have the greatest number of accidents of any part of the corridor, with 75 occurring during the 5 year period from 1999 to 2004. The area between the NH 27 intersection and the NH 151 intersection on the Hampton/North Hampton boundary is characterized by urban strip development, and the largest concentration of driveways along the corridor with 95 curb openings as well as numerous street intersections. While the area does include a center turn lane, the volume of traffic and sheer number of driveways makes left turns difficult as well as creating high accident potential.

Continuing north from the downtown area of Hampton and into North Hampton and Rye the Route 1 corridor takes on a more rural character with motorists traveling at higher travel speeds. Several side street roadways such as Fern Road, Elm Road, North Road, and Dow Lane intersect the corridor at skewed angles or at locations where sight lines are limited. The sight lines are limited at the off-set North Road intersections in North Hampton due to both the poor vertical and horizontal roadway alignment. The vertical alignment along the corridor is also problematic on the northbound approach to the Breakfast Hill Road intersection in Rye. A vertical crest limits the view of the intersection from the south. This is particularly problematic because the intersection is under traffic signal control. Motorists stopped at the traffic signal are not always visible to motorists approaching the intersection from the south.

As Route 1 continues into Portsmouth the corridor takes on a more urban feel. Traffic volumes along this segment of the corridor are high. In addition, several high volume side streets, such as Ocean Road, Lang Road, Heritage Avenue, and Constitution Avenue, intersect the corridor. Numerous uncontrolled driveways along this segment of the corridor adversely impact the efficient flow of traffic along the corridor. Motorists attempting to turn left onto the corridor from driveways or unsignalized side streets experience substantial delay and difficulty. The intersection of Constitution Avenue is closely spaced between the signal to the south at the Wal-Mart/ White Cedar Boulevard intersection, and another to the North at the Shaw's/Springbrook Circle intersection. In addition, the roadway in that area is constrained as the number of lanes drop to the north of the Wal-mart/White Cedar Boulevard, and a cemetery and historic structures limit any widening that can be done. This intersection and the segment of Route 1 north to Wilson Road were, until recently, listed in the State 10 Year Plan and were scheduled to be improved in the next few years. The plan was to signalize Constitution Avenue and widen Route 1 to five lanes north to Wilson Road to alleviate congestion and match up with the five lane sections at north and south of this segment. While the need for improvements in this section of Route 1 is still there, the identified constraints at the Constitution Avenue intersection call for change in approach to the situation.

3.5 FUTURE CONDITIONS

A key element to this corridor study is the projection of future traffic volumes in the corridor and the evaluation of the adequacy of the existing road and intersection configuration to handle those expected volumes. To make these projections, it is necessary to consider both historical traffic growth as well as assumed future development in the area. This section discusses the methodology used to project future traffic volumes, and presents the results of an operational analysis conducted under the 20 year design volume condition.

There is a perception that there is not much land available for development along the US 1 corridor, but the fact is that current zoning allows for a great deal of physical growth of retail and non-retail commercial business, as well as industrial and residential space. The number of buildable acres was determined using zoning regulations, estimates of current land use (from 2003 and 2005 aerial photography), and compiled with GIS and the Regional Travel Demand Model. What this analysis found was that the zoning allows for approximately 8000 acres of developable property in the Traffic Analysis Zones (TAZs) that include US 1. Traffic Analysis Zones are groupings of Census Blocks unique to traffic modeling that establish small area origins and destinations for traffic. TAZs can be large or small in area, coinciding with the amount and intensity of land use within them. In the case of this corridor study, the TAZs are much larger than the study area, and translate into the capacity to develop an additional 8900 housing units, over 100,000 retail employees, and 384,000 non-retail employees. While these numbers are far beyond any anticipated growth in the area, they do provide a guide as to the growth potential and they suggest that physical constraints will not be the limiting factor in traffic growth.

The Regional Travel Demand model (updated in 2006) growth projections for the Route 1 communities are shown in **Table 3-6** and indicate a relatively low growth rate based on recent observed patterns. The results expect to add approximately 1400 new housing units and employment for 4400 people to the Route 1 communities over the next twenty years. This equates to a modest growth in housing per year of 0.6% and a somewhat higher employment growth rate of 1.2% per year which both reflects the predominance of commercial/ industrial zoning along the corridor as well as the recent higher growth in commercial development. This analysis included the implementation of all projects currently included in the State Ten Year Plan for transportation improvements as well as those projects from the Metropolitan Planning Organization long range plan and included many of the intersection improvements recommended in the 1989 US 1 Corridor Study, although not the full 5 lane widening and center raised median that were also recommended at that time.

TABLE 3-6
GROWTH EXPECTATIONS FROM REGIONAL TRAVEL DEMAND MODEL

	HOUSING UNITS	EMPLOYMENT
2007	10980	16947
2026	12380	21389
Total Change	1400	4442
% Growth	12.75%	26.21%
Ave Annual Growth Rate	0.63%	1.23%

3.5.1 NO BUILD FUTURE CONDITION

A level of service analysis was conducted at the key study area intersections for the year 2022 traffic volume condition for the no build alternative. The analysis reflects the 20 year traffic volume demands on the existing roadway network based on an assumed 2% per year growth compounded over twenty years from 2002 to 2022. This growth is reflective of the expected residential and commercial growth, and the travel along the corridor that it generates, as well as the continued growth in tourism and recreational travel to the region. Only those projects currently programmed in the State Ten Year Plan and the Metropolitan Planning Organization Transportation Improvement Program (TIP) were assumed to be completed.

ROUTE 1 CORRIDOR PLAN

TABLE 3-7
SIGNALIZED INTERSECTION CAPACITY ANALYSIS
2022 NO BUILD CONDITION

INTERSECTION WITH US ROUTE 1	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
	V/C*	DELAY**	LOS***	V/C	DELAY	LOS	V/C	DELAY	LOS
Constitution Avenue	No Count Data			No Count Data			No Count Data		
Heritage Avenue / Robert Avenue	0.96	41	D	1.11	83	F	No Count Data		
Ocean Road / Longmeadow Road	0.86	37	D	1.14	84	F	No Count Data		
Breakfast Hill Road / Washington Road	0.84	26	C	1.07	75	E	0.97	47	D
NH 111 (Atlantic Avenue)	No Count Data			1.08	61	E	0.66	21	C
Kershaw Avenue	0.77	28	C	0.93	43	D	0.90	41	D
NH 27 (Exeter Road / High Street)	1.43	216	F	2.08	335	F	1.29	237	F
Stickney Terrace	0.80	17	B	0.93	30	C	0.83	19	B
NH 88 Westbound / Depot Street	0.79	20	C	1.13	107	F	1.16	92	F
NH 88 Eastbound	0.71	28	C	0.82 [^]	159	F	0.72 [^]	142	F
North Access Road	0.69	13	B	1.1	53	D	0.89 [^]	39	D
NH 107 / South Access Road	No Count Data			0.98	55	E	1.16	68	E
Railroad Avenue / Pine Street~	No Count Data			0.83	24	C	1.00	35	D
Southgate Shopping Center / Lowe's~	No Count Data			0.54	24	C	0.66	29	C
Boynton Lane / Retail~	No Count Data			0.54	17	B	0.69	27	C
Wendy's Drive / Wal-Mart Drive	No Count Data			0.72	31	C	0.92 [^]	45	D
Lakeshore Drive / Home Depot Drive	No Count Data			0.63	21	C	0.80	33	C

* Volume to capacity ratio.

** Average delay (in seconds) per vehicle.

*** Level of service.

[^] NB Through Lane is over capacity.

~ Traffic volumes estimated from Lowe's TIAS (2006 existing conditions volumes).

As shown in **Table 3-7**, the results of the signalized intersection analyses reveal that most existing intersections will be over capacity within the 20 year forecast. It should be noted that even though the overall intersection of US Route 1 and NH Route 88 Eastbound operates under capacity, the single northbound through lane is over capacity (due at least partially to the small storage capacity of the left turn lane), and the overall intersection operates at a LOS F.

The results of the unsignalized intersection analyses, shown in **Table 3-8**, indicate that the left-turn exiting movements from most of the corridor side streets operate at poor levels of service (LOS F). Operationally deficient movements include the left-turn exiting movements from Lang Road, North Road, NH 151, NH 101E (Winnacunnet Road), NH 84, and Folly Mill Road. In addition, the right turns from Lang, Winnacunnet, and Watson Roads operate at LOS F as well.

Figures 3-8, 3-9, and 3-10 show the expected future turning movement values for the intersections along the corridor where turning movement counts were completed. The figures show the AM Peak, PM Peak and

ROUTE 1 CORRIDOR PLAN

TABLE 3-8
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS
2022 NO BUILD CONDITION

INTERSECTION WITH US ROUTE 1 MOVEMENTS	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
	DEMAND*	DELAY**	LOS***	DEMAND	DELAY	LOS	DEMAND	DELAY	LOS
LANG ROAD									
SB left-turn from US 1	110	13	B	260	25	C	No Count Data		
WB left-turn from Lang Rd	90	>200	F	60	>200	F			
WB right-turn from Lang Rd	275	>200	F	180	174	F			
NORTH ROAD (EAST)									
SB left-turn from US 1	20	10	B	30	13	B	No Count Data		
All WB movements from North Rd	90	>200	F	85	>200	F			
NORTH ROAD (WEST)									
NB left-turn from US 1	15	11	B	20	12	B			
All EB movements from North Rd	60	160	F	50	>200	F			
NH 151 (POST ROAD)									
NB left-turn from US 1	140	11	B	325	24	C	No Count Data		
All EB movements from NH 151	290	89	F	355	>200	F			
NH 101E (WINNACUNNET ROAD)									
NB left-turn from US 1	5	10	A	20	10	B	No Count Data		
SB left-turn from US 1	185	14	B	210	16	C			
WB left/through from 101E	210	>200	F	190	>200	F			
WB right-turn from 101E	240	71	F	200	61	F			
EB left/through from Driveway	15	>200	F	10	>200	F			
EB right-turn from Driveway	15	16	C	15	17	C			
NH 84									
NB left-turn from US 1	15	11	B	20	13	B	No Count Data		
All EB movements from NH 84	160	>200	F	370	>200	F			
FOLLY MILL ROAD									
WB left/through US Route 1	195	75	F	295	>200	F	No Count Data		
EB right-turn from Mill Road	65	17	C	115	114	F			
WALTON ROAD									
WB right-turn from Walton Road	240	16	C	230	55	F	No Count Data		

* Demand indicates the number of vehicles making the movement.

** Average delay (in seconds) per vehicle.

Saturday Peak respectively and reflect the projected thirtieth highest hourly volume for the year at the intersection. These values are utilized in the development of the intersection capacity and level of service analyses.

3.5.2 FUTURE TRAFFIC OPERATIONS WITH IMPROVEMENTS

A level of service analysis was also conducted using the build alternative. The same assumptions as the no build analysis were utilized for background improvements and growth. However, instead of a limited project set being constructed, the entire slate of roadway projects proposed in this document were completed. The analysis reflects the 20 year traffic volume demands on the proposed roadway network. It does not however, reflect any changes to traffic volumes and patterns that might occur due to rezoning, different development patterns (compact, mixed use developments for instance), or evolving changes from the implementation of access management principles along the corridor.

ROUTE 1 CORRIDOR PLAN

TABLE 3-9
SIGNALIZED INTERSECTION CAPACITY ANALYSIS
2022 BUILD CONDITION

INTERSECTION WITH US ROUTE ¹	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
	v/c ¹	DELAY ²	LOS ³	v/c	DELAY	LOS	v/c	DELAY	LOS
Constitution Ave.	No Count Data			No Count Data			No Count Data		
Heritage Ave. / Robert Ave.	0.61	16	B	0.82	27	C	No Count Data		
Ocean Rd. / Longmeadow Rd.	0.69	25	C	0.91	41	D	No Count Data		
Breakfast Hill Rd. / Washington Rd.	0.57	19	B	0.66	23	C	0.63	22	C
North Rd. East	0.47	12	B	0.60	13	B	No Count Data		
North Rd. West	0.47	12	B	0.56	12	B	No Count Data		
NH 111 (Atlantic Ave.)	No Count Data			0.84	33	C	0.59	20	C
Post Road/NH 151	0.62	14	B	0.73	17	B	No Count Data		
Hampton Center without "Bypass"									
Kershaw Avenue	0.77	28	C	0.93	43	D	0.90	41	D
NH 27 (Exeter Rd/High St)	1.28	187	F	1.98	296	F	1.35	208	F
Winnacunnet Road (NH 101E)	1.02	44	D	1.09	57	E	No Count Data		
Stickney Terrace	0.80	17	B	0.93	30	C	0.83	19	B
Hampton Center with "Bypass"									
Kershaw Avenue	0.59	16	C	0.74	22	C	0.70	23	C
NH 27 (Exeter Rd/High St)	1.05	103	F	1.45	206	F	1.18	118	F
Winnacunnet Road (NH 101E)	0.86	25	C	0.89	27	C	No Count Data		
Stickney Terrace	0.65	14	B	0.79	17	B	0.64	13	B
Route 101 Westbound Ramps	0.74	16	B	0.85	23	C	0.90	30	C
Route 101 Eastbound Ramps	0.80	19	B	0.77	18	B	0.70	18	B
NH 88 / Depot St.	0.60	13	B	0.72	20	C	0.70	21	C
NH 84	0.60	14	B	0.84	32	C	No Count Data		
North Access Rd.	0.69	13	B	1.1	53	D	0.89 ⁴	39	D
NH 107 / South Access Rd. ⁵	No Count Data			0.98	55	E	1.16	68	E
Railroad Ave. / Pine St. ⁶	No Count Data			0.71	27	C	0.71	25	C
Southgate Plaza / Lowe's ⁶	No Count Data			0.54	24	C	0.66	29	C
Boynton Lane / Retail ⁶	No Count Data			0.54	17	B	0.69	27	C
Wal-Mart Drive	No Count Data			0.72	31	C	0.92 ⁴	45	D
Lakeshore Drive / Home Depot	No Count Data			0.63	21	C	0.80	33	C
Main Street & Walton Road (4-way)									
Single EB Left from Main St	0.63	28	C	1.04	71	E	No Count Data		
Double EB Left from Main St	0.56	24	C	0.91	44	D	No Count Data		

¹ Volume to capacity ratio.

² Average delay (in seconds) per vehicle.

³ Level of service.

⁴ NB Through Lane is over capacity.

⁵ No proposed improvements = same as No Build

⁶ Traffic volumes estimated from Lowe's TIAS (2006 existing conditions volumes).

ROUTE 1 CORRIDOR PLAN

TABLE 3-10
UN SIGNALIZED INTERSECTION ANALYSIS
2022 FUTURE CONDITION WITH IMPROVEMENTS

INTERSECTION WITH US ROUTE 1 MOVEMENTS	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
	DEMAND*	DELAY**	LOS***	DEMAND	DELAY	LOS	DEMAND	DELAY	LOS
Lang Road									
SB left-turn from US 1	-	-	-	-	-	-	No Count Data		
WB left-turn from Lang Rd	-	-	-	-	-	-			
WB right-turn from Lang Rd	275	31	D	180	26	D			

* Demand Indicates the number of vehicles making the movement

** Average delay (in seconds) per vehicle

*** Level of Service

The results of the signalized intersection analyses conducted for the future year (*Table 3-9*) reveal that all intersections proposed for improvement operate at acceptable levels of service (LOS D or better in most cases). The remaining current problem is with the intersection of US Route 1 at NH 27, which will continue to be over capacity under all scenarios without radical expansion. In addition, growth and US Route 1 at NH 107 are expected to be over capacity by 2022 without any improvements.

The results of the unsignalized intersection analyses (*Table 3-10*) indicate that of all the unsignalized intersections examined as part of this study, only Lang Road is not proposed for future signalization. This is due to the proximity of this intersection with the Ocean Road/Longmeadow Road intersection (approximately 700 feet). Given the volume of traffic on Route 1 at this location, the current intersection would become a right-in and right-out only access point. The goal at this location is to tie Lang Road to the Ocean Road/Long meadow Road intersection with future redevelopment of the parcels fronting Route 1 in this area. This would provide improved access to Lang Road without creating a situation in which there are two, closely spaced, traffic signals.

CHAPTER 4:

RECOMMENDED IMPROVEMENTS

This section contains all of the recommendations for improving the Route 1 corridor based on the existing conditions and expected future conditions discussed in previous sections of this document. The most space is spent discussing the general types of roadway improvements necessary, followed by community specific roadway changes. However, the benefits from the roadway improvements will be short lived if other techniques to manage traffic are not considered as well. The scope of development possible under existing zoning will far outstrip the ability of the transportation system to keep up resulting in worsening, rather than improving, conditions. In that regard, planning for the future of the Route 1 corridor requires a comprehensive approach that details necessary roadway improvements as well as other types of changes that will be necessary to control traffic congestion and build Route 1 into a resource for the communities. Such an approach includes looking at the policies and regulations that govern land use and development, implementing improvements for pedestrians and bicyclists, accommodating future transit services in the roadway design, addressing aesthetic issues, and examining methods that can improve the operation of the existing roadway. This section begins with a brief overview of the approach that is recommended for moving forward with improvements, and the remainder discusses recommendations in the following areas:

- 4.1. Roadway Improvements (general & community specific)
- 4.2. Land Use Strategies
- 4.3. Access Management Strategies
- 4.4. Transit Improvements
- 4.5. Streetscaping and Landscaping
- 4.6. Financing Projects
- 4.7. Implementing the Corridor Plan

It should be made clear that the recommendations incorporated into this document are not intended to be the final word on changes to the corridor. Instead, they are designed to provide a consistent approach and starting point for communities to shape Route 1 to fit their character. The proposed roadway improvements are designed to a planning level and would necessitate a full scoping and design process (including public hearings), that would provide significantly more detail and further public input on what exactly would be constructed, the benefits, and the costs.

That being said, Public input has made it clear that not every part of Route 1 should be widened to five lanes and that care should be taken to avoid undue impacts were possible and to protect historic, cultural, and natural

resources as much as possible. As an alternative to widening, many land use and access management techniques are discussed and proposed to mitigate the existing and future traffic congestion on the corridor. In some cases, specific techniques are applied to particular locations however their use should not be thought of as being exclusive to those sites but potentially applicable all along the corridor.

A CONTEXT SENSITIVE APPROACH

A specific project planning methodology is proposed for improvements to the corridor. Context Sensitive Solutions (CSS) is a planning approach that shifts decision-making for transportation projects away from engineering for the greatest capacity and throughput of vehicles. Instead, a technique of using “open, early, honest, and continuous” communication, extensive public involvement, and thorough alternatives analysis is used to make transportation system improvements that meet the needs of the community and fit appropriately in their surroundings. A critical distinction between CSS and other planning processes is that it utilizes a set of priorities that places community, environmental, and transportation goals all on equal footing when evaluating alternatives. The goal is to have projects that are supported by the community, and in doing so, develop high quality improvements exceed the expectations of both engineers and the public.

Rather than relying primarily on engineers and planning professionals to design a project to be presented to the public for final review and approval, CSS calls for immediate public involvement and continuous communication between project planners and stakeholders. Transportation planners need to include stakeholders from all affected and interested communities including residents, abutters, businesses, non-profits, local and state government, regulatory agencies, and anyone else who feels that they have a stake in the final outcome of the project. Stakeholders should be involved in the scoping phase of the project when the purpose and extent of the project is determined, and should participate in the creation of scenarios to help build consensus on what approach should be used to solve the particular problem.

Creating a project that fits within the context of the community means design guidelines are flexible and are adaptable. Roadways in town centers should focus on social and economic interactions as well as pedestrian safety while highways should prioritize safe, fast reliable, throughput for automobiles and freight. Contextual elements that are taken into account by CSS include aesthetics, archeology, community, culture, environment, historic value, recreation, and scenic value. Community involvement is critical and those that live and work in an area are the best resource for preserving the environment and community in their own towns. Whereas planners and state agencies may focus on the technical requirements of a project or on the needs of those who drive through an area, residents will be focused on their quality of life and ensuring that their community remains a place in which they would like to live.

The CSS process has several steps:

- a. ***Establish a Vision and Goals:*** the process needs to begin with a vision of the outcome of the project and how it will enhance the community. It needs to address the goals and objectives of the community and look beyond simply the transportation function of the roadway.
- b. ***Define the Needs:*** determining the vision can aid in developing a problem statement that reflects the needs of all stakeholders, the area’s characteristics, and move towards fulfilling the vision of the improvement.
- c. ***Develop the Alternatives:*** the development of alternatives should be completed with an inclusive public participation process that defines the different approaches to addressing the problem statement and meeting the needs, vision, and goals as determined in the previous steps of the process.

- d. **Evaluate the Alternatives:** this should be an objective and balanced assessment of the benefits and costs, impacts, and trade-offs required for each alternative that has been developed. The key to this aspect is general stakeholder agreement on the evaluation criteria to be used, and the inclusion of larger community objectives beyond transportation. Examples of criteria are:
- **Mobility** – How does the alternative affect the ability to reach desired goods, services, activities and destinations?
 - **Accessibility** – How does the alternative improve the ability of people to physically move from one place to another via motorized or non-motorized modes?
 - **Social and Economic effects** – Does the alternative have impacts on historic or cultural resources? Does it displace businesses or residents? Does it improve the cohesiveness of a neighborhood or area?
 - **Environmental effects** – What are the scope and scale of the positive and negative impacts on the natural environment, land use, and energy consumption?
 - **Cost-effectiveness and affordability** – How much does each alternative cost for both the initial capital improvement and ongoing operation and maintenance? How does this compare with the economic benefits of the project?
 - **Other local factors** – How do the proposed alternatives “fit” within the community vision in the form of the Master Plan or other planning documents, local policies, or other local concerns?

The outcome of the alternatives evaluation process needs to be clear and open communication of the trade-offs of the various alternatives to the project stakeholders and the general public. The selection of a preferred alternative needs to be based on general consensus and is reflective of the needs of all users and the goals and vision of the project.

- e. **Design and Implement the project:** continuing community involvement in the development and implementation of a “preferred alternative helps to assure that the constructed project maintains community values. It can also lead to more innovative solutions and design flexibility as project goals are balanced. Strong public support can also speed up the permitting and approval process.

4.1 ROADWAY IMPROVEMENTS

The results of the operational analyses identified a number of existing, and anticipated future, corridor capacity and safety related deficiencies. In the past, the typical method of addressing capacity limitations was to widen the roadway, adding both travel lanes and turning lanes at intersections, in an attempt to build out of the congestion. What has been found however, is that the new capacity is rapidly consumed by growing traffic and more expansion is necessary. This is the situation facing many locations on the Route 1 corridor. Addressing both the existing and projected capacity deficiencies along the corridor would necessitate that the roadway be widened to **at least** two through lanes in each direction along much of the length, with additional turn lanes at many intersections. However, based on input received at the public informational meetings as well as input received by the Technical Advisory Committee, it is clear that the corridor communities do not want to see major widening of Route 1. Given that the roadway parallels I-95, the concern is that any widening of Route 1 would only draw more traffic to the corridor. Therefore, the goal is to develop a long-term improvement plan that manages the traffic along the corridor more efficiently and safely, while adding limited capacity. The recommended

plan attempts to balance the need to process traffic along the corridor while maintaining the character of the communities located along its length.

In general, the recommended plan of improvements incorporates good access management techniques in an effort to minimize the need to widen the corridor. The plan attempts to concentrate turning movements, particularly left-turn movements, at major signalized intersections. In general these major signalized intersections would provide a wider cross section consisting of two through lanes and an exclusive left-turn lane in each direction. The plan also calls for connector roadways and/or internal connections between adjacent properties that would serve to reduce the number of uncontrolled left-turn movements by providing as much access to the major signalized intersections as possible. The roadway improvements can be loosely categorized into the following:

- **Addressing skewed angle intersections:** The skewed angle intersections (streets that do not intersect at a 90 degree angle) along the corridor are either realigned or closed to address the safety issues posed by the approach to US 1. In some cases, due to the addition of signals, the realignment will result in improved access and intersection functionality as well.
- **Widening roadway segments:** adding travel lanes is kept to a minimum along the corridor, but there are some areas where the roadway is at capacity or near it given existing growth rates. The addition of through travel lanes or turning lanes in these locations will make significant improvements to traffic flow and the general functioning of the roadway.
- **Access Management:** Access management techniques will help minimize the need to widen the roadway by utilizing the existing infrastructure more efficiently and by making lower cost changes to the roadway and access points. This includes operational changes to the intersections and the roadway, raised medians at intersections to protect the functional area, driveway consolidations, improved driveway design, and other changes.
- **Additional traffic signals:** There are areas along the corridor that will be better served with the addition or relocation of traffic signals.
- **NH 101/US 1 Interchange:** The current interchange between NH 101 and US 1 poses significant safety and capacity problems due to its current configuration.
- **New Roadways:** An entirely new facility is proposed to address long-term congestion and limited right-of-way in Hampton, and access roads are planned for several areas along the corridor.
- **Planning for all Modes:** Improvements include features designed to assist transit or to serve pedestrian and bicycle traffic.
- **Aesthetic Improvements:** One of the complaints regarding US 1 has been how the roadway looks. While this report only shows examples of streetscape and landscaping improvements, the treatments can be applied almost anywhere along the corridor.

The specific long-term improvement plans for each community are discussed and depicted graphically in the following sections.

ROUNDBABOUTS AS AN ALTERNATIVE TO TRAFFIC SIGNALS

One of the key elements of the access management plan is the placement of well-spaced signalized intersections. These signalized intersections in combination with connector roadways or internal connections between adjacent

properties serve to safely and efficiently accommodate left-turn movements. The elimination, or at least the reduction, of uncontrolled left-turn movements along the corridor would be expected to increase the carrying capacity of the corridor as well as reduce the number of vehicular crashes. However, traffic signals are not the only means of safely and efficiently accommodating left-turn movements. Roundabouts can also serve this function.

A roundabout is a channelized intersection with one-way traffic flow circulating around a central island. Traffic entering the roundabout is placed under “Yield” control while the approaches are channelized to specific curvature in an effort to slow vehicular traffic. Single-lane roundabouts are generally very effective traffic calming devices as vehicles are forced to slow and more carefully travel through an intersection. This traffic calming effect, as well as the corridor aesthetics, is often enhanced by the placement of landscaped treatment within the central island as well as other streetscape amenities along the outside of the roundabout. In a slight contrast, although still serving a traffic calming role, larger two-lane roundabouts often serve in more of a high capacity role.

In recent years, the use of roundabouts as an alternative to the use of traffic signals has become popular in New Hampshire. There are currently 14 modern roundabouts in operation in New Hampshire, four of which have been constructed by the New Hampshire Department of Transportation (NHDOT). As more roundabouts are constructed and become operational in the State, we will gain more information as to their operation and as to their acceptance by motorists.

Could roundabouts be considered along Route 1 as an alternative to traffic signals? The answer is yes. However, a more detailed evaluation of the specific location would need to be conducted at the time of design. It is important to recognize that given the traffic volume demand along Route 1, obtaining acceptable operation (depending on the location) would likely require a two-lane roundabout. A two-lane roundabout would be larger, would likely require additional land acquisition, and may not be able to deliver the pedestrian friendly aspects of a single lane roundabout, which is often envisioned when considering a roundabout as an alternative to a traffic signal. Also, it is important that any decision on the placement of a roundabout (as well as a traffic signal) must be considered within the context and character of the particular segment of the corridor.

4.1.1 SEABROOK

Starting at the state line, the long-term plan calls for eliminating the one-way circular loop in the vicinity of the Seabrook Town Hall. Three different alternatives were examined for this intersection varying in both configuration and location of improvements.

- **Alternative A:** The first alternative implements a signalized intersection almost at the state line with Massachusetts (*Figure 4-1a*). However, this alternative has significant impacts on private property adjacent to the intersection as well as to the Cemetery located to the east of the roadway.
- **Alternative B:** A second alternative (*Figure 4-1b*), located a two lane roundabout at the northernmost part of the existing rotary and would tie directly into Walton Road as well as Folly Mill Road. While this alternative works from a traffic management aspect, it could potentially impact the historic church adjacent to the intersection. In addition, a two-lane roundabout was seen as potentially confusing to motorists.
- **Alternative C:** The preferred improvement (*Figure 4-1c*) replaces the existing configuration with a single signalized intersection that would realign Main Street opposite Walton Road so that both streets intersect Route 1 at a single point. Route 1 at the intersection would consist of two through lanes, and an exclusive

ROUTE 1 CORRIDOR PLAN

left-turn lane in each direction separated by a raised center median. The Main Street and Walton Road approaches to the intersection would consist of an exclusive left-turn lane and a shared through/right-turn lane. South of the new intersection, Route 1 would transition back to a two-lane roadway. This places a roadway through what is now the parking lot for the Town Offices and would require reconfiguration of access and parking for that building. Potentially, new parking could be constructed on the south side of the building on what is now the roadway as that road would no longer be necessary and could be removed.

North of the new intersection, Route 1 would be widened to a 5 lane cross section consisting of two through lanes in each direction separated by a two-way center turn lane. This section would transition into the 5 lane cross section at the existing signalized intersection at Lakeshore Drive. *Figures 4-2a, 4-2b, and 4-2c* show this section with the exact configuration of the road changing slightly depending upon the alternative constructed to replace the rotary.

The proposed plan calls for the placement of a raised center median along the short section of Route 1 from Lakeshore Drive through the Gretchen Road intersection (*Figure 4-3*), as well as connections between the parcels on the western side of US 1 to match the interconnected parking and roadways on the eastern side. The short distance and few parcels provide access for all to at least one of the traffic signals. Care must be taken in providing connections to the Seabrook Community Center to ensure that the parking lot does not become a through street. This area is also ideal for the location of a transit stop in that there are residential, commercial, and recreational opportunities within a short walk. Roadway improvements should provide adequate space for future transit stops.

Figure 4-4 shows the segment of US 1 between Boynton Lane and the area just south of Railroad Avenue. This segment was recently widened to five lanes and signal controls implemented at the Lowe's/Market Basket driveways as part of the improvements required by the development of Lowe's. The Boynton Lane intersection has also recently been upgrade to a signal as part of an adjacent development and provides an excellent pedestrian crossing location given the proximity of the Seabrook Community Center. Given the signals on each end, and the few driveways along this segment, there is an opportunity to implement a raised median (continuous or short stretches) to both limit the use of the center turn lane, and to provide improvements to the aesthetics of the roadway via median landscaping. Interconnecting the Community Center to a signal at Boynton lane is another option that should be considered and implemented if feasible and desired by the community. East of US 1, a cross-lot connection between Boynton Lane and Wal-Mart would also be a useful addition, allowing travel between the many businesses of the Market Basket, Wal-Mart, and Home Depot plazas without utilizing US 1. Future connections northward in this manner could extend these side connections to Railroad Avenue and would enhance both connectivity and access to businesses.

The roadway narrows to four lanes (2 north bound, center turn lane, 1 south bound) at Railroad Avenue (*Figure 4-5*) north to the taper from the NH 107 intersection. This segment should be widened to a five lane cross-section with the Railroad Avenue signals improved accordingly. Defined exclusive left-turn lanes and signal phasing would be provided with a two-way center turn lane provided along the segments between the intersections. Pine Street has already been connected to Railroad Avenue and the same should happen with Autumn Way if possible. Potentially, Smalls and Perkins Avenues could be connected to this intersection as well, providing many residents in that area with improved and safer access to US 1. Opportunities should also be examined that would provide the same type of connections along the eastern side of Route 1 between Railroad Avenue and Provident Way.

Provided that there are no major new traffic generators approved nearby, lane use at the Route 107/Provident Way intersection (*Figure 4-6*) would stay as it currently exists. The recent upgrade of that intersection implemented a double left-turn lane, a through lane and a shared through/right-turn lane in the northbound direction and an exclusive left-turn lane, two through lanes and an exclusive right-turn lane in the southbound direction. The

Route 107 approach to the intersection would consist of an exclusive left-turn lane, a shared through/left-turn lane, and a channelized right-turn lane. The addition of high traffic generating uses nearby may require work at this intersection to add turning lanes and other improvements dependent upon expected volumes of traffic and the proposed access configuration.

The intersection of US 1 with New Zealand Road (*Figure 4-6*) approximately 500 feet to the north of NH 107 is currently unsignalized, and experiences poor operating conditions due to the heavy volumes on US 1 and the proximity to the signals at NH 107. New Zealand Road, and the driveways to the adjacent Governor Weare Apartments, are frequently used as “short-cuts” for drivers desiring to access I-95 or points west from US 1 as well as Route 1 northbound from NH 107. These drivers can avoid congestion at the US 1/ NH 107 intersection by using New Zealand Road (and sometimes the Governor Weare driveways) to connect to Spur Road which joins NH 107 just east of the I-95 interchange. The current configuration of that intersection (stop controls at Spur Road, no turning lanes on NH 107, and a mixture of slow and fast moving traffic westbound on NH 107) has

led to a number of accidents in recent years and calls for various measures to be implemented. In addition to the safety problems, residents along New Zealand Road, particularly those in the Governor Weare Apartment complex, have complained about the volume and speed of traffic using both the New Zealand Road and the Governor Weare driveways as shortcuts.

Addressing and balancing the four issues (safety, traffic flow, access, and cut-through traffic) in this area requires a multi-faceted approach. It is proposed to address these issues through the following combined actions:

- **Signalize New Zealand Road:** this improves access to businesses and residences on New Zealand Road, Spur Road, and adjacent parcels. With limited traffic, green times can be extended north and south on US 1 to minimize disruptions of traffic flow.
- **Close Spur Road access to NH 107:** all access to New Zealand Road occurs via the proposed signal on US 1. From a safety and access management perspective this eliminates both

the safety issues at the Spur Road intersection as well as the the use of New Zealand Road as a short-cut. This alternative would require additional signage on NH 107 and US 1 to direct drivers who may have previously used Spur Road to New Zealand Road.

- **Eliminate US 1 Driveway of the Governor Weare Apartments:** closing the direct access to US 1, or gating it for emergency access only will reduce the impacts of traffic on the residents of the apartment complex. In addition, access to a signalized intersection will improve access to Route 1 for these households.
- **Encourage interconnection of adjacent lots opposite US 1 from New Zealand Road:** currently the fourth leg of the US 1/ New Zealand Road intersection is a driveway for a fast food restaurant. In signalizing New Zealand Road, adjacent parcels should be connected to the signal to provide improved access for those businesses fronting on US 1 in the vicinity. Care should be taken in connecting large volume generating uses however as it will have impacts on both the design of the intersection and the capability to move traffic along US 1.

PROJECT PRIORITIES FOR SEABROOK

1. Capacity constraints in the vicinity of RailRoad Avenue intersection.
2. Capacity and traffic flow between NH 107 and the North Access Road.
3. Expand connections to traffic signals and cross-lot connections to provide alternatives to using US 1.
4. Improve driveway design and consolidate access points.

While not on the US 1 corridor, the I-95 Exit 1 interchange in Seabrook continues to be a source of traffic congestion that impacts traffic. Efforts to address the congestion and safety issues at that location will aid in traffic moving to and from the Route 1 corridor.

While the ideal solution to the safety and traffic problems may be the elimination of the Spur Road connection to NH 107, it may be infeasible due to the perceived impacts on nearby businesses. In the end, the use of New Zealand Road as a short cut will be dependent upon the perception that it is a faster route. This is a direct reflection of the volume and flow of traffic on US 1 and NH 107 through the I-95 interchange. The more delay that drivers experience on US 1 and NH 107, and the greater volume of traffic, the more likely New Zealand will see increased use as a short-cut. Greater use of Spur road in the existing configuration means an increasing potential for accidents. From the perspective of the Route 1 Corridor Plan, the preferred solution is to signalize New Zealand Road, close the Spur Road connection to NH 107, and reconfigure the driveway to the Governor Weare Apartments. This eliminates cut-through traffic, reduces much of the safety problem, improves access for New Zealand Road, and providing that a large volume driveway does not become the fourth leg of the US 1/ New Zealand Road intersection, maximizes traffic flow on US 1. Given that closing Spur Road completely may not be possible, there are some other options that do address safety and operational concerns in that area but do not eliminate the cut-through traffic issue:

- ***Install a raised median on NH 107:*** this option eliminates left turns into and out of Spur Road, while still allowing right-in and right-out access. This method is less restrictive on access in that the potential to use New Zealand Road as a short-cut for traffic traveling from the US 1 corridor to I-95 remains. Safety is greatly improved by eliminating the left turning movements which are the most dangerous under the current design. This alternative would require additional signage to direct drivers to US 1 to access New Zealand Road from NH 107.
- ***Raised median with a directional opening:*** this option would install a raised median on NH 107 that would include an opening designed to allow left turns from NH 107 to Spur Road only. This would eliminate the left turn exits from Spur Road (the most dangerous turning movement) and would also improve safety by providing a protected space for left turning traffic to wait for a gap in opposing traffic. However, the left-turn from NH 107 to Spur Road is a very hazardous movement given the volume and speeds of oncoming traffic and accidents of that type would continue to occur at the intersection. This alternative would also allow for Spur/New Zealand to continue to be utilized as a short-cut.

While beyond the scope of the Corridor Plan, it would be beneficial for the Town of Seabrook and NH DOT to conduct an in depth analysis of circulation patterns and traffic flows that is both independent of the Corridor Plan and of any development proposals in the community.

North of New Zealand Road, the plan calls for a 5 lane cross section with an optional raised center median (**Figure 4-6 and 4-7**) to the North Access Road of the Seabrook power plant, which will assist greatly in moving traffic smoothly through this highly congested area. Gove Road would be reconfigured to form a fourth leg to the signalized intersection at the North Access Road (**Figure 4-7**) to provide improved access to most of the parcels on the west side of Route 1 in that vicinity. In addition, the new Gove Road connection could be utilized along with the existing intersection as a truck turnaround. Improvements would include constructing a connector road (or roads) between Rocks Road and the North Access Road to provide access to the traffic signals as well as a route for trucks and other vehicles to access the transfer station without utilizing the length of Rocks Road. This, along with signage restricting through trucks on Rocks Road, would remove much of the truck traffic from the residential neighborhood. Discussions with representatives of Florida Light and Power (Seabrook Plant ownership) have indicated a willingness to work with the community and the Department of Transportation to create such a connection. Another connection could be made to the Market Basket shopping center to the north providing that development with access to a signal as well.

Signalizing Rocks Road is an alternative for this area that provides limited improvement at a much reduced cost. This would alleviate the difficulty of making left turns from US 1 southbound or left turns from Rocks Road to US 1 southbound and would result in significantly safer and easier access for residents and transfer station users. This is a much less complicated solution compared to the preferred configuration, and some funding for installing the signal has been obtained by Seabrook via development proposals in the area. Like at the New Zealand Road intersection however, adding a signal in close proximity to an existing one (approximately 500 feet to the North Access Road signal) has negative impacts on the operations of the corridor. Compounding this is that currently what would be the fourth leg of the signalized intersection at Rocks Road is a business driveway with limited opportunity to connect adjacent parcels and the larger number of businesses and houses on Gove Road.

Between the North Access Road and the town line with Hampton Falls, the corridor would transition to a 3 lane cross section consisting of a single through lane in each direction and a center two-way turn lane (*Figures 4-8, 4-9, and 4-10*). Although the existing 3 lane section would be maintained in the area, the shoulders would be widened to 8 feet in areas without curbing and to 5 feet in areas with curbing. To reduce travel speeds and to prevent the two-way center turn lane from functioning as a “suicide lane” where motorists would travel for an extended length within the lane, the center lane could be broken up with the intermittent placement of raised (and landscaped) center median.

4.1.2 HAMPTON FALLS

Entering Hampton Falls from the south, Route 1 will transition from five lanes to three and will largely look the same as it currently exists (*Figures 4-9 & 4-10*) as only shoulder widening and drainage work is required until it begins to widen for the approach to the Kensington Road intersection (Route 84). There are relatively few driveways in this segment and the two-way left-turn lane allows for adequate access to properties without impacting through traffic. Exiting driveways (specifically left turns) can be more problematic as the long distance between traffic signals spreads out vehicles and reduces the number of gaps in traffic. Small sections of landscaped raised median could be installed in this section to visually break up the roadway and to develop more of a rural atmosphere. In addition, some work could be done along this segment of the corridor addressing driveway design issues to provide more structure and reduce the number of open parking lots facing the roadway.

Realigning Kensington Road (NH84) so that it intersects the corridor at a 90 degree angle eliminates the direct flow of traffic onto Kensington Road from the north (*Figure 4-11*). The intersection would be placed under traffic signal control with lane use consisting of an exclusive left-turn lane and a single shared through/right-turn lane in each direction on Route 1. With proper alignment and the cooperation of adjacent land-owners, signalizing this intersection provides the opportunity to create a cross-lot connection behind the US 1 businesses to Depot Road on the east, as well as a western connection that would tie in access to the elementary school and NH 88. When implemented, these roadways will allow for circulation around Hampton Falls without having to travel on US 1, reducing the burden on that roadway. In addition, it may create opportunities for some expansion of the village, and improved local circulation and access to businesses.

The high volume of traffic on the corridor through the center of Hampton Falls coupled with the over-capacity left turn at Lincoln Avenue create significant congestion and indicate that widening the facility to five lanes would be appropriate to handle the traffic needs for the foreseeable future. However, the community has consistently requested that Route 1 be kept as narrow as possible to protect the town common, businesses, and small village character of the town. This creates a challenge to balance traffic flow and capacity with the desire of the community and will require a combination of improvements to properly address. A three lane configuration

is proposed that will mitigate the worst of the congestion, but some delay will remain in the town center. In addition to improvements to US 1, the addition of connector roadways to provide alternate local circulation for the downtown businesses and residents, and changing the look of Route 1 with landscaping, sidewalks, and other “Main Street” style improvements to enhance Lafayette Road as a part of the community. *Figure 4-54* and related discussion in Section 4.5 show how landscaping can reduce the visual impact of the roadway, provide access management benefits, and create additional green space in the community in Hampton Falls.

The existing traffic signal at the Exeter Road (Route 88) intersection is proposed to be eliminated and restricted to right-in/right-out movements from Exeter Road, while Lincoln Avenue would be converted to a two-way street allowing full movement under traffic signal control at the intersection with Route 1 (*Figure 4-12*). It is possible that Lincoln Avenue may require some widening and potentially that could have impacts on the town common. However, it is likely that this could be mitigated in the design of the improvements such as by moving street parking, or by directing traffic that would be going from NH 88 southbound on US 1 to the current southern connection thereby eliminating the need for two eastbound lanes on Lincoln Avenue at the intersection. Design work for this intersection needs to be inclusive of the entire village to examine benefits and impacts to the larger area. Eliminating the NH 88 signal provides additional left turn storage capacity at Lincoln Avenue addressing a current source of congestion as the number of vehicles waiting to turn left are greater than the space available blocking the through lane and sometimes the adjacent signal. A raised center median between Kensington Road and Lincoln Avenue would be the most effective method of assuring that traffic moves smoothly through the Town Center as it would restrict left turns to the traffic signals. Paired with additional internal connections between adjacent properties on both sides of US 1, access to businesses and residents would enhance and circulation of pedestrians as well as motor vehicles would be improved. The close spacing of of the two proposed signalized intersections (approximately 700 feet) allows quick and safe left-turns (and U-turns for passenger cars) to be made at either end of the raised median. Crosswalks at the signalized intersections and sidewalks along both sides of US 1 are encouraged to serve the businesses, residents, school, and civic uses and will enhance the village character of the community.

To the immediate north of Lincoln Avenue/Depot Road is an area (*Figure 4-13*) that is heavily developed with commercial uses and has a high density of driveways. US 1 will be maintained at a 3 lane cross-section through this area to minimize impacts on these businesses, but extensive access management should be implemented to reduce the number of driveways, improve access and egress maneuvers, and maintain steady traffic flow through the area. This segment is within walking distance of the village center and would benefit both aesthetically and economically from improved pedestrian connections (both along and across US 1), landscaping, and from stronger integration with the character of the village (See “Reinventing Strip Development” in Section 4.5). This section could also include intermittent, raised, and potentially landscaped, center medians, creating visual interest, as well as providing access management and safety benefits through limiting the use of the center turn lane in areas where it is not utilized.

Continuing north, the 3 lane cross section consisting of a single through lane in each direction and a center two-way turn lane would be maintained, extending into the Hampton Marsh (*Figures 4-14 to 4-16*). Similar to the

PROJECT PRIORITIES FOR HAMPTON FALLS

1. Remove signal at NH 88/US 1, realign and add signal at NH 84/US 1.
2. Implement access management in the Village center to minimize widening.
3. Access Management north of Village center.
4. Improve circulation around the Village Center.

Although listed individually, the work in the Village center must really be undertaken as a whole package to reduce congestion and improve safety and circulation.

section to the south of the Hampton Falls village, the corridor shoulders would be widened to accommodate and encourage bicycle travel but work would otherwise be limited to minimize impacts on the environmental resources immediately adjacent to the roadway.

4.1.3 HAMPTON

Entering Hampton from the south through the Hampton Marsh is an area where minimal work on US 1 is necessary. Given the sensitive natural resources of the marsh, Figures 4-15 and 4-16 show that work is limited to shoulder improvements and other minor changes that can be implemented with minimal impacts to the area.

Multiple configurations are shown for the remainder of Hampton based on two options for improving US 1; constructing a bypass around the limited right-of-way that constraints options for improvements through the center of Hampton (Figures 17a, 18a, and 19a), or focusing modifications on the existing roadway (Figures 17b, 18b, and 19b). The option to relocate Route 1 would build a 2 lane limited access roadway providing a single lane of traffic in each direction along the alignment of the B & M railroad. As illustrated, the new roadway would extend northward from a redesigned NH 101/US 1 interchange for approximately 1.8 miles to just south of the Hampton/ North Hampton town line reconnecting to the existing US 1 at the current bridge over the B&M. Access to what is currently Route 1 and the downtown area would be provided at signalized intersections near each end of the new roadway, and potentially at one to two additional locations. However, the fewer the connections to the bypass, the greater improvement to traffic flow and the greater likelihood that the new roadway is utilized by through traffic only. It is estimated that this new roadway would carry as much as 40% of the current Route 1 traffic and reduce congestion significantly. The implementation of an option that has such dramatic impacts on traffic volumes needs to be studied in much more depth than has been done in the development of this Plan. In addition to the high cost of the construction of a new roadway, there is a potential for significant economic, land use, and environmental impacts that need more detailed examination before decisions can be made.

The plan for the NH 101/Route 1 interchange proposes to reconfigure that facility into a diamond (Figures 4-17a and 4-17b) or some other configuration that meets current safety and design standards such as a single point urban interchange. Depending upon the ultimate configuration of the interchange, the ramp intersections would be placed under traffic signal control and Route 1 through the interchange would provide additional capacity via two through lanes in each direction as well as an exclusive left-turn lane separated by a raised median. In the figures, each option utilizes a signal for Drakeside Road to tie back into the existing Route 1 north of the interchange although, as with the ramps, the ultimate configuration of that intersection will be dependant upon the design of the interchange itself.

Under either option, the reconfiguration of the NH 101/ US 1 interchange provides the opportunity and space to construct a multi-modal facility on land currently within the existing footprint. It is envisioned that this multi-modal center would serve as a park and ride, provide access and interconnection to both regional and local transit, and provide a connection to the beaches. The potential locations for this multi-modal center are shown on Figures 4-17a and 4-17b for illustrative purposes and should not be taken to be the exact location and configuration that

PROJECT PRIORITIES FOR HAMPTON

1. Address US 1/ NH 27 intersection configuration and NH 27 bridge over the B & M railroad.
2. Feasibility study and Design of NH 101 Interchange reconfiguration and Park and Ride
3. Signalize the intersection of US 1 and Winnacunnet Road.
4. Pedestrian and streetscape improvements in downtown Hampton.
5. Implement access management standards to improve traffic flow and minimize the need for widening from NH 101 north.
6. Study the feasibility and benefits/ costs of constructing a new US 1 around the center of Hampton.

is appropriate or desired. In addition to the transit connections that this facility can provide, it is also located within walking distance of the Hampton town center and could serve as an anchor that draws more activity and economic development to that area of the community. A study of the feasibility of an intermodal center on the site is being currently pursued by the Rockingham Planning Commission independently of this effort. A final report is expected in 2012.

The recommended actions for the existing segment of Route 1 in Hampton (Figures 4-20 through 4-25) focus on two things; addressing congestion within the limits of the current roadway, and improving the streetscape.

Continuing north, the plan calls for the installation of traffic signal controls at the Winnacunnet Road intersection (Figure 4-20) as well as a realignment of the intersection to reduce the pavement width on the Winnacunnet Road approach and constrain the intersection to a more standard “T” design. The plan also calls for realigning Exeter Road (Route 27) (Figure 4-21) to the south so as to align directly opposite High Street, improving the operation of the signalized intersection by allowing the Exeter Road and High Street through movements to run under the same signal phase. This will require the replacement of the existing bridge over the B & M Railroad with a new structure that is wider and aligned slightly to the south of the current location, or if feasible (and desired) its complete removal may be an appropriate option especially with freight service now eliminated on that line and abandonment being sought by Pan Am Railways.

From NH 27 to the town line with North Hampton (Figures 4-22 to 4-26), operational improvements will be best realized through the implementation of access management and driveway design standards, and other improvements that make more effective and efficient use of the existing roadway. Right of way is severely limited by existing structures which eliminates the opportunity to widen the roadway to any significant degree. This short stretch of roadway has nearly 100 driveways impacting both safety and traffic flow. Many parcels have multiple access points or are within a few feet of driveways for adjacent properties and consolidating driveways would have beneficial impacts on both traffic flow and safety. If over time, the community can reduce the number of driveway curb cuts, while improving driveway design, protect intersection functional areas, and create alternative access ways, Route 1 can evolve into a much more safe and efficient facility.

Streetscape improvements through Hampton are aimed at providing a safe and inviting place for pedestrians, and enhancing the character of the downtown area as a destination. Most successful downtowns have a pedestrian friendly environment and it is recommended that sidewalks be widened and upgraded using brick, stone or pavers to create contrasting patterns. Bump-outs should be installed to delineate crosswalks and to shorten crossing distances by physically narrowing the roadway for pedestrians. In addition, decorative lighting, street trees, and other streetscape would enhance the look and the feel area so as to establish a sense of place where people will want to gather (example shown on Figure 4-55 and discussed further in Section 4-5).

4.1.4 NORTH HAMPTON

The Corridor Plan calls for the installation of a traffic signal at the Post Road intersection on the Hampton/ North Hampton town line (*Figure 4-26*). Route 1 would be widened at the intersection to a 5 lane cross section consisting of an exclusive left-turn lane, a through lane, and a shared through/right-turn lane in each direction. A raised center median would be provided at the intersection to protect turning vehicles and to preserve intersection function. Work may also need to be completed on the adjacent bridge over the B&M Railroad to accommodate necessary widening. Moving north of the Post Road intersection (*Figure 4-27*), Route 1 would continue as a 5 lane cross section providing two through lanes in each direction as well as a center two-way turn lane.

ROUTE 1 CORRIDOR PLAN

At the existing 5 lane, signalized, intersection at the Home Depot (*Figure 4-28*), a connector roadway would be constructed that would provide direct access from Fern Road to the signals. This connection would allow the existing skewed Fern Road/Route 1 intersection to be discontinued although pedestrian and bicycle access would be maintained. A raised center median would be added along Route 1 at the existing signalized intersection again to protect turning vehicles and intersection function.

The 5 lane cross section of two through lanes in each direction and a center two-way turn lane would continue northward along Route 1 (*Figure 4-29*) to the Atlantic Avenue (Route 111) intersection (*Figure 4-30*). There the existing signalized intersection would be expanded to provide an exclusive left-turn lane, a through lane, and a shared through/right-turn lane in each direction. Like at the other signals, a raised center median would be provided at the intersection to protect turning vehicles and limit the driveway access within the functional area of the intersection.

Route 1 between Post Road and the Atlantic Avenue intersection is an area that would benefit from implementation of access management techniques such as driveway consolidation, cross lot connections, and potentially the addition of a raised center median. A continuous or intermittent landscaped, raised, median would focus left turns to a few locations and reduce the visual presence of Route 1. All three intersections provide good connection points between residential areas, community facilities, and the retail/service area. Either the Post Office/ Home Depot or the Atlantic Avenue intersections or both could form the center of a development node and would be an ideal locations to construct enhanced connections across US 1 with landscaping, wider sidewalks and crosswalks, raised medians at the intersections that provide pedestrian refuges, and other features that would serve to highlight them as gateways to the community.

Beginning just north of Atlantic Avenue (*Figure 4-31*), US 1 would transition back to a 3 lane cross section consisting of a single through lane in each direction as well as a two-way center turn lane. Similar to other segments throughout the corridor, roadway shoulders would be widened to accommodate and encourage bicycle travel. Short stretches of raised and landscaped median could also be utilized in this area as the continuous center turn lane is of minimal functionality due to few driveways and limited development potential.

PROJECT PRIORITIES FOR NORTH HAMPTON

1. Address safety issues at North Road intersections with US 1.
2. Improvements to Atlantic Avenue intersection with US 1
3. Implement access management standards for US 1.
4. Consolidation of Fern Road intersection with Home Depot Shopping center signal.
5. Signalize Post Road Intersection

Roundabouts are an alternative configuration to traffic signals that may work in the three leg segments of Route 1 in North Hampton and any design work should include them as an option for consideration.

Safety is a concern at the closely spaced Hobbs Road and Elm Road intersections with US 1. These roads are on the same side of US 1 and are separated by only a short deceleration lane (*Figures 4-32 and 4-33*). In addition, the Elm Road approach to US 1 is at a dangerously skewed angle. As an interim measure, the southern Elm Road access should be redirected and connected to US 1 further north at a 90 degree angle to increase spacing and to remove the skewed intersection. As shown in the figures, the long term recommendation is to close the existing access point for Hobbs Road and the two access points for Elm Road. connect Hobbs Road directly to Elm Road, and construct a new intersection further north on US 1 that consolidates traffic from Hobbs, Elm, and the Shel Al Mobile Estates into a single signalized access point. Route 1 at the new signalized intersection would be widened to a 5 lane cross section consisting of an exclusive left-turn lane, a through lane, and a shared through/right-turn lane in each direction. A raised center median would be provided at the intersection to separate directional flow along Route 1.

The two off-set North Road intersections are proposed to be further separated and relocated away from the horizontal curve that currently restricts sight lines (*Figures 4-34 thru 4-36*). Traffic signal control would ultimately be provided at each new intersection. Lane use along Route 1 at the intersection would include an exclusive left-turn lane, a through lane, and a shared through/right-turn lane in each direction. A raised center median would be provided at the intersection to separate directional flow along Route 1. The segment between the two new intersections would be transition back to a 3 lane cross section. These improvements could possibly be accomplished in stages, fixing one approach and then the other, or by changing the configuration and signaling at a later date. An updated signal warrants analysis should be completed prior to any project moving forward to verify the need for a signal or not.

The 3 lane cross section would continue north into Rye through a segment of the corridor with numerous driveways and curb-cuts. As an access management action, traffic signal controls are recommended at Lafayette Terrace (*Figure 4-37*) which would provide safe and efficient left-turn access to Route 1 from many of the parcels of land on both sides of the roadway. Route 1 at the signalized intersection would be widened to a 5 lane cross section consisting of an exclusive left-turn lane, a through lane, and a shared through/right-turn lane in each direction. A raised center median would be provided at the intersection to separate directional flow along Route 1 and again provides an opportunity for aesthetic treatments and enhanced connections across the roadway for pedestrians. The Lafayette Terrace vicinity has also been identified as appropriate for transit stops and related improvements and right-of-way space should be allocated for that purpose.

4.1.5 RYE

Given the short length of Route 1 in Rye, the recommended improvements are necessarily brief as well. Entering from the south, Dow Lane is the first street connection with Route 1 in the community and it currently intersects at a skewed angle. This is recommended to be reconstructed so as to intersect Route 1 at a 90 degree angle (*Figure 4-39*). In addition, some consideration should be given to structuring this intersection as a right-in, right out to eliminate the difficult left turn exit from Dow to Route 1. Route 1, in the vicinity of the intersection, would consist of 3 lane section with a single through lane in each direction and a center two-way turn lane until the approach to the Breakfast Hill/Washington Road intersection.

The roadway just south of the Breakfast Hill/ Washington Road intersection contains a problematic vertical crest that limits the sight distance on the northbound approach and has been a contributing factor in many accidents at that location. Currently, the approach features warning signs and a signal that flashes when the light is red for US 1 Northbound. The recommendation is to reduce this vertical crest to improve the sight lines approaching the intersection.

At the Breakfast Hill/Washington Road intersection (*Figure 4-40*), Route 1 would be widened to a 5 lane cross section consisting of an exclusive left-turn lane, a through lane, and a shared through/right-turn lane in each direction. A raised center median would be provided at the intersection to separate directional flow along Route 1 as well as prevent left turns from driveways within the functional area of the intersection. This is Rye's only signalized intersection on US 1, and the community may desire additional landscaping and aesthetic treatments as this serves as a gateway into the town. Transit stops for future corridor service have been indicated on the map near the intersection, and would provide a connection to the commercial centers at the intersection and some limited residential areas within walking distance.

Pedestrian and bicycle improvements should be included in any work done at the Breakfast Hill/Washington Road intersection with at least one crosswalk across Route 1 and shoulder space for bicycle travel.

North of Breakfast Hill Road lane use along corridor would transition back to a 3 lane cross section (*Figure 4-41*) as the roadway continues into Portsmouth. Transit stops are also listed on the map near the mobile home park for future service and should be designed into any roadway improvements in that area if they are not completed beforehand.

Compared to the other Route 1 communities, Rye has only a small number of driveways on the roadway and much of the economic and social activity of the town is focused away from the corridor. That being said, there is potential for significant development and redevelopment along Route 1 and the community should take steps to ensure that traffic generated from that growth is well managed. Implementation will involve the adoption of strong access management standards as well as coordination with both NH DOT District 6 driveway permitting and the neighboring communities.

PROJECT PRIORITIES FOR RYE

1. Address safety issues at Washington Road/ Breakfast Hill Road intersection with US 1.
2. Realign the Dow Lane intersection with US 1.
3. Implement Access Management standards to maintain efficient travel on US 1.

4.1.6 PORTSMOUTH

As the roadway moves from Rye into Portsmouth traffic volumes increase and land use becomes more intense, changing the character of the roadway from a rural to a more urban setting. It is recommended that a three lane cross section continue from Rye into Portsmouth (*Figures 4-42 to 4-44*) to the Ocean Road intersection where it widens to five lanes. Route 1 from this point to the US 1 Bypass is recommended to consist of a 5 lane cross-section including an exclusive left-turn lane, a through lane, and a shared through/right-turn lane at each of the signalized intersections; Ocean Road, Heritage Avenue, White Cedar Boulevard, and the South Gate Plaza. Where feasible it is recommended to construct a raised center median separate directional travel between the major intersections for improved safety and traffic flow along the roadway. The result will be the elimination of uncontrolled left-turn movements entering the corridor as well as limited left-turns from US 1 to driveways, resulting in smoother travel and fewer turn related accidents. The median should be landscaped and should incorporate pedestrian refuge points at all crossings as well as mid-block breaks to allow for turns in some cases. This will need to be paired with access improvements that improve the connection of individual parcels to traffic signals. One potential difficulty with raised medians is the need of for trucks to make left turns at locations other than intersections. A five lane cross-section is too narrow to allow for large vehicles to make u-turns (cars are ok) and either intersections will need to be widened further to accommodate this movement in some locations or truck turn-arounds will need to be constructed such as described for Ocean Road below.

Given the close proximity of Ocean Road and Lang Road, they both cannot be effectively signalized without creating additional congestion and delay. For this reason it is proposed that Lang Road be redirected to connect with Longmeadow Road to more fully utilize the existing four-way intersection and signals at Ocean Road (*Figure 4-45*). The current Lang Road connection to US 1 could remain open as a right-in/right-out access which may be useful as a truck turn-around location, or it could be closed entirely. Figure 4-45 shows an arrow making this connection, however the exact location of the connection will depend upon the parcel boundaries and active land use on the property.

Two travel lanes in each direction with a center median are proposed to continue north through Heritage Avenue (*Figure 4-46*) to the existing widened area around the White Cedar Boulevard intersection (*Figure 4-47*) where it already is a five lane roadway. The proposed raised median along US 1 will further regulate driveway access, and considerations need to be made to improve local circulation and maintain reasonable access to property. It will be important to provide parcels with access to traffic signals where possible. Some suggested circulation improvements are shown on the figures as white arrows including the construction of a new access road connecting Freedom Circle to Heritage Avenue, and interconnecting the parcels between Heritage Avenue and Constitution Avenue to ensuring that there are ways to get from these businesses to at least one of the traffic signals on US 1 in the vicinity. This may not occur all at once, but as land use evolves in the corridor or parcels get redeveloped, access improvements should be implemented as part of site improvements.

Until a few years ago, there were two projects in the State Ten Year Plan to address the capacity deficiencies at the Constitution Ave intersection and the 3 lane segment from this point to Wilson Road. This would have signalized Constitution Avenue and widened Route 1 to five lanes completing a 5 lane section from White Cedar Boulevard to the US 1 Bypass. However, financial constraints with Federal and State transportation resources have resulted in the removal of the two projects and a new approach will need to be found to fund their construction. In addition, work related to private development near the Constitution Avenue intersection has confirmed the presence of historic and cultural resources (a cemetery on one side of Route 1 and a historic structure on the other) that limit how much the roadway can be widened in that location. The proximity to the signals at White Cedar Boulevard (approximately 800 feet) and Springbrook Circle (approximately 450 feet) also make Constitution Avenue a difficult location to effectively signalize. Instead, it is proposed to redesign the existing Constitution Avenue intersection for right-in, right-out movements only, and that traffic be routed through the existing signal at Springbrook Circle for other movements. Route 1 in this area would be widened only to four lanes, with no center turn lane to minimize impacts on the historic resources. *Figure 4-48* shows this concept and includes a new roadway connection between Constitution Avenue and Springbrook Circle that goes through some of the existing buildings in the Shaw's Plaza. It is not intended that this sketch be the default design concept, but that it show the conceptual connection, so that any redevelopment of that plaza can accommodate changes to the traffic patterns to facilitate traffic flow.

PROJECT PRIORITIES FOR PORTSMOUTH

1. Improve Constitution Avenue intersection with US 1.
2. Consolidate Lang Road and Ocean Road intersections with US 1.
3. Implement access management standards for US 1.
4. Widen from Constitution Avenue to Wilson Road.

From this point north, Route 1 is recommended to be widened to 5 lanes as originally proposed in the State Ten Year Plan. This basic concept is shown on *Figures 4-49 and 4-50* and include a raised center median as well as sidewalks on both sides of Route 1. The median does not currently include any mid-block breaks, but given the distance between signals in this stretch of Route 1, a full break (and potentially an additional traffic signal although no analysis has been completed) may be appropriate at Campus Drive where traffic from Water Country can be tied into the corridor as well. With an additional directional break to allow left turns into Hoover Drive.

As Portsmouth is the only community with existing regular transit service along US 1, Transit stops are shown only in locations where COAST Route 6 currently stops in the study area; The Wal-Mart plaza and at Hillcrest Estates. Future improvements to the roadway near these two locations should include improvements for these transit stops and growth in COAST service should be accommodated with additional stops where appropriate.

Pedestrian improvements should include sidewalks on both sides of the roadway as far south as Ocean Road and the residential areas just to the south of that intersection. Signals should include full crosswalks and pedestrian signals to facilitate crossing the roadway. The shoulder should be constructed at least 4 feet wide to allow for bicycle travel.

4.2 COMMUNITY LAND USE STRATEGIES

Highway improvements generate increased accessibility to land along the upgraded roadway. This increases the value of the land adjacent to the roadway often leading to turnover in land use as denser and higher value uses replace existing land intensive uses. The increased development and growth then leads to more traffic, which in turn increases congestion and creates greater safety issues and when traffic flow has deteriorated enough, there is pressure to make improvements to the roadway. Conventional zoning practices have perpetuated this development cycle with the clearest evidence of this trend being the functional obsolescence created by strip commercial developments along major arterials such as Route 1. As this form of development intensifies, the growing number of curb cuts and resultant turning movements conflict with the intended function of the arterial which is to move people and goods safely, quickly and efficiently. This pattern of development often results in congestion and reduced level of service, which is then typically remedied by adding lanes, traffic signals, and other measures to try to maintain capacity. Eventually, if conditions deteriorate enough, it can cause businesses and shoppers to relocate, increasing vacancies and lowering property values. Nationwide, towns and cities are becoming increasingly concerned about this cycle and its effects on community character, quality of life, and the costs of providing infrastructure and services. Good roadway and driveway design, combined with appropriate land use and access controls can break this cycle producing corridors that enhance community character and economic growth.

US 1, in addition to being an arterial that serves the seacoast region, also acts as “Main Street” for many of the corridor communities. This requires an approach that balances the needs of regional traffic with local circulation and community function. In these areas, such as in the town centers of Hampton and Hampton Falls, increasing capacity through highway widening is not a viable option and improvements must be pursued through concepts such as access management, turning restrictions, and potentially balanced with an acceptance of lower levels of service in some cases. Land use policies and zoning regulations that encourage compact development and help to meet community design goals and values are one of the more effective long term methods of managing traffic and growth in the corridor. This is established with policy direction (Community Master Plan) and implemented through zoning ordinances and subdivision regulations that tailor the land use development process to fit local needs. In some cases, this all must also work in conjunction with the NH DOT Driveway Permitting process to produce developments that fit into community needs and resources.

4.2.1 MASTER PLAN

The Community Master Plan is an important policy document that establishes the overall direction of future development. It includes guiding principles for land use development patterns, including location, density and type of development. Each community should examine their master plan to ensure that it considers the following for the US 1 corridor area:

Land Use Patterns: how and where does the master plan encourage or limit development? This aspect is critical as future land use decisions will have a tremendous impact on future traffic patterns and conditions. Communities can encourage beneficial land use patterns through the following recommended approaches:

- **Promotion of Concentrated Development:** define areas within each community where growth is desired and focus community resources for infrastructure there. Compact development requires less extensive roadway infrastructure and creates efficiencies in delivery of public services such as, mail delivery, police and fire protection, reduces the volume of traffic, shortens driving trips, promotes walking, biking, and transit use, as well as numerous other benefits. In the context of commercial highway development, it means focusing growth around nodes to create depth and discouraging a linear pattern. The prime

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example of nodal development on the Route 1 corridor is the Hampton center. This area features mixed use development with housing, jobs, and services in close proximity to each other, public parking and an extensive sidewalk network. While travel through the US 1/ NH 27/High Street intersection is congested at times, the supporting system in the area does allow for multiple paths through and around it, as well as walking and biking to destinations.

- **Promotion of Mixed Use Development:** mixing retail, commercial and residential development can be complimentary for all uses and helps to balance the traffic levels throughout the day as well as reduce motor vehicle travel in general. This is especially effective in downtown or village center areas where traditionally mixed uses already exist and people can live, work and shop. It can also have benefits for a community when applied to existing strip development such as in Portsmouth’s Gateway District which includes most of US 1 south of the US 1 Bypass. This zone has the goal of enhancing “visual character and environmental quality” to accommodate affordable housing, mixed use development
- **Coordinate Land Use with Available Transportation Resources:** if the capacity is not available to support new development on the existing infrastructure, decisions must be made as to how to address the shortage. Less growth could be allowed, different types of land use that aren’t as transportation intensive could be permitted, or investment could be made to increase the capacity of the infrastructure.

Transportation: does the Master Plan identify existing conditions and methods utilized to manage traffic growth and congestion? This includes incorporating access management policies to form the basis of a community program and planning for future growth and congestion needs and to establish site planning standards for development on highways. Recommended methods for managing traffic community wide are:

- **Require interconnected streets:** New subdivision roads that link to other developments and the larger roadway network in a comprehensive way increase the capacity of the network and improve the connectivity of places within the community. Subdivisions that have a single access point ending in a cul-de-sac inhibit emergency access and increase traffic congestion during peak hours by providing limited points of entry or exit, and by not providing alternative routes for other nearby residential areas. While this is often desired by residents and perceived to be safer, it must be balanced against the benefits that improved connectivity can provide for a community in terms of reduced congestion and improved fire and police protection. Interconnected neighborhoods should not be limited to roadways as pedestrian and bicycle access points provide additional benefits to the community. Applied to Route 1, this means eliminating cul-de-sac streets and requiring that public rights of way be established between parcels to provide cross lot access.
- **Design to fit the location:** Context Sensitive Solutions (CSS) is an approach to project development and design that involves all stakeholders in a collaborative process that considers the total context within which a project will exist. The goal is to develop a facility that fits its physical and social setting, and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. On the Route 1 corridor, this will entail that developers and NH DOT work closely with communities to ensure that the specific designs implemented reflect local needs.
- **Planning for all modes of travel:** There are many diverse users of Route 1 and in the future, it is expected that transit, bicycling, and walking will become more important modes of travel within and between the communities. Improvements for these modes must to be explicitly incorporated into the design of roadway projects planned for Route 1. This includes adequate shoulders, sidewalks, and the provision of safe crossing points at intersections and at mid-block locations where appropriate.

4.2.2 LAND USE REGULATIONS

The general land use and transportation policies from the master plan are implemented through the community zoning and subdivision regulations. These rules, regulations, and ordinances control lot sizes, land use types, building heights, setbacks, as well as many other facets of development. They are the primary tool for local communities to guide development and redevelopment of land and are where a definitive impact on traffic patterns can occur. The communities on the US 1 corridor should consider implementing the following to supplement the existing site plan review requirements:

- **Corridor Improvement Financing Options:** establish a system that helps to offset the highway infrastructure costs of new development on Route 1. This could be in the form of an Impact Fee, Betterment District, Tax Increment Finance (TIF) District, or other financing mechanisms that would coordinate off site development, exactions and impact fees in the implementation of the Route 1 Corridor Plan. Local financing options are further detailed later in this section of the report (Section 4.6).
- **Traffic Impact Studies:** While many communities have requirements for traffic impact studies in place, all should work with the Department of Transportation to establish specific requirements and thresholds for when they are necessary and consistency in what should be included. A formal process and detailed requirements such as those illustrated in *Table 4-1* benefit the community and developers by establishing up front what is going to be required for each proposal. Some of the items that should be standardized are the scope determination process, the horizon year time period, analysis periods, study area, and demand calculation methods.
- **Limiting new access points:** Currently each parcel abutting US 1 is entitled to at least one access point depending on frontage and specific location. If the parcel is subdivided, it could entail that each of the created parcels gets direct access to US 1, adding driveways in close proximity and while both the communities and NH DOT discourage this, there is nothing that explicitly prevents it. A short provision can be added to the zoning ordinance that effectively limits the number of driveways to one per current existing parcel along an arterial roadway. Future subdivisions of those parcels must make use of common driveways, access easements or service roads to access the new lots.
- **Pre-establish and plan access:** Having a corridor access plan in place has benefits for both the community and land developers. The community gains by establishing a set of improvements and access controls that can be utilized to guide development as well as provide a basis for traffic impact mitigation. The land developer saves time and resources by knowing community requirements ahead of time and can tailor their initial design to meet the established standards and criteria for access and circulation. This study forms a basis for communities and NH DOT, as it sets out desired signal locations, access controls, and other necessary improvements. The next step for communities would be to establish a parcel specific access management plan for the Route 1 corridor.
- **Require appropriate driveway design:** Properly spaced and designed access points are critical to maintaining traffic flow and safety on congested roadways. The factors that determine good design are spacing, width, turn radius, throat length and approach grade. Driveway spacing plays a critical role in determining the safety of the corridor with a direct correlation between the number of driveways in a particular area and the rate at which accidents occur. The other design components determine the speed at which vehicles can enter or exit the driveway and the number of vehicles that can be processed without causing internal or external circulation problems. On US 1, communities should review current driveway standards and implement changes that facilitate consistent and appropriate driveway spacing and design.
- **Performance Zoning:** In contrast to traditional zoning, performance zoning allows almost any use to be approved in a specific area as long as it meets certain pre-established criteria. Each proposed use is analyzed

for impacts to community infrastructure, water and sewage, traffic levels, as well as other standards and developments meeting the requirements are permitted.

- **Compact Subdivision Design:** This type of subdivision design utilizes either compact mixed use (village based design), or compact single use (cluster development), to reduce the amount of sprawl created by a new development. This requires improved pedestrian, bicycle and motor vehicle access and connectivity to the larger community, and replacing cul-de-sac with interconnected neighborhoods helps to build a sense of community as well as providing alternative transportation routes.
- **Access Management Overlay District:** The use of overlay districts as a method for managing access along commercial corridors is rapidly increasing across the United States, and is becoming an important planning tool in New Hampshire. Special requirements are added onto an existing district, while retaining the underlying zoning and its associated requirements. Language that specifies standards for the Access Management Overlay District is integrated into the zoning ordinance, while corridors (overlays) are designated on the zoning map. Overlay district requirements may address a myriad of access management issues including joint access, interconnecting driveways, driveway spacing, as well as limitations on new driveways. This type of response is useful when there is support for access regulation in one area (such as a corridor) but not in other parts of the community. This type of district can cross municipal boundaries as long as each entity involved approves it.

In addition, the following zoning & subdivision regulations should be examined for adequacy and amended as necessary:

- **Setbacks:** setbacks should be deep enough to allow for flexibility in locating driveways, ensuring adequate driveway throat-length, and to accommodate future right-of-way and/or roadway widening sidewalks or shoulders to be used as bike lanes. As highway rights-of-way vary in width, it is suggested that setbacks be measured from the centerline of the highway. The NH DOT US 1 Policy that has been in effect since the 1980s is working to establish a 90' right of way for the length of the corridor, with an 80' width in areas constrained due to existing development. It is recommended that building follow that policy along the corridor and be no less than 45' from the center line of the roadway. Given existing lot sizes and development there are some that will not ever be able to meet this standard but it should not discourage communities from trying to make improvements.
- **Frontage:** frontage requirements establish the potential number of access points onto a highway, and minimums should be higher on arterial roadways to allow for greater spacing between driveways and improved traffic flow. For zoning districts with a minimum lot size less than 1 acre, the recommended minimum frontage is 250'. Districts requiring larger minimum lot sizes should require $\pm 400'$ of frontage. Increasing the minimum frontage should be utilized only in areas that are not planned for nodal development, and where each lot will have a driveway access onto Route 1.
- **Signs:** while sign regulation is not necessarily a component of an access management regulatory scheme, two very specific tools are offered for consideration.
 - **Off-Premise Signs:** off-premise signs create visual confusion, which has an impact both on safety (drivers searching for signs and not watching the roadway), and on traffic flow (slowing to look for signs). It is recommended that off-premise signs not be permitted along the US 1 Corridor unless they are part of a larger community or corridor-wide signage program to aid wayfinding.
 - **Sign Setbacks:** freestanding sign location(s) should be sufficiently regulated so that they provide adequate information without causing confusion or creating hazards for the traveling public. Specific

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TABLE 4-1: TRIP GENERATION THRESHOLD

 REQUIREMENTS	 SIZE OF PROPOSED DEVELOPMENT	DEVELOPMENT SIZE			
			SMALL	MEDIUM	LARGE
		ACCESS LOCATION & DESIGN REVIEW	TRAFFIC IMPACT ASSESSMENT	TRAFFIC IMPACT STATEMENT	REGIONAL TRAFFIC ANALYSIS
		T ≤ 100 PEAK HOUR TRIPS	100 < T ≤ 500 PEAK HOUR TRIPS	500 < T ≤ 1000 PEAK HOUR TRIPS	T > 1000 PEAK HOUR TRIPS
Pre-application meeting or discussion		✓	✓	✓	✓
ANALYSIS OF ROADWAY ISSUES					
Existing Condition analysis within study area		✓	✓	✓	✓
Site distance evaluation		✓	✓	✓	✓
Nearby driveway locations		?	✓	✓	✓
Existing traffic conditions at nearby intersections and driveways			✓	✓	✓
Future roadway improvements			?	✓	✓
Crash experience in proximity to site		?	✓	✓	✓
Trip generation of adjacent development			?	✓	✓
Trip distribution analysis			✓	✓	✓
Background traffic growth			?	✓	✓
Future conditions analysis at nearby intersections			?	✓	✓
Mitigation identification and evaluation			?	?	✓
SITE ISSUES					
Traffic Generation		✓	✓	✓	✓
Traffic Distribution		?	✓	✓	✓
Evaluate number, location and spacing of access points		?	✓	✓	✓
Evaluate access design, queuing, etc.		✓	✓	✓	✓
Evaluate site circulation		✓	✓	✓	✓
OTHER ANALYSIS					
Gap analysis for unsignalized locations			?	?	✓
TSM/TDM ¹ Mitigation measures (car or vanpooling, transit, etc.) - Transit Agency participation				?	✓
Effect on traffic signal progression, analysis of proposed signal locations				?	✓

T = Total

✓ = Required



traffic signal should not be permitted

? = May be appropriate on a case by case basis

¹TSM/TDM = Transportation System Management/Transportation Demand Management

Table adapted from: Transportation and Land Development, 2nd Ed. By Vergil G. Stover & Frank J. Koepke, ITE, 2002, p.3-6

setback requirements must be based upon several factors, including the posted speed of the road, building setback requirements, dimensional standards for sign size, and lighting method. In addition, signs need to be located so as lead the motorists to the business, and so as to not interfere with sight lines for entering or exiting vehicles.

- **Limit Driveways:** each lot should be limited to a single driveway on US 1 except in unusual circumstances. While this is most effective at improving flow in less developed areas that have larger parcels, a short provision can be added to the zoning ordinance that effectively limits the number of driveways to one

per existing parcel. This limits future subdivisions of those parcels to use of common driveways, access easements, or service roads to access the new lots.

- **Driveway Spacing and design:** regulations should establish both criteria for driveway design and minimum spacing standards. At a minimum, driveways should be spaced with enough distance between them so that vehicles making a right turn out of adjacent driveways don't collide. Driveways should not be "one size fits all" and must be sized according to the amount and type of traffic that will be using them as well as with consideration of internal circulation, traffic on the adjacent roadway, and nearby pedestrian activities.

4.3 ACCESS MANAGEMENT

Access Management involves maintaining control over the location and design of all entrance points to a public highway. The intent is to preserve the safety and efficiency of the roadway, while at the same time providing reasonable access to adjacent properties. Practically, it means limiting the number of, or appropriately spacing driveways, as well as ensuring proper design the roadway and access points so that it is safe and traffic moves as efficiently as possible. Access management tools designed to be implemented prior to the development of a highway, as well as retroactively to improve the function of existing roadways. The tools are comprehensive and include policies, regulations, design standards, as well as physical improvements to the roadway. The benefits are widespread for all users of the transportation system as well as the community as a whole:

- **Motorists** gain from fewer, less severe traffic accidents as well as improved traffic flow, saving both time and money.
- **Businesses** benefit from preserving their market and/or delivery areas, as customers find it easier to access a business due less congested roadways and lower accident potential. Often corridors with good access management are friendlier to pedestrian traffic which can create additional business opportunities as well.
- **Land Owners** benefit from the increased economic development potential of their property on an efficient corridor, as well as increased property values from a larger market area created through reduced congestion.
- **Developers** gain from having established access and design criteria which reduces their design costs and delays by giving them a specific set of requirements to plan towards.
- **The General Public** gain from prolonging the life of the existing roadway through preserving its capacity. This allows funds that might have been spent on new facilities to go into better maintaining the existing network. In addition, there can be benefits for both public transportation travel times and access. Finally, good access management can create a more aesthetically pleasing area with fewer signs, more green space, and an overall more walkable community.

4.3.1 ACCESS MANAGEMENT PRINCIPLES

With the ultimate goal of access management being to find the appropriate balance between safe, efficient traffic flow, and access to individual properties, there are some guiding principles that should be kept in mind when creating plans and improvements.

- **Maintain Reasonable access to property:** an abutter's access to a highway is a given property right that cannot be taken away without compensation. It is however, subject to regulation by municipalities and/or

the NH Department of Transportation under RSA 236:13 which specifically allows both to determine the number, location, and appropriate design of that access.

- ***Provide benefits to the greater community:*** proper application of access management should do more than just improve conditions for drivers. It should help the business environment through safe and convenient access for customers and employees, and benefit taxpayers through more cost-effective use of their money.
- ***Classify roadways based on their function:*** more important roadways (in terms of volume or connections to the network) need a higher degree of access control so that the road continues to perform according to the function it was designed to serve.
- ***Establish Good Design:*** implementing standards that promote well designed roads, intersections, and driveways is the backbone of future improvement, as well as the foundation for correcting existing access issues.
- ***Maintain interconnected streets:*** interconnections between adjacent lots and between new subdivisions and the existing street system are important to maintaining safe and efficient traffic flow. Road networks that work the best are those that provide the user with options for getting from place to place.
- ***Incorporate planning and zoning:*** good access management integrates the concepts into community plans and zoning regulations. Including access management goals in the community master plan, and in local zoning and land development regulations can be helpful in preventing new access problems.
- ***Promote interagency coordination:*** with jurisdiction over land use along US 1 passing through seven communities, and with driveway permitting involving the NH DOT as well, it is critical that processes are coordinated and design standards complimentary. Interagency agreements, such as a Memorandum of Understanding (MOU), provide a solid basis for this coordination with regard to review and approval of development proposals.
- ***Educate the public:*** when citizens and business owners understand the benefits of access management, and are actively involved in developing and implementing plans, there will be much more support for the specific improvements.

4.3.2 RECOMMENDED ACCESS MANAGEMENT PRACTICES AND TECHNIQUES

Much of Route 1 is already heavily developed and portions of the corridor may never meet ideal access standards. Retrofitting access management policies and techniques is difficult due to limited right-of-way and buildings in close proximity to the roadway. In addition, in similar situations, property owner opposition is usually high until it becomes clear how the changes can help resolve the safety and congestion problems that exist. It must be demonstrated that access management can reduce congestion and accidents, save time for travellers, and be cheaper than other alternatives.

There are general practices that are applied at different regulatory and operational levels to facilitate good access management and within each of those general practices are a large number of techniques that can be utilized to manage access on a roadway. This section of the report details the practices and techniques recommended for the corridor and provides appropriate standards and thresholds for the communities to implement.

SEPARATING OR LIMITING THE NUMBER OF CONFLICT POINTS

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The intersection of a street with a driveway or another street creates the potential for interaction between vehicles moving in different directions and at different speeds. The specific locations at which these vehicles come together are known as conflict points and with more intersections there is a greater accident potential. In addition, not only are the number of conflict points a factor, the distance between them is important as well. Providing sufficient time between potential conflicts for drivers to properly perceive and react helps to simplify the driving task and improves operations and safety. The specific methods used to minimize the number of conflict points and ensure adequate spacing are the following:

RESTRICT THE NUMBER OF DRIVEWAYS PER LOT

Lots which have frontage on one highway only should be allowed a single driveway. An exception can be made when two, one-way driveways are substituted for a single driveway when the minimum required distance between driveways can be met. Lots with frontage on both an arterial highway, and an adjacent or intersecting road should 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. The current requirements along the corridor vary from community to community. In general, it is encouraged that each lot have only one access point to Route 1, but that any development within the district have no more than one driveway on the roadway unless frontage is greater than 500 feet in which case one access per 250 feet of frontage would be allowed.

Recommendation: each community should limit parcels to a single driveway on US 1, or two one-way access points, unless frontage is greater than 500 feet in which case two full access points may be allowed. In addition, the regulations should require the placement of primary access points on connecting streets, where possible.

RESTRICT THE NUMBER OF LOTS

Currently lot size and frontage requirements are dependent upon the zoning district and community that the parcel is in. Minimum frontages range from 60 to 250 feet and minimum parcel sizes range from as small as 10,000 square feet (approximately 1/4 acre), to as large as a 2 acres (See **Table 2-4** for details). The differing standards create inconsistencies along the corridor & allow for a much greater density of driveways in some places.

Recommendation: for zoning districts with a minimum lot size less than 1 acre, the recommended minimum frontage is 200'. Lots in districts requiring larger minimum lot sizes should be required to have $\pm 400'$ of frontage. Because much of the corridor already has small parcels, increasing the minimum lot frontage is not likely to have a significant effect on the number of driveways. In the less developed areas however, increasing the frontage requirements should limit to some extent the subdivision of the larger parcels along the roadway.

REGULATE THE LOCATION, AND SPACING OF DRIVEWAYS

Traffic safety studies have shown that collision rates increase as driveways and road access points become more dense. By establishing a minimum distance between access points on the same side of the roadway this is capped and safety improved as drivers are provided with additional space to assess and react to entering, exiting, or turning vehicles. Similarly, driveway alignment on opposing sides of the street can also have impacts on the safety and efficiency of exiting maneuvers, particularly left turns. The ideal situation has driveways on opposite sides of the roadway spaced adequately for the speed of the roadway so that left turn exits from one driveway are not blocked from one opposite it. At higher speeds, this offset should be greater and ranges from approximately 250 feet at 25 MPH to 750 feet at 50 MPH. Driveways directly opposite each other are less desirable, but establish the proper layout for future traffic signals. The worst conditions for driveway movement are those that are slightly offset so that movements across the roadway from one driveway to the other are possible but difficult as the close layout

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causes left turning traffic entering one of the driveways to block traffic exiting from the other. Currently, only the communities of Rye (300'), North Hampton (100') and Seabrook (200') have driveway offset requirements in place. An additional aspect of driveway location is reducing the number directly accessing an arterial street such as Route 1. This requiring that where possible land uses connect to side streets which already have an intersection with the arterial. This is significantly safer for the motorist, allows for smoother traffic flow, and concentrates traffic into a few locations that together, may warrant a traffic signal where separately they would not have.

Recommendation: establish a minimum distance between driveways on the same and opposing side of a highway, including all road intersections that is measured from the centerline of the driveways at the right-of-way line and is a function of the posted speed in accordance with the Minimum Spacing of Access Points table (Table 4-2) and include these requirements in the regulations of each community. For lower volume driveways, and locations where future traffic signals are likely, offsets can be eliminated in favor of placing the drives directly opposite each other. A process for granting exceptions to this requirement for low volume driveways and future signalized intersections should be allowable on a case by case basis via the community Planning Boards.

Recommendation: Where possible, access to parcels should occur via side streets connecting to Route 1 as opposed to Route 1 itself, especially if doing so would provide access for the parcel to an established traffic signal.

TABLE 4-2: MINIMUM SPACING OF ACCESS POINTS ON ARTERIAL ROADWAYS

POSTED SPEED (MPH)	CENTERLINE TO CENTERLINE DRIVEWAY SPACING (FT)	NUMBER OF DRIVEWAYS PER MILE (APPROX)
20	85	62
25	105	50
30	125	42
35	150	35
40	185	29
45	230	23
50	275	19

From Iowa State University Access Management Toolkit:
<http://www.ctre.iastate.edu/>

ENCOURAGE SHARED ACCESS TO PARCELS AND DRIVEWAY CONSOLIDATION

Adjacent properties can often share driveways and parking lots with only minor modifications to site plans and this significantly impacts the number of driveways on the roadway. Cross lot connections allow drivers and pedestrians to access multiple adjacent properties without utilizing the arterial roadway, lowering the volume of traffic and reducing conflicts. Currently, only Seabrook encourages cross-lot connections, and it has been applied in many locations along Route 1 in that community. While it has been utilized occasionally in other areas, In most cases, each parcel has its own access point to the roadway.

Recommendation: for improvements in traffic flow and safety, shared access should be the default for commercial areas as it is the most effective way to reduce the number of driveways and extended to all parcels with frontage on Route 1 within the study area. All projects subject to subdivision review should provide interconnecting driveways or easements for future construction of driveways that will provide and promote both vehicular and pedestrian access between adjacent lots without accessing the highway, and should be designed to provide safe and controlled access to adjacent developments where they exist. Every effort should be made by the Planning Boards to require construction of these driveways in anticipation of future developments.

LOCATE DRIVEWAYS AWAY FROM INTERSECTIONS

Ensuring that the functional area of an intersection is free of driveways benefits both the operation and safety (Figure 4-51). The exact distance that a driveway should be from the intersection is dependent upon the type of intersection (signalized or not), it's configuration, signal timing, presence of turning lanes, traffic volume and speed. It is also dependent upon whether the access point is located on the intersection approach or exit. Most of

ROUTE 1 CORRIDOR PLAN

the communities in the Route 1 corridor do provide for some corner clearance although in some cases the distance required is not adequate for the needs nor are the regulations flexible to address the individual location.

Recommendation: provide an additional requirement in driveway regulations that driveways be located outside of the functional area of an intersection so as to minimize interference operations. Allowances should be made for directional driveways and right-in/right-out restricted driveways at the discretion of the Planning Boards.

PROVIDE ADEQUATE SIGHT DISTANCE

One of the most critical safety requirements is for adequate sight distance and ensuring that drivers exiting driveways have the ability to see far enough to ensure that the roadway is clear. The critical measure in ensuring adequate sight distance is termed **Stopping Sight Distance** and is the distance required for a driver, traveling at the design speed of the road, to stop before colliding with an object in the roadway. As shown in **Table 4-3**, this distance increases with speed and ranges from 115 feet at 20 MPH to over 700 feet at 70 MPH. An additional aspect of appropriate sight distance is ensuring that the visibility provided at intersections is great enough so that drivers stopped and waiting to make a left turn movement have enough distance (time) to make the decision, accelerate, and safely cross or enter the roadway.

Intersection Sight Distance is impacted by horizontal and vertical road curvature, fencing, signs, landscaping, utility locations, and even snow levels and storage. The requirements necessary for ensuring clear sight distances at intersections is usually determined at the local level and are included in the Zoning Ordinance although in many cases, communities apply NH DOT standards for state roads, to the local facilities. Route 1 is currently designed for speeds around 35 miles per hour, and this should remain predominantly unchanged with any improvements. As individual projects are implemented along the corridor it will be important to consider the safety impacts of changes that increase the design speeds and the need for greater sight distances in already developed areas.

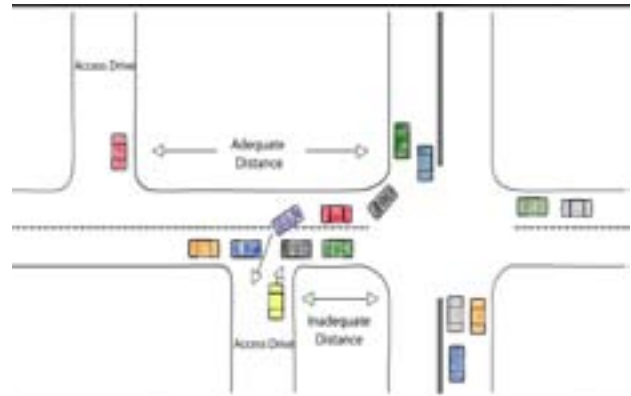
Recommendation: ensure that minimum sight distances appropriate for the design speed of the roadway are included in the driveway regulations.

RESTRICT TURNING MOVEMENTS INTO AND OUT OF DRIVEWAYS

Restricting turning movements from specific driveways can make great improvements in safety and traffic flow by reducing conflicting movements near intersections. The most effective method is a center raised median which prohibits any left turns into or out of adjacent driveways and eliminates the most difficult and unsafe traffic movements. Another method involves designing the specific driveway to be directional (right in, right out), but this is often difficult to construct in a manner that eliminates the restricted movement.

Recommendation: implement requirements in the access management component of the zoning ordinance to include provisions for raised medians at signalized intersections that extend along Route 1 to the extent of the functional area of the intersection. Right-in/Right-out driveways and single direction driveways should be allowable within the functional area on a case by case basis as considered appropriate by the Planning Boards.

Figure 4-51: Corner Clearance



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PROPER INTERSECTION SPACING

Adequate and consistent intersection spacing promotes improved access to property and better traffic progression. This is especially important in the case of signalized intersections where improper placement can create additional areas of conflict, traffic queues, and congestion. Signalized intersections are ideally spaced at ½ mile (2640 feet) but can operate effectively at distances as close as ¼ mile apart (1320 feet) before traffic becomes disrupted. In conjunction with proper spacing, the length of cycles at a traffic signal can greatly influence the congestion and delay along the corridor. In fact, the cycle times should be determined not solely based on volume of traffic, but on the distance to adjacent signals and the desired speed of travel through that section of the roadway.

Recommendation: this study recommends that traffic controls (signals or roundabout) be located at a number of intersections where they do not currently exist. The access management component of the each community's regulations should include minimum spacing standards for signalized intersections and require that analysis of intersection operations and signal timings include the impacts of adjacent controlled intersections.

**TABLE 4-3 : STOPPING SIGHT
DISTANCE**

DESIGN SPEED OF ROADWAY (MPH)	STOPPING SIGHT DISTANCE (FEET)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730

Source: AASHTO, A Policy on Design of Highways and Streets, 2001

REMOVING TURNING VEHICLES FROM THROUGH TRAFFIC LANES:

Allowing through traffic to be unimpeded by turning vehicles improves operations, reduces conflicts, and the duration of conflicts that do occur. This involves constructing left and/or right turn lanes or providing space for vehicles to slow and turn without stopping traffic behind them.

RIGHT-TURN AND LEFT-TURN LANES

Right-turn lanes are typically installed at intersections with high turning movements, or they can be utilized at mid-block locations for high volume driveways. They can also be retrofitted into areas where poor driveway or site circulation has caused traffic backups. Left turn lanes provide critical safety and capacity improvements to a corridor, especially under heavy traffic conditions. Isolated left turn lanes are designed to move turning vehicles out of the through lanes at intersections. These can be either protected by a raised median to separate opposing directions of traffic, or unprotected adjacent to the opposing traffic. Continuous left turn lanes are constructed along an entire segment of the road, and can either be dual left turn lanes that carry a single direction of traffic (known as a Left Turn Lane or LTL), or a single center turning lane that carries traffic from both directions (known as a Two Way Left Turn Lane or TWLTL). Much of Route 1 has existing TWLTLs, even in areas where there are no driveways.

Recommendation: at a minimum, left turn lanes should be considered at intersections with all roadways and high volume driveways along the corridor where vehicles waiting to make left turns create congestion and delay. A continuous two-way left-turn lane should be constructed only in areas where left-turn volumes warrant its use, and short sections of raised medians should be considered to provide some restrictions to left-turns and limit its use as a travel lane. Right turn lanes should be considered for high volume intersections and driveways where removing turning vehicles from the travel lane provides benefits to the traffic flow and safety on the corridor.

REDUCING CONFLICTING VOLUMES OF TRAFFIC

Providing the ability for vehicles to circulate between adjacent sites without having to access the roadway reduces the volume on the roadway and results in fewer vehicle-vehicle conflicts. This requires making connections between parcels for different types of traffic and sharing access points.

REQUIRE UNIFIED INTERNAL CIRCULATION

The goal of unified internal circulation is to provide the most efficient and safe design of parking lots, loading zones, refuse storage and pickup areas for access by both pedestrians, passenger cars, as well as the large vehicles that provide services to the site. This is particularly an issue at establishments with drive-thru services where queues can spill out onto the street and hinder traffic movement.

Recommendation: include an access management component in the regulations that requires that site circulation be smooth, not hinder entry or exit, or interrupt the flow of traffic on Route 1 and that any impacts external to the site be mitigated at the time of construction.

FRONT AND REAR ACCESS ROADS

Access roads, whether in the front or rear of a development, eliminate the need for multiple driveways and offer connections between parcels that don't require the use of the arterial roadway. These types of connections are especially useful in that they can provide access to many parcels via a single traffic signal on the arterial.

Recommendation: Allow for the development of access roads to connect multiple parcels to signalized intersections as well as to allow circulation between parcels without utilizing Route 1. This is particularly beneficial to connect multiple sites to traffic signals, reducing driveways on Route 1 and improving traffic flow and safety.

IMPROVING DRIVEWAY OPERATIONS

Driveway designs that are appropriately sized for the type and volume of traffic and that allow drivers to smoothly maneuver between the roadway and driveways have both safety and operational benefits. In addition, good design will accommodate pedestrians, cyclists, and transit users.

DRIVEWAY DESIGN

There are several driveway design components that work together to allow smooth and safe movement of vehicles on and off the roadway. These components are also illustrated in *Figure 4-52*.

Throat Length: Throat length refers to the amount of driveway space available for stacking incoming and outgoing vehicles, and is measured from the street to the end of the driveway within the development. When there is insufficient distance to manage this traffic, entering vehicles can back up into the street and exiting vehicles can be stuck in the parking lot. The minimum length of a driveway needs to be adequate to accommodate the queuing of the maximum number of vehicles defined by the peak period of operation, as identified in the traffic study for the development. For driveway with one entry lane and one exit, this value ranges from 30 to 75 feet, while for driveways with multiple exit lanes the minimum value increases to 50 feet to handle the higher expected traffic volumes. For signalized access points, the throat length is much longer ranging from 75 to 300 feet dependent upon the the number of exiting lanes.

Angle of Entry: The angle of entry or exit of a driveway impacts the speed at which a vehicle can maneuver through it and the quicker that this movement can happen, the less impact there is on traffic on the roadway. This must be balanced however as too much of an angle reduces sight distances to the left for exiting traffic. Adding a flare or taper to the driveway access can make this a much more efficient process as well.

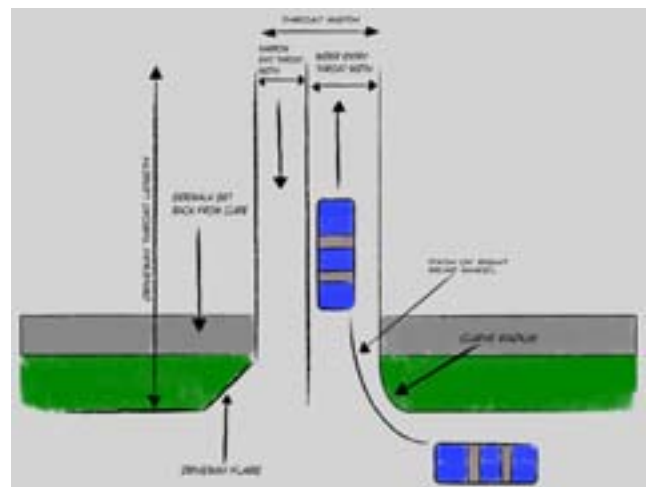
Throat Width and Turn Radii: The appropriate combination of driveway width and turn radius is critical for vehicles to smoothly transition from the roadway into a driveway. As the driveway width is increased, the turn radius can be decreased while maintaining smooth maneuvering. The range of radii is generally from 15 feet in already developed areas with heavy pedestrian traffic (for safety) or space constraints, to 25 feet in areas where more space is available. Sites with significant truck traffic could see turn radii of up to 50 feet to accommodate the large vehicles. Throat width will be dependent upon the number of lanes entering and exiting but should range from around 15 feet for single lane residential driveways to 40 feet for driveways with a single entry lane and two exit lanes. It is critical that the radii and width be designed to the type of vehicles that will be utilizing the driveway, and that it also be considered in conjunction with the other aspects of driveway design such as angle of entry.

Type of Curb Opening: The type of curb return design can have a large impact on driveway operations. Driveways using the dropped curb design or a dustpan design have generally had to be much wider than necessary or have operational issues due to drivers making wide turns to avoid the curbing that juts out into what would be the natural turn radius. Driveways should utilize the curb return style opening which allows for a much more natural turning movement, narrower drives, and improved operations.

Slope: While slope is not usually much of an issue in the seacoast area, the grade of a driveway should be minimized to allow a vehicle to pull off of the roadway without a large speed reduction. NH DOT limits driveway grades to not more than 6% up or down for “a distance sufficient to accommodate expected vehicle storage in urban areas. Beyond the area of the driveway immediately adjacent to the roadway, the maximum grade for any driveway deemed a major entrance is listed as 8% while for all others it is 15%.

Recommendation: adopt driveway design standards that fit the best design to the site specific need and the vehicles utilizing the driveway. This requires that the standards be flexible in width, throat length, turn radii so that driveway operations are fluid. Curb return style driveway openings should be utilized to ease the transition from the roadway to the driveway with minimum encroachment into oncoming traffic and minimum delay.

FIGURE 4-52: DRIVEWAY COMPONENTS



IMPROVING ROADWAY OPERATIONS

Preserving the function of the roadway and providing standards appropriate to the volume and type of traffic utilizing a roadway results in improved safety and operations. With several signals being considered for US 1, it becomes critical to consider proper spacing and other operational aspects so that the roadway continues to operate at high levels of efficiency as traffic volumes increase.

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PROPER SIGNAL TIMING

In conjunction with proper signal spacing, the length of cycles at a traffic signal can greatly influence congestion and delay. Cycle times should be determined not solely based on volume of traffic, but on the distance to adjacent signals and the desired speed of travel through each segment of road. If a signalized intersection is located within 1/2 mile of an adjacent signal or signals, the timing of each can influence the congestion and delay at the others.

Recommendation: require that signals be timed to prioritize traffic flow on Route 1 and that signals located within 1/2 mile of each other be coordinated and synchronized to reduce congestion and delay on the corridor.

MEDIANS

A raised median separates opposing directions of traffic and reduce conflicts (and accidents) by eliminating left turns except for prescribed locations. This allows for better traffic flow and less congestion as one direction of traffic is not affected by the other except at signalized locations. The raised median also provides a refuge for pedestrians in the center of large roadways making crossing a safer movement especially for those that may be slower moving such as the elderly or disabled. In addition, with appropriate vegetation, a raised median can add tremendous aesthetic value to an area and transform the perception of the area by all visitors. Often medians are resisted by business owners who fear that eliminating the options for their customers will have negative impacts due to the “inconvenience” faced trying to access their property. Various studies have examined the issue and shown that in most cases customers will accept some additional effort as a trade-off for steady traffic flow and improved safety, and that the largest negative effects of medians were felt most often during construction and not while in active use. This is especially true in locations where motorists have difficulty making left turns into or out of driveways under the existing design such as seen in many locations on Route 1. That being said, medians should be paired with other improvements designed to facilitate local circulation and access to individual properties such as connector roads, cross-lot driveway connections, median breaks for turns in some locations, and improved signage.

Recommendation: raised medians should be constructed within the functional area of signalized intersections and in other locations where capacity is constrained and impacted significantly by left turn movements and greater control over traffic movement is required. A raised median should also be considered for “gateway” areas that would benefit from an attractive, landscaped, median that establishes that the motorist is entering the community. Medians should not be implemented without consideration for the impacts on access to individual properties and should be paired with other circulation and management improvements to ensure that adequate access remains for each impacted parcel.

PEDESTRIAN & BICYCLE FACILITIES

Pedestrians and cyclists are best served by limiting the number of crossing points (driveways) and by making the crossings as narrow as is feasible. Crosswalks and user activated pedestrian crossing signals should be included at any signalized intersection. Shoulders should be a minimum of four feet and should be designed to accommodate bicycle traffic. Sidewalks and crosswalks should be set back from the mouth of the driveway, and the volume of pedestrians and cyclists should be a consideration in the determination of the driveway taper, turning radius, and speeds of entry and exit.

Recommendation: require that pedestrian and bicycle needs be included in driveway and roadway improvements. Specifically, pedestrian crossing points should be as narrow as is feasible, sidewalks should be separated from the roadway by a landscaped strip and free of obstacles to movement. Roadway construction projects should include sidewalks, shoulders designed to accommodate bicycles, and pedestrian phases at traffic signals.

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SUPPORTING STREET NETWORK

Secondary roadways should support the arterial system by providing through connections between residential and commercial areas, as well as between residential areas. By interconnecting neighborhoods instead of using a cul-de-sac, the accessibility of the local street system is improved reducing the need for local traffic to utilize the arterials on short neighborhood trips.

Recommendation: encourage inter-connections between neighborhoods and parallel streets where possible to allow for local circulation without using US 1.

INCREASING THE CAPACITY OF THE ROADWAY

The traditional response to traffic congestion and delay has been to add lanes to the roadway. In recent years, as resources have diminished and development has constrained widening, it has become more difficult to carry out this approach and it is now only used when volumes have outgrown the ability of other approaches to efficiently move traffic. Given the shortage of resources that are available it becomes important that any roadway widening also be taken as an opportunity to consolidate driveways, connect multiple parcels to traffic signals, and implement other access management techniques that help to maximize the capacity of the roadway. Widening has been used as sparingly as possible on the Route 1 corridor.

Recommendation: pursue the widening of Route 1 only to eliminate bottlenecks and create a consistent roadway profile in a particular area, and where other solutions are inadequate. Pairing selective widening with access management and other opportunities to reduce congestion is a more cost effective and sustainable approach for the corridor.

In some cases, when other access management techniques are not enough to reduce the congestion on a roadway, a bypass of the congested area can be an effective solution. Construction of a bypass raises issues that most other access management solutions do not, such as high cost, and potential social, economic, and environmental impacts. That being said, if a bypass is to be constructed, it is most effective when access to the new facility is limited, and it is utilized to move through traffic instead of providing local access to businesses or residences. A bypass is proposed as a potential solution for the section of Route 1 in Hampton where a narrow roadway and right-of-way constraints make widening impossible without tremendous impacts on the downtown. This proposal requires significant additional study of its feasibility, potential benefits, and impacts to the community.

Recommendation: Utilize by-passes to reduce pressure on facilities that have no other outlet. Planning for this type of facilities should include extensive analysis of the benefits as well as the potential socioeconomic costs.

4.3.3 DRIVEWAY PERMITTING & ACCESS MANAGEMENT MOU

Outside of Urban Compact Areas, the NH Department of Transportation has jurisdiction over access to State highways which does not give DOT the authority to prevent or prescribe development, or to completely prohibit access to land abutting those highways. Instead, ***New Hampshire RSA §236:13 Driveways and Other Accesses to the Public Way***, establishes the authority to regulate driveways and accesses to State highways, and this is expanded procedurally in the ***NH DOT Policy Relating to Driveways and Access to the State Highway System***, which details the permitting process and the standards necessary to follow for residential and commercial driveways. These procedures provide NH DOT with discretion over the location and design of access points. The purpose of the policy is to establish a consistent and fair process for all applicants while keeping the following principles a priority:

- a. Provide maximum safety and protection to the traveling public through the orderly control of traf-

fic movement

- b. Minimize conflict points;
- c. Acquire appropriate site distance on or to any class I, III or the state maintained portion of class II highways;
- d. Maintain the serviceability of affected highways, which could require alterations;
- e. Monitor the design and construction of driveway entrances and exits; and
- f. Maintain compliance with RSA 236:16, effective July 1, 1971, as amended.

Because of the split in control of land use and driveway connections (except in Urban Compacts) it is important that DOT and the communities work cooperatively to manage access and traffic along US 1. Difficulties in coordinating driveway permitting and development approvals led the Department of Transportation to work with the Regional Planning Commissions and communities around the state to develop an Access Management Memorandum of Understanding (MOU). The MOU is an agreement between the municipality and NHDOT whereby the two cooperate to ensure that information is shared, processes are clear, and that driveway permitting is coordinated with the local site plan approval process. This is facilitated by the development of an access management plan of sufficient detail for the roadway in question. The Access Management Plan can be parcel specific but at a minimum delineates present and future driveway locations; joint access points; intersections layouts, including present and future plans for signalization; and frontage/service roads. The purpose of the plan is to provide for the orderly development/redevelopment of the corridor in compliance with the adopted access management standards. Prospective developers of properties along the corridor would be required to incorporate and construct the appropriate components of the Plan into their development plans as determined by the Planning Board and NH DOT.

Recommendation: Each community should work with NH DOT and the RPC to approve an Access Management Memorandum of Understanding for driveway permitting on Route 1, and other state highways in the community as appropriate.

4.3.4 IMPLEMENTING ACCESS MANAGEMENT

Developing an access management program requires a number of steps be undertaken. While US 1 Corridor Plan can serve as the basis for an access management plan, it does not provide the parcel specific detail that may be necessary for each community. The Plan is also limited to recommendations for Route 1 and a more comprehensive approach to access management that includes other roadways may be desired by the communities. In either case, the steps to implementing access management are the following:

- a. ***Integrate Access Management into the Master Plan:*** address multimodal approaches to transportation and translate access management principles into policy statements in the master plan and other planning documents.
- b. ***Develop a Roadway Plan:*** classify the roadway network according to function and establish design criteria for roadways, intersections, and driveways.
- c. ***Address in Land Use planning:*** adjust the land use and land use planning to compliment the access management standards.
- d. ***Strengthen local subdivision regulations and design standards:*** evaluate and update policies, subdivision regulations, and related ordinances to incorporate access management principles and design standards.
- e. ***Develop sub-area and corridor plans:*** create plans for specific sub-areas of the community and include the public in the process.

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- f. ***Integrate transportation safety & operations into the land use decision-making process:*** Ensure that information regarding roadway safety and operations is included in plan evaluations and studies.
- g. ***Establish a traffic impact analysis process:*** establish a tiered approach to Traffic Impact Analysis (TIA) so that all proposals are reviewed to some degree with larger and more complex proposals triggering more detailed level of analysis.
- h. Coordinate with other jurisdictions: integrate the land use and transportation planning via coordination with NH DOT and neighboring communities. This entails establishing an Access Management MOU between the community and NH DOT. Implementing the MOU requires the following steps:

Step 1. Review community Zoning, Site Plan, and Subdivision regulations for Access Management strategies and update to address any deficiencies or desired changes.

Step 2. Establish joint responsibilities of NH DOT and the community to coordinate between site plan approvals and driveway access permits. This will determine who is to be notified of driveway permit applications to NH DOT and under what circumstances. In addition, it should establish time lines for the community to consider and respond to the application making a recommendation to NH DOT based on an adopted Access Management Plan.

Step 3. Approve a Memorandum of Understanding (MOU) with the New Hampshire Department of Transportation (NH DOT) to improve access management on New Hampshire State Highways.

Step 4. Incorporate Access Management standards into community Site Plan and Subdivision regulations. This can be accomplished by adding them directly to the regulations, incorporating them in an appendix, or referencing a specific access management plan directly. The US 1 Corridor Plan has the components to act as a basic access management plan sufficient to establish an MOU between the communities and NH DOT. The study establishes necessary improvements, as well as policies and standards that should be utilized to keep traffic on the corridor manageable. Communities can further develop this basic plan to suit their needs and as parcel specific access components become apparent.

Step 5. Utilize the most current land use regulations in conjunction with the master plan to implement Access Management strategies.

4.4 TRANSIT IMPROVEMENTS

Public transportation plays an important role in addressing the mobility, traffic and air quality issues that are facing the Seacoast region. It represents a more efficient use of the existing roadway network by carrying passengers that might otherwise be driving their own vehicles, and a successful public transportation system can reduce congestion by remove a significant number of vehicles from the roadways, which is especially important on physically constrained corridors such as Route 1. Public transportation also offers many social benefits by providing a service to those who cannot or do not drive themselves, due to personal choice, age, income or disability. However, there are many factors that present challenges to public transportation on the Route 1 corridor as well. Specifically, the land use patterns which have emerged (i.e., relatively low residential density and separation of land uses) are often incompatible with traditional public transportation, which operate best in an area with high population/development densities and mixed land uses.

4.4.1 INTERMODAL CENTER/PARK & RIDE

The reconfiguration of the NH 101/ US 1 interchange provides an opportunity to address some of the corridor transit service deficiencies via the construction of a transit center and park and ride facility. This location places the intermodal station adjacent to a major regional roadway (NH 101), close to the Hampton town center, and within a few minutes of both Interstate 95 and the NH beaches. The exact location of this facility would likely be determined during the design of the interchange, and would be located and oriented differently depending upon the course of action determined for improvements in the center of Hampton. Situated at the Route 1/ NH 101 interchange, this facility is within walking distance of the Hampton downtown and is close enough to reduce congestion by providing overflow parking and shuttle service to the beach. In addition, the site is well situated to provide connections to intercity transit service such as is on I-95, to the Downeaster train, as well as serve any local transit service along the Route 1 corridor.

Recommendation: As an interim measure, pursue improvements to the existing park and ride facility on Route 27 in Hampton near the NH 101 interchange.

Recommendation: Perform a feasibility study of the placement of an intermodal center at the US 1/ NH 101 interchange that works with a reconfigured interchange. In addition, the study should include a conceptual design, estimates of service levels and demand, and cost.

4.4.2 FIXED ROUTE SERVICE

Currently there is no daily fixed route transit service along the length of Route 1. While it has been established that such service is a desired expansion of the COAST system, and the communities are generally supportive, there is no time line for implementation at least partially due to the funding that each community would be required to provide for the service. That being said, there are still some transit improvements recommended for Route 1 that would benefit any future fixed use service:

Recommendation: Prepare the Roadway so that desirable locations for transit stops have been delineated and are incorporated into the design of adjacent roadway improvements if not constructed beforehand. Designs should include pullouts to enable the bus to leave the traffic stream, user amenities such as concrete pad waiting areas, benches, lighting, and shelters, as well as connecting bicycle and pedestrian facilities.

Recommendation: Extend current COAST Route 1 Service from the current stops in Portsmouth just south of Ocean Road to provide service to all Route 1 communities. Service levels should be adequate for the expected ridership and strive for 1 hour headways, more than 12 hours of service per day, Monday through Saturday.

Recommendations: Make Connections to Regional Passenger Rail by providing seasonal shuttle service between Exeter and Hampton. COAST tested an implementation of this service connecting Epping to Hampton Beach with intermediate stops in Exeter and Hampton, including the train station to meet the Downeaster, Exeter downtown, Hampton Downtown, and many of the residential streets near the beach. With minimal publicity and marketing the service was lightly utilized and any future service of this type will need a more robust program.

4.4.3 INTERCITY COMMUTER SERVICE

Very good Boston-bound commuter bus service is currently operating from the Portsmouth Transportation Center, provided by C&J Trailways via the Interstate 95 corridor with an intermediate stop at the Park and Ride in Newburyport. To the west, the Amtrak Downeaster provides limited commute-hour passenger rail service with station stops in Dover, Durham, and Exeter as well. The Downeaster currently offers only one peak hour round trip, with a rather late evening return. However, there is currently no commuter transit service to the communities south of Portsmouth in the U.S. Route 1 corridor and those interested in an alternative to driving must either drive to Newburyport to catch a bus or train, or drive west to Exeter to board the Downeaster.

Recommendation: Connect to Regional Commuter Service via the intermodal transit facility proposed adjacent to the reconfigured NH 101/ US 1 interchange provides as an opportunity to address demand for intercity transit service. Existing intercity service to Boston and Logan Airport on I-95 from Dover and Portsmouth is very popular and the demand for parking at the Portsmouth and Newburyport park and rides often exceeds capacity indicating the need for another facility in the area.

Recommendation: Capitalize on East-West bus services: An intercity service utilizing Flightline van services is expected to start in the near future and the Hampton Intermodal Center would be an ideal starting point for that service from the seacoast to Manchester and Manchester Airport. This location would also be an excellent location for park and ride service to any future NH 101 service.

4.4.4 RAIL SERVICE

In addition to bus based transit service, there is some potential that passenger rail service could be feasible in the future, and this alternative has been studied previously to some extent. The poor track conditions between Portsmouth and Hampton, the fact that the tracks have been removed from Hampton south through Seabrook, and the fact that the rail line passes through both high value natural resource areas (Hampton Marsh and others), and the Seabrook Nuclear Power plant security zone, all pose significant barriers to any potential service along the length of this corridor as does the startup cost. A 1999 feasibility study completed by the Rockingham Planning Commission, that was updated in 2005 to utilize 2000 Census data and include an alternatives analysis, projected that the 2010 ridership would find approximately 542 commuters (1084 daily trips) utilizing a Hampton Branch passenger rail line that connected into MBTA service in Newburyport. Given that analysis of relatively low ridership, the high cost of starting and operating the service (\$77-\$100 million capital cost to build it, as well a \$4.4 million annual operating subsidy), it was determined that the project was non-competitive for the Federal Transit Agency New Starts Program due to the high cost and low user benefit compared to other proposed transit systems funded by the program. Any service of this type along the corridor is likely relegated to a far future option.

- **Preserve Right-of-way:** any roadway improvements should not preclude the future use of the Hampton Branch rail line should it be desired and feasible to enhance freight service or establish a passenger rail service along the corridor.

4.5 STREETScape AND LANDSCAPING IMPROVEMENTS

In addition to the role that US 1 places moving regional traffic to retail areas, New Hampshire Beaches, and other attractions, Lafayette Road is “Main Street” for many of the communities. Because of that, a balance must be attained between the desire to have a roadway that fits the community and the growing needs of regional traffic that uses the corridor. This balance can be partially addressed with streetscape improvements designed to return downtown areas to their intended function, improve the aesthetics of the roadway, and enhance the character of the community by reducing the perception of US 1 as a roadway that divides as much as it connects. The streetscape is the elements of the built environment within the roadway corridor and it effects how we experience the street. These elements include structures such as buildings, bridges and walls, trees and landscaping, open spaces, surfaces and textures, lights and lighting, signs, signals, building design, parking as well as other aspects of the roadway corridor. It is the unique combination of these elements within each community that becomes an important aspect in establishing the character of the community, and enhances the historic “Main Street” feel of the corridor in some areas.

4.5.1 HISTORY

The streetscape on Route 1 has changed significantly over time as the road evolved from a stage road to the current arterial that exists today. Historic photos of Route 1 often show a tree lined boulevard that no longer exists. The addition of the railroads and trolleys in the 19th Century produced the first big changes to the corridor, as tracks and crossings were added. However, it wasn't until the spread of Dutch elm disease during the 1930's that the corridor began to undergo wholesale change. Like in many other places, the American Elms died off and have not been replaced as the communities have grown and developed resulting in a significant change in the character of the roadway and losing many of the benefits that the landscaping has historically provided.

4.5.2 BENEFITS

It is not easy to justify using limited available funding for the expense of enhancing a roadway with landscaping and other improvements solely on the perception that the primary benefits are aesthetic only. However, there are a wide range of significant and lasting benefits to providing a well designed streetscape:

- ***Safety and Traffic Calming:*** rows of trees and other landscaping elements located at a community gateway provides a transition between country and community which helps to change driver perception. Landscaping elements help to create the impression of a narrower roadway, especially when combined with curbing, sidewalks and on street parking. This slows cars and trucks to appropriate speeds and improves safety for traffic, bicyclists, and pedestrians as injuries and fatalities from collisions decrease significantly at lower speeds.
- ***Pedestrian Friendly:*** the shade and cooling provided by trees provide a more comfortable and pleasant environment for pedestrians that invites walking and generates additional use. In downtown areas this can produce economic benefits as pedestrians linger longer in areas that are attractive purchasing more goods and services as well as contributing to the perception that an area is a place to be.
- ***Wayfinding Assistance:*** landscaping can serve as a landmark to drivers, especially when located on a raised center median or in the center of a roundabout, and serve to alert drivers to changes in the roadway.

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- **Reduce traffic congestion:** landscaping, along with appropriate pedestrian and bicycle facilities can offer and attractive option to walk or bicycle. This can reduce the demand for short distance vehicle trips as people get out and walk instead of driving between stores or other destinations.
- **Economic Enhancement:** some studies have shown that communities who invest in creating and maintaining an inviting and attractive streetscape have higher land values and perform better economically than communities that have not made this investment.
- **Community Character:** different areas of the country are known for their differing landscapes, and appropriate streetscape improvements help to provide a sense of history and permanence. This area, and US 1 in particular, was historically known for the Elm trees that lined the roadway and returning these trees to the corridor would bring back some of that historic character.
- **Aesthetic Value:** trees and shrubs utilized as screening material soften the glare of lights, hid parking lots and other undesirable views, or conversely can highlight and enhance particularly attractive views.
- **Decreasing noise:** while small groups of trees provide little in the way of noise reduction, the sound of the wind in the leaves and visual screening can mask some vehicular noise and psychologically make an area seem quieter than it actually is.
- **Environmental Benefits:** there are a variety of ecological benefits to landscaping and trees. They improve air quality by providing oxygen and absorbing carbon dioxide and other pollutants, they absorb rainfall and reduce storm water runoff; they cool and shade areas in summer months, and can block and reduce winds. Finally, they provide urban habitat for birds and other wildlife.

4.5.3 GENERAL RECOMMENDATIONS

Improvements to the streetscape will help to create a unique identity and return the historic element currently missing from much of the Route 1 corridor. In addition to general recommendations for the corridor communities, there are specific types of improvements recommended for different areas based on their defining characteristics:

- **Village Centers:** those areas along the corridor that form the historic town centers of Hampton and Hampton Falls. These areas support a mix of uses and building types and a range of commercial and community activities. Buildings are close to the roadway with some existing landscaping and there is open space as well in the form of public parks. Sidewalks and crosswalks provide accommodations for pedestrians and generally activity is greater for these modes. Currently the villages of Hampton and Hampton Falls fit this description but other areas along the corridor could evolve into centers as well if desired by the communities.
- **Highway Commercial Areas:** This encompasses much of the area zoned highway commercial with significant retail development and there are areas in every community fitting this description. The roadway is generally either 3 or 5 lanes in width with a center turn lane. Setbacks are larger than in the village centers but still relatively close to the roadway. Landscaping, where it exists is generally in the form of front yard plantings and screening between businesses or uses. Pedestrian and bicycle activity is reduced compared to village centers.
- **Rural Transition Areas:** The spaces between communities where development is less intense or absent, the roadway is uncurbed, and speed limits are generally higher. There may be some agricultural use in the area along with scattered development of various types, or there may be no development at all. Setbacks are generally large and landscaping is primarily from natural features and agricultural activity. These areas serve as transition zones between areas of more intense development and are scattered along the corridor such as in the southern part of Hampton Falls, the Hampton Marsh area, and portions of North Hampton and Rye.

There are a number of recommendations that fit generally along the corridor and should be applied in all areas.

- **Capitalize on History:** as one of the earliest settled areas of New Hampshire, historic spots are prevalent in the area, and highlighting and should be documented utilizing historic markers, information kiosks, public art, and other methods will generate interest from residents and travelers alike.
- **Fit the road to the landscape:** look at the landscape to determine how best to make a project blend with the surrounding physical features and context.
- **Engage the community:** the design process for any improvements should work directly with residents to incorporate community feedback into the final design.
- **Plan for all modes:** include support for all modes of travel as part of all future residential and commercial developments along the corridor. This includes the construction of transit stops, roadway shoulders wide enough for bicycle use, sidewalks and crosswalks, and landscape/streetscape improvements, especially in community centers where pedestrian activity is likely to be greater.
- **Maintain safety for all users:** site lines should be kept clear of visual obstructions at all intersections and space should be maintained on the sidewalk for pedestrian circulation. In higher speed areas, clear zones adjacent to the roadway need to be maintained to provide drivers the opportunity to make corrective actions without striking roadside hazards.
- **Maintain what is built:** to ensure safety of users and to encourage continued use of facilities, sufficient maintenance funds should be provided for sidewalks and shoulder areas. A well maintained and attractive streetscape will attract both businesses and customers to an area.

VILLAGE CENTERS

When Route 1 passes through community centers, it must accommodate the needs of many different users, often in a narrower right-of-way than the rest of the corridor. In addition to commuter and regional tourist traffic, the town centers see a larger presence of pedestrians, cyclists, trucks making local deliveries, and citizens accessing goods and services and using community centers. The village centers would benefit from sidewalk and streetscape improvements to help counter the impacts of increased congestion, as well as to enhance the appearance and viability of the town centers. These changes have been illustrated for the communities of Hampton and Hampton Falls as examples, but could be applied to any area along the corridor that communities wish to transform into more pedestrian-friendly and attractive environments. The following improvements are recommended for village areas:

(Some are also illustrated in the layouts for Hampton Falls and Hampton (Figure 4-54 and 4-55, respectively) in the Appendix)

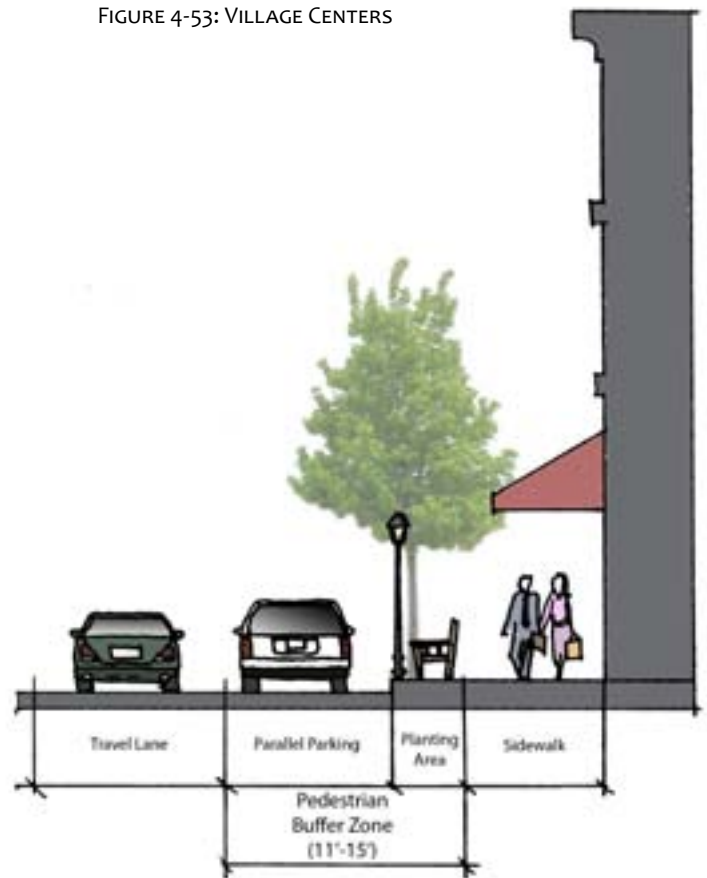
Recommendations Pictured:

- **Maintain Existing Roadway width:** restrictive right-of-way widths require that improvements to traffic flow take place within the existing roadway width. The need to provide parallel parking, and bicycle and pedestrian facilities along the corridor may require the reduction of lane widths and limited shoulders.
- **Enhance Sidewalks:** to support the “downtown” of the community, the walking area of sidewalks should be at least 5 feet wide in residential areas and 6 feet in commercial areas. A minimum width of 12 feet is recommended in areas where there is landscaping and space for displays, street furniture and “window shopping” as shown in *Figure 4-53*.

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- **Create Buffer Zones:** separating pedestrians from moving traffic by providing parallel parking, landscaping, and street furniture between the roadway and the sidewalk increases the comfort level of those walking. The buffer zone should be an area of at least 1.5 to 3 feet of space between the curb and the area in which pedestrians are walking that provides space for parallel parked car doors to open without interfering with circulation. If wide enough, this area can host street furniture and landscaping.
- **Street Trees and landscaping:** tree lined roads and sidewalks provide significant pedestrian and aesthetic benefits, and help to promote the unique qualities of the area. Trees placed 40 feet apart with branches beginning 8-10 feet off the ground provide structure while allowing for good visibility of driveways, signs, and businesses. Trees grown specifically for use as street trees work best as they are bred to have few low branches. Higher vertical clearances may be necessary for areas where the tree canopy overhangs the roadway to ensure that there is adequate space for trucks. Where possible, it is recommended that the communities introduce disease resistant Elm trees along Route 1 to restore that historic aspect of the corridor. When placing trees in sidewalks, tree grates should be installed to both preserve the sidewalk and the health of growing trees. Likewise, landscaping should be utilized for screening with care taken to not block site lines and signage.

FIGURE 4-53: VILLAGE CENTERS



- **Scale Lighting:** lighting in community downtown areas should be styled to be respective of history and village scale. Pedestrian pathways and crossings should be well lit. Light fixtures should incorporate the latest energy efficient technologies and be designed to light the roadway and sidewalk (not the sky) and reduce glare.
- **Use Vertical curbs:** in downtown areas, vertical curbing should be utilized to provide vehicle deflection at low speed and to keep vehicles from encroaching on pedestrian spaces.

Other Recommendations:

- **Incorporate Transit stops:** transit stops should be placed adjacent to intersections or at mid-block with exact locations determined by site and route dependent variables. Care should be taken so that the stops are not located in places that will interfere with intersection turning movements, pedestrian crossings, or driveways. Stops should be clearly marked and have adequate parking restrictions adjacent to them to allow buses to smoothly move out of traffic and into the stop zone. Stops should be incorporated into a pedestrian network connecting residential and commercial uses with transit access. When possible, transit stops should also provide bus shelters or the like, to give protection from the elements and vehicular traffic.
- **Install Visible Crosswalks:** crosswalks should be highly visible and at all four legs of intersections in most circumstances. Mid-block crossings or at unsignalized intersections are recommended in areas that are greater than 300 feet from the nearest signalized intersection. Using contrasting colors or materials to mark the

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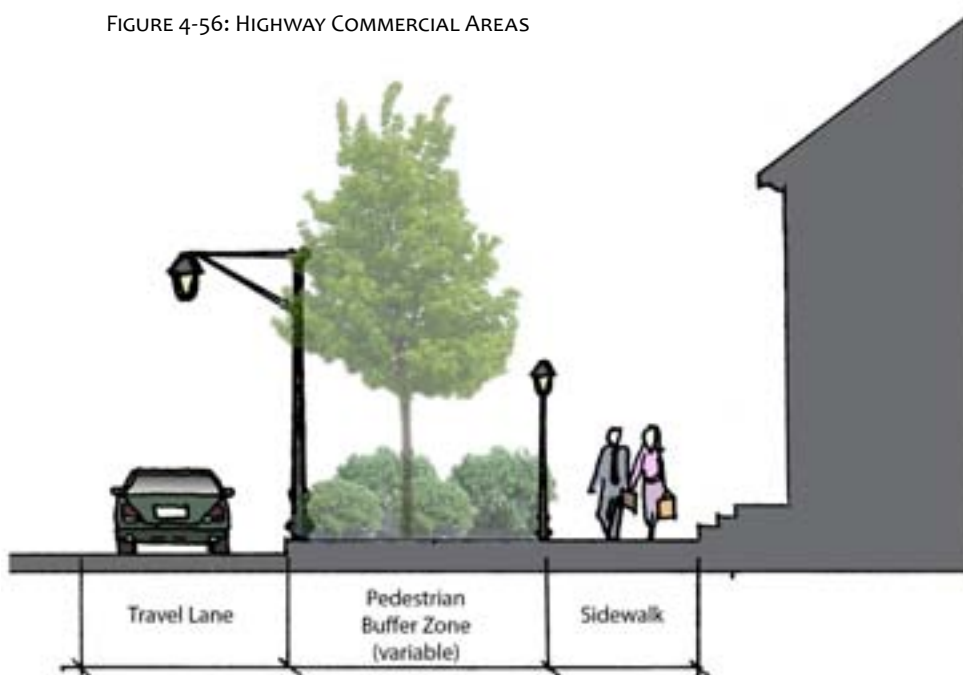
crosswalk enhances visibility for drivers and increases safety. The areas around crosswalks should be well lit to ensure that drivers can see pedestrians crossing at night.

- **Install Curb Extensions (bulb outs):** curb extensions at crosswalks in downtown areas provide significant benefits to pedestrians by reducing the crossing distance (time) and improving visibility to motor vehicles. This type of improvement is recommended at all pedestrian crossing points, particularly where visibility behind parked vehicles is a problem or where there is a need to reduce the crossing distance.
- **Include Space for Bikes:** while the entirety of US 1 is not an ideal route for bicycle traffic many do use the roadway to access employment and services as well as to link between routes that attract recreational cyclists. The downtown areas of communities should accommodate bicycles within the shoulder of the roadway as well as provide space for racks close to businesses.
- **Consider Raised Medians:** in some cases, introducing a raised median can provide important traffic flow and safety benefits to a town center through limiting left turns in heavily congested areas. At the same time, a properly landscaped and maintained median can lessen the visual impact of the pavement and beautify the roadway. On wider roadways, the median can serve as a pedestrian refuge as well as a public art display space. It should be noted that raised medians are recommended only in conjunction with other circulation improvements that ensure connectivity of businesses, residents, and civic centers with the community. The visual changes of adding a landscaped median are shown in *Figures 4-54 and 4-55*.

HIGHWAY COMMERCIAL AREAS

Much of the land use adjacent to Route 1 consists of auto-oriented commercial and retail activity. This includes strip commercial centers with parking lots adjacent to the roadway, many driveways in close proximity to each other, and in some cases, no curb or defined driveway at all. The intensity of land use is lower and the mix less diverse than in the town centers, making these areas less conducive to walking and accessible primary by car only. At the same time, many locations adjacent to residential areas can benefit from greater connectivity and improvements to the streetscape. These areas have different design and functional needs for both pedestrians and vehicles than the village centers.

FIGURE 4-56: HIGHWAY COMMERCIAL AREAS



Recommendations Pictured:

- **Sidewalks and Buffers:** there are currently sidewalks in some auto-oriented areas and they should be constructed in areas where there is potential for pedestrian traffic via nearby residential developments. Sidewalks should be a minimum of 5 feet wide and set far enough back from the curb to be outside of the curve radius on driveway crossings and to allow level crossings with no more than a 1:10 slope from the sidewalk to the driveway/road intersection. As there is no on street parking

Reinventing Strip Development

The last decade has seen community development efforts focused on revitalizing downtown areas with great success. Many town centers have returned to their former vitality and attention is now shifting to areas of strip development along commercial corridors. These sites are generally looked at as unattractive and unsustainable, less convenient and accessible due to continued shifting of land uses, and are viewed as needing to change to continue to be viable in today's rapidly evolving communities. At the same time, these commercial areas provide a significant portion of the economic base and for that reason need to be better integrated into the communities using many of the lessons and techniques learned in downtown redevelopment. The Urban Land Institute (ULI) has identified ten basic principles for integrating strip development into the community:

1. **Form Lasting Partnerships:** The general public, business and community leaders need to be involved in determining the direction of the community and crafting the policies, standards, and plans to ensure broad community support. Once plans are approved, implementation will require that partnerships continue to manage and resolve development impacts, and provide financing and government services to the community.
2. **Anticipate Change:** As the region grows, consumers have increasing options for where and how they receive their goods and services, including not going anywhere. Demographic shifts (aging population, growing numbers of two income households) are changing needs, and while it used to be that everyone wanted a house in the suburbs, needs are more diverse and current development patterns do not fit what they need. Bringing the vitality of downtowns to strip developments will address this to some extent but will require mixing in other uses and amenities such as parks, public services, cultural attractions, and dining to protect against shifts in buying patterns and build a more stable economic base.
3. **Perform a Market Assessment:** Assess the market area and specific market forces at work within the community (such as tourism), with the understanding that differing growth rates, economic conditions, populations, incomes, and levels of access will create different results. The assessment should discuss where specific development fits within the community, and any plans should build on existing strengths and be reasonable about expectations.
4. **Reduce Retail Zoned Land:** Allowing too much land to be zoned for retail results in sprawling growth patterns that prioritizes building new over redeveloping existing uses. Proper scaling to the size of the market (as determined in a market assessment) can stimulate economic growth by providing a strong economic base even if there is less land available overall for development. Rezoning can stimulate higher density use and infill development, helping to create nodes of growth and moving away from a linear pattern. Higher densities also promote walking and transit use, providing some congestion relief. The land that is removed from retail zoning should be set aside for open space, mixed use, residential, office space, recreation facilities, and civic uses.
5. **Focus Development:** Strip development offers visibility, convenient parking, and the ability to scale larger, but at the same time are almost completely auto-oriented and lack character. Restructuring development into higher density nodes that mix compatible uses breaks this pattern and provides many benefits. Major intersections or existing growth centers often serve as the focus for nodal development with zoning modified to allow mixed use and higher densities and design/landscape standards create a friendly, walkable place. There are a number of planning tools that are utilized to implement nodal development such as transfer of development rights, design standards, or direct public investment in building civic uses to anchor mixed use areas.
6. **Address Traffic Congestion and Parking:** Highway commercial strips generate automobile traffic, and this is desired by business owners as high traffic volumes translate into more customers. However, too much traffic and inadequate infrastructure cause safety and congestion issues that lead those customers to go somewhere "more convenient". Communities should examine the type of traffic on the roadway (tourist, shoppers, and commuters for instance) and determine the best management practices from that standpoint. Expanding the roadway is not always an option, and techniques such as access management may improve safety and traffic flow. The large amount of free parking has been one reason that strip retail development has been successful however it is not necessary and standards should be changed to design parking for reasonable demand and encourage shared parking between complimentary uses. Designing overflow areas, accommodating transit connections, and facilitating pedestrian movement between parcels can reduce demand for parking and this is aided by layouts that place parking to the side or rear of buildings and include landscaping to produce attractive, better connected, pedestrian friendly places.
7. **Create a Place:** People will visit locations that are memorable, and those places with coordinated design and complimentary land uses are most likely to produce repeated trips. This generates economic gains through spending, and increased value as a location becomes more in demand (downtown Portsmouth for example). Some elements that can help create a memorable place include enhancing the pedestrian design by installing wide, attractive walkways, and ensuring that buildings are close to the street and blank walls and dead space are minimized. This creates a space for active uses of the sidewalk, such as outdoor dining, and helps pedestrians feel secure and comfortable in an area. Other components that further the perception of place include mixing a variety of compatible uses, providing attractive sightlines, comfortable street furniture, landscaping, and varying building design. Attractive gateways (intersections and other entry points), and providing a variety of services also generate activity.
8. **Enhance Character:** Growth in a community can be accommodated either via sprawl or increased density, and choosing the later provides the incentive to reuse existing low density developments. Many times these areas form the economic base of communities and with enhancements will contribute to the character as well. Increasing development pressure will push the suburban strips to diversify into non-retail uses and evolve into well-connected, mixed use centers where people can live, work, shop, and play. This provides a place for higher density housing and mixed use projects while at the same time preserving single-family residential neighborhoods.
9. **Beautify:** One of the chief complaints regarding strip development is that it offers little that is aesthetically pleasing. Including beautification as part of corridor redevelopment creates space that people are more likely to visit, will stay longer at, and return to more often. The starting point is to establish design standards and guidelines that reflect the desired character and require development projects to conform.
10. **Adopt Regulations:** Once policies have been established in planning documents, they must be followed by standards and regulations to support and implement them. Zoning regulations should facilitate developers furthering the community plans but have the flexibility to allow for site specific variances. Regulations should look to eliminate or minimize "dead" uses that produce little activity (such as storage facilities) and should include lot size and frontage minimums as well as driveway limits designed to minimize the number of curb cuts. Standards should include landscaping, signage, architectural design, pedestrian connections, and other aspects that are crucial to site design and character. Community investment in public facilities can often initiate this process, as the public investment tends to generate additional private investment.

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along most of Route 1, separation of pedestrians from motor vehicles will need to be done with landscaping and moving the sidewalk back from the curb as far as is feasible. Greater separation of pedestrians from traffic creates a more relaxed atmosphere for walking that can generate additional use.

- **Street Trees and landscaping:** street trees should be considered where they will not interfere with sight lines and where they can meet roadway clear zone requirements. If the roadway is curbed, there should be a landscaped area between the curb and the sidewalk. Trees should be planted at approximately 40 foot intervals to provide some structure and screening along the roadways. Branches should be at least 10 feet of the ground to provide clearance for trucks and to provide visibility for signs.
- **Lighting:** prioritize pedestrian scale lighting at pedestrian crossing locations, at transit stops, or where adjacent land uses support pedestrian activity.
- **Vertical curbs:** many of the commercial areas along US 1 have vertical curbs and they are recommended for all of these locations to provide for vehicle deflection and to protect pedestrian spaces.
- **Raised Medians:** medians can be continuous or intermittent and are appropriate for safety at intersections, especially when there are high volumes of pedestrian traffic in which case a refuge should be included within the median. Medians also have the potential to reduce the visual impacts of the roadway and enhance the aesthetic appeal of the area. Medians should not be installed without a comprehensive examination of the access of adjacent parcels and consideration for how limiting left turns will impact traffic.

Other Recommendations:

- **Transit Stops:** in auto-oriented commercial areas, transit stops should be located near employment and retail centers as well as other areas that tend to generate transit trips. Turnouts should be considered for congested areas and implemented with appropriate entrance and exit tapers for urban conditions. The transit stops should also include shelter and seating for users, connections for pedestrians between the stop and adjacent land uses, and considerations for lighting and other security measures.
- **Crosswalks:** crosswalks should be highly visible and at a minimum of two legs of each signalized intersection. Crosswalks should be accommodated in mid-block locations only where there is pedestrian activity and distances between signals are greater than 600 feet and strong consideration should be given to utilizing a median pedestrian refuge at these locations.
- **Curb Extensions (bulb outs):** bulb outs for pedestrians are only recommended in areas where on street parking is allowed and where higher volumes of pedestrian activity is likely to occur.
- **Driveway Improvements:** there are a large number of driveways in most of the highway commercial districts on US 1. An effort to consolidate and realigned them would provide operational and safety benefits, as well as aesthetic improvements creating a more uniform appearance.
- **Bike Lanes:** the shoulders of Route 1 should be designed to a minimum of 4 feet to be adequate for bicycling and wider where possible. While there are better roadways in the area for recreational cycling, Route 1 does serve as a direct connection for many to retail, services, and jobs along the corridor.

RURAL TRANSITION AREAS

The areas of Route 1 outside of the village centers and commercial areas generally have wide shoulders, no curbs, and higher posted speed limits than other areas on the roadway. The higher speeds require larger clear distances for safety purposes which limits the space within the right of way for some types of landscaping and streetscape improvements. In many cases this is not a problem, as the setting in these areas is more open with a backdrop

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consisting of the native landscape or historic agricultural use. As these areas are either undeveloped or are much less intensely developed than the rest of the corridor, many of the streetscape recommendations for the village and highway commercial areas do not apply.

Recommendations Pictured:

- **Street Trees and landscaping:** in these areas landscaping should be an extension of the natural environment. Care should be taken to maintain clear zones and sight lines when planting due to higher speeds and no curbing. Replanting of elms in these areas along the corridor is recommended as long as it can be done consistent with safety requirements. **Sidewalks:** sidewalks are not recommended for these areas except as necessary to provide landings for crosswalks at traffic signals.

FIGURE 4-57: RURAL TRANSITION AREAS



- **Bike Lanes:** roadway shoulders should be at least 4 feet wide to be utilized for bicycle traffic.

Other Recommendations:

- **Transit Stops:** rural transit stops are located as need in locations that are likely to generate transit trips. Turnouts should be implemented to remove the bus from traffic. Stop locations should include shelter and seating for users, and considerations for lighting and other security measures.
- **Crosswalks:** crosswalks should be considered at intersections where there is a potential for pedestrian traffic.
- **Pedestrian Scale Lighting:** at intersections where there is expected to be pedestrian traffic.

4.6 FINANCING IMPROVEMENTS

One of the biggest challenges facing the communities along the US 1 corridor will be in finding ways to pay for the recommended improvements. Traditionally projects of this type have been advanced to the State Ten Year Plan to be queued for eventual construction. However, given the current financial limitations with respect to state and federal funding, waiting for any of the individual projects to be constructed via that route is likely to take a minimum of 10 to 15 years, and might be a viable option only for the larger projects, such as the reconstruction of the NH 101

interchange or the new road around the center of Hampton. Given existing and expected resources on the Federal and State level, communities will benefit from finding alternate means of financing many of the improvements proposed for US 1. This will mean working with citizens, other communities, NH DOT, and private interests along the corridor to find appropriate mechanisms.

4.6.1 PROJECT ESTIMATES

General estimates regarding the construction cost of the intersection and segment improvements have been prepared and are listed in *Table 4-5* which also shows the type of project, the figure(s) that the project is shown in, as well as a description of the proposed improvement. The cost listed is in 2006 dollars and is intended simply to show the magnitude of improvements described in this plan. Construction costs are increasing rapidly (45% between 2004 and 2007), and new estimates will need to be prepared when specific projects are brought forward for construction.

4.6.2 FEDERAL FUNDING PROGRAMS

There are a number of different categories of Federal Transportation funding that could be utilized to construct improvements. Most any use of these funds will require that the project be listed in the State Ten Year Plan, as well as the Metropolitan Planning Organization (Rockingham Planning Commission) Transportation Improvement Program, and will mean that they are competing for priority with other projects around the state.

- ***Surface Transportation Program (STP):*** This program is the source of most of the funds apportioned to the State and is the most flexible in what the money can be used for. STP funds may be obligated for construction, reconstruction, rehabilitation, resurfacing, restoration, and operational improvements for highways including Interstate highways and bridges. They also may also be used to pay intercity bus capital costs, carpool projects, parking facilities and programs, bicycle and pedestrian facilities on any public roads, and the modification of public sidewalks to comply with the Americans with Disabilities Act of 1990.
- ***Transportation Enhancements (TE):*** This is a set aside from the STP that in New Hampshire has primarily been used for bike and pedestrian facilities (including rail to trail conversions) and education but can also be used for scenic beautification or environmental mitigation. In New Hampshire, TE funds are programmed on a two year cycle through a competitive project selection process that begins with proposals submitted to the Regional Planning Commission where they are prioritized. Projects are then sent to the state TE committee for review and prioritization and those chosen to be funded are then added to the State Ten Year Plan.
- ***Highway Bridge Replacement and Rehabilitation Program (HBRRP):*** These funds may be used for the rehabilitation, reconstruction, or replacement of a bridge with safety or structural deficiencies, or that is functionally obsolete on any public road.
- ***Congestion Mitigation and Air Quality (CMAQ):*** This program funds projects specifically to reduce congestion and improve air quality. There is a long list of projects types that are eligible for this funding including implementing traffic management, monitoring, and congestion relief strategies, transit expansion or enhancement, alternative fuel projects, inspection and maintenance (I/M) programs, and intermodal freight improvements as well as many others. In New Hampshire, CMAQ funds are programmed using the same process as TE funds, with the additional step of an air quality benefits analysis for each project.

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**TABLE 4-5
ROADWAY IMPROVEMENT PROJECTS & COST ESTIMATES**

Town	Location	Figures	Cost*	Description
Seabrook	Main St./Walton Rd. (Option 3)	1,2	\$2,300,000	5 lane, 4-way intersection with signal
	North of Walton to north of Gretchen Rd.	2,3	\$2,200,000	5 lane, add medians
	Gretchen Rd. to Lowe's	3,4	N A	no improvement necessary
	North of Lowe's to south of NH 107	5,6	\$800,000	Add southbound lane at Railroad Ave
	NH 107 Intersection	6	N A	no improvement necessary
	New Zealand to North Access Road	6,7	\$2,800,000	5 lane, add 4th leg to North Access intersection
	North Access Road to Hampton Falls Town Line	7,8	\$400,000	Transition to 3 lane section with full shoulder
Hampton Falls	Seabrook Town line to Kensington Road (NH 84)	9-11	\$1,000,000	Continue 3 lane section with full shoulder
	Kensington (Rt.84) to Lincoln Ave (Rt. 88)	11,12	\$2,800,000	Signal at Rt.84, raised median
	Landscaping Improvements	12a	\$300,000	Add landscape improvements to roadway improvements
	Lincoln Ave to Hampton Town Line	13-15	\$1,000,000	Provide full shoulder for 3 lane section
Hampton	Hampton Falls town line to South of NH 101	15,16	\$800,000	Provide full shoulder for 3 lane section
	NH 101 Interchange (aligned with parallel road)	17a	\$18,600,000	New interchange
	NH 101 Interchange (aligned with existing Rt.1)	17b	\$17,300,000	New interchange
	New Road parallel to US 1	18a,19a	\$8,600,000	New Parallel Road
	Winnacunnet Road Intersection	20	\$100,000	3 way signalized intersection
	High St./Exeter Rd. intersection	21	\$2,100,000	Realign Exeter Road, replace bridge
	Landscaping improvements for Hampton down-town area	21a	\$300,000	Streetscape improvements
	High St to North Hampton Town line	22-26	\$100,000	Signal at Post Road. No other roadway improvement specified
North Hampton	Hampton Town Line to Atlantic Ave	26-30	\$7,900,000	5 lanes, add 4th leg to Home Depot int, discontinue Fern Rd.
	Glendale Road to Elm Road	31,32	\$500,000	Provide full shoulder for 3 lane section
	Elm Road (south) to Elm Road (north)	32,33	\$2,900,000	Signal and new connection, Connect Hobbs Rd. with Elm Rd., discontinue north end of Elm Rd.
	Elm Road to North Road	34	\$400,000	Provide full shoulder for 3 lane section
	North Rd. (West)	35	\$2,200,000	5 lane, signal, realign North Road
	North Rd. (East)	35-36	\$2,400,000	5 lane, signal, new connection from North Rd to US 1
	North Rd. (new connection) to Rye town line	36-39	\$2,600,000	Provide full shoulder for 3 lane section, 5 lane section and Signal at Lafayette Terrace
Rye	North Hampton town line to Breakfast Hill Road	39,40	\$600,000	shoulder improvements, realign Dow Lane approach to US 1
	Breakfast Hill Road Intersection	40	\$2,000,000	5 lanes, vertical crest reduction
	Breakfast Hill Road to Portsmouth town line	41-43	\$1,000,000	3 lanes, shoulder improvements
Ports-mouth	Rye town line to Ocean Road	43-45	\$900,000	Provide full shoulder for 3 lane section
	Ocean Road to Wilson Road	45-50	\$7,800,000	5 lane with raised median, roadway approach improvements at intersections
Total			\$47,600,000	Not including 101 Interchange
			\$65,000,000	With less expensive 101 Interchange and no bypass
			\$74,800,000	With more expensive 101 interchange & Hampton bypass

* Costs were developed for 2006 and updated to 2010 utilizing the National Highway Construction Cost Index (NHCCI) developed by the Federal Highway Administration (FHWA): <http://www.fhwa.dot.gov/policyinformation/nhcci.cfm>

4.6.3 STATE FUNDING SOURCES

Funding from the state is somewhat more flexible in how quickly it can be obtained and programmed for construction of improvements, but somewhat less flexible in how the funding can be used.

- **State Aid Funds for Class I, II, and III Highways (RSA 235:10-:21):** These funds are provided for the purpose of constructing or reconstructing sections of Class I, II, and III highways. This includes improvements to unimproved sections or to advance the priority of construction for special types of work such as drainage, riding surface, or elimination of sharp curves on Class I highways or improved sections of Class II highways. Approved projects receive 2/3rds state funding of the cost, with the municipality expected to contribute 1/3rd.
- **Bridge Aid Funds (RSA 234):** Consists of both State and Federal Highway Funds for construction or reconstruction of structures on Class IV and Class V roads as well as municipally-maintained bridges on Class II highways. Structures having a clear span of at least 10 feet qualify for state funds, and those having a span of at least 20 feet qualify for federal funds. The ratio for the aid is 80% Federal or State and 20% municipality. Construction of Class II bridges transfers the maintenance responsibility from the municipality to the State.
- **Highway Block Grant Aid Funds (RSA 235:23 & :25):** Come from a portion of the road toll (gas tax) and motor vehicle registration fees collected by the State and are given to municipalities for the purpose of constructing, reconstructing, or maintaining Class IV and V highways. These funds are apportioned to all municipalities on a yearly basis as follows:
 - Apportionment A: Allocated from an annual apportionment of not less than 12% of the total highway revenues collected the preceding fiscal year. The amount distributed is based on one-half (1/2) mileage and one-half (1/2) population.
 - Apportionment B: Allocated from an annual apportionment of \$400,000 distributed based on a formula using equalized valuation and Class V mileage. It is designed to give the greatest benefit to municipalities with low, equalized valuations and high road mileage.

4.6.4 MUNICIPAL FUNDING SOURCES

There are a variety of opportunities available to the community to raise funds for road projects locally. The advantage of this is the speed at which funds can be raised, and put towards improvements compared to the federal and state processes.

- **Warrant Article/Capital Improvement Program:** The Warrant Article has historically been the approach to locally funding transportation improvements in New Hampshire. This involves placing the project on the ballot (either individually or as part of a Capital Improvement Program) for the community to approve funding via local property tax, and can be utilized either to directly finance a project or to pay for one that is being reimbursed by Federal or State funds, or other revenue generating mechanism.
- **Local Option Fee:** The Local Option Fee for Transportation Funding is one means of generating local funding via local vehicle registration fees. A New Hampshire law passed in 1998 (HB 648) 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. The revenues collected (minus up to 10 percent for administrative costs) are deposited into a transportation improvement fund for almost any kind of transportation project. It is recommended that communities establish a plan for using these funds and a process for regular updates.
- **Traffic Impact Fee:** onetime fee to new developments to pay for the cost of serving the additional traffic that it generates. These fees are calculated based on the number of trips generated by the new development as

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established in an approved traffic study. The cost of correcting existing deficiencies is usually excluded from the calculation for equity and legal reasons. A **Roadway Impact Fee** is a variation of this that is levied on a fair share basis based on the new development's anticipated portion of total traffic on a roadway.

- **Development Agreements:** A negotiated agreement between a developer and the community to mitigate the impacts of a proposal by meeting community conditions of approval. This is accomplished during zoning or subdivision approval, when local government has broad discretion in approving a project. This method is flexible in meeting community needs, but can be applied unevenly.
- **Transportation Development District (TDD):** Also known as a Special Assessment District, properties abutting a designated section of roadway are assessed for their fair share of the cost of the road improvement. Fees can be assessed based on trip generation or other factors 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 1 could form a district to provide a larger pool of funds for transportation improvements.
- **Tax Increment Financing:** The projected increase in property value from a development is partially taxed for a prearranged time period. The community (or developer in some cases), 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 to gather funds from multiple sources.

4.7 IMPLEMENTING THE CORRIDOR PLAN

The projects proposed in the Route 1 Corridor Plan create a set of tasks that will require community effort and investment to achieving progress. The success of the plan will ultimately depend upon the willingness of the New Hampshire Department of Transportation and the communities to implement the recommendations and integrate the Corridor Plan with community land use and transportation planning processes. As most development

FIGURE 4-58: SEABROOK TOWN HALL VILLAGE CONCEPT 1. Starting with one of the proposed alignments of US 1 from the Corridor Plan, the Town of Seabrook reimaged the town hall area during a design charrette that was a component of the update to the Community Master Plan.



activity on the Route 1 corridor is funded by private entities, this sector will also need to be involve amount and location of development will have impacts on the transportation improvement projects that can be implemented. The following steps establish a process to ensure the timely and continued implementation of the Plan's components:

4.7.1 ENDORSE THE CORRIDOR PLAN

Each of the communities as well as the RPC and NH DOT should endorse the Corridor Plan as official notification that it is being utilized for planning the corridor. This gives the plan legitimacy as the vision for the future of the corridor and provides a firm basis for project planning.

- Upon endorsement by Rockingham Planning Commission, the Route 1 Corridor Plan will become the official transportation plan for the purposes of adding projects to the Regional Long Range Transportation Plan and Transportation Improvement Program (TIP).
- Upon endorsement by NH DOT, the Route 1 Corridor Plan will become the blueprint for state project planning and for the driveway permitting process on the roadway.
- Upon endorsement by a community, the Route 1 Corridor Plan will become the baseline comparison point for land use and transportation planning efforts that impact the roadway.

4.7.2 INTEGRATE INTO COMMUNITY PLANNING

Once endorsed, the concepts within the plan can be incorporated into local transportation and land use planning documents and processes.

- Revise municipal master plans to be consistent with the corridor plan. This can take the form of changes to the transportation chapter to include the proposed projects and access management policies. It can also be expanded to include other aspects of the master plan and consideration of the land use related concepts.
- Create and adopt zoning overlay districts that implement access management ordinances and promote greater coordination of land use and transportation planning for properties within the Route 1 corridor.
 - An overlay district has the advantage of applying more stringent zoning standards to specific problem areas without impacting the remainder of the community.
 - Options and procedures for variances and exceptions from the additional overlay requirements should be established for non-conforming sites or locations with other significant issues.
- Integrate access management standards into the development review process. The improvement of traffic conditions on Route 1 relies on access management in lieu of roadway expansion in many locations. In

PORTSMOUTH US 1 GATEWAY DISTRICT

The 1995 Portsmouth Master Plan identified the opportunity for Route 1 to evolve into a place where design, function, and transportation are integrated in an efficient and aesthetically pleasing manner. Goals for the corridor include gateway signage, mixed-use, transit-oriented development, redevelopment and improved landscaping in order to promote economic development and housing opportunities and to strengthen transportation connections. In response to this the Gateway District was established in 2009 to unify a myriad of conflicting zones straddling the corridor.

The stated purpose of the Gateway District is: "To provide for redevelopment along existing developed commercial corridors in order to enhance visual character and environmental quality of such corridors, to accommodate affordable housing in mixed-use developments, and to encourage site designs that promote pedestrian circulation and public transit use."

Via conditional use permit, the Gateway District allows for townhouses, live/work spaces (in which work space is integrated with a dwelling unit), as well as multi-family residential as part of a mixed-use development. In mixed-use developments, residential uses must comprise between 30-70% of gross floor area. Site design considerations in the Gateway District aim to enhance pedestrian circulation and aesthetics of the corridor. The system of design standards generally relegate parking behind buildings and establish pedestrian amenities to help disintegrate the "strip-mall" appearance currently inhabiting the corridor.

this regard, considerations of access management issues should be a primary traffic consideration during the development review and approval process as that provides the best opportunity to make adjustments to access and improve travel on the corridor. This process should occur for any change in use that would require plan review as well as prior to any planned road construction on US 1.

- Negotiate and sign an Access Management Memorandum of Understanding with NH DOT to better coordinate the driveway permitting and community land use planning processes.
- Work with NH DOT and private developers to ensure that the design of any US 1 improvement projects are consistent with those outlined in the US 1 Corridor Plan and community needs.
- Address the land use impacts on traffic by implementing compact development, mixed-use, and other mechanisms that can reduce auto use. Other tools include transfer of development rights, zoning incentives (such as density bonuses), or expedited permitting for development that is consistent with the corridor plan.
- Utilize the Regional Impact process via the Rockingham Planning Commission to give adjacent communities abetter status on development projects that are likely to have significant impacts on Route 1 traffic outside of the community where they are being built.

4.7.3 ESTABLISH FINANCING MECHANISMS

Providing for multiple methods of financing the necessary roadway and other improvements described by the plan will facilitate their implementation. Some options for this are to:

- Establish a Transportation Development District for each community (or multiple adjacent communities) that will direct public and private funding to critical US 1 improvements.
- Pursue funding from existing programs such as Congestion Management and Air Quality (CMAQ) Transportation Enhancements (TE), Highway Safety Improvement Program (HSIP), as well as State funding for smaller critical projects such as the Betterment or State Aid Highway programs. Eligibility for some of these programs is limited, and local match requirements vary but all options should be explored.
- Establish infrastructure impact fees or negotiate commitments from developers (e.g., to fund sidewalks, signals, transit improvements), or public private partnerships to fund transportation improvements.

4.7.4 CONTINUE CORRIDOR PRESERVATION ACTIVITIES

It is anticipated that many projects will not be needed until the outer years of the Plan or beyond, making preservation of both capacity and right-of-way a key component to the Plan's success. The need to preserve right of way for future improvements was particularly stressed. Therefore the following efforts will need to be undertaken:

- To work towards ensuring a consistent right-of-way on the corridor, NH DOT will need to continue collecting ROW frontage from individual development and redevelopment activities as they occur.
- Communities need to maintain setbacks of adequate depth to minimize development within the right-of-way. This is especially important in areas where US 1 is proposed to be widened.
- Communities must make efforts to minimize the number of driveways along the corridor, preserving traffic flow and roadway capacity.

- Communities must continue to make efforts to ensure that traffic generated by new development or redevelopment of existing uses does not outstrip the capacity of the roadway to carry that traffic and that any added burdens are mitigated.

4.7.5 MONITOR CORRIDOR CONDITIONS

Establishing an approach to monitoring corridor conditions is a critical component to managing the implementation of the plan over time. Monitoring has two purposes: first, to look backwards at strategies that have been implemented and assess their effectiveness; and second, to examine current conditions and indicate when thresholds have been reached and further improvements or actions have become necessary. Monitoring is conducted using available data on changes to population and employment on the corridor, new development or redevelopment along or near the roadway, changes in traffic volumes or patterns, and changes in crash rates. Some data sources, such as traffic counts and accident databases, already may be developed, while others may need to be established such as a mechanism for tracking development permits across the multiple jurisdictions along the corridor.

- Establish a US 1 Corridor Monitoring Committee (CMC) to aid in the advocacy and implementation of projects.
- Track development proposals, improvement projects, and other changes to travel on the corridor.
- Recommend projects for construction to the communities, NH DOT, and the RPC.

MONITORING PROCESS

The process for corridor monitoring and development tracking will be accomplished through the establishment of a corridor monitoring committee involving key stakeholders that meets twice per year to review development activity and transportation changes on the Route 1 corridor, analyze the data, and make recommendations for projects to move forward. The following activities will be monitored, with review and analysis as appropriate:

- Land development proposals
- Traffic impact studies
- Traffic volumes and congestion
- Transit services and ridership
- Highway and transit project progress
- Highway safety needs

The Corridor Monitoring Committee (CMC), including members of the current Corridor Advisory Committee, will meet biannually to review changing conditions in the Corridor. The intent is that CMC members share information regarding developments in their community that impact the corridor, as well as any progress on corridor projects from the local level. In addition, the CMC will receive updated information on any traffic studies conducted by NH DOT or the RPC and progress on projects being funded by state or federal funding. The CMC would be comprised of representatives from the Planning Board or Planning Staff of each community,

NH DOT, RPC and would be tasked with establishing priorities for improvements with a corridor-wide perspective.

All monitoring activities will be documented in a periodic Corridor Monitoring Report. This report will provide an update for all interested parties, including community leaders, legislators, and CMC members, on the status of the monitoring efforts and any projects that have been “triggered” by activity on the corridor. It will also ensure that the Plan is actively managed over time and remains responsive to changing conditions.

4.7.6. PROJECT IMPLEMENTATION

All of the improvement projects identified and included in the Plan can be placed in one of two categories; those that are currently needed, or those that will likely be necessary in the future.

The first category consists of those projects that are currently necessary to alleviate existing congestion or safety problems. This assessment is based on traffic analysis indicating which currently failing intersection movements with significant delays can be relieved by minor widening, safety concerns, and other existing transportation network needs. The projects that are seen as being required in the short-term to address the most critical problems on the corridor are the following:

SEABROOK

- Railroad Avenue bottleneck caused by lane reduction for southbound lanes
- Lane reduction south of Lakeshore Drive
- Rocks Road/North Access Road connection & Gove Road access to signal.

HAMPTON FALLS

- NH 88 and Lincoln Avenue Signal consolidation
- NH 84 intersection

HAMPTON

- NH 27 intersection and Railroad bridge replacement.
- Winnacunnet Road intersection signalization.
- Park and Ride/transit center at NH 101 interchange.

NORTH HAMPTON

- North Road Safety improvements
- Connecting Fern Road to traffic signal at Home Depot/Shaws Plaza
- Elm Road/US 1 safety improvements

RYE

- Safety improvements at Breakfast Hill/Washington Road

PORTSMOUTH

- Lang Road intersection/connection with Ocean Road
- Constitution Avenue intersection

CORRIDOR WIDE IMPROVEMENTS

- Access Management improvements such as curbing to better define driveways, consolidating access points, and ensuring that the functional areas of intersections are clear of driveways.
- Streetscape and landscape improvements should be undertaken in conjunction with improvement projects or with major land use developments.
- Bicycle and Pedestrian improvements also in conjunction with other projects unless some dedicated funds (such as TE or CMAQ programs) are acquired.
- Inclusion of bus stop improvement in roadway improvement designs so that at the very least, space is made to accommodate future stops.
- Preservation of US 1 and Hampton Branch Right-of-way for future improvement needs.

TRIGGERING

The second set of projects is those that will be “triggered” by growth in traffic or other changes. While not justified in the short-term, most of these projects are expected to be necessary over the next 20 years. Establishing thresholds for when those projects become necessary provides a process for setting priorities amongst the many projects using data collected from the corridor monitoring. The triggers that will be used to evaluate projects on the US 1 Corridor are, singly or in any combination, the following:

- ***Steady deterioration in level of service (LOS) to "D" or worse*** at an intersection or on a segment of roadway would trigger a response in the form of strategies to stabilize or reduce demand (i.e. travel demand management measures or transit improvements), or increase capacity.
- ***Safety improvements recommended by NH DOT's Highway Safety Improvement Program*** would trigger an evaluation to see if the recommendations were compatible to the Plan or whether adjustments need to be made before a project moves forward.
- ***Implementation of regional off corridor projects that impact travel on US 1*** (for example, Interstate 95 Exit 1 improvements), would trigger an evaluation that would focus on compatibility of the proposed improvements with the Plan for Route 1 and the likely impacts of those changes on the corridor.
- ***Major land development activity*** would initiate a review of transportation needs; level of service implications, transit service needs or opportunities, safety concerns, and pedestrian and bicycle needs.

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- *Transit service changes* that might require ancillary improvements to complement the service or otherwise change the time frame for corridor projects.

While it is desired that future proposals for Route 1 improvements fit within the broad philosophy of the Corridor Plan, changing conditions may dictate adjustments to project scopes, designs, or other aspects. The projects that will be monitored for meeting these prompts are:

SEABROOK

- Redesign of the rotary at the state line
- New Zealand Road – dependent upon final disposition of Spur Road intersection with NH 107
- Widening north of the North Access Road

HAMPTON FALLS

- Shoulder widening in 3 lane sections

HAMPTON

- NH 101 Interchange – Existing safety issues but capacity is currently adequate.
- NH 151/US 1 Intersection signalization
- Shoulder improvements

NORTH HAMPTON

- Widening between Hampton TL and Atlantic Avenue
- Improvements in the vicinity of Elm Road
- Improvements in vicinity of Lafayette Terrace

RYE

- Shoulder improvements along 3 lane section of roadway

PORTSMOUTH

- Widening from Ocean Road to Heritage Avenue
- Widening from Constitution to Wilson Road

CORRIDOR WIDE

- Shoulder improvements on 3 lane segments

4.7.7 COMMUNITY INVOLVEMENT

The Corridor Plan purposely does not detail the exact designs of the proposed improvement projects. Instead, as each project goes forward for construction it will be designed to match with location specific conditions as part of a public process. It will be critical that the communities take an active role in the project development to both keep designs consistent with the Plan as well as meet community needs. In moving forward with projects from the plan, the following actions are recommended to engage the community:

- Involve the public early in the process to establish what problem is being addressed, and to determine the project scope, schedule, and key decision points.
- Engage as many local and regional stakeholder groups as can be identified.
- Keep the context in mind when designing improvements. What works in one area may not work in another. The most successful projects “fit” within the community.
- Establish a “vision” for the future that addresses the transportation and other community goals and values.
- Establish a wide range of preliminary alternatives that can be narrowed to a range of reasonable alternatives. In choosing an alternative use cost effectiveness as one of many factors and not the only factor.
- Work towards consensus on the project in which the principal groups and individuals involved can live with a particular proposal.

4.7.8 FURTHER STUDY

There are several areas within this study which have only been superficially addressed due to limitations in resources. Further in-depth work will be required to determine needs, benefits, and costs before implementation can occur. The aspects of the study recommended for further study are:

- Feasibility study of the US 1 Bypass around the center of Hampton using the railroad right-of-way. While this project has the potential to tremendously reduce congestion in downtown Hampton, there are many aspects of the proposal that have not been examined. Foremost in this is an examination of the economic impacts of building a bypass on the viability of businesses in the downtown area as well as a more detailed analysis of traffic volumes and patterns under different scenarios.
- The potential for transit service along Route 1 has not been studied in recent years. The current economic climate and the amount of development along the corridor both lend themselves to increased demand for public transit service.
- Real estate market analyses can help determine the current and likely future demand for land zoned for particular uses within a community. Knowing this information can help communities better tailor zoning to demand as well as have a better understanding of the future direction of growth in the community.
- Parcel specific access management plans are helpful to communities in mapping out driveway access points and planning for future improvement needs.