# Table of Contents

1.0 Executive Summary  
2.0 Introduction  
3.0 Inventory and Analysis  
   3.1 Traffic Volumes  
   3.2 Pedestrian and Bicycle Transportation  
   3.3 Economic Development Profile  
   3.4 Land Use and Development Regulation  
   3.5 Conservation Land  
   3.6 Utilities  
   3.7 Corridor Visual Analysis  
   3.8 Natural Systems  
   3.9 Historic and Cultural Resources  
   3.10 Summary of Issues and Opportunities  
4.0 Vision for the Future  
5.0 Strategy and Evaluation of Corridor Improvement Concepts  
   5.1 Strategy  
   5.2 Evaluation Criteria  
   5.3 Traffic Operations Analysis
6.0 Proposed Roadway Improvements 88

6.1 Amherst East of the Bypass 88

6.2 Bypass in Milford and Amherst 90

6.3 Transition from Western Milford to Wilton 93

6.4 Improvements in Wilton 95

6.5 Pedestrian and Bicycle Improvements 96

6.6 Corridor Aesthetics 97

6.7 Development Guidance and Review 102

7.0 Implementation 106

7.1 Priorities and Cost 106

7.2 Implementation Process 106

8.0 Acknowledgements 110

Appendix A - Public Meeting Notes

Appendix B - Design Guidelines for Milford Industrial Area (BROX)

Appendix C - RKG Market Study of the BROX Property
1.1 The Problem

Route 101 gets a little worse every year: congestion, accidents, traffic that should be on the highway is cutting through residential neighborhoods. In Bedford, Route 101 is a barrier that cuts the town in half, separating neighborhoods and dividing the town center. In Amherst, congestion is increasing north and east of the bypass section, making it increasingly difficult to make turns into and out of side streets and driveways. On the bypass, congestion causes the eastbound off-ramp at Route 101A to back up onto the highway. Nine fatal head-on collisions have occurred in the past ten years, almost double the statewide average. In western Milford, there is serious congestion at the traffic signals and in the stretch of highway between the Souhegan River and the railroad tracks. In Wilton, there are safety problems due to poor sight lines and outdated intersection geometry, making access to and from the highway difficult.

As bad as these problems are today, they will get worse if nothing is done. Traffic projections anticipate 35 to 50 percent more traffic in 20 years. The result will be more congestion, with level of service failure on the bypass, in western Milford, and in Amherst north and east of the bypass. This will result in more short-cutting through residential areas, more accidents, and a continuing barrier dividing the towns, particularly in Bedford where the highway passes through the town center. It will be more difficult and hazardous to enter and leave side streets and businesses. Commercial development with direct highway access will continue to occur, particularly in Bedford and Wilton, potentially changing the character of the highway.

1.2 The Strategy

The Route 101 Corridor Plan is a strategy to reduce problems and realize benefits. It has several key parts:

- Access to the highway must be managed for safety.
- Intersections and then roadway segments must be improved to make them safer, accommodate traffic and reduce traffic diverting through residential neighborhoods. Ultimately, Route 101 should have four travel lanes (two in each direction) from Route 114 in Bedford to western Milford, with a landscaped median (not a barrier) to control left turns. In Wilton, improvements to shoulders and intersections may be sufficient to make the two-lane section adequate for the 20-year horizon of the Plan.
- In Bedford, the Joppa Hill/Stowell Road and Hardy/Jenkins Road intersections should be improved and signalized, and the Meeting-
New Hampshire Route 101 Corridor Plan

house Road, Constitution Drive intersections should be improved, greatly reducing congestion. In the longer term, the Route 114/101 intersection should be totally reconstructed.

- An overpass for local traffic, pedestrians and bicycles at Nashua Road should be provided, reconnecting the north and south halves of Bedford’s Town Center. The connector road from Nashua to Wallace Road which was proposed at the May 2002 public meeting should be relocated behind Route 101 businesses.

- A boulevard cross-section with a landscaped median, tree-lined roadway, and development guidelines for Bedford’s commercial center would make the center a better place to do business and shop. The improvements would also signal drivers to slow down.

- In Amherst, local overpasses at Horace Greeley Road and Walnut Hill Road would provide connections between neighborhoods and permit traffic to reverse direction, access businesses, and make right turns to enter and leave side streets and driveways instead of left turns.

- When the bypass is widened to four lanes with a vegetated median, interchanges should be improved. A flyover ramp from Route 101A to westbound Route 101 would relieve congestion and encourage drivers to use Route 101 instead of passing through Milford’s local streets. Ramp improvements at NH Route 101A and NH Route 13 would provide better acceleration distances and relieve off-ramp backups onto the highway.

- In western Milford, the bypass should be extended approximately half a mile, rejoining the existing highway west of the Wilton Road intersection. This would relieve the congested intersections and the bottleneck between the river and the railroad. Access would be improved for existing commercial and industrial uses and new development on the BROX site.

- In Wilton, intersections at Abbott Hill Acres and Intervale Road should be improved, left turn lanes provided, and a traffic signal added at Greenville Road (NH Route 31 south).

- Roadway improvements should be well-landscaped and guidelines for commercial development should be implemented to improve aesthetics and manage access in Bedford and Wilton. Design guidelines for the BROX property should be implemented to ensure a quality development for the benefit of the Town of Milford.

- Hazardous left turns must be reduced, and turning traffic should be directed to appropriately designed intersections to enter and leave the highway safely; there will be some inconvenience but the people affected will directly benefit from increased safety. Provisions must also be made for left turns into business entrances.
Because the highway will operate better with these improvements than at present, traffic diverting to neighborhood streets will be substantially reduced in Bedford’s historic town center, Meetinghouse Road, and the neighborhood south of Donald Street. Short-cutting in Amherst and Milford will be similarly relieved by improvements to the bypass and its interchanges with Route 101A and Route 13.

Some property would need to be acquired by NHDOT at some locations in Bedford and Milford, but in general the highway right-of-way is adequate. Few or no buildings would be needed to be relocated or removed in Bedford. Property would need to be acquired at the Black Forest Bakery/Café in Amherst, the development site next to Route 101A interchange in Milford, and for the bypass extension in western Milford. The most significant impact would be at the Meadowbrook Industrial Park, where the full or partial taking of one building would be necessary. Property owners would be fairly compensated for takings or easements. Some wetland impacts would occur in Bedford and Amherst, but they would be limited in extent and can be minimized through design; wetland permits are part of the design process. These issues will be addressed during engineering design, which includes assessment of environmental impacts and a public process.

The Corridor Plan will result in a safer, better operating, and better looking Route 101, a stronger town center, reduced traffic diversion to local streets, facilities for pedestrians and bicycles, and the capability to better control and guide commercial development.

1.3 The Result

- A safer roadway with less congestion.
- Less diversion of traffic into residential areas.
- A better commercial center in Bedford encouraging lower vehicular speeds and accommodating pedestrians, and better conditions for development in western Milford and Wilton.
- An attractive highway corridor through all four towns, preserving existing character.

1.4 Next Steps

The Route 101 Corridor Plan is a first step toward action. The second step is detailed engineering of each project. The Corridor Plan summarizes what the improvements are expected to look like, their size, and their level of impact. Detailed analysis of wetland impacts and property requirements will be part of preliminary engineering, and there will be a public process for each project to review the design and suggest improvements. Locations of left turns will be determined through this process.
The recommended improvements would cost $43 to $48 million in Bedford over 10 or more years. The total cost would be $52 to $53 million in Amherst through Wilton, nearly half of it for widening and extending the bypass and making it safer. These projects are all eligible for federal funding at an 80% level. Route 101 is a regional facility, and all the recommended actions in the Corridor Plan are part of a coordinated strategy to improve safety and traffic operations; therefore, the remaining 20% of project costs should be borne by the state with little or no contribution by the towns.

The Bedford Town Council voted to approve the Bedford Route 101 Corridor Plan on August 14, 2002; next, the Southern New Hampshire Planning Commission must approve it. The Corridor Plan for Amherst, Milford, and Wilton has been reviewed by town officials and the four-town Steering Committee, where it was coordinated with the Bedford portion of the Plan. The recommended improvements will be incorporated into the regional Long Range Transportation Plan by the Nashua Regional Planning Commission. All actions in the Corridor plan for the four towns must win the approval of New Hampshire DOT to be included in the next revision of the state Long Range Transportation Plan. Coordination with DOT has been ongoing throughout the study.

Adopting design guidelines is a town action that can be undertaken over the next year or two, following technical drafting, study by the planning boards, and public hearing.

The following table shows the implementation sequence for the Route 101 Corridor projects.
insert phasing table here
2.0 Introduction

2.1 Genesis of the Route 101 Corridor Study

Route 101 is the principal east-west corridor in southern New Hampshire. As New Hampshire developed and grew in population, and as vehicle miles traveled increased at a dramatic rate, problems inevitably occurred: reduced traffic flow at key intersections, increasing number of accidents, conflicts between through traffic and local access to side streets and commercial driveways, and impacts on the quality of life in the towns traversed by the highway. It is time for action by the four Route 101 Corridor towns to address current and future problems by identifying ways to improve the highway while at the same time managing access and guiding future development in a manner that improves both the economy and the quality of life in all four towns. Recognizing this need, and with the support of New Hampshire’s congressional delegation and the New Hampshire Department of Transportation, NRPC obtained funding through NHDOT for the Route 101 Corridor Study in Wilton, Milford, and Amherst. (Bedford, which lies outside the NRPC region, obtained separate funding for its portion of the corridor study.) The plan for the corridor study called for a high level of community involvement in each town, coordination of the study through a Steering Committee, and a work scope that addresses both the transportation and land use issues in the corridor.

2.2 NRPC Role

The Nashua Regional Planning Commission is directing the study in its member towns. NRPC maintains a database of information on transportation, land use, and natural resources. This information is the basis for many of the maps in this report, with coordinated information provided by the NRPC Geographic Information Systems (GIS) staff. NRPC’s transportation staff did a significant amount of field work to provide traffic counts at key intersections in the study area during the summer and fall of 2001. Additional traffic and land use information was provided by the consultant team.

2.3 Study Process

The Route 101 Corridor Study began with a series of public meetings in each of the three NRPC member towns in May 2001. These meetings were well attended and yielded a large number of issues and concerns to be addressed in the study, with safety being the most important. Workshops were held in each town in January 2002 to develop a draft vision for the Corridor Plan. That vision statement provided the roadmap for the development of strategies and concepts for improving the corridor. Preliminary options were presented at two meetings held in April and May in Milford and Amherst. Draft final recommendations were presented to town officials...
of each town at their publicly attended meetings, and a final public meeting was held in September 2002 to present the Corridor Plan. Final revisions were made in response to this last round of meetings.

The Town of Bedford recently completed a Corridor Plan for its portion of the Route 101 Corridor. A Corridor Study Steering Committee comprised of members from all four towns and Nashua Regional Planning Commission met regularly throughout the development of both planning documents to coordinate the work in all four towns and ensure that the recommendations of both documents are consistent and compatible. New Hampshire DOT has been kept informed of progress and has reviewed the Bedford recommendations. A meeting with DOT on the plan for Amherst, Milford and Wilton will be held shortly after publication of this report.

2.4 Report Overview
This Final Report on the Route 101 Corridor Study addresses the towns of Wilton, Milford, and Amherst. The report documents the Corridor Study in these towns, covering transportation, economics, land use, aesthetic and environmental issues and opportunities in the first nine sections. The report also includes a Vision Statement for the Corridor in these three towns, reflecting input received at the Visioning Workshops. Summaries of all public meetings and these workshops are included in the Appendix to the report.

The next section of the report presents a strategy to realize this vision and the criteria used to evaluate options for transportation improvements. The following sections present the recommended transportation improvements, landscaping recommendations, and measures to guide development and manage access. The concluding section is an implementation program for The Route 101 Corridor Plan, with a phased action list and discussion of the implementation process.
3.0 Inventory and Analysis

3.1 Traffic Volumes

To determine the existing traffic volume demands and flow patterns along the corridor, the Nashua Regional Planning Commission (NRPC) conducted an extensive traffic volume count program during the fall months of 2001. Weekday morning (7:00 – 9:00 AM) and weekday evening (4:00 – 6:00 PM) peak period manual turning movement counts were conducted at seventeen intersections along the corridor. The peak period traffic volume counts were conducted at the following intersections with Route 101.

- Horace Greeley Road
- Amherst Town Transfer Station (Count conducted on Saturday 9:00 - 11:00 AM.)
- Walnut Hill Road
- The Meeting Place
- Amherst Street Interchanges
- NH 122 Interchanges
- Route 101A Interchanges
- Route 13 Interchanges
- Old Wilton Road/Phelan Road
- Elm Street (Route 101A)/North River Road
- Wilton Road
- Abbott Hill Road/NH 31 North
- Greenville Road (NH 31 South)

To supplement the intersection turning movement counts, 24-hour automatic traffic recorder counts were conducted at key locations along the corridor. The existing condition traffic volumes are presented in Figure 1. A summary of the automatic traffic recorder count data is presented in Table 1.

<table>
<thead>
<tr>
<th>Route 101 Existing Traffic Volume Summary (2001)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Weekday Traffic Volume (vpd)</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>East of the Meeting Place</td>
</tr>
<tr>
<td>East of NH 13</td>
</tr>
<tr>
<td>West of NH 13</td>
</tr>
<tr>
<td>East of Old Wilton Road</td>
</tr>
<tr>
<td>East of Wilton Road</td>
</tr>
<tr>
<td>East of Greenville Road</td>
</tr>
</tbody>
</table>
Insert Figure 1 foldout here
As shown in the table, the 2001 Average Weekday Traffic (AWDT) along Route 101 ranges from approximately 25,600 vehicles per day (vpd) east of Route 13 on the bypass section of Route 101 in Milford to 14,740 vpd east of Greenville Road at the west end of the study area in Wilton. Peak hour traffic volumes range from approximately 7.2 to 8.6 percent of the AWDT. Directional flow is predominately eastbound (62 percent) in the AM peak hour and westbound (57 percent) in the PM peak hour.

New Hampshire Department of Transportation (NHDOT) maintains two permanent count stations on Route 101 within the study corridor. Data from these count stations in Amherst (north of NH 122) and in Temple (at the Wilton town line) provide valuable insight into the traffic flow characteristics of the existing corridor. A review of daily traffic volume variations along Route 101 (north of NH 122 in Amherst) during the month of August 2000 revealed little variation during the weekdays with the weekday volumes ranging from approximately 20,600 vpd to 23,300 vpd with the low volume recorded on a Wednesday and the high volume recorded on a Friday. Saturday traffic reflected the average traffic volume throughout the week at 21,700 vpd, while Sunday traffic was significantly lower at 17,600 vpd. The daily variations in Amherst are depicted in Figure 2.

At the west end of the Route 101 corridor, daily traffic volume variations (at the Wilton town line in Temple) during the month of August 2001 show the weekday daily volumes exhibiting a steady increase in volume as the weekend approaches. The weekday volumes range from a low of 7,900 vpd on Monday to a high of 9,700 vpd on Friday. The Saturday daily volume remained relatively high at 9,500 vpd. This trend is reflective of the more recreational nature of the western end of the corridor as compared to the daily variations in Amherst, which reflect a more typical commuter pattern. The daily variations in Temple are depicted in Figure 3.
A comparison of the hourly variations for a typical weekday and a Saturday, as expected, reveals markedly different trends. Figures 4 and 5 show the hourly traffic variations for a weekday and a Saturday during the winter of 2001 – 2002 along Route 101 west of Route 13 in Milford. Route 101 exhibits typical commuter route characteristics with well-defined morning and evening commuter peak periods. The morning commuter period peaks between 7:00 and 8:00 AM, with the commuter period over by 9:00 AM. The volume of traffic remains relatively constant throughout the late morning and midday with an increase in volume experienced by early afternoon. The PM commuter period extends from 3:00 PM to 6:00 PM. By comparison, on a Saturday the volume of traffic remains relatively high and constant from 11:00 AM to 6:00 PM.

An examination of historical traffic volume data collected by the New Hampshire Department of Transportation (NHDOT) at its permanent traffic recorder station located along Route 101 in Amherst provides monthly traffic volume variations for a weekday and a Saturday. The data show that for a weekday, the highest daily volumes occur during the summer months of June, July, and August. The lowest daily volumes were recorded during the months of January and February. Interestingly, the highest volume month when only considering Saturday traffic is October. The high weekend traffic in October is most likely reflective of foliage related recreational activity. The monthly variations for weekday and Saturday traffic are depicted in Figures 6 and 7.


3.2 Accidents

Accident records provided by the New Hampshire Department of Transportation were reviewed and evaluated. The accident data for the towns of Amherst, Milford, and Wilton are summarized in the following paragraphs.

3.2.1 Amherst

During the five-year period of 1996 to 2000 a total of 185 accidents were reported along the Route 101 study corridor in Amherst. The Route 101A interchange recorded the highest number of accidents (39 accidents), during this period. Other high accident locations include the Amherst Street interchange (23 accidents), the NH 122 half-interchange (11 accidents), and the Horace Greeley Road intersection (11 accidents). Many of the segments of Route 101 in Amherst and some unsignalized intersections in the northern portion of Route 101 in Amherst are showing a high percentage of personal injury related accidents. In the area between Walnut Hill Road and the Amherst Street interchange the percentage of accidents involving personal injury exceeds fifty percent. Note that in 2001, which was not included in the 1996-2000 database available through the NHDOT, a fatal accident occurred on the bypass section of Route 101 near NH 122. The accident was the result of a driver drifting into oncoming traffic. The segment of Route 101 between Horace Greeley Road and the Bedford town line reported 29 accidents from 1996 to 2000. The accident data for the town of Amherst are summarized graphically in Figure 8.

3.2.2 Milford

During the five-year period of 1996 to 2000 a total of 103 accidents were reported along the Route 101 corridor in Milford. The Old Wilton Road intersection recorded the highest number of accidents (25 accidents). Twenty-two accidents were reported on the segment of Route 101 between the Route 13 interchanges and the signalized intersection of Old Wilton Road. Fifty-five percent of these accidents involved personal injuries and/or fatalities. Three of the four fatalities recorded
occurred on this segment of Route 101. This section of the corridor is clearly deficient from a safety perspective. The accident data for the Town of Milford are summarized graphically in Figure 9.

### 3.2.3 Wilton

A total of 63 accidents were reported on Route 101 in the Town of Wilton during the five-year period of 1996-2000. The segment of Route 101 from Abbott Hill Road to Greenville Road recorded forty-two accidents. Twenty-nine percent of these accidents involved personal injuries. There were no fatalities reported during the five-year period. Roadway alignment and sight distance related deficiencies along this segment of the corridor might contribute to the relatively high number of accidents. The accident data for the Town of Wilton are summarized in Figure 10.

### 3.2.4 Public Input on Safety Issues

Most of the concerns expressed by residents at the Visioning workshops held in Amherst, Milford, and Wilton, focused on safety-related issues along the corridor.

In the town of Amherst, the discussion focused in the area of recent roadway improvements. The recent improvements that were identified include the widening of Route 101 to provide left-turn lanes at Horace Greeley Road, the Town Transfer station, and the Meeting Place. A review of accident data for a six-year period (1996-2001) showed an overall decrease in the number of accidents at the upgraded intersections. Residents appreciate this level of enhanced safety created by the addition of turn-lanes on Route 101. Residents expressed a desire for additional turn-lanes to enhance safety along the corridor provided the existing shoulder is not reduced as a result of the widening.

In the town of Milford, the segment of Route 101 from the Route 13 ramps to the traffic signal at the intersection of Old Wilton Road was identified as a high accident area. At the Visioning workshop, reasons for this safety deficiency were discussed.
Possible reasons include:

- Solar glare
- Limited visibility of the queue from signal at Old Wilton Road due to the horizontal curve
- No breakdown lane
- Icing on the bridge
- High speed/passing
- Segment length

Several residents stated that because of their safety-related concerns with traveling along the bypass, they often avoid the bypass and use local roadways.

Wilton residents raised safety concerns at the intersection of Abbott Hill Road with Route 101. Recently a NHDOT construction project was completed that included the construction of left-turn storage lanes for eastbound and westbound traffic. The project also involved cutting back the hill on the south side of Route 101 to improve intersection sight distance. Residents felt that this project did not address all of the safety deficiencies at the intersection for the following reasons; the flashing yellow light was removed, more pavement on Route 101 encouraged higher speeds, and the shoulder width was reduced at the intersection. Suggested improvements to this intersection and other unsignalized intersections in Wilton included overhead signage indicating the geometry of the upcoming intersection, increased lighting for better visibility, and reinstallation of the flashing yellow caution light (at Abbott Hill Road).

### 3.2.5 Bypass Safety Issues

During the course of the study, officials from the town of Milford – including the Selectmen and the Chief of Police raised concerns with the number of fatal accidents that have been occurring along the Bypass. As a result, a series of meetings were held with the New Hampshire Department of Transportation (NHDOT) in an effort to better understand the problem and to develop a plan to address the problem.

This five-mile segment of Route 101, which extends into Amherst, has experienced eight fatal head-on crashes (vehicles crossing the centerline) in the last nine years. Accounting for the volume of traffic and the length of the segment, this translates into a Fatalinity Rate of approximately 2.4 fatal crashes per 100 million vehicle miles. By comparison, the average Fatality Rate\(^1\) for the State of New Hampshire is 1.0 fatal crashes per 100 million vehicle miles. Not only is this segment of the corridor experiencing fatal crashes at a rate that is over two times the state average, but also all of the reported fatal crashes involve motorists crossing the centerline. In addition, nearly all of the fatal crashes occurred during daylight hours. Generally, you would expect between 30 and 40 percent of fatal accidents to occur at night. Clearly,
this is a problem of motorists crossing the centerline during the daylight hours.

We believe that the principal cause of the high fatality rate is driver inattention. In this hectic fast-paced world that we live in today, more and more motorists are driving while their attention is focused on other activities. Whether it is talking on a cell phone, drinking coffee, having lunch, or even reading and writing in their automobile, these activities divert a driver’s attention. On a high speed - high volume roadway such as the Bypass, an inattentive driver can cross the centerline and collide head-on with the opposing traffic in a split second. Ironically, driver inattention along this segment of Route 101 may be related to the change in the character of the highway. Motorists traveling along Route 101 from the east in Bedford or from the west in Wilton tend to be more attentive because they have to given the turning movements that occur at numerous side streets and driveways. As motorists enter the Bypass, which is limited access with no turning movements, two things happen: first motorists tend to increase the travel speeds and second they tend to pay less attention to the roadway.

Also, some motorists may see the Bypass as their only opportunity to pass slower moving vehicles - such as trucks. However, as the volume of traffic along Route 101 continues to grow, it is becoming increasingly difficult to find safe passing opportunities. This can lead to driver frustration and to motorists taking unsafe chances.

From an operational and a safety perspective, the Bypass should be widened to a four-lane median divided highway (two lanes in each direction). In fact, as presented later in this report, a four-lane median divided section is recommended. However, given the substantial costs, widening the Bypass to a 4-lane cross-section is under the best circumstances several years away. For this reason, an effort was made to evaluate potential immediate or short-term solutions that if put in place, could enhance the safe and efficient flow of traffic along the Bypass. The following section discusses some of the various alternatives that were considered as potential solutions to address the immediate safety needs of the highway.

**Alternatives Considered for Improving Bypass Safety**

To enhance the safe flow of traffic in the near-term will involve a combination of driver education, police enforcement, and roadway design modifications. The following paragraphs summarize the various alternatives that were evaluated.

Alternatives that educate motorists primarily come in the form of signage. Signs can be used to alert motorists that a particular section of a roadway is a problem area and that caution should be used. Variable message boards, such as those that have recently been placed by the NHDOT serve to alert motorists and reinforce existing regulations. The existing message to “OBSERVE THE POSTED SPEED LIMIT” can be an effective method of maintaining a safe and consistent speed through the segment. Another form of signage that can be used to alert and educate motorists is a
sign that reads: “LIGHTS ON FOR SAFETY – PLEASE DRIVE COURTEOUSLY”. This type of sign, which would be placed in each direction, at the beginning and the end of the Bypass and at each interchange, would serve to not only remind motorists to be cautious, but the turned-on headlights would provide an added visual stimuli of the on-coming traffic.

The enforcement of existing speed limits and passing restrictions is also a vital component to addressing the safety problems along the Bypass. An increased visual presence of law enforcement along the Bypass would serve to alert motorists to maintain reasonable speeds and to only pass in safe and defined passing areas. Perhaps off-road “launching pads” (parking areas for police patrol vehicles) could be constructed along the Bypass at strategic locations so that police could monitor travel speeds and passing maneuvers.

It is often suggested that reducing the posted speed limit would serve to address safety deficiencies. The posted speed limit should be appropriate for the geometric conditions along the roadway and should match driver expectations. Posting the speed limit below reasonable driver expectation often results in a disparity between the high and the low speed as some motorists will continue to travel at speeds appropriate for the conditions while others will slow, respecting the speed limit. It is this type of variance in speed that can lead to serious crashes. As long as the speed limit reflects the geometric conditions of the roadway, most motorists will tend to travel at constant speed - which is a safer condition. We do not believe that reducing the posted speed limit along the Bypass would address the identified safety deficiencies. In fact, doing so could have the opposite effect.

A more effective way of reducing travel speeds for all motorists is through roadway design modifications. We have evaluated a series of physical modifications to the Bypass for their effectiveness, cost, and ease of implementation. The evaluation considered such actions as the placement of jersey barriers, rumble strips, painted medians, reflectorized delineators, and the construction of passing lanes.

The placement of a jersey barrier down the center of the Bypass would address the problem of head-on collisions. However, the barrier would require seven feet of pavement width (3 feet for the barrier and 2 feet on each side for an offset to the travel lane). Unless Route 101 can be widened (which is not a short-term solution) the needed width would have to be taken from the shoulder area, effectively reducing the 10-foot shoulder to 6 ½ feet. As motorists will tend to drift away from the barrier and closer to the shoulder, this alternative could create a potential hazardous condition, particularly at night, if an automobile were to breakdown along the shoulder. For this reason, this alternative is not recommended.

Rumble strips are grooved patterns that are placed primarily along paved shoulders to alert fatigued or distracted motorists that they are about to drift off the roadway. The use of rumble strips along roadway edges has been shown to be a very cost-
effective way of keeping motorists safely on the roadway. To a lesser degree, but increasingly, rumble strips are being used along the centerline of roadways to reduce the potential of motorists drifting into the oncoming traffic. The NHDOT has placed some centerline rumble strips along Route 101, however it is too early to determine their effectiveness. We believe that centerline rumble strips can be effective, however we would suggest that the rumple strips be placed down the center of the roadway with double yellow centerlines placed on each side of the rumble strip rather than placing the pavement markings within the strip. Doing so provides better separation and the rumble strip doesn’t break up the pavement markings.

A painted 4-foot wide center median would provide the benefit of introducing some spacing to separate directional traffic while eliminating some of the problems associated with a physical barrier. The 4-foot painted center median could be put in place without widening the roadway by reducing the paved shoulder area from 10 feet to 8 feet. This option would include the placement of two rumble strips inside the painted pavement markings. To provide additional delineation, plastic delineator tubes could be placed down the center of the painted median.

This placement of the painted median would, like the jersey barrier alternative, require building up the shoulder area (the two foot width that vehicles would now be using for travel). The need to add pavement surface to the shoulder as well as the placement of new pavement markings would necessitate a one-inch overlay of the entire length of the Bypass, which would be costly. The cost to implement the 4-foot median option is estimated at approximately $600,000.

Another option considered was the construction of passing lanes. This alternative would involve the widening of Route 101 at one location in the eastbound direction and another location in the westbound direction. Similar to truck climbing lanes they would provide an additional lane for a length of at least one half a mile. Although this option could be effective in providing motorists safe opportunities to pass, it would be expensive, as each location would likely cost several hundred thousand dollars to construct.

**Action Plan for Improving Bypass Safety**

Based on discussions between the NHDOT and the Town of Milford, the NHDOT has committed to the following action plan.

**Immediate**

1. Continue the use of variable message boards, which direct motorists to “OBSERVE THE POSTED SPEED LIMIT”.
2. Install “LIGHTS ON FOR SAFETY – PLEASE DRIVE COURTEOUSLY” signs in each direction, at the beginning and end of the Bypass and at each interchange.
3. Review passing zones and, where appropriate, reduce the length of the passing zones and increase the length of the no-passing areas.

4. Review location and sizing of signing and where appropriate replace.

5. Extend the centerline rumble strip along all no-passing areas.

**Short-term**

The NHDOT will continue to monitor the safety conditions along the Bypass and when this segment of Route 101 is scheduled for its next pavement overlay, the Department will reconsider the option of upgrading the shoulder area so as to install either the 4-foot painted median with rumble strips or the single center rumble strip with double yellow pavement markings on either side.

In addition to these actions by the NHDOT, state and local police should increase their presence along the Bypass. Perhaps off-road “launching pads” (parking areas for police patrol vehicles) could be constructed.

### 3.3 Transportation Infrastructure

Route 101 is a state-maintained principal east-west highway that extends from the seacoast to Keene. As it passes through the study corridor communities of Amherst, Milford, and Wilton, the highway function varies. The bypass section, which extends from Old Wilton Road in Milford to Baboosic Lake Road in Amherst, is a limited access two-lane bi-directional undivided highway with 12-foot travel lanes and 10-foot wide paved shoulders. Full diamond interchanges are provided at Route 13 and at Baboosic Lake Road. A partial cloverleaf provides full access/egress at Route 101A, and a half diamond interchange provides westbound access/egress only at NH 122. The speed limit through the bypass section is posted at 55 mph.

The cross-sections for the remaining segments of the corridor are also two-lane bi-directional and undivided, but are characterized with business frontage, numerous curb cuts and intersecting side streets, and in western Milford – traffic signal control. In Wilton, study area intersections such as Greenville Road (NH 31 South) and Abbott Hill Road serve as residential collector roadways connecting local residential streets to the corridor. In Milford, access to Route 101 is provided at three signalized intersections where collector roads such as Wilton Road, Elm Street (Route 101A), and Old Wilton Road connect Route 101 to the Wilton town center, and residential communities north and east of Route 101 in Milford respectively. Numerous uncontrolled commercial driveways front Route 101 in Milford between the intersections of Wilton Road and Elm Street (Route 101A). The posted speed limit varies from 35 mph near signalized intersections to 50 mph in Amherst near the Bedford town line.
Nearby alternative travel routes to Route 101 include Route 101A for east/west travel from Milford to the F.E. Everett Turnpike. Route 101A is a minor arterial with daily traffic volumes ranging from 20,500 vpd west of the 101 interchange to 30,580 vpd east of the 101 interchange at the Amherst/Milford town line. Some local roads provide alternative routes to 101 in Milford. The roadway network of Armory Street and Osgood Road provide connections to local destinations in Milford. These roadways are residential collectors with low speeds, narrow pavement and stop-control at intersections. NH 122 serves as an alternative route to Route 101 in Amherst. NH 122 is a major collector with traffic volumes of 4,900 vpd south of the Route 101 interchange. NH 122 has been introduced as a safer alternative to the bypass segment of Route 101 due to the reduced speeds compared to the bypass. The nearby street system is summarized in Table 2.

### TABLE 2
Nearby Street System

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Roadway Name</th>
<th>Functional Classification</th>
<th>Count Location</th>
<th>Traffic Count (vpd)</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amherst</td>
<td>Horace Greeley Road</td>
<td>Minor Collector</td>
<td>N of 101</td>
<td>2,389</td>
<td>New Boston, residential</td>
</tr>
<tr>
<td></td>
<td>Baboosic Lake Road</td>
<td>Minor Collector</td>
<td>E of 101</td>
<td>2,622</td>
<td>Amherst, residential</td>
</tr>
<tr>
<td>NH 122</td>
<td></td>
<td>Major Collector</td>
<td>S of 101</td>
<td>4,880</td>
<td></td>
</tr>
<tr>
<td>Milford</td>
<td>Route 101A (Nashua Street)</td>
<td>Minor Arterial</td>
<td>E of 101 at Amherst TL</td>
<td>30,583</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Route 101A (Nashua Street)</td>
<td>Minor Arterial</td>
<td>W of 101</td>
<td>20,497</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NH 13 (South Street)</td>
<td>Minor Arterial</td>
<td>S of 101</td>
<td>11,747</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NH 13 (South Street)</td>
<td>Minor Arterial</td>
<td>N of 101</td>
<td>5,385</td>
<td>Wilton town center</td>
</tr>
<tr>
<td></td>
<td>Wilton Road</td>
<td>Local</td>
<td>over Souhegan River</td>
<td>9,288</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S of 101</td>
<td>1,194</td>
<td>residential</td>
</tr>
<tr>
<td>Wilton</td>
<td>Abbott Hill Road</td>
<td>Local</td>
<td>S of 101</td>
<td>1,194</td>
<td></td>
</tr>
</tbody>
</table>

### 3.3.1 Operational Analysis: Existing Conditions

Measuring traffic volume along Route 101 indicates the importance of the corridor to the local and regional roadway system, but gives little indication of the quality of traffic flow. To measure the quality of traffic flow, key intersections were analyzed from an operational perspective. The results of this analysis provide a valid indication of how well the roadway system operates given existing and predicted travel demands.

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 the 2000 Highway Capacity Manual (HCM) were used to analyze the signalized and unsignalized study area intersections.

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, intersection movements operating at
LOS A or B experience very little if any delay. Level of service C is typically considered the average delay condition. LOS D is considered to be acceptable if there is undue burden required to achieve LOS C. LOS E and F indicate that the intersection or movement being analyzed is at capacity, and 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 conducted for the 2001 base year reveal that each of the four intersections is currently operating under capacity during both the morning and evening peak hours. The analysis indicates relatively good operation at the intersection of Wilton Road in Milford. This intersection currently operates at LOS C during the morning and evening peak periods. The analysis of the intersections of Elm Street and Old Wilton Road indicate that during the morning peak hour, these intersections are close to capacity. Each is currently operating at LOS D with volume to capacity ratios ranging from 0.85 to 0.89. The signalized intersection of the westbound Route 101 ramp with Route 101A operates at LOS C, with little delay to through traffic. However, the nearby unsignalized eastbound Route 101A experience delay resulting from the relatively heavy flow of traffic on Route 101A. During the morning peak period, the heavy volume on Route 101A causes the queuing of vehicles from the eastbound off-ramp back onto Route 101.

The results of the unsignalized analyses revealed poor operation (LOS F) where vehicles enter the corridor from side streets such as Greenville Road and Abbott Hill Road in Wilton, and from The Meeting Place, Walnut Hill Road, and Horace Greeley Road in Amherst. Intersection movements at the interchange ramps to Route 13 and Route 101A also reveal poor operation. However, the movements at the NH 122 and Amherst Street interchange ramps operate well (LOS A or B).

The results of the base condition intersection analyses are summarized in Tables 3 and 4.

<table>
<thead>
<tr>
<th>Intersection with Route 101</th>
<th>Weekday AM Peak Hour</th>
<th>Weekday PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vic*</td>
<td>Delay*</td>
</tr>
<tr>
<td>Wilton Road</td>
<td>0.83</td>
<td>27</td>
</tr>
<tr>
<td>Route 101A (Elm Street)/North River Road</td>
<td>0.89</td>
<td>38</td>
</tr>
<tr>
<td>Old Wilton Road/Phelan Road</td>
<td>0.85</td>
<td>39</td>
</tr>
<tr>
<td>Route 101A WB Ramp</td>
<td>0.70</td>
<td>22</td>
</tr>
</tbody>
</table>

* Volume to capacity ratio
* Average delay per vehicle (in seconds)
** Level of Service
To estimate future traffic volume demand, regional traffic volume models prepared by the Nashua Regional Planning Commission and the Southern New Hampshire Regional Planning Commission were examined. From the model projections for the Route 101 corridor, growth rates were determined for the towns of Amherst, Milford, and Wilton. These growth rates (1.5 percent per year for Wilton and Milford, 2.0 percent per year for Amherst) were applied to the 2001 base traffic volumes to develop the 2021 future traffic volumes along the corridor. The 2021 traffic volumes are shown in Figure 11.

### TABLE 4
Unsignalized Intersection Capacity Analysis
2001 Base Condition

<table>
<thead>
<tr>
<th>Intersection with Route 101</th>
<th>Movement</th>
<th>Weekday AM Peak Hour</th>
<th>Weekday PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Demand+</td>
<td>Delay*</td>
</tr>
<tr>
<td>NH 31S (Greenville Road)</td>
<td>Left from Route 101</td>
<td>120</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Left/Right from NH 31S (Greenville Road)</td>
<td>285</td>
<td>70</td>
</tr>
<tr>
<td>NH 31N/Abbott Hill Road</td>
<td>EB Left from Route 101</td>
<td>80</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>WB Left from Route 101</td>
<td>70</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>NB Left/Thru/Right from Abbott Hill Road</td>
<td>145</td>
<td>358</td>
</tr>
<tr>
<td></td>
<td>SB Left/Thru/Right from NH 31N</td>
<td>95</td>
<td>195</td>
</tr>
<tr>
<td>Route 101 WB Ramps/NH 13</td>
<td>Left from NH 13</td>
<td>105</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Route 101 WB Ramp</td>
<td>260</td>
<td>52</td>
</tr>
<tr>
<td>Route 101 EB Ramps/NH 13</td>
<td>Left from NH 13</td>
<td>85</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Route 101 EB Ramp</td>
<td>150</td>
<td>20</td>
</tr>
<tr>
<td>Route 101 WB Spur/Route 101A</td>
<td>Right from Route 101 WB Ramp</td>
<td>230</td>
<td>12</td>
</tr>
<tr>
<td>Route 101 EB Ramps/Route 101A</td>
<td>Left from Route 101A</td>
<td>70</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Left from Route 101 EB Ramp</td>
<td>35</td>
<td>478</td>
</tr>
<tr>
<td></td>
<td>Right from Route 101 EB Ramp</td>
<td>860</td>
<td>577</td>
</tr>
<tr>
<td>Route 101 EB Off ramp/NH 122</td>
<td>Left from Route 101 EB Ramp</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Right from Route 101 EB Ramp</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Route 101 WB Onramp/NH 122</td>
<td>Left from NH 122</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Route 101 EB Ramps/Amherst Street (NH 122)</td>
<td>Left from Amherst Street (NH 122)</td>
<td>420</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Route 101 EB Ramp</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Route 101 WB Ramps/Amherst Street (NH 122)</td>
<td>Left from Amherst Street (NH 122)</td>
<td>60</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Route 101 WB Ramp</td>
<td>240</td>
<td>11</td>
</tr>
<tr>
<td>The Meeting Place Driveway</td>
<td>Left from Route 101</td>
<td>55</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Left from The Meeting Place Driveway</td>
<td>55</td>
<td>410</td>
</tr>
<tr>
<td></td>
<td>Right from The Meeting Place Driveway</td>
<td>60</td>
<td>25</td>
</tr>
<tr>
<td>Walnut Hill Road</td>
<td>Left from Route 101</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Walnut Hill Road</td>
<td>65</td>
<td>215</td>
</tr>
<tr>
<td>Town Transfer Station¹</td>
<td>Left from Route 101</td>
<td>160</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Town Transfer Station</td>
<td>205</td>
<td>106</td>
</tr>
<tr>
<td>Horace Greeley Road</td>
<td>Left from Route 101</td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Horace Greeley Road</td>
<td>180</td>
<td>278</td>
</tr>
</tbody>
</table>

* Demand of vehicles during the peak hour
* Average delay per vehicle (in seconds)
** Level of Service
¹ Delay greater than 999 seconds

### 3.3.2 Operational Analysis: Future Volumes

To estimate future traffic volume demand, regional traffic volume models prepared by the Nashua Regional Planning Commission and the Southern New Hampshire Regional Planning Commission were examined. From the model projections for the Route 101 corridor, growth rates were determined for the towns of Amherst, Milford, and Wilton. These growth rates (1.5 percent per year for Wilton and Milford, 2.0 percent per year for Amherst) were applied to the 2001 base traffic volumes to develop the 2021 future traffic volumes along the corridor. The 2021 traffic volumes are shown in Figure 11.
Insert Figure 11 Fold Out Here
A level of service analysis similar to the existing condition analysis was conducted at the key study area intersections for the 2021 future traffic condition. The analysis reflects the ability of the existing roadway network to meet the projected 20-year traffic volume demands.

The results of the signalized intersection analyses show that three of the four signalized intersections (Wilton Road, Elm Street/North River Road, and Old Wilton Road/Phelan Road) would operate at or over capacity in the year 2021. The Route 101 WB Ramp/Route 101A intersection is expected to operate at an acceptable level of service (LOS C) with the planned upgrade of the intersection. The intersection improvements, which include the addition of a second left-turn lane on the Route 101A westbound approach and the provision of an exclusive right-turn lane on the Route 101A eastbound approach, will be constructed as part of a mitigation package for a recently approved retail development.

The results of the unsignalized analyses reflect poor operations for minor street approaches at all intersections with the exception of the half interchange at NH 122. Turning movements at the westbound on-ramp and eastbound off-ramp intersections with NH 122 are expected to operate at LOS C or better during both the morning and evening peak periods. All other minor street approaches to unsignalized intersections in the study area operate at poor levels of service (LOS E or F) during one or more of the weekday peak periods.

The results of the future condition intersection analyses are summarized in Tables 5 and 6.

TABLE 5
Signalized Intersection Capacity Analysis
2021 Future Condition

<table>
<thead>
<tr>
<th>Intersection with Route 101</th>
<th>Weekday AM Peak Hour</th>
<th>Weekday PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>v/c</td>
<td>Delay</td>
</tr>
<tr>
<td>Wilton Road</td>
<td>1.09</td>
<td>65</td>
</tr>
<tr>
<td>Route 101A (Elm Street)/North River Road</td>
<td>1.20</td>
<td>101</td>
</tr>
<tr>
<td>Old Wilton Road/Phelan Road</td>
<td>1.14</td>
<td>100</td>
</tr>
<tr>
<td>Route 101 WB Ramp/Route 101A†</td>
<td>0.68</td>
<td>25</td>
</tr>
</tbody>
</table>

† Includes retail development mitigation

In addition to evaluating the signalized and unsignalized intersections along the corridor, a key element in the evaluation of the corridor is determining the number of basic lanes that will be needed along various segments of the corridor to accommodate the future travel demands. The basic lanes of a highway are the travel lanes that are needed solely to accommodate the movement of through traffic. Basic travel lanes do not include traffic management lanes such as climbing lanes, acceleration/deceleration, weaving, and merging lanes, which may be needed in the vicinity of an
<table>
<thead>
<tr>
<th>Intersection with Route 101</th>
<th>Movement</th>
<th>2021 Future Condition Weekday AM Peak Hour</th>
<th>2021 Future Condition Weekday PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Demand+</td>
<td>Delay*</td>
</tr>
<tr>
<td>NH 31S (Greenville Road)</td>
<td>Left from Route 101</td>
<td>160</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Left/Right from NH 31S (Greenville Road)</td>
<td>385</td>
<td>561</td>
</tr>
<tr>
<td>NH 31N/Abbott Hill Road</td>
<td>EB Left from Route 101</td>
<td>110</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>WB Left from Route 101</td>
<td>95</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>NB Left/Thru/Right from Abbott Hill Road</td>
<td>195</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>SB Left/Thru/Right from NH 31N</td>
<td>125</td>
<td>#</td>
</tr>
<tr>
<td>Route 101 WB Ramps/NH 13</td>
<td>Left from NH 13</td>
<td>140</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Route 101 WB Ramp</td>
<td>350</td>
<td>381</td>
</tr>
<tr>
<td>Route 101 EB Ramps/NH 13</td>
<td>Left from NH 13</td>
<td>115</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Route 101 EB Ramp</td>
<td>205</td>
<td>68</td>
</tr>
<tr>
<td>Route 101 WB Spur/Route 101A</td>
<td>Right from Route 101 WB Ramp</td>
<td>310</td>
<td>15</td>
</tr>
<tr>
<td>Route 101 EB Ramps/Route 101A</td>
<td>Left from Route 101A</td>
<td>95</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Left from Route 101 EB Ramp</td>
<td>45</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>Right from Route 101 EB Ramp</td>
<td>1160</td>
<td>724</td>
</tr>
<tr>
<td>Route 101 EB Off ramp/NH 122</td>
<td>Left from Route 101 EB Ramp</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Right from Route 101 EB Ramp</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Route 101 WB Onramp/NH 122</td>
<td>Left from NH 122</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Route 101 EB Ramps/Amherst Street (NH 122)</td>
<td>Left from Amherst Street (NH 122)</td>
<td>625</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Route 101 EB Ramp</td>
<td>25</td>
<td>43</td>
</tr>
<tr>
<td>Route 101 WB Ramps/Amherst Street (NH 122)</td>
<td>Left from Amherst Street (NH 122)</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Route 101 WB Ramp</td>
<td>355</td>
<td>15</td>
</tr>
<tr>
<td>The Meeting Place Driveway</td>
<td>Left from Route 101</td>
<td>80</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Left from The Meeting Place Driveway</td>
<td>80</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>Right from The Meeting Place Driveway</td>
<td>90</td>
<td>171</td>
</tr>
<tr>
<td>Walnut Hill Road</td>
<td>Left from Route101</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Walnut Hill Road</td>
<td>95</td>
<td>#</td>
</tr>
<tr>
<td>Town Transfer Station1</td>
<td>Left from Route 101</td>
<td>240</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Town Transfer Station</td>
<td>305</td>
<td>#</td>
</tr>
<tr>
<td>Horace Greeley Road</td>
<td>Left from Route101</td>
<td>65</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Left/Right from Horace Greeley Road</td>
<td>285</td>
<td>#</td>
</tr>
</tbody>
</table>

* Demand of vehicles during the peak hour
* Average delay per vehicle (in seconds)
** Level of Service
# Delay greater than 999 seconds

interchange to accommodate vehicles entering or exiting the highway. These basic lanes serve to provide a consistent number of lanes over a significant length of highway.

For the purpose of designing state maintained roadways, the New Hampshire Department of Transportation (NH DOT) has established LOS D as a minimum acceptable operating condition. Therefore, for the purpose of this evaluation it will be necessary to determine the number of lanes that will be needed along the corridor to obtain LOS D.

The results of an operational analysis for each of the corridor segments show that under existing conditions (2001) the segment of the corridor in Wilton operates at
LOS D, while the segments in Milford from Old Wilton Road to Route 13 and from Route 13 to Route 101A operate at LOS E. In Amherst, the segment from Route 101A to NH 122 operates at LOS D/E, the segment from NH 122 to Baboosic Lake Road operates at LOS D and the segment east of Baboosic Lake Road operates at LOS E.

Under the future year (2021), the operating condition for the entire corridor is expected to deteriorate to LOS E and LOS F. LOS E conditions are expected along the segment in Wilton, in Milford from Old Wilton Road to Route 13, and in Amherst from Route 101A to Baboosic Lake Road. LOS F conditions are expected in Milford from Route 13 to Route 101A and in Amherst east of Baboosic Lake Road.

Therefore, to accommodate the 20-year design hour volumes, the corridor will need to be widened to a four-lane cross-section. However, it is not enough to simply widen the corridor. The long-term plan for the corridor needs to meet the needs of the communities along the route.

3.2 Pedestrian and Bicycle Transportation

The Route 101 Corridor has a significant amount of bicycle use. The accompanying map shows many regional bike routes paralleling Route 101 and crossing it (primarily at overpasses and underpasses in the bypass section). Designated bike routes use Route 101 west of the 101/101A intersection in western Milford and in Amherst from Route 122/Baboosic Lake Road to Horace Greeley Road. Although no volume estimates are available, cyclists can be seen using the highway shoulders throughout the corridor, particularly on weekends. Riders can be seen on the highway shoulder in both designated and undesignated portions of the highway.

The principal infrastructure for bicyclists in the corridor is the paved highway shoulder, which is generally eight to ten feet wide, but narrows or disappears in portions of western Milford and Wilton and at some right-turn situations in Amherst. Use of the highway shoulder is legal but advisable only for experienced cyclists. On parallel and crossing routes, bicycles share the road with motor vehicles, and although vehicular speeds are generally lower on these routes, only experienced cyclists are comfortable. In Milford, segments of multi-use path have been planned; these are more suitable for children and less experienced cyclists.

There are no sidewalks along Route 101 in the corridor study area. Some pedestrians do walk on the roadway shoulder, but their number is small. Some pedestrians have also been observed crossing at the 101/101A intersection in western Milford.

A transportation study for the three towns will commence after the completion of the Route 101 Corridor Plan. This study, which is funded through a grant from the federal Transportation and Community and System Preservation Program (TCSP) will be managed by NRPC. It will consider townwide traffic issues, integration of transportation and land use, and alternative transportation modes including pedestrian, bicycle, and transit. Its recommendations will supplement those of the Route 101 Corridor Plan.

Implications for the Route 101 Corridor

The paved shoulder along the highway should be maintained for use by experienced bicyclists, and widening of the shoulder should be considered at locations where automobiles use the shoulder for right turns or where the shoulder becomes a right-turn lane.
3.3 Economic Development Profile

This report section provides a “snapshot” of the existing economic development activities (non-residential development) along Route 101 in each respective community and is not intended to be an overview of the real estate market or provide insight into potential future market trends. For a regional perspective, population, labor and employment estimates for each community are compared to Hillsborough County.

The data for the Town of Milford were collected as part of a conceptual market study for the industrial land in the BROX property and other industrial parcels. The data for Amherst and Wilton were collected to provide baseline data for the Route 101 Corridor Study.

In order to obtain data and information for the market overview, three methods were used. The first consisted of an analysis of current and historical population, labor and employment data provided by the U.S. Census and the New Hampshire Department of Employment Security. The second consisted of an estimation of square footage of non-residential properties along Route 101 via a “windshield survey”. The third included an interview with the zoning/planning official from the Town of Amherst.

3.3.1 Amherst and Wilton

The Towns of Amherst and Wilton, located approximately 20 miles south west of Manchester and 50 miles north west of Boston, have current (2000) populations of approximately 9,100 and 3,100. In terms of percentage growth, both Amherst and Wilton have experienced strong growth throughout the 1990s with increases of 19% and 20% respectively. Comparatively, Amherst and Wilton have outperformed Hillsborough County in terms of population growth by approximately 6% and 7% respectively. Table 1 indicates a comparison of population growth for each community and Hillsborough County between 1990 and 2000.

<table>
<thead>
<tr>
<th>Town</th>
<th>1990</th>
<th>2000</th>
<th># Change</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amherst</td>
<td>9,068</td>
<td>10,769</td>
<td>1,701</td>
<td>18.8%</td>
</tr>
<tr>
<td>Wilton</td>
<td>3,122</td>
<td>3,743</td>
<td>621</td>
<td>19.9%</td>
</tr>
<tr>
<td>Hills. County</td>
<td>336,073</td>
<td>380,841</td>
<td>44,768</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

Source: U.S. Census

Labor Force, Employment and Unemployment Conditions

According to data provided by the New Hampshire Department of Employment Security, Amherst’s labor force has experienced strong growth throughout the 1990s increasing by 875 individuals – representing an increase of 17%. Wilton’s increase in labor force was modest as compared to Amherst with...
an increase of 112 individuals (7%). As shown in Table 2, between 1990 and 2000, Hillsborough County, although outperforming Wilton’s labor force growth by approximately 4%, increased its labor force by approximately 11%, which is 6% less than Amherst’s labor force growth over the same time period.

As shown in Table 3, Amherst has a current (2001) total employment base of approximately 5,700 jobs – which represents an increase of approximately 890 jobs (19%) since 1991. Wilton’s employment base is considerably smaller with a current total of approximately 1,660 jobs and increasing by 145 jobs (10%) since 1991. Comparatively, the County outperformed Wilton in terms of percentage job growth by approximately 5% over the same time period.

In terms of the current (2000) distribution of private employment in Amherst, the largest employment area is the service sector (1,240 private jobs or 41%) followed by the trade sector (971 private jobs or 31%). The manufacturing sector has a significant presence in town with over 600 jobs representing 21% of the total workforce. The transportation, communications and public utilities (TCPU) and finance, insurance and real estate (FIRE) sectors represent the smallest portion of the workforce at 2% and 3% respectively.

As with most communities, Wilton’s 2000 employment base is heavily concentrated within the service (180 private jobs or 45%) and trade sectors (156 private jobs or 40%) representing approximately 85% of Wilton’s total jobs. Manufacturing jobs represent approximately 13% of Wilton’s employment base.

Compared to the region, Amherst and Wilton have significantly higher concentrations of jobs in the service and trade sectors (over 70% and 80%) with the region having approximately 50% of its jobs in these sectors. Manufacturing employment in the region is slightly higher than both communities with almost one in four jobs being manufacturing related. Figure 1 indicates the distribution of employment for the Towns of Amherst, Wilton and

<table>
<thead>
<tr>
<th>Table 3. Total Employment Change: 1991-2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amherst, Wilton and Hillsborough County</td>
</tr>
<tr>
<td>1991</td>
</tr>
<tr>
<td>Amherst</td>
</tr>
<tr>
<td>Wilton</td>
</tr>
<tr>
<td>Hills. County</td>
</tr>
<tr>
<td>Source: NH Department of Employment Security</td>
</tr>
</tbody>
</table>

New Hampshire Route 101 Corridor Plan
Hillsborough County (region) for 2000.

As shown in Figure 2, Amherst experienced significant percentage job growth in TPUC (45 jobs or 225%), service (647 jobs or 109%) and FIRE (34 jobs or 76%) sectors. Manufacturing experienced a net loss in jobs of almost 50 jobs (7%). Over the same time period, Wilton experienced net gains in service (53 jobs or 42%) and trade employment (40 jobs or 35%), while losing jobs in the manufacturing (20 jobs or 29%) and TPUC (1 job or 14%) sectors. The region experienced job growth in all sectors over the same time period.

In terms of the current (2000) distribution of private business establishments, approximately half (189) of Amherst’s private businesses fall within the service sector representing the largest segment of the town’s establishment base. Trade and manufacturing establishments represent the second largest (142 or 36%) and third largest (29 or 7%) of the total business base. Interestingly, Amherst’s significant manufacturing employment compared to its modest establishment base indicates that each of the town’s manufacturing companies employ approximately 21 workers — by far the largest employment per establishment rate of any industrial sector.

Currently in Wilton, 56% of the town’s 54 businesses are service industry establishments with the town’s 17 trade establishments comprising 31% of the total businesses.

Similar to employment distribution, based on 2000 establishment information, service and trade establishments comprise a smaller amount (38% and 32%) of the total County establishment base compared to Amherst and Wilton. In terms of employment per establishment, throughout the County, each manufacturing establishment employs approximately 53 workers — more than double the next closest sector (TPUC) at 21 workers per establishment. Figure 3 provides the distribution of busi-
ness establishments for the Towns of Amherst and Wilton, as well as Hillsborough County.

In terms of establishment growth, between 1991 and 2000, Amherst experienced significant percentage growth in the service (83 establishments or 78%), FIRE (7 establishments or 41%) and TCPU (2 establishments or 40%) sectors. The number of manufacturing establishments declined by 9 representing a decline of 24%. With the exception of the service sector which gained 14 businesses (88%), all industry sectors in Wilton lost businesses or stayed at the same establishment level over the same time period. On a County basis, all industry sectors experienced growth with the largest percentage gains being in the agriculture, forest and fish (59 establishments or 44%) and the service (1,192 establishments or 39%) sectors. Figure 4 shows the change in business establishments in the Towns of Amherst and Wilton and the County between 1991 and 2000.

Based on an analysis of unemployment estimates provided by the New Hampshire Department of Employment Security, the Towns of Amherst and Wilton have experienced steady declines in unemployment from the early 1990s through to 2000. Between 1991 and 2001, unemployment in Amherst and Wilton has declined by 1% and 2.4% respectively. Over the same time period, the County has outperformed both Towns with a reduction in unemployment of 3.2%. Figure 5 indicates unemployment rate trends for Amherst, Wilton and the region between 1991 and 2001.

**Current Economic Development and Site Conditions**

In order to assess the economic conditions along Route 101 in Amherst and Wilton, a “windshield survey” of existing business establishments was conducted. The purpose of the survey was to inventory the types of businesses along Route 101 as well as estimate the area (square footage) of each respective establishment. Attempts were made to contact municipal officials from each community, however, only planning and zoning officials from the Town of Amherst were available to provide additional information relative to the existing site conditions of the corridor. Based on the estimated building size of each establishment, an employment multiplier was applied which provides an estimate of the establishment’s total number of employees.
Route 101 through Amherst and Wilton contains mostly small service and retail establishments with most being classified as “mom and pop” (small privately owned and managed) businesses. In addition to the service and retail establishments, there are a very small number of FIRE businesses and, what appear to be, manufacturing establishments.

As shown in Table 4, it is estimated that the Route 101 through Amherst contains approximately 31,900 SF (28 businesses) of non-residential development which is primarily concentrated in service and retail establishments. The 28 businesses along Route 101 represent approximately 7% of Amherst’s establishment base. When an employment multiplier is applied to each land use, it is estimated that 116 individuals work in these respective establishments – representing 2% of Amherst’s total employment. As the applied employment multiplier periodically over/underestimates typical employment within certain establishments, an adjusted (sensitized) employment estimate of approximately 96 jobs is provided – representing 1.7% of Amherst’s total employment base. Although not within the study area, it is estimated that Route 101A in Amherst contains majority of the town’s employment and establishment base.

Route 101 through Wilton contains approximately 49,000 SF (14 businesses) of non-residential development which is concentrated in the manufacturing and service establishments. It should be noted that one manufacturing business (Label Art) is estimated to comprise over half of the manufacturing space along Route 101 in Wilton. The 14 businesses along Route 101 in Wilton represent approximately 26% of the town’s establishment base. In terms of employment, these establishments employ an estimated 107 workers which represent approximately 7% of Wilton’s employment base. An adjusted Route 101 employment estimate ranging from 81 (5% of employment base) to 271 (16% of employment base) has been provided. It should be noted that the 271 jobs estimate includes 215 workers (provided by the New Hampshire Department of Employment Security) from Label Art which likely includes workers from other Label Art locations. It is likely that an

<table>
<thead>
<tr>
<th>Table 4. Summary of Economic Conditions: 2002 - Route 101</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Towns of Amherst and Wilton</strong></td>
</tr>
<tr>
<td><strong>Amherst</strong></td>
</tr>
<tr>
<td>Establishment Type</td>
</tr>
<tr>
<td>Service</td>
</tr>
<tr>
<td>Retail</td>
</tr>
<tr>
<td>FIRE</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Estimated Total Town Employment 2001</td>
</tr>
<tr>
<td>% Employment on Route 101</td>
</tr>
<tr>
<td>Estimated Total Town Establishments 2000</td>
</tr>
<tr>
<td>Estimated Occupied Establishments on Route 101</td>
</tr>
<tr>
<td>% Establishments on Route 101</td>
</tr>
<tr>
<td><strong>Wilton</strong></td>
</tr>
<tr>
<td>Establishment Type</td>
</tr>
<tr>
<td>Service</td>
</tr>
<tr>
<td>Retail</td>
</tr>
<tr>
<td>Manufacturing</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Estimated Total Town Employment 2001</td>
</tr>
<tr>
<td>% Employment on Route 101</td>
</tr>
<tr>
<td>Estimated Total Town Establishments 2000</td>
</tr>
<tr>
<td>Estimated Occupied Establishments on Route 101</td>
</tr>
<tr>
<td>% Establishments on Route 101</td>
</tr>
</tbody>
</table>
*Note: Includes employment estimate (215) for Label Art which may include employees at other locations.

Source: Gruen, Gruen Associates and RKG Associates, Inc.
adjusted employment range between 80 and 100 jobs would be realistic. As with Amherst, it is estimated that 101A through Wilton contains most of the town’s employment and establishment base.

**Conclusions: Amherst and Wilton**

The following points are most relevant relative to the economic development conditions found along Route 101 through the Towns of Amherst and Wilton:

- Amherst and Wilton have experienced strong population growth throughout the 1990s;
- The majority of the employment and establishment base in each community involves the service and trade sectors;
- Between 1991 and 2000, Wilton has experienced a net loss of manufacturing and TCPU jobs;
- It is estimated that employment in establishments along Route 101 in Amherst represents approximately 2% of the town’s employment base while the Wilton section of Route 101 represents approximately 5% to 7% of the employment base.
- In terms of businesses, Route 101 through Amherst represents approximately 7% of the town’s establishment base while Route 101 through Wilton represents approximately one quarter of the town’s establishment base.

### 3.3.2 Milford

This section contains excerpts of the *Non-Residential Market Study for the BROX Property* by RKG Associates, Inc., which is Appendix C to this report. See the appendix for footnotes, figures, and more information.

**Population and Household Trends and Projections**

Since 1980, population in the Town of Milford has increased by more than 4,930, to a base of 13,618 persons in 2001. The increase during the 1990s (1,820) was almost half the size of the increase during the 1980s (3,110). The average annual growth rate between 1980 and 2001 was roughly 2.7% in Milford, and only 1.4% per year during the 1990s. Population in Hillsborough County also increased between 1980 and 2001, but at a somewhat slower rate as indicated by an average annual increase of 1.9%.

**Labor Force and Unemployment Trends**

Between 1990 and 2001 the resident labor force in the Town of Milford increased by more than 320 participants, or 4.5%. This finding suggests that only 17.6% of the new persons (1,820 persons) in Milford were labor force participants, while the other 82.4% were non-participants, such as children, non-working household mem-
bers, or retirees. In Hillsborough County the labor force increased at a faster percentage rate, 6.0% between 1990 and 2001, than in Milford, suggesting a higher growth in labor force participants in the rest of the County. The growth rate in the labor force in the Nashua PMSA at 4.5% was similar to that in Milford, but less than half the growth rate indicated for the State. By comparison the growth rate in the Manchester PMSA was 7.2%, higher than indicated for the Nashua PMSA and Milford, indicating that this area is benefiting from a greater increase in labor force participants.

Conclusions The labor force in Milford has increased at a much slower rate than population growth since 1990. In fact, only 17.5% of the population increases were labor force participants. In addition, the number of employed persons increased as the unemployment rate declined in the latter half of the 1990s. However, a softening in the economy in the early 2000s has resulted in a recent up-tick in the unemployment rate. The unemployment rate in Milford, however, is traditionally lower than other areas, suggesting a more stable labor force.

Business Trends
In 1998, Milford had 390 operating businesses, reflecting a gain of 179 firms since 1980, when there were 211 businesses operating in the town. This indicates an 84.8% gain, or an average of more than 4.2% per year. However, the number of businesses declined by 8 firms in the last two years. As noted, the town experienced a higher percentage of growth in new businesses during the 1980s than in the 1990s. The average annual growth rate was 5.8% in the 1980s, but only 1.7% per year in the 1990s. In addition, 93.3% of all new businesses since 1980 are classified as non-manufacturing firms. This trend was similarly observed at the county and state levels.

In Milford, firms in the services industry experienced the most growth between 1980 and 2000, followed by gains in retail businesses. In 2000, firms in these two sectors represent 64% of all businesses operating in Milford. Increases were also experienced in the wholesale trade, manufacturing and construction sectors. In fact, gains were evident in the number of businesses across all industry sectors during the twenty-year period. These increases appear fairly consistent with changes observed in the two surrounding PMSAs.

Conclusions Milford has enjoyed a gain of roughly 170 operating businesses between 1980 and 2000. Nearly 93.6% of this growth occurred in non-manufacturing businesses, with businesses in the services and retail sector experiencing the most growth during the twenty-year period. Some growth, albeit small, did occur in the manufacturing sector, which experienced more growth in businesses during the 1990s than in the 1980s. This latter finding counters the trend in the manufacturing sector in the Nashua PMSA, where nominal growth in manufacturing businesses occurred in the 1990s. In fact, Milford captured nearly 36% of the growth
in manufacturing firms in the Nashua PMSA during the 1990s, which is nearly four times its representation (9.3%) in 2000. This is a significant finding in light of the decline in manufacturing employment as discussed below, and beneficial for the planning of a proposed business park. It also suggests that manufacturing businesses are locating in Milford, despite it being somewhat removed from the interstate highway network.

**Employment Trends**

Total employment in the Town of Milford increased by 3,440 jobs (from 3,420 in 1980 to 6,860 in 1999, the peak of the twenty year period) indicating a 100.4% gain. Employment in Milford declined by nearly 800 jobs in 2000, to a level of roughly 6,080 jobs. Between 1980 and 1989, employment rose by nearly 1,870 jobs, representing an annual growth rate of 6.0% during the 1980s. Then, employment levels declined to a low of 4,610 jobs in 1991, and subsequently recovered over the next three years, such that employment in 1994 surpassed the previous high mark in 1989. Over the next five years, employment increased by another 1,590 jobs, indicating a 6% average growth rate between 1994 and 1999. A decline of -11.5% occurred between 1999 and 2000, such that the average growth rate since 1994 was only 2.5%. Therefore, between 1980 and 2000, private employment in Milford increased by 2,650 jobs, denoting an annual growth rate of 3.9%. More importantly, 21.7% of the jobs were in manufacturing companies, as this sector experienced a gain of 575 positions, or 27.9%, during this twenty-year period. Manufacturing employment reached a peak in 1984 at 2,570 jobs, and then declined to its nadir of 1,660 jobs in 1992. In 1998, manufacturing jobs recovered to its previous benchmark, and by 2000 surpassed that level by only 62 jobs. In other words, the amount of manufacturing jobs in 2000 is only 2.4% higher than the prior peak sixteen years earlier in 1984. In spite of these low trends, Milford experienced a higher growth rate in manufacturing jobs over the last twenty years than Hillsborough County or the State.

Between 1980 and 2000 employment in the retail sector in Milford experienced the most growth as evidenced by an increase of more than 1,100 jobs during the twenty-year period. As illustrated, only 23.3% of this growth in retail employment occurred in the 1990s, similar to trends in the services sector. In comparison, employment in the manufacturing-durable goods sector experienced a gain of roughly 800 jobs during the twenty-year period, and all of it occurred in the 1990s. Employment gains were also evident in the FIRE, TCPU, wholesale trade and construction sectors. In total, jobs increased by nearly 430, offsetting losses in the non-durable manufacturing goods sector.

While Milford enjoyed both new business and employment growth during the last twenty years, the average number of workers per firm (business) declined in nearly all industry sectors. As illustrated, the average employment at firms in the non-durable goods sector was smaller in 2000 than in 1980, dropping from roughly 62
jobs per firm to nearly 34 jobs per firm in 2000. Also, average employment at firms in the durable goods sector declined from nearly 60 in 1980 to an average of 44 in 2000. The average employment per firm in the other industries was below 16 persons per firm, ranging from a high of 16 in the TCPU sector, to a low of nearly 7 in the construction industry.

**Conclusions**  In 2000, employment in Milford remained about 800 jobs below the previous high benchmark of nearly 6,900 jobs established in 1999. In the twenty-year period between 1980 and 2000, Milford has experienced an increase of roughly 2,650 jobs, or a 77.3% gain in its employment base. This suggests an average growth rate of 3.9% per year during this time frame. However, more job growth occurred during the 1980s than in the 1990s. Unlike the trends in the Nashua PMSA, Milford has enjoyed an increase in its manufacturing base, which accounted for 43.3% of total employment in Milford for 2000. This suggests that the local area has been able to retain and/or attract a higher percentage of manufacturers than the region as a whole. Employment in the services and retail sectors have also enjoyed gains, as well as all the other major industrial sectors. Historical trends also indicated that the average number of workers per firm has been declining over the last twenty years, which, from a real estate perspective, suggests less building space and land areas will be needed to support new and existing businesses.

**Property Type**

Roughly 49% of Milford’s employment base in 2000 was in businesses that utilize industrial-type buildings. Employment in primary metal industries accounted for nearly 31% of these jobs followed by jobs in the instrument and related products, other manufactures, and electronic equipment sectors. Printing and publishing jobs, and industrial machinery jobs accounted for another 6%, each, followed by jobs in the industrial machinery and equipment sector, wholesale trade sector, and the stone, clay and glass products sector. As exhibited, ten sectors of the twelve are forecasted to experience growth in the short term.

**Conclusions**  Milford has a strong and diversified employment base and nearly all the indigenous industries are in those sectors that are forecasted to experience job growth over the short term. Nearly 50% of the Milford’s employment base utilizes industrial type properties, while another 28% occupy retail type buildings and another 18% of the base is services oriented and would utilize office type buildings. Future employment demand would be more oriented to office or “flexible” space (a hybrid of office and industrial), since 62.5% of the job growth is forecasted in services oriented business, and the remaining 38% fairly evenly divided between industrial and retail type employment.

---

1 Gruen, Gruen and Associates, Employment and Parking in Suburban Business Parks: A Pilot Study (Washington D.C.: Urban Land Institute, 1986) has been used which is considered an industry standard for determining employee density by land use/workspace.
3.4 Land Use and Development Regulation

Land use along the Route 101 Corridor is a key issue. The type and amount of development along the highway affects the demand for access to and from Route 101, and this in turn has a significant effect on traffic flow and safety. Development also affects the character of the Corridor and thus the quality of life in the towns through which it passes.

3.4.1 Amherst

Land Use

Development has more impact on the Route 101 Corridor north and east of the town center where access to abutting parcels is from the highway. In the limited access bypass section, access is an issue only at interchanges.

Along the section of Route 101 north and east of the Route 122/Baboosic Lake Road interchange which provides access to Amherst’s town center, land is predominantly agricultural, very low density residential, or vacant. Access demands are focused at a small number of commercial driveways and at the intersections of side streets serving residential land use. The visual character of this area of the Corridor in Amherst is rural and open.

There are small areas of commercial land use and the town solid waste transfer facility along this portion of highway. Principal commercial land uses are the Salzburg Square and the Meeting Place complexes, along with smaller stand-alone businesses like the Black Forest. Small-scale professional offices are located just off the highway along Limbo Lane adjacent to the first interchange. An undeveloped site at the end of Limbo Lane has access to Route 101 opposite the entrance to the Meeting Place. In general, these commercial uses are generally perceived as positive in Amherst, and little future commercial development is foreseen.

South of the Route 122 interchange at the northern end of the bypass section of Route 101, land is either vacant or in residential use with houses set well back from the highway. With few exceptions these houses are invisible from the driver’s point of view, although traffic noise may be audible from some residences. Because the highway is grade-separated from town roads with either interchanges or overpasses where they cross, there is little direct connection between these Amherst land uses and Route 101, with the important exception of traffic that diverts from the highway via residential areas.

Amherst’s town center is located approximately one mile west of the northern-most interchange on the bypass Section of Route 101. A large area of commercial and industrial use lies along Route 101A in the southern portion of Amherst.
Zoning

Most land in Amherst is zoned for low density rural residential use in districts designated “Residential Rural” (2 acres non-wetland per dwelling), “Northern Rural” (5 acres non-wetland per dwelling), and “Northern Transitional” (3.5 acres non-wetland per dwelling). These three districts account for most of the land fronting on the portion of Route 101 north and east of the Town Center, which is in a Historic district. A small Limited Commercial District comprises the Salzburg Square Development. The LC district requires a 100’ setback from Route 101, which is a designated scenic road; maximum site coverage is 20 percent and 30 percent of the site must be kept in open space. Non-residential development is subject to site plan review. A small General Office district adjacent to the highway near the town center comprises small-scale professional offices. Little or no future non-residential development is foreseen along Route 101, and it is reportedly unlikely that the Town will ever enact additional non-residential zones in this area.

As noted above, the major commercial and industrial areas of Amherst are in along Route 101A in the southern part of town, within large Commercial and Industrial zoning districts and a small General Office district.

Issues and Opportunities

The land uses along the Route 101 Corridor in Amherst do not strongly affect operations and safety, and their overall character is positive. The Corridor Study should address specific access points, such as the entrance to the Meeting Place, where a parcel in the General Office district on the north side of Route 101 may be developed and its access coordinated with access for the Meeting Place.
Land Use Map: Amherst
Zoning Map: Amherst
3.4.2 Milford

Land Use

In Milford, the limited-access bypass section of Route 101 continues through much of the town, making a transition to direct access for abutting parcels north of the Old Wilton Road traffic signal.

Along the limited access section, land use near the highway is primarily vacant with some low density residential development set well back from the highway, limiting its exposure to the highway. Route 101A is a major regional commercial and industrial land use corridor, which has a full interchange with Route 101 near the eastern edge of Milford. A concentration of commercial development in two shopping malls adjacent to the interchange places significant demand for access on Route 101A, and this in turn affects the flow of traffic at the interchange ramps. Route 13 is a second interchange with several industrial and commercial uses, which can be glimpsed from the highway but do not appear to interact significantly with the operation of the interchange and Route 101 itself.

The BROX property is a 313-acre tract of land acquired by the Town in 1999. Approximately 123 acres in the northern part of the property, through which the highway passes, is zoned industrial and designated for light industrial development; this proposed development and its relationship to surrounding land uses and access are discussed in an Appendix to this report. The southern portion of the property includes a new elementary school, with the remainder being reserved for future Town needs.

After passing through the BROX property and overpassing its unpaved service road which connects to Old Wilton Road via Perry Road, Route 101 curves to the north and descends to a signalized intersection at Old Wilton Road. The area from this intersection to the Route 101/101A intersection is a major industrial land use area of Milford, with an active commercial node which includes a Market Basket supermarket and Granite Bank. The industrial area has several subareas. An older industrial area extends east between Old Wilton Road and Route 101A. The Meadowbrook light industrial subdivision lies to the west with access to Route 101 via Phelan Road. A large modern industrial building of the Hitchener Manufacturing Company (which also has a large facility in the area along Route 101A) also has access to Route 101 via Phelan Road.

West of the 101/101A intersection, land is constrained between an active railroad line to the south and Route 101 and the Souhegan River to the north. In this area there is a strip of businesses which are generally automobile-oriented, including service stations, convenience stores, and auto repair businesses. These businesses have highly constrained sites, particularly at the end closest to the 101/101A intersection. Many have poorly defined access, although some recent improvements have been made at Silva Mart, and access to and from Route 101 is a significant
issue. Continuing west into Wilton is the signalized intersection at Wilton Road where there is a Bank of New Hampshire branch office and a site on which an Irving convenience store/gas station is proposed.

Milford's town center, the Oval, is located on Route 101A approximately 2 miles northwest of the easternmost Route 101A interchange and approximately 3 miles east of the signalized 101/101A intersection.

**Zoning**

The largest portion of Milford is in the Residence “R” district, including the southern and southwestern parts of town; this district adjoins the south side of Route 101 between the BROX property and Osgood Road and also east of Route 13. The central residential portion of Milford lies in the single-family Residence “A” district (15,000 square foot minimum with municipal services, 40,000 square feet without both sewer and water) and the single and multiple family Residence “B” district (20,000/60,000 square foot minimum lot size depending on services); the “A” and “B” districts adjoin the north side of Route 101 and a portion of the south side of the highway between Brookside and Osgood Roads.

At the Route 101A and Route 13 interchanges land is zoned both Commercial (C) and Integrated Commercial-Industrial (ICI). The Commercial district permits a wide range of retail, restaurant, office, and automobile-oriented uses. It requires 20,000/60,000 square foot minimum lot size depending on the presence of municipal services, has a 30-foot front setback and requires 30% open space on site. The ICI district permits commercial uses as well as distribution, light manufacturing, and research & development uses. ICI requires 20,000/40,000 square foot minimum lot size depending on availability of municipal services, and has 30 foot front setback and 30% required open space.

The ICI district also occurs along Route 101A west of central Milford, including the Market Basket site near the 101/101A intersection and also the area between the highway and Wilton Road at the western edge of Milford. The constrained commercial strip west of the 101/101A intersection is in the Commercial district.

The remainder of the western Milford area adjoining Route 101 is in the Industrial District. This district allows light manufacturing, processing and warehousing, distribution, research & development, and large (over 15,000 square foot) office buildings. Commercial or residential uses are not allowed.

Milford addresses Aquifer Protection, Wetlands, and Floodplains through overlay districts.

Milford has detailed Site Plan Review regulations for non-residential development. The regulations provide for design review and assessment of impacts to public ser-
issues and the natural environment. Architectural review is required at the Planning Board’s discretion. The regulations address in detail landscaping, parking layout, driveways, erosion and sediment control.

**Issues and Opportunities**

Land use issues affecting the Route 101 Corridor in Milford occur primarily in the western part of the Corridor. Access to the BROX industrial property is a significant issue to be coordinated with highway improvements; this and other BROX development issues are discussed below in an Appendix to this report, but the size of the BROX development makes it important for all development issues in the western Milford area to be coordinated. The commercial strip just west of the 101/101A intersection is also a key development issue. Better access management is crucial to the future operations and safety along this stretch of Route 101, and there are opportunities to upgrade the appearance and value of the commercial properties through better design. While guidelines for redevelopment would not have immediate effect, there is potential for the gradual redevelopment and upgrading of parcels in this area in response to market forces and roadway improvements that make traffic in this area more manageable. The key challenge in this commercial strip is the small parcel size, particularly the depth of parcels between the highway in front and the railroad track in the rear. Milford’s zoning and development controls are already well-conceived, and improvements to address development at BROX and the larger commercial/industrial area would best be in the form of specific guidelines for the town-owned BROX property.
Land Use Map: Milford
3.4.3 Wilton

**Land Use**

Wilton’s downtown is an attractive mixed use area which lies just north of Route 101 on the north side of the Souhegan River near the eastern edge of town. Route 101 continues past the Wilton Road intersection in Milford, around a sweeping bend and into the Town of Wilton. The highway passes to the north of modern multifamily housing in western Milford and follows the base of Abbott Hill, which has many single-family residences located at higher elevations. Because of the topography, there is no visual connection between these homes and the highway, but access is a problem for many residents, particularly at the entrance to Abbott Hill Acres whose intersection with Route 101 has poor sight lines and a steep approach grade. Recent improvements were made at the nearby Abbott Hill Road intersection, which provides additional access to this residential area and the southeast part of Wilton.

Route 101 continues past Abbott Hill to largely open flat land along the Souhegan River, which the highway crosses just before Intervale Road. This area includes widely separated commercial uses including two garden centers (Bursey’s and the House by the Side of the Road) which are seasonally busy and generate heavy demands for both access and roadside parking. There is also a convenience store, a truck-oriented business, and the Monadnock Spring Water Company. Several residences are also located near Route 101. Some conversion of houses to retail use has occurred and may occur in the future. The Corridor Study Area ends as Route 101 curves to the north toward Isaac Frye Highway and Wilton Center, and Route 31 diverges to the south.

**Zoning**

Most of Wilton is in the low density Residential-Agricultural district (1 to 2 acres acre minimum per single family residence, depending on soil type). The more moderate density Residential district (half-acre/1acre depending on availability of municipal sewer and water services) comprises downtown Wilton, much of Abbott Hill, and an area west of downtown along Greenville Road (Route 31 north). The multi-family housing noted above is in the Residential-Agricultural district. Large Industrial districts are located between Route 101 and downtown Wilton, on the north side of Route 101 west of its crossing of the Souhegan River, and on both sides of the highway near the divergence of Route 31 south. Outside the Corridor Study Area there is more industrially zoned land along Route 101 west of Route 31, along Route 31 south, and along Route 31 in the northern part of town.

Commercial districts are located along Wilton Road in the downtown, and between Route 101 and the Souhegan River west of the highway’s crossing of the river. A small Commercial district is also located at the divergence of Route 31 south.
Wilton’s zoning permits residential uses in the Commercial District and commercial uses in the Industrial district. Permitted uses in these districts are broad, including all types of restaurant, retail, office, and entertainment uses as well as automobile-oriented uses in the Commercial district and a broad range of uses in the Industrial district. Maximum lot coverage in the Commercial district is 75 percent, with uses pre-dating March 1990 grandfathered from this requirement, although impervious cover may not be increased; maximum coverage in the Industrial district is 60 percent. Front setbacks of 35 feet, minimum, are required with no parking permitted in the front setback but allowed between the setback and the front of the building. Parking is permitted up to 10 feet from side and rear lot lines where the abutting parcel is commercial or industrial, and shared parking between adjacent commercial or industrial parcels is permitted with no setback.

There are special access provisions for commercial lots fronting on Route 101. Access for such lots must be from a side street if available rather than directly from the highway. In addition, for such lots,

“provisions shall be made during the site plan review process for the layout and construction of streets or side roads as the Planning board shall determine necessary to permit travel between adjacent lots without accessing Route 101. To encourage shared lot access, where at all possible and practical, the location of all accessory street or roadway curb cuts shall be situated to allow adjacent lots to also take advantage of or share the same point of access along the street or highway.” (Section 7.2.4)

These provisions have obvious benefit for access management with benefits for traffic flow and safety along Route 101.

There are no guidelines or standards in Wilton’s zoning that go beyond setbacks and maximum coverage to address visual aspects of commercial or industrial development.

**Issues and Opportunities**

As more development occurs along Route 101 in the Commercial and Industrial districts, particularly west of the Souhegan River crossing, the character of the Route 101 Corridor will change. The special access provisions for Route 101 are innovative and provide a good basis for addressing access management issues. Wilton’s zoning is clear and straightforward, so modifications are not really required. However, the existing provisions should be applied rigorously to key issues such as access management and landscaping along the highway. Some restrictions or conditions on highway-oriented uses with heavy access demands might also be considered.
Land Use Map: Wilton
Zoning Map: Wilton
3.4.4 Build-out analysis

A build-out analysis was performed for the corridor study area. This analysis considers the maximum amount of development which could occur in the future if all buildable land were developed as allowed by current zoning. As discussed below, the analysis was based on realistic development densities: these are often well below the maximum possible building “envelope” that would be derived from zoning requirements for lot size, setback, building height, site coverage, and minimum parking requirements. In practice, development in areas like the Route 101 Corridor occurs at lower density with more open space and more parking than required and less building area than theoretically obtainable by following all dimensional requirements. There will be exceptions to this generalization, particularly on small parcels, but on average, development density is best approximated for this area by using 10% of the site area as a rule of thumb for commercial floor area, and 20% for industrial use. These averages were checked against actual recent development such as the Meadowbrook Industrial Park in Milford. Finally, vacant land was excluded from the analysis if it was constrained by very steep slopes and wetlands.

Amherst has essentially reached build-out in the Route 101 Corridor, owing to the small areas zoned for non-residential use and the town’s low-density residential zoning.

In Milford, most of the buildable vacant land with access to the corridor is already developed. The principal exception is the BROX property where, potentially, 400,000 square feet of industrial, distribution, and/or research and development use could be constructed, based on the town’s subdivision plan.

Wilton has a large area of land west of Abbott Hill zoned for industrial and commercial uses. There are 20 industrially zoned parcels ranging in size from 0.2 acres to 12 acres. (Parcels too small to meet frontage and other dimensional requirements were assumed to be developable if joined with adjacent parcels.) The total developable area of vacant industrial land in the corridor is approximately 57 acres (2.46 million square feet of land). This area could be built out with a total of 494,000 square feet of industrial buildings. (Commercial use is permitted in Wilton’s industrial districts but would in practice be developed at a lower density.)

Wilton has 16 vacant buildable commercially-zoned parcels in the corridor study area west of Route 101’s Souhegan River crossing, which range in size from one-half acre to 3.5 acres. The total commercially zoned developable area is approximately 24 acres. If fully developed for commercial use, these parcels could support approximately 106,000 square feet of new development.

In addition, Wilton has approximately 27 acres of residentially zoned vacant land in the corridor study area. Assuming that soil conditions are adequate for on-site disposal, approximately 25 dwelling units could be constructed.
Implications for the Route 101 Corridor

If build-out were reached, the potential development described above would have some effect on traffic volumes, particularly in Wilton, but this amount of new development (which would not be likely to be fully realized within 20 years) is consistent with the overall traffic projections used in the corridor study. Of more concern are the access management issues posed by new development with more parcels seeking access to Route 101, and more traffic at critical intersections like Old Wilton Road/Route 101. As described in the previous section, Wilton’s zoning already contains provisions specifically aimed at managing access to Route 101 by encouraging shared access and connections between adjacent parcels.
3.5 Conservation Land

The accompanying map shows conservation and watershed protection land and Public open space in Wilton, Milford, and Amherst, based on data from the NRPC GIS department and checked locally. These lands are primarily municipal in ownership and serve a variety of purposes from recreation to aquifer protection. The key aspect of their location is that none of the conservation parcels other than Bragdon Farm in Amherst is traversed by Route 101, although a number of parcels are located near the highway right-of-way.

Issues and Opportunities

The map of conservation lands provides general information on the location of parcels which should be protected from impacts due to the highway and options for corridor improvements. Detailed information will be used in the evaluation of any improvement options which may affect these parcels.

3.6 Utilities

The Route 101 highway right-of-way is generally free from constraints due to public utilities. For example, although there are pole-supported electric power distribution lines along the highway in several locations, no major power line corridors cross the highway, and there are no regional sewer, water, or gas transmission facilities known to be in the right-of-way. When more specific highway improvement concepts are identified, part of their evaluation will be a more detailed examination of utility lines which may require relocation within the right-of-way or elsewhere. The New Hampshire Department of Transportation and individual utility companies can provide this information in response to specific proposals during preliminary design, but it is currently too early in the development of proposed improvements to seek this type of information.
Conservation Lands
3.7 Corridor Visual Analysis

3.7.1 Amherst

The section of Route 101 that crosses Amherst, Milford and Wilton can be described as a sequence of visual experiences. Different qualities of enclosure, topography, development, proportion, scale, and activity lead to variations in the visual character of Route 101, all of those elements adding up to the experience of driving along Route 101. The techniques for analyzing a sequence of “views from the road” was first developed in the 1950s by Donald Appleyard and Kevin Lynch; these techniques have been applied here to the Route 101 Corridor.

While people experience the Corridor directly, without being consciously aware of the elements that combine to create the experience, an analysis and description of these aspects can provide information for making decisions about what to change and what to preserve about the character of Route 101 as it passes through each town. What follows is a synopsis of a visual analysis conducted for the section of the Route 101 Corridor passing through the towns of Amherst, Milford, and Wilton. The accompanying maps and photographs document the sequence of views from the road.

In Amherst, the visual character of Route 101 can be divided into four distinct stretches of road: the first is an east-west stretch leading from the Bedford town line to Horace Greeley Road; the second is a north-south stretch to Blueberry Hill Road; the third is a north-south stretch leading to Corduroy Road; and the fourth is a stretch leading to the Milford Border.

In the first (east-west) stretch, the topography generally has slopes cross-wise to Route 101 and slopes down to the south and up to the north, affording numerous expansive views of the largely open, rolling countryside ahead and to the south. Views are punctuated by intermittent lines of tall trees along the road edge and occasional development in the form of isolated structures set back from the road. The road is contained to the north by upward sloping land and more consistent lines of trees.

The second (north-south) stretch is generally more constrained than the first stretch. The open sight lines from the road to lower elevations are gone, and both east and west side of the road have similar elevations. A solid line of tall trees fronts both edges of the road. There is no development along this stretch to break the continuity of the tree wall; however halfway along this stretch the trees thin out and provide a screened view of the pond between the eastern edge of Route 101 and Old Manchester Road.

A greater sense of openness describes the third (north-south) stretch of Route 101 in Amherst. Trees are lower and set far back from the road edge; however, broad views over the countryside are few. The road changes elevation slowly, and a sense
of riding a ridge occurs as one approaches the traffic interchange where Route 101 overpasses Route 122 (Ponemah Road). Brief glimpses of the rolling countryside below occur at the overpass.

The final (north-south) stretch of Route 101 in Amherst is characterized by numerous broad views of the rolling countryside. Three factors contribute to this quality. First, there is an absence of development along the road edge, thereby avoiding visual obstructions. Second, the trees along the road are set far back and open up frequently. Third, the road rides along an elevation that is higher than its immediate surroundings (with overpasses at Ponemah Road and Merrimack Street and the Souhegan River), giving a vantage point to the countryside.
fold out page here - Amherst Visual Analysis
3.7.2 Milford

In Milford, the visual character of Route 101 can be divided into three distinct stretches of road: the first is an east-west stretch leading from the Amherst border to an area west of Ball Hill Road; the second is an east-west stretch to the curve on the Route 101 Bypass just before Old Wilton Road; and the third is a developed stretch through the area around the intersection of Route 101 and 101A (Elm Street) to the Wilton town line.

The first stretch of Route 101 in Milford is characterized by numerous broad views of the rolling countryside ahead and to the south. To the north, heavy vegetation and slightly higher topography limit views, but do not impede a sense of openness. To the south, the absence of development along the road edge, trees that are low, set far back from the road, and open up frequently, and a relatively level surrounding landscape provide a dramatic sense of the entire countryside along this stretch of road and a glimpse of the distant Mount Monadnock.

The dramatic views of the previous stretch of road are replaced in the next stretch by lines of low trees set back from the road edge. This area is continuous in character along its entire length, with the only change occurring at the end of the bypass where the road turns to the north and connects to a more developed area.

The last stretch of Route 101 in Milford is characterized by a combination of industrial development at one end, and roadside commercial development at the other. The topography is generally flat along the road, but slopes up dramatically in the background. At the intersection of Elm Street and Route 101, traffic dominates the environment and buildings are set far back to accommodate large parking lots, and there is little foliage along the street edges. After Route 101 turns west beyond the 101/101A intersection, there is a dense strip of automobile-oriented commercial development located close to the road with little setback or separation of sites. Buildings and trees are situated close to the street edge. As one approaches Wilton, the topography slopes up dramatically to the south to Dram Cup Hill, and to the north one sees a series of views of the Souhegan River screened by trees along its edges with the land sloping up behind it.
fold out page here - Milford Visual Analysis
3.7.3 Wilton

In Wilton, the visual character of Route 101 can be divided into two distinct stretches of road: the first is an east-west stretch leading from the Milford border to Intervale Road, and the second is a stretch heading roughly northwest to Route 31, where the Corridor Study Area ends.

The most dominant aspect of this area of Route 101 is the topography. The road runs between the foot very steep and heavily vegetated slopes to the south and the Souhegan River to the north. Development occurs intermittently and at a lower elevation than Route 101, affording broad but brief views of historic mill buildings and downtown Wilton. Traveling east on this stretch, there is a brief but dramatic view of the church steeple in the downtown.

The second stretch, which begins as Route 101 crosses to the north side of the river, is less developed, with heavy vegetation along both sides of the road and brief views out to the north. At the end of this stretch, the topography levels out, trees are intermittent and set back, and there are patches of commercial use along the south side of the road including garden centers, a truck-oriented business, convenience store, and the Monadnock Spring Water Company. These commercial uses vary in type but are seen as independent islands of activity in the larger landscape around them. One sees several houses as the Corridor Study Area approaches its end where Route 31 diverges south.
fold out page here - Wilton Visual Analysis
3.8 Natural Systems

3.8.1 Wetlands and Waterways

Wetlands are important natural resource areas that support wildlife and contribute to water quality improvement and control of flooding. They are also viewed by many people as making important contributions to community aesthetics and quality of life. Wetlands are regulated at both the state and federal level, and they may be a key issue during environmental review of highway improvements. Therefore, it is important to be aware of their location and give them due consideration in planning for improvements. Wetland impacts are one of the key issues in evaluating options for improving Route 101.

Wetlands are shown on the map below.

Amherst

Amherst has many significant wetlands along the Route 101 Corridor. (A principal reason for providing ramps at Route 122/Ponemah Road only to and from the south was to minimize impacts on the large adjacent wetland.) Route 101 runs along a large wetland system beginning just west of Schoolhouse Road, crossing it east of Horace Greeley Road, and running along the wetland’s north edge for another 2000 feet; Salzburg Square lies between the highway and the middle portion of this wetland.

A second large wetland system drained by Beaver Brook lies east of Route 101 between Walnut Hill Road and Baboosic Lake Road. This wetland is in turn connected to a series of wetlands on the west side of the highway from the Thatcher Drive/Thornton Ferry Road area to Boston Post Road, where it crosses to the east side of Route 101. The southern end of this wetland complex is adjacent to the half-interchange at Ponemah Road, as described above. Beaver Brook then runs on a course that is farther from Route 101, joining the Souhegan River approximately 2000 feet east of the Route 101 bridge. The Route 101 river crossing is environmentally sensitive and may constrain any potential improvements that would widen the highway at that location.

Milford

Beyond the Souhegan River, Route 101 is on high ground, crossing an intermittent brook approximately one-half mile east of Route 13. A wetland system along the brook running west of Route 13/Mont Vernon Road borders the Route 101/Route 13 interchange and is crossed by the highway at this point. The highway runs near the large wetland system associated with Great Brook, Birch Brook, and Osgood Pond. It passes through the BROX property, which contains a significant wetland. Perry Road, which provides access to the BROX land from Old Wilton Road is also bordered by wetlands where it crosses Tucker Brook. These wetlands are con-
strains which are addressed by the Milford's subdivision plan for the BROX property and also constrain improvements to the Perry Road access.

Beyond the 101/101A intersection in west Milford, the highway runs parallel to the Souhegan River; widening in this area may have impacts on the river bank and is thus a constraint that must be addressed.

**Wilton**

Significant wetlands are generally absent from the Route 101 corridor study area in Wilton, with the exception of the bridge over the Souhegan near the east end of Intervale Road.

**Implications for the Route 101 Corridor**

Wetland encroachment should be avoided altogether whenever possible. Where options for roadway improvement may have impacts on wetlands, the severity of impact will be an important criterion in evaluating the option. Where avoidance is not possible and there is sufficient justification for the improvement, impacts should be minimized through design to the extent possible, and the necessary permitting process should be included in the implementation strategy.
3.8.2 Floodplains and Stormwater

Flooding is a natural phenomenon which can be worsened by development and filling. As shown on the accompanying map, there are flood prone areas along the Souhegan River and its tributary brooks and wetlands.

Flood-prone areas are regulated locally through zoning, in response to federal mandates in connection with the Federal Emergency Management Agency (FEMA) flood insurance program. FEMA has prepared maps delineating floodplains based on hydrologic studies and investigation of historic flooding events. Flooding is also an important consideration in wetlands regulation. The hydrological relationships of stormwater runoff and flooding with wetland resources is a complex one which must be addressed during design and permitting. However, the so-called “100-year floodplain” is a good rule of thumb for anticipating issues in a planning study. (The term “100-year” is used to denote flood levels associated with a 1 percent probability in a given year; it is possible to have 100-year floods two years in a row.) The 500-year (0.2 percent probability) storm is also delineated on FEMA maps.

There are three general considerations applicable to flood-prone areas:

- Don’t impede the passage of flood water
- Minimize filling of land below the 100-year flood level, thereby displacing flood storage and widening the area of flooding
- Minimize increases in impervious surfaces, which contributes to the amount and speed with which stormwater runoff reaches waterways and wetlands.

In addition, roadways should be above the 100-year flood elevation so that they continue to function when intense storms cause flooding. This consideration needs to be addressed in providing access improvements serving the BROX property, because Perry Road runs through a flood-prone area.

Stormwater discharge is an important aspect of the design of the highway and development of sites along it. Rain and snowmelt on pervious surfaces such as grassy and wooded land percolate into the ground replenishing groundwater, and excess runoff during intense storms travels more slowly on vegetated land, reaching streams and rivers over an extended period of time which the waterways can accommodate more successfully than the sharply peaked discharge from impervious surfaces like parking lots, building roofs, and roadways.

Stormwater drainage is an important aspect of highway design. Route 101 discharges through swales and culverts to natural drainages at hundreds of points along its length. No specific stormwater discharge problems have been identified to date, but any improvements that increase the highway’s paved cross-section or introduce access ramps must be carefully designed to accommodate stormwater appropriately. Stormwater analysis is part of the design and permitting process,
and both engineering practices and standards and regulatory criteria require that stormwater impacts be minimized.

**Implications for the Route 101 Corridor**

These considerations must be borne in mind when considering projects that widen the highway in flood-prone areas. They are also considerations in development of land along the corridor, with impervious site cover being an issue for site plan review and guidance.
3.9 Historic and Cultural Resources

Historic resources are an important part of the heritage of the Route 101 Corridor towns and an important part of the sense of place and quality of life in each town. The map on the following page shows the location of historic resources in Wilton, Milford, and Amherst which have been listed in the National Register of Historic Places. These include both residential and industrial buildings, public buildings, and the Amherst Village National Register historic district, which comprises several houses, the church, the common, and the Town Hall as contributing elements. Data was provided by the NRPC GIS department and checked with the National Register.

In addition to the intrinsic value of historic and cultural resources, National Register status is also important in that Section 4(f) of the federal Transportation Act and Section 106 of the National Historic Preservation Act regulate transportation improvements that are funded in part by the federal government. These regulations limit the impacts of projects on the resources, and in the case of Section 4(f) may dictate that certain alternatives which completely avoid the resource must be selected if it is prudent and feasible to do so. Both laws also require minimization of any impacts that cannot be avoided altogether. These laws apply not only to listed properties but also properties which the New Hampshire State Historic Preservation Officer determines are potentially eligible for listing.

There are other resources in the three towns which are historic but not listed on the National Register, although some may be potentially eligible for listing. Just as the listed properties are located some distance from Route 101, these non-listed historic resources do not appear to be located near the highway. This reflects that fact that Amherst Village and downtown Milford and Wilton are not traversed by Route 101.

The term “cultural resources” refers to archaeological sites of prehistoric origin. In order to protect the integrity of these sites, their location is not publicly available information. However, as part of the evaluation of any roadway improvements that substantially extend the footprint of the highway (for example, a new interchange), location sketches will be sent to the New Hampshire State Historic Preservation Officer for review with respect to known archaeological sites. If this review suggests that the presence of undocumented archaeological sites is possible in the affected area, a survey may be required during engineering design of the improvement.

Implications for the Route 101 Corridor

Historic and cultural resources do not appear likely to affect plans for the Route 101 Corridor.
National Register of Historic Places

1 County Farm Bridge
2 Craigin, Daniel, Mill
4 Stonyfield Farm
5 Whiting, Oliver, Homestead
6 Wilton Public and Gregg Free Library
7 Milford Cotton and Woolen Manufacturing Company
8 Milford Townhouse and Library Annex
9 Peabody, William, House
10 Amherst Village Historic District

Route 101
- Wilton Border
- Amherst Border
- Milford Border
- Public Roads
3.10 Summary of Issues and Opportunities

The Corridor Study conducted two public meetings in each of the three town in the corridor, one set in May-June 2001 and Visioning Workshops in January 2002. From these meetings, which were well attended by residents, business people, and town officials, as well as analysis of the data collected in the first phase of the study, a series of issues and opportunities has been developed. These issues and opportunities are summarized on the following map. Meeting summaries are included in the appendix to this report.

In addition to location-specific issues and opportunities, there are implications of floodplains and wetlands, land use patterns and zoning that are more widely applicable; they are discussed in the preceding report sections.
insert fold-out page here
4.0 Vision for the Future

Based on workshops held in Amherst, Milford, and Wilton during January 2002, the following Vision Statement is proposed. Although the Vision is not a guarantee of a successful outcome, it is optimistically worded to provide a description of the best realistic outcome and to serve as a benchmark to evaluate the success of the Corridor Plan.

“Over the next 20 years, traffic is expected to increase on Route 101. At the same time, improvements in each town will improve safety and traffic flow and reduce the highway’s impacts on each town.

Safety is the highest priority. Provisions will be made for traffic to enter the highway from side streets and commercial driveways, and for vehicles on the road to make safer turns into these streets and driveways. Better access management will reduce points of conflict. Hazards due to limited sight distances will be addressed. Existing signalized intersections will be improved to reduce safety problems.

On the bypass section in Amherst and Milford, improvements will reduce accidents caused by vehicles crossing the center line. Improvements will provide for passing slower traffic at appropriate locations in a safe manner and for traffic to safely enter and leave the highway from intersecting roads. Hazards due to limited sight distance will be addressed.

Traffic flow is also a priority. Despite higher volumes in the future, traffic flow will be improved wherever possible through physical improvements and access management, or where this is not feasible, the degradation in traffic flow will be reduced to the extent possible. Improved flow on Route 101 and at interchanges will help to reduce cut-through traffic on local roads which impacts residential areas. The western 101/101A intersection in Milford and traffic flow into Wilton will be areas for improvement.

Other modes of transportation also play an important role in achieving a balanced transportation system. There will be provisions for bicycles traveling along the corridor or crossing it. Inter-city bus service along the corridor would improve mobility for corridor residents. Existing rail freight service must be preserved and coordinated with traffic flow at the crossing in Milford.

The above priorities notwithstanding, the current character of Route 101, as a rural highway with scenic qualities typical of this part of New Hampshire, will be preserved wherever possible. Pavement widening may be necessary, but impacts will be minimized, particularly where wetlands, mature trees, and businesses would be affected. Aesthetics will also be improved by requiring landscaping and good design for all improvements. Gateway landscaping will help define the key en-
trances to each town from the corridor.

Little or no future development requiring access from Route 101 is foreseen for some areas, for example, Amherst east of the bypass section. Additional commercial development is possible in Wilton, and there is a need for development coordination in the area around the western 101/101A intersection, including the BROX property now owned by the town. Guidelines for site design, landscaping, signage, lighting, and architecture will result in better quality new development and long term improvement of areas already developed.

The Route 101 Corridor Plan will be coordinated in the three NRPC region towns and in Bedford. The plan will also be coordinated with traffic studies and improvements adjacent to the corridor, e.g., the Route 101A Corridor Study and the TCSP townwide transportation studies. The Plan and its Implementation Strategy will be developed to identify feasible funding sources and priorities for action over the short, medium, and long term.”
5.0 Strategy and Evaluation of Concepts for Improvement of the Corridor

5.1 Strategy

Based on the analysis of data presented in the first part of this report, together with input from citizens at public meetings, a strategy was developed to realize the Vision for the Route 101 Corridor. The strategy has several parts.

Short- to mid-term need for bypass safety improvements

The most urgent need is to address the series of fatal head-on collisions on the bypass. Since these accidents appear to be due to driver inattention, an immediate action is to provide safety warnings on fixed and variable message signs. Beyond this first step, it is necessary to provide greater separation between the opposing travel lanes, which can be accomplished by shifting the travel lanes enough to provide a 4-foot painted median.

Mid- to long-term need for 4-lane median divided cross-section Milford and Amherst

Based on the traffic analysis and projections, four travel lanes (two lanes in each direction) are necessary on Route 101 to provide acceptable levels of service from the Bedford/Amherst town line to western Milford. This stretch of roadway should be median-divided to control left turns and provide a permanent solution to crossover accidents. In Wilton, levels of service will be at the borderline of acceptable service with two travel lanes so the strategy there is to provide full shoulders with a two-lane undivided section.

Interchange improvements

All interchanges on the bypass must be reconstructed to accommodate the wider cross-section. At the same time, ramp improvements can provide better acceleration distances for safety, and congestion at the ramp entrances and exits can be relieved by reconfiguring the ramps.

Alleviation of congestion in western Milford

The traffic signals at Old Wilton Road, Route 101A, and Wilton Road will become increasingly congested if nothing is done, and the stretch of highway with many commercial driveways between the Souhegan River and the railroad tracks will be a major bottleneck with failure levels of service (LOS F). To solve this problem, a short extension of the bypass will allow the through traffic to avoid the area, which will improve levels of service at these intersections and permit access improvements in the bottleneck.
**Improvements in Wilton**

Providing full 10-foot shoulders and improving geometrics and sight lines at sub-standard intersections will improve both traffic operations and safety. A traffic signal should also be provided at Greenville Road in the longer term.

**Access management outside the bypass section**

Both east and west of the bypass section it is important to control left turns, which reduce the capacity of the highway to carry traffic and contribute to accidents. The divided median limits left turns to selected locations, and overpasses with turn-arounds allow traffic to access side streets and driveways with safer right turns.

**Landscaping at Gateways**

As drivers leave the highway at interchanges, gateway landscaping provides an appropriate entry into each town and signals the change from high-speed highway to lower speed local street system.

**Pedestrian and bicycle improvements**

The regional bicycle route system crosses under the Route 101 bypass in several places and will be unaffected by the improvements. Local overpasses will provide safe-crossing points in Amherst north and east of the bypass, and improved shoulders will improve safety for on-road cyclists in Wilton. Pedestrian crossings should be included in intersection improvements in western Milford. Where interchange ramps meet local streets, the design should accommodate pedestrians who may be present on the local street. In addition, the BROX design guidelines provide for a pedestrian and bicycle path system.

**Guidance for Non-residential development**

Existing regulations are already in place in each town to address commercial and industrial development. New guidelines should be adopted for the BROX industrial development and the area along Perry Road in Milford. Existing regulations should be used to manage access and provide good landscaping along the highway.

**5.2 Evaluation Criteria**

In developing and evaluating options for improvements to the Route 101 Corridor, a series of evaluation criteria were used to test the feasibility of each improvement and to weigh alternative concepts where different approaches were considered. They are as follows:
• **Consistency with vision.** The proposed options are consistent with the Vision for the corridor. Although the projected traffic volumes require a 4-lane divided cross-section for much of the corridor, the plan limits pavement expansion to the extent possible and proposes only one new traffic signal (at Greenville Road in Wilton). Safety and traffic operations will be improved, traffic cutting through residential areas will be encouraged to stay on the highway, and the character of the corridor will be preserved.

• **Transportation benefit.** The proposed options solve many of the current and future operational and safety-related problems and make Route 101 a much better east-west transportation corridor in southern New Hampshire.

• **Consistency with streetscape and aesthetic design guidelines.** Highway and gateway landscaping will maintain the aesthetic quality of the corridor. Applying existing development regulations will control visual clutter and improve the appearance of commercial and industrial areas.

• **Impact on town cohesiveness.** Route 101 has less impact on cohesiveness in Amherst, Milford, and Wilton than in Bedford because it bypasses the centers of the three towns. Local overpasses in Amherst, and gateway landscaping help to improve town cohesiveness, and the reduction of traffic in western Milford will make that portion of town more cohesive.

• **Effect on town economic and fiscal well being.** The beneficial effects of congestion reduction and access management are greater than limited economic impacts due to restricting left turns. In western Milford, the reduction of through traffic in the commercial district will improve access to businesses.

• **Promotion of access management.** The options combine to provide excellent access management throughout the median divided section from the Bedford town line to western Milford. In Wilton, existing zoning provides good control of curb cuts and encourages shared driveways to reduce the number of access points on the highway.

• **Potential to increase non-motorized travel.** Although the designated bicycle routes currently cross under the bypass, bicycle transportation will be improved by the provision of better shoulders in Wilton and local overpasses in Amherst. Western Milford can become more bicycle- and pedestrian-friendly when the majority of through traffic bypasses the area on the proposed bypass extension.

• **Environmental and cultural impacts.** The proposed options are not completely free of environmental impacts, but every effort was made to minimize encroachment in wetlands, and the better flow of traffic will contribute to air quality conformity. The selected option for extension of the bypass avoids impacts on the Souhegan River and other floodplains and floodways. There is no impact on conservation land. There are no impacts on historic or cultural resources.

• **Right-of-Way and abutter impacts.** The existing right-of-way is adequate for nearly all of the proposed improvements. Where additional property is required, as in the local overpasses and service roads in Amherst, the area required is relatively small, and the preferred options minimize abutter
impacts where possible. The bypass extension in western Milford will require a new right-of-way and the partial or full taking of a modern building in Meadowbrook Industrial Park, but the overall benefit to abutters in the area justifies this impact, and the industrial park as a whole will remain functional and viable.

- Impact on utilities. No impacts are anticipated on major utilities.
- Joint public/private funding opportunities/resources. Most of the plan’s recommendations are appropriate for public sector action without private participation. However, there is a major opportunity for public private partnership in the development of the BROX land in Milford, and there is potential for similar cooperation in the long-term development of the industrial land in Wilton.
- Capital, operating and maintenance costs. Route 101 is a major state highway serving southern New Hampshire, and the costs of improvement (approximately $54 million, most of it for widening and extending the bypass section) are well justified in terms of safety and transportation benefit. Operation and maintenance costs will be typical of this class of highway and should be borne by NHDOT.
- Ease of implementation. The improvements are relatively straightforward and do not present unusual construction issues. The major implementation issue is securing funding for the improvements; however, implementation is phased over 10 to 15 years and the importance of the highway regionally and statewide makes these improvements relatively high in priority.
- Public support. Work was done from the inception of the planning study to involve citizens and consult with local officials. As a result, public support for the improvements is strong.

5.3 Traffic Operations Analysis of Improvements

As concluded in section 3.1 of this report, a four lane cross section will be needed for most of the route 101 corridor. However, the functional character of Route 101 as the state highway traverses the communities of Amherst, Milford, and Wilton differs from one segment of the corridor to another. As a consequence, the safety and operational issues along the corridor differ and therefore the improvement plan must reflect the specific needs of the various segments. From a functional perspective the corridor can be divided into the following four distinct segments.

- East of the Bypass in Amherst (Baboosic Lake Road to the Bedford town line)
- The Bypass in Milford and Amherst (Old Wilton Road to Baboosic Lake Road)
- Western Milford (Wilton Road to Old Wilton Road)
- Wilton (Greenville Road/Route 31 South to Old Wilton Road)
**New Hampshire Route 101 Corridor Plan**

**East of Bypass in Amherst (Baboosic Lake Road to the Bedford town line)**

The primary issue along the eastern segment of Route 101 in Amherst is one of access. There are a number of side streets and commercial driveways where left-turn movements entering the corridor as well as exiting the corridor are problematic. Left-turn movements entering the corridor from side streets such as Blueberry Hill Road, Walnut Hill Road, Horace Greeley Road, Old Manchester Road and others operate at LOS F with long delays. The same condition occurs at commercial driveways such as The Meeting Place, the town Transfer Station, and Salzburg Plaza.

To provide safe and efficient access to these side streets and driveways would necessitate either a series of traffic signals along the corridor or some type of connector roadways or overpass roadways. Based on input received at previous public meetings, a series of traffic signals would not be consistent with the future vision of the corridor expressed by Amherst representatives. Therefore, the improvement plan for this segment of the corridor focuses on the development of connector roadways.

One opportunity to provide a connector roadway would be to construct a local overpass that would connect Horace Greeley Road with Stockwell Road. With a raised center median along Route 101, this overpass would not only accommodate the left-turn movements to and from Horace Greeley Road and Stockwell Road, but would serve as a turnaround area where motorists exiting Salzburg Plaza and other side streets such as Schoolhouse Road, Saddle Hill Road, and Holly Hill Drive could reverse direction.

Access points that are closer to the Baboosic Lake Road interchange, such as The Meeting Place and Walnut Hill Road would best be served by constructing a parallel connector roadway back to the interchange. Unfortunately, most of the land running along the east side of Route 101 between Walnut Hill Road and the interchange is covered with wetlands.

One option would be to realign and widen Route 101 to the west (away from The Meeting Place). A local parallel connector roadway would be constructed between Walnut Hill Road and The Meeting Place within the footprint of the existing Route 101. The local roadway would pass beneath the realigned Route 101 and connect to Amherst Street providing The Meeting Place and Walnut Hill Road access to the Baboosic Lake Road interchange.

This alternative would require the reconstruction of the interchange, the construction of bridge structures where Route 101 would pass over the local connector roadway and where it would pass over Blueberry Hill Road. This alternative would require the taking of the bakery on the west side of the roadway.

A second alternative would be to widen Route 101, but maintain the roadway at its present location. A parallel connector roadway, similar to the first alternative, would extend from Limbo Lane, connecting to Blueberry Hill Road, and crossing over the highway to Walnut Hill Road on a local overpass. A connector to Route 101 would provide right-turn access. This system would provide Walnut Hill Road and Old Manchester Road safe and efficient westbound access while retaining right-turn ac-
cess in the eastbound direction. Blueberry Hill Road would have eastbound access at the Amherst Street interchange. The Meeting Place would have westbound access by way of the Amherst Street interchange; for egress from the Meeting Place to the west, an additional connection would be required where the local overpass connects to Walnut Hill Road; this may or may not be justifiable based on cost.

Based on input from the Steering Committee, the second alternative was selected as the preferred alternative.

**The Bypass in Milford and Amherst (Old Wilton Road to Baboosic Lake Road)**

The primary issue along the Bypass today is one of safety. To enhance the safe and efficient flow of traffic along the Bypass and to accommodate the future traffic volume demands this limited access segment of the corridor should be widened to a four-lane median divided cross-section. Each of the interchanges along the Bypass would need to be reconstructed to accommodate the widening of the highway. Traffic signal control would be provided at the ramp intersections with Route 13.

The upgrade at the Route 101A interchange would include the installation of a traffic signal at the Route 101A eastbound ramps as well as the widening of the off-ramp to provide a double right-turn lane. In addition, although the intersection improvements that are currently under construction at the westbound ramps are expected to provide an acceptable level of service under the 20-year design condition, the proposed plan calls for the construction of a flyover ramp that would allow motorists from the east on Route 101A to access directly onto the Bypass in the westbound direction without passing through an at grade traffic signal. The direct connection to the Bypass may discourage motorists from cutting through downtown Milford.

**Western Milford (Wilton Road to Old Wilton Road)**

Traffic operations along Route 101 in western Milford are controlled by the operations of the three signalized intersections with Wilton Road, Route 101A, and Old Wilton Road. In addition, this section of the corridor is located along a commercial strip with numerous driveways and is situated between an active railroad line and the Souhegan River, where there is not sufficient width to widen the roadway to the four lanes that are needed to accommodate the projected traffic volumes. Currently, motorists along this section of the corridor experience substantial congestion and long delays.

The proposed plan calls for extending Route 101 from just east of the Old Wilton Road intersection along the north side of Dram Cup Hill and rejoining the existing alignment east of the Wilton town line. This new alignment would essentially bypass the three existing traffic signals and would allow the east-west through traffic on Route 101 pass through the area without crossing the active rail line.

Slip ramps would be provided at the east end of the new roadway that would accommodate motorists destined to or arriving from the east. Traffic to and from the west
would be accommodated at a T-type signalized intersection located at the west end of the new roadway. Left-turn movements to the east on Route 101 would be prohibited.

No improvements would be needed at the three signalized intersections that would remain along the old Route 101 alignment. However, a center left-turn lane should be provided along the old alignment between Wilton Road and Route 101A to accommodate turns into the existing commercial uses.

**Wilton (Greenville Road/ Route 31 South to Old Wilton Road)**

The volume of traffic in Wilton is less than other segments of the corridor and for that reason can operate acceptably for much of the 20-year design period without widening the roadway to a four-lane cross-section. However, what is needed and is recommended is to widen the shoulders to the standard 10 foot width, to improve sight lines and intersection geometry at the side streets and driveways, and to provide center left-turn lanes to accommodate turns into the more significant traffic generators such as the town’s recycling center, Mansur Road, and local businesses along the corridor.

**Conclusions**

The results of the operational analyses comparing the future without and with improvements is presented in *Tables 1 and 2*.

**Table 1**

<table>
<thead>
<tr>
<th>Intersection with Route 101</th>
<th>Without Improvements</th>
<th>With Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weekday AM Peak Hour</td>
<td>Weekday PM Peak Hour</td>
</tr>
<tr>
<td></td>
<td>v/c+</td>
<td>Delay*</td>
</tr>
<tr>
<td>Greenville Road</td>
<td>0.87 26 C</td>
<td>0.77 20 C</td>
</tr>
<tr>
<td>Old Route 101</td>
<td>0.54 8 A</td>
<td>0.83 17 B</td>
</tr>
<tr>
<td>Wilton Road 1</td>
<td>1.09 65 E</td>
<td>1.15 84 F</td>
</tr>
<tr>
<td>Route 101A (Elm Street)/North River Road</td>
<td>1.20 101 F</td>
<td>0.96 51 D</td>
</tr>
<tr>
<td>Old Wilton Road/Phelan Road</td>
<td>1.14 100 F</td>
<td>1.16 125 F</td>
</tr>
<tr>
<td>NH 13 EB Ramp</td>
<td>-     -     -     -</td>
<td>0.55 14 B</td>
</tr>
<tr>
<td>NH 13 WB Ramp</td>
<td>-     -     -     -</td>
<td>0.63 22 C</td>
</tr>
<tr>
<td>Route 101A EB Ramps</td>
<td>-     -     -     -</td>
<td>1.03 40 D</td>
</tr>
<tr>
<td>Route 101A WB Ramp 2</td>
<td>0.68 25 C</td>
<td>0.71 27 C</td>
</tr>
</tbody>
</table>

* Volume to capacity ratio
* Average delay per vehicle (in seconds)
** Level of Service
1 Includes timing improvement
2 2021 Analysis includes Richmond development mitigation

The results show that, with the proposed improvements in place, each of the corridor’s signalized intersections would operate at an acceptable level of service under the future year condition. This includes the four existing signalized intersections as well.
### Unsignalized Intersection Capacity Analysis Summary

#### 2021 Future Condition – With and Without Improvements

#### Table 2

<table>
<thead>
<tr>
<th>Intersection with Route 101</th>
<th>Movement</th>
<th>Without Improvements</th>
<th>With Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Weekday AM Peak Hour</td>
<td>Weekday PM Peak Hour</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Demand+</td>
<td>Delay*</td>
</tr>
<tr>
<td>NH 31S (Greenville Road)</td>
<td>WB Left</td>
<td>160</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>NB Lanes</td>
<td>385</td>
<td>561</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH 31N/Abbott Hill Road</td>
<td>EB Left</td>
<td>110</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>WB Left</td>
<td>95</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>NB Lane</td>
<td>195</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>SB Lane</td>
<td>125</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>NB LT/TH</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>NB Right</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SB LT/TH</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SB Right</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 101 WB Ramps/NH 13</td>
<td>NB Left</td>
<td>140</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>WB Lane</td>
<td>350</td>
<td>381</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 101 EB Ramps/NH 13</td>
<td>SB Left</td>
<td>115</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>EB Lane</td>
<td>205</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 101 WB Spur/Route 101A</td>
<td>NB Right</td>
<td>310</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 101 EB Ramps/Route 101A</td>
<td>NB Left</td>
<td>95</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>EB Left</td>
<td>45</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>EB Right</td>
<td>1160</td>
<td>724</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 101 EB Off ramp/NH 122</td>
<td>NB Left</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>NB Right</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 101 WB Off ramp/NH 122</td>
<td>WB Left</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route 101 EB Ramps/Amherst</td>
<td>EB Lane</td>
<td>625</td>
<td>12</td>
</tr>
<tr>
<td>Street (NH 122)</td>
<td>NB Lane</td>
<td>25</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH 101 WB Ramps/Amherst</td>
<td>WB Lane</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>Street (NH 122)</td>
<td>SB Lane</td>
<td>355</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>SB Left</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SB Right</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Meeting Place Driveway</td>
<td>SB Left</td>
<td>80</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>WB Left</td>
<td>80</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>WB Right</td>
<td>90</td>
<td>171</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walnut Hill Road</td>
<td>SB Lane</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>WB Lane</td>
<td>95</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>WB Right</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>EB Right</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Town Transfer Station 1</td>
<td>NB Left</td>
<td>240</td>
<td>14</td>
</tr>
<tr>
<td>1Saturday 9:00-11:00AM</td>
<td>EB Lane</td>
<td>305</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>EB Left</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>EB Right</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horace Greeley Road</td>
<td>NB Left</td>
<td>65</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>EB Lane</td>
<td>285</td>
<td>#</td>
</tr>
<tr>
<td></td>
<td>EB Right</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Demand of vehicles during the peak hour
* Average delay per vehicle (in seconds)
** Level of Service
# Delay greater than 999 seconds
as the five locations where traffic signal control is proposed. The overall corridor will operate substantially better and safer with the proposed improvements in place. However, particular movements at some of the unsignalized corridor intersections are expected to continue to operate poorly (LOS E or F). These locations include side streets such as Abbott Hill Road in Wilton, and the Meeting Place and the Town Transfer Station in Amherst.

Installation of a traffic signal should be considered at the Abbott Hill Road intersection. However, the long-term solution for this intersection should be considered within the context of the long-term plan for the corridor west of Wilton. The right-turn movement from the Meeting Place, despite operating at a poor level of service, reflects an improved operation with the elimination of left-turn movements. The left-turn exiting movement from the Transfer Station in Amherst will experience long delays. However, this volume is relatively low as most Amherst residents enter and exit the facility to and from the west. To address the delays experienced by motorists destined to the east, the town should consider providing a secondary access to the Transfer Station that could connect to Austin Road and to Horace Greeley Road.
insert large format pages here
insert large format pages here
insert large format pages here
insert large format pages here
insert large format pages here
insert large format pages here
insert large format pages here
insert large format pages here
6.5 Pedestrian and Bicycle Improvements

Amherst, Milford, and Wilton already have good pedestrian environments in Amherst Village, the Oval, and downtown Wilton. The regional bicycle network is largely independent of Route 101, crossing under the highway’s bypass section. Nonetheless, there are potential improvements that can serve these non-motorized modes of transportation better. The TCSP study described in Section 3.2 will address pedestrian and bicycle transportation and will make additional recommendations regarding these modes.

6.5.1 Western Milford

The extension of the Route 101 bypass will substantially reduce traffic in this area, making the former Route 101 from Old Wilton Road to Wilton Road more suitable for bicycles. The guidelines developed for the BROX property call for a multi-use path providing pedestrian and bicycle circulation throughout the proposed industrial park, and it is expected that employees of the business in the area will use this path system. The development of BROX will increase the employee density of the area, and the improved traffic may also stimulate development of restaurants and shopping opportunities. Therefore, the existing signalized intersections should provide for actuated pedestrian signal phases to allow and encourage pedestrians to better utilize the area. A sidewalk on at least one side of Perry Road and Old Wilton Road would help to accommodate pedestrian movement.

6.5.2 Wilton

The improvement of shoulders and substandard intersections in Wilton will make this area more suitable for bicycles. It is suggested that sidewalks be provided by property owners in the industrial area east of Greenville Road as this area develops over the coming decades.

6.5.3 Amherst

The proposed local overpasses at Walnut Hill Road and Horace Greeley Road will provide routes for pedestrians and bicycles to cross the highway safely, which may encourage more pedestrian and bicycle travel to neighborhoods on the opposite side of the highway and to businesses accessible by the proposed service road connections. Pedestrian and bicycle accommodation should be among the design criteria for these improvements.
6.6 Corridor Aesthetics

6.6.1 Roadway Landscaping

Good frontage landscaping should be required of commercial and industrial development along Route 101 as described below. Within the public right-of-way, planted areas occur in the median of the highway and at interchanges.

Because of the nature of the bypass section, the 26-foot median is probably best treated as a grassy area. In Amherst north and east of the bypass, the 16-foot median area might include both grass and low shrubs or wildflowers keeping with the rural character of this portion of the corridor and consistent with similar potential treatments in the western portion of Bedford. A low maintenance treatment is necessary (minimizing trees and shrubs that require pruning), particularly if responsibility for maintenance of the median is to be assumed by New Hampshire DOT. If used, shrubs should be grouped at key locations along the corridor such as interchanges and well-mulched to minimize the growth of weeds. Recommended plant materials are listed below.

This approach is more costly to maintain than a curbed bituminous or Portland cement concrete median, but hard surfaced highway medians quickly become unsightly places for sand and debris to collect and weeds to grow through cracks in the surface. Mowed grass is the minimum acceptable treatment in terms of aesthetics. In areas such as narrow traffic islands where mowing may be difficult, alternative plantings such as low shrubs or wildflowers may be used. These planted areas should be well-mulched to minimize the growth of weeds. Cobbles set in mortar can also be used to provide a more attractive hard surfaced treatment for these small areas.

6.6.2 Landscaped Gateways

In contrast to the median, it is recommended that more intensive gateway landscaping should be installed at key locations, signaling the transition from the highway system to the local street system and welcoming visitors to the town. Potential locations for gateway landscaping

- Amherst Street interchange
- Route 101A at the interchange ramps
- Route 13 interchange
- Old Wilton Road intersection at the ends of the slip ramps
- Perry Road entrance to the BROX development
• Wilton connection to the bypass extension

• Greenville Road (Route 31 south) intersection in Wilton, entering industrial district.

Combinations of a canopy tree and an understory tree or shrub are suggested, such as white pine with paper birch (used in the Amherst Street interchange example) or red oak and witch hazel. Native flowering trees and shrubs can also be used, as in the Route 13 interchange example. Milford granite can be used to provide interest to the design in the form of low stone walls or bollards, which may be used for mounting welcoming signage.

The design must maintain clear sight lines at the ends of interchange ramps and provide adequate setback of trees and granite elements to meet safety criteria.

Two examples of gateway landscaping design using native trees and granite are illustrated for the Amherst Street interchange and the Route 13 interchange.

6.6.3 Recommended Plant List

The following table lists commonly available landscape plants which are suited to the southern New Hampshire climate and a highway setting.

6' wide planting strip along edge of roadway

Medium sized Trees (do not conflict with overhead utility wires)

Imperial Honeylocust - *Gleditsia triacanthos* ‘Impcole’
American Hornbeam - *Carpinus caroliniana* (tree form)
Columnar Sargent Cherry – *Prunus sargentii* ‘Columnaris’
Macho Amur Corktree – *Phellodendron amurense* ‘Macho’
Regent Japanese Tree Lilac - *Syringa reticulata*
Japanese Black Pine – *Pinus thurbergiana*
Pitch Pine – *Pinus rigida*
Western Red Cedar – *Juniperus virginiana*

Groundcover
Grass seed mix. Blend of Fescue, Kentucky Bluegrass and Ryegrass

14’ to 26’ wide planted roadway median

Shade or Stand-Alone Trees

Shademaster Honeylocust - *Gleditsia triacanthos* ‘Shademaster’
Red Maple ‘Red Sunset’ – *Acer rubrum* ‘Red Sunset’ (20’ wide median)
Red Maple ‘Armstrong’ – *Acer rubrum* ‘Armstrong’ (14’ wide median)
Littleleaf Linden – *Tilia cordata*
Skymaster English Oak – *Quercus robur* ‘Pyramich’
Scotch Pine – *Pinus sylvestris*
Austrian Pine – *Pinus nigra*
Eastern White Pine – *Pinus strobus* (for locations not directly exposed to road salt)

**Flowering Trees**
Regent Japanese Tree Lilac - *Syringa reticulata* (20’ wide median)
Amelanchier x graniiflora ‘Autumn Brilliance’ - *Autumn Brilliance Serviceberry* (20’ wide median – tree form)
Cleveland Select Pear – *Pyrus calleryana* ‘Chanticleer’ (20’ and 14’ wide median)
Columnar Sargent Cherry – *Prunus sargentii* ‘Columnaris’ (20’ and 14’ wide median)
Crimson Cloud English Hawthorn – *Crataegus laevigata* ‘Superba’ (thornless tree form)

**Shrubs**
Rugosa Rose - *Rosa rugosa*
Fragrant Sumac - *Rhus aromatica*
Mugo Pine ‘Mugo’ - *Pinus mugo* ‘mugo’
Chinese Juniper ‘Hetzii’ - *Juniperus chinensis* ‘hetzii’
Winged Euonymus ‘Rudy Haag’ - *Euonymus alatus* ‘rudy haag’
Dwarf Fothergilla - *Fothergilla gardenii*
Mugo Pine - *Pinus mugo*
Large Fothergilla - *Fothergilla major*

**Groundcover**
Grass seed mix. Blend of Fescue, Kentucky Bluegrass and Ryegrass
insert
foldout
page
here
insert
foldout
page
here
6.7 Development Guidance and Review

6.7.1 Land Use and Development

The three corridor towns already have good development regulations in place and provide thorough site plan review of proposed development. Route 101 does not pass through the centers of the towns, and except in Wilton, west of the Souhegan River, there are few opportunities for new development with frontage on Route 101. Therefore, additional guidelines are unnecessary. (Guidelines have been developed for the BROX industrial development site to optimize development potential and quality, but for the most part, the BROX property is not highly visible from the highway and these BROX guidelines affect views from the highway corridor primarily by requiring existing trees to be retained to the extent possible.)

It remains important for the town planning boards and planning staff to emphasize access management and landscaping along the highway for both traffic safety/traffic flow and aesthetics. Property owners should be made aware of the future plans to provide a median divider limiting left turns. Planning boards should require commercial development to provide a center left-turn lane on an interim basis at locations where turns are appropriate. Boards should also consider requiring driveway entrances to be designed to prohibit outbound left turns from the property onto the highway.

In Wilton, the existing zoning provisions should be used to require shared driveways and effective landscaping of the front setback area. For commercial development, the front setback (from which parking is excluded) should be landscaped to separate the building from the roadway but not fully screen it. Some taller shade trees should be incorporated in the landscaped area as well as lower plantings. This type of design is more aesthetic and in keeping with the character of the corridor than, for example, a uniform row of screening shrubs such as closely spaced arbor vitae. For industrial development, the front setback is 100 feet from Route 101 (75 feet from side streets) and use of native woodland trees to achieve more complete separation from the highway is appropriate. Existing trees should be retained to the extent possible.

It is recommended that in design review the effectiveness of proposed planting plans should be evaluated against a stated objective, such as:

“The front setback area should be well landscaped with a combination of ground cover, shrubs and shade trees of sufficient size and density to visually separate the building from the roadway create an aesthetically pleasing roadway edge. The landscaping should provide views through the landscaped area to the building and parking areas rather than screening them from view.”

Proposed designs should be revised as necessary to achieve the design objective. This approach encourages creative design by site designers. Alternatively, prescribed planting patterns and specifications can be incorporated into the site development regulations.
6.7.2 Access Management

Wilton’s zoning contains exemplary language limiting businesses to one curb cut on Route 101, requiring access from a side street if available instead of a curb cut on the highway, and encouraging easements to permit shared driveways and connections between adjacent commercial and industrial parcels. Side setback requirements also exempt shared parking lots from the customary 10-foot side setback to encourage this practice.

Examples of site plans using the Wilton zoning provisions are shown in the illustration.

6.7.3 BROX Property

The consultant team studied the market, site design, and access issues of the BROX industrial development in Milford and the related area along Perry Road. Findings and recommendations are presented in the Appendix to this report.
Sample Site Layout: Industrial Development
Sample Site Layout: Commercial Development

10' setback for unshared parking (no setback for shared parking)
7.0 Implementation

7.1 Priorities and Cost

The Implementation Program for the Route 101 Corridor consists of several actions over a time period of 10 to 15 years. Priorities were assigned on the basis of importance and urgency (for example, the need to address serious accidents on the bypass led to an interim action within three years) as well as the feasibility of obtaining project funding from federal and state transportation funds. The table in the Executive Summary compares the actions proposed for Amherst, Milford, and Wilton to the implementation program for Bedford, which is fully documented in a separate report.

It should be noted that there is some overlap between the cost of the Route 101A interchange improvements and some ramp improvements recommended by the NRPC Route 101A Corridor Plan, a plan for Route 101A from Nashua to Milford.

Although the total cost of the Corridor Plan is considerable, it should be noted that all of the projects directly benefit one of the state’s two major east-west highways in southern New Hampshire (the other one being Route 9.)

7.2 Implementation Process

This section addresses the crucial process of making the Route 101 Corridor Plan a reality. The Corridor Plan comprises two documents, one for Bedford (which is in the Southern New Hampshire Planning Commission region) and this report for the three towns in the Nashua Regional Planning Commission’s region. These documents have been coordinated through a four-town Steering Committee from the inception of the planning process in May 2001. It is therefore appropriate that this section address the implementation of the combined recommendations for the entire corridor.

The Route 101 Corridor Plan is a first step toward action. The second step will be detailed engineering of each project. The Corridor Plan summarizes what the improvements are expected to look like, their size, and their level of impact. Detailed analysis of wetland impacts and property requirements goes beyond the information available at this stage and will be part of preliminary engineering design, which will overlap with environmental assessment. There will be a public process for each project to review the design and suggest improvements. Locations of left turns will be determined through this process. Following the preliminary design and environmental assessment phase, final design and construction will occur as funding for each project element is secured and committed. In order to expedite the improvement of near-term projects (including the Hardy/Jenkins and Meetinghouse intersections, bottleneck improvement between Route 114 and Old Bedford Road, the interim project to provide greater separation between travel lanes on the bypass in Amherst and Milford, geometric improvements in Wilton, and center left-turn lanes in Wilton, Milford, and Bedford) it is recommended that individual assessments be done for these rela-
fold out page here - implementation chart
tively small projects, with a consolidated assessment of the highway widening and later phase intersection improvements. The Nashua Road, Horace Greeley, and Walnut Hill Road overpasses and connector roads could receive individual environmental assessments or be included in the consolidated environmental assessment of the Corridor Plan, depending on the schedule for the overpass project.

Funding is a key issue. The recommended improvements are part of a coordinated Plan and are all eligible for federal funding at an 80% level, with the remaining 20% state/local. Because the Route 101 Corridor Plan improves safety and operations on a major state highway, it is likely that all or nearly all elements of the plan will be designed and built with federal and state funds, requiring no contribution by the towns. Maintenance responsibility will need to be discussed with New Hampshire DOT during the implementation process; it is possible that the state will accept the responsibility to maintain medians and other highway landscaping within the right-of-way.

Costs will be spread over the implementation period, which is 10 to 15 years. The Bedford Town Council voted to approve the Corridor Plan on August 14, 2002. To secure funding the Southern New Hampshire Planning Commission must amend its Long Range transportation Plan to include the Bedford projects, and the Nashua Regional Planning Commission will likewise add the improvements in Amherst, Milford, and Wilton to its Long Range Transportation Plan. Projects in the Corridor Plan must win the approval of New Hampshire DOT to be included in the next revision of the state Long Range Transportation Plan. The Route 101 Corridor Plan recommendations for Bedford through Wilton have been coordinated through the Route 101 Steering Committee, which has representatives from all four towns.

Because of the urgency of the current situation, the Hardy/Jenkins intersection has been recommended for an earmark in the FY 2003 federal transportation budget.

Adopting design guidelines is a town action that can be undertaken over the next year or two, following technical drafting, study by the Bedford and Milford Planning Boards, and public hearings.

7.3 Project Funding Process

Roadway projects chosen for state funding are normally selected from the Statewide Transportation Improvement Program (STIP). In the State of New Hampshire, the Ten-Year Transportation Improvement Program is an intermodal program of transportation projects, as developed and updated every two years under RSA 228:99. The Ten-Year Program identifies projects, a schedule of when the projects would occur, and suggested funding categories (as defined by federal legislation in the case of federal funds) that can be used to implement the design and construction of projects.

The Ten-Year Program is developed through the cooperative efforts of municipalities, Regional Planning Agencies and Metropolitan Planning Organizations, the New Hampshire Department of Transportation, the Governor’s Advisory Commission on
Intermodal Transportation, the Governor, and the New Hampshire Legislature. Throughout the Ten-Year Program development there are numerous opportunities for public input and involvement.

The process for projects coming out of the Route 101 study is summarized as follows:

- New roadway projects are introduced in the fall of even-numbered years. In this case the town of Bedford will submit the Route 101 project to the Southern New Hampshire Planning Commission by October of 2002, and the improvements in Amherst, Milford, and Wilton will be addressed by the Nashua Regional Planning Commission. It is likely that the individual short-term improvements will be submitted as individual projects, and the later project phases submitted as multi-part projects for scheduling, funding, and implementation purposes.

- The projects will be ranked along with other projects submitted and regional public hearings will be held. The Transportation Advisory Committee (TAC) for each region ranks the projects submitted by the regional planning agencies.

- Projects are added to a Draft Regional 10-Year Plans early in the spring of the following year (2003) and are then submitted to the NHDOT for consideration for the various funding categories available.

- The NHDOT will then prepare a statewide 10-year program, which is submitted, to the Governor’s Advisory Commission on Intermodal Transportation (GACIT). Following a series of public hearings that will be held throughout the state, the GACIT will finalize a Draft 10-Year Plan.

- The Governor reviews the 10-Year Plan and submits it to the Legislature for adoption and a Statewide Transportation Improvement Program is submitted to the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) for approval.

- The project development process begins with the preparation of preliminary engineering and environmental documentation to understand the socio-economic and environmental impacts as well all of the project improvement measures and costs.

The Route 101 improvements will likely require the development of one or more Environmental Assessments (EA) or possibly Environmental Impact Statements (EIS) to evaluate all of the Corridor Plan’s impacts to cultural and environmental resources. Numerous public meetings would be held and a formal public hearing would also be held to obtain testimony and determine the necessity of the proposed improvements.
Acknowledgements

The Route 101 Corridor Plan for Amherst, Milford, and Wilton was prepared for the Nashua Regional Planning Commission with funds provided by New Hampshire Department of Transportation. The NRPC staff provided data collection, analysis, and mapping for the project and managed the consultant team.

Steering Committee

The Corridor Plan was coordinated by a Steering Committee with representation from Amherst, Bedford, Milford, and Wilton and the NRPC staff:

- Michael Davidson, Wilton Planning Board
- Bill Greiner, Bedford Town Council
- Keith Hickey, Bedford Town manager
- Bill Parker, Milford Planning Director
- Marilyn Peterman, Amherst Board of Selectmen
- Michael Scanlon, Bedford Town Council
- Andrew Singelakis, Executive Director, NRPC
- Stephen Williams, Assistant Director and MPO Coordinator, NRPC
- Matt Waitkins, Transportation Planner, NRPC
- Karen White, Bedford Planning Director

Consultants

Jim Purdy AICP, Wallace Floyd Design Group, Project Manager

Marty Kennedy PE, Vanasse Hangen Brustlin, Inc., Assistant Project Manager

Jimmy E. Hicks, RKG Associates, Inc., Consultant