NEW HAMPSHIRE ROUTES 9, 10, 12, 101 UPGRADE
KEENE-SWANZEY
NHS-STP-T-F-011-1 (4), 10309

FINAL ENVIRONMENTAL ASSESSMENT/
SECTION 4(f) EVALUATION
VOLUME I OF II

PREPARED FOR:

US DEPARTMENT OF TRANSPORTATION
Federal Highway Administration

Signature: _____ **Date:** 5/20/99

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

Signature: _____ **Date:** 5-6-99

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I. Introduction

I. INTRODUCTION

Pursuant to the National Environmental Policy Act (NEPA) and Section 4(f) of the Department of Transportation Act, this Final Environmental Assessment/Section 4(f) Evaluation (FEA/ 4(f)) evaluates the potential impacts of the proposed project to upgrade New Hampshire Routes 9, 10, 12, and 101 in the City of Keene and Town of Swanzey, New Hampshire (see Figure 1.1.1). Potential social, economic, and environmental impacts are described, and measures to avoid and/or mitigate the impacts are discussed.

A Draft Environmental Assessment and Section 4(f) Evaluation (DEA/4(f)) was made available to the public, appropriate agencies and local officials in January of 1998. Copies of this report were made available for review at the following locations:

- State of New Hampshire
  Department of Transportation
  John O. Morton Building
  1 Hazen Drive, P. O. Box 483
  Concord, NH 03302-0483

- City of Keene Planning Dept.
  3 Washington Street
  Keene, NH 03431

- City of Keene Public Library
  60 Winter Street
  Keene, NH 03431

- Town Clerk's Office
  Town of Swanzey
  P.O. Box 9
  East Swanzey, NH 03446

- Stratton Free Library
  Main Street
  West Swanzey, NH 03494

- Federal Highway Administration
  279 Pleasant St, Rm. 204
  Concord, NH 03301

A public comment period followed, which included a Public Hearing held on April 8, 1998. As a result of comments received on the DEA/Section 4(f) Evaluation and/or at the Public Hearing, several changes have been made to the proposed plans and environmental documents. Changes made to the Draft Environmental Assessment are noted in the Final Environmental Assessment in shaded print.

If no significant impacts are identified through this process, a Finding of No Significant Impact (FONSI) will be issued by the Federal Highway Administration (FHWA). If significant impacts are found which cannot be avoided or mitigated, FHWA will require that an Environmental Impact Statement (EIS) be prepared.

This project was reviewed under the environmental classification procedures outlined in 23 CFR Part 771, *Environmental Impact and Related Procedures*. Under these procedures, FHWA–funded projects are classified to specify the level of study detail necessary under NEPA. The proposed project has been progressed as a Class III project (Environmental Assessment), which includes all non-Class I (Environmental Impact Statement) and non-Class II (Categorical Exclusion) actions. The significance of project-related environmental impacts is typically unknown under a Class III project.

II. Project Identification and Purpose/Need

II. PROJECT IDENTIFICATION AND PURPOSE/NEED

2.1 Project Location and Limits

The proposed project is located in the City of Keene and Town of Swanzey in Cheshire County, where New Hampshire (NH) Routes 9, 10, 12 and 101 converge. The project will include major upgrades along NH Routes 9, 10, 12, and 101 in both the east-west and north-south directions. Proposed improvements include the following highway segments: (refer to Figure 2.1.1)

Segments 1,2,3,4: From west of the intersection of Base Hill Road with NH Route 9 easterly along portions of NH Routes 9, 10, 12 and 101 approximately 5.5 km (3.4 miles) to east of the Optical Avenue intersection with NH Route 101. Segment 3 includes approach work along Main Street and NH Route 12 from the vicinity of Appleton Street, southward to the vicinity of the NH Route 12 crossing of the Branch River, a distance of approximately 520 m (1700 ft.).

Segment 5: From NH Route 101 northward along NH Routes 9,10,12 for a distance of approximately 2.6 km (1.4 miles).

Segments 6,7: From its intersection with NH Route 101, the limits extend southward along NH Route 10 to the vicinity of Lucinda Terrace, a distance of approximately 1280 m (4,200 ft.) The project resumes approximately 260 m (850 ft.) north of the Base Hill/Ash Hill Road intersection and continues southward for another 900 m (2,950 ft.).

Segment 8: From its intersection with NH Routes 10, 12 and 101, the limits extend northward along Winchester Street approximately 580 m (1900 ft.), ending just south of the Winchester Street bridge over the Ashuelot River. The limits also extend 150 m (500 ft.) northerly along Island Street from its intersection with Winchester Street.

Segment 9: From approximately 125 m (410 ft.) north of the NH Route 12/32 intersection, the project limits extend southerly along NH Route 12 for a distance of 535 m (1.750 ft.), and on NH Route 32 for 290 m (950 ft.).

Improvements will also be conducted on the approaches of several local roads, including Base Hill Road, Production Drive, West Street, Park Avenue, Ash Hill Road, Matthews Road, Winchester Street, Key Road, Island Street, Rose Lane, Martell Court, Main Street, and Optical Avenue.

Table 2.1.1 provides a summary of the existing features of NH Routes 9, 10, 12, and 101 for the major segments of the project:

TABLE 2.1.1 – EXISTING NH ROUTES 9/10/12/101 FEATURES						
HIGHWAY SEGMENT	LENGTH	(Shoulder-Lanes-Shoulder) PREDOMINANT WIDTH	NO. INTERSECTIONS	NO. BRIDGES	POSTED SPEED	COMMENTS
1 (NH 9)	1.6 km (1.0 miles)	3.0m-3.6m-3.6m-3.0m (10'-12'-12'-10')	3	1 (NH 9 over Ash Swamp Brook)	40 mph	Flashing yellow signal at Base Hill Road, signalized T-intersection at end of bypass
2 (NH 10/12/101)	0.8 km (0.5 miles)	3.0m-3.6m-3.6m-3.6m-3.6m-3.0m (10'-12'-12'-12'-12'-10')	1	0	40 mph	Signalized intersection at Winchester Street/NH Routes 10, 12, 101
3 (NH 12/101)	1.3 km (0.8 miles)	3.0m-3.6m-3.6m-3.0m (10'-12'-12'-10')	1	1 (NH 12/101 over Ashuelot River)	40 mph	Signalized intersection at Main Street/NH Routes 12, 101
4 (NH 101)	1.8 km (1.1 miles)	3.0m-3.6m-3.6m-3.0m (10'-12'-12'-10')	1	1 (Box Culvert-NH 101 over Beaver Brook)	40 mph	Signalized intersection at Optical Avenue
5 (NH 9/10/12)	2.6 km (1.6 miles)	3.0m-3.6m-3.6m-3.0m (10'-12'-12'-10')	2 (West Street Interchange)	1 (NH 9/10/12 over West Street)	55 mph (NB) 40-55 mph (SB)	Signalized intersections at West Street ramps
6 (NH 10)	1.3 km (0.8 miles)	1.5m-3.6m-3.6m-3.6m-1.5m (5'-12'-12'-12'-5')	8 (NH Route 10 from Kit Street. to Lucinda Terrace)	1 (NH Route 10 over Ash Swamp Brook)	30 mph	Center two-way left turn lane
7 (NH 10)	1.0 km (0.6 miles)	1.2m-3.6m-3.6m-1.2m (4'-12'-12'-4')	2	0	40 mph	
8 (Winchester Street)	0.6 km (0.4 miles)	0.6m-3.6m-3.6m-3.6m-3.6m-0.6m (2'-12'-12'-12'-12'-2')	2	1 (Island Street over Ashuelot River)	30 mph	Signalized intersection at Key Road, turn lanes at Key Road/Island Street
9 (NH 12/ 32)	0.5 km (0.3 miles)	1.2m-3.6m-3.6m-1.2m (4'-12'-12'-4')	3	-	30 mph	

2.2 Project Purpose

The purpose of this project is to improve the existing highway network producing satisfactory traffic level of service, safety and appropriate access provisions, while being consistent with community goals, including improvement of the internal City of Keene and the Town of Swanzey's traffic capacity problems.

The Keene/Swanzey Project will address the transportation deficiencies identified in the *Traffic Needs Study* (completed by NHDOT in 1993, see Section 3.1.1), which include excessive traffic congestion delay and reduced safety. These deficiencies are most pronounced along the existing highway network (NH Routes 9/10/12/101) particularly at the following key intersections with NH Route 101: NH Routes 9/10/12, NH Routes 10/12/Winchester Street, and NH Route 12/Main Street. These intersections are currently operating at or near failure conditions (Level of Service E or F based on 1990 traffic volumes) and will continue to worsen with expected growth in future traffic (see Table 3.3.2).

The deficiencies along the existing highway network in and around the City of Keene and Town of Swanzey have resulted in traffic avoiding the congested areas and seeking alternative routes compounding an existing capacity problem throughout the local street network. These traffic problems are inconsistent with the City of Keene development goals of enhancing the Town center, encouraging pedestrian activities, and creating a town square atmosphere.

For the purposes of determining compliance with the 404(b)1 permit guidelines the US Army Corps of Engineers (ACOE) has defined the basic project purpose as "to provide for the safe and efficient flow of traffic along NH Routes 9/10/12/101 in and around Keene and Swanzey" (see letter in Appendix A).

2.3 Project Need

An analysis of the corridor for safety concerns/deficiencies, traffic growth and related congestion, as outlined in the following sections, establish the need for the project and improvements to NH Routes 9/10/12 and 101.

2.3.1 Safety Concerns

2.3.1.1 Roadway Characteristics

The majority of the highway segments for NH Routes 9, 10, 12 and 101 throughout the study area were constructed in the 1960's with a major addition constructed in the late 1970's (NH Routes 9/10/12 bypass). Portions of the highway network exhibit substandard features, as defined by modern highway design practices as established by the American Association of State Highways and Transportation Officials (AASHTO). Other smaller improvements have occurred more recently (early 1990's)

and include widening and inclusion of a two-way left turning lane along NH Route 10 (Winchester Street) from Kit Street to Krif Road, pavement widening along NH Routes 10/12/101 (two lanes to four lanes) from the NH Routes 9, 9/10/12, 10/12/101 intersection to the Winchester Street intersection with NH Routes 10, 12, 101, and NH Route 12 roadway and widening/bridge improvements (Main Street) from NH Route 101 to just south of the Branch River.

Substandard features along the existing corridor include, but are not limited to:

Inadequate weaving sections

- Between the West Street interchange (with NH Routes 9/10/12) and the NH Route 9/10/12 interchange

Weaving sections are highway segments where the pattern of traffic entering and leaving contiguous points of access results in vehicle paths crossing each other. Where crossing volumes are high and the available length of weaving sections short, operations become congested and potentially dangerous, particularly when travel speeds are high.

Lack of adequate shoulder

- NH Route 12 (south of The Branch)
- NH Route 10 (south of Krif Road)

Shoulder is the portion of the roadway contiguous with the travel lanes that provides for accommodation of stopped vehicles, emergency use and recovery area. The lack of adequate shoulder width creates increased congestion, reduced recovery area, lack of area for stopped vehicles, and reduced space for maintenance operations such as snow removal.

Poor intersection geometry and/or intersection sight distance

- Matthews Road/NH Route 10
- Base Hill Road/Ash Hill Road/NH Route 10
- NH Route 32/NH Route 12
- Base Hill Road/NH Route 9
- NH Route 10/Lucinda Terrace

The ability to see ahead and react to various roadway conditions is of the utmost importance to the safe and efficient operation of a vehicle on a highway. When this ability to see ahead (sight

distance) is compromised, a potentially unsafe condition is created. Sight distance problems are a particular concern at unsignalized intersections where side road traffic is entering the travel stream from a stop condition. Poor intersection geometry (skewed intersecting angles, inadequate turning radii, etc.) compounds this problem by making turning movements more difficult.

Inadequate pavement super-elevation or cross slope

- NH Route 101 @ Main Street intersection

In the design of highway curves, it is necessary to establish the proper relation between design speed and curvature, and their joint relationship with superelevation (banking of curves) and side friction. Improper superelevation could result in hazardous conditions to vehicle operations, caused by the imbalance of centrifugal force and side friction factors.

Each of the conditions listed above create safety and operational problems which can contribute to accident occurrence and vehicle operation difficulties.

2.3.1.2 Accidents

As part of the effort to identify deficient locations throughout the project corridor, a review of the accident history was conducted for each of the roadway segments and key intersection locations. Utilizing data obtained from NHDOT *Accident Location Reports* for the years 1992 through 1996, accidents were recorded by roadway segment and intersection location as summarized in Tables 2.3.1 and 2.3.2 and Figures 2.3.1 and 2.3.2. Accident information includes total number of accidents per segment or intersection, identifies type of collisions, type of accident (i.e. property damage only, personal injury, fatalities) and accident rates per million entering vehicles (intersections), or per million vehicles miles (roadway links).

As can be observed from Tables 2.3.1 and 2.3.2, a total of 298 accidents were reported for the five-year period, with the majority of accidents occurring at intersection locations (254). Relative to type of accidents, 191 involved property damage only, 107 involved personal injury, and no fatalities were reported.

The locations with the greatest amount of accidents include the Main Street/NH Routes 12, 12/101, and 101 intersections (60 accidents), the West Street at NH Routes 9/10/12 ramp intersections (40 accidents), and the Key Road/Winchester Street intersection (37 accidents). Based on

TABLE 2.3.1
SUMMARY OF ACCIDENTS ON ROADWAY LINKS
(1992-1996)

ROADWAY LINK (between)	Accident Rate Per Million Vehicle Miles	Total # Accidents (1992-1996)	Accidents Involving Property Damage Only	Accidents Involving Personal Injury	Accidents Involving Fatality	TYPES OF COLLISIONS						
						Broadside Collision	Angle Collision	Head-on Collision	Rear-end Collision	Backing Collision	Collision with Fixed Object	Unknown or Other
1. ROUTE 9 (Base Hill Rd. & NH 9/10/12)	0.00	0	0	0	-	-	-	-	-	-	-	-
2. NH 10/12/101 (NH 9/10/12 & Winchester St. (NH 10))	0.15	3	2	1	-	-	-	-	-	-	1	2
3. NH 12/101 (Winchester St. (NH 10) & Main St. (NH 12))	0.29	8	3	5	-	-	-	-	4	-	-	4
4. NH 101 (Main St. (NH 12) & Optical Ave.)	0.21	3	1	2	-	-	1	-	-	-	1	1
5. NH 9/10/12 (NH 9 & West St.)	0.11	3	1	2	-	-	-	-	1	-	-	2
6. NH 9/10/12 (West St. & NH 9/12 Interchange)	0.04	1	1	0	-	-	-	-	-	-	-	1
7. NH 10 (NH 10/12/101 & Matthews Rd.)	0.21	5	4	1	-	-	2	-	-	-	-	3
8. NH 10 (Matthews Rd. & Base Hill Rd./ Ash Hill Rd.)	0.04	1	0	1	-	-	-	-	-	-	-	1
9. NH 12 (NH 12/101 & NH 32)	0.43	20	13	7	0	0	2	0	0	0	2	16
TOTALS		44	25	19	0	0	5	0	5	0	4	30

TABLE 2.3.2
SUMMARY OF ACCIDENTS AT INTERSECTIONS
(1992-1996)

ROADWAY INTERSECTION	Million Entering Vehicles (1992-1996)	Accident Rate Per Million Entering Vehicles	Total # Accidents (1992-1996)	Accidents Involving Property Damage Only	Accidents Involving Personal Injury	Accidents Involving Fatality	TYPES OF COLLISIONS						
							Broadside Collision	Angle Collision	Head-on Collision	Rear-end Collision	Backing Collision	Collision with Fixed Object	Unknown or Other
1. Base Hill Rd. at NH 9	27.6	0.36	10	7	3	-	-	1	-	2	-	1	6
2. NH 9 at NH 9/10/12	53.7	0.15	8	3	5	-	-	1	-	1	-	-	6
3. Winchester St. (NH 10) at NH 12/101	77.7	0.33	26	11	15	-	-	1	-	8	-	-	17
4. Main St. (NH 12) at NH 101	69.3	0.87	60	45	15	-	-	5	-	7	-	1	47
5. Optical Ave. at NH 101	24.5	0.33	8	7	1	-	-	1	-	1	-	1	5
6. West. St. at NH 9/10/12	46.6	0.86	40	20	20	-	-	4	-	7	-	-	29
7. Island St. at Winchester St.	40.2	0.45	18	7	11	-	-	4	-	2	-	1	11
8. Key Rd. at Winchester St.	44.5	0.83	37	28	9	-	-	2	-	3	-	-	32
9. Matthews Rd. at NH 10	30.2	0.13	4	3	1	-	-	-	-	-	-	-	4
10. Base Hill Rd./ Ash Hill Rd. at NH 10	26.6	0.75	20	16	4	-	-	4	-	4	-	2	10
11. NH 32 at NH 12	36.1	0.64	23	19	4	-	-	1	-	1	1	-	20
TOTALS	-	-	254	166	88	0	0	24	0	36	1	6	187

accident rates per million vehicles the following intersection locations had the highest accident rates:

- Main Street (NH Route 12) at NH Route 101 (0.87 per million)
- West Street at NH Routes 9/10/12 (0.86 per million)
- Key Road at Winchester Street (0.83 per million)

Based on accident rates per million vehicle miles (MVM), the following roadway links had the highest accident rates:

- NH Route 12 (from NH 101 to NH 32) – 0.43 per MVM
- NH Route 12/101 (from Winchester Street to Main Street) – 0.29 per MVM

Regardless of actual accident rates, a number of sites have been specifically identified as being safety concerns because of geometric deficiencies through discussions with local police officials and input by local citizens. These include:

- Base Hill Road/Ash Hill Road/NH Route 10 intersection
- NH Route 12/32 intersection

2.3.2 Traffic Growth

As depicted in Table 2.3.3, historic permanent traffic count data clearly identifies that traffic volumes have increased substantially for all major links of the study area over the past twelve years. As can be noted from the table, percentage volume increases (from 1984 to 10/97) have ranged from 44.7% for the NH Route 12 recorder at Westmoreland to 82.5% for the NH Route 9 recorder at Chesterfield. Note that for the recorder along NH Route 10 in the Town of Swanzey, counts were unavailable prior to 1988.

Table 2.3.3 Average Historical Weekday Traffic

Year	NH 9 Chesterfield	NH 10 Swanzey	NH 12 Marlborough	NH 12 Westmoreland
1984	6250	---	6106	4655
1985	7798	---	6674	5170
1986	8557	---	7096	5374
1987	9529	---	7526	5931
1988	10166	9252	8189	6320
1989	10565	9484	8481	6478
1990	10214	9597	8360	6551
1991	10054	9491	8152	6342
1992	10807	9588	8594	6577
1993	10903	9856	8528	6463
1994	10938	10587	8492	6498
1995	11319	10704	8436	6378
1996	11374	10344	8582	6478
1997	11408	10175	8674	6737

In addition to these base counts, a substantial amount of traffic data and investigations have been undertaken beginning with the *Traffic Needs Study* (Resource Systems Group, Inc., 1993) completed in 1993. This study utilized an expanded City of Keene traffic model to assess existing and future traffic deficiencies along the NH Routes 9/10/12/101 corridor in City of Keene and Town of Swanzey.

The primary tool for assessing the traffic needs and future traffic projections for the study area was an existing traffic model that was originally developed for the City of Keene. The model was expanded to incorporate the geographical area of the Town of Swanzey and to predict future traffic volumes assuming various land use growth rates.

The actual highway forecasting model (TMODEL-2) created for the Keene/Swanzey area follows the general form of models that have been developed for hundreds of urban and other densely settled areas in the United States.

The model represents a simplification of reality where land use creates a demand for travel, and the travel demand is assigned to the highway network. The model performs three steps. First, the amount of traffic beginning and ending in each zone is estimated. This step is called trip generation. In the second step, these

origins and destinations are paired in order to form complete trips. This step is called trip distribution. Finally, trips are distributed onto the road network along the most desirable (quickest) travel paths. This step is called assignment. Utilizing this process, the model can be utilized to forecast future traffic volumes and redistribute the traffic as changes and improvements are made to the existing network.

Relative to future land use projections, future year (2015) land use assumptions were supplied by the City of Keene Planning Department and the Southwest Regional Planning Commission (for the Town of Swanzey) which formed the basis for projecting future traffic volumes. The traffic model used for the study is based on a PM peak hour volume, as conditions during this hour generally represent the highest traffic volumes during each weekday throughout the study area.

The *Traffic Needs Study* analyzed future conditions assuming moderate and high land use growth rates for both a weekday PM condition and a Saturday noon condition to provide for sensitivity analysis. Subsequent to the completion of the Traffic Needs Study in 1993, the City of Keene and Town of Swanzey (represented by the Southwest Regional Planning Commission) were asked in the summer of 1996, to verify and update the land use assumptions used in the original study.

The City of Keene confirmed the original the land use assumptions, with some minor adjustments in several areas of the city. The City also recommended reducing the size of the proposed development in the Konover retail center area (located west of NH Routes 9/10/12 and north of NH Route 9), as the development plans have been substantially scaled back from approximately 70,000 m^2 (750,000 S.F.) of retail space to 37,000 m^2 (400,000 S.F.). The revised recommended annual growth rates for residential and non-residential growth were 0.5% and 1.5% respectively.

The Southwest Regional Planning Commission (SWRPC) noted that their original residential and non-residential land use growth rates were based on full build-out scenarios that resulted in growth rates that probably could not be sustained for a 20-year period. As such, the SWRPC recommended that the residential and non-residential growth rates be reduced to reflect their best estimate of future growth for the Town of Swanzey. The revised recommended annual growth rates for residential and non-residential land use were 2.1% and 2.6% respectively.

When compared with the high growth rate assumptions used in the *Traffic Needs Study*, these land use revisions generally resulted in some minor decreases in forecasted traffic volumes (although some highway links had small increases). These final land use assumptions formed the basis for future traffic forecasting and analysis when assessing preliminary designs. The projected growth in traffic volumes between years 1990 and 2015 for each of the highway links of the study

area are depicted in Figures 2.3.3 and 2.3.4. As can be observed from the figures, the volumes on some of the highway links for NH Routes 9/10/12/101 will nearly double by the year 2015.

Failure to make roadway improvements will result in the worsening of existing capacity and operation problems that already have compromised the ability to provide a safe and efficient regional highway network in and around the Keene/Swanzey area. Future growth in traffic volumes will create longer delays throughout the corridor and will compound traffic problems throughout the local street network of the City of Keene, as traffic will begin to seek alternative travel routes to avoid excessive delays along the existing highway network (NH Routes 9, 10, 12 and 101).

III. Alternatives

III. ALTERNATIVES

Pursuant to the provisions of the National Environmental Policy Act, applicants for projects utilizing federal funding or requiring federal approvals/permits must first analyze and document the impacts of the proposed project relative to alternatives. Alternatives must include: No-Build (Baseline), Transportation Demand Management (TDM), Transportation System Management (TSM) and new location or upgrade alternatives.

3.1 PROJECT EVOLUTION/ALTERNATIVES CONSIDERED AND DISMISSED

The Keene/Swanzey study originally considered a NH Route 10 bypass roadway beginning at the existing south end of the NH Routes 9/10/12 Keene bypass and proceeding southerly on new location terminating in the vicinity of Base Hill Road and Ash Hill Road intersection with NH Route 10 (see Figure 3.1.1). The intended purpose of the new bypass was to alleviate traffic congestion and unnecessary turning maneuvers along NH Route 101 by removing the 'dogleg' traffic flow associated with the NH Route 10 corridor in the City of Keene. The project, as originally envisioned, was commonly referred to as the NH Route 10 Bypass project since it was a logical southerly extension of the original NH Routes 9/10/12 bypass completed in 1979.

Because of the inherently high potential for environmental impacts associated with this bypass concept, a *Traffic Needs Study* (Resource Systems Group, Inc., 1993) was prepared to assess if practical alternatives were available within the existing corridors that could maintain a satisfactory level of service, safety, and appropriate access provisions. As such, the primary purpose of the *Traffic Needs Study* was to identify the most practical alternative(s) that would best address the overall traffic needs of the study area. This included analysis of the existing network conditions, upgrade of the existing roadway network, interchange (grade-separated) alternatives along the existing network, and analysis of the originally proposed north-south NH Route 10 Bypass (new location alternative).

3.1.1 *Traffic Needs Study*

The *Traffic Needs Study* was initiated in the Spring of 1992 and concluded with the Final Report in June 1993. The results of the study were presented to the public during an informational meeting held in the City of Keene on August 10, 1993. Additionally, a summary of the study was presented to federal and state natural resource and regulatory agencies during a monthly review meeting held at the NHDOT offices in Concord on August 19, 1993.

As discussed in Section 2.3.2, the primary tool for assessing the traffic needs of the study area was an existing traffic model that was originally developed for the City of Keene. This model was expanded to incorporate the geographical area of the Town of Swanzey and to predict future traffic volumes assuming various land use growth rates. The traffic model was used to analyze various roadway network alternatives. The traffic model is designed to redistribute traffic as changes and improvements were made to the existing network.

Based on future design year traffic projections (Year 2015), an iterative process of roadway improvements were analyzed beginning with the existing roadway and intersection conditions. Incremental improvements were then made to the existing roadway network which included additional through lanes, addition of exclusive left and right turn lanes, and interchange (grade-separated) scenarios at critical intersection locations. The effect of the planned north-south NH Route 10 bypass alternative was also added to the existing network to analyze its effectiveness in improving study area traffic flow.

Based on the aforementioned methodology and analysis, the primary findings and conclusions and recommendations of the *Traffic Needs Study* were as follows:

3.1.1.1 Findings and Conclusions

- Intersection capacity analysis showed the need for major improvements both in the east-west (NH Route 101) and north-south directions (NH Routes 9, 10 and 12).

- Conventional widening and at-grade intersection improvements along the existing roadway network did not provide acceptable levels of service when analyzing design year traffic volumes.

- Widening and inclusion of conventional grade-separated interchanges along the existing highway network improved traffic capacity at certain locations, but did not provide overall acceptable levels of service for design year traffic volumes at the major intersections along NH Route 101 (NH Routes 9/10/12, Winchester Street/NH Routes 10/12; Main Street/NH Route 12).

- The inclusion of the NH Route 10 Bypass combined with conventional interchanges and upgrades along the existing highway network provided acceptable levels of service at only two of the three major intersections (see above) along NH Route 101.

- Construction of the NH Route 10 Bypass does not substantially attract volumes away from NH Route 12 and Main Street.

- Construction of the Route 10 Bypass does reduce traffic along existing NH Route 10 (Winchester Street); however, a grade separated interchange and Winchester Street improvements will still be required to produce acceptable level of services for Year 2015 traffic.

- Construction of the NH Route 10 Bypass will likely result in significant environmental impacts, which will be difficult to mitigate and obtain required permits for.

- A Single Point Diamond Interchange (SPDI) operates more efficiently than conventional interchanges at the NH Routes 10/12/101/Winchester Street location and NH Routes 12/101/Main Street location.

- Upgrade improvements along the existing NH Routes 9, 10, 12 and 101 corridor will result in additional capacity, improved traffic flow and increased safety. These improvements will re-attract traffic currently using the local roadway network in the City of Keene, which is presently avoiding the traffic delays and congestion presently occurring in the state corridor.

3.1.1.2 Recommendations

- Since the NH Route 10 Bypass project does not substantially improve traffic congestion throughout the overall study area, and it would result in extensive environmental impacts, it was removed from consideration as a viable alternative.

- Improve the east-west NH Routes 9/10/12/101 roadway to two lanes in each direction with turning lanes and auxiliary lanes as required from west of Base Hill Road to east of Main Street.

- Study a trumpet-type interchange at the terminus of the existing NH Route 9 bypass with NH Routes 10/12/101.

- Study a single point diamond interchange at the Winchester Street intersection with NH Routes 10/12/101.

- Widen Winchester Street (NH Route 10) to two lanes in each direction from south of NH Route 101 to a southern terminus in the vicinity of Matthews Road.

- Improve the geometrics and traffic flow at the Winchester Street (NH Route 10) intersections with Matthews Road and Base Hill Road/Ash Hill Road.

- In the interest of optimum intersection operation, it was recommended to study a Single Point Diamond Interchange (SPDI) at the Main Street (Route 12) intersection. However, due to potential inherent impacts (residential, business, historical, major drainage, and construction costs) with a SPDI layout, an at-grade intersection should also be studied to reduce the types of potential impacts.

Based on the recommendations of the *Traffic Needs Study*, the original project study area was revised from a new highway location corridor (depicted by the red boundary in Figure 3.1.1) to a narrow corridor width

surrounding the existing highway network of NH Routes 9, 10, 12 and 101 (green shading). The revised limits of the study area will encompass the anticipated highway upgrade alternatives (including interchanges) along the existing highway network.

3.1.1.3 *Traffic Needs Study* Modifications

During late 1995 and early 1996, the 1"=2000' alignment concepts recommended in the *Traffic Needs Study* were investigated in greater detail. Utilizing detailed 1"=50' scale (one foot contour interval) mapping, preliminary layout plans, profiles and schematic roadway typical sections were developed and analyzed relative to operational characteristics and environmental and physical constraints.

When assessing the alignment/interchange recommendations in greater detail, it was observed that the West Street interchange also had numerous operational and capacity problems, due to inadequate through and turning lanes along West Street. Since West Street is also a major access point to and from the City of Keene, it was included in the study area.

Due to some unique operational and geometric considerations, it became evident that some modifications to the recommendations set forth in the *Traffic Needs Study* would be required to meet future traffic needs. The existing traffic operations of the NH Routes 9/10/12/101 highway network are complex as the network currently serves high volumes of local and external (pass through) traffic in both an east-west and north-south direction. Additionally, the traffic volumes are projected to increase substantially in the future. The short distance between major intersection locations, i.e., Winchester Street to the end of the existing bypass, West Street, and Main Street combined with the existing high volume weaving movements between local and through traffic required alternative geometric and traffic solutions to be reviewed throughout the corridor.

Due to the complexities of the project, ongoing local, public involvement was essential in developing sound engineering solutions that would meet both the needs of the traveling public and local communities. A Citizens Advisory Task Force (CATF) was formed in May of 1996 to assist and interact with the design team of NHDOT, FHWA and the project's design consultant. The CATF is comprised of various officials and interested residents. Beginning in June of 1996, the CATF met with the design team on a monthly basis to discuss and form consensus on major design, environmental and socioeconomic issues related with the project. The CATF continued to meet on a monthly basis until a formal public hearing was held. The general public was encouraged to attend the CATF meetings and a dedicated public comment period was a scheduled portion of each meeting. The CATF also interacted with local neighborhood groups and special interest groups on an ongoing basis.

One of the most critical variables which influences the design of the project is the forecasting of future traffic volumes on highway and roadway links throughout the Keene/Swanzey area. As previously mentioned, a comprehensive, land use based, regional traffic model for the project area has been developed. The model has been an extremely useful tool in examining the effectiveness of proposed designs.

In conjunction with the use of the traffic model, the design process was initiated. The initial efforts of the design development focused on investigation of alternatives that would address the critical traffic and safety areas of the project. These included short weaving distances between proposed interchanges, particularly between Winchester Street and the proposed trumpet interchange at the end of the existing bypass.

Numerous alternatives were investigated including modifications to interchange configurations, investigation of service/collector roads in the east-west direction, and investigation of connector roads. Each alternative improvement was incorporated into the traffic model and extensive traffic capacity and weaving analyses were undertaken to test each alternative's effectiveness. After feasible traffic solutions were found for the various sections of the project, more detailed engineering investigation followed, including the development of 1"=50' scale plans and profiles to verify that the concepts would satisfy accepted engineering and safety criteria. Major segments of the project were investigated at CATF meetings, designs were reviewed, then modified in response to input and comments. Eventually, the major segments were combined and composite project plans, profiles, and construction slope limits were developed at 1"=50' scale.

The design features of the project as derived by the CATF Design Development Process incorporates the majority of the recommendations of the *Traffic Needs Study* with the following modifications/additions:

- The Single Point Diamond Interchange (SPDI) at Winchester Street and its relationship with the proposed trumpet interchange has been modified to mitigate the westbound weaving problem between the interchanges.

- The SPDI concept at Main Street and NH Route 101 has been replaced with an alternative option that includes an improved at-grade Main Street intersection combined with a relocation of NH Route 12 from the NH Routes 12/32 intersection to the NH Route 101/Optical Avenue intersection. This short relocation of NH Route 12 is referred to as the Optical Avenue Connector.

- The inclusion of West Street Interchange improvements into the project, including widening and roadway improvements along the West Street approaches.

- The inclusion of the Island/Pearl/Winchester Street intersection (at the City of Keene's request), due to its close proximity to the SPDI at NH Routes 10/12/101 and the Key Road intersection.

The following is a brief discussion for each of the design modifications. More detailed discussions of the proposed improvements are provided in Section 3.3.

Winchester Street SPDI – As recommended in the *Traffic Needs Study* an SPDI at the Winchester Street/NH Routes 10/12/101 intersection is proposed. NH Routes 12/101 will pass over a widened Winchester Street which will remain at grade. The SPDI features a tightly compressed diamond interchange configuration that is controlled by one centrally located traffic signal, which in this case, is located under the overpass structure.

The revised feature of the SPDI at Winchester Street is related to the ramps that connect to the adjacent trumpet interchange to the west. The proposed design features a westbound 'braided ramp configuration' that essentially eliminates the weaving movement between traffic entering at Winchester Street and continuing west on NH Route 9, and NH Routes 12/101 westbound traffic accessing NH Routes 9/10/12 north. The concept vertically separates the movements by bringing the westbound to northbound ramp (NH Routes 12/101 to NH Route 9/10/12) over the westbound on ramp (to NH Route 9) from Winchester Street. This concept will require construction of an additional bridge and retaining walls to accommodate the ramp crossings, however it eliminates the undesirable high speed mainline weave that was inherent with the configuration recommended in the *Traffic Needs Study*.

Main Street (NH 12) Intersection Improvements/Optical Avenue Connector - The recommendations of the *Traffic Needs Study* stated that a grade-separated interchange would be required at the NH 101/Main Street intersection to accommodate future travel demand. Due to the constrained right-of-way and heavy left turn volumes, it was suggested that a SPDI would be most appropriate at this location. As such, the SPDI concept was developed at 1"=50' plan and profile scale. Although the SPDI provided good level of service for future traffic demand, the detailed SPDI layout created substantial impacts including King Court and Martell Court access impacts, visual impacts adjacent to the historic district of Main Street, and most importantly major impacts to residential and commercial properties and to St. Joseph Cemetery along NH Route 12 (South Main Street). The impacts along South Main Street would be caused by major widening for the associated turn lanes approaching the SPDI and the need for two travel lanes in each direction south to the vicinity of NH Route 32.

The NH Route 12 widening would require the acquisition of multiple businesses north of The Branch, the reconstruction and widening of the NH Route 12 bridge over The Branch (which was recently reconstructed in

1995), and impacts to the St. Joseph Cemetery (including possible impacts to grave sites and extensive right-of-way impacts to the residential community south of the cemetery). Additionally, the CATF and other local neighborhood groups were very concerned about the visual, historic and neighborhood impacts of a SPDI in the context of existing setting of the Main Street area.

In order to reduce substantial congestion from the Main Street intersection, and to avoid the need to widen NH Route 12 (Main Street), the concept of an Optical Avenue Connector was investigated using the traffic model to test its effectiveness in reducing traffic volumes along NH Route 12 (Main Street). The connector would begin in the vicinity of the NH Routes 12/32 intersection, would then curve to the north on new location passing over The Branch on a new bridge, and then would connect to the Optical Avenue/NH Route 101 intersection. The connector would be designed to encourage north-south NH Routes 12/32 traffic to utilize the connector, therefore reducing through traffic on existing NH Route 12 (Main Street). The proposed intersections of the Optical Avenue Connector with NH Route 32 and Optical Avenue/NH Route 101 would be signalized with appropriate turning lanes provided.

With the Optical Avenue Connector handling the majority of the current NH Route 12 north/south through traffic, the need for a grade-separated interchange would be eliminated at the Main Street/NH Route 101 intersection. Furthermore, no additional widening would be required on Main Street south of NH Route 101. The Main Street/NH Route 101 intersection, which would remain at grade, would need to be widened to seven lanes in the east-west direction to accommodate turning lanes and some additional widening would be required for turning lanes north of NH Route 101. Provisions will be made for pedestrian crossings at the intersection via sidewalks/crosswalks and pedestrian signal phasing.

Given the operational efficiencies of the Optical Avenue Connector and community concerns of the SPDI, the CATF recommended that the SPDI concept at Main Street be dismissed as a viable option for addressing the traffic needs for the eastern portion of the project study area. Access options for King Court and Martell Court with Main Street and Rose Lane with the Optical Avenue Connector were also developed and are described in Section 3.3.

West Street Interchange Improvements - Upon further investigation of the results of the traffic studies, it became apparent that traffic projections at the West Street Interchange affected the operations of the other major access points in the City of Keene. Traffic investigations also identified severe capacity and operational problems along West Street and at some of the associated ramps and weaving sections of the interchange. As such, the project scope included West Street Interchange improvements and improvements northward to the NH Routes 9/10/12/101 interchange.

Island/Pearl/Winchester Street Intersection – This intersection was included in the project at the request of the City of Keene in the Spring of 1997. The original limits of the project terminated on Winchester Street just south of this intersection. Due to the close proximity to the Key Road intersection coupled with the poor geometrics of the existing intersection, the CATF concurred that the intersection should be included in the project. The proposed work, which is described in more detail in Section 3.3, will also propose replacement of a temporary bridge, adjacent to the intersection, that carries Island Street over the Ashuelot River.

3.2 OTHER ALTERNATIVES CONSIDERED AND DISMISSED

3.2.1 No-Build

The No-Build alternative assumes that the existing roadway network will be maintained in its current condition and configuration. The National Environmental Policy Act (NEPA) requires that the No-Build alternative be considered and serve as a baseline condition to which other alternatives will be compared during the evaluation process. No improvements to the existing highway system are planned for the No-Build alternative other than normal routine maintenance by NHDOT District forces.

The No-Build alternative will not fulfill the purpose and need of this project as traffic volumes will continue to increase and operating conditions/ level of service, which are currently at or near failure conditions at many of the key intersections throughout the corridor, will continue to deteriorate. The increased congestion is expected to compound noted safety problems throughout the corridor. The existing highway network of NH Routes 9/10/12/101 will eventually lose its functionality as a rural principal arterial and part of National Highway System and operations will break down resulting in stagnation of the state and local roadway networks in and around the City of Keene.

3.2.2 Transportation System Management (TSM) Alternatives

TSM alternatives consist of improvements to the existing roadway system that do not include major construction such as physically expanding the capacity of a highway with additional through lanes, interchanges, etc. Examples of TSM include the coordination/optimization of signal timings, new signal installations, re-striping of lanes, channelization, access management, signing, reversible lanes and adding/lengthening turning lanes.

As documented in the *Traffic Needs Study*, it is clear that TSM measures alone will not address the current and projected traffic problems throughout the project study area. Projected traffic for the design year of 2015 must be addressed by major widening and inclusion of grade separated interchanges at critical locations.

Although the TSM alternative will not address the current and future traffic demands of the project corridor, several TSM improvements will be integrated into the project including:

- Consolidation of driveways, improved access management along NH Route 10 (Winchester Street)
- Coordination of signal systems (Winchester Street, West Street)

Additionally, the City of Keene is planning to implement the following TSM improvements in the near future:

- Installation of emergency pre-emption systems at key signalized intersections throughout City of Keene
- Coordination of signal timing along West Street

3.2.3 Transportation Demand Management

Transportation Demand Management (TDM) focuses on measures to shape or modify traffic demand with the goal of reducing overall traffic volumes rather than increasing capacity by traditional methods (i.e., adding additional lanes, etc.). TDM options include, but are not limited to:

- Staggered work hours
- Ridesharing
- Carpooling
- Restricted parking
- Preferential parking policies
- Mass Transit
- Park and Ride Lots
- Modification to land use and zoning plans
- Tax policies
- Employer trip reduction plans
- High-occupancy vehicle (HOV) lanes
- Alternative modes of transportation (pedestrian, bike, etc.)

A number of state, municipal and private organizations were contacted to assess current and future TDM efforts throughout the Cheshire County area. These organizations include:

- NHDOT – Bureau of Transportation Planning
- NHDOT - Car Pooling & Ride Sharing Program
- Southwestern Regional Planning Commission
- City of Keene Planning Department
- NH Bureau of Trails
- Pathways for City of Keene
- Keene State College

Based on input from these organizations, several TDM measures seemed appropriate for the study area and should be pursued in conjunction with the proposed highway system improvements. These include:

- Encouragement of alternative modes of transportation - There has been very active local involvement by various bike, pedestrian, equestrian, and snowmobile groups to expand and promote the use of alternative modes of transportation throughout Cheshire County. As summarized in section 4.2.5, there are aggressive plans to expand the existing trail and bike/pedestrian network in and around City of Keene through ongoing and future projects. The proposed improvements (see section 3.3) will include provisions for providing continued and improved access for these alternative modes of

transportation through the inclusion of a multi-use trail system. Additionally, sidewalk improvements or additions will be included in the project to encourage pedestrian travel.

- Potential for Demand Management techniques such as staggered work hours could be effective for major businesses located in the Optical Avenue area and the Kit Street area.
- Although no Park and Ride Lots are currently planned for this region of the state, carpooling and ridesharing programs should be promoted.
- Encouragement of comprehensive land use and zoning structure throughout the corridor.

Although these specific TDM measures are recommend to be included, in addition to the Preferred Alternative, these measures alone could not reasonably be expected to address the transportation deficiencies throughout the project area.

3.2.4 Roundabout Alternatives

A roundabout is defined as a one-way circulatory roadway around a central island usually with flared approaches to allow multiple vehicle entry. Modern roundabouts have two fundamental design features including yield at entry points and deflection of the entering vehicle path.

The concept of roundabout use in the City of Keene was originally documented in a report entitled "Alternate Planning and Transportation Perspective" prepared by Michael Wallwork in June of 1994. The report suggested the possible use of roundabouts at 18 separate intersections located throughout Keene. The roundabout conceptual designs contained with this report were based on 1990 traffic volumes obtained from the Resource Systems Group original traffic study report and from traffic counts supplied by the City of Keene. No design year analysis was completed by this report.

With regard to the Keene-Swanzey upgrade project, roundabout alternatives were considered at the following three major project intersections:

- NH Route 9/NH Routes 9/10/12/NH Routes 10/12/101
- Winchester Street/NH Route 10/NH Routes 12/101
- Main Street/NH Route 12/NH Routes 12/101

The ARRB Transport Research Report ARR 321, *Roundabouts: Capacity and Performance Analysis* (Akcelik, et. al., 1998), indicates that the practical capacities of single and two-lane roundabouts are 2,620 and 4,400 vehicles per hour, respectively. Design year 2015 weekday PM peak traffic volumes for all of the intersections listed above exceed the capacities of single and two-lane roundabouts. In addition, the practical capacity figures cited in the research are expressed in terms of cars only. Adjusting for truck traffic would lower the capacity figures accordingly. Therefore, roundabouts were dropped from further investigation as a feasible or prudent alternative.

Aside from the noted traffic capacity deficiencies, certain safety concerns were identified with use of roundabouts at the above noted intersections and intersections in close proximity to the highway network:

- Roundabouts are generally not compatible with area traffic signals. Such systems move vehicles through controlled areas in platoons by adjusting traffic signal times for progressive flow. Roundabouts interfere with platoon movements. The proximity of the Key Rd. signalized intersection and the potential for future signals at Kit or Wetmore Streets would be of concern along Winchester Street.
- Pedestrian and bicycle facilities are a particular safety concern at unsignalized roundabouts due to constant traffic flow. Due to the high anticipated numbers of pedestrian, bicycle and recreational users, this would be a particular concern at the Winchester Street and Main Street intersections.
- The problem of trucks overturning or shedding their loads has no obvious solutions in relation to roundabout layout geometry. Of particular concern is the high percentage of truck traffic utilizing the highway network and the long tangent highway sections approaching the three intersections noted above.

Although the use of roundabouts may be appropriate in various urban and rural settings, their use along the major intersections and highway links of NH Routes 9,10,12 and 101 is not considered feasible or prudent primarily due to the capacity deficiencies and safety concerns.

3.3 SELECTED ALTERNATIVE

The Selected Alternative to address the long- term needs of the corridor and to meet the project purpose and need consists of a major upgrade to the existing highway network of NH Routes 9, 10, 12 and 101. As documented in Section 3.1, the development of this alternative considered a multitude of engineering, traffic, and environmental constraints. The design process was enhanced by the input and interaction of the Citizen's Advisory Task Force (CATF), which provided valuable local input that helped to guide major project decisions.

The goal of the proposed improvement plan was to provide a safe and efficient transportation facility that would meet the public needs for the future (through year 2015) while minimizing environmental and socioeconomic impacts.

3.3.1 Design Criteria

The design criteria for the upgraded highway, intersecting streets, and interchange ramp designs were selected in conformance with *Policy on Geometric Design of Highways and Streets* (AASHTO, 1994) and the NHDOT *Highway Design Manual* (NHDOT, 1981). The design criteria for the various roadway components are summarized in Table 3.3.1.

TABLE 3.3.1 DESIGN CRITERIA

Roadway	Design Speed	Max. Grade	Min. Grade	Lane Width	Shoulder Width	Maximum Superelevation	R.O.W. Access Control
NH 9, 10*, 12*, 101	100 km/hr (60 mph)	4%	0.5%	3.6 m (12 ft)	3.0 m (10 ft)-outside 1.2 m (4 ft)-inside	8.0%	Limited, controlled
NH 32	60 km/hr (40 mph)	6%	0.5%	3.6 m (12 ft)	1.2 m (4 ft)	4.0%	None
Local System	Des. 60 km/hr (40 mph) Min. 50 km/hr (30 mph)	10% 10%	0.5% 0.5%	3.6 m (12 ft) 3.3 m (11 ft)	varies varies	4.0% 4.0%	none
Interchange Ramps	Des. 80 km/hr (50 mph) Min.** 60 km/hr (40 mph)	5% 6%	0.5% 0.5%	varies varies	varies varies	6.0%	limited
Winchester Street, Island Street to Town of Swanzey Line	Des. 60 km/hr (40 mph) Min. 50 km/hr (30 mph)	10% 10%	0.5% 0.5%	3.6 m (12 ft) 3.3 m (11 ft)	varies varies	4.0% 4.0%	none
Optical Avenue Connector	80 km/hr (50 mph)	5%	0.5%	3.6 m (12 ft)	3.0 m (10 ft)	4.0%	limited, controlled

* Sections along Winchester Street (North of NH Route 101) and NH Route 12 (approach sections to NH Route 101) treated as local roadways
** Trumpet Loop Ramps Min. = 50 km/hr (30 mph)

3.3.2 Traffic Analysis

As previously stated, a substantial amount of traffic analysis was undertaken during the development of the *Traffic Needs Study*. This study identified the basic needs of the highway network for the projected design year of 2015 relative to lane use, signal requirements, intersection configurations, and interchange requirements. Utilizing the recommendations of the *Traffic Needs Study* as a framework, more detailed traffic analysis was conducted during development of the preliminary design to verify signal warrants, weaving maneuvers, ramp junction LOS and intersection LOS.

The traffic data was analyzed for the base year (1990) and design year (2015) using accepted traffic methodologies to evaluate roadway capacities and design warrants for intersections, adjacent highway segments and interchange ramp roadways. Analyses included:

- Signalized intersection capacity
- Unsignalized intersection capacity
- Progression analysis
- Signal warrant analysis
- Weaving analysis
- Left and right turn lane warrants
- Ramp roadway capacity and ramp junction capacity
- Queuing analysis

Relative to identifying capacity conditions, the related analysis involves the determination of "Level of Service" (LOS), which is a qualitative measure of how motorists perceive traffic conditions. The following letter codes are used:

- A - represents the best condition with little or no delays
- B,C,D - represent intermediate conditions of decreasing operational performance
- E - represents full capacity conditions
- F - represents failure of the roadway or intersection to adequately carry the traffic volume

Specific to signalized intersection Level of Service the following criteria was followed:

LOS	Characteristics	Stopped Delay (sec)
A	Little or no delays	less 5.0
B	Short Delays	5.1-15.0
C	Average Delays	15.1-25.0
D	Long Delays	25.1-40.0
E	Very Long Delays	40.1-60.0
F	Extreme Delays	over 60.0

To guide improvement decisions to the existing highway system, the NHDOT has established a Level of Service D as the minimum acceptable measure of capacity within this urban area.

The traffic summary tables presented in this section are based on projected 2015 P.M peak hour traffic volumes (Figure 3.3.1) for the recommended improvements throughout the highway corridor.

TABLE 3.3.2 - Level of Service (LOS) Signalized Intersections
Weekday PM Peak Hour Volumes

Intersection	Year 1990 No-Build (Delay – V/C)	Year 2015 No Build Overall LOS (Delay – V/C)	Year 2015 Build Overall LOS (Delay – V/C)
NH Route 9/Routes 9/10/12/NH Routes 10/12/101	F	F	---
Winchester St. (NH Route 10)/NH Routes 10/12/101	F	F	B (15 - 0.6)
Main St. (NH Route 12)/NH Routes 12/101	E (49-1.1)	F	D (28 - 0.9)
West St./NB Off Ramp (NH Routes 9/10/12)	B* (10-0.6)	E	B (15 - 0.7)
West St./SB Off Ramp (NH Routes 9/10/12)	B* (8-0.6)	F	B (15 - 0.7)
Winchester St./Key Road	C* (22-0.8)	E (36 - 1.0)	C (15 - 0.7)
Winchester St./Island St./ Pearl St.	**	**	C (22 - 0.8)
Route 12/Connector Road/Route 32 Ext.	---	---	B (8 - 0.5)
Route 101/Optical Avenue/Connector Road	---	---	C (17 - 0.8)

Legend: B = Level of Service
(15 - 0.7) (Delay in Seconds - Volume/Capacity Ratio)

* Expect more delay and worse Level of Service, due to inadequate available storage.

** Unsignalized with Existing/No-Build conditions

TABLE 3.3.3 - WEAVING ANALYSIS – LEVEL OF SERVICE
Ramp Junction Analysis – Level of Service
Year 2015 Weekday PM Peak Hour Volumes
WEAVING AREA ANALYSIS

Weaving Area	Level of Service	
	Weaving Traffic	Non-Weaving Traffic
Southbound Weave (West Street to Routes 9/10/12)	D	D
Northbound Weave (Routes 9/10/12 to West Street)	C	C
Eastbound Weave * (Trumpet Interchange to SPDI)	D	D

* No westbound weave due to braided ramp system

RAMP JUNCTION ANALYSIS		
Location	**Ramp Type**	**Level of Service**
EASTBOUND (Between Production Drive and Trumpet Interchange)	**Off-Ramp**	**B**
EASTBOUND (Between SPDI and Main Street)	**On-Ramp**	**B**
WESTBOUND (Between SPDI and Main Street)	**Off-Ramp**	**B**
WESTBOUND (Between SPDI and Trumpet Interchange	**Off-Ramp**	**B**
WESTBOUND (Between SPDI and Trumpet Interchange)	**On-Ramp**	**B**
WESTBOUND (Between Trumpet Interchange and Production Drive)	**On-Ramp**	**B**

TABLE 3.3.4 – Traffic Signal Warrant Evaluation Year 2015 Weekday PM Peak Hour Volumes		
Existing Unsignalized Intersection	**Signal Warranted in Near Future**	**Construct Signal Conduit Only***
NH Route 9/Base Hill Road	No	Yes
NH Route 9/Ash Brook Road	No	Yes
NH Base Hill Road/NH Route 10	No	Yes
Ash Hill Road/NH Route 10	No	Yes
Matthews Road/NH Route 10	No	Yes
NH Route 10/Kit Street	No	Yes
Winchester Street/Island Street/Pearl Street	Yes	---
Route 12/Connector Road/NH Route 32 Extension	Yes	---
NH Route 12/NH Route 32	No	Yes

** Based on current analysis, the traffic signal is not warranted. However, conduit will be installed, and the intersection monitored for future signals.*

3.3.3 Proposed Improvements

In general, the proposed improvements consist of upgrading the existing highway network along NH Routes 9,10,12 and 101 through the use of additional travel lanes along highway segments, intersection improvements (additional turning lanes) and where required, inclusion or modification of grade separated interchanges. The proposed improvements include providing two travel lanes in each direction, separated by a 20 foot-curbed median (see Figure 3.3.4) along the following highway segments (refer to Figure 3.3.2):

- Segments 1,2,3,4 – From west to east, the proposed four-lane section would begin west of the Base Hill Road/NH Route 9 intersection and proceed easterly to the Optical Avenue/NH Route 101 intersection. The proposed section would transition back to the existing two-lane highway system, west of Base Hill Road and east of Optical Avenue.

- Segment 5 – Along NH Routes 9,10,12 two northbound travel lanes would be provided from the trumpet interchange northward through the West Street interchange. Two southbound lanes would be provided south of the West Street interchange to the trumpet interchange where the lanes would split to provide east and westbound movements to NH Routes 10,12,101 and NH Route 9.
- Segment 6 – From its intersection with NH Route 101, proposed improvements would include widening NH Route 10 (Winchester Street) to four travel lanes (two each northbound and southbound) separated by a two-way center left turn lane. The proposed five lane section would taper back to meet existing width south of Matthews Road.
- Segment 7 – Proposed improvements would include reconfiguration of the Base Hill Road and Ash Hill Road intersections with NH Route 10 and safety widening along NH Route 10 to provide left turn storage.
- Segment 8 – Proposed improvements would include widening and realignment of Winchester Street from NH Route 101 northward through the Island /Pearl Street intersection.
- Segment 9 – The proposed four-lane section would extend along the proposed Optical Avenue Connector from north of NH Route 32 to the Optical Avenue/NH Route 101 intersection.

The proposed improvements also include new grade separated interchanges at the end of the existing bypass and at the Winchester Street/ NH Routes 10/12/101 intersection, modifications to the West Street interchange, north-south widening along Winchester Street (NH Route 10), widening and inclusion of additional turning lanes at the Main Street/NH Routes 12/101 intersection, inclusion of the Optical Avenue Connector Road various safety and intersection improvements and inclusion of a multi-use path. A more detailed description of the proposed improvements, as described by roadway segment, follows (refer to Figure 3.3.6A for plan sheet layout index, Figures 3.3.6-01 through 3.3.6-12 for plans of the proposed improvements, and Figures 3.3.7-01 through 3.3.7-06 for proposed profiles):

Segment 1

The proposed improvements would begin approximately 430 m (1400 ft.) west of Base Hill Road. NH Route 9 would transition from its existing two-lane width to the proposed four-lane section just west of Base Hill Road. The Base Hill Road intersection with NH Route 9 would be modified by relocating the intersection slightly to the east improving the crossing angle and related sight distance of the intersection. Protected left turn lanes would be provided along NH Route 9 in the median area. Short left-turn storage lanes will be provided along Base Hill Road at the relocated intersection. Although traffic analysis has determined that the reconfigured intersection would not warrant a traffic signal in the near future, the appropriate conduit will be placed under the project in anticipation of future signalization. Other improvements include providing a short connecting roadway to existing Base Hill Road to provide access to a residence located just south of NH Route 9 (see Figure 3.3.6-01).

Continuing eastward, improvements will include providing additional hydraulic capacity for the concrete box culvert that conveys Ash Swamp Brook underneath NH Route 9. The additional hydraulic capacity will be accomplished by providing a supplemental culvert that will also serve as a bike/pedestrian underpass. In addition, the existing box culvert will be lengthened to accommodate the wider NH Route 9 roadway.

Production Drive will be relocated slightly to the west to align with Ash Brook Road. In order to eliminate turning movements adjacent to the proposed trumpet interchange, the existing driveway to the New Hampshire Department of Safety facility will be relocated to the west, running north of the Super 8 Motel and connecting to Ash Brook Road. Protected left turn storage lanes will be provided along NH Route 9 at the intersection. Although the intersection does not warrant signalization, conduit will be placed under this project in anticipation of future signal requirements. The area north of NH Route 9 and west of the existing bypass is being considered for future development, with the site access being proposed at Ash Brook Road. If the development does progress to construction, the developer will be responsible for the additional offsite roadway improvements that would be required to accommodate the future use, including signalization.

The proposed trumpet interchange (see Figures 3.3.6-02) will provide direct connections between the existing bypass and access to the west (NH Route 9) and east (NH Routes 10/12/101). NH Routes 9/10/12 will pass over NH Route 101 on a new bridge. Connecting ramps will provide direct access to the east and west. The configuration and location of the interchange were chosen to maximize the weaving distances between adjacent interchanges (West Street and Winchester Street), accommodate potential construction phasing concepts and to minimize environmental impacts.

Segment 2

In addition to providing additional east-west capacity along NH Routes 10/12/101, the improvements for segment 2 features the inclusion of the Single Point Diamond Interchange (SPDI) at Winchester Street and the related connecting ramps between the proposed trumpet interchange and Winchester Street.

As noted in the *Traffic Needs Study*, the SPDI configuration was chosen as it provided the most efficient traffic operations and geometric design (tightly constrained) that best fit the existing traffic and site conditions. The unique feature of the SPDI is its three-cycle signal phasing in which opposing left turns operate simultaneously. The SPDI features a tightly compressed diamond interchange that contains one signalized intersection located underneath the overpass structure, where all the ramp roadways converge with the side road. In this particular instance, NH Routes 12 and 101 will pass over Winchester Street on a long, 75 m ± (250 ft.) single span bridge. Due to the ramps' close proximity

to the mainline, retaining walls will be required in all four quadrants of the interchange between the mainline section and ramp roadways.

As mentioned previously, the short weaving distance in the westbound direction between the SPDI and the trumpet interchange required an extensive investigation to address this constraint. The proposed solution features a braided ramp concept that provides vertical separation (thus eliminating the weave) between the NH Routes 12/101 westbound to NH Routes 9/10/12 northbound ramp and the westbound movement from Winchester Street to NH Route 9. As can be observed from Figures 3.3.4 and 3.3.6-03 this concept requires the use of retaining walls and construction of a new bridge that will carry the NH Routes 12/101 westbound to NH Routes 9/10/12 northbound ramp over the westbound on ramp. Traffic wishing to access NH Routes 9/10/12 north from Winchester Street will do so via a ramp that will continue westward to NH Routes 9/10/12. Careful consideration will be given to overhead signing along the westbound on ramp, to insure that traffic is lined up correctly for the desired westbound or northbound lane. Although some weaving is expected along this ramp, it will occur on a low speed facility as opposed to the high speed, higher volume mainline section.

Segment 3

Proposed improvements for this segment include the continuation of the east-west widening of NH Routes 12/101 to two travel lanes in the east and west directions. This expansion of the roadway will require the widening of the bridge that carries NH Routes 12/101 over the Ashuelot River.

Segment 3 also includes proposed improvements at the Main Street intersection with NH Routes 12/101. Improvements include additional east-west capacity along NH Route 101, including continuing the two through lanes (east and west direction) through the intersection and providing a dual left turn to North Main Street for the eastbound approach. Improvements along North Main Street include a dual left turn in the southbound direction (to accommodate additional traffic wishing to access the Optical Avenue Connector) and the addition of a right turn lane in the southbound approach.

The aforementioned improvements will result in the elimination of access to King Court and will affect the access to three properties along King Court. The proposed improvement concept presented at the Public Hearing maintained access to the property that occupies the northwest quadrant of the intersection (Coughlin Insurance Building) by converting the existing entrance-only driveway (from Main Street) to a two-way driveway. The remaining properties, owned by Turner-Busch Inc. (NYNEX) and Stretch (Indian King Framery) were to be acquired by the Department. This decision was made only after lengthy alternative investigations and ensuing CATF discussion relative to maintaining King Court access. Alternatives were investigated for providing alternative access via Appleton Street or Main Street. Each of these alternatives was determined to have extensive operational and socioeconomic/historic impacts, and therefore was dismissed as viable options by the CATF.

Following the Public Hearing, Kenneth Bakke (President of Turner-Busch) requested to retain the use of the NYNEX property at 11 King Court, and to provide access to the property through an existing private right-of-way along Richard and Patricia Greene's property located on 431 Main Street. After Department review, an alternative access plan was developed that provided access to the Turner-Busch property and Stretch property via an access drive to Main Street (see Figure 3.3.6-05). Included in this proposal was the provision for a short refuge area to accommodate left turns for northbound vehicles along Main Street.

The layout will avoid the acquisition of the Turner-Busch, Inc. and Stretch properties; however, all affected parties must be agreeable to such a joint access. Should Turner-Busch Inc. and the Department not reach a mutual agreement for a joint easement to gain access to Main Street, then the Department will acquire the properties through the normal Right-of-Way procedure.

Given this access arrangement, the owners of the property at 441 Main Street (Coughlin Insurance) requested to be acquired, which was subsequently granted by the Department.

Improvements along South Main Street include reworking the northbound approach section to provide for a dual left turn and a single northbound through lane. The actual out-to-out width of the roadway will not be increased and improvements will tie into the existing roadway section north of the NH Route 12 bridge over The Branch. Additional improvements include the relocation of Martell Court from its existing intersection location, approximately 80m (250 ft.) south (see Figure 3.3.6-05). This will require construction of a culvert or bridge to span over Beaver Brook. The relocation will enhance the operations of the Main Street/ NH Routes 12/101 intersection and will provide better access to and from Martell Court which currently is very difficult, due to its close proximity to the Main Street intersection.

Segment 4

Improvements include the continuation of the four-lane highway section that will carry through the Optical Avenue intersection. The four-lane section will taper back to meet the existing two-lane section east of Optical Avenue. The four-lane section is required between Main Street and Optical Avenue to accommodate the additional traffic that is anticipated to use the proposed Optical Avenue Connector (Segment 9). Due to the east-west roadway widening, the concrete box culvert that conveys Beaver Brook underneath NH Route 101 will need to be lengthened.

The inclusion of the Optical Avenue Connector will require an exclusive free-flow right turn lane on the eastbound approach to the Optical Avenue intersection, as well as left turn storage in the median along the westbound approach.

As mentioned previously, the Optical Avenue Connector concept was proposed to draw traffic away from South Main Street, providing an at-grade traffic solution

at the Main Street/NH Routes 12/101 intersection, while minimizing socioeconomic and environmental impacts. The intent of the Connector design is to encourage north-south traffic to utilize the bypass in lieu of continuing up South Main Street. The configuration of the intersection of NH Route 32 and South Main Street and the Connector was purposely designed to make it difficult to travel from South Main Street to points south on NH Route 12 and vice versa. This will be accomplished through proposed signal timing at the Optical Avenue Connector/NH Route 32 intersection. Conversely, southbound traffic along South Main Street will be controlled by a stop sign at NH Route 32, making it difficult to find gaps to make a left turn, then a quick right turn to access NH Route 12 south.

The Connector itself will consist of two travel lanes in the north and south direction separated by a 6.1 m (20 ft.) curbed median. The Connector will require a new two-span bridge to cross over The Branch. The Connector will provide for dual left turn lanes for the northbound approach to the Optical Avenue/NH Route 101 intersection. The Connector will bisect Rose Lane, which will be relocated to the south to align with NH Route 32, thus forming the fourth leg of the intersection. Additionally, a short connector roadway will be provided from Chestnut Green Condominiums to Rose Lane (see Figure 3.3.6-07). This relocation will provide improved ingress and egress for the businesses located along Rose Lane as well as Chestnut Green Condominiums, as they will have the advantage of a signalized intersection with NH Routes 12/32 to gain access to points north or south. The northern section of Rose Lane will be dead-ended and a maintenance turnaround provided. Also, as requested by the owners of the Chestnut Green Condominium Association, the existing access drive to NH Route 12 will be discontinued.

Other provisions include a 'hammerhead' turnaround at the end of the short section of South Main Street (south of NH Route 32), as this road will be dead-ended.

Segment 5

Improvements include the widening of NH Routes 9/10/12 to accommodate an additional northbound lane from the trumpet interchange north through the West Street interchange and an additional southbound lane south of the West Street interchange. Improvements will require modifications and widening along West Street to accommodate 2015 traffic volumes including additional through and left turn lanes (see Figure 3.3.6-10) between intersection ramps. Additional West Street improvements are proposed at the West Street/Park Avenue intersection, which will be reconfigured to provide improved geometrics and operations.

Due to the proposed West Street and NH Routes 9/10/12 widening, the NH Routes 9/10/12 bridge over West Street will be reconstructed and the corresponding roadway profile raised to provide adequate vertical clearance over West Street. Additional interchange improvements include a two-lane exit ramp for the NB off ramp and additional ramp widening to provide for turning movements at the respective West Street intersections.

Both ramp intersections will continue to be signalized in the future, and will be coordinated with a proposed coordinated signal system along West Street that is planned by the City of Keene.

Segment 6

As identified in the *Traffic Needs Study*, NH Route 10 (lower Winchester Street) requires a five-lane section consisting of two lanes in the northbound and southbound direction with a two-way center left turn lane (see Figure 3.3.5) to accommodate the projected 2015 traffic volumes. This section is proposed from south of the SPDI interchange improvements to the vicinity of Matthews Road, where the roadway width will taper back to meet the existing roadway width just south of Matthews Road (see Figure 3.3.6-03). The alignment of this proposed typical section was studied in detail in an attempt to minimize impacts to adjacent properties. The proposed alignment was selected after months of study and CATF discussion, as it provided the needed capacity improvements, while minimizing potential total acquisitions of adjacent properties or businesses.

The proposed roadway improvements include the dead ending of Lucinda Terrace to eliminate a dangerous intersection sight distance problem at the NH Route 10/ Lucinda Terrace intersection. Lucinda Terrace traffic will now access NH Route 10 via Matthews Road located approximately 215 m (700 ft.) east of the intersection. The construction of a hammerhead turnaround will require the acquisition of one property (Nadeau) located in the northeast quadrant of the intersection. Roadway improvements will also include construction of a sidewalk along the westerly side of Winchester Street from the SPDI southward to Bergeron Avenue and will also propose the consolidation of driveway access points along this highly developed section of roadway.

In addition to the proposed turning lane improvements at the SPDI, improvements are proposed at the Matthews Road/NH Route 10 intersection that include improving the intersection geometrics to improve the intersection angle. Although signal warrants are currently not met, both Kit Street and Matthews Road intersections with NH Route 10 will be provided with conduit in anticipation of future signal requirements.

Segment 7

Proposed improvements at the Base Hill Road/Ash Hill Road intersection with NH Route 10 includes both realignment and improvements along the side roads and horizontal and vertical alignment adjustments and widening along NH Route 10 (see Figure 3.3.6-08).

In order to address the poor geometrics at the existing Ash Hill Road/Base Hill Road crossing of NH Route 10, Ash Hill Road will be relocated approximately 275 m (900 ft.) south so that it aligns itself opposite Whittemore Farms Road. This will produce an 'offset intersection' configuration, thus eliminating direct crossings from Base Hill Road to Ash Hill Road, or vice versa. Vehicles wishing

to cross NH Route 10 would first access NH Route 10, turn right, and then turn left to the opposite side-road. NH Route 10 would be widened to provide left turn lanes to Ash Hill and Base Hill Roads (see Figure 3.3.5). NH Route 10 geometrics would also be modified to provide improved sight distance to the Base Hill Road intersection. Additional minor improvements would include the construction of a hammerhead type turnaround at the end of Ash Hill Road, and the relocation of a driveway at the residence located at the end of the now dead-ended Ash Hill Road.

Segment 8

Proposed Winchester Street improvements north of NH Route 101 include widening to accommodate additional turning lanes for the SPDI (see Figure 3.3.6-03A). Due to the close proximity of the Key Road intersection and to provide smooth lane transitions, improvements will be made at the Key Road intersection by adding additional turning lanes including an exclusive southbound right turn lane. The proposed signal at Key Road will be coordinated with the signal at the SPDI and Winchester Street/Island Street (see below).

The associated widening along this section of Winchester Street will cause unavoidable acquisition of adjacent properties. As such, multiple alignments were investigated to minimize these damages. After review of the anticipated impacts along the eastern and western sides of Winchester Street, it was determined that the least damaging option would be to hold the existing limits of the western roadway and provide the required roadway widening along the east side of Winchester Street. This will require the acquisition of two businesses and a house (currently vacant) owned by Keene State College.

At the request of the City of Keene, the NHDOT Commissioner agreed to extend the project northward to include addressing the traffic congestion problems at the Island/Pearl Street intersection. After investigating multiple intersection improvement concepts, including consideration of a round-about and 'jughandle' intersection configurations, the proposed concept depicted in Figure 3.3.6-03A, was investigated and subsequently approved by the CATF. The concept essentially makes Winchester Street to Island Street a direct north-south movement, and realigns northern Winchester Street opposite Pearl Street, thus completing a four-legged, signalized intersection. This option provided good level of service, limited construction costs and minimized impacts to an adjacent City of Keene Park. The option would require widening along Island Street to accommodate additional turning lanes at the proposed Winchester Street/Island Street/Pearl Street intersection and construction of a new bridge over the Ashuelot River to replace an aging, narrow temporary bridge. This option has the additional benefit of matching into existing roadway conditions, before the Winchester Street Bridge crossing of the Ashuelot River (as opposed to all other options investigated); thus saving associated bridge widening costs.

The proposed reconfiguration of the Island Street/Winchester Street intersection will require modification to the Keene State College parking facility located along

the east side of Winchester Street. The relocation of Winchester Street to the east will result in the loss of approximately 100 parking spaces and will require modification of the access drives to the lot. The entrance drive will be located towards the north end of the lot whereas the exit drive will be located at the south end, away from the Island/Winchester Street intersection. The existing landscape features (grassed earth berms) within the parking lot will be replicated in the new lot layout.

Multi-Use Trail

In addition to vehicular traffic, the existing highway corridor is used extensively by alternative modes of non-motorized transportation including bicycle, pedestrian (use of sidewalks and shoulders), snowmobile and equestrian users (use of adjacent areas). With the inclusion of higher speed grade separated interchanges at the end of the existing bypass and Winchester Street, alternative methods for providing existing access for these users were investigated. The proposed method of maintaining existing access consists of providing a multi-use path that essentially parallels the alignments of NH Routes 9, 10, 12 and 101. The plan features the following components:

- The multi-use path will be comprised of a 3.0 m (10 ft.) paved section with 0.6 m (2 ft.) graded shoulders on each side. (Note that the Department agreed to increase the width of the path to 3.0 m (10 ft.) from 2.4 m (8 ft.) in response to numerous requests by various multi-user groups for a wider path width.)
- In the east-west direction, the path will begin near Ash Swamp Brook and will run eastward to the southern branch of the Cheshire Branch trail. The path will pass underneath the Optical Avenue Connector Bridge over the Branch River. East of Optical Avenue, the path will be unpaved and will consist of a graded shelf that can accommodate a future paved path. The path will generally run along the southern toe of slope of the east-west improvements. The path will align itself with the proposed pedestrian crossing locations at the Main Street and Winchester Street locations.
- A grade-separated underpass culvert (approximate size 4.6 m (15 ft.) width by 3.0 m (10 ft.) height) will be provided at Ash Swamp Brook to allow a north-south crossing of NH Route 9. The culvert will serve a dual use, also serving as a flood relief structure for Ash Swamp Brook (see Section 4.9.2).
- A grade-separated structure (path over NH Routes 12/101) will be provided at the Ashuelot trail crossing (see Figure 3.3.6-04). The path will loop to the south to provide access to the existing railroad (trail) approach grade. A direct east-west path connection will be provided underneath the proposed overpass structure.
- The NH Routes 12/101 bridge over the Ashuelot River will be widened and protected with guard rail to provide a protected crossing over the river.
- Similar to the east-west improvements, north-south provisions include a path beginning in the vicinity of Relocated Production Drive and heading

northward to the Cheshire Branch and West Street. The proposed path would run along the western toe of slope of NH Routes 9/10/12. The NH Routes 9/10/12 bridge over West Street will be lengthened to allow for a bike lane along the south side of West Street to make a connection to the proposed bike path currently under construction (Fall 1997) between the West Street Interchange and Main Street vicinity.

- The multi-use path will continue northward, tying into the existing bike path network serving Keene's Wheelock Park, which was built in conjunction with the NH Routes 9/10/12 Interchange project. Connections to NH Route 12 will feature a one-way (southbound only) path from NH Route 12 to the existing network, whereas the access to NH Route 12 north will be via a new connection from the existing bike path to the northbound shoulder of NH Route 12 (see Figure 3.3.6-12). From the east (NH Routes 9/10), users will access the existing bike path network via an emergency access road location (just west of Court Street) and a short connection between the access road and existing path.

3.3.4 Construction Phasing/ Construction/Right of Way Costs

Because of the complexities and size of the project, funding considerations and the phasing and timing of construction activities were major topics of CATF discussion. Through a consensus-building process, the CATF and NHDOT focused on developing a construction phasing concept that addressed the most critical needs of the project early in the sequence, while balancing traffic, engineering and funding considerations. The phasing concept that was proposed is depicted in Figure 3.3.3 and the ensuing discussion.

As can be observed from Figure 3.3.3, the construction is envisioned to occur in seven major phases. Table 3.3.5 provides information relative to the phase location, construction duration, preliminary and final engineering costs, right of way costs, construction costs and funding information for the current State of New Hampshire Ten Year Program. A brief description of the various phases and reasons for prioritization follows:

Phases 1, 2

In general, the CATF considered Winchester Street and its related congestion at major intersections with NH Routes 12/101 and Key Road to be the most critical area of the project that required improvements. As such, it was recommended that north-south Winchester Street improvements be given the top priority in terms of phasing. Although there was little debate as to this decision, there was concern about traffic behavior when Winchester Street was under construction, specifically regarding potential detour routes such as Base Hill Road. The traffic model was utilized to estimate how traffic would behave given the assumption that Winchester Street would be under construction and delays could be expected. The results of this analysis clearly showed that there would be a substantial increase of traffic on Base Hill Road in an attempt to avoid the construction zone. It was recommended that the intersections of Base Hill Road with NH Route 9 and NH Route 10 be constructed prior to north-south Winchester Street improvements to provide needed safety improvements at these intersections. The improvements at the Base Hill Road/ NH Route 9 intersection will also include improvements eastward along NH Route 9 to the vicinity of Ash Swamp Brook.

In addition to the north-south Winchester Street improvements in Phase 2, some temporary east-west improvements may be required along NH Routes 12/101 to provide acceptable level of service at the Winchester Street/ NH Routes 12/101 temporary intersection. Preliminary traffic analysis suggested the need for a temporary additional through and right turn lane in the east-west direction (one through, one right turn lane each direction).

Phase 3

After Winchester Street, the Main Street intersection with NH Routes 12/101 was identified as the other major bottleneck relative to traffic congestion and needed improvements. Additionally, it has the highest level of accidents of the study roadways. It was further agreed that it was logical to construct the Optical Avenue Connector and the related improvements along NH Route 101 prior to construction at the Main Street area. With the Optical Avenue improvements in place, traffic would be redirected away from South Main Street, thus construction along Main Street could be accomplished under much lower traffic volumes when the improvements are eventually built (in Phase 5). As depicted in Figure 3.3.3, the Rose Lane realignment and improvements along NH Route 32 would also occur under this phase.

Phase 4

Phase 4 improvements would include the construction of the east and westbound ramps of the Single Point Diamond Interchange (SPDI) such that east-west traffic on NH Routes 12/101 would be shifted to these ramps. The ramps would be temporarily widened to two lanes in each direction to accommodate the higher mainline east-west traffic volumes. Temporary signals would be installed along Winchester Street at both the eastbound and westbound ramp intersection locations. These temporary signals will be coordinated with adjacent signals at

Key Road and Island/Pearl Street to insure proper traffic progression. These improvements would provide additional capacity at Winchester Street and provide room for future construction of the mainline portion of the SPDI including the bridge over Winchester Street and its associated retaining walls.

Improvements will also include upgrading of NH Route 9 to four lanes from the vicinity of Ash Brook Road including the relocation of Production Drive, Ash Brook Road improvements and the proposed improvements at the Ash Swamp Brook culvert (under NH Route 9).

In conjunction with this phase it was proposed to construct the majority of the multi-use trail system with the intent of providing a system that removes the path users from future construction zones along NH Routes 10/12/101 during completion of the SPDI and trumpet interchange. As currently proposed, the construction of the multi-use bridge over NH Routes 12/101 at the Ashuelot trail crossing would be included in this phase. During ensuing CATF discussion it was also noted that the construction of the bridge could occur in any phase and could be moved up in the overall sequence if desired.

Phase 5

Prior to completion of the SPDI and trumpet interchange, it is proposed to complete the Main Street intersection improvements and widen NH Routes 12/101 to four lanes adjacent to the intersection. This would provide a consistent four-lane section along NH Route 101 and ultimate improvements at Main Street in advance of the major construction of the SPDI and trumpet interchange. Improvements in this phase would include the widening of the NH Routes 12/101 bridge over the Ashuelot River and completion of the multi-use trail to Main Street.

Phase 6

Phase 6 includes the completion of the major components of the SPDI, the trumpet interchange and construction of the braided ramp system that will provide the eventual connections between the interchanges. As can be observed from Table 3.3.5, this phase represents the most costly component of the project and is anticipated to take at least two full construction seasons to complete. The traffic control plan to maintain traffic during this phase will be comprised of multiple sub-phases that will be fully developed during final design.

Phase 7

The final phase will be completion of the West Street Interchange improvements and associated improvements along West Street. As currently proposed, the final link of the multi-use path will also be constructed under this phase, connecting the path from West Street northward to the NH Routes 9/10/12 interchange area.

Wetland Mitigation Phasing

Approximately 80 percent of the wetland impacts associated with the project occur during Phases 4-7 (see Section 4.10.6). The greatest impacts are associated with Phase 6 (30 percent, or 3.8 ha (9.4 ac)), which involves construction of the proposed trumpet interchange. The concept for mitigation area construction currently being considered by NHDOT is to construct the areas during the same construction phase (work area) in which the proposed mitigation site lies. Since almost all (10.8 ha (26.6 ac), or about 82 percent) of the proposed wetland mitigation is adjacent to the trumpet interchange area, the majority would thus be accomplished prior to, or during, Phase 6.

TABLE 3.3.5 – CONSTRUCTION PHASING/PROJECT COSTS *							
CONST. PHASE	LOCATION	FISCAL YEAR	CONST. DURATION	ENGINEERING ESTIMATE	RIGHT OF WAY ESTIMATE	CONST. ESTIMATE	TOTAL COST
1	Base Hill Rd/NH Rte. 9 & NH Rte. 10	2000	1 year	$350,000	$400,000	$3,300,000	$4,050,000
2	Winchester Street (City Part.)	2002	1-2 years	$250,000	$435,000	$1,500,000	$2,185,000
	Winchester Street (State Part)			$450,000	$2,500,000	$3,500,000	$6,450,000
3	NH 101/Optical Ave/NH 32	2001	1 year	$850,000	$1,225,000	$7,450,000	$9,525,000
4	SPDI EB & WB Ramps	2003	1 year	$850,000	$250,000	$6,300,000	$7,400,000
5	Main Street & NH 12/101	2003	1 year	$600,000	$1,250,000	$5,000,000	$6,850,000
6	SPDI Mainline & Trumphet Int'c	2004/05	2 years	$1,800,000	-	$16,200,000	$18,000,000
7	West Street Interchange	2005	1-2 years	$750,000	$230,000	$6,500,000	$7,480,000
TOTAL COST				**$5,900,000**	**$6,290,000**	**$49,750,000**	**$61,940,000**

* These cost are preliminary based upon Conceptual Design Information

STATE'S TEN YEAR PROGRAM
(In Millions)

	ENGR.:	ROW:	CONSTRUCTION:
	FY 99 - $5.000	FY 99 - $0.400	FY 00 - $ 4.000
	FY 00 - $0.500	FY 00 - $2.000	FY 01 - $ 6.000
		FY 01 - $3.750	FY 02 – $ 5.300
		FY 02 – $0.500	FY 03 – $11.750
			FY 04 - $ 4.550
			FY 05 - $ 19.000
TOTAL	$5.500 MILLION	$6.650 MILLION	$50.600 MILLION

IV. Environmental Impacts of Proposed Action

IV. ENVIRONMENTAL IMPACTS OF PROPOSED ACTION

4.1 LAND USE

4.1.1 Existing Land Use

As the largest and only city in Cheshire County and the hub of four major highways, existing land use in the City of Keene reflects the full spectrum of development intensity. Within the project limits, land use consists of well-defined areas of undeveloped, agricultural, residential, commercial, industrial, and public land uses (see Figure 4.1.1). Existing development patterns place undeveloped and agricultural properties along NH Routes 9, 9/10/12, 10/12/101, and 101. Residential properties are found along Base Hill Road, West Street west of NH Routes 9/10/12, Main Street, and NH Routes 10 and 12. Commercial and industrial properties exist along West Street east of NH Routes 9/10/12, Winchester Street, Main Street, Optical Avenue, and NH Routes 10 and 12. Public facilities are scattered throughout the project limits. The former City of Keene landfill is located southeast of the NH Route 12 and NH Route 101 intersection.

The Town of Swanzey is a sparsely developed residential community, with approximately 15 percent of the town's 11,332 ha (28,000 ac) currently developed (*Land Use Plan,* 1990). Within the project limits, land uses include undeveloped, conservation, public, residential, and commercial (see Figure 4.1.1). Businesses and residences are concentrated along NH Routes 10, 12, and 32 near the City of Keene/Town of Swanzey border. Development along Ash Hill and Base Hill Roads is primarily residential. A commercial establishment and NHDOT District Maintenance Facility are located on Base Hill Road near the Base Hill Road/NH Route 10 intersection. A small section of the Yale Forest, a private conservation area, is within the project limits north of the Base Hill Road/NH Route 10 intersection.

4.1.2 Future Land Use/Proposed Developments

Land use and development in a municipality are influenced in part by the municipality's population trends. Population projections prepared by the New Hampshire Office of State Planning predict that the population of City of Keene will remain fairly consistent (approximately 22,700) during the next twenty years. As such, it is not anticipated that the City will experience the intense development pressures encountered during the past thirty years. The Town of Swanzey's population (approximately 6,500) is predicted to increase steadily through the next twenty years. However, land use in most of the immediate project area within City of Keene and Town of Swanzey is expected to remain unchanged because it is currently developed or is unsuitable for development due to features such as wetlands and floodplains.

Specific projects, such as a new mall or conference center, also have the potential to influence development in its surrounding area. The City of Keene Planning Department and the Town of Swanzey Planning Board secretary were contacted to identify any major developments proposed within the project limits. Only one large development, the proposed Konover Commercial Retail Center in Keene, is currently proposed.

The proposed Konover Commercial Retail Center will be developed immediately east of Ash Swamp Brook and north of NH Route 9, behind the existing Super 8 Motel and the NH Fish and Game Office/NH State Police Barracks building. As currently planned, the retail center would ultimately consist of two separate buildings, with a combined floor space of approximately 41,800 m^2 (450,000 $ft.^2$). As of this writing, it remains uncertain when the proposed Konover Commercial Retail Center will be constructed.

In order to provide access to the proposed retail center, the existing driveway of the Super 8 Motel will be developed by the Konover Development Corporation as a four-lane roadway, Ash Brook Road. Production Drive is proposed to be relocated to the west, in order to align with Ash Brook Road. This will be a 4-way intersection that will be constructed to accommodate a future traffic light, in the event that the proposed retail center is completed. The road will also be used to access the NH Fish and Game Office/NH State Police Barracks building, as the existing driveway to the building will be eliminated under the proposed improvements to NH Route 9. Construction of a State liquor store is being considered at this location, and it would also be accessed via this road. In addition, the intersection at Base Hill Road and NH Route 9 must be reconfigured by the developer, should the development precede the proposed roadway improvements, due to potential traffic impacts.

In the Town of Swanzey, a development proposal has been made for a parcel located on the west side of NH Route 10, just south of the Keene/Swanzey boundary and slightly beyond the work limits of the proposed roadway improvements. The proposed development would include a 2,500 m^2 (27,000 $ft.^2$) theater complex and approximately 6,200 m^2 (67,000 $ft.^2$) of retail space. The proposal has received conditional site plan approval from the Town, contingent upon receipt of required permits and approvals from other agencies. It is anticipated that this development will be constructed during the 1999 construction season.

4.1.3 Existing Zoning

The City of Keene and the Town of Swanzey regulate development within the project area. Both municipalities have zoning ordinances designed to promote the health, safety, and general welfare of the communities. As such, the individual ordinances dictate the type, density, and location of development within each community.

According to the City of Keene's official zoning map and the *Keene Zoning Ordinance* (November, 1996), project-area roadways front on nine zoning districts (see Figure 4.1.2). These districts and their intent are summarized below:

Zone	Intent of Zone
• Conservation	Preserve as open space land which is critical or delicate in an environmental nature
• Agricultural	Allow for farms and farmland, and discourage nonagricultural activity
• Rural	Provide for very low density residential or agricultural development without disrupting the natural terrain
• Low Density	Provide for low density/intensity single family residential dwellings
• Medium Density	Provide for medium density/intensity residential dwellings up to three units per structure
• High Density	Provide for high density/intensity residential dwellings with no limits on the number of units per structure
• Commerce	Provide an area of intense commercial development
• Industrial	Provide for manufacturing, processing, assembling, wholesaling, and transportation -oriented activities
• Industrial Park	Provide for those manufacturing and assembling activities which add value to a product

Since there are numerous zoning districts within the project area, no particular zoning district will be disproportionately affected.

Within the project limits, two areas have recently been proposed for re-zoning. As shown in Figure 4.1.2, properties along the west side of Winchester Street from the intersection with NH Routes 10/12/101 to just south of Wetmore Street are zoned Commercial. It has been proposed to extend the Commercial zone southward to Ash Swamp Brook. This would require rezoning several properties from Industrial to Commercial. It is unlikely the rezoning will have a substantial impact on the proposed project, as the properties proposed for rezoning are currently developed. Since the issuance of the DEA, this request for rezoning was denied. However, changes to the City's *Master Plan* are being considered that would allow this rezoning in the future.

The second area proposed for rezoning is located on the eastern side of Winchester Street at the intersection with NH Routes 10/12/101. A request has been made to rezone approximately 8 ha (20 ac) of an undeveloped 34 ha (85 ac)

parcel from Industrial to Commercial. Approximately 0.24 ha (0.6 ac) of the 8 ha (20 ac) will be acquired as part of the project to accommodate the new interchange. The construction of a commercial establishment at this location could generate substantial traffic volumes, depending on the type and size of the business. The parcel currently has deeded access to Winchester Street approximately 150 m (500 ft.) south of the intersection of NH Routes 10/12/101 (see Figure 3.3.6-03). Under Build conditions, access at this location may require that certain movements be restricted, because of its proximity to the intersection. As an alternative, access to this parcel, and/or future subdivisions thereof, could be via Krif Road and other right-of-ways that exist on the east side of Winchester Street.

The above-noted request for a change in zoning was also denied following issuance of the DEA. The owner of the parcel remains interested in pursuing a zoning change at this location.

In the Town of Swanzey, project-area roadways front only two zoning districts: Business (B) and Commercial/Industrial (C/I) (see Figure 4.1.2). According to the Town of Swanzey's *Zoning Ordinance* (March, 1997), the Business (B) zone is intended to provide for the development of commercial uses that are oriented towards the traveling public or are most suited on a highly accessible highway network. NH Routes 12 and 32 within the project area are in the Business zone. The Commercial/Industrial (CI) zone was created to minimize strip development and encourage off-road development on portions of NH Route 10. NH Route 10 and portions of Ash Hill and Base Hill Roads are within the Commercial/Industrial (CI) zone.

4.1.4 Consistency with Regional and Local Plans

4.1.4.1 Regional Plans

The Southwest Region Planning Commission (SWRPC) prepared the *Southwest Region Transportation Plan* (September, 1992) to identify transportation priorities within Cheshire and Hillsborough Counties. This analysis of the region's highway network revealed that there are numerous deficiencies with the NH Routes 9, 10, 12, 101 roadway network in the Keene/Swanzey area, particularly with regard to the level of service (LOS) at major intersections. At the time this document was prepared, the major element of the Keene/Swanzey project was the original bypass concept, i.e., a bypass on new location extending from the NH Routes 9/10/12 intersection southward to NH Route 10 near its intersection with Base Hill Road.

Although it was noted that traffic volumes and speeds along the NH Route 10 bypass could create safety hazards and endanger land use patterns within the Town of Swanzey, the SWRPC identified the City of Keene existing Bypass System as its highest priority project for the Region's Transportation

Improvement Program (TIP). Specific recommendations contained in the 1992 document were as follows:

> "Design and construction of intersections and road segments to segregate through and local traffic at NH 12 & 101; NH 10, NH 12 & NH 101; and NH 9, NH 10 & NH 12 on the Keene bypass system. The project may include a 4-lane highway from east of NH 12 on NH 101 to west of NH 12 on NH 9, overpasses at each intersection, and a bypass link of NH 12 from the intersection of NH 12 from the intersection of NH 32 & NH 12 northeast to the intersection of NH 101 and Optical Avenue."

More recently, the SWRPC has prepared the *Southwest Region Transportation Improvement Program for 1999-2008*, as an update to the *Southwest Region Transportation Plan.*

The updated plan again identifies the City of Keene Bypass System as its highest priority project for the region's State Transportation Improvement Program (TIP). Although still referred to as the "bypass" project in the updated SWRPC document, it is clear that the concept being endorsed is that of the current NH Routes 9, 10, 12, 101 Improvement Project as described in this Environmental Assessment, and not the original NH Route 10 Bypass.

Given the SWRPC's acknowledgement of traffic problems on project-area roadways and the ranking of the City of Keene Bypass project as the number one priority in the TIP, the proposed project is consistent with recommendations of the SWRPC.

4.1.4.2 Keene Master Plan

The City of Keene completed its *Master Plan* in 1995. The *Master Plan* is composed of nine "mini plans" on topics such as land use, open space, and economic development. Two of these plans—Land Use and Transportation—are particularly relevant to this study.

The *Land Use Master Plan* (1994) was developed to "encourage rational, economical, and environmentally efficient" land use patterns. It was designed for a 10-year horizon and applies to five broad categories of land use, including open space, industrial, commercial, residential, and institutional. Land use objectives from the *Plan* that are relevant to this project are discussed below.

- Open Space, including water resources, hillsides, trail corridors and greenways, land with special or unique characteristics, and active and passive recreational areas.

- Abandoned railroad beds should be preserved for recreational purposes whenever possible

- Areas surrounding groundwater supply wells should be protected
- Areas bordering rivers and streams should be designated as future "greenways"

- The City should establish a policy of "no net loss of wetlands"

- Industrial Land, including land used for manufacturing products.

  - The City should adopt a policy of "no net loss of industrial land," and additional acreage that is suitable for industrial development has been identified.

- Commercial Land, including land used for business purposes other than those included as industrial uses.

  - New commercial development should occur in the area bounded by Winchester Street, NH Routes 9/10/101 bypass, and Downtown. Land along major roadways should be developed for industrial or commercial development.

While the proposed project will permanently alter 11.5 ha (28.5 ac) of existing wetlands, an approximately equal acreage of wetlands will be restored/created as a mitigation measure. As such, the City's policy of "no net loss of wetlands" will be upheld. The proposed project is also consistent with the other goals listed above.

Phase I: Downtown of the *Transportation Master Plan* (1993) focuses on traffic problems inside the bypass. The City Planning Department hopes to commence work on Phase II, which would cover the remainder of the city, in the upcoming year. Nevertheless, the Phase I plan has a broad goal that concerns traffic well beyond the downtown area, as follows:

"Maintain and expand the capacity of the major corridors leading into the Downtown, and encourage and facilitate a concentration of future office and retail development inside the bypass system, so as to minimize the spread of traffic congestion in the remainder of the City. Complete a major upgrade of West Street, Winchester Street, Main Street, and Emerald Street by the year 2003"

Since the proposed project will expand the capacity of the major corridors leading into the city and thus assist in the alleviation of city-wide traffic congestion, it can be concluded that it is consistent with the *Transportation Master Plan.*

4.1.4.3 Swanzey Master Plan

The *Swanzey Master Plan* (1990) was developed to guide the town on issues such as land use, housing needs, and transportation needs. The Thoroughfare and Transportation Analysis and Land Use Plan sections of the *Plan* are relevant to the proposed project, and are discussed below.

The general goal presented in Thoroughfare and Transportation Analysis section is as follows:

> "To provide for the safe and convenient circulation and movement of goods and people within the Town and to points beyond utilizing all practical methods"

Since the proposed project will improve safety and circulation within the Town of Swanzey and the City of Keene, it can be concluded that it is consistent with the above goal.

The Land Use Plan section presents the proposed land use patterns within the Town of Swanzey for the next five to ten years. Goals and objectives were developed for several types of land uses; those that are relevant to the proposed project are listed below:

Residential

- "Allow for development off of major roads in order to discourage 'strip' development."

Economic Development

- "Recognize the importance of the West Swanzey sewer system and the Town of Swanzey Water Company's community water system in promoting the expansion of commercial and industrial development in the West Swanzey/Route 10 area".

- "Amend the Town of Swanzey Zoning Ordinance to provide for a Light Industrial Zone encompassing part of the Yale Forest between Matthews Road and Route 10".

Recreation

- "Identify existing publicly-owned green space and specify intended uses to meet community needs for recreation, as well as for conservation and production".

Natural Resource Use and Conservation

- "Preserve and protect the Town of Swanzey's natural resources, including forest lands, air, wildlife habitats, and earth and water resources".

- "Ensure that the natural resources are protected for aesthetic pleasure and recreational use, as well as for the health and well-being of the residents".

- "Encourage development that is compatible with the natural resources and does not contribute to pollution, erosion, or other detriments to the environment".

The proposed project is consistent with the goals and objectives presented in the Land Use Plan section.

4.2 SOCIAL IMPACTS

The social impacts of this project are considered in five different categories: Neighborhoods, Travel Patterns/Accessibility, Local Facilities, Other Public Services, and Pedestrian/Bicycle Paths. All of these social aspects can potentially be impacted by a project of this magnitude. Therefore, the following sections discuss the possible impacts that may be associated with this project.

4.2.1 Neighborhoods

Eight distinct neighborhoods or residential areas can be identified within the project limits as follows:

1) Park-Fairview Area, located west of the West Street interchange, including the Park-Fairview Historic District.
2) Base Hill Road/Route 9 area, including properties on both sides of NH Route 9
3) Island/Park Street area, including several residences on Winchester Street north of Key Road
4) South Winchester Street area, extending from the Winchester Street Intersection with NH Routes 10/12/101 to Ash Swamp Brook, and including residential areas accessed by Fairbanks and Wetmore Streets.
5) Winchester Street/Matthews Road areas, extending along those streets from Ash Swamp Brook to the vicinity of the Keene/Swanzey line
6) Base Hill Road/Ash Hill Road area in the Town of Swanzey
7) Main Street area, located north of NH Route 101, including the Main Street Historic District
8) NH Routes 12/32 area, extending from Main Street south of NH Route 101, south to the project limits.

Because the proposed roadway improvements center on the existing alignment, impacts on the majority of the neighborhoods will be minor. The number of residential displacements by neighborhood is presented in Table 4.2.1.

TABLE 4.2.1 – RESIDENTIAL DISPLACEMENTS BY NEIGHBORHOOD

NEIGHBORHOOD	NUMBER OF RESIDENTIAL DISPLACEMENTS (Units)
Park-Fairview	0
Base Hill Road/Route 9	0
Island/Pearl Streets	3
South Winchester Street	0
Winchester Street/Matthews Road	1
Base Hill Road/Ash Hill Road	0
Main Street	2
Routes 12/32	8

As shown in the table, displacements associated with the projects are largely isolated, and most neighborhoods will have no displacements. Thus, the character and cohesion of most neighborhoods will be largely unaffected by the proposed improvements.

Neighborhood impacts occur primarily in one area. The Optical Avenue Connector will be on new alignment, and will alter the character of the neighborhood near the intersection of NH Routes 12 and 32. The new connector will divide the neighborhood, but will not isolate any portions of it, because the facility will be at-grade.

Construction of the connector will require the acquisition of 8 residential units along NH Route 12. Thus, the composition of the neighborhood will change somewhat, as 8 households will have to relocate outside the neighborhood.

Some of the effects of the Optical Avenue Connector on the neighborhood will be positive. In particular, the connector will divert a substantial volume of traffic away from the portion of Main Street located north of the connector, which is the largest part of the neighborhood. These residences on Main Street will thus experience less traffic, and a reduction in traffic noise (see Section 4.6). Conversely, those residential properties which directly abut the new connector, will experience a slight increase in noise levels.

All neighborhoods may experience some inconvenience during the construction period. However, access will be maintained to all neighborhoods and individual properties during this period.

4.2.2 Travel Patterns/Accessibility

- NH Route 9

  NH Route 9 will be widened to two lanes in each direction (plus turning lanes) from approximately 100 m (350 ft.) west of the existing Base Hill Road intersection to the proposed trumpet interchange on NH Route 9 (see Figure 4.2.1). Eastbound and westbound traffic will be separated by a raised, curbed median. Access onto NH Route 9 will be provided only at the Base Hill Road and Production Drive/Ash Brook Road intersections. The existing driveway to the New Hampshire Fish and Game Department (NHF&G) office/ NH State Police Barracks building will be eliminated since the building will not be accessible from eastbound NH Route 9. Access to this building will be rerouted via existing Ash Brook Road, located approximately 180 m (600 ft.) west of the existing driveway. Since access will be retained to all other buildings to the east along NH Route 9, and only minor changes will occur to make roadway travel easier, it is expected that there will be no negative access impacts in this area.

- Base Hill Road/NH Route 9 Intersection

  Improvements to the Base Hill Road/NH Route 9 intersection will shift Base Hill Road approximately 150 m (500 ft.) east of the existing alignment. Initially, stop signs will be placed on Base Hill Road at its intersection with NH Route 9. The stop signs may be replaced with a traffic signal in the future, if warranted.

  A portion of the existing roadway will be left in place, in order to maintain access to a residence located in the southwest corner of the Base Hill Road/NH Route 9 intersection, and to a currently unimproved parcel which has deeded right-of-way to Base Hill Road. A turnaround will be constructed at the end of this segment so that maintenance and emergency vehicles can be accommodated. A stop sign will be placed at the intersection with relocated Base Hill Road. Since Base Hill Road will only be shifted a minor distance and access will be maintained to all properties, no negative impacts to existing travel patterns or accessibility are anticipated.

- Production Drive

  The entrance to Production Drive will be shifted approximately 180 m (600 ft.) to the west so that it is directly across from Ash Brook Road (see Figure 4.2.1). If the proposed Konover Commercial Retail Center is built, Konover Development Corporation will improve Ash Brook Road and will provide intersection signalization to utilize it as an entrance/exit to the retail center. If the commercial retail center is not built, stop signs will be placed at the ends of Production Drive and Ash Brook Road, but the conduit will be placed to accommodate a future traffic signal when warranted. No negative impacts are anticipated regarding access in this area.

- NH Route 9/NH Routes 9/10/12/101 Intersection

  The proposed trumpet interchange at the NH Route 9/NH Routes 9/10/12/101 intersection will result in changes to existing travel patterns, but will retain all currently available movements. Currently, vehicles passing through this intersection are controlled by a traffic signal. Under the proposed interchange, traffic driving on NH Route 9 and NH Routes 10/12/101 will have a through movement, without stopping. Vehicles southbound along NH Routes 9/10/12 will have direct access to east and westbound directions via new interchange ramps connecting to NH Route 9 (westbound) and NH Routes 10/12/101 (eastbound) (see Figure 4.2.1). These changes are expected to decrease delays in travel along NH Routes 10/12/101, as well as create safer travel due to limited access

on NH Routes 10/12/101. Negative impacts to accessibility or travel patterns are not anticipated from the proposed trumpet interchange.

- West Street/Park Avenue Intersection/West Street Interchange

  In order to mitigate an existing non-standard alignment at the West Street/Park Ave intersection, geometric improvements will be made to this intersection. West Street will be realigned to match McKinley Street and the intersection will be widened to become a standard 4-leg intersection, rather than the existing Y-shaped intersection. The stop sign at the end of West Street will remain, and no substantial changes to existing traffic patterns will result.

  Improvements will be made at the West Street Interchange, including additional through and turning lanes, an island, and medians to improve traffic operations.

- Pearl Street/Island Street Intersection and Winchester Street (North)

  Improvements along Winchester Street begin at the Pearl Street/Island Street/Winchester Street intersection and proceed southward to the vicinity of the NH Routes 10/12/101 intersection.

  The Pearl Street/Island Street intersection improvements include the replacement of the existing (temporary) Island Street bridge over the Ashuelot River, and reconfiguration of the awkward, existing, skewed intersection to a 4-leg intersection with normal approaches. In this manner, an acceptable Level of Service can be achieved, while maintaining access and existing traffic patterns.

  Improvements south of Island/Pearl Street include additional turning lanes at Key Road and the approach to the Single Point Diamond Interchange (SPDI) at Winchester Street/NH Routes 10/12/101. The signals at the SPDI, Key Road, and Island/Pearl Street will be coordinated to enhance traffic flow through this congested section of roadway. Several drive access layouts will be modified through this section including access to Dunkin Donuts, the American Automobile Association building, and the restaurants on the west side of Winchester Street, north of Key Road.

- Single Point Diamond Interchange (SPDI)/Winchester Street (South)

  The proposed Single Point Diamond Interchange with Winchester Street and NH Routes 10/12/101 will cause major changes to existing travel pattern, but will retain all existing movements (See Figure 4.2.1). Currently, vehicles passing through this intersection are controlled by a

traffic signal. The proposed interchange will allow for east-west through traffic driving on NH Routes 10/12/101 and NH Routes 12/101 to no longer stop at the intersection, but rather travel straight through on an overpass. On ramps will provide access to NH Routes 10/12/101 and NH Routes 12/101 from Winchester Street and NH Route 10. Traffic exiting Routes 10/12/101 and NH Routes 12/101 will take off ramps to a single intersection under the NH Routes 10/12/101 bridge at Winchester Street. This intersection will be controlled by a traffic signal and is expected to positively impact travel in the City of Keene. The interchange will increase the capacity of traffic that will be able to travel freely along NH Routes 10/12/101 and NH Routes 12/101, as well as improving capacity for through traffic and turning movement from Winchester Street and NH Route 10, substantially decreasing travel delay.

Traffic heading westbound from Winchester Street and along NH Routes 12 and 101 will utilize a 'braided' ramp system to access points west and north. Traffic from Winchester Street heading west to NH Route 9 would access an on ramp, which would pass underneath the proposed NH Routes 12/101 westbound off ramp (to NH Routes 9,10,12 northbound). Traffic heading north to NH Routes 9/10/12 from Winchester Street would access the same on ramp, but would continue on a westbound extension of the ramp that connects to NH Routes 9/10/12. Westbound traffic from NH Routes 12/101 heading north to NH Routes 9/10/12 would pass over the westbound NH Route 9 access ramp, via a new bridge, and merge with the Winchester Street traffic on the westbound extension. This SPDI and braided ramp interchange will also allow for safer travel as it separates the through east-west traffic from Winchester Street and eliminates high speed weaving movements in the westbound direction.

Improvements along Winchester Street (NH Route 10), south of the SPDI, will include consolidation of access to driveways, particularly between Matthews Road and the SPDI. The intent of the driveway work is to eliminate unnecessary driveways and uncontrolled, wide paved areas, thus improving north-south traffic flow along NH Route 10 and Winchester Street.

Winchester Street will be widened to two lanes in each direction separated with a two-way left turn lane from the SPDI south to Bradco Road. Minor changes will be made to the entrances of Krif Road, Wetmore Street, Fairbanks Street, and Kit Street, as well as several private driveways. The entrance to Matthews Road will be widened and shifted approximately 30 m (100 ft.) southward improving poor intersection geometry. No substantial impacts to existing traffic patterns or accessibility are anticipated from any of these improvements.

Since the issuance of the DEA, the project plans have been revised to incorporate the dead-ending of Lucinda Terrace at its current intersection with Winchester Street. A turnaround will be provided at this location, requiring the acquisition of one residence (4 Lucinda Terrace). This proposal has the support of residents on Lucinda Terrace and will provide the following benefits: 1) elimination of an intersection (Lucinda Terrace and Winchester Street) that currently has limited sight distances, and 2) will prevent a residential street (Lucinda Terrace) from being used as a shortcut between Winchester Street and Matthews Road. Under this plan, Lucinda Terrace will be accessed via its intersection with Matthews Road.

As noted, the intersections of Winchester Street with Krif Road, Wetmore Street and Fairbanks Street will be retained. Because Winchester Street in this area will be widened from the existing 3 lanes (1 through lane in each direction with center turning lane) to 5 lanes (2 through lanes in each direction with center turning lane), City representatives have expressed some concerns that left-hand turns into and out of these roads, which access a residential area west of Winchester Street, will be made more difficult.

Existing traffic volumes on all these side streets are low, and traffic signals are not currently warranted. It is recognized that a signal could be warranted at Kit Street, which is closest to the SPDI, in the future, particularly if currently vacant industrial/commercial property in the area is developed. This issue of a possible traffic signal at Kit Street would be of future concern, because it could interfere with the operation of the SPDI.

It does not appear that access to the above-noted roadways, over the near term, will be impeded with the proposed improvements to Winchester Street. City concerns are based on the assumption that additional roadway width will impede left-hand turns. However, the availability of gaps in traffic is at least as important as width for left-turn movements. It is expected that, over the short term, the provision of an additional through lane in each direction on Winchester Street will create more gaps, or opportunities for left hand turns, compared to existing conditions.

This issue goes beyond the immediate project proposal and is related to how future development in the area will be allowed to occur. Keene officials have recognized that changes/improvements in access to this area (for example, by consolidation and/or relocation of some of these side streets) might be beneficial or warranted in the future.

- Base Hill Road/NH Route 10 Intersection

  The entrance to Base Hill Road will be widened and shifted slightly to the north in order to provide an improved alignment. At the intersection, NH Route 10 will be shifted slightly to the east and widened, to provide for a left-turn lane. A stop sign will initially control traffic, but a traffic light may be installed in the future pending future warrants. No substantial impacts are anticipated.

- Ash Hill Road/Ash Hill Road Connector

  Due to its skewed alignment with Base Hill Road and resulting sight distance concerns, Ash Hill Road will be relocated approximately 275 m (900 ft.) to the south, where it will align with Whittemore Farms Road (see Figure 4.2.1). Existing Ash Hill Road will be dead-ended before the existing NH Route 10 intersection, but access will be maintained to the residences along the road via the new connector. Stop signs will be placed at the end of the Ash Hill Road Connector at its intersection with NH Route 10. No access impacts are anticipated from these improvements. The proposed improvements will substantially improve the safety of this intersection area by eliminating crossing movements, improving sight distance, and providing turning lanes on NH Route 10.

- Main Street/NH Routes 12/101 Intersection

  Improvements to the Main Street/NH Routes 12/101 intersection will result in the closure of King Court, a dead-end street off Main Street. This will result in the acquisition of one business at 441 Main Street (at the request of the Owner). The remaining businesses (Indian King Framery and the Turner-Busch property) will lose access to King Court, but plan to maintain access to Main Street via a new shared driveway through 441 Main Street and the Greene property at 431 Main Street (See Plan Sheet 3.3.6-05). Provided that the Department and the property owners can reach a mutual agreement for the provision of a shared access, the construction of the driveway access to Main Street will be incorporated into the highway improvements. If an agreement cannot be reached, the Department will acquire the Turner-Busch, Inc. and Stretch properties through the normal Right-of-Way procedure.

- NH Route 12

  Minor improvements will be made to NH Route 12 (Main Street) between its intersection with NH Routes 12/101 and the bridge over The Branch. An additional northbound left turning lane will be added between the northbound and southbound lanes, and the entrance to

Sheridan Street will be slightly widened. Due to its close proximity to the NH Route 12/NH Route 101 intersection, Martell Court will be relocated via a connector road connecting with Sheridan Street (see Figure 4.2.1). This intersection at Sheridan and NH Route 12 will provide better left turn access from NH Route 12 since it is approximately 140 m (450 ft.) from the Main Street intersection. As such, no substantial impacts will result.

- Optical Avenue Connector/NH Route 32 Intersection

Perhaps the most substantial change to existing traffic patterns will result from the proposed Optical Avenue Connector. This new roadway will begin at the Optical Avenue/NH Route 101 intersection and continue southwards until it connects with NH Route 12, approximately 180 m (600 ft.) south of the NH Route 32 intersection. Traffic from the Town of Swanzey that currently uses NH Route 32 and NH Route 12 to access NH Routes 9/10/12/101 and roadways in City of Keene will access these points via the new connector in the future. Traffic volumes on NH Route 12 (South Main Street) between NH Route 101 and NH Route 32 will be reduced as a result of the Connector.

The proposed Optical Avenue Connector will cross the alignment of existing Rose Lane, and thereby prevent access to the bus garage, an asphalt plant, and a recycling center at the end of the road in the current manner. In order to maintain access to the businesses for buses and other vehicles, a new connector to Rose Lane will be constructed (see Figure 4.2.1). The Chestnut Green Condominium Association has expressed concerns about accessing Main Street (NH Route 12) after the Optical Avenue Connector is built. As a result, the Rose Lane Connector will also serve as the new entrance to the condominium complex. The intersection of the Optical Avenue Connector and Rose Lane Connector will be signalized. Existing Rose Lane, where it will become cut off by the Optical Avenue Connector, will terminate with a turnaround for maintenance vehicles.

A stub connector will extend NH Route 32 from existing NH Route 12 (South Main Street) to the Optical Avenue Connector. Stop sign control will be proposed at the stub connector intersection with NH Route 12 (South Main Street). This will encourage free flow along NH Route 32 to the Optical Avenue Connector, by creating a right-of-way for the traffic using NH Route 32.

In addition, a 120 meter (400 foot) section of South Main Street will become a dead end, and the entrances to Greenwood Avenue will be slightly widened.

- Project Medians

While new roadways and interchanges may produce the most substantial changes, raised medians can also affect traffic patterns and accessibility in their immediate vicinity. Raised medians are proposed as part of this project in the areas listed below:

- NH Route 9, NH Routes 9/10/12, NH Routes 10/12/101, NH Routes 12/101, NH Route 101
- Entrances to Ash Brook Road, Production Drive, and Key Road
- West Street on the approaches to the interchange and beneath the bridge
- Winchester Street from the Island/Pearl Street intersection to Key Road. It resumes after Key Road, to the SPDI.
- NH Route 10 south of the SPDI to the Kit Street intersection. Resumes after the Kit Street intersection, and continues for approximately 40 m (120 ft.).
- Main Street from the NH Route 101 intersection northwards approximately 75 m (250 ft.)
- NH Route 12 south of the NH Route 101 intersection extending approximately 75 m (250 ft.) to the north side of the Sheridan Way intersection. Resumes on the south side of the Sheridan Way intersection and continues for approximately 30 m (100 ft.).
- Optical Avenue Connector from NH Route 101 to the NH Route 32/Rose Lane Connector. Resumes after the NH Route 32/Rose Lane Connector intersection and continues for approximately 180 m (580 ft.).

Potential impacts from the medians would include limiting access to side roads from the major roadways and limiting left turns to businesses and residences. However, controlled median access has a positive effect in that it allows for more efficient traffic flow by reducing conflicts due to turning traffic, making the roadway more efficient and safer.

4.2.3 Local Facilities

Local facilities such as schools, churches, fire protection, and police protection can be greatly impacted by transportation projects. Many of the services that a city provides for the residents are dependent on the system roadway. In the event that a project should negatively impact any of these facilities, mitigation measures would need to be considered. In the following section, the impacts to public facilities are discussed in more detail.

4.2.3.1 Schools

There are ten public and three private primary and secondary schools in the City of Keene and the Town of Swanzey. None of these school buildings or related facilities (such as ball fields) are directly within the project limits, and as such, none will be directly impacted. However, seven of the public schools and all three private schools serve students that reside within or travel through the project limits (see Figure 4.2.2 and Table 4.2.2).

Table 4.2.2 -- PROJECT AREA PUBLIC AND PRIVATE SCHOOLS

SCHOOL NAME	LOCATION
KEENE PUBLIC SCHOOLS	
ELEMENTARY	
Symonds School (grades K-5)	79 Park Ave., Keene
Wheelock School (grades K-5)	24 Adams St., Keene
JUNIOR/SENIOR HIGH	
Keene Middle School (grades 6-8)	17 Washington Ave., Keene
Keene High School (grades 9-12)	43 Arch St., Keene
SWANZEY PUBLIC SCHOOLS	
ELEMENTARY	
Mt. Caesar (grades pre-K-3)	585 Old Holmstead Highway, East Swanzey
Cutler School (grades 4-6)	31 South Winchester St., West Swanzey
JUNIOR/SENIOR HIGH	
Monadnock Regional (grades 7-12)	580 Old Holmstead Highway, East Swanzey
PRIVATE SCHOOLS	
St. Joseph's (grades K-7)	92 Wilson St., Keene
Monadnock Waldorf (grades pre-K-8)	98 South Lincoln St., Keene
Community Christian School	Cobble Hill Road, West Swanzey

In the City of Keene, each of the elementary schools primarily serves the surrounding neighborhood. The Middle and High Schools serve much larger areas than the elementary schools. In addition to City of Keene residents, the Middle School receives students from Stoddard, Marlow, Nelson, and Harrisville. The Keene High School is the largest high school in southwestern New Hampshire and includes pupils from seven neighboring towns. It is also the site of the Cheshire Center of Applied Science and Technology, which is one of twenty vocational centers in New Hampshire.

Elementary students in the Town of Swanzey attend Mt. Caesar for grades pre-K-3 and Cutler for grades 4-6. Students in grades 7-12 attend Monadnock Regional, which serves eight neighboring towns.

Methods of transportation to school for students in the City of Keene and the Town of Swanzey include walking, riding a bike, driving a car, or taking a bus. Generally, students in grades one through twelve who live less than 1.6 kilometers (one mile) from school walk or ride their bikes to school. Kindergartners who live less than 0.8 kilometers (half a mile) from school also walk or ride their bikes. Because of their proximity to the project limits, four public schools and one private school in City of Keene were contacted to see if students cross through the project limits on their way to or from school.

In general, these intersections are of greatest concern with respect to students who walk to school:

- West Street Interchange
- Winchester Street/NH Routes 10/12/101 (Proposed SPDI)
- Main Street/NH Routes 12/101

In discussing this issue with school officials, it is apparent that: 1) school locations in relation to these intersections are such that very few students who walk to school cross them, and 2) students at essentially all primary/secondary schools are actively discouraged by the schools from crossing these intersections because of the traffic volumes. As a result, it has been concluded that the proposed improvements will not substantially impact students who walk to school.

A summary of the existing/proposed design features of these intersections as they affect pedestrians is presented below:

- West Street Interchange - Proposed improvements to the West Street interchange will widen the existing roadway. This will make it slightly more difficult for students to cross. However, sidewalks, crosswalks, and pedestrian signals will be provided, and busing is available for those students who do not want to cross the roadway.
- SPDI – The proposed Single Point Diamond Interchange is the largest of the project area and will be the most complex for pedestrians to cross. However, under existing conditions, there are no established pedestrian features (i.e., sidewalks, crosswalks or pedestrian signals) and no substantial refuges provided by medians or islands. The SPDI will have sidewalks and established crosswalks. While it may be difficult to cross the interchange area in either a north-south or east-west direction during a single signal phase, relatively large islands and medians will provide refuge for pedestrians.

- Main Street/NH Routes 12/101 - Proposed improvements to the Main Street/NH Routes 12/101 intersection will widen the existing roadway, making it slightly more difficult for students to cross. However, a new median is proposed to serve as protection for pedestrians who cannot cross both directions of traffic during one pedestrian signal phase. Sidewalks and crosswalks will also be available. In addition, new pedestrian signals will be provided, and busing is available for those students who do not want to cross the roadway.

School bus transportation in the City of Keene and the Town of Swanzey, and for St. Joseph's students residing in City of Keene, is provided by a private firm, Laidlaw Busing Services. School buses travel or stop along every road in the project limits. One of Laidlaw's bus garages is located on Rose Lane, off of NH Route 12. As a result, NH Route 12 within the project limits receives a greater than average volume of school bus traffic at pick-up and drop-off hours.

The proposed project may produce short-term impacts to the busing of school children. Construction activities may increase traffic congestion and result in delays. These impacts can be effectively mitigated by Laidlaw and the schools through alternate bus routes and designated bus stops for children that live within the project limits.

In the long-term, however, positive impacts on busing are anticipated from two of the proposed improvements. The first involves the Park Avenue/West Street intersection. Currently, buses traveling from Park Avenue onto West Street (and vice versa) experience difficulty turning because of the tight turning radius. The proposed project will improve safety by realigning the Park Avenue/West Street intersection providing adequate turning lanes for school buses.

Access to Laidlaw's bus garages off Rose Lane will also be improved compared to existing conditions. The proposed Rose Lane Connector will provide signalized access to the Optical Avenue/NH Route 32 Connector. Signalized access is considered a positive impact, as safety for buses and other vehicles exiting and entering Rose Lane will improved.

In addition to the grammar schools mentioned previously, two colleges are within or in close proximity to the project limits (see Figure 4.2.2). Keene State College, located at 229 Main Street in City of Keene, offers undergraduate and graduate degrees to its students. The 150-acre campus borders Appleton Street and NH Routes 12/101 within the project limits.

Keene State College facilities that will be impacted by the proposed project include recreation facilities west of the Ashuelot River and north of NH Routes 12/101, a pedestrian path that runs beneath NH Routes 12/101 at the

Ashuelot River Bridge, an administrative building on Winchester Street and a parking area on Winchester Street. A baseball field, backstop, and bleachers of the above-mentioned recreation facilities are within the slope limits of improvements to NH Routes 12/101. However, these facilities are within NHDOT's existing and proposed right-of-way. An agreement exists between Keene State College and NHDOT that allowed the college to construct their facilities within the state's right-of-way, with the agreement that the facilities would have to be removed if the right-of-way was found necessary for future highway construction. As such, those portions of the baseball field and pedestrian path are not considered Section 4(f) properties. The college will be responsible for relocating the baseball field, at their cost.

The college's pedestrian path that crosses beneath NH Routes 12/101 could be impacted by the widening of the NH Routes 12/101 bridge across the Ashuelot River. This path is one means of pedestrian access to other Keene State College athletic fields, located south of NH Routes 12/101 (the other access is via Krif Road). Specific impacts to the path are unknown at this time, but it may be necessary to shift the path slightly, to accommodate widening of the bridge. Any necessary relocation will be accomplished as part of this project. Access will be retained in the long-term, but the path may be closed in the short-term while improvements are made to the bridge.

The building owned by Keene State College and used for administrative offices and the parking lot that will both be impacted by the project are located on the same parcel on the east side of Winchester Street, just north of Riverside Plaza. The building, which is eligible for the National Register of Historic Places, will be acquired for the realignment of Winchester Street. Acquisition for right-of-way will also eliminate 109 of 530 parking spaces on the parcel, and impact bermed, landscaped areas.

Potential mitigation measures available for these impacts include the following:

- Keene State College will receive fair market value for property impacts.
- The building at 441 Main Street to be acquired for the project may be a suitable replacement for the administrative office space. If the Indian King Framery and/or NYNEX building are acquired by the Department, one or both may also be suitable replacement(s), subject to future right-of-way negotiations.
- The project design incorporates a bermed, landscaped area for the remaining parking area.
- The loss of parking will be handled as a functional replacement. NHDOT will either compensate Keene State College to establish replacement parking on the adjacent power company parcel, or will directly include property acquisition and replacement parking construction as part of the project.

Located north of the project limits on Roxbury Street (off Main Street), Antioch New England Graduate School is a small school that offers Masters and Doctoral degree programs. No impacts are anticipated to this school or any of its facilities.

4.2.3.2 Churches

There are nineteen churches and one cemetery near the project area, including twelve churches along Main Street and in the vicinity of the Main Street/Court Street/West Street/Roxbury Street crossroads (See Figure 4.2.2). These include: Keene State College Ministry and the Newman Center at Keene State College, St, Bernards Parish, St. James Episcopal Church, Sturtevant Chapel, and The United Church of Christ. All nineteen of these churches are located outside of the project limits; therefore, there will be no direct impacts to the churches in the City of Keene. St. Joseph's Cemetery, located on Main Street in the City of Keene, is also outside of the project limits and will not be impacted.

4.2.3.3 Fire Protection/Emergency Services

Fire protection in the project area is provided by the City of Keene Fire Department and the Town of Swanzey's Fire Department. The City of Keene Fire Department is a paid department whose district covers City of Keene and Roxbury. They also serve as back-up for the surrounding towns. In addition, the Department responds to emergencies involving hazardous materials in Cheshire and Sullivan Counties in New Hampshire, and Windham County in Vermont. The fire station is located outside the project limits, at 22 Vernon Street. The City of Keene also maintains a fully equipped, unmanned, Air Rescue Fire Fighting (ARFF) facility at the Dillant-Hopkins Airport in the Town of Swanzey.

Fire protection for the Town of Swanzey is provided by the Swanzey Fire Department. The Department has three stations—West Swanzey, Swanzey Center, and East Swanzey. The project area in the Town of Swanzey is within the district covered by the West Swanzey station, which is located on NH Route 12 (Main Street). Mutual aid agreements exist between the Town of Swanzey and the surrounding towns.

Emergency medical services in the City of Keene and the Town of Swanzey are provided by the City of Keene Fire Department and the Swanzey Fire Department. The City of Keene Fire Department is the primary agency in the City of Keene and the seven surrounding towns, including the Town of Swanzey.

Ambulance service in the Town of Swanzey is supplemented by the Swanzey Fire Department rescue squads, located at the East Swanzey and

West Swanzey stations. The project area is covered by the rescue squad at the West Swanzey station. Since the rescue squads do not possess an ambulance, patients must be transported to the hospital by the City of Keene Fire Department. Additional ambulance service in City of Keene and the Town of Swanzey is provided by Robert J. DiLuzio Ambulance Service, a private ambulance company located at 49 Court Street. The Service predominantly performs non-emergency transfers; however, they serve as the primary back-up to the City of Keene Fire Department.

None of the aforementioned facilities will be directly impacted by the project. Fire and emergency services may experience short-term impacts during construction of the proposed project. Response times to emergencies could increase slightly as a result of traffic congestion during construction. In the long-term, however, response times to emergencies and to area hospitals would most likely decrease. The new, less congested roadways will allow for freer travel and more direct routes.

4.2.3.4 Police Protection

Police protection within the project area is provided by four police agencies. The City of Keene Police Department, located north of the project limits at 3 Washington Avenue, has jurisdiction for the entire city (see Figure 4.2.2). Located on Eaton Road to the south of the project limits, the Town of Swanzey Police Department provides round-the-clock police services for the Town of Swanzey. The City of Keene and the Town of Swanzey's Police Departments have mutual aid agreements with one another, as well as the surrounding towns.

Additional police protection for the City of Keene and the Town of Swanzey is provided by the Cheshire County Sheriff's Department, located at 12 Court Street, and Troop C of the New Hampshire State Police, located along NH Route 9 (see Figure 4.2.2). Assistance to the City of Keene and the Town of Swanzey's Police Departments by the Cheshire County Sheriff's Department is primarily limited to prisoner transfers and investigations during regular business hours. Troop C of the New Hampshire State Police, which covers Cheshire and Sullivan Counties, assists with investigations and emergencies.

The only direct impact to these facilities is the proposed relocation of the access road to the State Police Barracks. Like the fire and emergency services, police services may experience short-term impacts during construction. Response times to emergencies could temporarily increase slightly as a result of traffic congestion. In the long-term, the police will be able to travel to and from emergencies and respond to complaints faster. The new roadways will allow for more direct routes without the interruption of traffic lights, stop signs, and slow moving traffic.

4.2.4 Other Services

No United States Post Offices are located within or in close proximity to the project limits. During the construction of the roadways in the City of Keene and the Town of Swanzey's postal carriers may experience some delays on their routes. While some of the delivery routes may need to be changed to accommodate the new road configurations, no substantial impacts are expected.

There are two highway garages within the project limits. The City of Keene Highway Garage is located at 580 Main Street approximately 60 m (200 ft.) south of the Main Street/NH Route 101 intersection. The NHDOT Regional Maintenance Facility is located on Base Hill Road near the intersection with NH Route 10. Access to both facilities will be retained at all times.

4.2.5 Pedestrians/Bicyclists

Pedestrians and bicyclists in the City of Keene and the Town of Swanzey are accommodated by sidewalks, shoulders adjacent to certain roadways, and trails. Within the project limits, sidewalks currently border the following streets:

- West Street—both sides until the intersection with Park Avenue, at which point the sidewalk is on the southern side only
- Park Avenue—both sides
- Winchester Street—western side from NH Route 101 to Key Road, both sides from Key Road northward
- Pearl Street— both sides
- Island Street— both sides
- Main Street—both sides until just south of Appleton Street, at which point the sidewalk is limited to the western side. The sidewalk on the western side continues across NH Route 101 until it reaches the vicinity of Martell Court.
- Appleton Street—on the north side for approximately 60 m (200 ft.)
- NH Route 12 (Keene)—both sides from Martell Court to St. Joseph's Cemetery. From the cemetery to the City of Keene/Town of Swanzey boundary, the sidewalk is on the western side only.

According to the Public Works Departments from the City of Keene and the Town of Swanzey, no new sidewalks are planned within the project limits in the near future.

All the above-listed sidewalks will be impacted in the short-term by construction activities. Access across the sidewalks may be limited or prohibited during construction for safety reasons. However, no long-term impacts are anticipated, as all impacted sidewalks will be replaced with new sidewalks and access will be retained.

Bicyclists and pedestrians frequently travel along the shoulders and other groups, such as equestrians and snowmobilers, have utilized the existing right-of-way of major roadways in the project limits. Once the proposed improvements are completed, travel along the shoulders from north of the NH Routes 9/10/12 interchange, south along the bypass, to the trumpet interchange, west to the Production Drive/Ash Brook Road intersection, and east to the Main Street intersection, will be prohibited for non-motorized vehicles. In order to mitigate potential impacts, a multi-use pathway and bridge have been incorporated into the proposed project (see Section 4.13.5 and Figure 3.3.6-01 through 3.3.6-12).

Access for pedestrians across NH Routes 12/101, adjacent to the Ashuelot River, is currently provided by the Keene State College walkway. The walkway is not handicap-accessible and can only be used by pedestrians. As mentioned previously in Section 4.2.3.2, the Keene State College walkway may be temporarily impacted by the widening of the NH Routes 12/101 bridge across the Ashuelot River. Any required relocations will be accomplished as part of this project.

4.3 ECONOMIC

Economic impacts of a highway project can be both positive and negative. The relationship between the roads and individual properties, the current and potential future uses of the property, and changes in access both to the property and the area in general are all factors that play a role in determining the economic impacts of a highway project.

A reduction in traffic could increase the value of residential property along a roadway; however, any businesses along the road that may depend on drive-up customers could be negatively impacted. New traffic patterns could influence the development of vacant or under-utilized parcels by creating more of a potential to develop there, thus creating an increased tax base. The taking of businesses and residences by a highway project will result in a measurable reduction of the tax base and a loss of local jobs. This is an easily quantifiable economic impact to the affected areas. Development of new businesses encouraged by a highway project can increase the tax base and provide new jobs, bringing a positive economic impact to the area.

4.3.1 Regional Impacts

The proposed NH Routes 9,10,12, and 101 improvement project is anticipated to be a positive impact on the region. The project consists of improvements at the intersection of major east-west and north-south routes in southwestern New Hampshire. The roadway network currently experiences congestion and delay, and operating conditions will continue to deteriorate in the future. The proposed project will provide acceptable levels of service through the planning period and, as such, will have regional transportation and economic benefits.

4.3.2 Local Impacts

The roadway improvements will make transport of products to and from businesses safer and more efficient. This is likely to reduce transport times and costs to some extent, and thus benefit industries and businesses in both the City of Keene and the Town of Swanzey. The proposed improvements will generally make access for business more convenient, and will also provide for a safer and more efficient route of travel for daily commuters to and from their jobs. Therefore, the proposed project is anticipated to have a positive impact on the local economy.

Locally, there will be some negative impacts to both businesses and residences within the study area, primarily associated with direct property takes. Results of the *Conceptual Stage Study Relocation Plan* (see Appendix B), prepared by the NHDOT Bureau of Right-of-Way for the project, are summarized in the following sections.

4.3.2.1 Displacement of Properties/Relocations

Residential and commercial displacements associated with the project occur within the City of Keene and are presented in Table 4.3.1. The proposed project will require the acquisition of buildings and the displacement of families, 1 non-profit organization, and businesses. The removal of these buildings is the minimum acquisition necessary to accommodate roadway widening and realignment. Table 4.3.1 lists the properties and their uses.

TABLE 4.3.1 – PROPERTY ACQUISITIONS

ADDRESS	USE
169 Island Street	3-Family Residence
185 Island Street	Business
4 Lucinda Terrace	Single-Family Residence
440 Main Street	Public Housing (2-Family Unit)
441 Main Street	Business (Insurance Agency)
692-694 Main Street	Business (HKS Realtors) and detached single-family residence
698 Main Street	Single-Family Residence
702 Main Street	Single-Family Residence/Detached Rental Unit
708 Main Street	Single-Family Residence
714 Main Street	Single-Family Residence
718 Main Street	Single-Family Residence
23 Sheridan Way	Single-Family Residence
536 West Street	Business (Triumph Auto Glass)
332 Winchester Street	Keene State College Office Building
340 Winchester Street	Business (Texaco Gas Station)
348 Winchester Street	Business (Bank of Walpole)

No low-income communities were identified within the project limits. According to the *Conceptual Stage Study Relocation Plan*, the social and economic characteristics of the majority of the displacees appear to place them in the middle income bracket.

The area's racial composition is similar to the City as a whole. According to the 1990 census data, 1.25% of the people living in the project area in the City of Keene are ethnic minorities (African-American or other). This percentage compares to an overall minority population in the City of Keene of 1.1%. The proposed project will not displace a disproportionate share of minority, ethnic, or low-income groups. The proposed improvements will not displace, transect, isolate, or separate any established minority, ethnic, or low-income communities or neighborhoods.

Very little of the work associated with the project occurs in the Town of Swanzey, and the work in that municipality will not involve any displacements, major right-of-way acquisition or roadway on new

alignment. As a result, it can be concluded that the project will not displace a disproportionate share of minority, ethnic or low-income groups, and will not displace, transect, isolate or separate any established minority, ethnic, or low-income neighborhoods in the Town of Swanzey.

A summary of estimated acquisitions from the *Conceptual Stage Study Relocation Plan* is presented in Table 4.3.2. Through a survey of the local realtors, it was concluded that there is an adequate number of functionally similar, decent, safe, and sanitary residential dwellings for sale or lease within the project area to accommodate any and all displaced people. It also concluded that there are no cases that warrant special relocation considerations. Relocation of the businesses that are being displaced can also be accommodated within the project area. However, in order to sufficiently accommodate their needs, the Department will, if necessary, acquire these properties at the earliest date and assist these businesses with appropriate planning and coordination in order to meet their relocation requirements.

TABLE 4.3.2 – RIGHT-OF-WAY ACQUISITIONS[1]

PHASE	LOCATION	FISCAL YEAR	TOTAL PARCELS	TOTAL PARTIAL ACQ.	NUMBER OF RES. BLDG. ACQ.	NUMBER OF BUS. BLDG. ACQ.
1	Base Hill Road/Ash Hill Rd. NH Route 9/Base Hill Road	1998/99	21 10	19 6	0 0	0 0
2	Winchester Street (City Part) Winchester Street (State Part)	1999/2000	15 63	14 51	1[2] 1	1 3[3]
3	NH 101/Optical Avenue/ NH 32	2000/01	39	25	7[4]	1
4	SPDI EB & WB Ramps	2001/02	10	6	0	0
5	Main Street & NH 12/101	2002/03	28	16	2[5]	1
6	SPDI Mainline & Trumpet Interchange	2004/05	5	0	0	0
7	West Street Interchange	2005/06	19	12	0	1
	TOTAL		210	149	11	7

[1] ACQUISITION INFORMATION BASED IN PART UPON *CONCEPTUAL STAGE STUDY RELOCATION PLAN* (NHDOT 8/22/97)
[2] THREE-FAMILY UNIT
[3] ONE IS A NON-PROFIT ORGANIZATION (KEENE STATE COLLEGE OFFICE BUILDING)
[4] ONE IS A SINGLE-FAMILY RESIDENCE WITH DETACHED RENTAL UNIT (CONSIDERED 2 ACQUISITIONS IN THIS TABLE); ONE IS A BUSINESS WITH A DETACHED SINGLE-FAMILY RESIDENCE, (ALSO CONSIDERED 2 ACQUISITIONS).
[5] ONE IS A 2-FAMILY UNIT

The Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, will control all of the acquisition and displacement activities required by the Selected Alternative. Residential property owners affected by the required right-of-way acquisition will be eligible for a variety of compensation measures, including the following:

- Fair market value for acquired property.
- Relocation advisory assistance services.
- Payments for moving and relocation costs.
- Replacement housing payments for homeowners.
- Residential mortgage interest differential payments and closing costs.
- Replacement housing payments for tenants.

The displaced businesses will be eligible for relocation benefits, which include:

- Fair market value for acquired property
- Relocation advisory assistance services
- Payments for actual reasonable moving
- Business re-establishment costs

4.3.2.2 Impacts to Business Access and Visibility

The impacts to business accessibility will occur mainly along Winchester Street in the City of Keene. Visibility of businesses along the proposed roadways is not an issue for any of the affected businesses because visibility will not be reduced as a result of the improvements. Accessibility and loss of parking for the businesses will be the major impact experienced in this corridor. Fourteen businesses on Winchester Street - twelve on the south side of NH Routes 10/12/101 and two on the north side of NH Routes 10/12/101 - will lose parking spaces in front of their business and two will lose use of overhead access doors. The impacted businesses are listed below:

North of NH Route 9

- Dunkin Donuts – loss of approximately 2 parking spaces.
- Keene State College – loss of approximately 109 parking spaces.

South of NH Route 9

West side of Winchester Street

- Benny's Auto Body – loss of approximately 7 parking spaces and access to 1 overhead door.
- Bumper to Bumper Auto Parts – loss of approximately 5 parking spaces.
- G&R Electric – loss of approximately 5 parking spaces.
- Redline Motor Sports – loss of approximately 2 parking spaces.
- VFW – loss of approximately 1 parking space.

East side of Winchester Street

- Keene Chrysler Plymouth – loss of approximately 18 parking spaces.
- Keene Electric & Plumbing Supply – loss of approximately 4 parking spaces.
- Fairfields Auto – loss of approximately 4 parking spaces.
- Mitsubishi – loss of approximately 2 parking spaces.
- Webber Energy Fuels – loss of approximately 12 parking spaces.
- Portland Glass – loss of approximately 17 parking spaces and access to 1 overhead door.
- Monroe Muffler – loss of approximately 8 parking spaces.

The loss of parking space can have a negative impact on the businesses, and could potentially affect business viability. NHDOT has proposed for acquisition on this project those businesses where the building would be physically impacted, or where business viability would be affected by loss of parking or accessibility.

On the east side of Winchester Street, there are several cases where some rearranging of existing space will be possible that will result in additional parking. However, for most of the businesses, especially on the west side of Winchester Street, a reduction in the amount of parking space available will occur. This is not considered a substantial impact, because there is parking next to and behind all of the businesses.

The proposed design at Winchester Street will consolidate curb cuts on both the east and west sides of the street. This would provide access management by creating common driveways for neighboring businesses. It would also reduce the amount of space needed in front of each business for driveways, potentially leaving more available space for parking.

The project as originally proposed would also have resulted in the loss of approximately 75, of an existing total of 585, parking spaces at the Fairbanks Plaza on West Street, due to right-of-way acquisition and slope impacts. In response to a request from the property owners to reduce impacts to the Plaza, NHDOT will construct a retaining wall between the northbound off ramp and the multi-use trail to maintain the parking along the westerly side of the Plaza, will reduce the West Street lane widths (provide eleven (11) foot lanes), and adjust the median transition along West Street in order to minimize the encroachment into the Fairbanks Plaza and the loss of parking. The impacts to the property will be

appraised through the Department's Right-of-Way acquisition process and compensation will be provided in accordance with State and Federal law.

Project work on West Street will also eliminate the direct left-turn access to the West Street Citgo Station for vehicles eastbound on West Street, due to construction of a median. This turning movement must be eliminated because of the driveway's proximity to the intersection serving Fairbanks Plaza and the West Street Shopping Center. The Citgo Station will retain its existing access points for westbound traffic. Eastbound motorists could still access the station through an existing entrance within the West Street Shopping Center.

The original design also would have eliminated access to 2 commercial buildings on King Court (the NYNEX building and Indian King Framery), which were therefore proposed for acquisition. Since the issuance of the DEA, NHDOT has agreed to work with the owners of 441 Main Street to obtain an easement that would allow continued access to the two commercial buildings on King Court by a shared driveway through 441 Main Street and 431 Main Street (Greene property). Assuming an easement can be negotiated, the NYNEX building and Indian King Framery will not be acquired, in keeping with the current owner's requests.

4.3.2.3 Tax Base Impacts

The potential tax-base impacts to the City of Keene were based on information gathered from the City of Keene Assessment Office and the findings of the *Conceptual Stage Study Relocation Plan* prepared by the NHDOT. The NHDOT Bureau of Right-of-Way has estimated there will be approximately $3,200,000 worth of full acquisition and relocation in the project area. This was based on a "windshield appraisal" that was conducted in 1997, which may vary slightly from assessed values. It does not include impacts associated with partial acquisitions

Tax base impacts were identified by multiplying the total tax rate for the City of Keene ($38.31/thousand) by the total assessed value of property subject to right-of-way acquisition. The tax rate is the total rate for City, School, and County taxes combined. All acquisitions are in the City of Keene. Results of these calculations are illustrated in Table 4.3.3 below.

TABLE 4.3.3 – TAX BASE IMPACTS [A]		
PARCEL	ASSESSED VALUE	LOSS IN TAX DOLLARS
169 Island Street	$104,300.00	$3,996.00
332 Winchester Street (Keene State College)	$945,100.00	N/A
348 Winchester Street	$605,500.00	$23,197.00
340 Winchester Street	$189,000.00	$7,241.00
694 Main Street	$174,300.00	$6,677.00
698 Main Street	$83,700.00	$3,207.00
702 Main Street	$100,800.00	$3,862.00
708 Main Street	$75,700.00	$2,900.00
714 Main Street	$63,800.00	$2,444.00
718 Main Street	$78,400.00	$3,044.00
440 Main Street (Keene Housing Authority)	$105,200.00	N/A
536 West Street	$70,900.00	$2,716.00
441 Main Street	$340,200.00	$13,033.00
23 Sheridan Way	$68,500.00 [B]	$2,624.00
4 Lucinda Terrace	$116,900.00	$4,478.00
185 Island Street	$35,477.00[B]	$1,363.00
TOTAL	**$3,157,777.00**	**$80,782.00**

[A] Based on the 1996 Tax Assessment
[B] Assessment for building only, land not included because located on parcel with multiple structures.

The assessed valuation of the properties to be acquired totals $3.15 million, and the project's property acquisition requirements will result in an approximately $80,800 reduction in property tax revenue. This represents 0.35 percent of the total assessed valuation ($891,282,400.00), and 0.3 percent of total property tax revenue in the City of Keene. Therefore, it is anticipated that there will be minimal impacts to the tax-base due to the proposed realignment projects of NH Routes 9,10,12, and 101.

During the construction phase of the proposed project, there may be some temporary impacts to businesses. Potential customers may avoid the construction area, potentially affecting sales. However, a reasonable access will be maintained at all times during the construction period, in order to minimize impacts on businesses.

4.4 FARMLANDS

4.4.1 Important Farmlands

The Farmland Protection Policy Act (FPPA), P.L. 97-98 authorizes the United States Department of Agriculture (U.S.D.A.) to develop criteria for determining the effects of federal programs on the conversion of farmland to nonagricultural land uses. The legislation affects three types of land:

- Prime Farmland,
- Unique Farmland, and
- Farmland of Statewide/Local Importance.

The Natural Resources Soil Conservation Service (NRCS) has classified certain soil map units as prime, unique, or of statewide/local importance for the purposes of FPPA regulations. The important farmlands and their association with the proposed highway development project are described in the following:

- Prime Farmland is land that has the best combination of physical and chemical characteristics for producing feed, forage, fiber, and oilseed. According to the U.S.D.A., prime farmland has the soil quality, growing season, and moisture supply that are needed to economically produce sustained high yields of crops when treated and managed according to modern farming methods. As shown in Figure 4.4.1, prime farmland is found throughout the project limits, but is primarily located along NH Route 10 and NH Route 101. Specific prime soil types in the project limits include Pootatuck (4), Occum (401), and Skerry (558B) (see Table 4.4.1).

- Unique Farmland is land other than prime farmland that is used for the production of high value crops. In order to be classified as unique farmland, the land must produce high quality/yield crops when using modern farming techniques and must meet the soil quality, location, growing season, and moisture supply requirements. There are no soils in Cheshire County which are classified as unique farmland.

- Farmland of Statewide/Local Importance are additional areas that have been identified as important to the local production of crops and are not included in the prime farmland and unique farmland lists. These soils are important for the production of crops, but exhibit some soil properties that do not meet the prime or unique farmland criteria. Farmland of local importance that is used for the production of high value food, fiber, or horticultural crops may also be identified.

Farmlands of statewide/local importance are found throughout the project limits, with those of local importance being the most prevalent soil type. Farmlands of local importance are found along NH Route 9, NH Route 9,10,12, NH Route 10,12,101, and NH Route 101. The Suncook (2), Rippowam (5), Windsor (26B), Raynham-Wareham (218), and Croghan (613B) soil types are all classified as farmland of local importance. Monadnock (142C) is the prevalent farmland of statewide importance, and is found in the Base Hill Road/Ash Hill Road/NH Route 10 area of the project.

Table 4.4.1 – CHARACTERISTICS OF IMPORTANT FARMLANDS

SOIL SYMBOL	SERIES	PERCENT SLOPE	DRAINAGE	HYDRIC	EROSION POTENTIAL
PRIME FARMLAND SOILS					
4	Pootatuck fine Sandy loam	0-3 percent	Moderately well drained	Potential Inclusions	Slight
401	Occum fine Sandy loam	0-3 percent	Well drained	No	Slight
558B	Skerry fine Sandy loam	3-8 percent	Moderately well drained	No	Slight
FARMLAND SOILS OF STATEWIDE IMPORTANCE					
142C	Monadnock fine sandy loam	8-15 percent	Well drained	No	Slight
FARMLAND SOILS OF LOCAL IMPORTANCE					
2	Suncook loamy fine sand	0-3 percent	Excessively drained	No	Slight
5	Rippowam fine sandy loam	0-3 percent	Poorly drained	Yes	Slight
26B	Windsor loamy fine sand	3-8 percent	Excessively drained	No	Slight
218	Raynham-Wareham Complex	0-3 percent	Poorly drained	Yes	Slight
613B	Croghan loamy fine sand	0-5 percent	Moderately well drained	No	Slight

Implementing regulations developed under the FPPA established a rating system to determine impact to farmlands. Once the area of eligible farmland is determined, a Farmland Conversion Impact Rating Form (Form AD 1006) is completed by the sponsoring federal agency and NRCS to determine a numerical score for the farmland conversation.

As noted above, farmland protected under the FPPA is specified by certain soil types. Farmland does not include land "already in or committed to urban development or water storage", as defined in FPPA regulations.

4.4.2 Active Farmlands

Active farmlands in the immediate project area are located in the southeast and northeast quadrants of the proposed trumpet interchange, and slightly north of the trumpet along the west side of NH Routes 9/10/12. These two areas are part of the same farm operation.

The two fields near the proposed trumpet interchange, totaling approximately 6.8 ha (16.8 ac), are currently planted to corn. The fields are on existing NHDOT right-of-way, and have been leased for agricultural purposes since the land was acquired by NHDOT in the 1970's. Available information indicates that the farmer will not seek to renew the lease after 1997.

The other active agricultural area located north on NH Routes 9/10/12 is the area proposed for the Konover Commercial Retail Center. Thus, it appears this area will also be taken out of production.

4.4.3 Impacts to Important Farmlands

Coordination with the local (Walpole) office of the NRCS indicates that all areas of farmland soils to be affected by the proposed project are considered "already in or committed to urban development" (see NRCS letter included in Appendix A). As such, the farmlands to be converted in associated with the project are given no consideration for protection under the FPPA, and no further coordination with NRCS is required.

4.4.4 Impacts to Active Farmlands

The two fields near the proposed trumpet interchange, which are currently leased from NHDOT for corn production, comprise 6.8 ha (16.8 ac) and will not be available for future farm production. This loss is not considered substantial, particularly since these fields are expected to go out of production, irrespective of the NH Routes 9, 10, 12, 101 project.

4.5 AIR QUALITY

The Air Quality section examines the potential air quality impacts of the proposed NH Routes 9,10,12, and 101 Improvements located in the City of Keene and the Town of Swanzey. Carbon monoxide (CO) levels associated with the Build and No-Build alternatives are predicted and compared with the National Ambient Air Quality Standards (NAAQS), illustrated in Table 4.5.1, to determine if air quality impacts may occur. Since a regional emission analysis has been conducted by the New Hampshire Department of Transportation for the entire state, project alternatives were analyzed at the microscale, or localized, level to satisfy the requirements of the National Environmental Policy Act (NEPA), and determine compliance with the Clean Air Act Amendments (CAAA). Microscale CO levels were predicted at various project area receptors located at the intersections of:

- Main Street and NH Route 101,
- Winchester Street and NH Route 9,10,101, and
- Optical Avenue and NH Route 101.

The first two intersections were chosen because they are the "worst" project area intersections in terms of Level of Service. The Optical Avenue area was selected because it includes roadway on new alignment that changes source-receptor distances. The analysis was conducted for Build and No-Build conditions for the following three years:

- 1995 – The existing study year,
- 2000 – The estimated year of completion (ETC)[1], and
- 2015 – The project design year.

4.5.1 Project Conformity

Pursuant to the Clean Air Act Amendments of 1990, the entire project is included in a portion of the State that has been classified as a "Not Classified" ozone nonattainment area. In New Hampshire, "Not Classified" ozone nonattainment are those geographical areas which were classified in the 1979 classification (as part of the Merrimack County/Southern NH Region) and for which there is not sufficient monitoring data to change them to full attainment status. Cheshire County is one such area. The NAAQS for ozone is 0.12 ppm[2], which is not to be exceeded more than once per year. Both the City of Keene and the Town of Swanzey have been designated as "unclassifiable" attainment for carbon monoxide (CO). Insufficient monitoring data is available to merit full attainment status.

[1] Build conditions only modeled; traffic/LOS data not available for Year 2000 No-Build Conditions.

[2] On July 16, 1997, the EPA issued final rules revising the NAAQS for ozone. The new rules replace the existing one-hour, 0.12 ppm primary and secondary standards with a new eight-hour, 0.08 ppm primary and secondary standard. The new standard will be phased in over a period of time. The 0.12 ppm 1-hour standard will not be revoked in a given area until that area has achieved 3 consecutive years of air quality data meeting the 1-hour standard.

Table 4.5.1 – National Ambient Air Quality Standards[1]		
	PRIMARY	SECONDARY
Particulate Matter (PM - 2.5)		
3-Year Avg. of 98th percentile 24-hour average	65 μg/m³	65 μg/m³
3-Year Avg. of Annual Arithmetic Mean	15 μg/m³	65 μg/m³
Particulate Matter (PM-10)		
3-Year Avg. of 99th percentile 24-hour average	150 μg/m³	150 μg/m³
Maximum 24-hour average	150 μg/m³	150 μg/m³
3-Year Average of Annual Arithmetic Mean	50 μg/m³	50 μg /m³
Sulfur Dioxide (SO_2)		
Maximum 24 Hour [2]	0.14 ppm	-
Maximum 3 Hour [2]	-	0.50 ppm
Annual Arithmetic Mean	0.03 ppm	-
Carbon Monoxide (CO)		
8 Hour Average [2]	9 ppm	-
1 Hour Average [2]	35 ppm	-
Nitrogen Dioxide (NO_2)		
Annual Arithmetic Mean	0.053 ppm	0.053 ppm
Ozone (O_3)		
3-Yr. Average of 4th – Highest Daily Maximum 8-Hour Conc.	0.08 ppm	0.08 ppm
Maximum Hourly Average	0.12 ppm[3]	0.12 ppm[3]

[1]Source: 40 CFR Part 50
[2]Maximum concentration not to be exceeded more than once per year.
[3]This limit is applicable only to areas designated nonattainment for ozone as of July 18, 1997; once an area has attained the 1-hour NAAQS and has been redesignated accordingly, the 1-hour limit will no longer apply, and the 0.08 ppm standard will be in effect.

The proposed project lies outside of the boundaries of the State's designated Metropolitan Planning Organization (MPO's) areas, but was included in the *Statewide Transportation Improvement Program 1997 to 1999*. As a result, the project was included, along with other non exempt and regionally significant projects, in a total burden analysis completed for the nonattainment area, as part of the *FY 1997 Conformity Determinations for Transportation Improvement Programs, Transportation Plans, and Regional Emissions Analysis of Transportation Projects in New Hampshire's Nonattainment Areas* (August 30, 1996), as required under the current conformity regulations. The conformity determinations were reviewed by the US Environmental Protection Agency (USEPA) and approved by the US Department of Transportation in November 1996.

As the project is included in a Transportation Improvement Program, which has been determined to conform with the New Hampshire State Implementation Plan and the requirements of the CAAA, the Federal Highway Administration has determined that a separate project-level conformity determination is not required. Therefore, a project specific mesoscale (emission inventory) analysis is not required. However, a project-specific microscale CO modeling analysis has been performed for this project.

4.5.2 Microscale Analysis

Microscale analyses are used to model CO pollutant concentrations for purposes of alternative evaluation as well as for purposes of comparison to the NAAQS. The objective of this type of analysis is to predict the maximum 1-hour and 8-hour CO concentrations at selected receptor points in sensitive locations around the proposed project.

4.5.2.1 Introduction

Carbon monoxide concentrations produced by motor vehicles operating near three signalized roadway intersections in the project area were predicted using CAL3QHC Version 2.0, a microcomputer air quality model. The model is a consolidation and revision of both CALINE-3, a line-source dispersion model developed by the California Department of Transportation and an algorithm that internally estimates vehicular queue lengths at signalized intersections.

4.5.2.2 Air Quality Modeling Methodology

CAL3QHC uses variables that have been determined for each intersection to generate 1-hour CO concentrations at selected receptor locations. A summary of model input variables are presented in Table 4.5.2.

All of the variables are entered into the model by link. Exhaust emission factors were generated using the USEPA Mobile Source Emission Factor computer model, MOBILE5A, a computer model used to generate CO emissions in grams/vehicle-mile, based on vehicle type, operating characteristics and speeds. Table 4.5.3 illustrates the CO emission factors as generated by MOBILE5A. For the purposes of this model the posted speed limit of the roadway and a combination of all types of vehicles were used.

Table 4.5.2 – AIR QUALITY MODELING VARIABLES		
VARIABLES	**EXISTING/ NO-BUILD 2015**	**FUTURE BUILD 2000/2015**
SITE VARIABLES		
Averaging Time	60 minutes	60 minutes
Surface Roughness	108 cm	108 cm
Settling Velocity	0 cm/s	0 cm/s
Deposition Velocity	0 cm/s	0 cm/s
Scale Factor	0.3048	0.3048
Link Coordinates	Various (x,y,z)	various (x,y,z)
Receptor Coordinates	Various (x,y,z)	various (x,y,z)
LINK VARIABLES		
Free Flow		
Section Type	AG, FL, BR	AG, FL, BR
Vehicles/hour	Varied by link	varied by link
Emission Factor	Varied with speed	varied with speed
Source Height	0	0 (except for overpass)
Mixing Zone	road width + 20 ft.	road width + 20 ft.
Queuing		
Section Type	AG	AG
Source Height	0 ft.	0 ft.
Lane Width	Current width	12 ft.
No. of Lanes	1 or 2	1 or 2
Total Signal Cycle	Actual or Default (90 sec)	Actual or Default (90 sec)
Total Red Cycle	Actual or Default (45 sec)	Actual or Default (45 sec)
Clearance Lost Time	2 seconds	2 seconds
Approach Volume	Varied by link	varied by link
Idle Emissions	Varied by year	varied by year
Saturation Flow Rate	1600	1600
Signal Type	2	2
Arrival Type	3	3
METEOROLOGICAL VARIABLES		
Mixing Height	1,000 meters	1,000 meters
Wind Speed	1 m/s	1 m/s
Stability Class	4	4
Background Concentration	2 ppm	2 ppm
Wind Angle	0-360 degrees	0-360 degrees
Increment Angle Degrees	10 degrees	10 degrees

Table 4.5.3 – MOBILE5A Emission Factors for CO (gm/mile)			
SPEED	**1995**	**2000**	**2015**
Idle*	878.975	595.25	440.6
5 mph	190.38	132.24	100.33
10 mph	104.32	77.07	61.42
20 mph	60.17	48.17	40.73
30 mph	41.96	31.65	24.93
40 mph	32.96	23.47	17.09
45 mph	30.23	20.87	14.52
50 mph	28.99	19.64	13.25
55 mph	29.16	19.75	13.3
60 mph	50.63	31.1	18.85

*Idle emission rates were generated by multiplying the exhaust emission factors at 2.5 mph by 2.5, and are expressed in gm/hour, rather than gm/mile.

Receptor locations were selected using EPA guidelines and were placed at locations where human presence was likely for any length of time. This would include homes and places of employment that may be near the roadway. Receptors were also located on sidewalks. With the exception of sidewalks, no receptors were located within the right-of-way, and all receptors were located outside of the "mixing zone" of the model. Receptors designated as "C", on Figures 4.5.1 through 4.5.6, represent "common" receptor locations. That is, each numbered receptor location preceded by a "C" is in the same location for Existing/No-Build and Build conditions. Receptors preceded by an "SE" represent sidewalk receptor locations under Existing/No-Build conditions. Receptors designated "SP" are sidewalk receptor locations under proposed (Build) conditions. Sidewalk receptors under Existing/No-Build and Build scenarios have been placed in "comparable", but not necessarily identical, locations, because sidewalk locations may change.

Traffic volumes for the base year (1995), Year 2015 No-Build, and Year 2015 Build conditions are those generated from the overall traffic analysis for this project, and represent P.M. peak hour volumes. Traffic volumes for the Year 2000 were interpolated from the Year 1995 and 2015 volumes. Roadway speeds used in the modeling represent "congested" speeds related to volume/capacity ratios on each link

Output from CAL3QHC consists of CO predictions, at each receptor, on a 1-hour basis. A background value of 2.0 ppm was then added to model predictions to determine the 1-hour concentration. The 8-hour concentrations were determined by multiplying the raw 1-hour concentrations (model output) by a persistence factor of 0.7, and then

adding a background value of 2.0 ppm. Results of the analyses are summarized in Tables 4.5.4 and 4.5.5, predicted concentrations at individual receptors are listed in Tables 4.5.6 through 4.5.8, and the analysis is discussed in the following sections.

TABLE 4.5.4 - PREDICTED 1-HOUR CO CONCENTRATIONS
KEENE/SWANZEY AIR QUALITY STUDY
NEW HAMPSHIRE ROUTES 9, 10, 12, & 101 UPGRADE

Intersection	Option	Number of Receptors	Range of Maximum Modeled CO Concentrations[1]			Number of Receptors Exceeding NAAQS[2]		
			1995	2000	2015	'95	'00	'15
Winchester Street/ NH Routes 10/12/101	No Build	45	4.2-13.6	N/A	4.4-22.0	0	N/A	0
	Build	45	N/A	3.5-8.5	3.7-9.5	N/A	0	0
Main Street/ NH Routes 12/101	No Build	37	4.3-14.7	N/A	3.8-10.4	0	N/A	0
	Build	37	N/A	3.1-11.2	3-10.4	N/A	0	0
Optical Avenue/ NH Route 101; NH Routes 12/32	No Build	8	2.6-6.6	N/A	2.5-5.3	0	N/A	0
	Build	31	N/A	3.0-9.0	3.3-10.3	N/A	0	0

[1] Includes background concentration of 2 ppm

[2] One-hour NAAQS = 35 ppm

* Not modeled; traffic/LOS data unavailable

NA = not applicable

TABLE 4.5.5 – PREDICTED 8-HOUR CO CONCENTRATIONS
KEENE/SWANZEY AIR QUALITY STUDY
NEW HAMPSHIRE ROUTES 9, 10, 12, & 101 UPGRADE

Intersection	Option	Number of Receptors	Range of Maximum Modeled CO Concentrations[1]			Number of Receptors Exceeding NAAQS[2]		
			1995	2000	2015	'95	'00	'15
Winchester Street/ NH Routes 10/12/101	No Build	45	3.5-10.1	N/A	3.7-16.0	3	N/A	11
	Build	45	N/A	3.0-6.6	3.2-6.9	N/A	0	0
Main Street/ NH Routes 12/101	No Build	37	3.6-10.9	N/A	3.3-8.2	4	N/A	0
	Build	37	N/A	2.8-8.4	2.7-7.9	N/A	0	0
Optical Avenue/ NH Route 101; NH Routes 12/32	No Build	8	2.4-5.2	N/A	2.4-4.3	0	N/A	0
	Build	31	N/A	2.7-6.9	2.9-7.8	N/A	0	0

[1] Includes background concentration of 2 ppm

[2] Eight-hour NAAQS = 9 ppm

* Not modeled; traffic/LOS data unavailable

NA = Not Applicable

TABLE 4.5.6-MAXIMUM CO CONCENTRATIONS[1,2] AT THE INTERSECTION OF WINCHESTER STREET AND NH ROUTE 12

RECEPTORS	1-HOUR				8-HOUR			
	Existing (ppm)	Build 2000 (ppm)	Build 2015 (ppm)	No Build 2015 (ppm)	Existing (ppm)	Build 2000 (ppm)	Build 2015 (ppm)	No Build 2015 (ppm)
C1	5.6	3.9	4.2	7.1	4.5	3.3	3.5	5.6
C2	4.9	4.8	5.0	5.6	4.0	4.0	4.1	4.5
C3	5.6	5.7	5.6	6.4	4.5	4.6	4.5	5.1
C4	6.1	5.4	5.5	6.7	4.9	4.4	4.5	5.3
C5	7.5	4.7	5.3	7.6	5.9	3.9	4.3	5.9
C6	6.5	4.4	4.7	7.2	5.2	3.7	3.9	5.6
C7	8.3	5.9	5.8	8.6	6.4	4.7	4.7	6.6
C8	4.9	3.5	4.0	4.4	4.0	3.1	3.4	3.7
C9	5.4	3.9	4.7	4.8	4.4	3.3	3.9	4.0
C10	6.0	4.6	5.1	6.4	4.8	3.8	4.2	5.1
C11	4.4	5.2	6.2	4.7	3.7	4.2	4.9	3.9
C12	5.1	4.1	4.8	5.9	4.2	3.5	4.0	4.7
C13	4.2	3.4	3.7	5.4	3.5	3.0	3.2	4.4
C14	7.3	6.3	6.5	11.5	5.7	5.0	5.2	8.7
C15	10.8	5.6	6.2	22.0	8.2	4.5	4.9	**16.0**
C16	10.8	5.7	6.4	21.8	8.2	4.6	5.1	**15.9**
C17	8.7	4.8	5.4	16.3	6.7	4.0	4.4	**12.0**
C18	10.7	5.7	6.1	20.7	8.1	4.6	4.9	**15.1**
C19	10.1	5.9	6.6	19.6	7.7	4.7	5.2	**14.3**
C20	10.0	6.1	6.5	19.0	7.6	4.9	5.2	**13.9**
C21	5.7	4.2	4.7	9.9	4.6	3.5	3.9	7.5
C22	5.6	4.2	4.8	9.5	4.5	3.5	4.0	7.3
C23	6.6	5.9	6.5	12.0	5.2	4.7	5.2	9.0
C24	5.4	4.8	5.3	9.7	4.4	4.0	4.3	7.4
SP1/SE1	7.6	8.5	9.0	8.5	5.9	6.6	6.9	6.6
SP2/SE2	6.4	5.3	6.2	7.4	5.1	4.3	4.9	5.8
SP3/SE3	6.8	7.5	7.1	7.7	5.4	5.9	5.6	6.0
SP4/SE4	8.2	6.9	7.2	9.5	6.3	5.4	5.6	7.3
SP5/SE5	8.8	6.2	6.8	10.0	6.8	4.9	5.4	7.6
SP6/SE6	9.9	6.7	7.1	10.2	7.5	5.3	5.6	7.7
SP7/SE7	10.4	7.6	7.9	10.3	7.9	5.9	6.1	7.8
SP8/SE8	12.2	7.6	7.8	11.5	**9.1**	5.9	6.1	8.7
SP9/SE9	13.2	6.2	7.0	13.2	**9.8**	4.9	5.5	**9.8**
SP10/SE10	11.3	5.9	7.1	12.1	8.5	4.7	5.6	**9.1**
SP11/SE12	10.0	5.3	6.5	10.8	7.6	4.3	5.2	8.2
SP12/SE12	8.0	8.1	9.5	8.7	6.2	6.3	7.3	6.7
SP13/SE13	6.7	8.3	8.7	7.5	5.3	6.4	6.7	5.9
SP14/SE14	6.6	5.3	6.3	7.7	5.2	4.3	5.0	6.0
SP15/SE15	6.8	6.8	7.2	8.2	5.4	5.4	5.6	6.3
SP16/SE16	6.6	6.7	7.9	7.7	5.2	5.3	6.1	6.0
SP17/SE17	7.4	7.5	7.7	9.4	5.8	5.9	6.0	7.2
SP18/SE18	8.9	7.1	8.3	13.8	6.8	5.6	6.4	**10.3**
SP19/SE19	9.3	6.7	7.2	14.3	7.1	5.3	5.6	**10.6**
SP20/SE20	10.3	5.2	5.9	20.2	7.8	4.2	4.7	**14.7**
SP21/SE21	13.6	6.4	6.9	11.6	**10.1**	5.1	5.4	8.7
Receptors Exceeding NAAQS	0	0	0	0	3	0	0	11

[1] Concentrations are in parts per million and include a background concentration of 2 ppm.
[2] Concentrations in bold exceed the NAAQS.

TABLE 4.5.7 - MAXIMUM CO CONCENTRATIONS[1,2] AT THE INTERSECTION OF MAIN STREET AND NH ROUTE 101

RECEPTORS	1-HOUR				8-HOUR			
	Existing (ppm)	Build 2000 (ppm)	Build 2015 (ppm)	No Build 2015 (ppm)	Existing (ppm)	Build 2000 (ppm)	Build 2015 (ppm)	No Build 2015 (ppm)
C1	6	3.9	3.9	5.0	4.8	3.3	3.3	4.1
C2	6	3.8	4.1	5.1	4.8	3.3	3.5	4.2
C3	6.4	4.5	4.9	5.6	5.1	3.8	4.0	4.5
C4	6.7	4.4	4.3	5.6	5.3	3.7	3.6	4.5
C5	11.9	4.7	5.0	10.2	8.9	3.9	4.1	7.7
C6	9.4	3.9	4.1	7.8	7.2	3.3	3.5	6.1
C7	8.4	4.1	4.2	7.3	6.5	3.5	3.5	5.7
C8	4.9	3.3	3.2	4.3	4.0	2.9	2.8	3.6
C9	4.3	3.2	3.0	3.8	3.6	2.8	2.7	3.3
C10	7.3	3.5	3.5	6.3	5.7	3.1	3.1	5.0
C11	7.3	3.4	3.6	6.2	5.7	3.0	3.1	4.9
C12	10.6	3.9	4.2	8.0	8.0	3.3	3.5	6.2
C13	6.0	3.1	3.2	5.0	4.8	2.8	2.8	4.1
C14	8.5	3.3	3.5	6.7	6.6	2.9	3.1	5.3
C15	12.2	4.0	4.0	8.9	**9.1**	3.4	3.4	6.8
C16	8.5	3.3	3.5	6.5	6.6	2.9	3.1	5.2
C17	8.4	3.2	3.5	6.2	6.5	2.8	3.1	4.9
C18	11.2	3.5	3.9	8.2	8.4	3.1	3.3	6.3
SP1/SE1	9.8	5.4	5.8	8.2	7.5	4.4	4.7	6.3
SP2/SE2	10.3	5.3	5.2	8.6	7.8	4.3	4.2	6.6
SP3/SE3	10.6	5.9	5.8	8.8	8.0	4.7	4.7	6.8
SP4/SE4	10.2	7.4	7.4	8.6	7.7	5.8	5.8	6.6
SP5/SE5	11.6	6.8	6.4	9.9	8.7	5.4	5.1	7.5
SP6/SE6	12.0	6.6	6.3	10.4	**9.0**	5.2	5.0	7.9
SP7/SE7	7.1	6.5	7.6	6.5	5.6	5.2	5.9	5.2
SP8/SE8	10.2	11.2	10.4	9.2	7.7	8.4	7.9	7.0
SP9/SE9	10.0	6.8	7.1	8.9	7.6	5.4	5.6	6.8
SP10/SE10	7.0	6.0	6.0	5.9	5.5	4.8	4.8	4.7
SP11/SE11	8.6	5.4	5.5	7.5	6.6	4.4	4.5	5.9
SP12/SE12	11.9	6.3	5.7	9.9	8.9	5.0	4.6	7.5
SP13/SE13	9.4	5.1	4.8	8.4	7.2	4.2	4.0	6.5
SP14/SE14	6.4	4.2	4.4	5.4	5.1	3.5	3.7	4.4
SP15/SE15	10.8	4.2	4.1	9.4	8.2	3.5	3.5	7.2
SP16/SE16	11.6	4.3	4.3	8.5	8.7	3.6	3.6	6.6
SP17/SE17	12.9	3.9	4.1	9.6	**9.6**	3.3	3.5	7.3
SP18/SE18	12.7	3.9	4.4	9.3	**9.5**	3.3	3.7	7.1
SP19/SE19	14.7	4.0	4.1	10.9	**10.9**	3.4	3.5	8.2
Receptors Exceeding NAAQS	0	0	0	0	4	0	0	0

[1] Concentrations are in parts per million and include a background concentration of 2 ppm.
[2] Concentrations in bold exceed the NAAQS.

TABLE 4.5.8 – MAXIMUM CO CONCENTRATIONS[1,2] AT THE INTERSECTION OF OPTICAL AVENUE AND NH ROUTE 101/NH ROUTE 32 CONNECTOR

RECEPTORS	1-HOUR				8-HOUR			
	Existing (ppm)	Build 2000 (ppm)	Build 2015 (ppm)	No Build 2015 (ppm)	Existing (ppm)	Build 2000 (ppm)	Build 2015 (ppm)	No Build 2015 (ppm)
C1	2.6	3.7	5.0	2.5	2.4	3.2	4.1	2.4
C2	-	3.0	3.3	-	-	2.7	2.9	-
C3	-	3.8	4.2	-	-	3.3	3.5	-
C4	-	4.5	5.2	-	-	3.8	4.2	-
C5	-	4.3	4.9	-	-	3.6	4.0	-
C6	-	3.7	4.3	-	-	3.2	3.6	-
C7	-	3.4	3.7	-	-	3.0	3.2	-
C8	-	4.1	4.3	-	-	3.5	3.6	-
C9	-	3.4	4.2	-	-	3.0	3.5	-
C10	-	3.5	4.0	-	-	3.1	3.4	-
SP1/SE1	3.8	3.8	4.7	3.8	3.3	3.3	3.9	3.3
SP2/SE2	6.6	5.9	6.5	5.3	5.2	4.7	5.2	4.3
SP3/SE3	4.8	6.0	6.3	3.8	4.0	4.8	5.0	3.3
SP4/SE4	5.9	4.7	4.8	4.5	4.7	3.9	4.0	3.8
SP5/SE5	5.2	3.6	4.4	4.3	4.2	3.1	3.7	3.6
SP6/SE6	4.2	3.4	4.2	3.8	3.5	3.0	3.5	3.3
SP7/SE7	4.6	8.8	9.6	3.8	3.8	6.8	7.3	3.3
SP8	-	6.4	7.7	-	-	5.1	6.0	-
SP9	-	7.3	8.9	-	-	5.7	6.8	-
SP10	-	6.1	8.9	-	-	4.9	6.8	-
SP11	-	7.1	6.2	-	-	5.6	4.9	-
SP12	-	5.1	7.6	-	-	4.2	5.9	-
SP13	-	9.0	10.3	-	-	6.9	7.8	-
SP14	-	4.8	5.4	-	-	4.0	4.4	-
SP15	-	3.6	4.7	-	-	3.1	3.9	-
SP16	-	3.3	4.9	-	-	2.9	4.0	-
SP17	-	5.6	6.4	-	-	4.5	5.1	-
SP18	-	6.2	9.6	-	-	4.9	7.3	-
SP19	-	5.6	7.8	-	-	4.5	6.1	-
SP20	-	6.1	6.9	-	-	4.9	5.4	-
SP21	-	5.3	6.5	-	-	4.3	5.2	-
Receptors Exceeding NAAQS	0	0	0	0	0	0	0	0

[1] Concentrations are in parts per million and include a background concentration of 2 ppm.
[2] Concentrations in bold exceed the NAAQS.

4.5.2.3 Existing and No-Build Conditions Analysis

An analysis of Existing (1995) and Year 2015 No-Build conditions was conducted to determine if any violations of the NAAQS standards for CO currently or would exist at any of the three intersections that were studied. Year 2000 No-Build conditions were not modeled because required traffic/Level of Service information was not available. A brief discussion explaining the results of the analysis at each intersection is given in the following:

- Winchester Street/NH Routes 10/12/101

  The analysis at Winchester Street was conducted by modeling 45 receptors as shown on Figure 4.5.1. Predicted 1-hour CO concentrations for existing conditions, range from 4.2-13.6 ppm and do not exceed the 1-hour standard. Corresponding 8-hour values range from 3.5-10.1 ppm, with 3 receptors exceeding the 8-hour NAAQS.

  For Year 2015 No-Build conditions, 1-hour concentrations range from 4.4-22.0 ppm, all below the 1-hour standard. 8-hour concentrations range from 3.7-16.0 ppm, with 11 receptor locations exceeding the 8-hour standard.

  The predicted violations of the 8-hour standard are attributed to the poor Level of Service at the Winchester Street intersection for both Existing and No-Build conditions.

- Main Street/NH Routes 12/101

  The analysis at Main Street was conducted by modeling 37 receptors (illustrated in Figure 4.5.3) in locations that would be considered areas for likely human presence. Predicted 1-hour CO concentrations for existing (1995 traffic) conditions range from 4.3-14.7 ppm. No receptors exceed the 1-hour NAAQS of 35 ppm. 8-hour concentrations range from 3.6-10.9 ppm, with 4 receptor locations exceeding the 8-hour standard of 9 ppm.

  Predicted 1-hour CO concentrations for Year 2015 No-Build conditions range from 3.8-10.4 ppm, with no receptors exceeding the 1-hour standard. 8-hour concentrations are predicted to range from 3.3-8.2 ppm, with no receptors exceeding the 8-hour standard.

  The violations of the 8-hour standard are attributed to the poor Level of Service at this intersection under Existing/No-Build conditions.

- Optical Avenue/NH Route 101; NH Routes 12/32

  The analysis at Optical Avenue was conducted by modeling 8 receptors (illustrated in Figure 4.5.5). Receptors at the NH Routes 12/32 intersection could not be modeled because traffic/LOS information was not available for Existing/No-Build conditions.

  Predicted 1-hour CO concentrations at the Optical Avenue/NH Route 101 intersection for Existing conditions range from 2.6-6.6 ppm, with no receptors exceeding the 1-hour standard. The corresponding 8-hour predictions range from 2.4-5.2 ppm, with no receptors exceeding the standard.

  Predicted 1-hour CO concentrations for Year 2015 No-Build conditions range from 2.5-5.3 ppm, with no receptors exceeding the 1-hour standard. Predicted 8-hour concentrations range from 2.4-4.3 ppm, with no receptors exceeding the standard.

4.5.2.4 Future Year Build Conditions Analysis

An analysis of the future year (2000 and 2015) conditions was conducted to estimate CO concentrations for the Build (with improvements) cases. The results for each intersection are presented in the following discussions.

- Winchester Street/NH Routes 10/12/101

  For the future Build cases at the Winchester Street intersection 45 receptors were modeled (see Figure 4.5.2). Predicted 1-hour concentrations for the Years 2000 (3.5-8.5 ppm) and 2015 (3.7-9.5 ppm) are all below the 1-hour NAAQS for CO. All predicted 8-hour concentrations for 2000 (3.0-6.6 ppm) and 2015 (3.2-6.9 ppm) are also below the 8-hour standard.

  Predicted 1-hour and 8-hour CO concentrations are lower under Build than No-Build conditions, as a result of improved Levels of Service.

- Main Street/NH Routes 12/101

  For the Build cases at the Main Street intersection, 37 receptors were modeled (see Figure 4.5.4). Predicted 1-hour CO concentrations range from 3.1-11.2 ppm in the Year 2000 and 3.0-10.4 ppm in 2015. None of the predicted 1-hour values exceed the NAAQS. Predicted 8-hour concentrations in the

Year 2000 range from 2.8-8.4 ppm and in 2015 range from 2.7-7.9 ppm. No values exceed the 8-hour standard.

Predicted 1-hour and 8-hour CO concentrations for Build conditions are lower than Existing or No-Build cases, which reflects improved intersection operating conditions.

- Optical Avenue/NH Route 101; NH Routes 12/32

  For the future Build cases at the Optical Avenue intersection, 31 receptors were modeled (see Figure 4.5.6). Predicted 1-hour concentrations for the Years 2000 (3.0-9.0 ppm) and 2015 (3.3-10.3 ppm) are all below the 1-hour NAAQS for CO. Likewise, predicted 8-hour concentrations for 2000 (2.7-6.9 ppm) and 2015 (2.9-7.8 ppm) do not exceed the 8-hour standard.

  Predicted 1-hour and 8-hour CO concentrations are lower under Build than No-Build conditions, attributable to improved Levels of Service.

4.5.2.5 Summary

Air quality modeling results from the three modeled intersections in the project area indicate that there will be no violations of the 1-hour NAAQS for carbon monoxide under any of the scenarios considered. However, CO concentrations at some receptors are predicted to exceed the 8-hour NAAQS at the Winchester Street and Main Street intersections under both Existing and Year 2015 No-Build conditions[1]. No violations of the 8-hour standard are predicted under Years 2000 and 2015 Build conditions at any of the intersections modeled. Examination of the model results indicates two general trends:

1) a reduction of CO concentrations in the future as the vehicle fleet mix changes, resulting from federally-mandated decreases in vehicle emissions, and

2) a decrease in CO concentrations under Build conditions, compared to the No-Build, as a result of the improved operating conditions under the Build scenario.

[1] The model results should not be interpreted that actual violations of the 8-hour standard for CO currently do or will occur under No-Build conditions at Winchester or Main Streets. The CAL3QHC model itself is conservative, and worst-case traffic and meteorological assumptions are used as input to the model. Thus, the model predictions likely overestimate actual CO concentrations.

4.5.3 Construction Air Quality

Construction activities affect air quality primarily due to short-term increases in Total Suspended Particles (TSP). Excavation and earth-moving operations are the primary contributors to TSP. Measures can be taken during construction to reduce the amount of dust, such as, regular street cleaning during construction and using water and calcium chloride on the roads to keep the dust to a minimum. NHDOT will utilize such measures through the construction phase.

4.6 NOISE

4.6.1 Methodology

A noise analysis was performed for this project using the Federal Highway Administration's (FHWA) Highway Traffic Noise Prediction Model Stamina 2.0 to predict existing noise levels within the study area, as well as future noise levels, for both Build and No-Build conditions.

Field measurements were taken using a Metrosonics dB308 Metrologger sound level meter at 16 noise measurement locations within the project area in October, 1994 and July and August, 1997 (see Figure 4.6.1). Noise level readings were recorded for a 15-minute period at 15 of the locations between 3:00 – 6:00 p.m. to coincide with the P.M. peak traffic period. One site was monitored during the A.M. peak traffic period. Vehicle counts were made during the monitoring period. The monitored noise levels were then compared to the predicted noise levels (using the traffic counts) to validate the model's accuracy. Table 4.6.1 illustrates the difference between the measured noise levels and predicted existing noise levels. At all but one of the monitoring locations, differences are between zero and three decibels, which is considered acceptable. At one location (Monitoring Site 7), the difference between measured and predicted noise levels was 5 dBA. Because this site was close to the NHDOT Maintenance Facility on Base Hill Road, noise levels were influenced by idling trucks. This accounts for the discrepancy at this location.

Table 4.6.1 – NOISE AT MONITORING LOCATIONS					
[1]Monitoring Site No.	Location	Date	Monitoring Period	Noise Level (dBA, Leq)	
				Measured	Predicted
1	52 Base Hill Road	10/25/94	5:00 – 5:15 p.m.	64	64
2	Front of Super 8 Motel – Route 9	10/27/94	5:18 – 5:30 p.m.	62	62
3	Route 9, 10, 12 – 2,340' North of Rte. 10, 12, 101	10/26/94	5:25 – 5:40 p.m.	67	65
4	29 Fairbanks Street	10/27/94	4:45 – 5:00 p.m.	53	53
5	515 Route 10	10/27/94	4:20 – 4:35 p.m..	66	66
6	Guyettes Sales & Service – Route 10	10/27/94	3:56 – 4:11 p.m.	67	65
7	NHDOT Bldg. – Base Hill Road	10/27/94	3:30 – 3:45 p.m.	64 [2]	59
8	Rte. 12, 101 – 305 ft. East of Winchester Street	10/26/94	4:47 – 5:02 p.m.	63	64
9	CCIA Insurance – Martell Court	10/26/94	4:20 – 4:35 p.m.	64	66
10	John Coughlin Real Estate – King Court	10/25/94	5:40 – 5:55 p.m.	65	65
11	Cummings Building – Route 12	10/26/94	3:55 – 4:10 p.m.	67	70
12	678 Route 12	10/26/94	3:30 – 3:45 p.m.	72	70
13	Route 12	7/15/97	3:55 – 4:10 p.m.	54	57
14	Route 12	7/15/97	4:15 – 4:30 p.m.	65	66
15	Route 12	7/15/97	3:30 – 3:45 p.m.	68	71
16	419 Winchester Street	8/1/97	8:15 –8:30 a.m.	66	63

[1] See Figure 4.6.1 for monitoring locations
[2] measured noise level influenced by idling trucks

The noise levels are given in units of dBA, Leq. dBA is a weighted decibel unit that best corresponds to the frequency response of the human ear. Leq represents an equivalent steady state sound level, which in a stated period of time contains the same acoustic energy as the time varying sound level during the same period.

Traffic noise impacts occur when predicted future, build noise levels approach (within one decibel), equal or exceed the FHWA Noise Abatement Criteria (NAC) (see Table 4.6.2) or when predicted future, build noise levels exceed existing noise levels by 15 dBA or greater. It is generally observed that a 0-3 dBA increase or decrease represents no noticeable change,

a 3-5 dBA increase or decrease represents a slight change, a 6-14 dBA increase or decrease represents a moderate change and a 15 dBA or greater increase or decrease represents a substantial change in noise levels.

TABLE 4.6.2 – NOISE ABATEMENT CRITERIA FOR HIGHWAY PROJECTS[1]

Activity Category	Leq (h)	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to service its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties or activities not included in Category A or B above.
D	----	Undeveloped lands
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

[1] Source: 23 CFR 772

Abatement analysis is required when noise impacts are identified. The following noise abatement measures are considered when noise impacts are identified:

- Traffic management measures
- Alteration of horizontal and vertical alignments
- Acquisition of property rights for construction of noise barriers or acquisition of buffer zones.
- Construction of noise barriers.
- Noise insulation of public use or non-profit institutional structures.

The final decision on the implementation of noise abatement is made after careful and thorough consideration of the feasibility and reasonableness of the proposed abatement measures. Noise barriers must achieve a minimum insertion loss (noise reduction) of 5 dBA and cost less than $30,000 per residence to be considered feasible and reasonable.

4.6.2 Impacts

The study limits for the noise analysis were divided into 13 areas (see Figure 4.6.2) to accurately describe how the proposed project would affect noise levels in the study area. The area boundaries are based on roadway characteristics and predominant land use (i.e. residential or commercial/industrial). There are approximately 214 receptors located within the noise analysis study limits including 121 residential properties and 93 commercial/industrial properties. These are no Category A land uses in the project area and no schools, churches, libraries or hospitals adjacent to project area roadways.

A summary of the noise analysis is presented in Table 4.6.3. No receptors are predicted to experience a 15 dBA or greater increase in noise levels. Individual area descriptions and results are provided below.

TABLE 4.6.3 – NOISE ANALYSIS SUMMARY

Receptor Area	No. of Receptors	Land Use[1]	No. Receptors Approaching, At or Exceeding Noise Abatement Criteria		
			Existing Res/Com/Total	2015 No-Build Res/Com/Total	2015 Build Res/Com/Total
1	19	Res.	0/0/0	1/0/1	1/0/1
2	5	Com/Res.	0/0/0	0/0/0	0/0/0
3	7	Res./Com.	3/0/3	3/0/3	3/0/3
4	5	Res./Com.	0/0/0	0/0/0	1/0/1
5	18	Com./Res.	1/0/1	1/0/1	0/0/0
6	14	Res./Com.	2/0/2	2/0/2	2/0/2
7	31	Com./Res.	1/17/18	1/20/21	1/16/17
8	19	Res./Com.	13/0/13	18/0/18	17/0/17
9	9	Res./Com.	0/0/0	1/1/2	1/1/2
10	6	Com.	0/0/0	0/0/0	0/0/0
11	10	Res./Com.	6/0/6	7/0/7	6/0/6
12	22	Com./Res.	3/14/17	3/15/18	3/0/3
13	49	Res./Com.	37/0/37	39/2/41	12/2/14
Totals	214		66/31/97	76/38/114	47/19/66

[1] Where land use is mixed, predominant use is listed first

AREA 1

There are approximately 19 residential properties in this area, which is located near the intersection of Base Hill Road with NH Route 10. These receptors presently experience noise levels between 57 and 65 dBA. If the project is not constructed, the receptors will

have noise levels between 59 and 68 dBA in 2015 with one residence adjacent to NH Route 9 (68 dBA) exceeding the NAC.

If the project is constructed, the receptors will have noise levels between 59 and 67 dBA by 2015 with one residence adjacent to NH Route 10 at the NAC (67 dBA). Generally, receptors in this area will experience a 0-3 dBA increase in noise levels in 2015 compared to existing conditions.

A noise barrier would not be acoustically effective or economically reasonable and is not proposed for this location. Heavy truck traffic is already restricted on Base Hill Road and further traffic management measures, such as a reduction in speed limits, are not feasible.

AREA 2

There are approximately 4 commercial properties and one residential property (motel) within this area, which lies along NH Route 9 near Production Drive. These receptors presently experience noise levels between 56 and 62 dBA. If the project is not constructed, the receptors will have noise levels between 58 and 64 dBA by 2015.

If the project is constructed, the receptors will have noise levels 0-3 dBA higher than existing conditions, or between 54 and 65 dBA, by 2015. No predicted noise levels exceed the NAC, and abatement analysis is not required.

AREA 3

Approximately 4 residential properties and 3 commercial properties were modeled within the boundaries of Area 3, which is in the vicinity of the West Street interchange. These receptors presently experience noise levels between 55 and 68 dBA with 3 residences approaching, at or exceeding the NAC. If the project is not constructed, the residential receptors will have noise levels between 56 and 69 dBA by 2015 with 3 residences (67 to 69 dBA) at or exceeding the NAC.

If the project is constructed, one business will be acquired. The remaining receptors will experience noise level increases of 0-3 dBA compared to existing conditions. Predicted noise levels are between 58 and 69 dBA by 2015 with the same 3 residences (67 to 69 dBA) at or exceeding the NAC. These receptors front directly on West Street or Park Avenue, and because of the presence of an intersecting street and the need to maintain driveway access, a noise barrier is not feasible at this location. Other types of mitigation such as alignment shifts or traffic management measures are either infeasible or ineffective.

AREA 4

There are approximately 4 residential properties (3 apartment buildings, and 1 single family) and 1 commercial property within Area 4, which encompass the west end of Key Road, adjacent to NH Routes 9/10/12. These receptors presently experience noise levels between

57 and 62 dBA. Under No-Build conditions, the receptors will have noise levels between 58 and 63 dBA by 2015.

If the project is constructed, the receptors will have noise levels between 60 and 66 dBA by 2015 with one residential property (the single family residence) approaching the NAC. This represents a 0-4 dBA increase over existing conditions. Abatement analysis indicates that a barrier to protect the single family residence is not cost effective, and is therefore not proposed. The project design already incorporates a westward shift of the alignment at this location, which moves the noise sources slightly away from the receptors. Traffic management measures, such as the exclusion of trucks or reduced speed limits, are not feasible at this location.

AREA 5

There are approximately 17 commercial properties and 1 residential property within the limits of this area, which lies along Winchester Street and Key Road. These receptors presently experience noise levels between 57 and 68 dBA with one residence (67 dBA) at the NAC. If the project is not constructed, the receptors will have noise levels between 58 and 69 dBA by 2015 with one residence (69 dBA) exceeding the NAC.

If the project is constructed, three commercial properties in this area will be acquired. The remaining receptors will have noise levels between 60 and 68 dBA by 2015 (increase of 0-3 dBA compared to existing conditions) with no receptors approaching or exceeding the NAC. The residence does not experience a noise impact under Build conditions, because the alignment of Winchester Street shifts to the east, away from the receptor. Because predicted noise levels do not exceed the NAC, abatement analysis is not required.

AREA 6

Approximately 12 residential and 2 commercial properties were modeled within Area 6, which encompasses the Island/Pearl Streets area. These receptors presently experience noise levels between 58 and 67 dBA with two residential receptors (66-67 dBA) approaching or at the NAC. If the project is not constructed, the receptors will have noise levels between 60 and 70 dBA by 2015 with two residences (69-70 dBA) exceeding the NAC.

If the project is constructed, one residential and one business structure will be acquired. The remaining receptors will have noise levels between 61 and 69 dBA by 2015 with two residences (68-69 dBA) exceeding the NAC. These noise levels represent a 0-3 dBA change from existing conditions.

Because of the presence of cross streets, driveways and limited right-of-way area, noise barriers are not feasible in this area. Alignment shifts and traffic management measures are also not feasible in this area.

AREA 7

There are approximately 30 commercial properties and 1 residential property within this area, which includes Winchester Street from its intersection with NH Routes 10/12/101 south to the vicinity of Matthews Road. Most of these receptors are in very close proximity to the roadway, which makes them sensitive to slight changes in alignment. These receptors presently experience noise levels between 60 and 74 dBA with 17 businesses (71-74 dBA) and one residence (67 dBA) approaching, at or exceeding the NAC. If the project is not constructed, the receptors will have noise levels between 61 and 75 dBA by 2015 with 20 businesses (71-75 dBA) and one residence (69 dBA) approaching or exceeding the NAC.

If the project is constructed, the receptors will have noise levels between 61 and 72 dBA by 2015 with 16 businesses (71-72 dBA) and one residence (68 dBA) approaching, at or exceeding the NAC. This represents a 0-3 dBA change from existing conditions. In some cases, noise levels are lower under Build conditions because of a slight shift in the alignment.

Noise barriers are not feasible in this area because of the presence of side streets and numerous curb cuts required for access to businesses. Further alignment shifts, which are constrained by development on both sides of the roadway, or traffic management measures, are also not feasible at this location.

AREA 8

There are approximately 18 residential properties and 1 commercial property within this area, which extends along NH Route 10 from the vicinity of Matthews Road south to the Town of Swanzey. These receptors presently experience noise levels between 64 and 72 dBA with 13 residential properties (66-72 dBA) approaching, at or exceeding the NAC. If the project is not constructed, the receptors will have noise levels between 66 and 73 dBA by 2015 with 18 residences (66-73 dBA) approaching or exceeding the NAC.

If the project is constructed, one residential property will be acquired. The remaining receptors will have noise levels between 66 and 74 dBA by 2015 with 17 residences (66-74 dBA) approaching or exceeding the NAC. This represents a 0-3 dBA change from existing conditions.

Cross streets and numerous driveways prohibit the use of noise barriers in this area. Alignment shifts and traffic management measures are also not feasible.

AREA 9

Approximately 7 residential properties and 2 commercial properties were modeled within Area 9, which includes the Base Hill Road/Ash Hill Road intersection area. These receptors presently experience noise levels between 56 and 70 dBA with no receptors approaching or exceeding the NAC. If the project is not constructed, the receptors will have noise levels

between 59 and 72 dBA by 2015 with one residence (66 dBA) approaching and one commercial property (72 dBA) at the NAC.

If the project is constructed, the receptors will have noise levels between 59 and 72 dBA (0-3 dBA change from existing conditions) by 2015 with one residence (67 dBA) and one commercial property (72 dBA) at the NAC.

Noise barriers are not feasible in this area because of access requirements. Alignment shifts and traffic management strategies are also not feasible.

AREA 10

There are approximately 6 commercial properties in Area 10, which is located on the west side of the Main Street/NH Routes 12/101 intersection. These receptors presently experience noise levels of 63 - 64 dBA. If the project is not constructed, the receptors will have noise levels between 64 and 66 dBA by 2015.

If the project is constructed, the receptors will have noise levels between 64 and 67 dBA by 2015, or a 0-3 dBA change compared to existing conditions. Abatement analysis is not required, because no predicted noise levels exceed the NAC.

AREA 11

Nine residential properties and one commercial property were modeled in this area, which includes Main Street between NH Routes 12/101 and Baker Street. These receptors presently experience noise levels between 63 and 68 dBA with 6 residential properties (66-68 dBA) approaching, at or exceeding the NAC. If the project is not constructed, the receptors will have noise levels between 64 and 69 dBA by 2015 with 7 residences (66-69 dBA) approaching or exceeding the NAC.

If the project is constructed, one residence and one commercial property will be acquired. The remaining receptors will have noise levels between 64 and 68 dBA by 2015 with 6 residences (66-68 dBA) approaching, at or exceeding the NAC. Noise levels will change 0-3 dBA compared to existing conditions.

Noise barriers are not feasible at this location because of intersecting streets and numerous driveways. Alignment shifts or traffic management measures are also not feasible at this location.

AREA 12

Eighteen commercial properties and 4 residential properties were modeled within Area 12, which includes Main Street from NH Routes 12/101 south to the vicinity of St. Joseph's Cemetery. These receptors presently experience noise levels between 66 and 74 dBA with 14 businesses (71-74 dBA) and 3 residential properties (71 to 74 dBA) approaching, at or exceeding the NAC. If the project is not constructed, the receptors will have noise levels

between 66 and 75 dBA by 2015 with 15 businesses (71-75 dBA) and 3 residential properties (72 to 75 dBA) approaching, at or exceeding the NAC.

If the project is constructed, the receptors will have noise levels between 63 and 69 dBA by 2015 with 3 residences (66 to 69 dBA) approaching, at or exceeding the NAC. These noise levels generally represent a 3-6 dBA decrease from existing conditions. Noise levels will decrease in this area under Build conditions due to the diversion of traffic to the Optical Avenue Connector. This diversion is a traffic management measure.

Because of access requirements, noise barriers are not feasible at this location. Further alignment shifts or traffic management measures are also not feasible.

AREA 13

There are approximately 41 residential properties and 8 commercial properties in Area 13, which includes the general area of the NH Routes 12/32 intersection and the proposed Optical Avenue Connector. These receptors presently experience noise levels between 54 and 72 dBA with 37 residences (66 to 72 dBA) approaching or exceeding the NAC. If the project is not constructed, the receptors will have noise levels between 62 and 73 dBA by 2015 with 39 residences (66 to 73 dBA) and two commercial properties (71 dBA) approaching, at or exceeding the NAC.

If the project is constructed, 6 residences and 1 business will be acquired. The remaining receptors will have noise levels between 59 and 71 dBA by 2015 with 12 residences (66 to 71 dBA) and 2 commercial properties (71 dBA) approaching, at or exceeding the NAC. Overall, this represents a 0-5 dBA change from existing conditions. However, noise levels on NH Route 12 north of the Optical Avenue Connector will decrease substantially (5-8 dBA), due to the diversion of traffic to the Connector.

The impacted properties under Build conditions are located south of the Optical Avenue Connector. Noise barriers are not feasible in this area, due to access requirements. Alignment shifts and traffic management measures are also not feasible.

4.6.3 Summary of Noise Modeling

The results of traffic noise modeling are summarized in Table 4.6.3. As shown in the table, an estimated 97 receptors (combined residential and commercial) in the project area currently have noise levels that approach, are at, or exceed the Noise Abatement Criteria. Nearly all of these are properties in close proximity to the road along Winchester and Main Streets, south of NH Route 101.

Under Year 2015 No-Build conditions, the total number of receptors with predicted noise levels that approach, are at, or exceed the NAC increases to 114 (combined residential and commercial). This increase is attributable to traffic growth.

Under Year 2015 Build conditions, the number of combined residential and commercial receptors that exceed the NAC is 66, which is 48 fewer impacted receptors than under No-Build conditions. This decrease occurs primarily because construction of the Optical Avenue Connector diverts traffic away from Main Street, and thereby reduces noise impacts in that area.

Noise barrier construction is not feasible in most of the areas where impacts occur because access is uncontrolled, and there are numerous driveways and curb cuts. Alignment shifts to reduce noise levels are not feasible, because the proposed improvements center on the existing alignment, and impacted receptors occur in close proximity to, and on both sides of, the roadways. Reduction of speed limits, as a traffic management measure to reduce noise levels, is not feasible because posted speed limits in the project area are already low. Restriction of truck traffic is also not feasible, because the roadways involved are major east-west and north-south routes in southwestern New Hampshire.

4.6.4 Future Noise Levels for Planning Purposes

Data developed from this noise study has been summarized in a format that may be useful to local officials in their planning efforts. Table 4.6.4 lists, for each of the noise receptor areas, the approximate distances from the roadway (under Year 2015 Build conditions) to the 66 dBA and 71 dBA contours. These represent the noise levels where the Noise Abatement Criteria for residential and commercial properties, respectively, are approached.

TABLE 4.6.4 – APPROXIMATE DISTANCES TO THE 66 AND 71 dBA CONTOURS

RECEPTOR AREA (ROADWAY)	DISTANCE FROM ROADWAY m (ft.)	
	66 dBA	71 dBA
1 (NH Route 9)	33 m (110 ft.)	9 m (30 ft.)
1 (Base Hill Road)	Edge Pavement	N/A
2 (NH Route 9)	40 m (130 ft.)	14 m (45 ft.)
3 (West Street)	8 m (25 ft.)	Edge Pavement
4 (Key Road)	45 m (150 ft.)	21 m (70 ft.)
5 (Routes 10/12/101)	15 m (50 ft.)	Edge Pavement
5 (Winchester Street)	17 m (55 ft.)	Edge Pavement
6 (Island/Pearl Streets)	6 m (20 ft.)	Edge Pavement
7 (Winchester Street)	15 m (50 ft.)	Edge Pavement
8 (Route 10)	26 m (85 ft.)	2 m (5 ft.)
9 (Route 10)	26 m (85 ft.)	Edge Pavement
10 (NH Routes 12/101)	30 m (100 ft.)	6 m (20 ft.)
11 (Main Street)	8 m (25 ft.)	Edge Pavement
12 (Route 12)	8 m (25 ft.)	Edge Pavement
13 (Route 12 N of Connector)	8 m (25 ft.)	Edge Pavement
14 (Connector and Route 12S)	21 m (70 ft.)	9 m (30 ft.)

4.6.5 Construction Noise

Construction activities would result in substantial, but temporary, noise impacts to receptors at various locations within the project. Noise levels would vary depending on the type and number of pieces of construction equipment active at any one time. Table 4.6.5 shows typical noise levels for various pieces of equipment that may be utilized during construction. It is expected that noise levels exceeding 67 decibels could occur up to 150 m (500 ft.) away from construction activities. In general, construction noise would be restricted to daylight hours.

TABLE 4.6.5 – TYPICAL NOISE LEVELS OF CONSTRUCTION EQUIPMENT

SOURCE	NOISE LEVEL (IN dBA AT 15 METERS (50 FT.)
Bulldozer	80
Front End Loader	70 – 84
Dump Truck	83 – 94
Jackhammer	81 – 98
Crane with Headache Ball	75 – 87
Backhoe	72 – 93
Scraper	80 – 93
Crane	71 – 82
Welding Generator	71 – 82
Concrete Mixer	74 – 88
Concrete Pump	81 – 84
Concrete Vibrator	76
Air Compressor	74 – 87
Pile Driver	91 – 105
Paver	86 – 88
Grader	80 – 93
Roller	73 – 75
Tamper	74 – 77

* Source: US Environmental Protection Agency 1971.

Two factors - the length of the construction period and the fact that large quantities of fill material will have to be trucked in - increase the importance of the construction noise issue on this project. A mitigating circumstance is that the most substantial construction elements are located in commercial and undeveloped, rather than residential, areas. As described in NHDOT's *Policy and Procedural Guidelines for the Assessment and Abatement of Highway Traffic Noise for Type 1 Highway Projects* (June, 1996), effective control of highway construction noise will be achieved by design considerations, sequence of operations, source control, site control, time and activity constraints, and community awareness, as practicable.

4.7 GROUND WATER RESOURCES

4.7.1 Aquifers

Stratified-drift aquifers are present in the Keene valley and underlie the entire project area (see Figure 4.7.1). Stratified-drift aquifers are not the only aquifers present, but they are the most common and most productive aquifers of the valley in which Keene and Swanzey lies. Therefore, these aquifers are the most common sources of potable groundwater in the area.

Stratified drift aquifers consist mainly of sedimentary layers of sand and gravel, parts of which are saturated and can yield water to wells or springs. The distribution and hydraulic characteristics of stratified drift aquifers are related to the original environment in which the sediments were deposited. The stratified-drift deposits found throughout the state, including eskers, kame terraces, deltas, and glacial-lake deposits, represent the variety of depositional environments that existed during the time of glacial retreat.

The project area passes within approximately 300 m (1000 ft.) of the West Street Well Field and through a portion of its secondary recharge zone. This well field draws groundwater from the stratified-drift aquifer (see Figure 4.7.2). According to the City of Keene's Department of Public Works, the West Street well is used to augment the city's drinking water supply in times of increased demand. The City of Keene's Department of Public Works draws over 80% of the city's water from surface supplies located beyond the limits of the project area. The West Street well is not run continually, and is idle unless demand on the surface water reservoirs rises beyond their production ability. Based on pumping records from 1996-1997, the West Street well produced an average of 848,000 L/day (0.224 million gallons per day (MGD)). The currently installed pumping capacity is approximately 2,350,000 L/day (0.620 MGD), which is assumed to represent the long-term yield of the well.

According to *the Water Resources Management Program, City of Keene, New Hampshire,* prepared by BCI Geonetics (1988), the West Street well field is situated on deposits laid at the edge of a glacial melt-water lake. The hydrologic setting of the well field is defined by the Ash Swamp Brook drainage basin. Because of its geologic and hydrologic setting, the West Street well is partly situated on silts and clays laid down by the melt-water lake, and the more permeable alluvial deposits laid down by Ash Swamp Brook. According to BCI Geonetics, the well can receive recharge from Ash Swamp Brook as well as direct infiltration.

Although the primary and secondary recharge zones of the West Street Well Field have been defined, the City has not established a wellhead protection program under the provisions of the Groundwater Protection Act (RSA 485-C).

A second City of Keene well field, the Court Street Well Field, is also used to augment the surface water supply and is located approximately 4 km (2.5 mi) north (upgradient) of the project area, outside of the project limits.

Inquiries made to the United States Environmental Protection Agency (EPA) indicate that there are no sole source aquifers in the project area (Doug Heath, EPA, personal communication) Therefore, construction activities within the aquifer are not subject to federal sole source aquifer provisions.

A former "community well" is located on Ash Hill Road, on property owned by Mr. Arthur Desrosier. According to the property owner (Personal Communication, January 21, 1999), this is a large diameter (probably dug) well of unknown depth that was used by the previous owner of the parcel, and several other residences in the area, to draw water by rope and bucket. It has not been used as a source of water supply for a number of years and is essentially abandoned.

4.7.2 Potential Impacts

Two potential sources of impacts to groundwater are considered in this section. The first source is associated with the potential release of deleterious materials during construction activities or with post-construction highway runoff. The second source is associated with the use of highway deicing agents (i.e., salts).

Construction activities are not expected to pose a direct impact to groundwater quality. Indirect impacts may arise through accidental spills of motor fuels and oils, hydraulic fluids, and other chemicals associated with highway construction equipment. Accidental spills originating from construction machinery or materials could occur during construction. Petrochemicals that are spilled or leaked onto the highway by passing traffic may become constituents of highway runoff. It is also possible for larger releases of these chemicals to occur in the event of a traffic accident within the secondary recharge zone.

The current alignment of NH Route 9 passes through the secondary aquifer recharge zone of the West Street Well. According to records obtained from the City of Keene Department of Public Works, although the West Street well field receives drainage from the highway, its water quality records for 1997 do not show higher than acceptable concentrations of typical petrochemical compounds. The records show that the maximum contaminant levels for compounds such as benzene, toluene, ethylbenzene, and xylene are routinely below the minimum detection limits of the analytical instruments used. Because the proposed project will improve roadway geometrics and safety, the potential for a traffic accident-induced chemical release that would affect the aquifer is expected to be reduced. Impacts potentially arising from construction activities will be prevented or mitigated by application of Best Management Practices (BMPs). Proposed BMPs are discussed in Section 4.7.3.

A second potential contaminant of runoff would be sodium chloride, or salt, which is used as a deicing compound. The NHDOT has applied 7.4 metric tons of salt within each lane-kilometer (13.2 tons/lane-mile) of highway within Keene, averaged over the last 3 years. This application rate is anticipated to be similar for the proposed project.

The "Toler method" (Toler, 1977) was used to predict the potential sodium and chloride concentrations of groundwater at the West Street well field as a result of applying road salt at the above-noted rates. The Toler method is the standard methodology used by state and federal agencies for predicting salt and chloride concentrations in surface and groundwater that result from the use of salt as a highway de-icing compound.

The potential impact to groundwater quality at the West Street well field was assessed by comparing current sodium and chloride concentrations reported by the City of Keene Department of Public Works with the levels predicted by the Toler method. Current records for the West Street well field show sodium at 26.1 mg/L and chloride at 38.0 mg/L. According to the DES Water Supply Engineering Bureau (Env-Ws 310-319), the drinking water standard for both sodium and chloride is 250 mg/L. For water supply purveyors, the reportable concentration for sodium is 100 to 250 mg/L. Sodium is reportable at 100 mg/L as at that level it may pose a health concern to those on sodium restricted diets. Sodium concentrations at or above 250 mg/L are reportable and enforceable. At concentrations above 250 mg/L, enforcement action will be taken. Under an enforcement action, the party responsible for the elevated levels must take remedial action to reduce sodium and chloride concentrations to acceptable levels.

The Toler method applied to groundwater is a simple and worst-case method that assumes that all salt applied to the roadway within the recharge zone of a well will dissolve, enter the groundwater and be withdrawn through the pumping well over the course of a year. The method considers the amount of salt applied, the number of lanes and their lengths, and the amount of water produced by the well each year. Salt is applied to the roadways of Keene at an average rate of 7.4 metric tons/lane-km (13.2 tons/lane-mile) per year. According to the City of Keene's Department of Public Works, the West Street well produces approximately 310 million liters (82 million gallons)/year. Figure 4.7.2 shows 2.3 lane-kilometers (1.4 lane-miles) of the project currently within the secondary recharge zone of the West Street well field. The project will result in the creation of an additional 4.0 lane-kilometers (2.5 lane-miles) within the secondary recharge zone. This will bring the total to 6.3 lane-kilometers (3.9 lane-miles) within the secondary recharge zone.

Based on these factors, it is estimated that the maximum concentrations of sodium and chloride, resulting from the application of road salt within the recharge zone under Build Conditions, are 60 mg/L and 91 mg/L, respectively. Added to existing concentrations, this gives a maximum sodium concentration of 86 mg/L and a maximum chloride concentration of 128 mg/L. Both concentrations are

below the drinking water standard of 250 mg/L, and the sodium concentration is also less than the reporting limit of 100 mg/L.

The former "community well" on Ash Hill Road lies within the footprint of the proposed roadway improvements. Because it is no longer used as a water supply, filling of the well for the roadway improvements is not considered an impact on groundwater resources.

4.7.3 Mitigation

At the request of NHDOT, the DES has developed *Recommendations for Implementing Groundwater Protection Measures When Siting or Improving Roadways* (November, 1995). In that document, DES recommends that all groundwater in the state shall receive a minimum level of protection, which is currently achieved with NHDOT's policy of utilizing grassed swales and other appropriate Best Management Practices (BMPs) to treat runoff wherever practicable. DES then recommends that additional protection measures be implemented based on the proximity of the roadway to the public water supply wells or other areas of high value groundwater. A summary of protection measures is prescribed in Table 4.7.1.

TABLE 4.7.1 – SUMMARY OF GROUNDWATER PROTECTION MEASURES AND APPLICABILITY [1]				
PROTECTION LEVEL	**LEVEL 1**	**LEVEL 2**	**LEVEL 3**	**LEVEL 4**
Applicability	Statewide	• Wellhead protection areas • Locally-designated groundwater/ aquifer protection areas • GA1 areas	• Within 1,000 ft. of large C or P well • Within 500 ft. of a small C or P well	• Within 400 ft., of a large C or P well • Within 200 ft. of a small C or P well
Exceptions	Where higher-level measures apply	• Where a competent impermeable layer exists between groundwater protection area and road's drainage area • Level 3 or 4 areas	• Where a competent impermeable layer exits between well screen and road's drainage area • Bottom of well is above elevation of highway • Overburden well and WHPA does not include highway drainage area • Level 4 areas	Where bottom of well is above highway elevation
Stormwater treatment BMPs, e.g. Grassed swales	X	X		
Non-structural measures[2]		X	X	X
Lined grassed swales Lined snow storage areas. Runoff diverted to extent possible			X	
Raised railings			X	X
Closed drainage system outletting outside Level 4 area				X

[1]Source: *Recommendations for Implementing Groundwater Protection Measures when Siting or Improving Roadways* (DES, November, 1995)

[2] Includes measures such as providing site specific information to officials that will assist in isolating a spill; reductions in salt application rates, etc.

Based on the distance from the proposed roadway improvements to the West Street Well Field (approximately 300 m (1000 ft.), Level 3 protections would apply. The NHDOT has determined that lined grass swales will be used through the recharge area of this well and that the ditches will outlet outside of the

recharge zone, if possible. Other BMPs that will be implemented for groundwater protection on this project include the following:

- No harmful materials storage within the well recharge zone.
- Construction staging area will not be located in the well recharge zone.
- No refueling of construction vehicles within the well recharge zone.
- No storage (i.e., parking) of construction vehicles within the well recharge zone
- Vehicles shall be inspected for leaks of fuel, oil, hydraulic fluids, etc. before use within the aquifer recharge zone. Vehicles found to be leaking shall be repaired or excluded from use within the recharge zone.

The former "community well" on Ash Hill Road will be properly decommissioned in accordance with NHDES groundwater protection regulations prior to roadway construction activities.

4.8 SURFACE WATER RESOURCES

The surface water bodies within the project area are shown on Figure 4.8.1. During the construction phase of the project, the primary potential impact to surface water quality may be due to siltation and sedimentation from erosion. Other possible impacts may arise from the introduction of oils, grease, and organic debris from the construction activities. Once the project is complete, the increase in pavement area could impact water quality because highway runoff typically contains de-icing salts, petroleum hydrocarbons, metals, nutrients, silts, and sediments. Motor vehicle accidents and spills can also result in releases of constituents such as petroleum hydrocarbons, heavy metals, and organics to the surface water bodies.

The dominant drainage basins within the study area were delineated on 1:25,000 scale USGS quadrangle sheets. The surface area of the basins was measured directly on the quad sheets. The drainage basin divides within the study area used for this analysis are illustrated on Figure 4.8.2.

4.8.1 Existing Surface Water Resources

This section describes the surface water bodies within the project area and the surface water supplies within the general vicinity. No public water supply sources are known to occur within the project study area or within one-half mile downgradient of the proposed improvements (R. Lamb, Keene Planning Dept., pers. com., 9/22/97; R. Kingsbury, Swanzey Planning Board, pers. com., 9/25/97).

All of the surface water bodies noted within the project area are class B rivers and streams, according to DES, which indicates that their general water quality makes them suitable for fishing, swimming and other recreational purposes. The principal surface water bodies found within the project area are described in the following:

- Ash Swamp Brook has a total drainage area of approximately 50 km^2 (19 mi^2), and within the project area includes Ash Swamp Brook, New Run Brook, the Unnamed Brook, and several agricultural ditches. There are also several upstream tributaries. Ash Swamp Brook enters the Ashuelot River approximately 300 m (1,000 ft.) south of the City of Keene/Swanzey Township line.

- New Run Brook, which is within the Ash Swamp Brook drainage basin, flows in a northeasterly direction from Base Hill Road to its confluence with Ash Swamp Brook.

- Unnamed Brook is an intermittent stream with its headwaters originating in ditches near the intersection of NH Route 101 with Winchester Street. It flows southerly to a confluence with Ash Swamp Brook near the City of Keene/Swanzey Township line.

- Ashuelot River has a total drainage area upstream of the NH Route 101 crossing of approximately 290 km^2 (110 mi^2). The other rivers and streams (e.g., The Branch, Ash Swamp Brook) within the study area flow into the Ashuelot south of NH Route 101. The total drainage area of the Ashuelot River drainage basin in the project area, including these tributaries, covers approximately 600 km^2 (230 mi^2). The Ashuelot has well defined floodplains within the project study area, and is a major tributary to the Connecticut River. The river flows in a southerly direction within the project area.

- Beaver Brook lies between the Ashuelot River and The Branch watersheds, entering The Branch just upstream of its confluence with the Ashuelot. Beaver Brook has a total drainage area of approximately 26 km^2 (10 mi^2). Within the project area, it flows in a southwesterly direction, crossing under the NH Route 101 and NH Route 12 (Main Street) prior to its confluence with The Branch, approximately 180 m (600 ft.) west of NH Route 12.

- The Branch has a total drainage area of 230 km^2 (89 mi^2), and includes Otter Brook, Roaring Brook, and Minnewawa Brook tributaries. Within the project area, The Branch flows in a westerly direction adjacent to, and south of NH Route 101. The Branch converges with the Ashuelot River approximately 240 m (800 ft.) south of NH Route 101 and 300 m (1,000 ft.) west of NH Route 12.

Just east of the study area, there is a dam across The Branch with a channel to divert stream flow in a southerly direction to Upper Wilson Pond, Wilson Pond, and ultimately into the South Branch Ashuelot River. During a field visit on September 11, 1998, nearly all of the stream flow was diverted to Upper Wilson Pond, and only a trickle of water flowed into The Branch's channel. According to staff of the Swanzey Public Works Department, which manages the dam, this is the normal condition for this time of year. When stream levels are higher, a portion of the flow enters The Branch. The proportions of flow entering Upper Wilson Pond and The Branch are not monitored and are not known.

The City of Keene obtains most of its water from two reservoirs located in Roxbury and Nelson, within the Roaring Brook watershed (part of The Branch's watershed). The water bodies within the Roaring Brook watershed are designated Class A. The surface water supplies are located well upstream of the project and will not be affected by the project. Two wells used to augment the reservoirs are described in Section 4.7.

Surface water quality impacts are discussed in Section 4.8.3 and mitigation measures are discussed in Section 4.8.4.

4.8.2 Protected Rivers

4.8.2.1 Federal Wild and Scenic Rivers Program

In 1968, the Congress of the United States passed the Wild and Scenic Rivers Act (16 U.S.C. 1271-1287). The Act declared that "certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." Under this act, there are three categories of protected rivers or river segments. Wild rivers are unspoiled, naturally flowing rivers at least 16 km (10 mi) in length with limited accessibility. Scenic rivers are natural rivers, relatively free of impoundment, which have unique scenic qualities and are at least 8 km (5 mi) in length. Recreational rivers offer outstanding recreational potential, are relatively accessible, and exhibit high water quality.

No rivers within the study area have been designated under the Wild and Scenic Rivers Program, according to a list entitled *Wild & Scenic Rivers by State* prepared by the National Park Service in 1997.

4.8.2.2 New Hampshire Rivers Management and Protection Program

In 1988, the New Hampshire legislature passed the New Hampshire Rivers Management and Protection Program (RSA 483), which states that:

The state shall encourage and assist in the development of river corridor management plans and regulate the quantity and quality of in-stream flow along certain protected rivers or segments of rivers to conserve and protect outstanding characteristics, including: recreational, fisheries, wildlife, environmental, cultural, historical, archeological, scientific, ecological, aesthetic, community significance, agricultural, and public water supply so that these valued characteristics shall endure as part of the river uses to be enjoyed by the New Hampshire people. (RSA 483)

The Act establishes a two-tier approach to river management: state designation of river segments, and local river corridor management planning. To be designated, a river segment must be nominated, with supporting information, and the designation must be approved by the legislature and the governor. A Local River Advisory Committee (LAC) is established, which develops a Local River Corridor Management Plan and comments on activities affecting the river that require state or federal permits. The committees are comprised of local representatives from a broad range of interests. The New Hampshire Department of

Environmental Services (NHDES) administers the program through a Rivers Coordinator and the LAC.

Currently there are eleven rivers or river segments, including the Ashuelot River, that are protected by the state program, and four more are being considered for future designation. The Ashuelot River was designated for a variety of reasons. The Ashuelot River, in its entirety, is 180 km (62 mi) long with a watershed of approximately 1100 km^2 (420 mi^2) and flows through ten riverfront municipalities. Several archeological sites are known along the Ashuelot, and the oldest known evidence of man in New Hampshire, dating back 10,500 years, has been found along the river. The United States Fish and Wildlife Service has identified the Ashuelot as one of the four most important refuges for the federally-listed endangered dwarf wedge mussel. The river is also a natural migratory route for raptors, waterfowl, and songbirds because of its general north-south orientation. The river corridor also provides feeding areas for the federally-listed threatened bald eagle. There are also state-listed endangered and threatened wildlife and vegetation species that have been observed along the river. Within the project area, the river flows through a variety of land uses, including commercial land, residential land, natural floodplain forests, and athletic fields.

Designated rivers are classified by section as either natural rivers, rural rivers, rural-community rivers, or community rivers. The classifications are based on the type of land use and the cultural and environmental significance of the segment of the river. The segment of the river that is affected by the proposed NH Routes 9, 10, 12, and 101 reconstruction is classified as a community river.

Community rivers are defined in the Act as "those rivers or segments which flow through developed or populated areas of the state and which possess existing or potential community resource values..." Such rivers may have mixed land uses in the corridor, are readily accessible, and may include impoundments, diversions, flood control, or urban centers. The goal of management is to "maintain and enhance the natural, scenic, recreational and community values of the river and... ensure the rights of riparian owners" for land uses which are compatible with the "instream public uses of the river and the management and protection of the resources for which the river or segment is designated."

The *Draft Ashuelot River Corridor Management Plan* prepared by the Ashuelot River Local Advisory Committee in 1997 specifies management goals for the community river segment in The City of Keene. Among the goals are the following:

- provide public access for instream and riparian recreation;

- maintain or rehabilitate forested riparian buffer;
- reduce non-point source pollution threats (such as stormwater runoff)
- preserve undeveloped floodplain areas; and
- integrate corridor management and land conservation with existing public land.

The work proposed in the vicinity of the Ashuelot River includes replacing the bridges over the river at NH Routes 12/101 and at Island Street and upgrading portions of the adjacent roadways. At Island Street, the existing bridge is a temporary structure built approximately 20 years ago. It will be replaced with a new, wider bridge, with no actual construction in the river. North of the new bridge, the additional lanes will taper back to meet existing roadway width. South of the bridge, Island Street will be widened to add additional lanes. The widening will result in impacts to approximately 1045 m^2 (11,250 $ft.^2$) of Hickey-Desilets Park, a small (0.6 ha, 1.5 ac) City-owned park which borders the river. Impacts to the park will be minimized. Overall, the proposed work will not alter the character of the area and is not inconsistent with the *Draft Ashuelot River Corridor Management Plan.*

At the NH Routes 12/101 crossing, the existing 2-span bridge will be widened to accommodate two additional lanes of traffic, a median section and a multi-use trail. In order to accomplish the widening, the existing pier will be extended approximately 10 m (30 ft.) and the abutments and wingwalls will also be extended. The extension of the pier will impact approximately 14 m^2 (150 $ft.^2$) of bottom habitat. Extension of the abutments/wingwalls will have a minor disturbance on stream bank vegetation, because the banks have already been altered by the placement of riprap. The span length will not be changed by the project.

An existing pedestrian path crosses NH Routes 12/101 at this location on a wooden walkway beneath the bridge. In order to widen the bridge, it may be necessary to modify the walkway. However, the walkway will be retained and any required modifications will be accomplished as part of the project.

The proposed bridge and road improvements represent an increase in pavement and therefore stormwater runoff, contrary to the goals of the Management Plan, but are necessary to meet traffic and safety requirements. Drainage will be carried from the roadway via grassed swales intended to improve the quality of road runoff. The pier in the river may result in a small increase in river impacts. A small amount of natural woodland buffer will be removed, but only adjacent to NH Route 101. Replanting will be undertaken where feasible to restore vegetative buffers. Recreational opportunities will be improved by the construction of a new multi-use trail along NH Route 101, including connections to the

abandoned Ashuelot Branch, which is being developed as part of a rails-to-trails system. The potential for new trailhead parking in the vicinity of Martell Court is being investigated as part of the project, which could improve accessibility to the river. Overall, the proposed work will not change the general character of the river or the area of the crossing, will not substantially affect the natural or scenic character of the area, and will improve recreational and community values of the river. Therefore the proposal is consistent with the Rivers Management and Protection Program and the *Draft Ashuelot River Corridor Management Plan.*

4.8.2.3 New Hampshire Comprehensive Shoreland Protection Act

The New Hampshire Legislature passed the Comprehensive Shoreland Protection Act (RSA 483-B) in 1991, and the Act became effective on July 1, 1994. The purpose of the Act is to protect the integrity and quality of the state's shorelands and public waters. This is accomplished by regulating land use within the shoreland zone. The Act applies to all public waters except for segments of rivers that were designated under the Rivers Management and Protection Program prior to January 1, 1993. "Public waters" include all water bodies with a surface area of 4 ha (10 ac) or more, all fourth order or higher watercourses, and estuaries and coastal waters. Within the study area, there are two watercourses, the Ashuelot River and The Branch, which are on the *List of New Hampshire Fourth Order Streams and Higher* prepared by the NH Office of State Planning in 1992 and are therefore subject to the Act. The Ashuelot River was also designated under the NH Rivers Management and Protection Program, but was designated after January 1, 1993, and therefore is not exempt from the Act.

The regulated shoreland is the land within 75 m (250 ft.) of the shoreline or "reference line" of public waters. The Act specifies which land uses are prohibited; which land uses are allowed; minimum standards for land uses within the shorelands; and exemptions from the law. Among the Act's provisions are the following:

1. The Act specifies that an existing natural woodland buffer shall be maintained within 45 m (150 ft.) of the reference line. Within this area, no more than 50 percent of the basal area of trees can be removed, except for construction of buildings, roadways, pathways, parking areas, etc. Replacement plantings may be permitted to maintain the 50 percent level. Within 15 m (50 ft.) of the reference line, stumps and root systems must be left intact.

2. Primary structures must be set back 15 m (50 ft.) from the reference line. An additional 7.5 m (25 ft.) of space around the structure may also be cleared. The Act does not specifically address highway projects. Based on meetings and correspondence

with the NHDES Shoreland Program, NHDOT considers roadway, shoulders and pedestrian paths to be primary structures, while embankments and drainage structures are not primary structures. Therefore, any clearing more than 25 feet from the edge of shoulders or pedestrian paths may be subject to Shoreland Program jurisdiction. Bridges are considered water-dependent structures under the jurisdiction of the Wetlands Bureau rather than the Shoreland Program.

3. Any activity within 15 m (50 ft.) of the river that is permitted by the NHDES Wetlands Bureau is allowed under the Act.

4. The Commissioner of NHDES has the authority to grant variances from the minimum standards.

The proposed project involves clearing of small areas of forestland and construction of primary structures within 45 m (150 ft.) of the reference line of both the Ashuelot River and The Branch. These activities are described below. There will be ongoing coordination with the Shoreland Program regarding any impacts, and a variance will be sought, if necessary.

The proposed structures, including bridges, roads, and trails, are primary structures and therefore allowed more than 15 m (50 ft.) from the reference line. Within 15 m (50 ft.), these structures will be permitted through the Wetlands Bureau.

1. At the NH Routes 12/101 bridge over the Ashuelot River, an existing bridge will be widened, and there will be a small amount of tree removal within the 45 m (150 ft.) buffer zone at the northeastern, southeastern, and southwestern quadrants of the crossing. Clearing will occur only where it is required for the construction of primary structures. Nearly all of the clearing will be within 7.5 m (25 ft.) of primary structures. Therefore, the cutting in these areas appears to be consistent with the requirements of the Act. At the northeastern quadrant, an existing bike path runs along the shoreline of the river, with an approximately 30 m (100 ft.) wide strip of woodland behind it, parallel with the highway (see Figure 3.3.6-04). Approximately 230 m^2 (2,500 $ft.^2$) of forestland within 45 m (150 ft.) of the river and more than 7.5 m (25 ft.) from primary structures will be cleared for the project. To compensate for any impacts, plantings will be made along the base of the new embankment and along the river within the right-of-way to reestablish as much vegetative buffer as possible.

The widened bridge will require an extension to the pier in the river and widened abutments. The modified pier and abutments are expected to be in approximately the same location and configuration as the existing structures, but may result in a small amount of additional impacts.

2. At the Island Street Bridge over the Ashuelot River, there is a fringe of trees along the banks of the river. Since the proposed bridge will be wider than the existing bridge, a few trees may need to be removed. "Natural woodland buffer" is defined in the Act as "...a forested area consisting of various species of trees, saplings, shrubs and ground covers...". Since the impacted area consists of a fringe of trees rather than a forested area, it is not considered a natural woodland buffer. However, replacement plantings will be made in this area. Island Street will be widened east of the bridge, and a small amount of City-owned park will be affected.

3. There will be a new crossing of The Branch to connect NH Route 12 to NH Route 101 at Optical Avenue. A new, approximately 90 m (300 ft.) long, 2-span bridge will be constructed, with a pier on an island in the river. Areas of natural woodland buffer will be cleared at all four quadrants of the crossing and where the pier will be built. Little of this buffer is within the jurisdiction of the Act, since all clearing will be within 7.5 m (25 ft.) from primary structures. To compensate for any impacts, vegetative plantings will be made along the base of the new embankment and along the river within the right-of-way to reestablish as much natural buffer as possible.

4.8.3 Direct Impacts to Surface Waters

This section describes all areas where the proposed work may result in direct physical alterations of river or stream channels or their banks. Refer to Figure 4.8.1 for locations of impact areas.

- Ash Swamp Brook: There are two locations where Ash Swamp Brook may be impacted:

  - Impact Area No. 1 is located on NH Route 9, approximately 500 m (1650 ft.) east of the intersection with Base Hill Road. The existing 3 by 6 m (10 by 20 ft.) box culvert will be extended on both sides of the road, but mostly on the south side. The dimensions and form of the extensions are expected to be the same as the existing culvert, and direct impacts, if any, would be limited to the banks and narrow fringes of the stream along the banks. A second box culvert is planned adjacent and parallel to the existing culvert. This second structure would be constructed as a

recreational trail and flood relief overflow channel. It would not directly affect the river.

- Impact Area No. 2 is located on NH Route 10 (Winchester Street), approximately 90 m (300 ft.) south of Krif Road. The existing bridge would be widened at this crossing, replicating the bridge opening and form. Direct impacts, if any, would be limited to the banks and narrow fringes of the stream along the banks.

- New Run Brook: There are no identified potential impacts associated with this flow segment from the development of the project.

- Unnamed Brook: This brook will be affected by construction of a new NH Routes 12/101 interchange with Winchester Street (see Impact Area No. 3). The improvements involve filling and culverting the brook channel. The affected portions of this water body are excavated intermittent stream/ditch channels.

- Ashuelot River: The possible impact locations include the following:

  - Impact Area No. 4-1 is located at the Winchester Street Bridge over the Ashuelot River. Proposed improvements end just west of the bridge, and no direct impacts are proposed for the river or its banks.

  - Impact Area No. 4-2 is located on Island Street near the intersection with Pearl Street. The Island Street Bridge over the Ashuelot River will be replaced with a wider single span structure, and improvements will be made to the road on each side of the bridge. Stone protection to the river is proposed. Minor impacts to the bank may occur for bridge support structures.

  - Impact Area No. 5 is at the NH Route 101 crossing over the Ashuelot River. The existing bridge will be widened to accommodate additional travel lanes, medians, and the multi-use trail. An existing pier in the river will need to be extended. The direct impacts to the river are expected to be limited to the dimensions of the pier extension. The banks may be affected by abutment structures.

- Beaver Brook: The possible impact locations are labeled as Impact Area No. 6, and include the NH Route 101 and NH Route 12 (Main Street) crossings of Beaver Brook. At NH Route 101, the existing 2.4 by 4.5 m (8 by 15 ft.) box culvert will be extended. At Main Street, the existing structure, which has twin metal culverts, will be replaced by a 2.4 m x 4.5 m (8 ft. x 15 ft.) concrete box culvert, which will also be extended

upstream to connect with the 8 ft. x 15 ft. box culvert underneath NH Route 101.

- The Branch: The impact location associated with The Branch is labeled as Impact Area No. 8, and is located south of the intersection of Optical Avenue with NH Route 101, along the proposed Optical Avenue Connector. A new roadway and 2-span bridge would be constructed to connect NH Route 32 with Optical Avenue. The bridge would be approximately 90 m (300 ft.) long and cross two branches of the river channel, requiring a pier on the island within the floodway. No direct river impacts are expected. There will be bank impacts on the island. During the construction period, a temporary bridge or causeway to the island will be established.

4.8.4 Surface Water Quality Impacts

The principal water quality concerns from highway construction/development are mainly due to runoff containing suspended solids and turbidity (silts/sediments), metals (copper, lead, and zinc), phosphorous, and chloride (from the use of de-icing salts). For metals analysis, the Federal Highway Administration's (FHWA's) prediction method for determining possible impacts to surface water quality from the highway drainage was used (Driscoll, et al, 1990). For sodium and chloride analysis, the "Toler" method was used (Toler, 1973). The results of the analysis were compared to the existing water quality of area rivers and streams as reported by NHDES Division of Water Supply and Pollution Control.

NHDES has conducted water quality sampling since at least 1974 at several stations within the Ashuelot River. The sampling stations of most relevance to this project include the following:

- 17a-Ash: Canoe sampling location within the Ashuelot River just upstream of the City of Keene wastewater treatment plant, approximately 0.8 km (0.5 mi) downstream of the NH Routes 12/101 crossing.
- Oa-Sba: Canoe sampling location within the South Branch Ashuelot River, approximately 3.2 km (2 mi) downstream of the project area.
- 16-Ash: Covered bridge on Sawyers Crossing Road, Swanzey, approximately 5.6 km (3.5 mi) downstream of the NH Routes 12/101 crossing.

Station 17a-Ash is expected to reflect the water quality of the Ashuelot within the immediate project area. Station Oa-Sba may reflect water quality conditions of a tributary of the Ashuelot within the general vicinity of the project. Station 16-Ash reflects water quality of the Ashuelot after it receives wastewater treatment plant discharges. Selected water quality data available from these sampling stations since 1990 are listed in Table 4.8.1. The data show that the treatment plant has a substantial effect on water quality, apparently resulting, for example, in elevated total phosphorus levels. It is unknown what effect the plant may have on many

Table 4.8-1. Selected Water Quality Data for the Ashuelot River Basin, 1990-1996

PARAMETERS	UNITS	CRITERIA (a)	SAMPLING STATION, YEAR, AND RANGE OF RESULTS																	
			17a-Ash		Oa-Sba		16-Ash													
			1994	1995	1994	1995	1990		1991		1992		1993		1994		1995		1996	
							Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
TEMPERATURE	°C	(b)	18.9	23.0	18.5	22.0	13.0	18.0	17.0	21.0	18.5	19.0	20.5	22.5	14.8	20.0	17.0	23.0	22.0	22.4
E. COLI	cts/100ml	(c)	130		280		<30	7500	40	90	120	860	20	150	70	320	30	490		
DISS. OXYGEN	mg/L	(d)	7.8	7.6	8.4	7.3	7.6	9.2	6.3	10.0	8.0	8.0	7.1	8.1	7.1	9.7	7.8	9.0	7.6	7.9
TOTAL PHOS.	mg/L	(e)		0.011		0.015	0.092	0.157	0.032	0.174	0.060	0.108	0.187	0.263	0.057	0.109	<0.05	0.490		
HARDNESS	mg/L						13.9	13.9	19.8	19.8	15.9	15.9	22.8	30.9	15.4	19.9	4.4	27.6		
TURBIDITY	NTU	10 (f)					1.80	10.10	2.20	2.20	1.63	5.70	3.50	7.40	1.80	3.60	1.00	2.80		
COPPER	mg/L	0.005 (g)					0.0020	0.0020	0.0048	0.0048	<0.003	<0.004	<0.01	<0.05	<0.004	<0.004	0.0025	0.0050		
LEAD	mg/L	0.014 (g)					0.0002	0.0002	0.0005	0.0005	<0.003	<0.004	0.0110	<0.05	<0.005	<0.005	<0.005	<0.005		
ZINC	mg/L	0.036 (g)					0.0100	0.0100	0.0125	0.0125	0.0240	0.0240	<0.05	<0.05	<0.01	<0.013	<0.025	<0.025		
CHLORIDE	mg/L	860 (g)					15.0	20.0	7.0	24.0										

Source of data: NHDES Surface Water Quality Regulations Env-Ws 430-440 (10/8/96)

NOTES:

(a) Source of criteria: state surface water quality law (RSA 485:A) and Surface Water Quality Regulations (Env-Ws 430-440, 10/8/96). Criteria are for Class B waters.

(b) The criteria for E. coli in Class B waters are 126 E. coli counts per 100 mL as mean of >=3 samples within 60 days, or 406 E. coli per 100 mL in any one sample.

(c) Discharges shall not appreciably interfere with uses.

(d) Generally not less than 75% of saturation.

(e) Class B waters shall contain no phosphorus in such concentrations that would impair any usage for that class.

(f) Class B waters shall not exceed naturally occurring conditions by more than 10 NTUs.

(g) Fresh water acute criteria. There may be other criteria for chronic exposure, marine waters, or protection of human health. The criteria for certain metals are calculated from formulas assuming a hardness of 25 mg/L. See text for rationale for hardness levels.

other parameters, such as metals. The water quality of Ash Swamp Brook, Beaver Brook, and The Branch are not known, but are likely comparable to the South Branch Ashuelot River. Beaver Brook has been sampled for coliform bacteria over the past two years, and elevated levels have been found.

- Suspended Solids and Turbidity

  Construction activities and highway runoff can contribute suspended solids to surface waters. The New Hampshire standard for turbidity NHDES, 1990) in Class "B" surface waters, is set at no more than 10 Nephelometric Turbidity Units (NTU) above the naturally occurring conditions. Turbidity levels recorded at sampling station 16-Ash since 1990 ranged from 1.0 to 10.1 NTU. These levels may be affected by the wastewater treatment plant. Appropriate stormwater management and erosion and sediment control best management practices will be implemented to ensure that possible turbidity impacts to surface waters are minimized. The grading and excavation activities (earthwork) associated with the highway project will exceed 2 ha (5 ac), therefore an NPDES General Permit for Stormwater Discharges Associated with a Construction Activity will be required. The General Permit will require the earthwork to proceed without creating a substantial visible contrast relative to color, taste, odor, turbidity and sediment between stormwater upstream and downstream of the project development area. See Section 4.8.5 for discussions of possible project mitigation efforts.

- Metals

  The principal metals of concern in highway runoff are copper, lead, and zinc. The FHWA's method compares the highest pollutant concentrations likely to occur once in three years in the receiving surface water body to water quality criteria. New Hampshire's water quality criteria (in the 1996 "Surface Water Quality Regulations" ENS WS 430-411) are consistent with EPA criteria (57 FR 60911). The method requires the input of streamflow data which are not available for the study area, but which may be inferred from the size of the watershed and regional streamflow characteristics provided by the FHWA. The method also requires information on pavement and right-of-way areas. All of the pavement within road improvement areas, rather than just additional pavement, was used in the analysis. The pavement associated with pedestrian/bicycle trails was not included, as it is not believed to be a source of pollutants and would not generate a substantial amount of runoff. The limits of work were used rather than the right-of-way area, as limit of work was considered a more accurate measure of the contributing area than right-of-way.

The runoff pollutant concentrations used in the analysis were assumed to be those from the 50th percentile rural highway site, as contained in the methodology. The FHWA method considers all sites with over 30,000 ADT to be "urban" highways, which have higher runoff pollutant concentrations. Many of the roads to be improved are expected to exceed 30,000 ADT by the design year 2015 (up to a maximum of 39,710 ADT). However, because the roads are within a relatively rural region, with open drainage systems that flow through roadside ditches and wetlands before entering receiving waters, it was believed the rural highway pollutant concentrations are a more accurate measure than the urban concentrations.

The water quality criteria used for the metals analysis are derived from the New Hampshire Surface Water Quality Regulations published in 1996 (Env-Ws 430-440), and are consistent with EPA criteria. The metals criteria vary depending on the total hardness of receiving waters. The formulas require hardness levels of at least 25 mg/L (57 CFR 60917), and the NHDES recommends against using hardness levels above 25 mg/L unless there is local data to support higher levels. The local data shows the total hardness levels within the Ashuelot River almost uniformly below 25 mg/L, and it is likely the tributaries have even lower levels. Therefore 25 mg/L was used to calculate the metals criteria.

The fresh water criteria for copper, lead, and zinc are listed in Table 4.8.2. An aquatic life criterion "might be thought of as an estimate of the highest concentration of a substance in water which does not present a significant risk to the aquatic organisms in the water and their uses" (45 CFR 79341). The fresh water acute criteria or "criteria maximum concentration" are one-hour average acute limits, but are based on laboratory tests lasting 48 to 96 hours. Stormwater runoff events are brief and sporadic, so the acute criteria are considered conservative for stormwater impact assessment. The EPA has developed "threshold effects levels for intermittent exposure", which are intended to reflect the "concentration levels which would impair beneficial uses under the kind of exposure conditions which would be produced by urban runoff (EPA, 1983). Therefore threshold effects levels for intermittent exposure may be more appropriate water quality guidelines than acute criteria for stormwater runoff impacts. Although no threshold effects levels have been calculated for hardnesses below 50 mg/L total hardness, the ratio of effects levels to acute criteria at different total hardness levels are fairly consistent, and the effects levels at lower total hardness levels can be extrapolated from these ratios. The effect levels shown in Table 4.8.2 were extrapolated to obtain an estimate of the approximate effects levels for 25 mg/L total hardness.

Table 4.8-2. Stream Impact Analysis Results: Metals[1]

Stream	Upstream Watershed Area (sq. miles)	Total Pavement Area within Study Area (Acres)	Total Area within Limits of Work within Study Area (Acres)	Increase in Once-in-Three-Year Concentrations (mg/L)[1]		
				Copper	Lead	Zinc
Ash Swamp Brook	19.01	54.84	101.98	**0.018**	**0.016**	**0.064**
Beaver Brook	9.87	11.79	17.54	**0.011**	**0.010**	**0.041**
The Branch[5]	89.12	11.87	20.57	0.002	0.002	0.008
Ashuelot River[2]	110.78	37.75	63.00	0.005	0.004	0.017
Ashuelot River[3]	228.78	116.25	203.09	**0.006**	0.006	0.023
Acute criterion (@25 mg/L total hardness)[4]				0.005	0.014	0.036
Threshold effects level for intermittent exposure (@25 mg/L total hardness)[4]				0.011	0.062	0.076
Concentration in runoff (50th percentile rural highway site)				0.022	0.080	0.080

Notes:

1. Bold type indicates where the expected increase in concentration would exceed acute criteria.

2. Ashuelot River at NH Routes 12/101 (does not include Ash Swamp Brook, Beaver Brook, or The Branch watersheds).

3. Ashuelot River south of NH Routes 12/101 (watershed includes entire study area, including Ash Swamp Brook, Beaver Brook, or The Branch watersheds).

4. See text for rationale for hardness levels.

5. A portion of the Branch's stream flow is diverted to Upper Wilson Pond, just upstream of the study area. See text for discussion.

The results of the analysis of metals impacts to surface waters are listed in Table 4.8.2, and are summarized below:

Ash Swamp Brook: The results show that the increases in copper, lead, and zinc in Ash Swamp Brook would exceed acute criteria an average of at least once every three years. Only copper would exceed threshold effects levels. The existing concentrations of these metals in Ash Swamp Brook are unknown.

Beaver Brook: Increases in copper and zinc are likely to exceed acute criteria at least once every three years, and the increase in copper is at the threshold effects level. The existing concentrations of these metals in Beaver Brook are unknown. Based on concentrations measured within the Ashuelot River downstream (discussed below), it appears that the increases in concentrations expected from the project are unlikely to exceed reasonable levels or to threaten existing uses of this stream.

The Branch: All increases are well below acute criteria and threshold effects levels. These impacts appear to be minimal.

However, these findings do not take into account the diversion of water from The Branch to Upper Wilson Pond. In reality, there is less stream flow than suggested by the size of the watershed and, at times, there is essentially no flow at all. This reduces the dilution of stormwater runoff, and therefore increases pollutant concentrations. However, the stormwater inputs will be occurring very low in the watershed, near the confluence with the Ashuelot River, so there is little stream channel to be affected. Furthermore, when there is no stream flow, there is essentially no aquatic habitat to be impacted. Efforts will be made to treat as much of the stormwater runoff as possible, in grass-lined swales and detention ponds.

Ashuelot River: Increases in metals at the NH Routes 12/101 crossing would be at or below acute criteria, and well below threshold effects levels. Considering the entire Ashuelot River drainage basin above the study area, including Ash Swamp Brook, Beaver Brook, and The Branch, increases in copper would exceed acute criteria but would be below threshold effects levels. Existing concentrations of copper, lead, and zinc in the Ashuelot River in the Town of Swanzey, downstream of the wastewater treatment plant, were generally below detection limits and well below acute criteria. On one occasion since 1990, copper was measured at the acute criterion of 0.005 mg/L, and zinc was measured at 0.024 mg/L, compared to an acute criterion of 0.036 mg/L. Lead concentrations during this period were well below acute criteria. It appears that, under normal circumstances, it is highly unlikely that the increases in metals from highway runoff would combine with background concentrations to result in concentrations that would threaten existing uses of the Ashuelot River.

- Phosphorus

Phosphorus is generally not a surface water problem with rivers and streams, although phosphorous levels of 0.02 to 0.10 mg/L can cause eutrophication in ponds, lakes, and impounded portions of streams (Gakstatter, et al, 1976; Carlson, 1977; Mills, 1985). The EPA recommends that phosphate phosphorous not exceed the 0.05 mg/L level in surface water bodies which directly enter lakes, and 0.10 mg/L for surface water bodies not discharging to lakes. Background total phosphorus (TP) levels within the Ashuelot River and the South Branch upstream of the wastewater treatment plant discharge were relatively low (0.011 and 0.015 mg/L, respectively), but TP levels downstream of the discharge were high (up to 0.586 mg/L). Stormwater runoff from the 50th percentile rural highway site contains an estimated 0.160 mg/L phosphate phosphorus. After dilution within water bodies, it is likely that the concentration of TP would be small compared to existing concentrations. Further, best management practices for treatment of metals will reduce the TP concentrations entering receiving waters. Finally, there are no ponds, lakes, or impoundments within the project area or immediately downstream that would be affected by TP in runoff from the project area. For these reasons, no formal phosphorus impact analysis was carried out for this study.

- Sodium and Chloride

Sodium and chloride are contributed to project area surface waters by de-icing operations. The State of New Hampshire criteria for sodium and chloride are the following:

Sodium:	Secondary Maximum Contaminant Level (for aesthetics):	100-250 mg/L
Chloride:	Aquatic life chronic criterion (four-day average limit):	230 mg/L
	Aquatic life acute criterion (one-hour average limit):	860 mg/L
	Secondary Drinking Water Standard (for aesthetics):	250 mg/L

The likely increases in sodium and chloride concentrations in receiving waters as a result of the proposed work were estimated using the Toler method cited above. The method uses the following formula:

$$\frac{\text{(tons salt per lane mile times number of lane miles)}}{\text{(inches of runoff times drainage area in square miles)}} \text{ times } 13.79$$

The product is the concentration of sodium chloride in mg/L. The parameters of the equation were determined from the following:

- Tons of salt per lane mile was provided by the NHDOT District 4. They have estimated they have applied salt at an average application rate of 7.4 metric tons/lane-kilometer (13.2 tons/lane-mile) within the City of Keene area over the three-year period from winter 1994-1995 through winter 1996-1997 (C. Sanders, NHDOT District Maintenance Engineer, pers. com., 9/97).

- The number of lane miles was calculated from project plans. For this analysis, only the increase in the number of lane miles was used.

- Average annual rainfall in the City of Keene, based on 57 full years of data from 1931 to 1995 compiled by the National Climatic Data Center, is 102 cm (40.04 inches). The assumed runoff coefficient was 0.4.

- The drainage area was delineated and measured on USGS quadrangle sheets, as described above.

Concentrations of sodium and chloride are likely to fluctuate over the course of the year as road salting activities fluctuate. The Toler method includes guidelines for calculating "peak" concentrations based on drainage area and average annual concentrations. Ratios are provided which may be multiplied by the average annual concentrations to obtain the maximum daily or monthly concentrations.

The results of the analysis, including average annual concentrations and maximum daily concentrations for each water body, are listed in Table 4.8.3. The results show that the proposed work would result in average annual increases in sodium concentrations ranging from 0.13 to 4.17 mg/L, and increases in chloride concentrations ranging from 0.19 to 6.43 mg/L. The maximum daily increases in sodium concentrations are expected to range from 0.15 to 5.84 mg/L, and chloride concentrations will range from 0.22 to 9.00 mg/L. The existing sodium concentrations found within the Ashuelot River in the Town of Swanzey sampling station 16-Ash in 1977-1981 (the only years in which sodium was sampled) ranged from 7 to 21 mg/L. Chloride levels found at sampling station 16-Ash since 1990 have ranged from 7 to 24 mg/L. It is not known what effect the treatment plant has on these concentrations, or what the concentrations are within the tributaries. Nevertheless, the concentrations are all well below water quality criteria. Given the expected project inputs and the background levels, it is highly unlikely that the project could cause sodium or chloride levels in receiving waters to approach water quality criteria.

Table 4.8-3. Stream Impact Analysis Results: Sodium and Chloride[1]

Stream	Additional Lane Miles within Study Area	Upstream Watershed Area (sq. miles)	Average Annual Increase (mg/L)		Ratio of Maximum Daily to Average Annual Increase	Maximum Daily Increase (mg/L)	
			Sodium	Chloride		Sodium	Chloride
Ash Swamp Brook	17.78	19.01	4.17	6.43	1.40	5.84	9.00
Beaver Brook	1.77	9.87	0.80	1.23	1.50	1.20	1.85
The Branch[4]	2.49	89.12	0.13	0.19	1.15	0.15	0.22
Ashuelot River[2]	4.35	110.78	0.17	0.27	1.10	0.19	0.30
Ashuelot River[3]	26.39	228.78	0.52	0.79	1.05	0.55	0.83
Acute criterion			None	860			

Notes:

1. Analysis is based on methods described in Toler (1973) and NYSDOT (1995).

2. Ashuelot River at Routes 12/101 (does not include Ash Swamp Brook, Beaver Brook, or The Branch watersheds).

3. Ashuelot River south of Routes 12/101 (watershed includes entire study area, including Ash Swamp Brook, Beaver Brook, or The Branch watersheds).

4. A portion of the Branch's stream flow is diverted to Upper Wilson Pond, just upstream of the study area. See text for discussion.

4.8.5 Mitigation

Possible impacts to surface water bodies have been minimized through planning and design efforts. Direct impacts to surface waters (culverts and fill) have been minimized and are limited to areas of existing culverts, bridges, and piers (the pier for the new Optical Avenue Connector bridge over The Branch will be on an island). Drainage design will incorporate water quality treatment features such as overland sheet flow of runoff, grass swales, and other features. The key elements of stream impact mitigation are described below.

A Stormwater Pollution Prevention Plan (SPPP) will be developed under the NPDES permitting guidelines, and will be used in implementing construction work. The plan will incorporate techniques and standards found in the national *Guidelines for Erosion and Sediment Control in Highway Construction* (AASHTO 1992) and *New Hampshire's Stormwater Management and Erosion Control Handbook* (NHDES et al. 1992).

New wetlands will be constructed to compensate for wetland impacts, and will provide water quality treatment within the Ash Swamp Brook watershed. These wetlands will be constructed primarily around the proposed trumpet interchange, and will receive road runoff from the proposed roadway. The wetlands will provide treatment of the runoff before it enters receiving waters. Because the wetlands will be large and the runoff will be spread along the length of the roadway, the runoff is not expected to adversely affect the wetlands. This treatment will occur in the watershed with the greatest potential increases in metals concentrations.

Best Management Practices (BMPs) for water quality treatment will be utilized where appropriate. The effectiveness of BMPs such as grass swales and wet detention basins depends on many factors. According to Dorman et al. (1988), a properly designed and constructed grass swale that is 30 m (100 ft.) long may remove roughly 80 percent of total suspended solids (TSS). Wet detention basins can remove similar rates of TSS. TSS removal rates in this range in swales and wet detention basins will remove 40 to 43 percent of total copper and zinc and 73 to 78 percent of total lead (Dorman, et al., 1988). For this project, the streams expected to receive the highest increases in pollutant concentrations are Ash Swamp Brook and, to a lesser extent, Beaver Brook. In the Ash Swamp Brook watershed, nearly all of the runoff from the proposed road improvements will flow over road embankments and through existing or constructed wetlands before reaching the brook. BMPs are recommended for areas where runoff will not flow overland into wetlands, for example, near Ash Swamp Brook at the Route 9 crossing. Assuming all of the runoff gets some water quality treatment, the once-in-three-year increases in concentrations of copper, lead, and zinc would all be below the threshold effects levels (Table 4.8.4). At Beaver Brook, if 50 percent of the runoff is treated, increases in all parameters would be below threshold levels. These measures would result in treatment of runoff from over half of the

pavement area proposed under the project. Combined with treatment of runoff from other parts of the project, this will result in substantial reductions in the overall potential increases in pollutant concentrations. It is likely the increases in pollutant concentrations in the Ashuelot River downstream of the project area would be well below both threshold and acute criteria.

Table 4.8-4. Stream Impact Mitigation Measures[1]

Stream	Proposed Mitigation Measures	Increase in Once-in-Three-Year Concentrations (mg/L) After Treatment[1]		
		Copper	Lead	Zinc
Ash Swamp Brook	Treat 100 percent of runoff in wetlands, grass swales, or wet detention basins	**0.010**	0.004	**0.037**
Beaver Brook	Treat 50 percent of runoff in wetlands, grass swales, or wet detention basins	**0.009**	0.006	0.032
The Branch	Grass swales, if feasible	<0.002	<0.002	<0.008
Ashuelot River[2]	Grass swales, if feasible	<0.005	<0.004	<0.017
Ashuelot River[3]	Includes all of the above measures in its watershed (at least 50 percent of runoff treated in wetlands or BMPs)	<0.003	<0.003	<0.012
Acute criterion (@25 mg/L TH)[4]		0.005	0.014	0.036
Threshold effects level for intermittent exposure (@25 mg/L TH)[4]		0.011	0.062	0.076
Concentration in runoff (50th percentile rural highway site)		0.022	0.080	0.080

Notes:

1. Bold type indicates where the expected increase in concentration would exceed acute criteria. Assumes treatment will reduce concentrations of copper and zinc in runoff by 43 percent and lead by 78 percent.

2. Ashuelot River at Route 101 (does not include Ash Swamp Brook, Beaver Brook, or The Branch watersheds).

3. Ashuelot River south of Route 101 (watershed includes entire study area, including Ash Swamp Brook, Beaver Brook, or The Branch watersheds).

4. TH = Total hardness. See text for rationale for hardness levels.

4.9 FLOODPLAINS

4.9.1 100 Year Floodplains/Floodways

A floodplain and floodway study was conducted for the project area in accordance with the requirements and guidelines of Executive Order 11988.

The City of Keene lies within the broad floodplain of the Ashuelot River Basin, and as such, the City is under a regular flood insurance program established by the National Flood Insurance Program. To help guide these programs, Flood Insurance Studies are conducted and flood boundary maps are prepared that identify base flood and floodway boundaries that assist communities in developing sound floodplain management measures.

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Flood Insurance Administration (FIA) as the definition of the base flood for the purposes of floodplain management measures. For the purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in the aspect of floodplain management. Under this concept the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of the stream and the adjacent floodplain that must be kept clear of obstructions, in order to convey the base 100-year flood without increasing flood levels by more than 0.3 m (1 ft.). Figure 4.9.1 depicts the floodway concept.

The Federal Emergency Management Agency (FEMA) requires communities participating in the flood insurance program to designate a floodway to avoid the possibility of substantially increasing upstream flood elevations. As such, a participating community must prohibit development within the designated floodway that would cause any additional rise in base flood elevations.

Due to the chronic, historical flooding problems in the Keene area, the City of Keene has adopted a local floodplain ordinance that is more restrictive than federal requirements. The ordinance essentially prohibits any filling of the floodplain, including the floodplain fringe (area outside the floodway) unless the volume filled is compensated (compensatory floodplain storage) by creating an equivalent volume of excavation. The requirements for compensatory floodplain storage are very detailed and require that floodplain compensation be created at the same elevations within the same watershed and channel reach that is being filled. Other requirements are tied to seasonal high ground water requirements.

The floodplains and floodways associated with this project were obtained from the National Flood Insurance Rate Maps (FIRM), and Flood Hazard Boundary Maps (FHBM), for the City of Keene and the Town of Swanzey. The flooding and floodway limits for the upper reaches of Ash Swamp Brook (upstream of NH Route 9) were obtained from a Conditional Letter of Map Revision (CLOMR) which is explained in further detail in Section 4.9.2.

The boundaries of the 100-year floodplain and floodways as identified in the Flood Insurance Study for the City of Keene and Town of Swanzey are depicted in Figure 4.9.2. The area adjacent to the Ashuelot River between the Faulkner and Colony Dam in downtown City of Keene and the Dickinson Dam in West Swanzey consists of a wide flat floodplain. Backwater effects from the Dickinson dam, as well as the flat gradient and meandering channel through this section has resulted in this area being commonly referred to as the 'bathtub'.

The Ashuelot River is the principal stream in the study area. It is controlled by the Surry Mountain Lake Dam, which is a flood control dam located just north of the City of Keene. Flowing south through the City of Keene, the Ashuelot River collects runoff from an additional 5.3 hectares (13 sq. mi.) drainage area before being joined by the Branch River. Ash Swamp Brook joins the Ashuelot River further downstream, just south of the Keene/Swanzey boundary. Beaver Brook is a tributary to the Branch River, joining the Branch just upstream of its confluence with the Ashuelot River.

4.9.2 Floodplain/Floodway Impacts

The proposed project will result in the placement of fill in the FEMA 100-year floodplain throughout the project area due to lane expansion, profile adjustments and construction of new ramp and connector roadways. Since the project is primarily an upgrade of existing facilities, the design maximized the use of the existing highway embankment in an attempt to minimize overall floodplain impacts. Table 4.9.1 summarizes the project floodplain impacts by watershed, including the additional floodplain impacts associated with the revised limits of the multi-use trail.

TABLE 4.9.1 – FLOODPLAIN IMPACTS (EXISTING FEMA MAPPING)

WATERSHED	FEMA 100-YEAR FLOOD ELEVATION	FLOODPLAIN IMPACTS M^3 (ACRE-FT.)
Ash Swamp Brook	472-478	98,900 (80.2)
Ashuelot River	472	44,400 (36.0)
Beaver Brook	472-474	9,500 (7.7)
Branch River	472-479	10,600 (8.6)
TOTAL		163,400 (132.5)

The proposed improvements will cross streams with established floodways and 100-year flood elevations at six locations as listed below:

- Ash Swamp Brook at NH Route 9
- Ash Swamp Brook at NH Route 10 (Winchester Street)
- Ashuelot River at Island Street
- Ashuelot River at NH Routes 12/101
- Beaver Brook at Main Street (NH Route 12), NH Route 101, and Martell Court
- Branch River at the Optical Avenue Connector

Specific floodplain impacts for each waterway crossing are discussed below.

Ash Swamp Brook at NH Route 9

As mentioned previously, the floodway for the Ash Swamp Brook reach above the NH Route 9 crossing currently reflects conditions identified in a Conditional Letter of Map Revision (CLOMR). The conditions identified in the CLOMR are recognized by the City of Keene as the best information currently available to establish floodway boundaries and flood elevations. The CLOMR is based on a proposed development of the Keene Meadows (area upstream of NH Route 9 and west of the existing bypass). After the proposed development is constructed, and as built conditions confirmed, then the CLOMR becomes final and new revised floodplain and floodway maps are produced.

The CLOMR established a split flow floodway through the Keene Meadows that must be kept free of obstructions. The split flow phenomena, theoretically occurs as 100-year backwater from the existing box culvert underneath NH Route 9, backs upstream until it eventually overtops the eastern channel banks of Ash Swamp Brook and begins to flow southeasterly into the Keene Meadows. In theory, the Keene Meadow area will fill up and then will overtop the roadway of NH Route 9 at a low point near the end of the existing bypass. It is estimated that approximately 28 m^3/sec (1,000 cfs) of the total 100-year discharge of 84 $m^{3/}$sec (2,950 cfs) will pass through the meadow. Based on this split flow volume the flood elevations and limits of the split flow floodway were determined as shown in Figure 4.9.2.

As can be observed from Figure 4.9.2, the proposed trumpet interchange and its associated ramps will impact the split flow floodway of Ash Swamp Brook. Due to the higher roadway profiles inherent in the proposed trumpet interchange ramps, it will be impossible to maintain the same road profile to continue to let the split flow overtop to the south. Options were investigated to construct relief culverts through the

interchange area such that upstream flooding conditions will remain unchanged.

Due to the existing ground elevations in the Keene Meadows adjacent to the split flow area, it is only possible to create approximately 1 m (3 ft.) of head on the relief structure underneath the southbound to westbound trumpet interchange ramp without affecting the water surface elevations through the Keene Meadows. A relatively long relief structure of approximately 20-25 m (65-80 ft.) will be required to pass the 100-year discharge under the bridge.

Continuing downstream, it will be necessary to provide equivalent relief structures underneath the mainline section of NH Route 9 and the associated loop ramps of the trumpet interchange. Additionally a floodway would have to be established downstream of NH Route 9 extending southward to where it would rejoin Ash Swamp Brook near its confluence with New Run Brook. The construction cost associated with this option was estimated to be in excess of $3,000,000. Because of the theoretical nature of the split flow (it has never been observed) and the substantial costs and complexities of providing relief culverts, another option was investigated as described below.

An alternative to maintaining the split flow condition would be to enlarge the existing waterway opening at the Ash Swamp Brook crossing of NH Route 9, which in turn would eliminate the split flow condition by reducing upstream water surface elevations. Preliminary investigations suggested that if the existing box culvert, a 3.0 m height by 6.0 m width (10 ft. by 20 ft.) structure were supplemented by adding a secondary relief culvert (4.6 m (15 ft.) in width), that backwater elevations would be reduced over 1.0 m (3 ft.) in the immediate upstream reach of Ash Swamp Brook. The full 100-year discharge would be maintained within the main channel and no split flow would occur.

Although this option undoubtedly improves upstream conditions, the question of reduced upstream storage and the potential for corresponding increase in downstream water surface elevations must be addressed. Relative to water surface elevations, preliminary investigations show essentially no increase in downstream water surface elevations with the full 100-year discharge now going down the main channel. The reason for this is two-fold. In general, the immediate downstream channel of Ash Swamp Brook is very deep and well defined and the 100-year flood and corresponding floodway is generally contained within the channel banks. Secondly, updated and more accurate channel survey shows that, in general, the channel ground elevations are approximately 0.6 m (2 ft.) lower than the Flood Insurance elevations.

Relative to lost storage in the Keene Meadows, preliminary investigations suggest that the large differences in peaking times between Ash Swamp Brook and the Ashuelot River (17 hours vs. 40 hours +/-) would not increase the composite hydrograph or corresponding water surface elevations downstream of NH Route 9.

Preliminary hydraulic investigations of increasing the size of the existing culvert results in the lowering of the 100-year flooding elevations through the Keene Meadows by approximately 1.2 m (4 ft.). Much of the currently mapped 100-year floodplain will be eliminated through the Keene Meadows. Some low lying areas and agricultural ditches will still remain within the 100-year floodplain, as some backwater flooding will still occur from the Ashuelot River via cross culverts underneath NH Routes 9/10/12.

The resultant change in 100-year floodplain and floodway throughout the Keene Meadow area is depicted in Figure 4.9.3. These proposed changes have been reviewed by the CATF and presented to the City of Keene for their concurrence for incorporating them into map revisions under the Flood Insurance Program. Currently, a revised CLOMR has been submitted to FEMA for review and acceptance that will update the existing floodplain mapping to reflect the proposed changes. It is expected that FEMA will make a final determination of the mapping changes in the spring of 1999.

It should be further noted, that the addition of the supplemental culvert underneath NH Route 9 would serve a dual use, as pedestrians, bicyclists, snowmobile and equestrian users have requested a recreational underpass in this area of the project. Based on the hydraulic analysis performed to date, it is proposed that the supplemental culvert could effectively provide flood relief and recreational functions.

Ash Swamp Brook at NH Route 10 (Winchester Street)

Upon review of the Flood Insurance Report for the City of Keene, it was observed that the Ash Swamp Brook 100-year flood elevation was controlled by backwater from the Ashuelot River at this crossing location.

The existing NH Route 10 (Winchester Street) bridge is a relatively short single span structure 9 m (30 ft.) that is currently overtopped by the backwater flooding. The regulatory floodway measures approximately 33 m (110 ft.) in width. The proposed structure will be widened to accommodate five travel lanes with shoulders and sidewalk. It is envisioned that the replacement structure will be an equivalent sized structure or slightly larger than the existing waterway opening. The profile of the bridge and roadway approach section will essentially match existing conditions, thus no obstructions to the regulatory floodway are anticipated.

Increasing the bridge span would not improve or change upstream flooding since the 100-year flooding elevations (as well as lower frequency floods) are controlled by backwater conditions from the Ashuelot River. The proposed improvements are not anticipated to cause changes to the floodway limits or 100-year flood elevations at this crossing location.

Ashuelot River at Island Street

Island Street currently crosses over the Ashuelot River via a temporary truss bridge. The existing floodway and 100-year floodplain are essentially coincidental at the crossing location and have a width of approximately 33 m (110 ft.). The proposed replacement structure will consist of a single-span bridge that will be designed to span the regulatory floodway and pass the 100-year flood underneath the low steel elevation of the structure. As such no changes to the floodway or floodplain elevations are expected as a result of this crossing.

Ashuelot River at NH Routes 12/101

NH Routes 12/101 currently crosses over the Ashuelot River via a two-span steel girder bridge. The bridge has two equal spans of 18 m (60 ft.) each, with a 1.2 m (4 ft.) wide solid shaft pier located in the Ashuelot River. Additionally, a pedestrian/bike path crosses underneath the bridge adjacent to the eastern channel bank. Upon review of the Flood Insurance Study, the existing bridge has approximately 1.5 m (5 ft.) of freeboard clearance over the 100-year flood elevation.

The proposed bridge improvements will consist of widening the existing bridge to accommodate additional travel lanes, median and multi-use path width. Some minor revisions will be required to the existing pedestrian path that passes underneath the bridge along the east bank of the river. The existing waterway opening and freeboard will be maintained and the regulatory floodway spanned by the widened bridge (except for the extension of the existing pier). Other than minimal increases in frictional losses due to the longer pier length, no changes to the floodway or 100-year water surface elevations are expected to occur at this crossing location. It should also be noted that the additional pier length will not result in any measurable change in the 100-year water surface elevation, as this elevation is being influenced by backwater conditions.

Branch River at the Optical Avenue Connector

Since the Optical Avenue Connector is on new location, this crossing currently does not exist. The existing floodway and 100-year floodplain are essentially coincident at the proposed crossing location and measures

approximately 65 m (215 ft.) in width. The proposed bridge will be a two-span steel girder structure with a center pier placed on an island in the middle of the Branch River. The bridge will be designed to span the regulatory floodway (except for placement of a center pier) and provide freeboard over the 100-year flood elevation. The only impacts would occur because of the pier placement. Because the pier is located on an island, the potential hydraulic effects are diminished. Furthermore in the context of the total waterway opening at the crossing, the small portion of the pier that would be inundated would be inconsequential. No changes in the regulatory floodway limits and minor or no changes are expected in upstream 100-year flooding elevations at this crossing location.

Beaver Brook at NH Route 101, South Main Street and Martell Court

Beaver Brook will cross project roadways in three locations, two being existing crossings at NH Route 101 and NH Route 12 (Main Street), and the third a proposed crossing associated with the relocation of Martell Court. Beaver Brook is conveyed underneath NH Route 101 and NH Route 12 (Main Street) by a single cell concrete box culvert and twin metal arch culverts, respectively. As defined by the Flood Insurance Study, Beaver Brook overtops NH Route 101 and Main Street during the 100-year event. The associated floodway width crossing NH Route 101 and further downstream ranges up to 91 m (300 ft.) in width. This is due to the large amount of flow in the respective adjacent floodplain that is outside the channel section. When reviewing the detailed computer files obtained from FEMA for Beaver Brook, errors were discovered in their data relative to ground elevations at the crossing locations. When compared to recent detailed project mapping, the elevations used for the FEMA study did not reflect the actual elevations along NH Route 101. Whereas the Flood Insurance Study showed extensive overtopping of NH Route 101, the more detailed project mapping showed that the overtopping would be limited to the Main Street intersection area. The width of the floodway in this area was apparently overestimated, and based on corrected mapping, should be much narrower.

In addition to the mapping and computer coding errors, an updated study (1993) of the Beaver Brook watershed was conducted by the Natural Resources Conversation Service (NRCS). The study took into consideration changes in the watershed that have occurred since the Flood Insurance Study was completed in the late 1970's. Changes included modifications to the Three Mile Dam located upstream as well as the inclusion of other natural storage areas. The results of the study suggested that the discharges utilized in the Flood Insurance Study were overly conservative and that NRCS estimated discharges were essentially half of those values.

Utilizing the lower NRCS discharges, preliminary HEC-2 (the same US Army Engineers program used in the Flood Insurance Study) computer model runs were conducted using the corrected mapping at the crossing sites. The results of this analysis determined that NH Route 101 and Main Street would not overtop during the 100-year flood and flow would be restricted to the culvert. Furthermore, upstream water surface elevations would decrease as well as floodway widths.

The floodway width reduction is an important issue as it impacts the size of the proposed bridge over relocated Martell Court. Currently the floodway width is over 70 m (230 ft.) at this location suggesting the need for a major bridge crossing that is inconsistent with the much smaller structure located immediately upstream at NH Route 101 (2.4 m height by 4.6 m width) (8 ft. by 15 ft.) concrete box culvert.

Given the inconsistencies in the Flood Insurance Study along with the updated NRCS study prompted discussions with the CATF and City of Keene suggesting that Beaver Brook be restudied and the associated floodplain mapping revised. Based upon the results of these meetings, the restudy has been completed and submitted to FEMA. The anticipated mapping changes include lower water surface elevations, reduced floodway widths and reduction in the 100-year floodplain. It is anticipated that the restudy will be reviewed and subsequently approved in the spring of 1999 by FEMA.

As noted in the previous section, the project is not anticipated to result in increases in water surface elevations or result in hazardous stream velocities. Each stream crossing will be designed such that upstream or downstream water surface elevations will not be increased when compared to Flood Insurance Study elevations. Additionally, the recommended changes to the Flood Insurance Study for Ash Swamp Brook and Beaver Brook will result in reduced 100-year floodplain mapping limits. In the case of Ash Swamp Brook, the revisions are expected to reduce the floodplain impacts listed in Table 4.9.1 by approximately 16,200 m^3 (13.1 ac-ft.). In the Beaver Brook watershed, the revised mapping limits will result in a reduction of approximately 4,100 m^3 (3.3 ac-ft.) of floodplain impacts. The total floodplain impacts under proposed conditions are estimated to be approximately 143,000 m^3 (116.0 ac-ft.).

4.9.3 Mitigation Measures

In the context of the overall floodplain of the Ashuelot River Basin, the filling of 143,000 m^3 (116.0 ac-ft.) of floodplain will have an insignificant effect on the hydraulic characteristics of the associated streams. However, floodplain storage is still an important issue and has been identified by various resource agencies as the most important function of the wetland systems within the project area. Floodplain compensation will be proposed for the project and will be combined with the wetland mitigation effort.

As can be observed upon review of Section 4.10, approximately 11.9 ha (29.2 ac) of wetlands will be impacted and ultimately mitigated. The creation of these wetland mitigation sites will involve excavation that in turn will produce floodplain compensation. Although this compensation may not follow all the specific requirements of the more restrictive City of Keene floodplain ordinance, it does attempt to mitigate the total floodplain impacts within existing NHDOT right-of-way. As can be observed, the proposed floodplain compensation matches closely to the floodplain impacts on a watershed by watershed basis, and generally provides 1:1 replacement of lost flood storage.

TABLE 4.9.2 – SUMMARY OF FLOODPLAIN IMPACTS AND MITIGATION

Watershed	Impacts	Proposed Mitigation
Ash Swamp Brook	82,700 m^3 (67.1 ac-ft.)	84,350 m^3 (68.2 ac-ft.)
Ashuelot River	44,400 m^3 (36.0 ac-ft.)	32,400 m^3 (26.2 ac-ft.)
Beaver Brook	5,400 m^3 (4.4 ac-ft.)	6,310 m^3 (5.1 ac-ft.)
The Branch	10,600 m^3 (8.5 ac-ft.)	22,010 m^3 (17.8 ac-ft.)
Total	143,100 m^3 (116.0 ac-ft.)	145,070 m^3 (117.3 ac-ft.)

As noted in Section 4.10, the actual amount of floodplain compensation at each of the wetland mitigation sites will be dependent on the level of seasonal high groundwater. The estimated seasonal high ground water elevations are summarized in Table 4.10.4 and represent the best current estimate of this parameter. During the final design process, monitoring wells will be installed to confirm groundwater elevations, and wetland/floodplain mitigation plans will be revised as required. Efforts will also be made to reduce floodplain impacts during the final design process by adjusting slope limits. In addition to wetland mitigation sites identified in Section 4.10, additional compensation may be identified during the final design process in the form of drainage ditches/swales and possible stormwater treatment basins.

4.10 WETLANDS

4.10.1 Regulatory Overview

Wetlands are considered Waters of the United States, and dredge and fill in wetlands are regulated under Section 404 of the Clean Water Act. The U.S. Army Corps of Engineers administers the program and coordinates with the EPA and the U.S. Fish and Wildlife Service in reviewing permit applications. Executive Orders 11988 and 11990 also address wetland impacts. Executive Order 11988 directs federal agencies to avoid support of floodplain development where feasible, and Executive Order 11990 requires federal agencies to minimize wetland loss. Under Clean Water Act Section 404(b)(1) guidelines, before a project may proceed with either dredging or filling of a wetland, it must be shown that efforts have been made to: 1) avoid the impacts, 2) minimize the impacts, and 3) if impacts are unavoidable, compensate for the impacts. Compensation for wetland losses must attempt to replace the wetland types and functions lost as a result of the project.

The State of New Hampshire regulates wetland impacts under RSA-482. The Wetlands Bureau of the New Hampshire Department of Environmental Services requires permit applications for excavation, removal, dredging, filling, or construction within wetlands. Under RSA 483-A:7, municipalities may designate "prime wetlands" based on the wetlands' size, unspoiled character, or other factors. No prime wetlands have been designated in either the City of Keene or the Town of Swanzey.

The Town of Swanzey has established a Wetlands Conservation District (Section VII of the Zoning Ordinance). The District is defined as "those areas of the town that contain marshes, ponds, bogs, lakes, swamps, streams, as well as soils that are defined as poorly or very poorly drained..." Areas of poorly and very poorly drained soils are based on 1984 soil mapping by the Soil Conservation Service (now the National Resources Conservation Service), which is compiled in the *Soil Survey of Cheshire County, New Hampshire* (Soil Conservation Service, 1989). There is no official Town map of the District, other than the definition and reference provided above. Under the ordinance, "streets, roads, and other access ways" may be allowed by special exception, providing certain conditions are met.

4.10.2 Wetland Identification Methods

Wetlands were identified and mapped for this project in two phases. In November 1994, the wetlands within 60 m (200 ft.) of the centerline of the existing roads within the study area were flagged, and the flag lines were surveyed. The delineation was revised after a field meeting with ACOE staff

conducted in June 1995. At that time, certain areas with hydric soil morphology were determined to be non-wetlands due to historical ditching and draining.

In October 1996 and July and August 1997, areas were reviewed where the proposed work would go beyond the original study area. Specifically, the study area was extended to the east along NH Route 101; to the area between Rose Lane and Optical Avenue; to the northeast along NH Routes 9/10/12 and the area of the proposed multi-use trail; and in miscellaneous other areas where impacts could extend beyond the original 120 m (400 ft.) wide corridor. In areas where impacts are expected, wetlands were generally flagged and surveyed. In other areas, approximate wetland boundaries were sketched on areal photos, checked in the field, and transferred to project base maps.

Both phases used the three-parameter approach described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). Wetlands were classified in accordance with the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin, 1979). The two phases of the wetland delineation are documented in the *Final Wetland Delineation Report* (Fugoro East, Inc., 1996) and the *Wetland Delineation Report Addendum* (McFarland-Johnson, Inc., 1997), which are available for review at the NHDOT office in Concord.

4.10.3 Wetland Functional Assessment Method

The ACOE does not prescribe a specific method for wetland functional assessment, but provides a general framework for a "Descriptive Approach" in which wetlands are qualitatively described rather than quantitatively ranked. According to the *Guide for Permit Applicants* published by the ACOE New England District (NED), in 1995, applicants must "conclude whether or not each of the listed functions and values is a principal function or value of the wetland and briefly explain any available data." In the *Highway Methodology Workbook Supplement* published by the ACOE NED in 1995, the ACOE describes their descriptive approach and how it should be implemented during highway planning and permitting. The *Supplement* identifies 13 functions and values and lists some of the considerations which may be used to determine whether each function or value is a principal function or value of a wetland. The functions of the wetlands within the original study area were assessed prior to publication of the *Supplement*, but the methods used were consistent with the method described therein. After the study area was expanded, the original assessment was reviewed in light of the new field data, and the new wetlands were also assessed. The method was consistent with that described in the *Supplement*. Note that the method identifies only those functions and values which are *principal* functions and values within a wetland. This means that only the most important functions and values are identified. Other functions and values may be present, but are of lesser importance.

4.10.4 Summary of Wetland Resources

The study area is generally within the broad floodplain of the Ashuelot River and its tributaries, and the wetlands reflect that feature. Most of the wetlands occur in relatively level land with poorly drained floodplain soils. Most of the wetland soils are poorly drained mineral soils of the Raynham-Wareham complex and Rippowam fine sandy loam, both floodplain soil series. Nearly all of the wetlands have been affected by some combination of filling, road drainage, or agricultural ditching. Because of this past history of disturbance, many of the wetlands contain mixed wetland and upland indicators.

The wetlands identified within the study area are shown on Figures 4.10.1 through 4.10.4. All wetlands are listed in Table 4.10.1, including the classification, acreage mapped, potential impact acreage, and principal functions and values. The wetlands may be grouped into four general categories, which are described below.

a. Forested and Scrub-Shrub Floodplain Wetlands

These wetlands occur nearly throughout the study area in the level floodplains. Most are affected by historical agricultural ditching, road construction, and road drainage. Most are poorly drained mineral soils, but a few have very poorly drained organic soils. The large size and position within the floodplain makes these wetlands generally valuable for flood storage. Ditches can reduce their flood storage value by draining off water quickly. Since most of these wetlands are along roads and the roads generally have open drainage systems, most receive road runoff. Most of these wetlands therefore are important for retaining sediments, toxicants, and nutrients. The wildlife value varies depending on the nature of the surrounding habitat. In general, these wetlands have well-developed shrub and/or tree strata, are part of larger habitat systems, and are associated with riverine habitat. Although these wetlands typically do not have any outstanding or unique features, they nevertheless constitute a large amount of good quality habitat, so wildlife habitat is a principal function.

Table 4.10.1. Wetland Summary

Wetland Symbol	Classifications (Cowardin et al. 1979)	Mapped Area (Hectares)	Mapped Area (Acres)	Impact Area (Hectares)	Impact Area (Acres)	Principal Functions & Values (see Legend) GW	FA	FH	SR	NR	PE	SS	WH	RE	EV	UH	VQ	ES
A	Palustrine Forested PFO1A	0.06	0.14	0.01	0.02													
B	Riverine Intermittent R4SB2	0.05	0.12	0.03	0.06													
C	Palustrine Forested PFO1C	0.56	1.39	0.16	0.40		X		X	X			X					
D	Palustrine Forested PFO1C	0.64	1.59	0.24	0.60		X		X	X			X					
E	Palustrine Emergent PEM1E	0.30	0.73	0.20	0.49													
1F, 2F	Palustrine Forested	6.97	17.21	2.21	5.45		X		X	X			X					
G	Palustrine Emergent, Palustrine Scrub-Shrub	0.64	1.59	0.04	0.10				X	X								
1H	Palustrine Emergent, Palustrine Scrub-Shrub	4.16	10.28	1.12	2.76		X		X	X			X					
2H	Palustrine Emergent, Scrub-Shrub & Forested	1.21	3.00	1.07	2.65		X		X	X			X					
I	Palustrine Emergent	1.43	3.54	1.22	3.01		X		X	X			X					
1J,2J,3J,4J	Palustrine Emergent, Scrub-Shrub & Forested	4.03	9.95	0.67	1.65		X		X	X								
K	Riverine Lower Perennial R2UBx	0.19	0.46					X					X					
L	Palustrine Emergent	0.39	0.96	0.25	0.63				X	X								
1N	Palustrine Scrub-Shrub	0.32	0.79	0.03	0.07													
2N	Palustrine Unconsolidated Bottom	0.04	0.09	0.04	0.09													
3N, 4N	Palustrine Scrub-Shrub	0.72	1.79	0.17	0.43		X		X	X			X					
1P, 2P	Palustrine Forested, Palustrine Scrub-Shrub	0.21	0.51	0.05	0.13													
Q	Palustrine Emergent PEM1E	0.55	1.36	0.20	0.49													
R	Palustrine Forested	0.37	0.91	0.10	0.24		X		X	X			X					
S	Palustrine Emergent, Palustrine Scrub-Shrub	0.62	1.52	0.08	0.19		X		X	X								
1T, 2T	Palustrine Forested	0.13	0.32	0.08	0.20													
U	Riverine Lower Perennial	0.30	0.73			X		X			X		X	X	X	X	X	
V	Palustrine Forested	0.10	0.24	0.04	0.10													
X	Riverine Lower Perennial	0.17	0.43			X		X										
BB	Palustrine Emergent & Scrub-Shrub	0.95	2.34				X		X	X		X	X					
CC	Palustrine Forested	0.21	0.52	0.02	0.05								X	X				
DD	Palustrine Unconsolidated Bottom	0.25	0.62	0.07	0.18								X					
EE	Palustrine Scrub-Shrub	0.15	0.36	0.10	0.24													
FF	Palustrine Emergent	0.15	0.37	0.15	0.37													
GG	Palustrine Scrub-Shrub	0.47	1.16	0.16	0.36		X					X	X					
1HH, 2HH	Palustrine Unconsolidated Bottom	0.41	1.02	0.04	0.10		X											
II	Riverine Intermittent & Palustrine Forested	0.13	0.32	0.08	0.20													

Table 4.10.1, Page 2

Wetland Symbol	Classifications (Cowardin et al. 1979)	Mapped Area (Hectares)	Mapped Area (Acres)	Impact Area (Hectares)	Impact Area (Acres)	Principal Functions & Values (see Legend) GW	FA	FH	SR	NR	PE	SS	WH	RE	EV	UH	VQ	ES
JJ	Palustrine Forested	0.87	2.15				X		X	X			X	X	X			
KK	Palustrine Forested	0.09	0.23										X					
LL	Palustrine Forested	0.41	1.02				X		X	X			X					
MM	Palustrine Forested	0.78	1.93				X		X	X			X	X	X			
NN	Palustrine Forested	0.44	1.08										X					
PP	Palustrine Forested	0.02	0.04															
QQ	Riverine Lower Perennial	0.13	0.33					X					X					
1SS	Palustrine Forested & Palustrine Scrub-Shrub	0.32	0.80				X		X	X			X					
2SS	Palustrine Forested	0.30	0.74				X		X	X			X					
TT	Palustrine Forested	0.08	0.19															
UU	Riverine Lower Perennial	0.36	0.88			X		X					X	X				
XX	Palustrine Forested	0.02	0.04															
WW	Palustrine Forested	0.35	0.86										X		X			
Ditches*	Palustrine Emergent			*	*	X												
2	Palustrine Emergent & Palustrine Forested	3.25	8.02	1.03	2.54		X		X	X			X					
3A&B	Palustrine Forested	2.95	7.29	0.11	0.27		X		X	X								
4	Palustrine Forested	0.01	0.02	0.00	0.01													
5	Palustrine Forested	2.49	6.14	0.47	1.15		X		X	X			X					
6	Palustrine Forested	0.03	0.08	0.03	0.08													
7	Palustrine Emergent & Palustrine Scrub-Shrub	3.13	7.73	0.53	1.30		X		X	X			X					
8	Palustrine Aquatic Bed	0.78	1.92	0.21	0.53		X		X	X								
9	Palustrine Scrub-Shrub	0.11	0.26															
10	Palustrine Scrub-Shrub	0.04	0.10	0.03	0.06													
11	Palustrine Emergent	0.15	0.38	0.07	0.17													
13	Palustrine Emergent	0.02	0.04	0.02	0.04													
16	Palustrine Scrub-Shrub	0.00	0.00															
17	Palustrine Scrub-Shrub	0.01	0.03									X	X					
18	Palustrine Emergent	0.02	0.06	0.02	0.04													
19	Palustrine Emergent	0.15	0.36	0.04	0.09													
20	Palustrine Emergent & Palustrine Forested	1.48	3.66	0.26	0.65		X		X	X			X					
21	Palustrine Forested	0.35	0.86	0.18	0.43								X					
22	Palustrine Scrub-Shrub	0.04	0.10	0.04	0.10													
23A&B	Palustrine Forested	0.10	0.25									X	X					
24	Palustrine Emergent	0.03	0.08									X	X					
25	Palustrine Forested	0.01	0.02									X	X					
26A&B&C	Palustrine Emergent	0.15	0.37	0.12	0.31													
27	Palustrine Scrub-Shrub	0.13	0.31	0.02	0.04													

Table 4.10.1, Page 3

Wetland Symbol	Classifications (Cowardin et al. 1979)	Mapped Area (Hectares)	Mapped Area (Acres)	Impact Area (Hectares)	Impact Area (Acres)	GW	FA	FH	SR	NR	PE	SS	WH	RE	EV	UH	VQ	ES
						Principal Functions and Values (See Legend Below)												
28	Palustrine Scrub-Shrub	0.38	0.94	0.11	0.27		X											
29	Palustrine Emergent	0.45	1.11				X		X	X								
30	Palustrine Emergent	0.89	2.20				X		X	X			X	X		X		
31	Palustrine Forested	2.56	6.33				X		X	X			X					
32	Palustrine Emergent	0.09	0.21															
33	Palustrine Emergent & Palustrine Forested	0.99	2.44				X		X	X			X	X		X		
34	Palustrine Emergent & Palustrine Forested	0.11	0.27	0.01	0.03													
35	Palustrine Forested	0.03	0.08															
36	Palustrine Forested	0.12	0.29	0.01	0.03													
37	Palustrine Emergent & Palustrine Forested	0.22	0.55				X						X	X				
39	Paulstrine Emergent, Scrub-Shrub & Forested	0.42	1.03	0.05	0.12				X	X			X					
40	Paulstrine Forested	0.28	0.70	0.03	0.06				X				X	X				
	TOTALS	52.99	130.88	12.02	29.58													

39-PEM1G, 39A-PSS1E, 39B-PSS1E, 39C-PSS/EM1E

NOTES

1. See Figure 4.10.1 through 4.10.4 for wetland locations.
2. See text for explanation of functional assessment methods.

* Impacts to drainage ditches and swales would amount to an additional 2.19 acres of impacts.

LEGEND

GW = Groundwater Recharge/Discharge
FA = Floodflow Alteration
FH = Fish and Shellfish Habitat

SR = Sediment/Toxicant Retention
NR = Nutrient Removal
PE = Production Export

SS = Sediment/Shoreline Stabilization
WH = Wildlife Habitat
RE = Recreation

EV = Educational/Scientific Value
UH = Uniqueness/Heritage
VQ = Visual Quality/Aesthetics
ES = Endangered Species

b. Emergent Wetlands

The emergent wetlands within the study area are mostly marshes dominated by broad-leaved cattail and influenced by some combination of damming (from road construction) and stormwater runoff. In a few areas, notably near Production Drive, there are wet meadows in mowed areas. These emergent wetlands can be important for flood storage. Their dense emergent vegetation improves their ability to retain sediments, toxicants, and nutrients in road runoff. Wildlife habitat value is generally good, despite their disturbed condition. Other functions and values are of limited importance.

c. Ditches and Swales

Man-made ditches and swales have been excavated nearly throughout the study area in efforts to lower water tables and gain useable land. Some of these ditches are maintained, but most are not actively maintained and have the full range of wetland features. Some of these ditches perform important water quality functions by filtering sediments, toxicants, and nutrients from stormwater runoff, although many do little more than convey runoff.

d. Rivers and Streams

Rivers and streams occur in many places within the study area. They include the Ashuelot River, The Branch, Ash Swamp Brook, Beaver Brook, and several smaller, unnamed streams. The unnamed streams appear to be mostly intermittent streams. Rivers and streams generally provide excellent wildlife and aquatic species habitat. Certain portions of the Ashuelot River drainage basin contains potential habitat for the federally endangered dwarf wedge mussel (*Alasmidonta heterodon*; see Section 4.12.3).

e. Other Wetlands

Many other, smaller wetlands occur within the study area. They are typically hydrologically isolated and many are disturbed by past grading, road fill, or runoff. Their functional value is limited because of their small size and disturbed condition.

4.10.5 Impact Assessment Methodology

The impact area for the proposed upgrade project was considered to include all wetland area within the toe of slope of the proposed work. Some additional impact may occur where most of a wetland will be filled and only a very small portion will be left unfilled. In such cases, professional judgment was used to determine whether the remaining wetland will continue to function as a wetland or whether it will become upland or become substantially degraded by the proposed work, in which case it would be considered an impact.

Impacts were quantified for overall wetland acreage and by road segment, wetland type, and principal wetland function or value. Certain kinds of impacts, other than direct dredge or fill, may adversely affect wetlands but are more difficult to quantify. These may include habitat fragmentation, the effects of hydrologic modifications such as runoff or impoundment, or any temporary disturbances such as construction impacts. These kinds of impacts are not quantified, but are described below and are addressed in the impact summary where appropriate.

Hydrologic modifications include impoundment, draining, flooding, or changes to the water regime. For this project, efforts have been made to avoid hydrologic modifications by maintaining pre-existing drainage patterns. No undercutting, ditching, or other drainage of wetlands is currently planned.

Water quality impacts on vegetated wetlands are difficult to assess with the current state of scientific knowledge. Most of the existing roadways to be upgraded have open drainage systems, so road runoff is spread out along the roadways. This generally maximizes the natural treatment of runoff in roadside ditches, swales, and wetlands, and minimizes impacts on any one receiving water or wetland. Most of the upgrade will maintain the open drainage system. Water quality impacts on streams and rivers are discussed in Section 4.8, Surface Waters.

Effects on wildlife habitat include habitat loss and fragmentation. Habitat loss is addressed below in the analysis of impacts on functions and in Section 4.12, Wildlife/Fisheries. Since the project involves mainly upgrades of existing roads, little habitat fragmentation is likely.

Secondary impacts are impacts that occur in the future or farther away from the proposed project as a result of the proposed action. The impacts may be due to changes in land use, population changes, or other socioeconomic changes. All of these impacts depend on a variety of social, political, and economic factors which are difficult to quantify.

4.10.6 Impacts by Road Segment and Construction Phase

The proposed work will result in the filling of approximately 12.0 ha (29.6 ac) of wetlands, plus an additional 0.9 ha (2.2 ac) of agricultural and highway drainage ditches. This total reflects the changes to the multi-use trail design, which have occurred since issuance of the DEA. The trail extensions have increased wetland impacts by 0.3 ha (0.7 ac).

Impacts to individual wetlands are listed in Table 4.10.1, and are shown by road segment in Table 4.10.2, by construction phase in Table 4.10.3, by wetland type in Figure 4.10.5, and by principal wetland function in Figure 4.10.6. The majority of these impacts will occur at the proposed trumpet interchange at NH Routes 9 and 101 (3.8 ha (9.4 ac)), excluding ditch impacts) and to the north along NH Routes 9/10/12 (3.4 ha (8.5 ac)). The trumpet interchange will affect wetlands on all sides of the interchange as new ramps are added. Wetland 4J (northeast of the intersection) and Wetland 1H (northwest of the

intersection) are a mixture of wet meadow and scrub-shrub wetlands that appear to have been farm fields historically. They have been affected by mowing and ditching, and receive road runoff. South of the intersection is a large area of forested wetlands (Wetlands 1F and 2F) where the loop ramps will be constructed. These wetlands have also been affected by historical ditching and by road construction. All of these wetlands provide flood storage, water quality improvement, and wildlife habitat functions.

North along NH Routes 9/10/12, 3.4 ha (8.5 ac) of wetlands will be filled for road widening, multi-use path construction, and improvements to the West Street interchange. Most of the impacts will be to Wetland 2H (emergent and forested wetland), Wetland 2 (cattail marsh), Wetland 5 (forested wetland) and Wetland 7 (scrub-shrub and emergent). Because of their large size, position within the floodplain, treatment of road runoff, and habitat diversity, these wetlands all provide principal flood control, water quality improvement, and wildlife habitat functions.

Wetland impacts along NH Route 9 west of the trumpet interchange are expected to total 1.1 ha (2.64 ac). These impacts are mostly attributable to road improvements to NH Route 9. Most of the impacts will occur in disturbed, wet meadow wetlands that are mowed and affected by road runoff. Less than 0.4 ha (1 ac) of this impact will be to less disturbed forested wetlands.

The improvements to the Winchester Street/NH Routes 12/101 interchange will result in approximately 1.6 ha (3.85 ac) of wetland impact. The affected wetlands are all currently impacted by ditches and road runoff, and most are mowed regularly. The largest impact will be to Wetland I, a wet meadow southwest of the interchange. Impacts will be caused by ramp improvements and a multi-use path.

Other areas of proposed work will have lesser impacts on wetlands, as described below:

- Along the main stem of NH Route 101, exclusive of interchanges, approximately 1.1 ha (2.68 ac) will be filled in a total of 11 different wetlands. All of these wetlands are currently affected to varying degrees by the existing roads and road runoff.
- At the "Ashuelot Rail Trail" and utility line crossing on NH Routes 12/101 (just west of the Ashuelot River crossing), approximately 0.4 ha (1.03 ac) of wetlands will be filled for trail improvements and access.
- The proposed connector from NH Route 12 to Optical Avenue will impact approximately 0.3 ha (0.68 ac) of wetland. These are mostly wetlands of low to moderate quality adjacent to existing roadways.
- At the intersection of Base Hill Road and Ash Hill Road, with NH Route 10 approximately 0.3 ha (0.78 ac) of wetlands will be filled for the relocation of Ash Hill Road to align with Whittemore Farms Road.

Table 4.10.3 summarizes wetland impacts by construction phase, which is relevant to the scheduling of wetland mitigation plans. As shown in the table, approximately 80 percent of the impacts occur in Phases 4 through 7.

TABLE 4.10.2. WETLAND IMPACTS BY UPGRADE SEGMENT (EXCLUDING AGRICULTURAL AND HIGHWAY DITCHES)		
Upgrade Segment	**Impacts**	
	Hectares	**Acres**
Route 9 west of the Route 101 interchange	1.09	2.64
Routes 9 and 101 interchange ("trumpet")	3.80	9.40
Routes 9 and 12 north of the Route 101 interchange	3.45	8.52
Winchester Street/Route 101 interchange	1.56	3.85
"Ashuelot Rail Trail" connectors and access	0.42	1.03
Route 101 main stem	1.09	2.68
Route 12 to Optical Avenue connector	0.28	0.68
Base Hill Road/Ash Hill Road intersection, Swanzey	0.33	0.78
TOTAL	12.02	29.58

TABLE 4.10.3. WETLAND APPROXIMATE IMPACTS BY CONSTRUCTION PHASE (EXCLUDING AGRICULTURAL AND HIGHWAY DITCHES)		
Construction Phase	**Impacts**	
	Hectares	**Acres**
PHASE 1 – Base Hill/Route 9 & Base Hill/Route 10	1.33	3.23
PHASE 2 – Winchester Street	0.00	0.00
PHASE 3 – Optical Avenue/Route 32 Connector	1.15	2.83
PHASE 4 – Eastbound/Westbound Ramps Route 10/12/101	2.24	5.5
PHASE 5 – Main Street/Route 101	0.04	0.10
PHASE 6 – SPDI Approaches/Bridge & Trumpet Interchange	3.81	9.40
PHASE 7 – West Street Interchange North/South Bypass	3.45	8.52
TOTAL	12.02	29.58

Note: The exact impact acreage within each phase may vary depending on details of the final design and construction phasing.

4.10.7 Impacts by Wetland Type

Figure 4.10.5 shows the expected impacts by type of wetland. Most of the impacts (6.1 ha (15.2 ac)), excluding ditch impacts) will be to palustrine emergent wetlands. These include wet meadow wetlands occurring in historical farm fields affected by mowing and ditching, and cattail marshes affected by road construction and runoff. Most of the emergent wetlands being affected are at the trumpet interchange and to the north along NH Routes 9 and 12.

Approximately 4.0 ha (9.77 ac) of forested wetland will be filled for the project. Most of this will occur at the trumpet interchange, where the new ramp loops will be constructed within Wetlands 1F and 2F. Other impacts to forested wetlands will occur along NH Route 9 west of Ash Swamp Brook, for road widening; to the north along NH Routes 9 and 12, for multi-use path construction; at the intersection of NH Route 10 with Base Hill Road/Ash Hill Road; and at miscellaneous other locations.

Other types of wetlands affected include:

- Scrub-shrub wetlands (1.5 ha (3.68 ac)). Most of this impact occurs at the trumpet interchange (Wetlands 1H, 2H, and 4J), with other impacts scattered along NH Route 101.
- Intermittent riverine wetlands (0.03 ha (0.06 ac)). This is Wetland B, a small stream at the western end of the study area.
- Palustrine unconsolidated bottom habitat (0.2 ha (0.37 ac)). These are small, isolated roadside wetlands receiving road runoff.
- Palustrine aquatic bed wetland (0.2 ha (0.53 ac)). This is Wetland 8, a wetland north of NH Route 101 east of Optical Avenue, which appears to have been excavated.

There may be a small amount of additional wetland impact at the NH Route 101 crossing of the Ashuelot River and the Optical Avenue connector over The Branch. The Ashuelot crossing will require extension of an existing pier in the river. There may be a small increase in the amount of riverine habitat affected by the pier. At The Branch, a new pier will be constructed on an island in the river. The island is predominately upland, but the work may result in a small amount of impact to vegetated wetland (Wetland 23A).

4.10.8 Impacts by Wetland Function

Figure 4.10.6 shows the expected impacts by principal wetland functions and values. This figure shows only impacts to the "principal", or most important, functions and values. The affected wetlands may provide other functions and values, but they are thought to be of lesser importance and are not considered principal. Functional assessment methods are described in Section 4.10.3.

The principal functions most affected by the project are flood flow alteration, sediment/toxicant retention, nutrient removal, and wildlife habitat. This is a reflection of the characteristics of the wetlands within the project area.

- Floodflow alteration is a principal function because several of the wetlands in question are large, receive road runoff, and are within the 100-year floodplain. This is considered a critical function of the study area wetlands. A total of 10.1 ha (24.84 ac) of wetland having principal floodflow alteration will be filled for the project. Impacts can be compensated for by creating flood storage areas within the affected watersheds.
- Sediment/toxicant retention and nutrient removal are principal functions in many wetlands due to the large size, dense vegetation, and presence of road runoff in the wetlands. There will be approximately 10.1 ha (24.96 ac) of wetlands having both of these principal functions affected. Impacts can be mitigated by constructing drainage systems that improve water quality before runoff is discharged into receiving waters.
- Wildlife habitat is a principal function because of factors such as habitat diversity and riparian habitat. A total of 9.2 ha (22.62 ac) of wetlands having this principal function will be impacted. To compensate for impacts, wetland types with equivalent wildlife value can be created within the project area.

Lesser impacts to sediment and shoreline stabilization (0.2 ha (0.36 ac)) and recreation (0.05 ha (0.11 ac)) functions are expected. No other principal functions will be affected.

4.10.9 Mitigation

According to the February 6, 1990 "Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines" (the MOA), wetland mitigation is a three-step process involving avoidance, minimization, and compensation. Avoidance of impacts to aquatic resources has been a primary concern throughout the project planning process. Regulatory agencies, including the ACOE, U.S. Fish and Wildlife Service (USFWS), NHDES Wetlands Bureau, and NH Department of Fish and Game, have been involved throughout the project planning process. The project has been discussed at several of NHDOT's monthly resource agency meetings. Field meetings have also been held with representatives of NHDOT, ACOE, USFWS, and the NHDES Wetlands Bureau to review impact areas and potential mitigation sites. During the course of these meetings, it was determined that the ACOE would not require mitigation for impacts to agricultural and highway ditches.

Avoidance of wetland impacts is not practicable for this project. Traffic congestion and safety problems cannot be resolved through the No Build, TSM, or TDM alternatives, so it is necessary to improve the road system. Because of the prevalence of wetlands throughout the Ashuelot River valley in the City of Keene, road improvements necessarily involved wetland impacts.

The second step, minimizing unavoidable impacts through project modifications, has been a key consideration in determining the currently proposed design. The original proposal called for construction of a bypass through currently undeveloped areas. This proposal would have affected high quality wetlands and caused habitat fragmentation. For these and other traffic reasons, the bypass alternative was dropped from consideration.

Since the upgrade follows the existing alignment, there is little opportunity to reduce impacts by adjusting the horizontal alignment. However, efforts will be made to minimize wetland impacts throughout the design process. For example, the slope limits and resulting wetland impacts were determined using standard side slopes, with a few exceptions. Steepening side slopes to reduce wetland impacts, where substantial safety issues are not present, will be considered during final design.

The third step, compensation for unavoidable impacts, may take the form of restoration, creation, enhancement, or preservation of wetlands. The compensation proposed for this project is described below.

Wetland mitigation attempts to replace the acreage of wetland lost, the types of wetlands lost, and the functions affected. The preferred location of mitigation sites, as specified in the MOA, is "in areas adjacent or contiguous to the discharge site" (i.e., on-site). If this is not practicable, mitigation should be "in the same geographic area if practicable (i.e., in close physical proximity and, to the extent possible, the same watershed)." For this project, the number and acreage of impact areas and limits imposed by a linear corridor made it impossible to compensate for each impact in an area "contiguous to the discharge site", but all mitigation areas investigated were within fairly close proximity to impacts areas. An effort was made to design mitigation within each affected sub-watershed, i.e., within the Ashuelot River, Beaver Brook, Ash Swamp Brook, and The Branch watersheds. Most of the proposed mitigation is within the existing NHDOT right of way, in areas that were formerly wetlands, prior to their drainage for agricultural purposes.

The functions most affected by the project, as described above, are flood flow alteration, sediment/toxicant retention, nutrient removal, and wildlife habitat. The regulatory and resource agencies involved in project review have agreed that flood storage is the principal impact of concern, and that mitigation should primarily address this impact. Hydrologic evidence shows that the wetlands within the project area are supported by groundwater. Therefore, wetland mitigation will involve excavating within uplands to reach the active water table. The excavation will occur within or contiguous to the floodplain and will yield flood storage compensation. To maximize flood storage capacity, the principal wetland type will be shallow marsh. An effort will be made to provide compensatory flood storage equivalent to impacts within each affected sub-watershed.

Methods for the selection and evaluation of mitigation sites were based on the MOA cited above, guidance from the NHDOT and the federal and state agencies involved in Section 404 and state permitting, and the professional expertise of the consultant. The first step

was to identify all potential mitigation sites within reasonable proximity of the project area. Sources of information included USGS 7.5-minute topographic maps; 1:4200 scale black-and-white aerial photographs taken on April 26, 1991; field observations; and project plans.

Sites were evaluated based on the following criteria:

- Condition of site (disturbed sites are preferred).
- Current land use (sites not in active uses are preferred).
- Hydrology (ground or surface water supply must be available).
- Size (larger sites are preferred).
- Proximity to impact areas (sites close to and in the same drainage basin as impacts are preferred).
- Functional suitability (the ability to replicate lost functions)
- Availability (sites that are within NHDOT right-of-ways or publicly-owned lands are preferred).

Approximately 30 sites were initially reviewed (Figure 4.10.7 and Table 4.10.4). After preliminary investigations and discussions with resource agencies, a number of sites were eliminated from consideration and preferred sites were identified. The originally recommended mitigation areas were Sites 6, 9, 11, 20 and 27. The mitigation proposal was presented at a meeting on September 24, 1997, and was accepted in principle by the federal and state resource and regulatory agencies.

Since the issuance of the DEA, Site 27 has been eliminated from consideration as a result of a Preliminary Site Investigation conducted at the site (see Section 4.15), and replaced by Site 28. The currently proposed sites are shown in Figure 4.10.7 and highlighted in Table 4.10.4. Conceptual plans for the 5 proposed mitigation sites are also shown on Figures 4.10.8 through 4.10.12. These conceptual plans are a part of the Section 404 permit application submitted to the ACOE for the project.

TABLE 4.10.4 – POTENTIAL WETLAND MITIGATION AREAS

Area Number	Approximate Mitigation Area Available ha (ac)	Approximate 100 Year Floodplain Elevation	Approximate Average Ground Elevation	Estimated Water Table Elevation [A]	Cover types Present	Potential for Floodplain Mitigation	Watershed	Estimated Acre/Feet of Floodplain Mitigation	Site Priority [B]	Comments
1	4.0 (9.9)	472'	479' MSL	---	Forest, shrub-scrub, forest opening, potential forested wetlands	Y	Ash Swamp Brook	---	4	Largely forested; May be unacceptable from habitat standpoint.
2	2.0 (5.1)	472'	471' MSL	---	Forest, shrub-scrub, forest opening, potential forested wetlands	Y	Ash Swamp Brook	---	3	Unacceptable to Regulatory Agencies (reviewed in field)
3	3.6 (9.0)	472'	470' MSL	---	Forest, forest opening, potential forested wetlands	Y	Ash Swamp Brook	---	3	Unacceptable to Regulatory Agencies (reviewed in field)
4	0.2 (0.4)	472'	474' MSL	---	Mown roadside, Forest	Y	Ash Swamp Brook	---	2	Adjacent to Ash Swamp Brook; potential for runoff treatment
5	0.1 (0.2)	472'	473' MSL	---	Mown fields and roadside	Y	Ash Swamp Brook	---	2	Adjacent to existing wetlands
5a	0.1 (0.3)	2472'	473' MSL	---	Mown fields and roadside	Y	Ash Swamp Brook	---	2	Adjacent to existing wetlands.
6	1.9 (4.6)	472'	473' MSL	467' [1]	Mown hay field near industrial \ Commercial lands	Y	Ash Swamp Brook	31.5	1	Proposed site (reviewed in field)
7	0.2 (0.4)	472'	473' MSL	---	Mown hay field near Industrial \ Commercial lands	Needs equalizer pipe	Ash Swamp Brook	--	2	Infield area
8	0.9 (2.2)	472'	473' MSL	--	Mown hay field near Industrial \ Commercial lands	Needs equalizer pipe	Ash Swamp Brook	---	2	Infield area of trumpet
9	5.4 (13.4)	472'	470' MSL	467' [1]	Corn field	Y	Ash Swamp Brook	36.7	1	Prior Converted Farmland. Proposed site (reviewed in field).
10a	0.2 (0.6)	476'	475' MSL	---	Partly forested, shrub-scrub and mown roadside	Y	Ash Swamp Brook	---	2	Adjacent to Ash Swamp Brook
10b	0.3 (0.7)	476'	474' MSL	---	Old field	Y	Ash Swamp Brook	---	2	Adjacent to existing wetlands – disturbed
10c	0.2 (0.5)	476'	476' MSL	---	Shrub-scrub	Y	Ash Swamp Brook	---	2	Adjacent to existing wetlands
10d	0.2 (0.6)	476'	477' MSL	---	Partly forested, shrub-scrub, potential wetlands	Y	Ash Swamp Brook	---	4	May be unacceptable from habitat standpoint.
11	3.5 (8.6)	472'	471' MSL	467' [1]	Corn field	Y	Ashuelot River	26.2	1	Prior Converted Farmland. Proposed site (reviewed in field).

A: Water table data sources:

[1] - Based on approximate average groundwater elevation (period Aug. 1963 – Dec. 1990) in USGS Well KEW-2, located approximately 0.6 km (0.4 mi) north of the proposed trumpet interchange.

[2] - Based on surveyed water elevation in nearby pond.

[3] - Estimate

B: Site priority categories:

[1] Proposed [2] Potential [3] Rejected [4] Undetermined

Proposed Site

TABLE 4.10.4 – POTENTIAL WETLAND MITIGATION AREAS										
Area Number	Approximate Mitigation Area Available ha (ac)	Approximate 100 Year Floodplain Elevation	Approximate Average Ground Elevation	Estimated Water Table Elevation [A]	Cover types Present	Potential for Floodplain Mitigation	Watershed	Estimated Acre/Feet of Floodplain Mitigation	Site Priority [B]	Comments
12	0.2 (0.5)	476'	471' MSL	—	Partly forested, shrub-scrub and mown roadside	Y	Ashuelot River	—	2	Relatively small area; partly forested
13	< 0.1 (0.1)	472'	470' MSL	—	Partly mown roadside and shrub-scrub	Y	Ashuelot River	—	2	Very small area
14	0.1 (0.2)	472'	471' MSL	—	Partly mown roadside and shrub-scrub	Y	Ashuelot River	—	2	Small Area
15	0.2 (0.6)	472'	476' MSL	—	Partly mown roadside and shrub-scrub	Y	Ashuelot River	—	2	Relatively small, but good prospect
16	0.2 (0.4)	472'	467' MSL	—	Partly mown field near athletic fields, drainage ditch and roadside	Y	Ashuelot River	—	2	Relatively small area
17	0.1 (0.3)	472'	469' MSL	—	Partly forested	Y	Ash Swamp Brook	—	4	Would impact forested area
18	0.1 (0.2)	472'	470' MSL	—	Partly forested	Y	Ashuelot River	—	4	Would impact forested area
19	0.2 (0.6)	474'	470' MSL	—	Mown and unmown field adjacent to roadside	Y	Beaver Brook	—	2	Adjacent to Beaver Brook; potential for runoff treatment
20	0.7 (1.8)	474[1]	470' MSL	467[3]	Mown and unmown field adjacent to roadside	Y	Beaver Brook	5.1	1	Adjacent to Beaver Brook; potential for runoff treatment. Proposed site.
21	0.2 (0.5)	472'	470' MSL	—	Mown and unmown field adjacent to roadside	Y	Ashuelot River	—	4	Landscape trees present
22	0.4 (0.9)	472'	470' MSL	—	Mown and unmown field adjacent to roadside	Y	Ashuelot River	—	2	Adjacent to Beaver Brook; potential for runoff treatment
23	0.4 (1.1)	472'	469' MSL	—	Mown and unmown field adjacent to roadside	Y	Ashuelot River	—	4	Landscape trees present
24	0.2 (0.4)	474'	473' MSL	—	Partly forested	Y	Beaver Brook	—	4	Small; habitat may preclude use
25	0.7 (1.8)	474'	476' MSL	—	Partly forested	Y	The Branch	—	4	Habitat may preclude use
26	1.1 (2.8)	483'	484' MSL	481.7[2]	Partly forested	Y	The Branch	■	2	Equalizer pipe required
27	0.3 (0.8)	478'	478' MSL	474[3]	Unvegetated	Y	The Branch	■	3	Former City wastewater plant site; Phase II investigation required
28	1.9 (4.7)	489'	490' MSL	486[3]	Unvegetated	Y	The Branch	17.8	1	Highly disturbed former gravel pit, high water table. Proposed site.
P-1	4.6 (11.4)	476'	472' MSL	—	Shrub-scrub, P.C. farm field gone fallow, partly wetland	Y	Ash Swamp Brook	—	3	Unacceptable to Resource Agencies (reviewed in field)
P-2	5.3 (13.2)	472'	477' MSL	—	Forested. Potential forested wetlands.	Y	Ashuelot River	—	3	Unacceptable to Resource Agencies (reviewed in field)

A: Water table data sources:

[1] - Based on approximate average groundwater elevation (period Aug. 1963 – Dec. 1990) in USGS Well KEW-2, located approximately 0.6 km (0.4 mi) north of the proposed trumpet interchange.

[2] - Based on surveyed water elevation in nearby pond.

[3] - Estimate

B: Site priority categories:

[1] Proposed [2] Potential [3] Rejected [4] Undetermined

■ Proposed Site

Proposed mitigation areas 6, 9, and 11 are in the vicinity of the proposed trumpet interchange. Area 6 is mowed grassland, and Areas 9 and 11 are Prior Converted Cropland, currently in corn. Areas 6 and 9 are within the Ash Swamp Brook watershed, and Area 11 is in the Ashuelot River watershed. Mitigation Area 20 is mowed right of way adjacent to Beaver Brook, and Mitigation Area 28 is a former gravel pit near The Branch. Combined, these five mitigation areas provide approximately 13.4 ha (33.1 ac) of wetland mitigation, compared to estimated impacts of 12.0 ha (29.6 ac). Construction of these mitigation areas will also provide approximately 145,070 m^3 (117.3 ac-ft.) of floodplain compensation, versus an estimated 143,100 m^3 (116.0 ac-ft.) of floodplain impacts resulting from the project. A tabulation of proposed wetland/floodplain mitigation is presented in Table 4.10.5.

Because the project provides for slightly more than wetland 1:1 replacement, the "excess" will also compensate for the 240 m^2 (2,600 $ft.^2$) of wetland impacts adjacent to The Branch associated with a previous NHDOT bridge project (Keene C-4306). In addition, the ditches and swales constructed for highway drainage and water quality improvement are expected to more than compensate for impacts to existing agricultural and highway ditches. The final wetland/floodplain compensation proposal will be refined during final design. As noted in Section 4.9.2, installation of monitoring wells will be required to confirm groundwater elevations for both wetland mitigation and floodplain compensation design purposes.

TABLE 4.10.5 – SUMMARY OF WETLAND/FLOODPLAIN MITIGATION

IMPACTS	
WETLAND IMPACTS	12.0 hectares (29.6 Ac)
FLOODPLAIN IMPACTS	
Ash Swamp Brook	82,700 m^3 (67.1 Ac-Ft.)
Ashuelot River	44,400 m^3 (36.0 Ac-Ft.)
Beaver Brook	5,400 m^3 (4.4 Ac-Ft.)
The Branch	10,600 m^3 (8.5 Ac-Ft.)
Total	143,100 m^3 (116.0 Acre-Ft.)
PROPOSED MITIGATION	
WETLAND	
Site 6	1.9 ha (4.6 Ac)
Site 9	5.4 ha (13.4 Ac)
Site 11	3.5 ha (8.6 Ac)
Site 20	0.7 ha (1.8 Ac)
Site 28	1.9 ha (4.7 Ac)
Total	13.4 ha (33.1 Ac)
FLOODPLAIN	
Ash Swamp Brook (Sites 6 and 9)	84,350 m^3 (68.2 Ac-Ft.)
Ashuelot River (Site 11)	32,400 m^3 (26.2 Ac-Ft.)
Beaver Brook (Site 20)	6,310 m^3 (5.1 Ac-Ft.)
The Branch (Site 28)	22,010 m^3 (117.3 Ac-Ft.)
Total	145,070 m^3 (117.3 Ac-Ft.)

4.11 VEGETATION

In order to assess the project area for vegetation impacts, vegetative communities within the project corridor were classified according to their character as identified from aerial photographs of the project site and field review during the wetland delineation. The classifications used are broadly defined, and are intended to reflect the dominant features observed.

4.11.1 Existing Vegetation

Many vegetative communities of the project area were created or are maintained by human activities. Examples of this would be lawns, parks, and maintained roadway right-of-way. In other instances, the substrate or the natural community is modified by human influence to an even greater extent. Examples of this level of modification are seen as crop fields and orchards. All of these vegetative communities are considered to be "cultural" rather than natural community types.

Terrestrial forest communities of the project area are Hardwood Forests (HF), Coniferous Forests (CF), and Mixed Forests (MF). These classifications are based on features noted on aerial photographs, and limited ground truthing. Deciduous hardwood trees such as red maple, sugar maple, beech, yellow birch, red oak and white oak typify the *HF* community type. A dominance of coniferous trees such as red pine, white pine, and eastern hemlock typify the *CF* community type. Hardwoods and conifers in co-dominance typify the *MF* community type.

Shrublands (S) and Old Fields (OF) are other types of natural terrestrial communities that occur within the project area. In the *S* community type, shrubs such as dogwood, viburnum, and honeysuckle are the dominant vegetation. In the *OF* community type, herbaceous species such as grasses, goldenrod, ragweed, and milkweed are dominant. Shrublands and Old Fields are abandoned farmlands undergoing transition from a cultural (i.e., man-made) community type to a natural community type. These community types are most commonly encountered on the northern and eastern portions of the project area.

Wetlands are also natural communities of the project area. A wetland delineation was conducted for this project and wetlands were classified according to the USFWS system (Cowardin, 1979) as described in more detail in Section 4.10. For purposes of vegetative impacts, the wetland classifications used are forested (FW), scrub/shrub (SS), emergent aquatic bed (EB), pond (P), and riverine (R). The wetland communities are found throughout the project area, with the greatest number being associated with the Ashuelot River, and Ash Swamp Brook.

The most common cultural vegetative community of the project area is the Lawn/Maintained Areas (LMA) community type. This community type occurs as residential, recreational (parks and athletic fields), commercial or other areas on which the vegetative cover is maintained by mowing or other activities. The LMA classification is generally assigned to areas where grass is mown for aesthetic purposes.

According to the New Hampshire Natural Heritage Inventory (NHNHI), an element of the New Hampshire Department of Resources and Economic Development's Division of Forests and Lands, no exemplary natural communities or threatened or endangered plant species have been identified within or immediately adjacent to the project area. The United States Fish and Wildlife Service (USFWS) reports that there are no known occurrences of federally protected plant life within the project area. Impacts, which reduce the acreage of wetland vegetation (see Section 4.10), will be mitigated on approximately a 1-to-1 ratio. In other words, for every acre of existing wetland impacted, an acre of replacement wetland will be provided. Therefore there will be no net-loss of wetland community type acreage within the project area.

Given conditions such as the dominance of cultural community types, the lack of protected community types or protected species of vegetation, and the 1-to1 replacement ratio for wetland community impacts, vegetation impacts are expected to be minimal. Impacts to each vegetative community type are summarized in Table 4.11.1.

Table 4.11.1 – IMPACTS TO VEGETATION

Community Type	**Impacted Area Hectares (Acres)**
Hardwood Forest	7.8 ha (19.2 Ac)
Coniferous Forest	0.0 ha (0.0 Ac)
Mixed Forest	0.6 ha (1.4 Ac)
Shrubland	0.9 ha (2.2 Ac)
Old Field	2.5 ha (6.2 Ac)
Forested Wetland	4.0 ha (9.8 Ac)
Shrub – Scrub Wetland	1.5 ha (3.7 Ac)
Emergent Wetland	6.1 ha (15.2 Ac)
Aquatic Bed Wetland	0.2 ha (0.5 Ac)
Pond	0.2 ha (0.4 Ac)
Riverine	0.0 ha (0.1 Ac)
Lawn / Maintained Areas	2.6 ha (6.5 Ac)
Agricultural, Crops	1.6 ha (4.0 Ac)
Agricultural, Pasture	0.0 ha (0.0 Ac)
Maintained Roadside	10.3 ha (25.4 Ac)
Total	38.3 ha (94.6 Ac)

4.11.2 Threatened and Endangered Species

In letters dated February 4, 1994 and April 21, 1997 the New Hampshire Natural Heritage Inventory (NHNHI) did not identify any state protected plants or plant communities within the project area. Similarly, the United States Fish and Wildlife Service (USFWS) did not identify any known occurrences of federally protected plants or plant communities within the project area in letters dated February 28, 1994 and May 14, 1997 (See letters in Appendix A).

Field investigations of plant communities extant within the project area were performed in the fall of 1996, and the spring of 1997. The purpose of these field investigations was the overall characterization of terrestrial and aquatic plant communities in the course of performing delineations. The field investigations were general in nature and did not target specific species or their habitats. None of the vegetative species identified during the delineations appear on the state (New Hampshire RSA 217-A) or federal listings of threatened or endangered species.

4.12 WILDLIFE/FISHERIES

Fisheries and wildlife concerns were investigated through contacts with local, state, and federal agencies. Inquiries regarding the potential presence of fisheries, wildlife preserves, refuges, and protected species of plant and animal life were sent to the appropriate agencies. The United States Fish and Wildlife Service (USFWS), the New Hampshire Department of Fish and Game (NHFG), and the New Hampshire Natural Heritage Inventory (NHNHI) were contacted for this information. Additional information was obtained from observations made during the fieldwork for wetland delineation. This information was also used to assess the potential impacts to wildlife and fisheries resources.

In general, no sensitive wildlife resources were identified within the project area. With the exception of active and abandoned agricultural fields, isolated wood lots, and some short river segments the majority of the project area is situated within an urban/suburban area. The dominant habitats on the landscape are cultural habitats created and maintained by human activity. The benefits of these habitats are limited both by low niche diversity, and frequent human intrusion. The wildlife resources discussed in this section relate to those identified by state and federal regulatory agencies.

4.12.1 Refuges

According to the agencies mentioned in Section 4.12 above, no refuges exist within or adjacent to the project area.

4.12 .2 Threatened/Endangered Species

In a letter dated April 21, 1997 the NHNHI reported that their files did not indicate the presence of sensitive species and/or plant communities within or adjacent to the project area. Additionally, the NHFG states that no protected fisheries or other protected wildlife habitats occur within the project area (see letters in Appendix A).

In a letter dated May 14, 1997, the USFWS responded that no federally-listed and/or proposed endangered or threatened species were known to occur within or adjacent to the project area. However, it was stated that the federally endangered dwarf wedge mussel (*Alasmidonta heterodon*) has potential to occur in the Ashuelot River and the South Branch of the Ashuelot River. The letter also reports that no evidence of dwarf wedge mussel presence was found during surveys of the Ashuelot River, Ash Swamp Brook, and Beaver Brook.

In a subsequent telephone interview, the USFWS stated that its Concord, NH office had performed a survey in the vicinity of the project site. The USFWS stated that they did not identify any individual or colonial occurrences of the dwarf wedge mussel during the survey of waterways within the project area. Based on the results of its survey, the USFWS concludes that no Biological Assessment pursuant to Section 7 of the Endangered Species Act will be required for the project. However, the USFWS did ask that an informal visual assessment for the presence of mussels be performed in the course of other fieldwork which dealt with areas in and adjacent to waterways.

A limited field survey for the presence of mussels was performed at the river and stream crossings of the project site on July 23, 1997. Streams surveyed include the Ashuelot River, Ash Swamp Brook, Beaver Brook, and two tributaries of Ash Swamp Brook. Sites surveyed were those points where a roadway crosses one of the named streams (Figure 4.12.1). The survey was performed by observing the stream bottom while wading immediately upstream, underneath, and downstream of the crossings indicated on the map. The lack of rainfall had left the tributaries of Ash Swamp Brook as dry channels. Therefore, no mussels are considered to currently inhabit the tributaries.

Observations made during the survey indicate that there are no mussels within the project area. Additionally, it seems there is very little habitat within the project area suitable for dwarf wedge mussels. According to the literature reviewed, dwarf wedge mussels occupy rivers at depths of 0.3 – 0.9 m (1 – 3 ft.), and prefer slow to moderate currents, and nearly silt free substrates of sand, gravel or mud. Occurrences of these approximate conditions were rarely observed within the stream segments immediately adjacent to the project's stream crossings.

Based on the observations made during the July 23, 1997 field survey, it is concluded that there were no occurrences of the dwarf wedge mussel within the project area at the time of the field survey. A description of the field survey and the conclusions reached was forwarded to the Concord, NH office of the USFWS for review. Following review of this information, the USFWS concluded that the project would not cause adverse effects to the dwarf wedge mussel, or other federally-listed species (see letters in Appendix A).

4.12.3 Other Fisheries/Wildlife Concerns

The Region 4 Office of the New Hampshire Fish and Game Department (NHFG) was contacted for information relative to wildlife and fisheries resources (Appendix A). According to the Region 4 office, no deer yards or other wildlife concerns are situated within or adjacent to the project area.

According to NHFG, The Branch (a.k.a., Minnewawa River) contains juvenile Atlantic salmon as part of the Connecticut River restoration program. Immature salmon, or 'parr', are known to occupy a riffle portion of The Branch which

serves as a nursery. This riffle habitat is east of the project area, and is described as extending from the abandoned railroad bridge over The Branch in West Keene to the Town of Marlboro. According to NHFG, the nursery area is not within the project area, but the juvenile salmon, or 'smolts' produced there will require unobstructed access to the mainstem of the Ashuelot River during their migration downstream in the months of April and May.

A second salmon nursery is located on the upper Ashuelot River at the Surry Dam. This nursery is situated well upstream of the project area. Smolts produced in this nursery will also migrate downstream during the months of April and May, and will require unobstructed access downstream as they pass through the project area.

NHFG stocks the Ashuelot River and The Branch with trout fingerlings. According to the NHFG hatchery, all stocking occurs east and north of the project area. The NHFG states that the project area is downstream of all systems of 'put-and-take' salmonid fisheries. At best, NHFG considers the river segments within the project area to contain a low abundance of warmwater gamefish species.

No other fisheries or wildlife concerns were identified by the local, state, or federal officials contacted. No indications of the presence of other fisheries or wildlife concerns were noted during the field reviews of the project site. As the proposed project will not place permanent structures in the mainstem channels of either The Branch or the Ashuelot River, no project related impacts to fisheries or fish species are anticipated.

In order to mitigate potential impacts on aquatic resources, NHDOT will implement the following mitigation resources:

- An Erosion and Sediment control plan will be developed and implemented during the construction period.
- Long-term water quality improvement measures (e.g., grassed swales, wetland mitigation) will be provided.
- Fish passage will be ensured when instream work is occurring.
- NHDOT will retain ownership of the corridor originally purchased for the Route 10 bypass. Thus, the natural and habitat values of this corridor will be preserved.

4.13 PARKS/RECREATION/CONSERVATION LANDS

4.13.1 Publicly-Owned Parks/Recreation/Conservation Lands

Publicly-owned parks, recreation areas, and conservation lands include lands and improvements that the county, state, or municipality owns and maintains for recreation or conservation purposes. In Cheshire County there are no county owned and maintained parks or recreation areas; therefore, all of these lands in the vicinity of the proposed project are either state or municipally owned (see Figure 4.13.1 and Table 4.13.1.).

4.13.1.1 State-Owned Lands

The only state-owned recreation/conservation lands in the immediate project area are the Keene State College athletic fields located north of NH Routes 12/101, just west of the Ashuelot River. A baseball field, backstop, and bleachers of the above-mentioned recreation facilities are partly within the slope limits of improvements to NH Routes 12/101. However, these facilities are partly within NHDOT's existing right-of-way, which NHDOT proposes to use for widening NH Routes 12/101. An agreement exists between Keene State College and NHDOT that allowed the college to construct the facilities within the state's right-of-way, with the knowledge that the facilities would have to be removed when the right-of-way was needed for highway improvements. As such, those portions of the baseball field and pedestrian path within the right-of-way are not considered Section 4(f) properties. The college will be responsible for relocating the baseball field, at their cost.

There are two parcels shown on Figure 4.13.1 that are governed by state conservation easements under the Land Conservation Investment Program (LCIP). Impacts to such parcels are not allowed, unless specifically authorized by the State legislature.

A LCIP property owned by the City of Keene is located south of NH Route 9, and west of Production Drive. It abuts the highway right-of-way, but will not be impacted by the proposed project. A second LCIP parcel (Carpenter and French Lot) is located in the Town of Swanzey, outside of the project limits.

4.13.1.2 Municipal Lands

Municipally-owned parks, recreation areas, and conservation lands are also depicted on Figure 4.13.1 and Table 4.13.1. Some of these lands are city-owned parks that have trails and other recreation facilities within them. Others are conservation lands that are available to the public, but

are not actively managed for recreation or wildlife/waterfowl refuge proposes.

TABLE 4.13.1 PARKS, RECREATION, AND CONSERVATION LANDS				
Site	Ownership	Classification	Adjacent to Project	Direct Impact
Keene State College Athletic Fields	State of New Hampshire	SOP	Yes	None[1]
Robin Hood Park	City of Keene	MOP	No	None
Edgewood Park	City of Keene	MOP	No	None
Ashuelot River Park Trail	City of Keene	MOP	No	None
Hickey-Desilets Park	City of Keene	MOP	Yes	1,045 m^2 (11,250 ft^2)
Wheelock Park	City of Keene	MOP	Yes	None[2]
Cleveland Field	City of Keene	MOP	No	None
Central Square Common	City of Keene	MOP	No	None
Robin Hood Forest	City of Keene	MCL	No	None
Beech Hill Conservation Area	City of Keene	MCL	No	None
Keene Forestry Park	City of Keene	MCL	No	None
Ashuelot River Park	City of Keene	MCL	Yes	None[2]
North & South Tenant Swamp	City of Keene	MCL	Yes	None[2]
Wetland Protection Area	City of Keene	MCL	No	None
West Street Well Field	City of Keene	MCL	No	None
Ash Swamp Brook Wetlands	City of Keene	MCL	No	None
Unnamed Lot (Beaver Brook)	City of Keene	MCL	Yes	1,125 m^2 (12,140 ft^2)
Keene LCIP	City of Keene	SCE	Yes	None
Matthews Road Lot	Town of Swanzey	MCL	No	None
Carpenter Street Field	Keene Schools	SOP	No	None
Middle School Field	Keene Schools	SOP	No	None
Wheelock School Play Area	Keene Schools	SOP	No	None
Senior League Ball Fields	Private[3]	POP	No	None
Kingsbury Lot (SPNHF)	Private	PCE	Yes	63 m^2 (680 ft^2)
Carpenter & French Lot (LCIP)	Private	SCE	No	None

Key

MOP - Municipally-owned park
SOP – School-owned recreation area
POP – Privately-owned park
MCL – Municipal conservation lands
SCE – State conservation easement
PCE – Private conservation easement

[1] Impact occurs to facilities, but only within existing highway ROW
[2] Proposed multi-use trail passes through these areas; not considered an impact
[3] Maintenance by Keene Parks Department

Hickey-Desilets Park, located at the corner of Winchester and Island Streets, is a City of Keene park that will be affected by the proposed project. This is a small park, approximately 0.6 ha (1.5 ac) in size, that includes two park benches, a pathway, and a 1939 war memorial. The park will be impacted by the reconstruction of the Island/Pearl Street intersection, as further described in Section 4.13.2.

Proposed wetland mitigation for the project will extend onto a City of Keene conservation parcel (unnamed lot on the north side of NH Route 101, east of Beaver Brook). The proposed wetland mitigation will utilize 0.11 ha (0.29 ac) of the City property, and will create a new wetland contiguous to an existing one on the parcel. The proposed mitigation is consistent with the intended use of this conservation land, and is supported by the City of Keene.

The multi-use trail proposed as part of this project will pass through portions of Wheelock Park, North and South Tenant Swamp, and Ashuelot River Park. The proposed multi-use trail will connect with an existing recreational trail system serving these areas. Because this proposed trail is considered consistent with, and beneficial to, the intended use of these parcels, trail construction has not been considered a negative impact.

4.13.2 Section 4(f) Lands

Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. Section 303) restricts the use of public parks, recreation areas, waterfowl or wildlife refuges, or historic sites of national, state, or local significance for transportation projects. The Act was amended in 1983 to state that the Secretary of Transportation can approve lands to be taken for transportation projects if there is no feasible development alternative and the selected development alternative minimizes adverse impacts to the greatest extent possible.

On this project, one Section 4(f) recreational property will be impacted. The Hickey-Desilets Park, at the intersection of Winchester and Island Streets, will be impacted by the realignment of this intersection. Approximately 1,045 m^2 (11,250 ft^2) will be impacted by acquisition and slope easements. Impacts to this property are described in detail in Section 5.0 (Section 4(f) Evaluation).

The proposed multi-use trail passes through a portion of Wheelock Park and connects to the park's existing recreational trail system. This issue has been discussed with the Keene Parks and Recreation Department. Because this trail is consistent with the intended use of the parcel, the City is in support of its construction (See letter from Mr. Brian Mattson dated January 6, 1998 in Appendix A). Therefore, the trail construction through Wheelock Park is not considered a "use" under Section 4(f). The City did request that they be involved

in the development of the alignment through Wheelock Park in the final design process.

The trail construction through Tenant Swamp and the Ashuelot River Park is likewise not a Section 4(f) use, because they are not eligible Section 4(f) properties (i.e., they are conservation lands, not public parks).

4.13.3 Section 6(f) Lands

Section 6(f) of the Land and Water Conservation Fund Act states in part that no property acquired or developed with funding assistance from this act shall be converted to non-recreational uses without the approval of the Secretary of Interior.

New Hampshire administers the state's 6(f) lands through the New Hampshire Department of Resources and Economic Development, Division of Parks and Recreation (DRED). Three properties in the immediate project area – Wheelock Park, Tenant Swamp and the Ashuelot River Park – are Section 6(f) lands. The proposed multi-use trail will pass through all 3 of these Section 6(f) properties. However, since the multi-use trail is consistent with the intended use of the parcels and does not involve acquisition by NHDOT, it is not considered a "conversion" of 6(f) lands to non-recreational use. This was confirmed during a February 6, 1998 meeting between NHDOT and Ms. Allison McLean of DRED. NHDOT will require a letter from DRED authorizing the temporary non-conforming condition that will exist during the trail construction period.

4.13.4 Other Recreation/Conservation Lands

Other recreational or conservation lands include privately-owned parks, preserves, and land trusts. The Yale University Forest and the Horatio Colony Preserve are both privately–owned and maintained facilities in the project area.

4.13.4.1 Yale University Forest

The Yale University Forest Preserve is owned and maintained by the Yale University School of Forestry. Yale University owns and maintains approximately 4,450 ha (11,000 ac) of forest land throughout the New England states. The forest lands in the City of Keene and the Town of Swanzey total approximately 575 ha (1,400 ac) (see Figure 4.13.1). This land has been owned by the school since the early 1920's.

The purpose of the forest is to create a place for students to learn about forestry practices, and the proper maintenance of conservation lands. The school harvests the land for timber. This is done to economically support the school programs, teach proper harvesting methods to students, and to maintain a healthy stock of trees. The forest is available to the general

public for passive recreational activities, but no facilities are provided by Yale University.

The NH Routes 9,10,12, and 101 improvement project will require acquisition of approximately 1.08 ha (2.67 acres) of property within the Yale Forest for proposed improvements to the NH Route 10/Base Hill Road/Ash Hill Road intersection. The only concern expressed by the director of the Yale School of Forestry, with respect to the proposed highway project, was in regards to continued access to the logging roads on the Forest parcels. During final design, NHDOT will coordinate with the School of Forestry to ensure that adequate access to logging roads within the project area will be maintained.

4.13.4.2 Horatio Colony Preserve

The Horatio Colony Preserve is a 180 ha (445 ac) parcel of land located at the top of West Hill. This land was set aside in a land trust as a wildlife preserve (see Figure 4.13.1). The trust maintains the land, in addition to the Horatio Colony Museum located on Main Street in the City of Keene. There are maintained and organized trails through the preserve for the public to use for hiking and wildlife education. The project does not affect any property within this preserve and no impacts will occur.

4.13.4.3 Private Conservation Easements

The Society for the Protection of New Hampshire Forests (SPNHF) holds a conservation easement on the privately-owned Kingsbury Farm, which is located between NH Route 9 and West Street, east of Base Hill Road. The parcel abuts NH Route 9, and approximately 63 m^2 (680 ft^2) will be impacted by the proposed roadway improvements.

4.13.5 Trail Systems

As the Keene area includes the intersection of major east-west and north-south highways, it is also a crossroads for an alternative transportation/recreational trail system still in the early stages of development. In the evolution of the NH Routes 9, 10, 12, 101 Improvement Project, the issue of providing an alternative transportation/recreational trail system as part of the project has been of great interest. This appears to reflect what has been occurring on a local planning level over the past decade, and involves the interests of a number of user groups (i.e., pedestrians, bicyclists, in-line skaters, cross-country skiers, snowshoers, snowmobilers, and equestrians), with sometimes conflicting interests and needs (i.e., alternative transportation versus recreation).

The area's potential for a trail system is strongly related to two abandoned railroad lines in the area: the Ashuelot Branch and the Cheshire Branch. These

have been purchased by the State and are covered by a management agreement with DRED for recreational use. A substantial portion of future trail development in the Keene area will focus on development of these railbeds, and various connections to them. Accessibility provided by these railbeds is both local and regional in scope.

A multi-use trail is being proposed as part of the NH Routes 9, 10, 12, 101 project. The trail has been incorporated in an attempt to address the needs and wishes of the user groups with alternative transportation/recreational interests. It is clear that this trail will not resolve all issues related to trail development in the Keene area. However, it has been designed to be a logical addition to the existing trail system, in such a manner that it will not impede future development of the trail system. This section discusses existing trail usage in the project area, local planning efforts, and how the proposed multi-use trail interacts with local plans and the interests of the various user groups.

4.13.5.1 Existing Usage

- Pedestrians/Bicyclists – Existing pedestrian/bicycle facilities are shown on Figure 4.13.2, which is a draft version of the City of Keene's Bicycle/Pedestrian Path Master Plan. Existing paved or improved facilities consist primarily of the existing roadway network, with the exception of some connecting trail links near the NH Routes 9/10 and NH Route 12 interchange. Several projects in the downtown area, such as the Downtown Cheshire Branch Trail Phases I and II, are recently completed, or under construction.

  Pedestrian/bicyclists currently have unrestricted access to all the roadways in the project area. They will be impacted by the proposed NH Routes 9, 10, 12, 101 project, because of the inclusion of grade-separated interchanges and associated widening of the state highway network in the project area. As a result, pedestrians and bicyclists will be excluded from the portion of the roadway network extending from Production Avenue, east to Main Street, and from the proposed trumpet interchange north to the NH Routes 9/10/12 interchange.

- Snowmobiles – The Keene Sno'Riders is an active snowmobile organization in the project area and is affiliated with the New Hampshire Snowmobile Association. The Keene Sno'Riders maintain several snowmobile trails within Keene. Most are in West Keene using private property and the Cheshire Branch. The State Trails Bureau has assigned the Sno'Riders maintenance responsibility of the Ashuelot Branch from NH Route 101 south to the Winchester town line.

  Areas of snowmobile usage are shown on Figure 4.13.3. In reviewing this figure, it must be emphasized that the routes depicted do not

necessarily imply authorized usage. In particular, a main east-west travel route for snowmobilers is along the right-of-way of NH Routes 9,10,12 and 101, and a number of direct crossings of these roadways are being utilized. Because these state highways are, and will continue to be classified as limited access right-of-way, travel along and direct crossings of those routes require a permit from NHDOT. At the present time, NHDOT has issued permits for two snowmobile highway crossings (of Route 9 near Production Drive and of Route 10 near its intersection with Routes 10/12/101) and one highway connector permit (along Routes 9 and Routes 10/12/101 between the aforementioned crossing permit locations). Snowmobiles are specifically prohibited from several City parks, and generally from any City-owned land, unless authorized by the City Council.

Primary interests of snowmobile organizations in the Keene area include the following:

- that snowmobiles have a legal right to use and access the state-owned former railroad corridors within the region, and that a safe connection between the Ashuelot and Cheshire Branch railbeds be provided,
- safe crossings of state highways at
  - the Ashuelot railbed at NH Routes 12/101
  - the Cheshire railbed near the West Street interchange
  - at NH Route 9 near the State Police Barracks, and
- access to services.

The Keene Sno'Riders have requested that a separate off-road, multi-use path parallel to NH Routes 9, 10, 12, and 101 be provided from Ash Swamp Brook to the Ashuelot and Cheshire Branch railbeds as part of this highway project.

- Equestrians – Areas of existing/proposed equestrian use are shown on Figure 4.13.3. Equestrians have the same legal rights as pedestrians with respect to crossings of state highways. Under Build conditions, equestrians will be excluded from the same segments of the roadway as pedestrians/bicyclists.

  Like snowmobilers, equestrians have a great interest in use of, and access to, the Ashuelot and Cheshire Branches. They too have requested that a multi-use path parallel to NH Routes 9, 10, 12, and 101 be constructed as part of the project, and that a safe legal crossing of NH Route 9 be provided at Ash Swamp Brook.

4.13.5.2 Local Trail Plans

Various trail user groups will continue to have their own particular interests and preferences, and the overall concept of a trail system in the Keene area will continue to evolve. However, the current vision of a Keene trail system is best summarized by the draft City of Keene Pedestrian/Bicycle Master Plan currently in progress (see Figure 4.13.2). This will replace an earlier (1994) draft Master Plan map.

The current draft differs from the 1994 version in several ways. First, it incorporates the multi-use trail proposed as part of this NH Routes 9, 10, 12, and 101 project as part of the future trail system. Second, the draft Bicycle/Pedestrian Master Plan document includes reference to trail users other than bicyclists and pedestrian (e.g., snowmobilers, equestrians, etc.), who were not specifically addressed in the 1994 draft. It remains apparent in the current draft narrative, however, that issues remain unresolved regarding which users will have access to the City portion of the trail system.

A draft implementation table for the plan is presented in Table 4.13.2.

4.13.5.3 Proposed Project Multi-Use Trail

The proposed highway improvement project will retain the same type of legal right-of-way (i.e., limited access) as currently exists. However, the roadway widening and the construction of two grade-separated interchanges would create a facility that would be unsuitable and unsafe for non-motorized users. Thus, pedestrians, bicyclists, and equestrians will be excluded from the proposed facility from Production Drive east to Main Street and from the proposed trumpet interchange north to the NH Routes 9/10/12 interchange.

As a result, a multi-use trail has been incorporated into the project design (see Figure 4.13.4 and Figures 3.3.6-01 through 3.3.6-12). The multi-use trail, which would be available to all the potential users, will be paved to a width of 3.0 m (10 ft.) and have 0.6 m (2 ft.) gravel shoulders on each side. As currently planned, the multi-use trail will begin at Ash Swamp Brook on the south side of NH Route 9 and proceed eastward towards the Winchester Street SPDI. At the SPDI, the trail crosses NH Route 10, and continues eastward along NH Routes 12/101 until the Main Street/NH Route 101 intersection. Along this segment, a proposed bridge will carry the trail across NH Route 12/101 at the Ashuelot Branch to provide access for users in a north-south direction. The bridge will be approximately 61 m (200 ft.) long.

TABLE 4.13.2[1]

CITY OF KEENE BICYCLE/PEDESTRIAN MASTER PLAN
PRIORITY IMPLEMENTATION TABLE

City of Keene Bicycle/Pedestrian Master Plan											
Priority Implementation Table								Estimated	Source of	Local Match	Planning
	Priority	Type	Length	Begin	End	Surface	Ownership	Total Cost	Funds	or City Cost	Schedule
Existing Facilities											
Wheelock Park/Court Street Bike Path	Existing	Bike/Ped Path	1.0 mile	Court Street	Wheelock Park	Asphalt	City of Keene	N/A	N/A	N/A	N/A
NH Rt. 9, 10, 12, & 101 Bypass System	Existing	Bike Lanes	14.5 miles	Rt. 9, 10, 12, 101	Rt. 9, 10, 12, 101	Asphalt	NHDOT	N/A	N/A	N/A	N/A
Facilities Approved for Construction											
Downtown Cheshire Branch Trail – Phase I	1	Bike/Ped Path	0.833 mile	Rt. 9/10 & Main St.	School & Island St.	Asphalt	City of Keene	$375,000	ISTEA	$75,000	1997/98
Keene Industrial Heritage Trail	1	Bike/Ped Path	0.97 mile	Main Street	Eastern Ave.	Asphalt	City of Keene	$346,000	ISTEA	$69,000	1998/99
Ashuelot Rail Trail Bridge	1	Multi-use Trail	N/A	Ashuelot River	Ashuelot River	Hard Pack/Stone	State Trails	$3,989	NRTF	Inkind	Ongoing
Ashuelot River Trail – Phase I	1	Multi-use Trail	1.0 mile	West Street	Rt. 9, 10	Native Soil/Stone	City of Keene	$10,000	Donated	Inkind	Ongoing
Facilities Approved for Planning & Design											
Downtown Cheshire Branch Trail – Phase II	1	Bike/Ped Path	0.055 mile	School Street	Island Street	Asphalt	City of Keene	$480,000	ISTEA	$96,000	2000/2001
Ashuelot Rail Trail – Phase I	1	Bike/Ped Path	0.5 mile	Emerald Street	Rt. 101	Asphalt	State Trails	$1090,000	State/Donated	Inkind	1999/2000
Ashuelot Rail Trail – Phase II	1	Multi-use Trail	1.0 mile	Rt. 101	Swanzey town line	Granular Stone	State Trails	$30,000	NRTF	Inkind	2001/2002
Ashuelot Rail Trail Crossing of Rt. 101	1	Overpass	N/A	Rt. 101	Rt. 101	Asphalt	NHDOT	$530,000	NHDOT	None	2001/2002
Ashuelot River Trail – Phase II	1	Multi-use Trail	1.5 miles	Rt. 9,10	Maple Ave.	Native Soil/Stone	City of Keene	$20,000	NRTF/Donated	Inkind	Ongoing
Cheshire Branch Rail Trail North	2	Multi-use Trail	5.5 miles	Rt. 9/10/12	Surry town line	Granular Stone	State Trails	$175,000	NRTF/Donated	Inkind	1999/2000
Cheshire Branch Rail Trail South	2	Multi-use Trail	2.0 miles	Eastern Ave.	Swanzey town line	Asphalt	State Trails	$550,000	ISTEA	$110,000	2006/2007
New/Replacement Facilities											
Cheshire Branch Trail North Crossing of Rt. 9, 10, 12	2	Overpass	N/A	Rt. 9, 10, 12	Rt. 9, 10, 12	Asphalt	NHDOT	$500,000	NHDOT	$100,000	2003/2004
Cheshire Branch Rail Trail South Crossing of Rt. 101	2	Overpass	N/A	Rt. 101	Rt. 101	Asphalt	NHDOT	$375,000	ISTEA	$75,000	2004/2005
Rt. 9/Ash Swamp Brook Underpass	2	Underpass	N/A	Rt. 9	Rt. 9	Asphalt	NHDOT	$300,000	NHDOT	None	1999/2000
Rt. 101 Bypass Path (Production Drive to South Main Street	2	Multi-use Path	3.0 miles	Production Drive	S. Main Street	Asphalt	NHDOT	$725,000	NHDOT	None	2001/2006
Rt. 9, 10 & 12 Bypass Path (Ash Swamp Brook to Wheelock Park)	2	Multi-use Path	2.5 miles	Ash Swamp Brook	Wheelock Park	Asphalt	NHDOT	$600,000	NHDOT	None	2001/2006
New Bike Lanes											
Rt. 12/South Main Street Bike Lanes	3	Lanes/Signs	0.83 mile	Rt. 101	Optical Ave. Ext.	Asphalt	City of Keene	$155,000	NHDOT	None	2001/2006
Rt. 10/Lower Winchester Street Bike Lanes	3	Lanes/Signs	0.79 mile	Rt. 9, 10, 12 & 101	Swanzey town line	Asphalt	City of Keene	$150,000	NHDOT	None	1999/2000
Maple Avenue Bike Lanes	3	Lanes Signs	0.62 mile	Rt. 12	Old Walpole Road	Asphalt	City of Keene	$125,000	ISTEA	$25,000	2007/2008
Rt. 101/Marlborough Bike Lanes	3	Lanes/Signs	1.89 miles	Stone Arch Bridge	Marlborough town line	Asphalt	NHDOT	$350,000	NHDOT	None	2008/2009
New Share the Road Signs											
Main Street & Washington Street – Share the Road Signs	3	16 Signs	2.2 miles	Rt. 101/Main Street	Rt. 9, 10	N/A	City of Keene	$2,800	City/CIP	$2,800	1999/2000
West Street & Roxbury Street – Share the Road Signs	3	20 Signs	2.5 miles	Base Hill Road	Water Street	N/A	City of Keene	$3,500	City/CIP	$3,500	1999/2000
Winchester Street & Marlboro Street – Share the Road Signs	3	16 Signs	2.0 miles	Rt. 10, 12, & 101	Eastern Avenue	N/A	City of Keene	$2,800	City/CIP	$2,800	1999/2000
Court Street & Old Walpole Road – Share the Road Signs	3	16 Signs	4.4 miles	Central Square	Surry town line	N/A	City of Keene	$2,800	City/CIP	$2,800	1999/2000
West Surry Road – Share the Road Signs	3	6 Signs	1.5 miles	Court Street	Surry town line	N/A	City of Keene	$1,050	City/CIP	$1,050	1999/2000
Maple Avenue & Hastings Avenue – Share the Road Signs	3	6 Signs	1.8 miles	Rt. 12	Hurricane Road	N/A	City of Keene	$1,050	City/CIP	$1,050	1999/2000
Arch Street & Park Avenue – Share the Road Signs	3	10 Signs	2.7 miles	Rt. 9, 10, 12	Maple Avenue	N/A	City of Keene	$1,750	City/CIP	$1,750	1999/2000
Hurricane Road – Share the Road Signs	3	15 Signs	3.8 miles	Arch Street	Westmoreland town line	N/A	City of Keene	$2,625	City/CIP	$2,625	1999/2000
Stearns Road – Share the Road Signs	3	8 Signs	2.1 miles	Arch Street	Rt. 9	N/A	City of Keene	$1,400	City/CIP	$1,400	1999/2000
Bradford & Base Hill Road	3	14 Signs	1.8 miles	Rt. 9	Swanzey town line	N/A	City of Keene	$2,450	City/CIP	$2,450	1999/2000

[1]Source: Draft City of Keene Bicycle Pedestrian Master Plan

At the Main Street intersection, the paved trail will continue eastward to Optical Avenue and will pass underneath the proposed Optical Avenue Connector bridge. The paved portion of the trail will terminate just east of Optical Avenue. A graded, grassed "shelf" will be constructed eastward of Optical Avenue, which will connect to the southern portion of the Cheshire Trail. The shelf will be graded to provide for a future paved path, which would be funded by other sources.

Pedestrian phasing will be incorporated into the signal phasing at the crossings of Winchester Street and Main Street, and will be provided for north-south crossings at the Optical Avenue intersection with Route 101.

The proposed trail also would extend northward, from the trumpet interchange along the west side of NH Routes 9/10/12, past the West Street Interchange, through Wheelock Park, and connects with existing trail elements at the interchange where NH Routes 9/10 and NH 12 split. It will be necessary to relocate part of the trail connection from the Cheshire Branch to West Street, which is currently under construction. Pedestrian signal phasing will be provided at the West Street crossing.

The addition of a culvert underpass and extension of the trail from Ash Swamp Brook to Production Drive, and the further extension of the trail eastward from Main Street to the South Branch of the Cheshire Trail, was a result of extensive input from trail user groups.

Based on an evaluation of existing trail usage, legal rights to access and local planning efforts, the proposed multi-use trail mitigates for any project-related impacts, and in fact, represents a substantial improvement over existing conditions for bicyclists, pedestrians, and other trail users.

4.13.6 Mitigation

The following measures will be undertaken to mitigate impacts on parks, recreation and conservation lands:

- A multi-use trail has been incorporated into the project design. The multi-use trail, which would be available to all the potential users, will be paved to a width of 3.0 m (10 ft.) and have 0.6 m (2 ft.) gravel shoulders on each side. As currently planned, the multi-use trail will begin at Ash Swamp Brook on the south side of NH Route 9 and proceed eastward towards the Winchester Street SPDI. At the SPDI, the trail crosses NH Route 10, and continues eastward along NH Routes 12/101 until the Main Street/NH Route 101 intersection. Along this segment, a proposed bridge will carry the trail across NH Route 12/101 at the Ashuelot Branch to provide access for users in a north-south direction. The bridge will be approximately 61 m (200 ft.) long.

At the Main Street intersection, the paved trail will continue eastward to Optical Avenue and will pass underneath the proposed Optical Avenue Connector bridge. The paved portion of the trail will terminate just east of Optical Avenue A graded, grassed "shelf" will be constructed eastward of Optical Avenue, which will connect to the southern portion of the Cheshire Trail. The shelf will be graded to provide for a future paved path, which would be funded by other sources.

Pedestrian phasing will be incorporated into the signal phasing at the crossings of Winchester Street and Main Street, and will be provided for north-south crossings at the Optical Avenue intersection with Route 101.

The proposed trail also would extend northward, from the trumpet interchange along the west side of NH Routes 9/10/12, past the West Street Interchange, through Wheelock Park, and connects with existing trail elements at the interchange where NH Routes 9/10 and NH 12 split. It will be necessary to relocate part of the trail connection from the Cheshire Branch to West Street, which is currently under construction. Pedestrian signal phasing will be provided at the West Street crossing.

- During final design, NHDOT will coordinate with the Keene Parks, Recreation and Facilities Department regarding the alignment of the multi-use trail through Wheelock Park in order to avoid impacts to a winter sliding area and to prevent disruptions of the trail through an area known as "the Pits", which is subject to unauthorized use by ATVs.
- Prior to trail construction through Section 6(f) properties (Wheelock Park, Tenant Swamp and the Ashuelot River Park), NHDOT will obtain authorization from DRED for the temporary non-conforming condition that will exist during the trail construction period.
- A new trailhead parking area in the vicinity of Martell Court will be incorporated into the project plans. The location and number of spaces will be determined during final design. If practical, the trailhead parking will incorporate river access limited to car-top boats in accordance with NH Department of Fish and Game criteria.
- The following measures will be incorporated into the final project design to minimize harm to Hickey-Desilets Park:

    - Roadway embankment sideslopes will be steepened to the extent practicable to reduce impacts. The current estimate of areal impacts is based on standard sideslopes.
    - NHDOT will coordinate with the City of Keene regarding possible relocation of the monument within the park.
    - The Landscape Plan for the project will include plantings to compensate for vegetation that must be removed. The planting plan will be coordinated with the City of Keene.

- NHDOT will evaluate any remnant parcels acquired for the project to determine if they are suitable as replacement for the impacted park property.

4.14 CULTURAL RESOURCES

4.14.1 Regulatory Overview

The evaluation of historical resources is guided by the following federal, state and local requirements.

- **Federal Requirements**

  Historical resources that are listed on, or eligible for listing on the National Register of Historic Places are given special protection by Section 106 of the National Historic Preservation Act of 1966, and by Section 4(f) of the Department of Transportation Act of 1966 (amended 1983).

  Under Section 106, any federal undertaking must be evaluated to determine if it will have an effect on historical resources. Federal undertakings include a broad range of activities: construction, rehabilitation projects, demolition, licenses, permits, loans, grants, and federal property transfers. Any federal agency participating in such an activity is required to identify, and evaluate historical resources within, or immediately adjacent to the project area. A historical resource may already be listed on, or determined eligible for the National Register of Historic Places, or it may be found eligible following an evaluation. It is the responsibility of the federal agency involved to ascertain the eligibility of the resource and the subsequent effect of the undertaking on it, following procedures outlined by the Advisory Council on Historic Preservation (36 CFR Part 800). During the course of this process, the agency consults with the State Historic Preservation Office, and other interested parties, to ensure all information available is reviewed. In New Hampshire, the State Historic Preservation Office is the New Hampshire Division of Historical Resources (NHDHR).

  Under Section 4(f), no approval is given for a project or program that requires the use of any publicly owned land from a public park, recreation area, wildlife/waterfowl refuge, or any land from a historic site of national, state, or local significance, unless:

  (1) there is no feasible and prudent alternative to the use of such land, and

  (2) the action includes all possible planning to minimize harm to the resource resulting from such use.

- **State Requirements**

  New Hampshire's Division of Historical Resources, in concert with FHWA and NHDOT, has established a methodology to meet the requirements of the historic preservation review process. The purposes of this process are (1) to locate and

identify historical, architectural and archaeological resources within a study area; (2) to apply the criteria for evaluation of eligibility of resources not already listed on, or determined eligible for, the National Register of Historic Places; (3) to assess the probable effects a project would have on resources listed in, or found eligible for the National Register; and (4) to develop appropriate mitigation methods that would lessen the impact.

- **Local Requirements**

Although the primary consulting parties in the historic and archaeological property review process are the federal and stage agencies, provision is made by the Advisory Council on Historic Preservation for members of the public to receive information and share their views. These interested parties may include local governments, applicants for federal licenses or permits, Indian tribes, historical societies, heritage commissions, historic district commissions, advocacy groups or any member of the general public.

4.14.2 Historical Resources

4.14.2.1 Methodology

The research and evaluation of historical resources was conducted in three phases: constraints mapping of the entire project area, completion of a Keene Area Form (an historic and architectural overview of the city), and intensive local surveys of resources that were likely to be impacted by the project.

The constraints mapping was conducted in 1994. The primary objective of this phase was to provide a broad overview of environmental constraints, as defined by historical resources that, through virtue of their age (more than 50 years old), were potentially eligible for the National Register. Each road within the project area was driven in order to map buildings, structures, cemeteries, bridges, parks, and other resources that appeared to pre-date 1950. Those resources were noted on a series of constraints maps. Though no assessment of potential significance was made at this level of evaluation, resources that had clearly lost their architectural integrity were noted. The constraints maps and accompanying report are on file at NHDHR, FHWA, and NHDOT.

The Keene Area Form, completed in 1995, provided the framework in which to evaluate the potential significance of individual resources and historic areas. It offers an overview of the city's development, from an integrated historical and architectural perspective. The form first summarizes the city's topography and broad economic patterns and trends in order to understand how its historic environment evolved. A discussion on local architecture follows, with surviving building types and architectural styles described, and overall integrity of remaining resources assessed. Clusters, or areas, of

resources that are cohesive, either thematically or architecturally, were identified when they continue to convey a strong sense of the city's history. The form continues with a discussion of the city's history – the how, when, why, and where of its development. Both the architecture and history sections were broken down into major chronological periods, which reflect historical trends. The final sections of the form provide preliminary evaluations of architectural/historical significance for historic areas, a bibliography, and photographs of representative resources.

The final phase of historical resource evaluation for this project concerned those resources that had been identified on the initial constraints maps, and would be impacted by the project. Inventory forms were completed for each of those 108 individual resources and five potentially historic areas, to determine if they were eligible for the National Register of Historic Places and thus afforded consideration under Section 106 of the National Historic Preservation Act, and by Section 4(f) of the Department of Transportation Act. The resources were evaluated against the following criteria for National Register eligibility.

Criterion A: Resources that are associated with events that have made a significant contribution to the broad patterns of our history; or

Criterion B: Resources that are associated with the lives of persons significant in our past; or

Criterion C: Resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

Criterion D: Sites that have yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting one or more of the above criteria, a property must retain sufficient integrity of location, design, setting, materials, workmanship, feeling, and association to express those qualities for which it is significant.

Each resource was researched, using historic maps and photographs, local histories, plans, newspaper articles, city directories, censuses, and manuscript and scrapbook materials at the Historical Society of Cheshire County. Additional important information was obtained through interviews with property owners and local historians. The data for each resource was recorded on inventory forms that are on file at NHDHR, FHWA, and

NHDOT. After all available research data had been collected, each resource was evaluated against the National Register criteria, its integrity was assessed, and the property's significance within its historic context analyzed. Final determinations for National Register eligibility were made by representatives from NHDHR, NHDOT, and FHWA. A consensus determination was reached in each case, and the resulting Determination of Eligibility forms for each property are on file with each agency. The form fronts for those districts and individual properties that were determined eligible (two districts and eight properties) are appended to this document (see Appendix C). Register-eligible properties are shown on Figure 4.14.1.

4.14.2.2 Historic Districts Eligible for the National Register of Historic Places

- **Main Street Historic District (Area A)**
  The Main Street Historic District, an area comprising approximately 20 ha (50 ac) along Main Street, between Water Street and NH Route 101, is eligible for the National Register under Criteria A, B, and C. The district includes fifty-three properties, of which forty-eight contribute to the district's significance.

  The district has strong associations with the historical development of the City of Keene, from its first settlement in 1736 through 1950 (the 50-year cut-off date for the Register), and encompasses virtually all of the first cluster of lots laid out by its proprietors, as well as the original town street, which has retained its original width and feeling. The nearly 215-year period of significance includes the evolution of the district as a prime residential area, as well as its shift toward institutional use, as two of the city's primary institutions, the Elliot Community Hospital and Keene State College, located here. Most of the houses within the district were constructed by, and occupied by prominent local citizens, leaders in the city's industrial, political, commercial, professional, philanthropic, religious, and development history. The wide variety of building forms, types, and architectural styles found within the district encompasses the full range of its historic evolution, and they retain a high degree of integrity. The nearly uniform setbacks and deep street lawn with mature plantings are an important component of the district's architectural character.

- **Park-Fairview Historic District (Area C)**
  Situated approximately 2 km (1.25 mi) west of Central Square in West Keene, the Park-Fairview Historic District includes a grid of eight early-twentieth century residential streets that extend off the northeast side of Park Avenue. The district's approximately 36 ha (90 ac) includes 168 resources, 141 of which are contributing. All but two of the resources were built as residences.

The district's significance lies in its direct associations to the City of Keene's growth during that period. Unlike many New Hampshire communities, the City of Keene maintained a healthy economic base throughout the years, and, thus, steady residential growth. As the city outgrew its available land within the downtown core, it looked to outlying areas for future development.

Landowners in West Keene were the first to capitalize successfully on that need, and the Park-Fairview Historic District evolved in concert with improved transportation needs (the streetcar), and the community's continued economic growth. The range of development and ensuing housing types reflects the long period of popularity of the district and its steady, continuous growth over a period of fifty years. The district meets Criterion A of the National Register.

4.14.2.3 Individual Properties Eligible for the National Register of Historic Places

- **A. Thomas Chilton's Granite Works (Inv. #286)**
  The A. Thomas Chilton Granite Works, 555 Main Street (Keene) is eligible for the National Register, under Criterion C, as the best surviving representative in the City of Keene of a 1920s-1930s one-story, concrete block commercial structure, a building type found in moderate numbers throughout the city. Block, or artificial stone, was made by several local companies, and was the material of choice for foundations throughout the city in the first three decades of the twentieth century. It was also used for a number of entire residences and small commercial structures, such as this building. Rusticated block was particularly popular. The eligible property boundary is limited to the footprint of the building.

- **Dickinson/Atwood House (Inv. #503)**
  The Dickinson/Atwood House, located at 169 Ash Hill Road in the Town of Swanzey, is one of two surviving hip-roof, central chimney houses in the Town of Swanzey. The house contributes to an understanding of late eighteenth century domestic architecture, and specifically, the variations of the hip-roofed house form, which more commonly had twin fireplace chimneys. In this house, the earlier Georgian center chimney form was combined with the two-story, hipped roof form that became popular during the Federal period. The property, which includes its 0.6 ha (1.5 ac) lot, is eligible under Criterion C of the National Register.

- **Smith/Wilder/Bardwell Farm (Inv. #505)**
  The Smith/Wilder/Bardwell Farm, which is located in the Town of Swanzey on NH Route 10 (West Swanzey Road), has strong associations with dairying, poultry farming, and boardinghouse tourism in the early

twentieth century. The farm reflects the changing trends in agricultural history during that period, as dairying gave way to poultry farming, which in turn, ceded to market gardening. Common to many New Hampshire farms, the property hosted summer boarders as an income supplement. The barn, which reflects renovations as it adapted from housing cows to chickens, is of particular note. The property is one of the very few intact farms within the City of Keene or the Town of Swanzey. The property is eligible for the National Register under Criteria A and C, and includes 7.2 ha (17.8 ac) on three lots.

- **MacDonald/Bergeron House (Inv. #508)**
  The MacDonald/Bergeron House, 523 Winchester Street (NH Route 10) in the City of Keene is eligible for the National Register, under Criterion C, as an example of the square house form, which was widely popular in the City of Keene in the early twentieth century, a period during which the city experienced strong residential growth. It represents the typical characteristics of the form, in its two stories, hip roof and square plan, as well as through period details such as the 4 (vertical)/1 window sash and sun porches. The house is one of only two identified brick square houses in the City of Keene, and one of the few for which there is an identified contractor. The eligible property includes the 0.14 ha (0.4 ac) lot.

- **531 Winchester Street (Inv. #509)**
  531 Winchester Street (NH Route 10) in the City of Keene is eligible for the National Register, under Criterion C, as an example of the bungalow house form, which was widely popular in the City of Keene in the early twentieth century, a period during which the city experienced strong residential growth. It represents the typical characteristics of the form, in its full-width front porch, exposed rafters and 3 (vertical)/1 window sash. The house is one of only two identified brick bungalow houses in the City of Keene, and one of the few for which there is an identified contractor. The eligible property includes the 0.2 ha (0.5 ac) lot.

- **Daniel Goodnow House (Inv. #526)**
  The Daniel Goodnow House, 332 Winchester Street (Keene), is architecturally significant, and meets Criterion C of the National register as an example of a sidehall plan, kneewall frame house with Greek Revival stylistic features, and which employs a series of distinctive "eyebrow" or "kneewall" windows to light the upper story. The house is further unusual in that the sidehall plan incorporates a chimney and fireplace on the facade. Though the City of Keene has a number of Greek Revival style sidehall-plan houses, as well as many kneewall houses, there are no others that have been identified with this odd variant of the sidehall plan, and which so fully utilize the kneewall window to maximize the upper floor area. The use of these windows on the house, along with the framing technique and floor plan, are significant for

contributing to an understanding of the City of Keene's vernacular architecture. The boundary for the eligible property is the footprint of the house.

- **Driscoll House and Farm (Inv. #539)**
  Driscoll House and Farm, 158 Island Street (Keene), is significant for representing a national trend in the dairy industry in the early twentieth century: the production of whole milk for retail sale to local customers. The property thus meets Criterion A of the National Register. The property is important within the City of Keene as a rare survivor of a dairy operation in a residential neighborhood; it is of further interest for its ownership by an immigrant (Irish) family. During this period, dairy farming was encouraged through governmental promotion of table milk to urban populations as necessary to good health. At the same time, government regulations and improved technology called for safer and more carefully regulated milk. Though dairy farms within Cheshire County had previously focused on cheese and butter production, milk replaced those products until, by the 1930s, the number of farms selling milk nearly quadrupled those selling only cream and butter. Low prices in the wholesale milk market encouraged farmers to develop their own milk routes, and the Driscoll family was no exception.

  The farm's location within the residential core of the City of Keene reflects the importance of market proximity, due to the perishability of fresh milk and reduced transportation costs. The buildings extant on the property reflect various aspects of the milk business. Of prime significance is the gambrel roof barn, the most common type of dairy barn during this period. The milk room, mandated by state legislation in the early twentieth century to prevent the spread of tuberculosis, also survives, attached to the ell off the back of the house. The entire 0.3 ha (0.8 ac) parcel is eligible for the Register.

- **The Bounty/Barry Faulkner House & Studio (Inv. #546)**
  The Bounty, 73 Base Hill Road (Keene), is of national significance for its association with the regional artists' colonies in southwestern New Hampshire; as the residence and studio of nationally renowned artist Barry Faulkner; and as an excellent example of an early twentieth century summer artist's residence. The eligible property, which meets Criteria A, B and C of the National Register, includes the entire 9 ha (22.6 ac) parcel. Barry Faulkner, a City of Keene native, was a nationally significant muralist whose work is featured in many prominent public buildings, including the United States Capitol and several state capitol buildings, as well as private houses. Locally, his work is featured in a number of buildings. His summer residence and

studio were adapted from an older farmhouse by Faulkner's friend, architect Eric Gugler.

Gugler specialized in monuments and public buildings and was known for his formal classical designs, clearly evidenced at The Bounty. Gugler's most notable project was the enlargement of the White House, including the Executive Office.

4.14.2.4 Impacts to Historic Properties and Districts

4.14.2.4.1 Methodology

The impacts of the project on historic properties that had been determined eligible for the National Register of Historic Places were evaluated by FHWA, NHDOT and NHDHR staff at meetings on September 24, and October 23, 1997. Consensus determinations were made by NHDHR and FHWA for each property, with concurrence by NHDOT, and the Determination of National Register Eligibility/Effects forms are included in Appendix C.

Criteria of Effect and Adverse Effect were determined based on the Section 106 review process established by the National Historic Preservation Act of 1966 and outlined in 36 CFR Part 800.9 which specifies the following:

No Effect: The undertaking will not affect an historic property.

Effect: The undertaking may alter National Register-qualifying characteristics and features of location, setting or use.

Adverse Effect: The undertaking may diminish the integrity of design, setting, materials, workmanship, feeling or association. Adverse effects include, but are not limited to:

- physical destruction, damage, or alteration of all/part of the property;

- isolation from, or alteration of the character of, the property's setting when that character contributes to the property's qualification for the National Register;

- introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;

- neglect of a property resulting in its deterioration or destruction; and

- transfer, lease, or sale of the property.

Otherwise adverse effects may be considered not adverse in the following circumstances:

- when the historic property is of value only for potential contribution to research, and when such value can be substantially preserved through appropriate research in accordance with professional standards and guidelines;

- when the undertaking is limited to rehabilitation of buildings and structures and is conducted in a manner that preserves the historical and architectural value of the affected historic property through conformance with the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*; or

- when the undertaking is limited to transfer, lease or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

No Adverse Effect: The undertaking could affect one or more historic qualities, but the effect will not be harmful to the National Register-qualifying aspects of the property.

4.14.2.4.2 Summary of Impacts

Of the eight individual properties and two districts within the project area that were determined eligible for the National Register, four would have adverse effects, including one property that would be acquired and possibly demolished; three would have no adverse effects; and three would have no effect as a result of the proposed project.

4.14.2.4.2.1 Adverse Effect

- **Main Street Historic District (Area A)**
  The Main Street Historic District would be adversely affected at its southern end by widening of the street and associated reduced width of street lawn and slope impacts; eleven contributing properties would be affected. The stone retaining wall, commemorative plaque, fieldstone gateway, four maple, and several other trees in front of the Elisha Lane House, 441

Main Street (Inv. #212-a) would be removed; the driveway to that house would also be relocated. At the request of the owner, NHDOT has agreed to acquire the Elisha Lane House.

Because Inv. #212-c (the Elisha Lane Carriage House) would no longer be accessible from Main Street or King Court under the originally proposed design, it had been proposed for acquisition by NHDOT. However, since the Public Hearing, an alternative has been developed that would provide access to this property via a driveway through 11 King Court, 441 and 431 Main Street. Therefore, acquisition of Inv. #212-c no longer appears necessary, pending successful negotiations for a new access point.

Slope impacts to Inv. 213, 218 and 219 will also occur. Changes to the street lawn (within existing roadway right-of-way) in front of Inv. #213, 214, 215, 216, 218, 219 and 220, including loss of one or two trees in front of Inv. #214, 215, 216, 218, 219 and 220, are anticipated.

- **MacDonald/Bergeron House (Inv. #508)**
  Approximately 266 m^2 (2,860 $ft.^2$) would be taken for slope work required to widen NH Route 10 (Winchester Street), with shrubs, two trees and the walkway affected. Two concrete posts at the beginning of the driveway would be removed. Though there would be no impact on the house, the work would result in an Adverse Effect on its setting.

- **Daniel Goodnow House (Inv. #526)**
  The proposed widening and relocation of Winchester Street would cause the acquisition, and possible demolition of the Daniel Goodnow House.

- **Driscoll House and Farm (Inv. #539)**
  Slope encroachment and right-of-way acquisition would entail approximately 513 m^2 (5,520 $ft.^2$) in order to widen Island Street. Several small trees along the Ashuelot River and the parking area would be affected, but there would be no impact on any of the structures.

4.14.2.4.2.2 No Adverse Effect

- **Park-Fairview Historic District (Area C)**
  Though there are five contributing properties to the Park-Fairview Historic District within the project limits, minor slope

work would occur only in front of Inv. #307 and 308, and would have No Adverse Effect on the district.

- **Dickinson/Atwood House (Inv. #503)**
  As part of the project work to improve the Ash Hill Road/NH Route 10 intersection, Ash Hill Road would be dead-ended at its western end. The existing driveway to this property, which is currently located near the intersection, is exceedingly awkward to access from westbound Ash Hill Road due to a sharp angle and steep slope and thus would be relocated to the east and away from the house. The pavement on the abandoned portion of Ash Hill Road will be removed, and the base course left in place to the extent practicable. A slope easement in the northwestern corner of the property, encompassing approximately 14 m^2 (150 $ft.^2$), will be required for a cut slope associated with NH Route 10.

- **531 Winchester Street (Inv. #509)**
  Approximately 204 m^2 (2,200 $ft.^2$) of right-of-way would be acquired for necessary slope work to widen NH Route 10 (Winchester Street). There would be no impact on the house or its setting, resulting in a determination of No Adverse Effect.

4.14.2.4.2.3 No Effect

- **A. Thomas Chilton's Granite Works (Inv. #286)**
  Since all of the project work would occur beyond the eligible boundary of this property, which is the building footprint, there would be no effect.

- **The Bounty/Barry Faulkner House & Studio (Inv. #546)**
  The existing driveway, though located within the NH Route 9 right-of-way, would be retained in situ and all slope encroachments would remain within the right-of way. No historic features of the property would be impacted, resulting in a determination of No Effect.

- **Smith/Wilder/Bardwell Farm (Inv. #505)**
  The project work, as originally proposed, entailed taking approximately 283 m^2 (3,050 $ft.^2$) for a shoulder, grass panel, and cut slope in order to widen NH Route 10 (West Swanzey Road). One tree in front of the house would have been removed. There would be no effect on any of the structures, and the proposed work was initially determined to have No Adverse Effect on the Smith/Wilder/Bardwell Farm.

The project design has subsequently been revised to eliminate all work along the frontage of the Smith/Wilder/Bardwell Farm. Therefore, there will be No Effect on this property.

4.14.2.5 Mitigation

Avoidance of historic properties is always preferred. When this is neither prudent nor feasible, mitigation measures use a combination of efforts to suit the individual circumstance. Section 5, Section 4(f) Evaluation, documents why avoidance is not prudent and feasible for the affected properties on this project. The measures considered appropriate for this project are minimizing land acquisition and slope encroachment work, relocating historic features, such as walls and plaques, and providing replacement landscaping to minimize visual impacts. In one instance, where loss of the historic property would occur, documentation is considered appropriate.

A Section 106 Memorandum of Agreement (MOA) has been developed for the project and is included in Appendix C. Individual mitigation measures for properties impacted by this project are as follows:

- **Main Street Historic District (Area A)**
  At Inv. #212-a, the granite wall and fieldstone entry gates, as well as the plaque, would be relocated, using existing materials. The property will be documented according to Historic American Buildings Survey (HABS) standards, then marketed for sale on-site with preservation covenants attached. If unsuccessful, the property will then be marketed for sale on-site without preservation covenants attached. A landscaping plan that addresses the loss of mature trees and the loss of some street lawn in all of the impacted areas of the district would be developed during final design, subject to review by NHDHR and FHWA.

  If NHDOT acquires Inv. #212-c, the property will be documented according to HABS Standards, then offered for sale with preservation covenants attached. If unsuccessful, the property will then be offered for sale without preservation covenants attached.

- **Park-Fairview Historic District (Area C)**
  A landscaping plan will be developed during final design to minimize, to the extent practicable, the effect of street widening on Inv. #307 and 308, subject to review by NHDHR and FHWA.

- **Dickinson/Atwood House (Inv. #503)**
  NHDOT will work with the property owners to redesign the property's driveway access in a historically sensitive manner. To the extent possible, the location of the abandoned portion of Ash Hill Road in

front of the Dickinson/Atwood House will be delineated by leaving the base course in placed, topsoiling and seeding.

- **MacDonald/Bergeron House (Inv. #508)**
  The project has incorporated lane reductions north of Matthews Road (compared to original design) to lessen property acquisition at the MacDonald/Bergeron House and the removal of nearby mature street-side trees. NHDOT, in consultation with NHDHR and FHWA, will design and implement a landscape plan to lessen the effects of street widening.

- **531 Winchester Street (Inv. #509)**
  The project has incorporated lane reductions north of Matthews Road (compared to original design) to lessen property acquisition at 531 Winchester Street and the removal of nearby mature street-side trees.

- **Daniel Goodnow House (Inv. #526)**
  The house will first be documented according to Historic American Buildings Survey (HABS) standards, then offered to the current owners for relocation, with preservation covenants attached, in order to ensure the preservation of its significant historic features. If the current owners do not elect the reconveyance alternative, the house will be offered for sale to the public with preservation covenants attached. If efforts to market the house are unsuccessful, it would be marketed without covenants.

- **Driscoll House and Farm (Inv. #539)**
  The required fill slopes for the proposed bridge abutment and Island Street widening would be designed to minimize the impacts to the extent possible.

4.14.3 Archaeological Resources

4.14.3.1 Methodology

Locations exhibiting archaeological resource sensitivity within the project area were defined during preliminary archaeological reconnaissance survey. These locations are documented in two reports (Goodby 1994, Goodby 1997), and are illustrated on Figure 4.14.2. Locations were assigned broad boundaries following a methodology developed to extract data from a number of sources on resource potential and sensitivity. This approach combined background documentary review and visual inspection. No subsurface sampling, or other detailed field work or archival study was undertaken to positively identify resources in sensitive areas, nor was any work completed to develop statements of National Register eligibility for any known or likely resources.

The preliminary archaeological reconnaissance has provided an acceptable level of information for identifying and evaluating potential impacts to archaeological resources within the study areas. Field verification will be undertaken, after the public hearing for the project, for each area of archaeological resource sensitivity and National Register eligibility will be determined. If impacted, a determination will be made as to the importance of preservation in place, versus data recovery. If preservation in place is necessary, a change in design or location will be recommended, if feasible and prudent, to satisfy Section 4(f). If a site is found to be chiefly important for the information it contains, data recovery will be implemented in accordance with the Secretary of the Interior's *Standards for Documentation* (48 FR 44734-37), and Section 4(f) would not apply.

4.14.3.2 Archaeologically Sensitive Areas

The area exhibits prehistoric and historic archaeological sensitivity, due to its physiography and history of settlement. This includes areas along project rivers, including the Ashuelot River, The Branch, and Ash Swamp Brook, particularly in areas with well-drained soils. Historic sites are likely in areas of historic settlement and growth from earliest settlement, through the nineteenth century. Sites, features, or components are also likely along historic roadways, or in association with existing structures.

Five areas exhibiting prehistoric archaeological resource sensitivity (see Figure 4.14.2) were defined as follows:

- Area 1: Areas on the northwest and southwest sides of the bridge carrying NH Routes 12/101 over the Ashuelot River, on a low, level terrace of Occum fine sandy loam.

- Area 2: The area surrounding the intersection of NH Route 9 and Base Hill Road, on a terrace of Windsor fine sand, which is in close proximity to the

former shoreline of glacial Lake Ashuelot and to the margins of the former Ash Swamp Brook.

- Area 3: The area directly northeast and southwest of Matthews Street in the vicinity of the Keene/Swanzey town line, situated on a level terrace of Caesar loam sand, extending from Matthews Street to the Ashuelot River. This location is in close proximity to a previously recorded prehistoric archaeological site (NH 41-11).

- Area 4: An area to the east and south of Rose Lane, consisting of a high terrace of Merrimac loamy sand overlooking the Branch.

- Area 5: The public park at the junction of Island Street and Winchester Street, situated on a level terrace of Ondawa fine sandy loam, adjacent to the Ashuelot River.

Two areas exhibiting historic archaeological resource sensitivity were identified as follows:

- Area A: The area surrounding Main Street, north of its intersection with NH Route 101, which is the general location of a late 17th to early 18th century cemetery, whose exact location is not known. While the headstones from this cemetery were removed and relocated to other cemeteries in the late 19th century, historic records are ambiguous as to whether all human burials were removed as well.

- Area B: An area approximately 30 m (100 ft.) south of Ash Hill Road in the Town of Swanzey, approximately 244 m (800 ft.) east of its intersection with NH Route 10, where an old foundation/cellar hole has been identified. While historic maps do not show any residences on this side of Ash Hill Road, this feature may be the remnant of a small barn or outbuilding associated with farmhouses, located on the north side of the road.

A meeting to review the preliminary archeological survey and determine the need for further (Phase I-B) archeological testing was held on February 5, 1998. In attendance were representatives from NHDHR and NHDOT. Although not present at the meeting, the FHWA subsequently concurred in the following determinations made at that meeting:

- Prehistoric archeological sensitivity Areas 1, 2, 4 and 5 should be tested. No Phase I-B testing was recommended for Area 3 (Matthews Road area), because impacts are not expected.
- Phase I-B testing was not deemed necessary for historic archeological sensitivity Area A (Main Street area), because of the past disturbance of the area. NHDOT will consider archeological monitoring during the construction period in this area.

- For historic archeological sensitivity Area B (foundation remains on Ash Hill Road), deed research was recommended.

4.14.3.3 Phase 1-B Archeological Survey and Impact Determination

Phase I-B archeological investigations for the sites located above were conducted during July and August of 1998. The investigations included shovel test pit sampling at the four locations with prehistoric resource sensitivity and archival research for a single historic age site. Results are documented in the technical report entitled *Phase I-B Archeological Assessment, Keene-Swanzey, New Hampshire, F-011-1(4)* (Bunker, 1998). The Phase I-B report was submitted to the NHDHR for review and comment.

No prehistoric archeological sites were discovered during the survey; only a single prehistoric artifact was found in a disturbed context. The report therefore recommended no further prehistoric archeological survey for the project.

Archival research did not establish the age of the foundation remains on Ash Hill Road. However, results suggest that this structure functioned as an agricultural shed, barn or outbuilding, perhaps during the 19th or 20th centuries. Archival research suggested that the remains are unlikely to provide any further archeological data, and therefore no further survey of this feature will be done.

4.14.4 Stone Wall Review

Following the issuance of the DEA, the Stone Wall Committee (consisting of representatives from the FHWA, NHDHR and NHDOT) conducted a review and rating of 15 stone walls in the project area. The overall project area does not qualify for preservation or reconstruction under NHDOT's Stone Wall Policy. The walls located at five individual properties were determined to meet the eligibility criteria.

Three of the walls: one at the Dickinson/Atwood House at 169 Ash Hill Road, one at the Coughlin Insurance building at 441 Main Street, and one at The Bounty at 73 Base Hill Road are elements of historic properties on or eligible for the National Register of Historic Places, and their disposition under the Policy is not applicable. Treatment of these walls will be in accordance with the Memorandum of Agreement submitted to the Advisory Council on Historic Preservation pursuant to 36 CFR Part 800.6(A).

One eligible wall (at 14 Matthews Road) is not expected to be impacted by the project. The final eligible wall is located at 129 Ash Hill Road. At the request of the landowner during the Public Hearing, NHDOT has committed to avoid the wall.

A copy of the Stone Wall Review Conference Report is contained in Appendix A.

4.15 HAZARDOUS MATERIALS SITES

A Phase I Initial Site Assessment (ISA) was conducted within and adjacent to, the project development area. The purpose of the study was the identification and evaluation of potential contamination from hazardous materials and/or petroleum. The investigation was completed by Fugro East, Inc./ENSR Environmental Consulting and Engineering, in two reports (File: 16-16-8656, dated February 1996, and File: 8726-284, dated September 1997). There were a total of 47 sites identified in the two reports, as having a potential for release of hazardous materials and/or petroleum products to the soil and/or groundwater (see Figure 4.15.1 for locations).

The information sources, available at the time of the investigation and utilized in locating potential sites, are listed in the following:

- NHDES Files
  - Registry of Underground Storage Tanks
  - Spill/Complaints Listing
  - RCRA – Hazardous Material Generators/Handler's List
- Sanborn Fire Insurance Mapping
- United States Environmental Protection Agency (EPA) – National Priorities List
- EPA's – Comprehensive Environmental Response, Compensation and Liability Information System
- NHDOT – Aerial Photographs
- Cheshire County – Historical Mapping from 1858
- Historical Society of the City of Keene
- Municipal Officials from the following:
  - Fire Department
  - Health Department
  - Public Works
  - Assessor's Office
  - Water Department
  - Sanitary Sewer Department
  - Planning Department
  - Engineer's Office

Once a review of the available documentation was made, and interviews were conducted with the municipal officials, a limited visual inspection of the properties was completed. In an effort to ascertain the environmental conditions, field reconnaissance was carried out, to look for indicators of possible contamination. No interior inspections, subsurface investigations, or other Phase II type actions were conducted during the assessment of the conditions. An environmental summary for the 47 ISA sites, having a potential for hazardous materials on-site, is provided in Table 4.15.1.

Following the Public Hearing, several additional ISAs and more detailed Preliminary Site Investigations (PSIs) were conducted. An ISA concerning the removal of petroleum Underground Storage Tanks (USTs) at a gasoline station, formerly located in Riverside Plaza (Site 8.0 in Table 4.15.1), concluded that it was unlikely that petroleum-contaminated

TABLE 4.15.1: INITIAL SITE ASSESSMENT FACILITIES				
SITE NO:	LOCATIONS:	FACILITY TYPE[1]	ROW ACQUISITION[2]	SUMMARY:
1.0	465 West Street	A	P	Gasoline/diesel dispensing facility
2.0	94 Key Road	B	-	Small quantities of RCRA hazardous waste generated
3.0	68 Key Road	B	-	Automobile service facility
4.0	363 Winchester Street	B	-	Site is listed as a NHDES disposal site (#910628)
5.0	351 Winchester Street	C	-	Site is listed as a NHDES disposal site (#930114)
6.0	345 Winchester Street	A	P	Site is listed on NHDES Groundwater Protection Bureau (GPB) listing
7.0	340 Winchester Street	A	T	NHDES listed site (#921006)
8.0	Winchester Street	D	P	NHDES listed site (#910310)
9.0	410 Winchester Street	B	P	Small quantity RCRA hazardous waste generator
10.0	434 Winchester Street	B	P	Spill complaint in 1991, and UST for gasoline, waste oil and fuel oil.
11.0	435 Winchester Street	B	P	Small quantity RCRA hazardous waste generator
12.0	440 Winchester Street	B	P	Automobile service facility
13.0	446 Winchester Street	B	P	Very small quantity RCRA hazardous waste generator
14.0	447 Winchester Street	B	P	NHDES disposal site (#890360)
15.0	451 Winchester Street	B	-	Small quantity RCRA generator (EPA #986467322)
16.0	452 Winchester Street	A	P	Fuel truck transportation office
17.0	472 Winchester Street	C	P	NHDES registered USTs for diesel were removed in 1989 with contaminated soils
18.0	508 Winchester Street	B	P	UST and monitoring well located on site
19.0	Base Hill Road	E	P	Small quantity RCRA generator (EPA #NHD982203119)
20.0	189 West Swanzey Road	C	P	NHDES disposal site (#950260) NHDES registered UST
21.0	164 Martell Court	A	-	NHDES disposal site (#921232)
22.0	Martell Court	E	-	Pre-treatment facility for raw sewage
23.0	492 Main Street	B	-	Automobile service facility
24.0	501 Main Street	A	P	NHDES disposal site (#8990324)
25.0	522 Main Street	A	-	NHDES disposal site (#910114)
26.0	526 Main Street	B	-	NHDES disposal site (#910410)
27.0	535 Main Street	A	-	NHDES disposal site (#921231)
28.0	537 Main Street	C	-	Very small quantity RCRA hazardous waste generator (EPA #NHD500003991)
29.0	540 Main Street	D	-	Previous fuel oil release (9/20/84)
30.0	543 Main Street	B	-	RCRA generator (EPA #NHD083400275)
31.0	559 Main Street	B	-	Fuel oil distribution facility
32.0	580 Main Street	E	-	NHDES registered USTs
33.0	Route 101 & 12	E	-	NHDES disposal site (#840282)
34.0	561 Main Street	A	-	NHDES disposal site (#890526)
36.0	597 Main Street	C	-	Previous report of soil contamination (10/91)
37.0	682 Main Street	E	P	NHDES disposal site (#920902)
38.0	150 Congress Street	F	-	NHDES disposal site (#900217)
39.0	Optical Avenue	C	P	NHDES disposal site (#870431)
40.1	Optical Avenue	F	-	NHDES disposal site (#891006)
40.2	Optical Avenue	F	-	NHDES disposal site (#891007)
40.3	Optical Avenue	F	-	Very small quantity RCRA generator (EPA #NHD500023827)
41.0	10 Optical Avenue	C	-	NHDES disposal site (#7931020)
42.0	50 Optical Avenue	C	-	Very small quantity RCRA generator (EPA #NHD008819013)
43.0	58 Optical Avenue	F	-	NHDES disposal site (#900815)
44.0	Rose Lane	E	T	NHDES disposal site (#900846)
45.0	32 Rose Lane	C	P	NHDES disposal site (#950528)
46.0	536 West Street	B	T	Automobile glass repair facility

[1] Type of Facility: Fuel service = A
Auto Sales and/or Service = B
Commercial Service = C
Retail Service = D
Municipal Use = E
Industrial Use = F

[2] Acquisition: T – Total
P - Partial

soils would be encountered during highway construction activities (ENSR, 1998a). An ISA for a property to be acquired, as part of the project, at 692-694 Main Street determined that the site formerly operated as a gasoline station, but no records regarding the presence of USTs or their removal could be located (ENSR, 1998b). The ISA recommended further investigations to evaluate the presence of USTs on site. This investigation will be conducted during the final design phase.

A PSI (ENSR, 1998c) was conducted in the area where the former City of Keene Landfill (Site 33.0 in Table 4.15.1) is believed to extend beneath and to the north of Route 101. The investigation involved the installation of 13 soil borings, five of which were completed as groundwater monitoring wells, soil and groundwater sampling and laboratory analysis of soil and groundwater samples. The PSI concluded that:

- Groundwater flow in the area appears to be towards the south.
- Several metals and total petroleum hydrocarbons (TPH) were detected in soil samples at concentrations below those that would require remediation.
- Based on the characteristics of several of the borings, the landfill may have extended north of NH Route 101 in this area.
- Volatile Organic Compounds (VOC's) were detected in three monitoring wells above the applicable Ambient Groundwater Quality Standards (AGQS) and/or New Hampshire Groundwater Category (GW-1) Standard. The VOC's may be coming from an off-site source north of the site, rather than the landfill itself. TPH was also detected in groundwater, but the State of New Hampshire does not have guidelines for TPH in groundwater.
- Based on the depth to groundwater (2.9 m (9.5 ft.)), the report concluded that it was unlikely to encounter groundwater during excavation activities for the highway upgrade.

A PSI was also conducted for the former Keene Waste Water Treatment Plant on Rose Lane (Site 44.0 in Table 4.15.1), a site which was proposed for wetland mitigation (identified as Mitigation Site 27 in Section 4.10.9). The PSI involved the installation of four groundwater monitoring wells, one soil boring, soil and groundwater sampling, evaluation of the groundwater flow direction and laboratory analysis of soil and groundwater samples. The findings of the PSI are summarized below:

- Groundwater flow is to the west-southwest, toward the Ashuelot River.
- Soil samples from 3 monitoring wells and 1 soil boring contained either TPH or metals above regulatory criteria. In ENSR's opinion, a Method 1 Risk Characterization may be warranted to address the TPH and metals in soil.
- The soil boring encountered approximately 5 m (16.5 ft.) of sludge, which was previously buried at the site.
- No VOCs were encountered in groundwater samples. TPH and zinc were detected in groundwater, but there are currently no guidelines for these parameters in groundwater. Nickel was detected in one well below the AGQS of 100 mg/l.

As a result of the PSI conducted for the former Waste Water Treatment Plant, this site was eliminated from consideration as a wetland mitigation site. There will still be acquisition of right-of-way and easements from this parcel for roadway, slope and drainage work.

4.16 VISUAL EVALUATION

4.16.1 Visual Resource and Impacts

The Keene/Swanzey project area is located in the Ashuelot River Valley of southwestern New Hampshire. The existing visual environment of the proposed project area is typical of the New England area. Surrounded by terrain ranging from rolling hillsides to mountainous, the Ashuelot River Valley is relatively flat. The Ashuelot River follows a meandering path through the valley, where it collects waters from several small creeks, ponds, wetlands, and marsh areas. There are several major visual and land use types within the area. The surrounding hillsides are predominantly forested. Within the river valley, marshland brushlot and wooded areas cover a substantial area. Agricultural land and maintained grassland occupy a smaller area. Commercial and residential areas, however, cover much of the valley, and spread into the foothills of the surrounding hillsides. The majority of development in the area is contained within the river valley and includes the historic Keene City Center, more recent strip lot development and residential areas. Existing roadways within the proposed project area are two to four-lane highways, characterized by busy at-grade intersections, narrow shoulders, and, in developed areas, roadsides that are congested with driveways and signs. The most positive visual resources in the area would be the views outward to the surrounding hillsides, the vegetative and wildlife variety associated with the river and wetland communities, and in some areas, the historic structures preserved in their near original state.

The proposed project is targeted at improving the level of service associated with the existing highway network in the area. Improvements will include major upgrades along NH Routes 9/10/12/101, in both the east-west, and north-south directions. Areas that will undergo a visual change will be:

- the proposed trumpet-type interchange at the terminus of existing NH Route 9 bypass with NH Route 10/12/101
- the proposed single point diamond interchange at the Winchester Street intersection with NH Routes 10/12/101
- the widening of Winchester Street south of NH Route 101
- alterations to Main Street (Route 12) at the intersection of NH Route 101 adjacent to, and within, the Historic District, and
- the construction of the Optical Avenue Connector between NH Route 12 and NH Route 101.

There are other areas that will undergo improvements and minor modifications under this project; however, the visual character of these areas is not expected to be substantially altered. In most cases, these areas will undergo minor alignment changes and reconstruction similar to existing conditions.

- The Trumpet Interchange

The proposed trumpet interchange at the NH Route 9 bypass will be a major change in visual character, compared to existing conditions. The existing intersection is an at-grade 'T' intersection, with two-3.6 m (12-foot) lanes on NH Route 9 and NH Routes 9/10/12, and 4 lanes on NH 10/12/101. The proposed interchange will contain four lanes in the east-west direction, including acceleration lanes, and on-off ramps. An embankment, approximately 7 m (23 ft.) high, will be constructed for the approaches to the bridge, which will carry ramps over NH Route 9. The right-of-way for this interchange was previously purchased by NHDOT for the formerly proposed NH Route 10 bypass. This right-of-way area surrounding the interchange is larger than what is actually needed for the currently proposed project. The right-of-way area surrounding the existing interchange is partly used for farming operations; the remaining portions consist of brushland or forest. Almost the entire area surrounding the proposed location of the Trumpet is zoned commercial; a small portion is agricultural. Some of this surrounding area is already developed and some is currently proposed for development (i.e. the Konover Commercial Retail Center).

Although the embankment/overpass associated with the trumpet interchange will be a contrast to the existing topography of the area, its setting (remote from the historic Keene City Center and within an area zoned for commercial development) reduces the impacts. In addition, the following measures, some of which apply to the project as a whole, will mitigate visual impacts,

- Approximately 10.8 ha (26.6 ac) of limited access right-of-way immediately adjacent to the trumpet is proposed wetland mitigation area to compensate for wetland impacts associated with the project. The wetland type will be shallow marsh. In addition to providing environmental benefits (i.e. wetland habitat, floodplain storage, water quality improvement), these areas will provide visual benefits as well.

  By providing natural habitat for wildlife and vegetation, there will be a positive impact on visual quality in this area. Vegetation and wetland areas will provide some screening of the new interchange from off-site areas, while creating interest for motorists along the roadway.

- A project landscape plan will be developed.

- A component of the landscape plan will be to identify areas where existing vegetation should be left undisturbed to provide a visual buffer for the facility. There appear to be several locations surrounding the trumpet interchange (especially towards the northeast and the City itself) where existing vegetation may serve this purpose.

- The Single Point Diamond Interchange (SPDI)

  The proposed single point diamond interchange at the intersection of NH Route 10 and NH Routes 10/12/101 will create the most substantial visual impact of the project. The existing intersection consists of one through lane, in each direction, on Winchester Street, with left and right turning lanes in both the northbound and southbound directions; and one through lane, in each direction, on NH Routes 10/12/101, with a left lane in both the eastbound and westbound directions. There are intermittent sections of sidewalk and crosswalks to accommodate pedestrians, and service the strip lot commercial development along Winchester Street. NH Routes 10/12/101 roadsides are mainly undeveloped, with maintained turf right-of-way. The proposed improvements to this interchange include an elevated four-lane overpass on NH Routes 10/12/101, with off and on ramps in both directions, and upgrading Winchester Street to provide additional through and turning lanes. The east-west approach sections will be constructed with retaining walls and earth embankment. A single span bridge will cross over Winchester Street and have an approximate girder depth of 3 m (10 ft.). This structure will have a major visual impact within the project area. To motorists travelling on NH Routes 10/12/101, the elevated roadway will create enhanced panoramic views of the Ashuelot River Valley and surrounding hillsides. To area residents, and locations within the Valley, the structure will become a major element in the landscape. The structure will be approximately 9 m (30 ft.) high in relationship to Winchester Street, and will serve as a major vertical element of the relatively flat river valley.

  With selective architectural treatments to concrete elements (e.g. textural and/or coloration), and native landscaping of island and embankment areas associated with this type of interchange, negative visual impacts can be minimized. These types of treatments, particularly in association with the pedestrian circulation system and trail connections proposed, could actually add to the passive green space resources of the community, while serving as a break to the continuous strip lot development along Winchester Street. It is expected that the SPDI area will receive the most comprehensive treatment in the project Landscape Plan to be developed. There is also the potential in the SPDI area, particularly on the north side (near Dunkin Donuts/Red Lobster and Applebee's) to leave in place previously planted trees that can provide screening.

  A computer-generated photosimulation of the proposed SPDI area is presented in Figure 4.16.1.

- Winchester Street South

  The widening of Winchester Street to the south of the single point diamond interchange with NH Routes 10/12/101 will also create a substantial visual change in character. Winchester Street has one through lane in each direction, with a common turning lane along its center. Roadside elements consist of gravel shoulders, with grass panels in some areas, and other sections have sidewalk and curbing to accommodate pedestrians. The majority of Winchester Street is commercially developed, with numerous driveways intersecting the roadway for access to off-street parking lots. Proposed improvements to Winchester Street will include

widening the roadway to two lanes in each direction, with a center two-way left turn lane. Curbing and sidewalk are proposed along the west side of Winchester Street to accommodate pedestrian circulation. In order to accommodate the proposed roadway width, a portion of the existing grass panel along Winchester Street will be used. Decreasing the width of the turf strip and adding traffic lanes will change the visual character of the existing roadway, and have been concerns to local officials and residents during the planning of this project, particularly since Winchester Street is regarded as one of the gateways to the City of Keene.

While visual concerns regarding the proposed changes on Winchester Street are reasonable, it is also the case that existing Winchester Street South is not one of the main visual resources of the project area. It is characterized by numerous curb cuts, non-uniform building setbacks, highly variable sign types and has little planned landscaping.

Additionally, in visual terms, it must be recognized that roadway width, in and of itself, does not determine overall visual character and quality. An example of this is existing Main Street in the City of Keene Historic District. Main Street at this location is wide, but its overall setting and exceptional landscaping treatment create a very positive visual experience.

The overall visual mitigation/landscape philosophy for Winchester Street (south of NH Route 10) is to minimize the loss of a good portion of existing grass panels by creating a planned, more valuable green space along the roadway. By adding pronounced vertical character with earth mounding and/or raised planters, with tree and shrub forms of vegetation at key locations, the negative effects of losing turf area can be reduced. The earth grading and tree/shrub vegetation will add year round character and interest to roadsides, as opposed to the seasonal value of turf, which is buried in snow during winter months in this part of the country. The proposed consolidation of curb cuts will also provide visual/landscape benefits.

Computer-generated photosimulations of possible landscape treatments in this area are shown in Figures 4.16.2 and 4.16.3.

- Main Street

The section of Main Street, north of NH Route 101, is another area of proposed development that is faced with the possibility of sensitive visual impacts. Not only is this section of Main Street a Historic District with its prestigious old homes, but it also functions as the main entrance to the downtown district of the City of Keene. The existing roadway in this area is four lanes wide. The existing historic homes along this section of roadway are set back off the roadway approximately 18 m (60 ft.). There are paved shoulders and sidewalks set back off the roadway. Proposed improvements to this section of roadway, which extends from NH Routes 12/101 to Appleton Street will provide Main Street with four travel lanes, a center median, and turning lanes near the intersection with NH Route 101. The paved roadway will be approximately 6 m (20 ft.) wider than the existing roadway. Due to roadway widening, some street tree plantings and sections of sidewalk will be lost, and grading operations will disturb a retaining wall in front of the Coughlin Insurance Building on Main Street. These effects will influence the visual character of this

section of Main Street. To offset some of the negative visual effects of improvements, the wall in front of the Coughlin Insurance Building will be relocated, or replaced in kind, and all street trees unable to be saved shall be replaced with the same or comparable species.

- Optical Avenue Connector

  The proposed Optical Avenue Connector will be a new alignment and is designed to alleviate the amount of traffic at the Main Street/NH Route 101 intersection. To construct this section of roadway, several residences will be displaced, and right-of-way must be purchased through existing commercial properties. The construction of a new section of roadway will have a visual impact on existing conditions. The proposed connector will consist of two travel lanes in each direction, a center median with turning lanes, and the construction of a new intersection to maintain traffic between NH Route 32 and the commercial properties in the connector area. Adjacent properties to the proposed roadway are mainly commercial and multi-family residential properties. Impacts to remaining single family residences in the area will be minimal. In fact, the proposed development will decrease the amount of vehicular traffic travelling in front of residences on Main Street, and will create an island area for green space screening and/or buffering from the new roadway. The new roadway will be constructed primarily in a cut situation, thus reducing visibility of the new roadway from surrounding properties. The new connector requires a bridge to cross the Branch River and connect to NH Route 101, which will create views from the roadway of the wooded river valley below. The bridge would require little, if any, visual mitigation, since it is located in an undeveloped area of the river valley. The construction of the Optical Avenue Connector will help to relieve the congested conditions along the southern, primarily residential, portions of Main Street, while creating direct access to NH Route 101 for commercial traffic in the area.

There are visual impacts associated with the highway improvements proposed for this project, but they are not all necessarily negative. In many cases, when properly planned, there are opportunities to improve the visual character of the area. There are ways to improve wildlife habitat, create new natural areas with little disturbance from people, create green space, and open new views of the scenic Ashuelot River Valley. The potential also exists to enhance the "historic gateway" to downtown City of Keene. Proposed developments associated with this project, or any project of considerable size, will have visual impacts. However, with proper planning, those impacts can be mitigated and, in some cases, visual resources can be improved.

4.16.2 Mitigation

In order to mitigate visual impacts from the proposed project, a Project Landscape Plan will be developed. One component of the plan will be to identify areas where existing vegetation will be left in place. The plan will give particular attention to the Single Point Diamond Interchange, Winchester Street, Hickey-Desilets Park, the Main Street Historic District and other properties eligible for the National Register of Historic Places.

4.17 CONSTRUCTION IMPACTS

During the construction phase of a highway project, there can be temporary impacts directly related to the construction process. The most noticeable impacts would be in the following areas:

- Socioeconomic
- Water Resources
- Noise
- Air Quality
- Energy

This section will address each of the above listed issues and temporary mitigation measures that can be taken to reduce the amount of impact.

4.17.1 Socioeconomic

The primary socioeconomic impact directly related to construction is potential restriction of access to businesses. During the construction phase of the project, businesses may experience a temporary reduction of sales, due to delays or disrupted access routes to the place of business. This is usually caused by the slowing or stopping of traffic during construction operations. Potential customers may deliberately avoid the congested areas causing businesses to lose sales. The majority of the impacted businesses are along Winchester Street. However, most of these businesses, especially those located south of NH Routes 10/12/101, are not reliant on drive-by customers. Temporary impacts to businesses during the construction period will be mitigated by the following:

- Construction will be undertaken in phases, and the overall construction sequence has been developed with the assistance of traffic modeling to identify the most efficient sequence of improvements.
- All existing roadways will remain open during the construction period, and an appropriate number of lanes will be maintained for traffic flow.
- Reasonable access to all properties will be maintained.

4.17.2 Water Resources

Construction activities associated with highway projects can cause adverse effects to water resources, due mainly to the release of deleterious materials, erosion and sedimentation. During the construction phase, various mitigation measures will be taken to reduce the potential impacts to water sources.

Best Management Practices for construction will be applied, permits will be obtained, a Soil Erosion/Sediment Control Plan will be developed, and regular inspection and maintenance of equipment are all measures that will be taken to prevent any adverse impacts to water resources caused by construction processes. Sections 4.7.3 and 4.8.4 discuss these measures in detail.

In the area of the proposed Trumpet Interchange at Production Avenue, new wetlands will be constructed to compensate for wetland impacts and provide water quality treatment within the Ash Swamp Brook watershed. The wetlands will collect roadway runoff and provide treatment to the water before it enters receiving waters.

The mitigation measures that have been proposed will reduce the impacts that construction may cause to the water resources in the project area. These measures will reduce the potential for temporary impacts and prevent any long-term impacts from developing.

4.17.3 Noise

Construction activities associated with roadway projects would result in noticeable noise increase along all affected roadways. These activities will result in substantial, but temporary, noise impacts to all places within the project area. The noise will vary, depending on the construction and the type and amount of equipment being used in each area. Section 4.6.3 addresses the noise levels of various types of construction equipment.

Noise impacts, due to construction, will be temporary and limited to daylight hours to the extent possible. This will reduce the amount of disturbance to residents within the project area.

4.17.4 Air Quality

The air quality in the project area will be slightly worse during construction than would normally be experienced, due to extensive use of large diesel and gasoline equipment within limited work areas, and an increase in the amount of Total Suspended Particles (TSP) released into the air.

Construction equipment will be used continually in specific areas, causing carbon monoxide concentrations in the air to increase. The constant idle emissions of equipment and the extra length of time for cars to go through the area will contribute to the deterioration of the air quality. However, this is a short-term impact, and no long-term impacts are anticipated.

Excavation and earth-moving operations are the primary contributors to TSP. These are the particles of dust and construction debris released into the air. Measures to reduce the amount of TSP will be taken, such as regular cleaning of the streets and the use of water and calcium chloride on the roads to minimize the amount of dust released.

Temporary impacts to air quality will occur; however, with proper mitigation these impacts can be reduced. All impacts are temporary and will not cause lasting long-term impacts to the air quality in the vicinity of the proposed projects.

4.17.5 Energy

Construction activities use energy in the form of fuel consumption for equipment and machinery. Energy usage will thus increase during the construction period, but none of the fuels required are in short supply. Because the proposed improvements will result in improved Levels of Service and reduce vehicle queues (and idling), long term operational energy expenditures are expected to decrease.

4.18 ENVIRONMENTAL JUSTICE

Executive Order (EO) 12898 of February 11, 1994, is entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations". This Executive Order requires Federal agencies to analyze the environmental effects, including human health, economic and social effects, of Federal actions on minority and low-income communities when undertaking environmental analysis under the National Environmental Policy Act (NEPA). The objective of the EO is to ensure that all programs or activities receiving Federal financial assistance that affect human health or the environment do not result in disproportionately adverse environmental effects on minority and low-income communities.

As documented in this report (see Section 4.3.2.1), no impacted areas within the project limits were identified as minority or low income communities. Thus, the project will not cause disproportionate impacts to such groups, and the project is concluded to be in compliance with EO 12898.

4.19 SCOPING, AGENCY COORDINATION, AND PUBLIC PARTICIPATION

4.19.1 Scoping, Agency Coordination

The FHWA is the lead Federal Agency for the development of this environmental document, as 80% FHWA funding for the project is anticipated. The NHDOT is responsible for implementation of the project and will provide state-matching funds.

Meetings were held periodically with natural resource agencies throughout the development of the project. Project review meetings were held on the following dates:

Date	Topic
August 19, 1993	Resource Agency Meeting @ NHDOT
February 24, 1994	Resource Agency Meeting @ NHDOT
March 3, 1995	Resource Meeting-floodplains, wetlands
March 23, 1995	Resource Agency Meeting @ NHDOT
June 26, 1995	Field trip to study area-review wetland boundaries
November 14, 1996	Resource Agency Meeting @ NHDOT
April 9, 1997	Floodplain meeting with FEMA, USACOE, New Hampshire Office of Emergency Management (NHOEM)
April 16, 1997	Resource Agency Meeting @ NHDOT
April 30, 1997	NHDHR-Historic Resources eligibility meeting
July 10, 1997	Field review of wetland mitigation areas with USFWS, Wetlands Bureau, Keene and Swanzey Conservation Commissions
July 16, 1997	Resource Agency Meeting @ NHDOT
July 30, 1997	NHDHR- Historic Resources eligibility meeting
August 13, 1997	NHDHR- Historic Resources eligibility meeting
August 27, 1997	NHDHR-Historic Resources eligibility meeting
September 24, 1997	Resource Agency Meeting-wetlands mitigation
September 24, 1997	NHDHR- Historic Resources effects meeting
October 13, 1997	Keene Conservation Commission
October 22, 1997	NHDHR-Historic Resources effects meeting
November 17, 1997	Keene Conservation Commission
December 16, 1997	Ashuelot River Local Advisory Committee
January 8, 1998	NHDHR – Phase 1B Archeological Survey
February 5, 1998	NHDHR – Phase 1B Archeological Survey with Consultant
February 6, 1998	DRED regarding Section 6(f) Properties
November 11, 1998	Stone Wall Committee
November 19, 1998	NHDHR – Historic Resources Effects Meeting

- Resource Agency meetings typically include EPA, USACOE, U.S. Fish and Wildlife Service, New Hampshire Wetland Bureau, New Hampshire Fish & Game Department, and New Hampshire DHR

As a result of this consultation, consensus has been reached on the following major issues:

- Wetlands – ACOE concurrence with project purpose, need and range of alternatives to be considered; concurrence on delineation methodology; approval of wetland boundaries; and all natural resource agencies agree on proposed mitigation areas and objectives.
- Floodplains – Agreement to modify floodplain mapping in the vicinity of the NH Route 9 crossing of Ash Swamp Brook, and modifications to floodplain mapping in the Beaver Brook watershed, due to better technical data and modifications to watershed characteristics that were not reflected in the original FEMA study. Agreement on proposed mitigation areas and methodology.
- Historic Resources – Identification of historic resources and determination of eligibility for the National Register; Determination of Effect completed; development of a draft Section 106 Memorandum of Agreement, including mitigation measures for project impacts.

4.19.2 Public Involvement

As mentioned in preceding sections of the report, public involvement has been an important component of the overall development of the preliminary engineering and environmental documentation. Public involvement has focused around the monthly meetings of the Citizen Advisory Task Force (CATF) and Technical Review Committee (TRC).

The CATF was formed in May of 1996 to assist and interact with the design team of NHDOT, FHWA and the project's design consultant. The CATF is comprised of various local officials and interested citizens appointed by the City of Keene and Town of Swanzey. The CATF met with the design team on a monthly basis to discuss and form consensus on major design, environmental and socioeconomic issues related with the project. The general public was encouraged to attend the CATF meetings and a dedicated public comment period was a scheduled portion of each meeting. Substantial public attendance occurred at each CATF meeting. The CATF also interacted with local neighborhood groups and special interest groups on an ongoing basis.

The TRC is comprised of representatives of NHDOT, FHWA, SWRPC, the City of Keene, the Town of Swanzey and the project's consultant. The TRC focused on the technical and environmental issues of the project, as well as interacting and responding to input provided by the CATF.

In addition to the CATF and TRC meetings, a number of larger Town Officials/Public Informational meetings have been held. The following identifies the dates of the respective CATF, TRC, and Public Informational meetings held for the project:

Date	Meeting
April 3, 1992	TRC-traffic model meeting
June 3, 1992	Public Officials Meeting-Project Scoping
January 19, 1993	TRC-*Traffic Needs Study*
May 21, 1993	TRC-*Traffic Needs Study*
August 2, 1993	TRC-*Traffic Needs Study*
August 10, 1993	Public Informational Meeting-*Traffic Needs Study*
February 8, 1995	TRC-Project Status meeting
April 17, 1996	Combined Public Officials/Informational Meeting
May 22, 1996	TRC meeting
June 5, 1996	CATF meeting
June 26, 1996	TRC meeting
July 10, 1996	CATF meeting
July 31, 1996	TRC meeting
August 14, 1996	CATF meeting
August 28, 1996	TRC meeting
September 11, 1996	CATF meeting
October 2, 1996	TRC meeting
October 9, 1996	CATF meeting
October 30, 1996	TRC meeting
November 13, 1996	CATF meeting
December 4, 1996	TRC meeting
December 11, 1996	CATF meeting
December 27, 1996	TRC meeting
January 8, 1997	CATF meeting
January 30, 1997	TRC meeting
February 12, 1997	CATF meeting
March 5, 1997	TRC meeting
March 12, 1997	CATF meeting
April 2, 1997	TRC meeting
April 9, 1997	CATF meeting
April 30, 1997	Public Officials/Informational meeting
May 7, 1997	TRC meeting
May 14, 1997	CATF meeting
May 30, 1997	TRC meeting
June 11, 1997	CATF meeting
July 2, 1997	TRC meeting
July 9, 1997	CATF meeting
July 31, 1997	TRC meeting
August 20, 1997	CATF meeting
September 3, 1997	TRC meeting
September 10, 1997	CATF meeting
October 1, 1997	TRC meeting
October 8, 1997	CATF meeting
October 9, 1997	Keene City Council-Project Overview, floodplains

October 29, 1997	TRC meeting
November 12, 1997	Public Officials/ Informational meeting
January 7, 1998	TRC Meeting
January 14, 1998	CATF Meeting
February 4, 1998	TRC Meeting
February 11, 1998	CATF Meeting
April 8, 1998	Public Hearing
January 26, 1999	CATF Meeting

As noted previously, the purpose of the CATF was to discuss and form a consensus on major design, environmental and socioeconomic issues related to the project. Some of the most important issues with which the CATF has been involved are as follows:

- Review of the *Traffic Needs Study*, and revisions thereof, and concurrence with traffic projections
- Proposed design at the Winchester and Main Street intersections
- Inclusion of the Optical Avenue Connector in the project
- Proposed improvements at the West Street Interchange
- Inclusion of the Island/Pearl Street area in the project, and the evaluation of alternatives
- Alignment alternatives for Winchester Street south of NH Routes 12/101
- Landscaping issues, particularly on Winchester Street
- Construction Phasing
- Multi-use trail issues

The CATF meeting of January 26, 1999, which included a presentation of *the Report of the Commissioner*, was the final meeting of the CATF. A new Advisory Task Force (ATF) will be established to provide community feedback during the final design process.

4.19.3 Public Hearing Review

A public heating for the project was held at Keene State College on April 8, 1998. Approximately 500 persons were in attendance, and approximately 40 persons commented at the hearing. An additional 80 written comments were received from individuals and/or groups.

The *Report of the Commissioner* issued on December 29, 1998, contains 59 responses to issues raised as a result of the public hearing process. The complete *Report of the Commissioner* and subsequent *Report of the Special Committee* are included in Appendix D.

4.19.4 Agency Comments on the Draft Environmental Assessment/Section 4(f) Evaluation

U.S. Department of the Interior (DOI), dated April 7, 1998 (In Appendix A)

1. *DOI concurs that there are no prudent and feasible alternatives to the proposed project, if project objectives are to be met.*
2. *DOI concurs with the proposed measures to minimize harm to historic properties, as detailed in the draft Memorandum of Agreement. A signed copy of the MOA should be included in the Final Section 4(f) Evaluation. Continued cooperation and coordination with the State Historic Preservation Officer were recommended through the remainder of the project process.*

   A signed copy of the final Section 106 Memorandum of Agreement is included in Appendix C. The MOA provides for continued coordination between FHWA, NHDOT and the State Historic Preservation Officer throughout the final design process.

3. *DOI concurs with the proposed measures to minimize harm to Hickey-Desilets Park, particularly the provision of replacement land for the parkland that will be taken for highway use.*
4. *DOI recommends that the concerns expressed in the January 6, 1998 letter from the City of Keene's Parks and Recreation Department regarding the alignment of the multi-use trail through Wheelock Park be resolved to the satisfaction of the City.*

   NHDOT has committed to working with the Keene Parks and Recreation Department in the final design process to develop an alignment which addresses the City's concerns about a winter sliding area and potential problems with unauthorized use of ATV's in Wheelock Park.

4.20 ENVIRONMENTAL COMMITMENTS

The following is a summary of mitigation measures that will be implemented in the completion of the proposed project.

General Measures

- During final design, changes to slope limits, alignment refinements, etc., will be made, where possible, to minimize impacts.
- An Advisory Task Force (ATF) will be established to provide community feedback during the final design process.

Social Impacts

- The Maintenance and Protection of Traffic Plan for the project will ensure that access will be maintained to all neighborhoods and individual properties during the construction period.
- Pedestrian signal phases will be provided at the West Street Interchange, Single Point Diamond Interchange at Winchester Street and the Main Street Intersection.
- NHDOT will provide information to the school districts on the construction schedule, so that the district can implement any required changes in bus routes, etc.
- The pedestrian path access (utilized by Keene State College), that crosses underneath NH Routes 12/101 at the Ashuelot River, will be retained with the construction of the new project. Any necessary modifications to the path resulting from project-related impacts will be undertaken as part of the project.

Economic

- Reasonable access will be maintained to all businesses during the construction period.
- To offset impacts to Keene State College's administrative building and parking lot on Main Street:
    - Keene State College will receive fair market value for the property.
    - The building at 441 Main Street to be acquired for the project may be a suitable replacement for the administrative office space. If the Indian King Framery and/or NYNEX building are acquired by the Department, one or both may also be suitable replacements, subject to future right-of-way negotiations.
    - The project will incorporate a bermed, landscaped area for the remaining parking area.
    - The loss of parking will be handled as a functional replacement. NHDOT will either compensate Keene State College to establish replacement parking on the adjacent power company parcel, or will directly include property acquisition and replacement parking as part of the project.
- In order to sufficiently accommodate relocatees' needs, NHDOT will, if necessary, acquire properties at the earliest date, and assist the businesses with appropriate planning and coordination in order to meet their relocation requirements.
- The Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, will control all of the acquisition and displacement activities required by the

Selected Alternative. Residential property owners affected by the required right-of-way acquisition will be eligible for a variety of compensation measures, including the following:

- Fair market value for acquired property
- Relocation advisory assistance services
- Payments for moving and relocation costs
- Replacement housing payments for homeowners
- Residential mortgage interest differential payments and closing costs
- Replacement housing payments for tenants

- The displaced businesses will be eligible for relocation benefits which include:

  - Fair market value for acquired property
  - Relocation advisory assistance services
  - Payments for actual reasonable moving
  - Business reestablishment costs

- The proposed design at Winchester Street will consolidate curb cuts on both the east and west sides of the street, creating common driveways for neighboring businesses, and reducing the amount of space needed in front of each business for driveways, potentially leaving more available space for parking.

Air Quality

- Contract documents will require the implementation of measures such as regular street cleaning and use of water and/or other dust palliatives, to minimize air quality impacts during the construction period.

Noise

- As described in NHDOT's *Policy and Procedural Guidelines for the Assessment and Abatement of Highway Traffic Noise for Type 1 Highway Projects* (June, 1996), effective control of highway construction noise will be achieved by design considerations, sequence of operations, source control, site control, time and activity constraints, and community awareness, as practicable.

Ground Water

- The NHDOT has determined that lined grass swales will be used through the recharge area of the West Street well, and that ditches will outlet outside of the recharge zone, if possible. Other Best Management Practices (BMPs) that will be implemented for groundwater protection on this project include the following:

  - No harmful materials storage within the well recharge zone
  - Construction staging area will not be located in the well recharge zone
  - No refueling of construction vehicles within the well recharge zone

- No storage (i.e., parking) of construction vehicles within the well recharge zone
- Vehicles shall be inspected for leaks of fuel, oil, hydraulic fluids, etc. before use within the aquifer recharge zone. Vehicles found to be leaking shall be repaired or excluded from use within the recharge zone

Surface Water

- To compensate for any impacts to streamside vegetation, vegetative plantings will be made along the base of the new embankment and streams within the right-of-way, to reestablish as much natural buffer as possible.
- Appropriate stormwater management and erosion and sediment control best management practices will be implemented to ensure that possible turbidity impacts to surface waters are minimized.
- Drainage design will incorporate water quality treatment features, such as overland sheet flow of runoff, grass swales, and other features. The key elements of stream impact mitigation are described below:

  - New wetlands will be constructed to compensate for wetland impacts, and will also be integrated with the drainage system to provide for water quality treatment of runoff before it enters receiving waters in several of the watersheds. Grassed swales basins will also be utilized, and wet detention basins will also be considered. The following table summarizes how the above-noted BMPs shall be implemented, based on water quality modeling for the project.

Stream	Proposed Mitigation Measures
Ash Swamp Brook	Treat 100 percent of runoff in wetlands, grass swales, or wet detention basins
Beaver Brook	Treat 50 percent of runoff in wetlands, grass swales, or wet detention basins
The Branch	Grass swales, if feasible
Ashuelot River @ NH Route 101	Grass swales, if feasible
Ashuelot River south of NH Route 101	Includes all of the above measures in its watershed (at least 50 percent of runoff treated in wetlands or BMPs)

  - A Stormwater Pollution Prevention Plan (SPPP) will be developed under the NPDES permitting guidelines, and will be used in implementing construction work. The plan will incorporate techniques and standards found in the national *Guidelines for Erosion and Sediment Control in Highway Construction* (AASHTO 1992) and *New Hampshire's Stormwater Management and Erosion Control Handbook* (NHDES ET AL. 1992).

Floodplains

- Approximately 145,070 m^3 (117.3 acre-feet) of floodplain compensation will be provided in association with wetland mitigation.
- Additional floodplain compensation may be identified during the final design process in the form of drainage ditches/swales, and possible stormwater treatment basins.
- The project will be constructed to conform to the proposed floodplain/floodway changes at Ash Swamp Brook and Beaver Brook under the Conditional Letter of Map Revision (CLOMR).

Wetlands

- Approximately 13.4 ha (33.1 ac) of replacement wetlands will be constructed.
- Steepening sideslopes to reduce wetland impacts, where substantial safety issues are not present, will be considered during final design.

Wildlife/Fisheries

- Fish passage will be ensured when instream work is occurring.
- NHDOT will retain ownership of the corridor originally purchased for the Route 10 bypass. Thus, the natural and habitat values of the corridor will be preserved.

Parks/Recreation/Conservation Lands

- During final design, NHDOT will coordinate with the Yale University School of Forestry to ensure that adequate access to logging roads within the project area will be maintained.
- A multi-use trail has been incorporated into the project design. The multi-use trail, which would be available to all the potential users, will be paved to a width of 3.0 m (10 ft.) and have 0.6 m (2 ft.) gravel shoulders on each side. As currently planned, the multi-use trail will begin at Ash Swamp Brook and proceed eastward towards the Winchester Street SPDI. At the SPDI, the trail crosses NH Route 10, and continues eastward along NH Routes 12/101 until the Main Street/NH Route 101 intersection. Along this segment, a proposed bridge will carry the trail across NH Route 12/101 at the Ashuelot Branch to provide access for users in a north-south direction. The bridge will be approximately 61 m (200 ft.) long.

  At the Main Street intersection, the paved trail will continue eastward to Optical Avenue and will pass underneath the proposed Optical Avenue Connector bridge. The paved portion of the trail will terminate just east of Optical Avenue. A graded, grassed "shelf" will be constructed eastward of Optical Avenue, which will connect to the southern portion of the Cheshire Trail. The shelf will be graded to provide for a future paved path, which would be funded by other sources.

  Pedestrian phasing will be incorporated into the signal phasing at the crossings of Winchester Street and Main Street, and will be provided for north-south crossings at the Optical Avenue intersection with Route 101.

The proposed trail also would extend northward, from the trumpet interchange along the west side of NH Routes 9/10/12, past the West Street Interchange, through Wheelock Park, and connects with existing trail elements at the interchange where NH Routes 9/10 and NH 12 split. It will be necessary to relocate part of the trail connection from the Cheshire Branch to West Street, which is currently under construction. Pedestrian signal phasing will be provided at the West Street crossing.

- During final design, NHDOT will coordinate with the Keene Parks, Recreation and Facilities Department regarding the alignment of the multi-use trail through Wheelock Park in order to avoid impacts to a winter sliding area and to prevent disruptions of the trail through an area known as "the Pits", which is subject to unauthorized use by ATVs.
- Prior to trail construction through Section 6(f) properties (Wheelock Park, Tenant Swamp and the Ashuelot River Park), NHDOT will obtain authorization from DRED for the temporary non-conforming condition that will exist during the trail construction period.
- A new trailhead parking area in the vicinity of Martell Court will be incorporated into the project plans. The location and number of spaces will be determined during final design. If practical, the trailhead parking will incorporate river access limited to car-top boats in accordance with NH Department of Fish and Game criteria.
- The following measures will be incorporated into the final project design to minimize harm to Hickey-Desilets Park:

  - Roadway embankment sideslopes will be steepened to the extent practicable to reduce impacts. The current estimate of areal impacts is based on standard sideslopes.
  - NHDOT will coordinate with the City of Keene regarding possible relocation of the monument within the park.
  - The Landscape Plan for the project will include plantings to compensate for vegetation that must be removed. The planting plan will be coordinated with the City of Keene.
  - NHDOT will evaluate any remnant parcels acquired for the project to determine if they are suitable as replacement for the impacted park property.

Cultural Resources

- The mitigation measures already incorporated into preliminary project design will be reviewed and refined during final design to further minimize impacts on historic properties. In final design, emphasis will be placed on minor alignment shifts, reductions in slope impacts, and development of a project Landscape Plan to minimize visual impacts. Specific concerns to be addressed for the impacted districts and individual properties are summarized below.

  - **Main Street Historic District (Area A)**
    At Inv. #212-a, the granite wall and fieldstone entry gates, as well as the plaque, would be relocated, using existing materials. The property will be documented according to Historic American Buildings Survey (HABS) standards, then marketed for sale on-site with preservation covenants attached. If unsuccessful, the property will then be marketed for sale on-site without preservation covenants

attached. A landscaping plan that addresses the loss of mature trees and the loss of some street lawn in all of the impacted areas of the district would be developed during final design, subject to review by NHDHR and FHWA.

If NHDOT acquires Inv. #212-c, the property will be documented according to HABS Standards, then offered for sale with preservation covenants attached. If unsuccessful, the property will then be offered for sale without preservation covenants attached.

- **Park-Fairview Historic District (Area C)**
  A landscaping plan will be developed during final design to minimize, to the extent practicable, the effect of street widening on Inv. #307 and 308, subject to review by NHDHR and FHWA.

- **Dickinson/Atwood House (Inv. #503)**
  NHDOT will work with the property owners to redesign the property's driveway access in a historically sensitive manner. To the extent possible, the location of the abandoned portion of Ash Hill Road in front of the Dickinson/Atwood House will be delineated by leaving the base course in place, topsoiling and seeding.

- **MacDonald/Bergeron House (Inv. #508)**
  The project has incorporated lane reductions north of Matthews Road (compared to the original design) to lessen property acquisition at the MacDonald/Bergeron House and the removal of nearby mature street-side trees. NHDOT, in consultation with NHDHR and FHWA, will design and implement a landscape plan to lessen the effects of street widening.

- **531 Winchester Street (Inv. #509)**
  The project has incorporated lane reductions north of Matthews Road (compared to the original design) to lessen property acquisition at 531 Winchester Street and the removal of nearby mature street-side trees.

- **Daniel Goodnow House (Inv. #526)**
  The house will first be documented according to Historic American Buildings Survey (HABS) standards, then offered to the current owners for relocation, with preservation covenants attached, in order to ensure the preservation of its significant historic features. If the current owners do not elect the reconveyance alternative, the house will be offered for sale to the public with preservation covenants attached. If efforts to market the house are unsuccessful, it would be marketed without covenants. The building will be demolished if all efforts to market it are unsuccessful.

- **Driscoll House and Farm (Inv. #539)**
  The required fill slopes for the proposed bridge abutment and Island Street widening would be designed to minimize the impacts to the extent possible.

- NHDOT will consider archeological monitoring during construction in the Main Street area.
- As a result of a Stone Wall Review, NHDOT has committed to avoid the stone wall located at 14 Matthews Road.

Hazardous Materials Sites

- Prior to construction, NHDOT will conduct investigations to determine whether underground storage tanks are present at 692-694 Main Street.

Visual Evaluation

- A project Landscape Plan will be developed. One component of the plan will be to identify areas where existing vegetation will be left in place. The plan will give particular attention to the Single Point Diamond Interchange, Winchester Street, Hickey-Desilets Park, the Main Street Historic District and other properties eligible for the National Register of Historic Places.

Construction

- A Maintenance and Protection of Traffic Plan will be developed, in order to maintain traffic flow and access to all properties.
- All impacted sidewalks will be replaced with new sidewalks, and access will be retained.
- Temporary impacts to businesses during the construction period will be mitigated by the following:

    - Construction will be undertaken in phases, and the overall construction sequence has been developed with the assistance of traffic modeling to identify the most efficient sequence of improvements.
    - All existing roadways will remain open during the construction period, and an appropriate number of lanes will be maintained for traffic flow.
    - Reasonable access to all properties will be maintained.

V. Section 4(f) Evaluation

V. SECTION 4(f) EVALUATION

5.1 INTRODUCTION

Section 4(f) of the Transportation Act of 1966 (49 U.S.C. 303), and the regulations adopted to implement that act (23 CRF Section 771.135), mandate that the Federal Highway Administration (FHWA) may not approve the use of any significant publicly owned public park, recreation area, wildlife or waterfowl refuge, or any significant historic site, unless a determination is made that: (1) there are no feasible and prudent alternatives to the use of said sites; and (2) all possible planning to minimize harm to said sites has been undertaken.

Publicly owned land is considered to be a park, recreation or wildlife and waterfowl refuge when land has been officially designated as such or when the federal, state or local officials having jurisdiction over the land determine that one of its major purposes or functions is for park, recreation or refuge purposes.

For the purposes of assessing impacts to historic sites, these have been defined to include all individual properties and districts either currently on the National Register of Historic Places, or those determined eligible for inclusion by the New Hampshire Division of Historic Resources (NHDHR) and FHWA.

The project, as proposed at the time of DEA issuance, would have caused a "use" of two historic districts and six properties determined to be individually eligible for the National Register of Historic Places. Since that time, project plans have been revised, thereby altering impacts to the Main Street Historic District and eliminating impacts to one property individually eligible for the National Register. The "use" of remaining properties occurs because the action will impair the historic integrity of the properties either by rehabilitation, alteration or demolition. The proposed project will also "use" property from a publicly owned park.

5.2 DESCRIPTION OF PROPOSED ACTION

The proposed project is located in the City of Keene and Town of Swanzey, in Cheshire County, New Hampshire, where NH Routes 9, 10, 12 and 101 converge (see Figure 2.1.1). The involved roadways are major east-west (NH 9 and 101) and north-south (NH 10 and 12) routes in southwestern New Hampshire.

The Keene/Swanzey Project will address the problems of excessive traffic congestion, delay and reduced safety in the project area. These deficiencies are most pronounced along the existing highway network (NH Routes 9, 10, 12, 101), particularly at the following key intersections with NH Route 101: NH Routes 9/10/12, NH Route 10/12/Winchester Street, and NH Route 12/Main Street. These intersections are currently operating at, or near, failure conditions (Level of Service E or F, based on 1990 traffic volumes), and will continue to worsen with the projected growth in traffic. The deficiencies along the existing highway network, in and around the City of Keene and the Town of Swanzey, have resulted in traffic avoiding the congested areas and seeking alternative routes, compounding an existing capacity problem throughout the local street network.

The purpose of the project is to improve the existing highway network, producing satisfactory levels of service, safety and appropriate access, while being consistent with community goals, including improvement of the internal City of Keene and the Town of Swanzey traffic capacity problems. This will be accomplished through the use of additional travel lanes along highway segments, intersection improvements (additional turning lanes) and construction of new grade-separated interchanges at the end of the existing bypass and at the Winchester Street/NH Route 10/12/101 intersection. The proposed improvements also include modifications to the West Street interchange, north-south widening along Winchester Street (NH Route 10), widening and inclusion of additional turning lanes at the Main Street/Route 12/101 intersection, construction of the Optical Avenue Connector, various safety and intersection improvements and construction of a multi-use trail. The proposed improvements are shown on Figures 3.3.6-01 through 3.3.6-12, and described in detail in Section 3.3.3.

5.3 SECTION 4(f) HISTORIC RESOURCES

5.3.1 Description of Properties

Two historic districts and eight individual properties located within the project limits were found eligible for the National Register of Historic Places. Both of the districts, and six of the individually eligible properties were determined, during development of the DEA, to experience impacts considered a "use" under Section 4(f). The impacted properties were the Main Street Historic District (Area A), Park-Fairview Historic District (Area C), Dickinson/Atwood House (Inv. #503), Smith/Wilder/Bardwell Farm (Inv. #505), MacDonald/Bergeron House (Inv. #508), 531 Winchester Street (Inv. #509), Daniel Goodnow House (Inv. #526), and Driscoll House and Farm (Inv. #539).

Full descriptions of each are found in Sections 4.14.2.2 and 4.14.2.3.

5.3.2 Impacts on Section 4(f) Historic Properties and Districts

Each eligible property was reviewed by FHWA, NHDOT, and NHDHR staff at meetings held on September 24 and October 23, 1997 to determine Section 106 and Section 4(f) impacts and minimization measures. Of the eight properties and two districts, both districts and six individual properties were found to involve a use under Section 4(f). Since that time, revisions to the project plans have altered the impacts to the Main Street Historic District and eliminated a Section 4(f) use of the Smith/Wilder/Bardwell Farm (Inv. #505). A revised summary of impacts is presented in Table 5.3.1.

TABLE 5.3.1 – SUMMARY OF 4(f) IMPACTS TO HISTORIC PROPERTIES

PROPERTY	ELIGIBLE AREA	IMPACTS TO PROPERTY (AREA)			
		ACQUISITION	SLOPE IMPACTS	OTHER	TOTAL
Main Street Historic District	20 ± ha 50 ± ac				
Inv. 212-a	0.29 ha 0.72 ac	Entire [A]	786 m^2 [B] 8460 $ft.^2$	-	0.29 ha 0.72 ac
Inv. 212-c	0.12 ha 0.29 ac	- [C]	-	-	-
Inv. 213	0.08 ha 0.21 ac	- -	102 m^2 1095 $ft.^2$	- -	102 m^2 1095 $ft.^2$
Inv. 218	0.18 ha 0.44 ac	114 m^2 1230 $ft.^2$	144 m^2 1550 $ft.^2$	-	258 m^2 2780 $ft.^2$
Inv. 219	0.16 ha 0.39 ac	5 m^2 50 $ft.^2$	9 m^2 100 $ft.^2$	-	14 m^2 150 $ft.^2$
Park-Fairview Historic District	36± ha 90± ac				
Inv. 307	0.17 ha 0.42 ac	6 m^2 65 $ft.^2$	65 m^2 700 $ft.^2$	-	71m^2 765 $ft.^2$
Inv. 308	0.13 ha 0.31 ac	60 m^2 650 $ft.^2$	28 m^2 300 $ft.^2$	-	88 m^2 950 $ft.^2$
Dickinson/Atwood House (Inv. 503)	0.61 ha 1.50 ac	-	14 m^2 150 $ft.^2$	530 m^2 [D] 5710 $ft.^2$	544 m^2 5860 $ft.^2$
Bardwell Farm (Inv. 505)	7.20 ha 17.79 ac	-	-	-	- [E]
MacDonald/Bergeron House (Inv. 508)	0.14 ha 0.35 ac	214 m^2 2300 $ft.^2$	52 m^2 560 $ft.^2$	-	266 m^2 2860 $ft.^2$
531 Winchester Street (Inv. 509)	0.20 ha 0.50 ac	158 m^2 1700 $ft.^2$	46 m^2 500 $ft.^2$	-	204 m^2 2200 $ft.^2$
Goodnow House (Inv. 526)	Building Footprint	Entire	-	-	-
Driscoll House (Inv. 539)	0.33 ha 0.82 ac	400 m^2 4300 $ft.^2$	113 m^2 1220 $ft.^2$	-	513 m^2 5520 $ft.^2$

[A] Entire parcel now proposed for acquisition.
[B] Direct disturbance for street widening, new sidewalk, driveway reconstruction and associated slope work
[C] Property no longer proposed for acquisition.
[D] Driveway Relocation
[E] Project limits revised in this area resulting in No Effect under Section 106 and no use under Section 4(f).

- **Main Street Historic District (Area A)**

The proposed action would affect eleven contributing resources at the southern end of the district, which includes forty-eight contributing and five non-contributing resources (see Figure 5.3.1) totaling approximately 20 ha (50 ac). Eleven contributing properties directly border the work limits. Four of the eleven properties will be physically impacted as summarized below:

- Inv. #212-a. Since the issuance of the DEA, NHDOT has agreed, at the property owner's request, to acquire this property. A stone retaining wall, fieldstone entry gates and a commemorative plaque will be impacted; and approximately 4 maple and several other trees on the property will be removed. The house will not be impacted. Project work also includes driveway modifications to provide a shared driveway to the NYNEX building and Indian King Framery.

- Inv. #213. Approximately 102 m^2 (1095 $ft.^2$) for driveway modifications and associated slope impacts to provide a new shared driveway to the Coughlin Insurance building, the NYNEX building and Indian King Framery.

- Inv. #218. Approximately 114 m^2 (1230 $ft.^2$) of acquisition and 144 m^2 (1550 $ft.^2$) of slope impacts. One large tree on property to be removed.

- Inv. #219. Approximately 5 m^2 (50 $ft.^2$) of acquisition and 9 m^2 (100 $ft.^2$) of slope impacts on the southwestern corner of the property.

The remaining seven properties will not be directly impacted, but will experience effects because widening of Main Street will reduce the width of the street lawn (within the existing roadway right-of-way) and require the removal of some street trees, thus altering the setting. However, they will not be directly impacted properties. Collectively, the Section 106 effect on the district has been determined to be Adverse by NHDHR and FHWA.

Inv. #212-c, currently occupied by a business, was originally proposed for acquisition because its access, via King Court to Main Street, would be eliminated. No impacts to the structure would have occurred. At the request of the Owner, an alternative means of access has been developed, and acquisition of the property no longer appears necessary. As a result, a Section 4(f) use will not occur.

- **Park-Fairview Historic District (Area C)**

Four contributing properties along the south boundary of the Park-Fairview Historic District, which includes 141 contributing resources and 27 non-contributing resources, totaling approximately 36 ha (90 ac), are located within the project limits. Two of these will be impacted. Specific impacts on the properties are discussed below and shown on Figure 5.3.2. None of the structures will be physically affected.

- Inv. #307. Approximately 6 m^2 (65 $ft.^2$) of acquisition and 65 m^2 (700 $ft.^2$) of slope impacts for sidewalk relocation and a cut slope, which will extend onto the property. The stone entrance walkway will be impacted in part; some shrubbery will require removal, and a mature silver maple may require removal.

- Inv. #308. Approximately 60 m^2 (650 $ft.^2$) of acquisition and 28 m^2 (300 $ft.^2$) of slope impacts for sidewalk relocation and a cut slope which will extend onto the property.

Overall, there is a Section 106 No Adverse Effect determination for this area, providing that the silver maple in front of Inv. #307 will not be removed, or a replacement planting will be made if its removal is necessary.

- **Dickinson/Atwood House (Inv. #503)**

The proposed improvement of the Ash Hill Road/Route 10 intersection would require the relocation of the existing driveway to this property and removal of some evergreen trees for the new driveway (see Figure 5.3.3). The structure would not be directly impacted. The driveway would be relocated to the south, with a more direct route to the garage behind the house. The relocated driveway would occupy 530 m^2 (5710 $ft.^2$), but no acquisition or easement would be involved. A cut slope in the northwestern corner of the property will impact approximately 14 m^2 (150 $ft.^2$). The Section 106 effect determination is No Adverse Effect.

- **Smith/Wilder/Bardwell Farm (Inv. #505)**

The project work originally required an easement of 283 m^2 (3050 $ft.^2$) for slope work and one tree in front of the house would have been removed. Under revised project plans, this property will not experience an Effect under Section 106, or a use under Section 4(f).

- **MacDonald/Bergeron House (Inv. #508)**

The proposed work would require approximately 214 m^2 (2300 $ft.^2$) of acquisition and 52 m^2 (560 $ft.^2$) of slope work (see Figure 5.3.4). Shrubs, two trees, the walkway, and two concrete posts at the entrance to the driveway would be removed, thus affecting the historic setting of the property and resulting in a Section 106 Adverse Effect determination. The house itself would not be impacted.

- **531 Winchester Street (Inv. #509)**

Approximately 158 m^2 (1700 $ft.^2$) would be acquired and an additional 46 m^2 (500 $ft.^2$) would be impacted for necessary slope work to widen Route 10 (Winchester Street) (see Figure 5.3.4). There would be no impact on the house, resulting in a Section 106 No Adverse Effect determination.

- **Daniel Goodnow House (Inv. #526)**

The proposed widening and relocation of Winchester Street would require the demolition or relocation of the Daniel Goodnow House (see Figure 5.3.5), a Section 106 Adverse Effect.

- **Driscoll House and Farm (Inv. #539)**

Approximately 400 m^2 (4300 $ft.^2$) would be acquired, as well as 113 m^2 (1220 $ft.^2$) for a slope easement in order to widen Island Street. Several trees and the parking area would be affected, but there would be no impact on any of the structures (see Figure 5.3.6). The Section 106 effect determination is Adverse.

5.3.3 Avoidance Alternatives

5.3.3.1 Area-Wide Avoidance Alternatives

The Keene-Swanzey project originally considered a NH Route 10 bypass roadway beginning at the existing south end of the NH Route 9/10/12 City of Keene bypass, and proceeding southerly on new location, terminating in the vicinity of the Base Hill Road and Ash Hill Road intersection with NH Route 10 (see Figure 3.1.1). The intended purpose of the new bypass was to alleviate traffic congestion and unnecessary turning maneuvers along NH Route 101 by removing the 'dogleg' traffic flow associated with the NH Route 10 corridor in the City of Keene. The project, as originally envisioned, was commonly referred to as the Route 10 Bypass project, since it was a logical southerly extension of the original NH Routes 9/10/12 bypass completed in 1979.

Although this contemplated bypass on new alignment would avoid the historic properties described in the previous section (with the possible exception of the Dickinson/Atwood House), it also would have caused extensive environmental impacts, particularly, impacts to high quality wetlands. In addition, a *Traffic Needs Study* for the area indicated that a bypass, in and of itself, was not a solution for the identified traffic problems in the City of Keene and the Town of Swanzey. The *Traffic Needs Study* indicated that more extensive east-west improvements were required. In other words, even if the bypass were built, improvements would still have been necessary at a number of other locations (e.g., Main Street, Winchester Street, West Street), and those improvements would have affected historic resources. Thus, the bypass was eliminated from consideration, both because it did not fulfill the project objectives and had the potential for extensive environmental impacts, and was therefore unlikely to receive the necessary environmental permits.

The No-Build Alternative, while it would avoid historic properties, does not satisfy the project objectives, and was also dismissed.

5.3.3.2 Area-Specific Avoidance Alternatives

The *Traffic Needs Study* demonstrated that the solution to traffic problems in the project area was best accomplished through improvements to the existing roadway network. This largely entails increasing roadway capacity through the provision of additional travel lanes, construction of two new interchanges, and intersection improvements. In addition, geometric improvements are required at certain locations.

Within each of the historic impact areas, development of avoidance alternatives is constrained by the facts that: 1.) historic properties border directly on the existing roadway network, 2.) the required improvements generally involve widening of the existing roadways, and 3.) there are other factors (e.g., businesses, residences, access considerations, topographic constraints, etc.) that influence feasible alignments.

In developing the preferred alternative for this project, which was an iterative process involving extensive public participation through the Citizen's Advisory Task Force, it was an ongoing objective to avoid or minimize impacts on surrounding properties, with particular attention given to historic properties. Descriptions of the alternatives considered to accomplish this for the separate impact areas are provided below.

- **Main Street Historic District (Area A)**

Because of the additional roadway capacity (width) required at the Main Street intersection and constraints imposed by the existing alignment, a complete avoidance alternative is not prudent and feasible. Attempts to avoid/minimize impacts at this location have proceeded through the following sequence:

- The *Traffic Needs Study* recommended that a Single Point Diamond Interchange (SPDI) be considered at this location, as the best alternative from a traffic capacity standpoint. However, the study also recognized that this option would be the most disruptive in terms of impacts, requiring a much larger project footprint, more extensive roadway widening along Main Street (both north and south of NH Route 101) and visual impacts that would substantially alter the setting of the historic district. The *Traffic Needs Study* recommended that an improved at-grade intersection also be considered.

- As the SPDI and improved at-grade intersection were investigated, it became apparent that both options would cause major impacts along Main Street. In order to achieve an acceptable Level of Service, the at-grade intersection would require a minimum of 9 lanes in the east-west direction (along NH Route 101) through the Main Street intersection. Additionally, both the SPDI and at-grade intersection alternative would require

extensive widening of NH Route 12 (South Main Street) from 2 lanes to 4 lanes southbound to the NH Route 32 intersection. This widening would require the purchase of multiple businesses and residences, would impact the St. Joseph's cemetery, and would also require more extensive roadway widening along N. Main Street (as compared to the preferred alternative) through the Historic District.

- Concerns with interchange/intersection impacts at Main Street resulted in the inclusion of the Optical Avenue Connector in the project. This Connector on new alignment substantially reduces through traffic on NH Route 12 (South Main Street), and allows the Main Street/NH Route 101 intersection, with modest improvements, to operate at an acceptable Level of Service as an at-grade intersection. With the inclusion of the Connector in the project, a SPDI and improved at-grade intersection options (without the Optical Avenue Connector) at Main Street were eliminated from further consideration.

Because of the presence of contributing historical sites on both sides of Main Street, avoidance could only occur by not fulfilling the project objectives (i.e., providing an unacceptable Level of Service by minimizing the number of lanes on Main Street) or by a major relocation of NH Route 101 to the south. A southern relocation of NH Route 101 is not economically reasonable or environmentally permittable, due to the presence of the confluence of three major rivers (Ashuelot, The Branch, and Beaver Brook) and heavy commercial development along NH Route 12.

- **Park-Fairview Historic District (Area C)**

The existing intersection of West Street, Park Avenue, and McKinley Street is offset and has a severe skew. The proposed improvements in this area include the realignment of this intersection to a normal 4-leg intersection, primarily through a realignment of part of West Street. In addition, a left turn lane will be added on westbound West Street at the intersection. It is primarily the additional width associated with the addition of a turning lane that is responsible for most of the impacts on the Park-Fairview Historic District.

Modification of this alignment to completely avoid effects on the district is feasible, but is not considered prudent, because: 1) the required shifting of the geometric alignment to the south would increase wetland impacts and increase impacts to properties on the south side of Park Avenue, and 2) the nature of the impacts on the district (i.e., No Adverse Effect) does not justify the additional wetland impacts associated with an avoidance alternative.

- **Dickinson/Atwood House (Inv. #503)**

At this location, the proposed cut slope associated with NH Route 10 extends onto the northwest corner of the property (see Figure 5.3.3). It is not feasible and

prudent to shift the alignment of NH Route 10 (and the cut slope) to the west, because doing so would displace businesses near the Base Hill Road/Ash Hill Road intersection. In order for the existing driveway to remain functional with the proposed improvements, it would have to be at least partly realigned on the west end, which would require considerable excavation on the front of the property.

- **MacDonald/Bergeron House (Inv. #508), 531 Winchester Street (Inv. #509)**

These properties, all located on the west side of Winchester Street (NH Route 10), experience relatively minor takings for slope work and/or sidewalks. These impacts possibly could be avoided by shifting the alignment to the east. However, this is not considered prudent because it would impact a number of residences on the east side of Winchester Street, including removal of mature trees on the east side, which is opposed by local officials and the public. Removal of these trees is recognized by NHDHR and FHWA as altering the setting of the historic properties.

- **Daniel Goodnow House (Inv. #526)**

The structure on this property lies directly within the alignment and is proposed for acquisition. An alignment shift to the east is not feasible, because of the presence of commercial development (Riverside Plaza) and a Keene State College parking lot. In order to avoid the property, the alignment would have to be shifted to the west. Figure 5.3.7 depicts an alternative that would completely avoid the Goodnow House and 2 other nearby Section 4(f) properties (the Driscoll House and Farm, and Hickey-Desilets Park). This avoidance alternative requires the acquisition of, or extensive property damage to, 5 businesses and the acquisition of 9 residential structures along Winchester Street, while the Selected Alternative only requires acquisition of 3 businesses (including the Goodnow House) and 2 residential structures. Thus, an avoidance alternative is not considered prudent.

- **Driscoll House and Farm (Inv. #539)**

A shift in the proposed alignment of Island Street towards the west would be required to avoid this property located on the east side of the road. As noted above in the discussion of the Goodnow House, an avoidance alternative for the three Section 4(f) properties in the Winchester/Island Streets area (See Figure 5.3.7) is not considered prudent, because of the increase in the number of business and residential acquisitions required, compared to the Selected Alternative.

5.3.4 Measures to Minimize Harm

The design of the Proposed Action was undertaken after a constraints map was prepared which identified a number of important resources (historic properties, residences and businesses, wetlands, etc.), which were avoided where possible. Where it was not feasible and prudent to avoid historic properties, due to safety concerns and other resource constraints, the following mitigation measures were evaluated and included as part of the project where possible:

- Minimizing land acquisition and maximizing the distance between the highway and the historic properties;
- Providing access, as necessary, to maintain existing land uses;
- Reset impacted fences, stairs, trails, monuments, etc. where appropriate;
- Alignments shifts, reduced design speeds, and exceptions to the maximum grade requirements, and
- Minimizing slope acquisition using slope adjustments, curbing, and retaining walls, where necessary.
- Landscaping

The mitigation measures already incorporated into preliminary project design will be reviewed and refined during final design, to further minimize impacts on historic properties. In final design, emphasis will be placed on minor alignment shifts, reductions in slope impacts, and development of a project Landscape Plan to minimize visual impacts. These measures are also described in the Section 106 Memorandum of Agreement for the project, contained in Appendix B.

Specific concerns to be addressed for the impacted districts and individual properties are summarized below:

- **Main Street Historic District (Area A)**
  At Inv. #212-a, the granite wall and fieldstone entry gates, as well as the plaque, would be relocated, using existing materials. The property will be documented according to Historic American Buildings Survey (HABS) standards, then marketed for sale on-site with preservation covenants attached. If unsuccessful, the property will then be marketed for sale on-site without preservation covenants attached. A landscaping plan that addresses the loss of mature trees and the loss of some street lawn in all of the impacted areas of the district would be developed during final design, subject to review by NHDHR and FHWA.

  If negotiations to develop alternate access to Inv. #212-c are unsuccessful and it becomes necessary for NHDOT to acquire the property, it will be documented according to HABS Standards. The property would then be offered for sale with preservation covenants attached. If unsuccessful, the property will be marketed without preservation covenants attached.

- **Park-Fairview Historic District (Area C)**
  A landscaping plan will be developed during final design to minimize, to the extent practicable, the effect of the street widening on Inv. #307 and 308, subject to review by NHDHR and FHWA.

- **Dickinson/Atwood House (Inv. #503)**
  NHDOT will work with the property owners to redesign the property's driveway access in a historically sensitive manner. To the extent possible, the location of the abandoned portion of Ash Hill Road in front of the Dickinson/Atwood House will be delineated by leaving the base course in place, topsoiling and seeding.

  During final design, additional slope treatments will be investigated to determine if the cut slope associated with NH Route 10 can be kept off of the northwest corner of the property.

- **MacDonald/Bergeron House (Inv. #508)**
  The project has incorporated lane reductions north of Matthews Road (compared to the original design) to lessen property acquisition of the MacDonald/Bergeron House and the removal of nearby mature street-side trees. NHDOT, in consultation with NHDHR and FHWA, will design and implement a landscape plan to lessen the effects of street widening.

- **531 Winchester Street (Inv. #509)**
  The project has incorporated lane reductions north of Matthews Road (compared to the original design) to lessen property acquisition at 531 Winchester Street and the removal of nearby mature street-side trees.

- **Daniel Goodnow House (Inv. #526)**
  The house will first be documented according to Historic American Buildings Survey (HABS) standards, then offered to the current owners for relocation, with preservation covenants attached, in order to ensure the preservation of its significant historic features. If efforts to market the house are unsuccessful, it would be marketed without covenants. The building will be demolished if efforts to market it are unsuccessful.

- **Driscoll House and Farm (Inv. #539)**
  The required fill slopes for the proposed bridge abutment and Island Street widening would be designed to minimize the impacts to the extent possible.

5.4 SECTION 4(f) RECREATIONAL PROPERTIES

5.4.1 Description of Properties

There is one Section 4(f) recreational property within the study area that would be impacted by the proposed project. Hickey-Desilets Park is a small city park of approximately 0.6 ha (1.5 ac) at the intersection of Winchester and Island Streets (see Figure 5.3.6). The park is bounded on the north and northeast by the Ashuelot River, the bank of which is wooded. The landscaping is relatively recent. The open, grassy triangle has sidewalks along Winchester and Island Streets, a dirt path cutting diagonally across the park between them and several picnic tables. Older pin oaks and more recent maple trees are planted irregularly throughout the park. The focal point is the flagpole and 1939 war memorial with a small garden around them. The memorial is a small boulder with a bronze plaque, which reads: "In memorium – Fred J. Hickey & Leo A. Desilets, Co. G103D U.S. Infantry, 26th Division. Killed in action at Chateau Thierry, France, During the World War".

According to a City of Keene Parks and Recreation brochure, this park dates from the mid-19th century. A portion of it may have been included in land purchased by the town from Abel Baker in 1855. This lot, which included a "hollow", was located just west of the Winchester Street Bridge. The purchase was probably for land that would become part of Pearl and Island Streets when they were laid out. The park area remained undeveloped, and was not labeled as a park on historic maps of the 19th century.

In the 20th century, the park was officially created by the City, with the acquisition of an acre of land from the Keene Gas and Electric Light Company. It was then named Ashuelot Park. In 1939, it was renamed Hickey-Desilets Park in honor of neighborhood residents Frederick Hickey and Ernest Desilets who died in the service of their country in WWI. The memorial was dedicated by the Gordon-Russell Post of the American Legion. The park is now maintained by the City of Keene Parks and Recreation Department.

5.4.2 Impacts on Section 4(f) Recreational Properties

Improvements to the intersection of Winchester, Island and Pearl Streets will impact approximately 1045 m^2 (11,250 $ft.^2$) of the park, through acquisition (730 m^2 (7850 $ft.^2$)) and slope easements (315m^2 (3400 $ft.^2$)). Impacts will be concentrated on the west side of the park where it borders Island Street. In this area, Island Street is being widened from two to four lanes, and roadway fill will extend onto current park boundaries. Approximately four mature trees, several smaller trees, shrubs and some riverbank trees and vegetation will require removal. The war memorial and flagpole will not be affected.

5.4.3 Avoidance Alternatives

Although the improvements at the Winchester/Island/Pearl Streets intersection represent an extension of the project limits for the Routes 9/10/12/101 improvement project, the need for improvements at Winchester/Island/Pearl Street has long been recognized and was initially studied in the 1970's. Available options at this intersection are constrained by a number of factors, including:

- The existing roadway geometry. At this location, there are two intersections in very close proximity with Pearl and Island Street traffic intersecting immediately before the Island Street intersection with Winchester Street
- The location of bridges on the eastern Winchester Street approach and on the Island Street approach. The latter bridge is a temporary bridge, which has been in place for approximately 20 years, is too narrow, and is in need of replacement.
- Residential/commercial development in the vicinity, particularly on the west side of Island Street
- The objective of maintaining existing access and directional traffic patterns on the affected roadways.

Traffic modeling for the project has shown that, in addition to geometric problems, additional lanes must be provided to achieve an acceptable Level of Service (LOS C in 2015), including additional lanes on Island Street. The additional width of Island Street must be provided on the east (park) side, because of the continuous residential/commercial development on the west side of the street (these buildings are in close proximity to the roadway, being separated only by a sidewalk). As noted in Section 5.3.3.2, an alternative (see Figure 5.3.7) that would completely avoid all Section 4(f) properties in the Winchester/Island Street areas (Hickey-Desilets Park, the Driscoll House and Farm, and the Goodnow House) would require the acquisition of 5 businesses and 9 residential structures, while the Selected Alternative only requires acquisition of 3 businesses (including the Goodnow House) and 2 residential structures.

As a result, there is no prudent and feasible alternative that satisfies the project objectives and avoids Hickey-Desilets Park. The No-Build Alternative does not fulfill the project objectives. The proposed 4-leg intersection eliminates the existing difficult dual intersection situation, which currently exits.

In developing the Preferred Alternative in this area, a total of 7 options (6 intersection configurations and a roundabout) were evaluated (see Table 5.4.1). All of the options dismissed had impacts on the park that were comparable, or greater, than the Selected Alternative. In addition, all alternatives dismissed had at least one characteristic that made it inferior to the Selected Alternative (e.g. approach problems, restricted access, required bridge widening, displacements).

5.4.4 Measures to Minimize Harm

The following measures will be incorporated into the final project design to minimize harm to Hickey-Desilets Park:

- Roadway embankment sideslopes will be steepened to the extent practicable to reduce impacts. The current estimate of areal impacts is based on standard sideslopes.
- The Landscape Plan for the project will include plantings to compensate for vegetation that must be removed. The planting plan will be coordinated with the City of Keene.
- NHDOT will evaluate any remnant parcels acquired for the project to determine if they are suitable as replacement for the impacted park property.

TABLE 5.4.1 - WINCHESTER / ISLAND STREET / PEARL STREET ALTERNATIVES

OPTION	DESCRIPTION	INTERSECTION LEVEL OF SERVICE	APPROACH PROBLEMS	REMARKS
1	Pearl Street (No Access)	B	SB Winchester queue blocks the right turn lane.	Uses a dual NB left turn lane. A 3-phase signal can be used. Bridge widening on Winchester is required.
2	Pearl Street (Restricted Turns)	B - C	SB Winchester queue blocks the right turn lane. The NB left turn may attempt to access Pearl Street.	Uses a dual NB left turn lane. Bridge widening on Winchester is required. A 4-phase signal is required.
3	Pearl Street (Turns Allowed)	C	SB Winchester queue blocks the right turn lane. LOS D Island Street approach. LOS D NB Left approach.	Combined left/thru/right lanes on Island Street approach. Use a dual NB left turn lane. A 4-phase signal is required. Bridge widening on Winchester is required.
4	Pearl Street (No Access) Jughandle for northbound left turns	B	SB Winchester queue blocks the right turn lane.	A NB Jughandle for left turns is used. A 2-Phase Signal can be used. Bridge Widening on Winchester is required.
5	Pearl Street Access Jughandle for northbound left turns	B	Island Street queue blocks access from Pearl Street	A NB Jughandle to Island Street is used. An exclusive NB left turn lane to Pearl Street is used. A 2-phase signal can be used. Bridge widening on Winchester is required. Two choices for NB left is available.
6 (Selected Alternative)	Pearl Street Access Realigned Winchester Street	C	SB Winchester queue is longer than the 2 lanes available. LOS D-Pearl Street approach. LOS D-NB left approach.	No bridge widening on Winchester. A 4-phase signal is required. Yield condition for NB Winchester traffic. Increase storage on Key Road, due to Winchester align. Increase green space on west side of Winchester Street
7	Roundabout Realigned Winchester Street	-----	Poor pedestrian and bike use Poor Pearl Street approach	No signal required. No bridge widening on Winchester Encroachment on Park Land Requires building takes along Island Street.

5.5 COORDINATION

Coordination with local and state officials, relevant to Section 4(f) issues, occurred throughout the course of the study. A Citizens Advisory Task Force included both local officials and other representatives, and met monthly for approximately the final 18 months of the project, to discuss design issues, alternatives and associated impacts. Consensus has been reached on all of these issues. CATF meetings were also open to the general public.

With respect to historic resources, NHDOT and FHWA attended meetings with NHDHR to discuss issues of eligibility, effect and mitigating measures. Consensus has been reached on all of these issues, and a Section 106 Memorandum of Agreement has been developed (see Appendix B).

5.6 SUMMARY

Based on the above considerations, there are no feasible and prudent alternatives to the use of land from the Main Street Historic District, the Park-Fairview Historic District, the Dickinson/Atwood House, the MacDonald/Bergeron House, 531 Winchester Street, the Goodnow House, the Driscoll House and Hickey-Desilets Park, and the proposed action includes all possible planning to minimize harm to the above-noted Section 4(f) properties resulting from such use.

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VI. REFERENCES

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VII. LIST OF PREPARERS

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VIII. Acronyms

VIII. ACRONYMS

AASHTO – American Association of State Highway and Transportation Officials
ac – acres
ac-ft – acre feet
ACHP – Advisory Council on Historic Preservation
ACOE – U.S. Army Corps of Engineers
ACOE NED – U.S. Army Corps of Engineers New England District
ADT – Average Daily Traffic
ARFF – Airport Rescue and Fire Fighting Facility
B – Business district
BMP – Best Management Practices
CAAA – Clean Air Act Amendments
CATF – Citizen Advisory Task Force
CF – Coniferous Forest
CFR – Code of Federal Regulations
cfs – cubic feet per second
C/I – Commercial/Industrial district
CLOMR – Conditional Letter of Map Revision
CO – Carbon Monoxide
dBA – A-Weighted Decibels
dBA-Leq – A-Weighted Decibels Level Equivalent
DEA – Draft Environmental Assessment
DES – Department of Environmental Services
DRED – New Hampshire Department of Resources and Economic Development
EB – Emergent Aquatic Bed
EIS – Environmental Impact Statement
EO – Executive Order
EPA – Environmental Protection Agency
ES – Endangered Species
ETC – Estimated Time of Completion
EV – Educational/Scientific Value
FA – Floodflow Alteration
FEA – Final Environmental Assessment
FEMA – Federal Emergency Management Agency
FH – Fish and Shellfish Habitat
FHBM – Flood Hazard Boundary Maps
FHWA – Federal Highway Administration
FIA – Federal Insurance Administration
FIRM – Flood Insurance Rate Maps
FONSI – Finding of No Significant Impact
FPPA – Farmland Protection Policy Act
FR – Federal Register
ft – feet
FW – Forested Wetland
FY – Fiscal Year
GW – Groundwater Recharge/Discharge
ha – hectare

HCM – Highway Capacity Manual
HABS – Historic American Building Survey
HEC-2 – U.S. Army Corps of Engineers Water Surface Profile Computer Program
HF – Hardwood Forest
HOV – High Occupancy Vehicle
hr – hour
km – kilometer
km^2 – square kilometers
LAC – Local Rivers Advisory Committee
LCIP – Land Conservation Investment Program
L_{eq} – Equivalent Steady State Sound Level
L/day – Liters/day
LMA – Lawn/Maintained Areas
LOS – Level of Service
LOW – Limits of Work
L&WCF – Land and Water Conservation Fund Act
m – meter
m^2 – square meter
m^3 – cubic meters
MCL – Municipal Conservation Lands
MF – Mixed Forest
mgd – millions gallons per day
mg/L – milligrams per liter
mi – miles
mi^2 – square miles
MOA – Memorandum of Agreement
MOP – Municipally-owned park
mph – miles per hour
MPO – Metropolitan Planning Organization
m^3/sec – cubic meters per second
MVM – Million Vehicle Miles
NA – Not Applicable
NAAQS – National Ambient Air Quality Standards
NAC – Noise Abatement Criteria
NB – Northbound
NED – New England District
NEPA – National Environmental Policy Act
NH – New Hampshire
NHDES – New Hampshire Department of Environmental Services
NHDHR – New Hampshire Division of Historic Resources
NHDOT – New Hampshire Department of Transportation
NHF&G – New Hampshire Fish and Game Department
NHNHI – New Hampshire Natural Heritage Inventory
NPDES – National Pollutant Discharge Elimination System
NPS – National Park Service
NR – Nutrient Removal
NRCS – Natural Resources Conservation Service
NTU – Nephelometric Turbidity Units

NYSDEC – New York State Department of Environmental Conservation
OF – Old Fields
P – Pond
PCE – Private Conservation Easement
PE – Production Export
POP – Privately-owned parks
PPM – Parts Per Million
R – Riverine
RCRA – Resource Conservation Recovery Act
RE - Recreation
ROW – Right of Way
RSA – NH Revised Statutes Annotated
S - Shrublands
SB – Southbound
SCE – State Conservation Easement
SCORP – Statewide Comprehensive Outdoor Recreation Plan
S.F. – Square Foot
SOP – School-owned recreation area
SPDI – Single Point Diamond Interchange
SPNHF – Society for the Protection of New Hampshire Forests
SPPP – Stormwater Pollution Prevention Plan
sq. mi. – square miles
SR – Sediment/Toxicant Retention
SS – Sediment/Shoreline Stabilization
SS – Scrub/shrub Wetland
SWRPC – Southwest Regional Planning Commission
TDM – Transportation Demand Management
TH – Total Hardness
TIP – Transportation Improvement Program
TMODEL2 – Transportation Modeling System by TMODEL corporation
TP – Total Phosphorous
TRC – Technical Review Committee
TSM – Transportation Systems Management
TSP – Total Suspended Particles
TSS – Total Suspended Solids
UH – Uniqueness Heritage
USDA – United States Department of Agriculture
USEPA – United States Environmental Protection Agency
USFWS – United States Fish and Wildlife Services
USGS – United States Geological Survey
V/C – Volume/Capacity Ratio
VQ – Visual/Quality Aesthetics
WH – Wildlife Habitat
WHPA – Wellhead Protection Area

APPENDIX A
CORRESPONDENCE

MGL
c.c. K. Cota
FHWA
✓McFarland-Jol

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

AUG 2 5 1994

FILE
91-4518-02

Regulatory Division
Operations Directorate

Mr. William R. Hauser
Environmental Services Section
New Hampshire Department of Transportation
P.O. Box 483
Concord, N.H. 03302-0483

SUBJECT: Basic Project Purpose NH Routes 9/10/12/101
Keene-Swanzey 10309

Dear Mr. Hauser:

This is in response to your request to define the basic project purpose for the Keene-Swanzey NH Routes 9/10/12/101 project.

It has been determined from the information provided that the basic project purpose is to provide for the safe and efficient flow of traffic along NH Routes 9/10/12/101 in and around Keene and Swanzey. This "basic project purpose" will be used in determining compliance with the 404(b)(1) guidelines.

Mr. Frank DelGuidice will be your project manager for this application, please develop a schedule with him to conclude our regulatory action on this project in a timely manner.

Sincerely,

William F. Lawless, P.E.
Chief, Regulatory Division
Regulatory Division

RECEIVED
SEP 0 3 1994

COPY SEC
CFW
KLS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

RECEIVED
BUREAU OF ENVIRONMENT
OCT 23 1997
N. H. DEPARTMENT OF
TRANSPORTATION

18 Oct 97

CENAE-CO-R-9400339

Mr. Charles Hood
New Hampshire Department of Transportation
Bureau of The Environment
PO Box 483
Concord,New Hampshire 03302-0483

SUBJECT: PHASE I SIGN OFF FOR KEENE-SWANZEY
10309

Dear Mr. Hood:

This is in response to the October 10, 1997 letter from your agency requesting a Phase I sign-off for the Highway Methodology.

We agree that the following alternatives: 1) no action 2) transportation management and transportation demand management 3) the upgrade of existing NH Routes 9,10,12, and 101 in the city of Keene/Swanzey, with the construction of a connector road from NH route 12, in the Town of Swanzey to the Optical Ave. intersection at RT 101 in Keene, should be carried forward into Phase II for further analysis.

Further, we agree that the by pass alternative be dropped from further consideration due to concerns over the potentially large wetland impacts.

This letter concludes Phase I of the Highway Methodology procedures.

If you have any questions please contact Mr. Frank Del Giudice of my staff at 781 -647- 8832.

Sincerely,

William F. Lawless, P.E.
Chief regulatory Branch
Construction Operations/ Division

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF
Regulatory Branch
CENAE-CO-R-199400339

18 May 1999

Marc G. Laurin
Senior Environmental manager
Bureau of Environment
The State of New Hampshire
Department of Transportation
John O. Morton Building
1 Hazen Drive , P.O. Box 483
Concord, NH 03302-0483

Subject: Phase II Sign - Off For Keene Swanzey FILE NO. 199400339

Dear Mr. Laurin:

This is in response to the May 12, 1999 letter from your agency requesting a Phase II sign-off for the Highway Methodology.

We agree that the proposed upgrades of existing NH Routes 9,10,12, and 101 in the Cities of Keene and Swanzey, with the construction of a connector road from NH Route 12, in the Town of Swanzey to the Optical Ave. intersection at Route 101 in Keene, is the "least environmentally damaging practical alternative (LEDPA)" and satisfies Section 230.10(a) of the 404 (b)(1) Guidelines.

This letter concludes Phase II of the Highway Methodology procedures.

If you have any questions, please contact Mr. Frank Del Giudice at 800-343-4789 or 978-318-8832.

Sincerely,

William F. Lawless, P.E.
Chief Regulatory Branch
Construction Operations Division

Cf: USFWS, USEPA, USFHWA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Offices
22 Bridge Street, Unit #1
Concord, New Hampshire 03301-4986

PJB JRK MS

RECEIVED
MAR 0 2 1994
McFARLAND-JOHNSON

Joe Kopalek
McFarland-Johnson, Inc.
171 Front Street
P.O. Box 1980
Binghamton, NY 13902

February 28, 1994

Dear Mr. Kopalek:

This responds to your letter dated January 26, 1994 requesting information on the presence of Federally listed and proposed endangered or threatened species in relation to the proposed highway improvement project located in Keene and Swanzey, New Hampshire.

Based on information currently available to us, no Federally listed or proposed threatened and endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area, with the exception of occasional transient endangered bald eagles (Haliaeetus leucocephalus) or peregrine falcons (Falco peregrinus anatum). However, we suggest that you contact David Moore, New Hampshire Natural Heritage Inventory Program, DRED, P.O. Box 856, Concord, New Hampshire 03302-0856, (603) 271-3623, for information on state listed species that may be present.

Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required. Should project plans change, or additional information on listed or proposed species becomes available, this determination may be reconsidered. This response relates only to endangered species under our jurisdiction. It does not address other legislation or our responsibilities under the Fish and Wildlife Coordination Act and the Federal Power Act.

A list of Federally designated endangered and threatened species in New Hampshire is included for your information. Thank you for your cooperation and please contact Susi von Oettingen of this office at (603) 225-1411 if we can be of further assistance.

Sincerely yours,

Gordon E. Beckett

Gordon E. Beckett
Supervisor
New England Field Offices

Inclosure

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN NEW HAMPSHIRE

Common Name	Scientific Name	Status	Distribution
FISHES:			
Sturgeon, shortnose*	Acipenser brevirostrum	E	Atlantic Coastal waters and rivers
REPTILES:			
Turtle, leatherback*	Dermochelys coriacea	E	Oceanic summer resident
Turtle, loggerhead*	Caretta caretta	T	Oceanic summer resident
Turtle, Atlantic ridley*	Lepidochelys kempii	E	Oceanic summer resident
BIRDS:			
Eagle, bald	Haliaeetus leucocephalus	E	Nesting: Coos County; entire state-migratory
Falcon, American peregrine	Falco peregrinus anatum	E	Current nesting: Coos, Grafton, and Carroll Counties; entire state-migratory
Falcon, Arctic peregrine	Falco peregrinus tundrius	T	Entire state-migratory
Plover, Piping	Charadrius melodus	T	Atlantic coast, migratory-historic nesting
Roseate Tern	Sterna dougallii dougallii	E	Atlantic coast
MAMMALS:			
Cougar, eastern	Felis concolor couguar	E	Entire state-may be extirpated
Whale, blue*	Balaenoptera musculus	E	Oceanic
Whale, finback*	Balaenoptera physalus	E	Oceanic
Whale, humpback*	Megaptera novaeangliae	E	Oceanic
Whale, right*	Eubalaena spp. (all species)	E	Oceanic
Whale, sei*	Balaenoptera borealis	E	Oceanic
Whale, sperm*	Physeter catodon	E	Oceanic
MOLLUSKS:			
Mussel, dwarf wedge	Alasmidonta heterodon	E	Cheshire (Ashuelot River) Grafton & Sullivan Counties (Conn. River)
INSECTS:			
Beetle, Puritan tiger	Cicindela puritana	T	Extirpated (CT Rvr Valley)
Butterfly, Karner blue	Lycaeides melissa samuelis	PE[1]	Merrimack County
PLANTS:			
Jesup's milk-vetch	Astragalus robbinsii var. jesupi	E	Connecticut River Valley
Robbins cinquefoil	Potentilla robbinsiana	E	Coos County
Small Whorled Pogonia	Isotria medeoloides	E	Belknap, Strafford, Merrimack, Grafton, Carroll, Rockingham, Hillsborough Counties

* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service

[1] Final Rule anticipated January 1993.

Rev. 11-12-92

MS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
22 Bridge Street, Unit #1
Concord, New Hampshire 03301-4986

May 14, 1997

RECEIVED
MAY 1 9 1997
McFARLAND-JOHNSON INC.

Mark Szymkowicz
McFarland-Johnson, Inc.
171 Front Street
P.O. Box 1980
Binghamton, NY 13902

Dear Mr. Szymkowicz:

This responds to your April 10, 1997 letter requesting information on the presence of federally-listed and proposed endangered or threatened species in relation to highway improvements in Keene and Swanzey, New Hampshire; the improvements are proposed for Routes 9, 10, 12 and 101.

The federally-endangered dwarf wedgemussel (*Alasmidonta heterodon*) is known to occur in the Ashuelot River and the South Branch of the Ashuelot River in Keene and Swanzey. However, prior surveys have not found evidence that the dwarf wedgemussel occurs in the Ashuelot River, Ash Swamp Brook and Beaver Brook within the project area. No other federally-listed or proposed threatened and endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area, with the exception of occasional transient bald eagles (*Haliaeetus leucocephalus*) or peregrine falcons (*Falco peregrinus*). You may wish to contact David Van Luven, New Hampshire Natural Heritage Inventory, P.O. Box 1856, Concord, NH 03302-0856, (603) 271-3623 for information on state-listed species that may be present.

A list of federally-designated endangered and threatened species in New Hampshire is included for your information. Thank you for your cooperation and please contact Susi von Oettingen of this office at (603) 225-1411 if we can be of further assistance.

Sincerely yours,

Michael J. Bartlett
Supervisor
New England Field Office

Enclosure

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
22 Bridge Street, Unit #1
Concord, New Hampshire 03301-4986

RECEIVED
OCT 9 1997
McFARLAND-JOHNSON INC.

October 6, 1997

Bryan D.Hunter
McFarland-Johnson, Inc.
171 Front Street
P.O. Box 1980
Binghamton, NY 13902

Dear Mr. Hunter:

This responds to your September 8, 1997 letter requesting concurrence with your determination of no effect to federally-listed or proposed threatened in the vicinity of the proposed improvements to Routes 9, 10, and 12 in Keene and Swanzey, New Hampshire.

The federally-listed endangered dwarf wedgemussel (*Alasmidonta heterodon*) occurs in the Ashuelot River in Surry and Keene, upriver from the proposed project. However, data from previous surveys and information provided in your letter indicate that dwarf wedgemussels are unlikely to occur in the project area, given the absence of other mussel species and the lack of suitable habitat. No other federally-listed or proposed threatened and endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area, with the exception of occasional transient bald eagles (*Haliaeetus leucocephalus*) or peregrine falcons (*Falco peregrinus*). Therefore, we concur with your determination of no adverse effects to the dwarf wedgemussel or other federally-listed species.

Thank you for your cooperation and please contact Susi von Oettingen of this office at (603) 225-1411 if we can be of further assistance.

Sincerely yours,

Michael J. Bartlett
Supervisor
New England Field Office

STATE OF NEW HAMPSHIRE
DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT
NATURAL HERITAGE INVENTORY
172 Pembroke Road P.O. Box 856 Concord, New Hampshire 03302-0856

STEPHEN K. RICE
Commissioner

DAVID MOORE
Coordinator

603-271-3623
FAX: 603-271-2629

RECEIVED
FEB 0 9 1994
JOHNSON

February 4, 1994

Joe Kopalek
McFarland-Johnson, Inc.
171 Front St., PO Box 1980
Binghamton, NY 13902

RE: Environmental Assessment for Routes 9, 10, 12, and 101, Keene and Swanzey

Dear Mr. Kopalek,

Thank you for consulting the New Hampshire Natural Heritage Inventory (NHI) regarding the presence of rare plants, animals, and exemplary natural communities (hereafter referred to as "elements") in your Keene and Swanzey study area - including portions of Ash Swamp Brook, the Ashuelot River, Beaver Brook, Minnewawa Brook, and Otter Brook.

The NHI collects and analyzes data on the status and distribution of rare native plant and animal species and exemplary natural communities in the state. Using our database, we review projects with regard to impacts on these species and communities. The NHI also administers the NH Native Plant Protection Act (RSA 217-A), which lists 300 plant species as Endangered, Threatened, or Special Concern.

The database of the Inventory indicates that there are no known element occurrences precisely within the project area. The dwarf wedge mussel (Alasmidonta heterodon), listed as Endangered by the Federal Endangered Species Act and NH Endangered Species Conservation Act, formerly inhabited much of the Ashuelot River but no longer occurs south of Keene. For your information I have enclosed a fact sheet on this species, and I have also included lists of all the rare species known from Keene and Swanzey. You should be aware that NHI data for this area is not the result of comprehensive field studies. Obviously, field surveys would be necessary to verify the presence or absence of any rare species in the study area.

For information on fish stocking activities, fishing access points, and other fisheries issues you should contact NH Fish & Game, Division of Inland Fisheries at (603) 271-2501.

Please contact me if you have further questions regarding this information.

Sincerely,

Andy Cutko
Biologist

enclosures

MS

STATE OF NEW HAMPSHIRE
DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT
DIVISION of FORESTS and LANDS
172 Pembroke Road P.O. Box 1856 Concord, New Hampshire 03302-1856

603-271-2214
FAX: 603-271-2629

ROBB R. THOMSON
Commissioner

PHILIP A. BRYCE
Director

RECEIVED
APR 24 1997
McFARLAND-JOHNSON INC.

April 21, 1997

MR MARK SZYMKOWICZ
MCFARLAND-JOHNSON
PO BOX 1980
BINGHAMPTON NY 13902

Dear Mr. Szymkowicz,

This letter is in response to your request for information on sensitive species and plant communities near your project #91-4518.02 involving highway improvements in Keene and Swanzey, NH by the NH Dept. of Transportation. I have searched our database for occurrences of sensitive species and plant communities near the project area identified in your letter of April 10, 1997. We currently have no recorded occurrences for sensitive species near this project area.

Information on fish stocking and other fishing-related activities may be obtained from the NH Fish & Game Department, 2 Hazen Drive, Concord, NH 03301.

Please note that our data can tell you only of *known* occurrences of rare species or plant communities in a given area. The Heritage database contains information gathered by qualified biologists and reported to our office. Since many areas have never been surveyed, a negative result (no records in our database) should not be interpreted as proving that no sensitive species are present. For some purposes, including legal requirements for state wetland permits, the fact that no species of concern are known to be present is sufficient. However, an on-site survey would provide better information on what species and communities are indeed present.

I hope this information is helpful to you. If you wish to know, we would be happy to explain in more depth how our data are collected and how rarity is judged. Please call if you have questions or need additional information.

Best regards,

David VanLuven
Coordinator, Natural Heritage Inventory

Forest Protection (603) 271-2217
Forest Management (603) 271-3456
Land Management (603) 271-3456
Information & Planning (603) 271-3457
Natural Heritage Inventory (603) 271-3623
TDD ACCESS: RELAY NH 1-800-735-2964 recycled paper
DIVISION OF FORESTS AND LANDS 603-271-2214

State of N Hampshire
Fish and Game Department
2 Hazen Drive, Concord, NH 03301
TDD Access: Relay NH 1-800-735-2964
(603) 271-3421

Donald A. Normandeau, Ph.D.
Executive Director

RECEIVED
JUN 0 2 1994
McFARLAND-JOHNSON

May 16, 1994

Joe Kopalek, Environmental Analyst
McFarland-Johnson, Inc.
171 Front Street
P.O. Box 1980
Binghamton, NY 13902

Dear Mr. Kopalek:

The New Hampshire Fish and Game Department has reviewed your request for the presence of state threatened and endangered wildlife species which may occur in specific locations along routes 9,10,12 and 101. As part of your request, information on the Ash Swamp Brook, Ashuelot River, Bear Brook, Minnewawa Brook and otter brook has also been considered.

The state threatened and endangered wildlife species we have records for in the Keene and Swanzey areas include the bald eagle, peregrine falcon, northern harrier, Cooper's hawk, common loon, common nighthawk and the osprey. Most of these records are of migrants observed in the area. Species with potentially undocumented nest locations would include Cooper's hawk and the common nighthawk (see the enclosed habitat description). The dwarf wedge mussel, a state and federally endangered species, historically occurred throughout the Ashuelot river, but are not currently thought to occur in the project area.

The Fish and Game Department annually stocks the Ashuelot River above Keene with rainbow and brook trout, and below Keene with brown trout. Otter Brook is stocked above Keene with brook and rainbow trout. Minnewawa Brook is stocked with brook trout. Ash Swamp Brook, Beaver Brook and the above three streams also support small populations of wild brook trout as well as common suckers, brown bullheads, dace, common sunfish, American eels, chain pickerel, and common shiners.

We suggest that you contact the Department of Resources and Economic Development and the Natural Heritage Inventory for information on locations of the state threatened and endangered plant species.

If you have any further questions please contact Biologist, John Kanter or Ecologist, William Ingham, Jr. at 271-2462.

Sincerely,

Donald A. Normandeau

Donald A. Normandeau, Ph.D.
Executive Director

cc: William Ingham, Jr
John Kanter

Wild
Discover New Hampshire

USDA United States Department of Agriculture

Natural Resources Conservation Service

R1, Box 315, Rt. 12 South
Walpole, NH 03608-9744
Tel: (603) 756-2988 FAX (603) 756-2988

November 26, 1997

Mark Szynkowicz
McFarland - Johnson, Inc.
171 Front Street
PO Box 1980
Binghamton, NY 13902

Dear Mr. Szynkowicz,

On October 27, 1997 your office, as an agent of the Federal Highway Administration, requested a determination of prime and unique farmland through the Farmland Protection Policy Act 1987, for route 9/10/12/101 upgrade project in the city of Keene, NH.

Our office determined that none of the prime or unique soils within the area presented on the site map would be considered prime and unique farmland. We made this determination because we determined the entire area contiguous to the project to be urban. We have researched this determination and have found that there is not a clear definition of "urban" but, feel justified in calling it so.

This determination is based on a conversation with Jack Munn, City of Keene planner, and an awareness of the status of area. Mr. Munn informed us that this area is zoned commercial and/or industrial and falls within the Urban Complex. It is expected to be developed. Also, the fields in this area were farmed in 1997 but, the local farmer has is moving out of town and whether there may be a new tenant on this site in future years.

If I can be of any further assistance, feel free to contact me at any time.

Sincerely,

Peter J. Newkirk
District Conservationist

THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORT. ON

LEON S. KENISON
COMMISSIONER

November 18, 1997

Mr. Brian Mattson
Keene Parks and Recreation Department
312 Washington Street
Keene, NH 03431

RECEIVED
NOV 21 1997
McFARLAND-JOHNSON INC

Dear Mr. Mattson:

Re: Keene-Swanzey; NHS-STP- T-F-011-1(4); 10309
(NH Rte 9,10,12 and 101 Highway Improvements)

The proposed improvements along the NH Routes 9, 10, 12, and 101 highway corridor will necessitate the restriction of pedestrians and bicycles along portions of the existing State highway for safety reasons. Due to this restriction, we are proposing to construct a separate paved path of eight (8) feet in width running separate and parallel to the State highway for pedestrians and bicycles.

The northern alignment of the proposed trail passes through three units of the City's park system (Wheelock Park, North and South Tenant Swamp Park, and Ashuelot River Park; see attached map). NHDOT proposes to procure an encroachment agreement with the City of Keene in order to construct and maintain portions of the trail passing through these properties. NHDOT would be responsible for the long-term maintenance of these paths (i.e.: future resurfacing, etc.).

The Keene-Swanzey Citizen Advisory Task Force (CATF) and the City Planning Office are very supportive of the trails and their connections into the existing trails along Wheelock Park. The bicycle and pedestrian path is also being viewed by the CATF and others as an alternative transportation facility which could serve other seasonal recreational uses.

This letter is being submitted to you for the purpose of assisting in our determination of whether the proposal to construct the trail through portions of the City's park system constitutes a "use" of public parkland under Section 4(f) of the Department of Transportation Act. Therefore, we are asking for your opinion as to whether or not the proposed trail is consistent and beneficial to the designated use of the properties.

Should you consider this path not to be consistent and beneficial to the City's park system, we will need to consider this as a "use" impact under Section 4(f) and it will trigger a comprehensive review of alternative locations that avoid the use of parkland, including the possibility of not constructing the trail north of the NH Routes 9/10/12 interchange with West Street.

JOHN O. MORTON BUILDING - 1 HAZEN DRIVE - P.O. BOX 483 - CONCORD, N.H. 03302-0483
TELEPHONE: 603-271-3734 FAX: 603-271-3914 TDD ACCESS: RELAY NH 1-800-735-2964

Your prompt written response and opinion would be greatly appreciated. Please feel free to contact me or Marc Laurin, our Senior Environmental Manager with the Bureau of Environment, at 271-3226 if you have any questions on this request.

Very truly yours,

Keith A. Cota
Program Manager
Bureau of Environment
Rm. 109 - Tel. (603) 271-3226

Encl.

C.c. Gilbert Rogers, Assistant Director of Project Development
Marc Laurin, Bureau of Environment
William O'Donnell, FHWA (w/encl.)
Rhett Lamb, City Planning Director
Mark Szymkowicz, McFarland-Johnson, Inc.

s:\projects\design\10309\110697lt.doc

City of Keene

3 Washington Street New Hampshire 03431

December 17, 1997

RECEIVED
DEC 3 0 1997
McFARLAND-JOHNSON INC.

Mark T. Szymkowiez, Environmental Manager
McFarland - Johnson, Inc.
171 Front Street
P.O. Box 1980
Binghamton, New York 13902

Dear Mr. Szymkowiez

I am in receipt of your December 5, 1997, letter concerning the impact on Hickey-Desilets Park that would be caused by improvements to the intersection of Island Street/Pearl Street and Island Street/Winchester Street.

The park is a small (1.3 acres) green space that was dedicated to two Keene veterans who were killed in World War I. The park provides an attractive, quiet spot at a very busy intersection. It has a couple of picnic tables for people to sit at on a grassy lawn with trees along the sidewalk borders. The park is used by neighborhood residents as a place to walk their dogs and for young children to play.

The improvements to the intersections will cause the removal of the trees along one side. As the park would be made smaller to accommodate the street improvements, every attempt should be made to retain its present character. The replacement of this tree line would be very important as the park's size and simple design will considerably reflect such a change. Also to be considered, would be the stone and flagpole commemorating the dedication of the park to those two veterans. The stone and pole may not appear properly centered if one side of the park is shortened.

I believe the park can still provide the same uses after the intersection improvements are in place. However, the present visual effects should be recreated not only for the immediate neighbors, but also for the many Keene citizens who pass through this intersection daily.

Sincerely

Brian A Mattson

Brian A. Mattson, Director
Parks, Recreation & Facilities

BAM/ase

City of Keene

3 Washington Street New Hampshire 03431

January 6, 1998

Keith Cota, Program Manager
Bureau of Environment
John O. Morton Building
1 Hazen Drive
P.O. Box 483
Concord, N.H. 03302-0483

Dear Mr. Cota

This is in response to your letter of November 18, 1997, requesting that the Keene Parks, Recreation and Facilities Department review the proposed paved path construction around the NH route 9, 10, 12 and 101 interchange.

There are minor concerns but we would endorse the general concept of proposed construction. The proposed connectors would be in keeping with the present pedestrian/bicycle path's routing through and to the City's park system.

There are two concerns we have at this time which could be addressed as more detailed planning of the paved path connectors is done. The first is the location of the planned path connection to the existing pedestrian/bicycle path at the southeast corner of Wheelock Path. A small, but heavily used hillside at that location provides a winter sliding area for youngsters. It would appear that a slight movement of the proposed connector would leave the sliding area intact. The other concern is the proposed paved path that crosses the eastern end of Wheelock Park through a very sandy area. This area, known locally as "The Pits", has had ATV activity on a consistent basis over the years. Although illegal in that area, the ATV use has always occurred there because of the attraction to ride in a dune-like topography. The exact location and construction of this portion of the paved path needs careful planning to prevent disruption by ATV's of the use of the paved path.

Overall, the new pathways will provide additional convenience for people traveling to and through the park system. I look forward to working with you on the planning of this new system.

Sincerely

Brian A. Mattson

Brian A. Mattson, Director
Parks, Recreation & Facilities

BAM/ase

Phone
Mayor 357-9804 • Manager 357-9804 • Accounting 352-1013 • Airport 357-9835 • Assessor 352-2125 • Attorney 357-9808
Building Maintenance 357-9844 • City Clerk 352-0133 • Equipment Garage 357-9831 • Fire 357-9861 • Health 352-5440 • Human Resources 357-9858
Human Services 357-9809 • Information Management Services 357-9802 • Inspections 352-5440 • Juvenile Conference Committee 357-9810
Landfill & Recycle/Transfer Station 352-5739 • Parks & Recreation 357-9829 • Planning 352-5474 • Police 357-9815 • Public Works 352-6550
Purchasing 357-9800 Tax Collector 357-9801 • Water Treatment Facility 357-8483 • Wastewater Treatment Plant 357-9836 • Water & Sewer 352-3239
FAX
Airport 357-8853 • City Hall 357-9847 • Fire 358-3420 • Landfill & Recycle/Transfer Station 352-8325 • Library 352-1101 • Police 357-9823
Public Works 357-9848 • Wastewater Treatment Plant 357-9854
Area Code 603

BUREAU OF ENVIRONMENT

CONFERENCE REPORT

DATE OF CONFERENCE: *November 17, 1998*

LOCATION OF CONFERENCE: *Bureau of Environment Conference Room*

ATTENDED BY:

FHWA	*NHDHR*	*NHDOT*
Harry Kinter	Jim Garvin	Marc Laurin
		Jason Stone

SUBJECT: Keene-Swanzey, NHS-STP-T-F-011-1(4),10309 - Stone Wall Review.

NOTES ON CONFERENCE:

The Stone Wall Committee reviewed the Project Area and fifteen individual walls to determine their rating in accordance with the Departments' Stone Wall Policy. Copies of the rating sheets are attached.

The overall Project Area does not qualify for preservation or reconstruction. The walls located at five properties were determined to meet the eligibility criteria, see below. Three of these walls are considered elements of historic properties and their disposition under the Policy is not applicable. Treatment of these walls will be in accordance with the Memorandum of Agreement to be submitted to the Advisory Council on Historic Preservation pursuant to 36 CFR Part 800.6(a).

- Granite State Bank property (Dickinson/Atwood House), 169 Ash Hill Road, Swanzey - Commitments for this historic property, including impacts to the wall, are addressed in the Memorandum of Agreement to be submitted to the Advisory Council on Historic Preservation pursuant to 36 CFR Part 800.6(a).
- Ralph and Jo Gregory property, 129 Ash Hill Road, Swanzey - At the request of the landowner during the Public Hearing, the Department has committed to avoid and/or replace this wall.
- Coughlin property, 441 Main Street, Keene - Commitments for this historic property, including impacts to the wall, are addressed in the Memorandum of Agreement to be submitted to the Advisory Council on Historic Preservation pursuant to 36 CFR Part 800.6(a).
- Parker property, 14 Matthews Road, Keene - Preliminary design indicates that this wall will not be impacted by the proposed project.
- Jacobs property (The Bounty), 73 Base Hill Road, Keene - Preliminary design indicates that this wall will not be impacted by the proposed project. Commitments for this historic property are addressed in the Memorandum of Agreement to be submitted to the Advisory Council on Historic Preservation pursuant to 36 CFR Part 800.6(a).

Submitted By: Marc G. Laurin

Senior Environmental Manager
Bureau of Environment
Room 109 - 271-4044

MGL:mgl
c.c. Harry Kinter, FHWA w/encl.
Jim Garvin, NHDHR w/encl.
Keith Cota, Project Manager via e-mail
Mark Szymkovicz, McFarland-Johnson, Inc. w/encl. ✓

s:\projects\design\10309\cultural\wallconf.doc

LSK — CAM — RWG —

Marc Lawin
(please provide copy to M-J).

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION ONE

279 Pleasant Street, Suite 204
Concord, New Hampshire 03301-2509

May 20, 1998

___ BRIDGE DESIGN
___ CONSTRUCTION
✓ ENVIRONMENT
✓ HIGHWAY DESIGN
___ MAT. & RES.
___ MUNC. HWYS.
✓ R.O.W.
___ TRANS. PLANNING
___ BUDGET & FINANCE

Mr. Robert W. Greer, Director
Project Development
The State of New Hampshire
Department of Transportation
Concord, New Hampshire 03302

Attn: Mr. Keith A. Cota, P.E.
Project Manager

KAC 5/22/98

Dear Mr. Greer:

Subject: Keene-Swanzey, NHS-STP-T-F-011-1(4), 10309

As a result of circulation of the Draft Environmental Assessment/Section 4(f) Evaluation, the only comment we received was an April 7, 1998 letter from the U.S. Department of Interior. Enclosed is a copy for your records and for your consideration prior to development of the final environmental document.

Sincerely yours,

William F. O'Donnell, P.E.
Environmental Program Manager

Enclosure

MAY 21 1998

STATE OF NEW HAMPSHIRE

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER- 98/53

Initials/Date

APR 7 1998

Ms. Kathlene O. Laffey
Division Administrator
Federal Highway Administration
279 Pleasant Street, Room 204
Concord, New Hampshire 03301

Dear Ms. Laffey:

This is in response to the request for the Department of the Interior's comments on the Environmental Assessment/Draft Section 4(f) Evaluation for the New Hampshire Routes 90, 10, 12 and 101 Upgrades in the Keene-Swanzey area, Cheshire County, New Hampshire.

We concur that there is no prudent and feasible alternative to the proposed project, if project objectives are to be met. As to the second proviso of Section 4(f), we recommend that consideration be given to the following mitigation measures to Section 4(f) resources.

Historic Resources

We concur with the proposed measures to minimize harm to the historic properties which may be affected by the proposed project, as detailed in the draft Memorandum of Agreement (MOA) in Appendix C. A signed copy of the MOA should be included in the Final Section 4(f) Evaluation. We recommend continued cooperation and coordination with the State Historic Preservation Officer during the construction phase, in order to bring the project to a satisfactory conclusion with minimum impact to historic resources.

Park and Recreation Resources

We concur with the proposed measures to minimize harm to Hickey-Desilets Park, particularly the provision of replacement land for the parkland which will be taken for highway use.

In its letter of January 6, 1998, the City of Keene's Parks and Recreation Department expressed two concerns about potential project impacts to recreation activities at Wheelock Park. One concern is about the planned path which connects to the existing bicycle/pedestrian path and its potential impact to a winter sliding area used by youngsters. The other concern is about the proposed paved path that crosses the eastern end of Wheelock Park and its potential impact to a sandy area known as "The Pits." We recommend that these concerns be resolved to the satisfaction of the Keene's Parks and Recreation Department. We also recommend that this Department be consulted regarding the construction of the trail through Tenant Swamp and Ashuelot River Park. Evidence that the above matters have been coordinated with the Keene's Parks and Recreation Department should be documented in the Final Section 4(f) Evaluation.

Summary Comments

The Department of the Interior has no objection to Section 4(f) approval of this project by the Department of Transportation, providing that the mitigation measures discussed above are adequately documented in the Final Section 4(f) Evaluation.

We appreciate the opportunity to provide these comments.

Sincerely,

for Kenneth L. Fraser

Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

cc: Mr. Robert W. Greer
Director of Project Development
New Hampshire Department of Transportation
1 Hazen Drive
Post Office Box 483
Concord, New Hampshire 03302-0483

Mr. Brian A. Mattson, Director
Parks, Recreation and Facilities
Department of Parks and Recreation
3 Washington, Street
City of Keene, New Hampshire 03431

APPENDIX B
CONCEPTUAL STAGE STUDY RELOCATION PLAN

STATE OF NEW HAMPSHIRE
INTER-DEPARTMENT COMMUNICATION

FROM: Richard N. Weiss
Right-of-Way Agent

DATE: August 22, 1997

SUBJECT: Conceptual Stage Study
Relocation Plan Keene-Swanzey,
10309

AT: Dept. of Transportation
Bureau Right-of-Way

TO: Keith Cota
Chief Project Manager

THRU: Jeanne A. Grover
Chief Relocation Advisor

RECEIVED
BUREAU OF ENVIRONMENT
AUG 29 1997
N. H. DEPARTMENT OF
TRANSPORTATION

This report follows the guidelines prescribed by the New Hampshire Department of Transportation Right-of-Way Relocation Policy and Procedures manual, Chapter 10, and the Federal Highway Administrative Technical Advisory dated October 30, 1987.

I. The following is an estimate of the displacements that will likely occur on the above referenced project. It should be understood that any design modifications could ultimately change the total number in any selected alignment.

All the estimated acquisition costs include only those acquisitions which comprise land and buildings and do not reflect any partial acquisitions of land only.

RELOCATION SUMMARY

4 Single Family Residences
1 Single Family Residence with 1 tenant living in out building
1 2 Family Residence (public housing)
1 3 Family Residence (not owner occupied)
1 Home business combo (SFR and Real Estate office, 2 structures)
6 Businesses (in 5 structures)
1 Non Profit Organization (UNH offices)

Estimated Acquisition Costs:	$2,760,000.00
Estimated Relocation Costs:	$ 393,500.00
Total:	$3,153,500.00

Construction will be done in seven (7) phases. Below is a breakdown of estimated acquisition and relocation costs for each phase.

PHASE 1

No Total Acquisitions

PHASE 2

Estimated Acquisition Costs:	$1,105,000.00
Estimated Relocation Costs:	$ 110,250.00
Total:	$1,215,250.00

PHASE 3

Estimated Acquisition Costs:	$ 655,000.00
Estimated Relocation Costs:	$ 179,750.00
Total:	$ 834,750.00

PHASE 4

No Total Acquisitions

PHASE 5

Estimated Acquisition Costs:	$ 920,000.00
Estimated Relocation Costs:	$ 83,500.00
Total:	$1,003,500.00

PHASE 6

No Takes

PHASE 7

Estimated Acquisition Costs:	$ 80,000.00
Estimated Relocation Costs:	$ 20,000.00
Total:	$ 100,000.00

In general, the social and economic characteristics of the majority of the displacees appears to place them in the middle income bracket. There appears to be no special ethnic or racial make-up of the families likely to be displaced. Any individuals with disabilities or elderly relocatees will be specifically identified prior to the acquisition stage and their special needs addressed accordingly.

II. A survey was conducted of available housing from local Realtors. The survey indicates an adequate number of functionally similar, decent, safe and sanitary residential dwellings for sale and rent/lease in the project area to accommodate any and all displacees. The current market in the area of Keene and Swanzey in which displacement will occur indicates adequate replacement homes for sale, in all styles, containing 1 to 5 bedrooms. Prices range from $65,000.00 to $140,000.00, with a median price of $103,000.00. A windshield appraisal of rental units available in the two subject towns appears to be sufficient in number and similarity to handle affected displacees. Rents are from $300.00 to $650.00. (Actual listings on which the above analysis was made are being retained in New Hampshire Department of Transportation files.)

III. There appears to be no discernible impacts on the neighborhoods. There also appears that there is no need for special relocation considerations, to resolve the needs of the displacees. Should the need arise additional advisory services shall be provided.

IV. Available housing in the area appears to be sufficient and within the financial needs of the displacees. Last resort housing will be made available if the need presents itself in accordance with Chapter 10 of the New Hampshire Department of Transportation, Right-of-Way Relocation Policy and Procedures Manual.

V. A number of business relocations will occur as a result of this project. Based on a survey of Realtors in the area there appears to be sufficient replacement sites to accommodate these relocations. Of particular concern is the relocation of the Walpole Bank and a Texaco Service/Gas Station. Both tenant businesses are located on a property owned by FGP Keene Inc. It is felt that both businesses could relocate in the project area, however, it may require early acquisition to accommodate their needs.

VI. In discussions with local officials and area residents and property owners, the Department has been made aware of general concern with respect to the displacement of homes and businesses. Specific concerns with respect to individual cases have not been expressed. At this time it would appear that relocating displaced homeowners can be accomplished without undue hardship or expense.

VII. The acquisition and the relocation program will be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. A Relocation Advisor will be assigned to manage any relocation problems of the affected parties.

Any further information or assistance regarding displacements on this project may be obtained by contacting the New Hampshire Department of Transportation Relocation Location. Physical evidence of this report is available through the Bureau of Right-of-Way, John O. Morton Building, 1 Hazen Drive, Concord, New Hampshire.

RNW/dmm

cc: Mark W. Richardson, Right-of-Way Administrator

PROJECT: Keene-Swanzey

FED NO. _____

STATE NO. 10307

ALTERNATIVE: Total

TOWN: Keene

CONCEPTUAL STAGE COST ESTIMATE

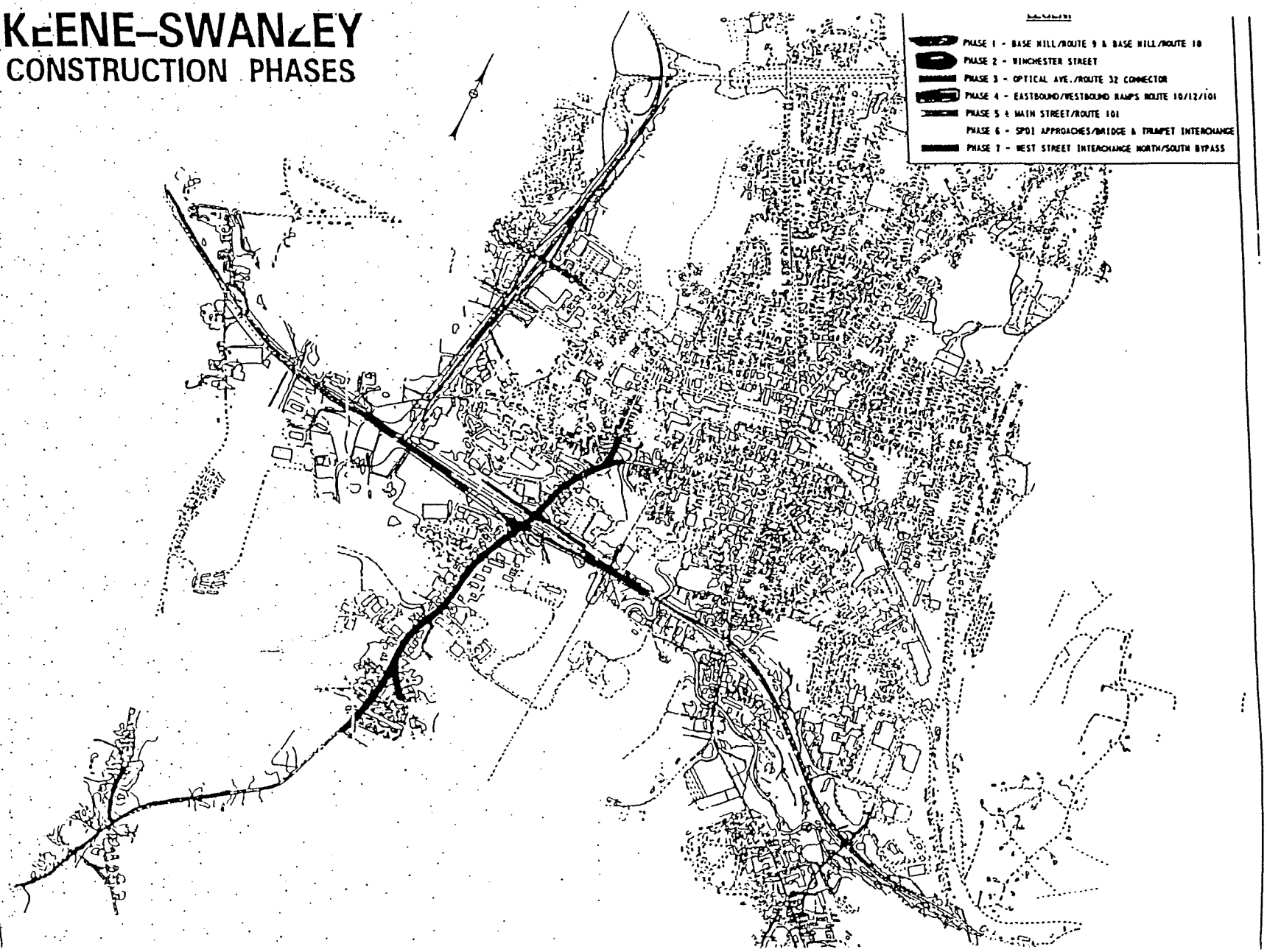
	UNITS	ACQ. COST	RUP # 6	RENT SUP # 6	MOVING COST	NO. OF STRUCTURES	NOTES
RESIDENCES	12	870,000	135,000	31,500	27,000	8+1*	*1-Denotes a garage that has been used as a Rental unit
BUSINESSES	7	*1,710,000			180,000	6	* Does not include the value of a Real Estate office considered under Residential Acq.
FARMS	0						
N.P.O.s	1	* carveout 180,000			20,000	1	
OTHER							
TOTAL	20	2,760,000	135,000	31,500	227,000		

ESTIMATED TOTAL ACQUISITION COSTS (FOR ABOVE UNITS) 2,760,000.00

ESTIMATED TOTAL RELOCATION COSTS 393,500.00

TOTAL 3,153,500.00

KEENE-SWANZEY
CONSTRUCTION PHASES



NH ROUTES 9/10/12 & 101
CONSTRUCTION SEQUENCE

KEENE-SWANZEY

20-Aug-97

PHASE	LOCATION	FISCAL YEAR	CONSTRUCTION DURATION	CONSTRUCTION ESTIMATE	10 YEAR PLAN
1	BASE HILL / ROUTE 9 & BASE HILL / ROUTE 10	1998 / 1999	1 YEAR	$4.0 M	$7.75 M
2	WINCHESTER STREET	1999 / 2000	1-2 YEARS	$3.8 M	FY 1999
3	OPTICAL AVE. / ROUTE 32 CONNECTOR	2000 / 2001	1-2 YEARS	$6.0 M	$3.75 M
4	SPDI EASTBOUND / WESTBOUND RAMPS ALONG ROUTES 10 / 12 / 101	2001 / 2002	1 YEAR	$5.5 M	FY 2000 $15.00 M
5	MAIN STREET / ROUTE 101	2002 / 2003	1 YEAR	$6.1 M	FY 2003
6	SPDI MAINLINE APPROACHES & BRIDGE & TRUMPET INTERCHANGE	2004 / 2005	2 YEARS	$16.2 M	$10.00 M
7	WEST STREET INTERCHANGE & NORTH / SOUTH BYPASS	2005 / 2006	1-2 YEARS	$6.5 M	FY 2004
			TOTAL ESTIMATED COST	$48.1 M	$36.5 M

Single Point Diamond Interchange

APPENDIX C
HISTORIC RESOURCES DOCUMENTATION

THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

LEON S. KENISON
COMMISSIONER

KEENE-SWANZEY
F-011-1(4)
10309

Pursuant to meetings and discussions from 1991 through 1997,* and for the purpose of compliance with regulations of the National Historic Preservation Act, as amended, and the Advisory Council on Historic Preservation's *Procedures for the Protection of Historic Properties* (36 CFR 800), the NH Division of Historical Resources and the NH Division of the Federal Highway Administration have coordinated the identification and evaluation of historic and archeological properties with plans to upgrade the NH Routes 9, 10, 12 and 101 transportation corridor in the town of Swanzey and the city of Keene, New Hampshire.

Based on a review pursuant to 36 CFR 800.4 of the properties in the project area, we agree that the following are eligible for the National Register of Historic Places: Main Street Historic District (Area A); Park-Fairview Historic District (Area C); A. Thomas Chilton's Granite Works, 555 Main Street (Inventory #286); Dickinson/Atwood House, 169 Ash Hill Road (Inventory #503); Smith/Wilder/ Bardwell Farm, 5 W. Swanzey Road (Inventory #505); MacDonald/Bergeron House, 523 Winchester Street (Inventory #508); Inventory #509, 531 Winchester Street; Goodnow House, 332 Winchester Street (Inventory #526); Driscoll House and Farm, 158 Island Street (Inventory #539), and The Bounty, 73 Base Hill Road (Inventory #546).

Descriptions of these districts and individual properties are on file at the New Hampshire Division of Historical Resources in Concord, New Hampshire.

Applying the criteria of effect at 36 CFR 800.5 and 800.9, we have determined that the project will have an adverse effect on the Main Street Historic District, the MacDonald/Bergeron House, Goodnow House and the Driscoll House and Farm. The project will have an effect on the Park-Fairview Historic District, the Dickinson/Atwood House, the Smith/Wilder/Bardwell Farm and Inventory #509, but the effect will not be adverse. A. Thomas Chilton's Granite Works and The Bounty will not be effected by the project. These effects, as well as proposed mitigation, are described on the attached NHDHR Determination of Eligibility/Effect forms.

In accordance with the Advisory Council's regulations, consultation will continue, as appropriate, as this project proceeds.

Nancy C. Muller
Nancy C. Muller
State Historic Preservation Officer

for Kathleen O. Laffey, Administrator
Federal Highway Administration

Concurred with by the New Hampshire Department of Transportation:

Date: 12/17/97 By: Elizabeth Hostutler
Elizabeth Hostutler, Historian

* 1/22/91, 4/14/94, 5/12/94, 1/12/95, 7/13/95, 2/11/97, 3/13/97, 4/30/97, 6/12/97, 7/30/97, 8/13/97, 8/27/97, 9/24/97, 10/22/97 and 11/13/97.

JOHN O. MORTON BUILDING - 1 HAZEN DRIVE - P.O. BOX 483 - CONCORD, N.H. 03302-0483
TELEPHONE: 603-271-3734 FAX: 603-271-3914 TDD ACCESS: RELAY NH 1-800-735-2964

NHDHR Area Letter A	Code
Name of Area Main Street County Cheshire Town/City Keene	
Inventory Form numbers from this area 212-233, 240-270 (Note: only # 212-222 have forms)	
Use: Present varied: see attached Original varied: see attached	
Period of Significance 1736-1950 General Condition excellent	
Setting Buildings line broad, straight street; consistent setbacks; urban residential setting	
Acreage approx. 50 acres UTM ref. A: 19/722025/4756380 B: 19/722220/4756400 C: 19/722390/4755470 D: 19/722200/4755470 USGS Quadrangle Keene Scale 1:25000	
Surveyor Elizabeth Durfee Hengen Recorded by same Date of field survey May-June 1997	

NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES—AREA FORM

☒ Project Area ☒ Historic District

Affix photo here.
Use photo continuation sheet for extra photos.

Roof line should align with right margin-----

Photographer facing: see attached sheets
Photograph date: for photos
roll# frame#
Negative stored at:

SKETCH MAP: Draw a general map of the Area indicating all properties (old and new) within it. Each property should be identified with an open box, and every property documented on an individual inventory form should be numbered with its corresponding NHDHR Inventory #. In the case of a "Historic District" Area Form, all contributing properties should be identified with shaded boxes while the boxes for non-contributing properties should remain unshaded. Label streets including route numbers, if any. (Attach a separate sheet if space is not sufficient.)

—Indicate North with arrow

Base map

see attached (p. 27)

(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project: Keene-Swanzey
Date of group review: 9/24/97, 10/22/97, 11/19/98
Participants: NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.

Inventory #: 212-233 and 240-270
Area: A
Town / City: Keene

Property name: Main Street Historic District
County: Cheshire

Address: Main Street, from NH Route 101 north to Water Street
Agency: NHDOT, NHS-STP-T-F-011-1(4), 10309
Reviewed for: [X] **R&C**

Individual Properties

NR SR
[ ] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[x] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts

NR SR
[x] [ ] Eligible
[ ] [ ] Not eligible
[ ] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [x] A (Event) [x] B (Person) [x] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: 50± acres

Significance: The Main Street Historic District is eligible for the National Register for its strong associations with the historical development of the City of Keene from 1736 through 1950 (the 50 year cut-off date). The district encompasses almost all of the first cluster of lots laid out by its proprietors, as well as the original town street. Most of the houses were constructed by, and occupied by prominent local citizens and possess a high degree of architectural significance and integrity. The distinctive streescape with its setbacks and plantings is also significant Forty-eight properties contribute to the district's significance, properties #212-b, 217, 228, 244, 254, 263 and 268 do not.

---

36 CFR 800.9 Criteria of Effect & Adverse Effect

[x] (a) **Effect:** undertaking may alter National Register-qualifying characteristics and features of
[ ] location [x] setting [ ] use

[x] (b) **Adverse effect:** may diminish the integrity of [x] design [x] setting [ ] materials [ ] workmanship [x] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[ ] (c) **Otherwise adverse effects may be considered not adverse:**
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: Effect determination includes contributing properties located within the project limits (Inventory #'s 212-a, 212-c, 213 - 216, and 218 - 222). Widening of Main Street with associated slope impacts within the District, direct physical impacts to contributing properties (at Inventory #'s 212-a, 212-c, 218 and 219) will result in an adverse effect with a 4(f) impact.

Mitigation: NHDOT will relocate the retaining wall, plaque, and the entrance-way walls at Inventory # 212-a. Inventory # 212-a will be marketed for sale on-site with preservation covenants, and then without, after its recordation. Comparable mitigation will occur at Inventory #212-c, if the owners request acquisition. Slope impacts to Inventory # 212-c will be minimized. A landscaping plan for the District will be developed to the extent feasible, subject to review by the NH DHR and FHWA.

NHDHR Area Letter C	Code
Name of Area Park-Fairview Historic Area County Cheshire Town/City Keene	03C
Inventory Form numbers from this area 307-311 (form fronts)	
Use: Present residential Original residential	
Period of Significance 1895-1950 General Condition good	
Setting well-landscaped, quiet residential neighborhood	
Acreage approx. 90A UTM ref. A: 19/E720340/N4756765 B: 19/E720540/N4757160 C: 19/E720400/N4757600 D: 19/E720000/N4757130 USGS Quadrangle Keene Scale 1:25000	
Surveyor Elizabeth Durfee Hengen Recorded by same Date of field survey May - July 1997	

NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES—AREA FORM

☒ Project Area ☒ Historic District

Affix photo here.
Use photo continuation sheet for extra photos.

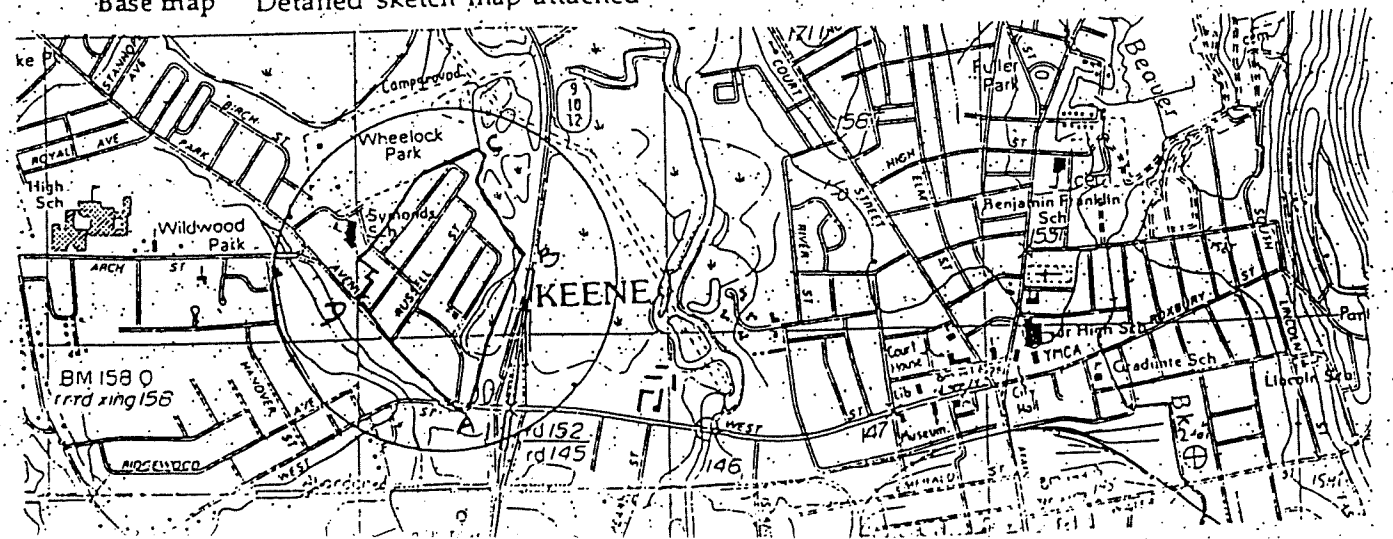
Roof line should align with right margin----

Photographer facing: see attached photo sheets
Photograph date:
roll# frame#
Negative stored at: NHDOT

SKETCH MAP: Draw a general map of the Area indicating all properties (old and new) within it. Each property should be identified with an open box, and every property documented on an individual inventory form should be numbered with its corresponding NHDHR Inventory #. In the case of a "Historic District" Area Form, all contributing properties should be identified with shaded boxes while the boxes for non-contributing properties should remain unshaded. Label streets including route numbers, if any. (Attach a separate sheet if space is not sufficient.)

—Indicate North with arrow

Base map Detailed sketch map attached



(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project: Keene-Swanzey
Date of group review: 9/24/97, 10/22/97
Participants: NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.

Inventory #: 307-311
Area: C
Town / City: Keene

Property name: Park-Fairview Historic District

County: Cheshire

Address: A grid of eight early 20th century streets that extend off the northeast side of Park Avenue: McKinley, Fairview, Nelson, Russell, Pine Avenue, Newman, Wheelock and Roosevelt Streets, as well as the northeast side of Park Avenue itself, between McKinley and Pine.
Agency: NHDOT, NHS-T-F-011-1(4), 10309

Reviewed for: [X] R&C

Individual Properties
NR SR
[ ] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[x] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts
NR SR
[x] [ ] Eligible
[ ] [ ] Not eligible
[ ] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [x] A (Event) [ ] B (Person) [ ] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: 90± acres

Significance: The Park-Fairview Historic District's significance lies in its direct associations to Keene's growth at the turn of the century and into the early twentieth century. As the city outgrew its available land within the downtown core, it looked to outlying areas for future growth. Landowners in West Keene were the first to capitalize successfully on that need, and the Park-Fairview Historic District evolved in concert with improved transportation and recreation (the streetcar and Wheelock Park) and the community's continued economic growth. The range of development and ensuing housing types reflect the long period of popularity of the District and its steady, continuous growth over a period of fifty years. The District still serves its original purpose and remains free of commercial intrusions.

---

36 CFR 800.9 Criteria of Effect & Adverse Effect

[x] (a) Effect: undertaking may alter National Register-qualifying characteristics and features of [ ] location [x] setting [ ] use

[ ] (b) Adverse effect: may diminish the integrity of [ ] design [ ] setting [ ] materials [ ] workmanship [ ] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[x] (c) Otherwise adverse effects may be considered not adverse:
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: Effects determination include contributing properties located within the project limits (Inventory #'s 307 - 311). Minor slope work will occur to Inventory # 307 and #308, and along the rear lot lines of 29 and 33 Fairview Street, resulting in no adverse effect with a 4(f) Impact.

Mitigation: A landscaping plan will be developed to the extent practicable for Inventory # 307, subject to review by the NH DHR and FHWA.

November 13, 1997, October 22, 1997, September 24, 1997

NHDHR Inventory # 286 | Code

NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES—INVENTORY FORM

Included in Area E

County Cheshire — 03C

Town/City Keene — K01

Address 555 Main Street

Current Owner Jay Blanchard

Property Name A. Thomas Chilton's Granite Works

Acreage .29A

Tax Map/Parcel# 39-2-69

UTM ref. 19/E722315/N4755220

USGS Quadrangle Keene Scale 1:25000

Use: Present monument shop — IPS

Original monument shop — IPS

Exterior Building Materials:

Roof: asphalt	ASP	Walls: concrete block	CON
Foundation: -		Chimney: concrete	CON
# of Stories: 1		Roof Shape: gable	
Chimney Location: south wall		Entry Location: center	
Sash Type: varied		Plan Configuration: rectangular	

Major Alterations (with dates): roof parapet removed; new display window sash

Condition: good

Outbuildings: sheds (2)

Setting: early-mid 20th c. commercial district

Architect/Builder: unknown

Source:

Orig. Construction Date: 1931

Source: Historic maps & city directories

☐ Multiple building campaigns (see reverse)

Style/Type: -

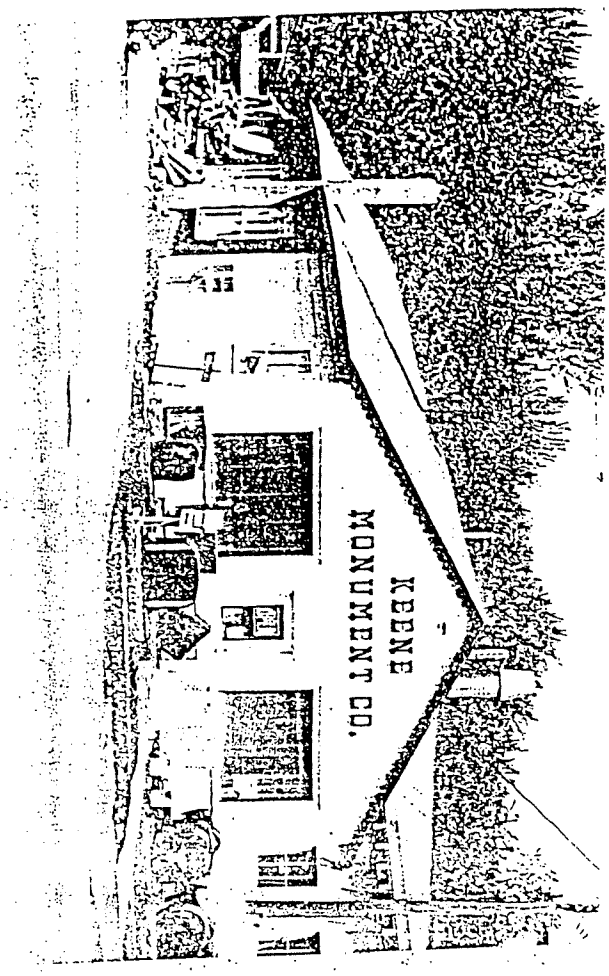
Moved: no

Date:

Surveyor: Elizabeth Durfee Hengen

Recorded by:

Date of field survey: June 1997



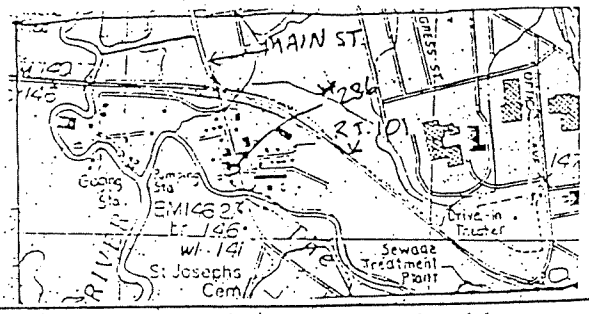
Photographer facing: NW

Photograph date: June 1997

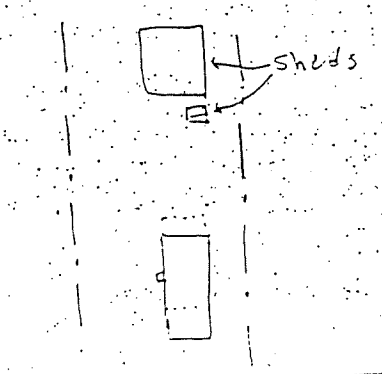
roll# 12 frame# 7

Negative stored at: NHDOT

Location Map indicate North with arrow



Property Map indicate North with arrow



(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project: Keene-Swanzey
Date of group review: 9/24/97, 10/22/97
Participants: NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.

Inventory #: 286
Area:
Town / City: Keene

Property name: A. Thomas Chilton's Granite Works

County: Cheshire

Address: 555 Main Street
Agency: NHDOT, NHS-T-F-011-1(4), 10309

Reviewed for: [X] R&C

Individual Properties

NR SR
[x] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[ ] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts

NR SR
[ ] [ ] Eligible
[x] [ ] Not eligible
[ ] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [ ] A (Event) [ ] B (Person) [x] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: Footprint of the building

Significance: The A. Thomas Chilton Granite Works is eligible as the best surviving representative in Keene of a 1920-1930s one-story, concrete block commercial structure, a building type that is found in moderate numbers throughout the city. Block, or artificial stone, was made by several local companies and was the material of choice for foundations throughout the city in the first three decades of the 20th century. It was also used for a number of entire residences and small commercial structures, such as this property. Rusticated blocks were particularly popular.

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36 CFR 800.9 Criteria of Effect & Adverse Effect

[ ] (a) **Effect:** undertaking may alter National Register-qualifying characteristics and features of
[ ] location [ ] setting [ ] use

[ ] (b) Adverse effect: may diminish the integrity of [ ] design [ ] setting [ ] materials [ ] workmanship [ ] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[ ] (c) Otherwise adverse effects may be considered not adverse:
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: No effect, no 4 (f) impacts.

Mitigation:

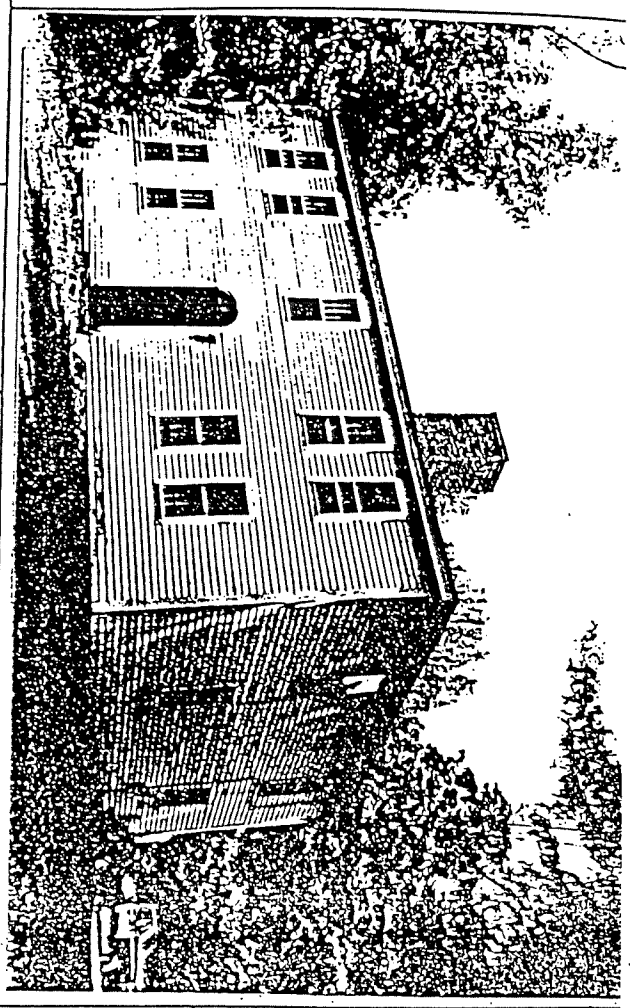
NHDHR Inventory # 503

NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES - INVENTORY FORM

		CODE
Included in Area	-	
Town/City	Swanzey	S26
County	Cheshire	03C
Address	169 Ash Hill Road	
Current Owner	Chambers, Allison	
Property Name	Dickinson/Atwood House	
Acreage	1.5	
Tax map/parcel #	51/ 2	
UTM ref.	19.719940.4753020	
USGS Quadrangle	Keene, NH-VT scale 1:25000	
Use: present	domestic	DOM
original	domestic/farm	DOM/ AGR

Exterior building materials:

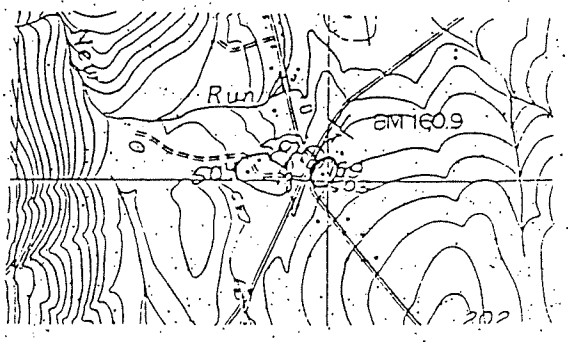
Roof: asphalt	ASP	Walls: clapboard	WWB
Foundation: mortared rubble	STO	Chimney: brick	BRI
# of stories: 2		Roof shape: hip	
Chimney location: front, off center ridge		Entry location: center	
Window type: 12/12		Plan configuration: rectangle	



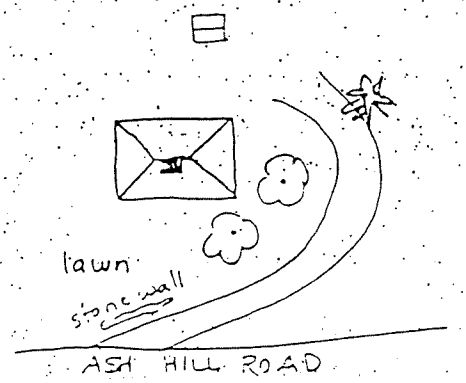
photographer facing: NE
photograph date: June 1997
roll# 15 frame# 4
negative stored at: NHDOT

Major Alterations	-	
Condition	good	
Outbuildings	garage (modern)	
Setting	set back in trees, near busy intersection	
Architect/Builder	unknown	
source	-	
Original construction date	c.1780	
source	see text	
☐ multiple bulding campaigns (see text)		
Style:	Georgian/Federal	CGO/ ERF
Moved?	no date -	
Surveyor	Lynne Emerson Monroe	
Recorded by	Kari Ann Laprey/ T.Hill	
Date of field survey	June 1997	

Location map indicate north with arrow



Property map indicate north with arrow



(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project:	Keene-Swanzey	**Inventory #:**	503
Date of group review:	9/24/97, 10/22/97	**Area:**	
Participants:	NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.	**Town / City:**	Swanzey
Property name:	Dickinson/Atwood House	**County:**	Cheshire
Address:	169 Ash Hill Road		
Agency:	NHDOT, NHS-T-F-011-1(4), 10309	**Reviewed for:**	[X] R&C

Individual Properties

NR SR
[x] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[ ] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts

NR SR
[ ] [ ] Eligible
[ ] [ ] Not eligible
[x] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [ ] A (Event) [ ] B (Person) [x] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: Map/parcel 51/2, 1.5 acres

Significance: The Dickinson/Atwood house is eligible as the most intact of less than five surviving houses of its type in the Town of Swanzey. The house contributes to an understanding of late 18th century domestic architecture as a variation on the hip-roofed house type, which more commonly had twin fireplace chimneys. In this house, the earlier Georgian center chimney form was combined with the two-story, hip-roof form that became popular during the Federal period.

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36 CFR 800.9 Criteria of Effect & Adverse Effect

[x] (a) Effect: undertaking may alter National Register-qualifying characteristics and features of
[ ] location [x] setting [ ] use

[ ] (b) Adverse effect: may diminish the integrity of [ ] design [ ] setting [ ] materials [ ] workmanship [ ] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[x] (c) Otherwise adverse effects may be considered not adverse:
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: Some benefit will occur by dead-ending Ash Hill Road. Relocation of the driveway through the property and minor slope work, associated with the widening of NH Route 10, will result in a no adverse effect with a 4(f) impact. An alternative which retains access to the existing driveway along the abandoned portion of Ash Hill Road has been evaluated and it has been determined that this does not provide safe and reasonable access into the property.

Mitigation: Recommend, unless objected to by the property owner, not disturbing the existing driveway and keeping it in place along with the proposed new driveway configuration, or developing the new driveway configuration within the property to tie in with the original driveway. The Ash Hill Road pavement is to be removed and the base course left along the abandoned portion of the road to the extent practicable.

NHDHR Inventory # 205

CODE

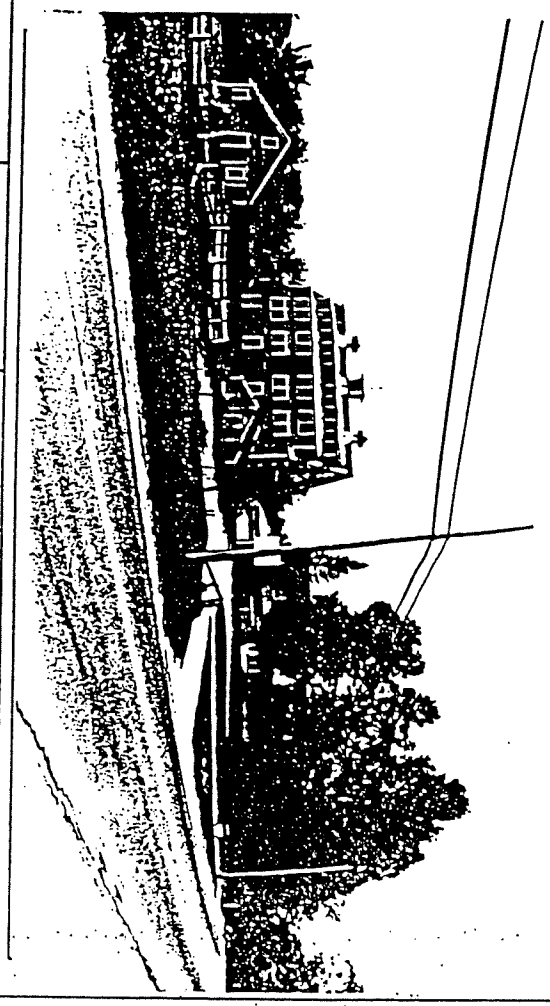
NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES - INVENTORY FORM

Included in Area	-	
Town/City	Swanzey/Keene	S26/
County	Cheshire	K01 03C
Address	5 West Swanzey Road (Route 10)	
Current Owner	CFX Bank	
Property Name	Smith/Wilder/Bardwell Farm	
Acreage	1.43+15 (Swanzey)+1.36 (Keene)	
Tax map/parcel #	38/1+38/2 (Swanzey)+85-1/20 (Keene)	
UTM ref.	19.720760.4754220	
USGS Quadrangle	Keene, NH-VT scale 1:25 000	
Use: present	residence/farm	DOM/ AGR
original	residence/farm	DOM/ AGR

Exterior building materials:

Roof: asphalt	ASP	Walls: clapboard	WWB
Foundation: brick	BRI	Chimney: brick	BRI
# of stories: 1 1/2	-	Roof shape: gable	-
Chimney location: ridge	-	Entry location: sidehall	-
Window type: 2/2	-	Plan configuration: rectangle	-

Major alterations	see text
Condition	good
Outbuildings	barns with sheds, garage
Setting	rural, busy highway
Architect/Builder	unknown
source	-
Original construction date	c.1909
source	see text
[X] multiple building campaigns (see text)	
Style	Queen Anne LVQ
Moved	no date -
Surveyor	Lynne Emerson Monroe
Recorded by	Kari Laprey/ T.Hill
Date of field survey	June 1997



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photograph date: June 1997
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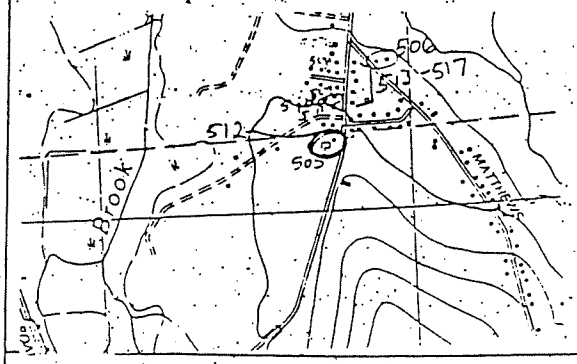
Negative stored at: NHDOT

Location map indicate North with arrow



Property map indicate North with arrow

SEE SHEET II

(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project: Keene-Swanzey
Date of group review: 9/24/97, 10/22/97, 11/19/98
Participants: NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.

Inventory #: 505
Area:
Town / City: Swanzey

Property name: Smith/Wilder/Bardwell Farm

County: Cheshire

Address: 5 West Swanzey Road
Agency: NHDOT, NHS-STP-T-F-011-1(4), 10309

Reviewed for: [X] **R&C**

Individual Properties
NR SR
[x] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[ ] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts
NR SR
[ ] [ ] Eligible
[ ] [ ] Not eligible
[x] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [x] A (Event) [ ] B (Person) [x] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: Map/parcel: Swanzey 38/1 & 38/2, 1.43 acres & 15.0 acres; Keene 85-1/20, 1.36 acres

Significance: The Smith/Wilder/Bardwell Farm is significant under Criterion A for its association with dairying, poultry farming and boardinghouse tourism in the early 20th century. The farm reflects the changing trends in agricultural history during that period. There are very few intact farm properties remaining in the outlying areas of Keene or Swanzey. The farm is of interest under Criterion C for its farm architecture. The large dairy barn, converted to a poultry barn is of particular note.

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36 CFR 800.9 Criteria of Effect & Adverse Effect

[ ] (a) **Effect:** undertaking may alter National Register-qualifying characteristics and features of
[ ] location [ ] setting [ ] use

[ ] (b) **Adverse effect:** may diminish the integrity of [ ] design [x] setting [ ] materials [ ] workmanship [ ] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

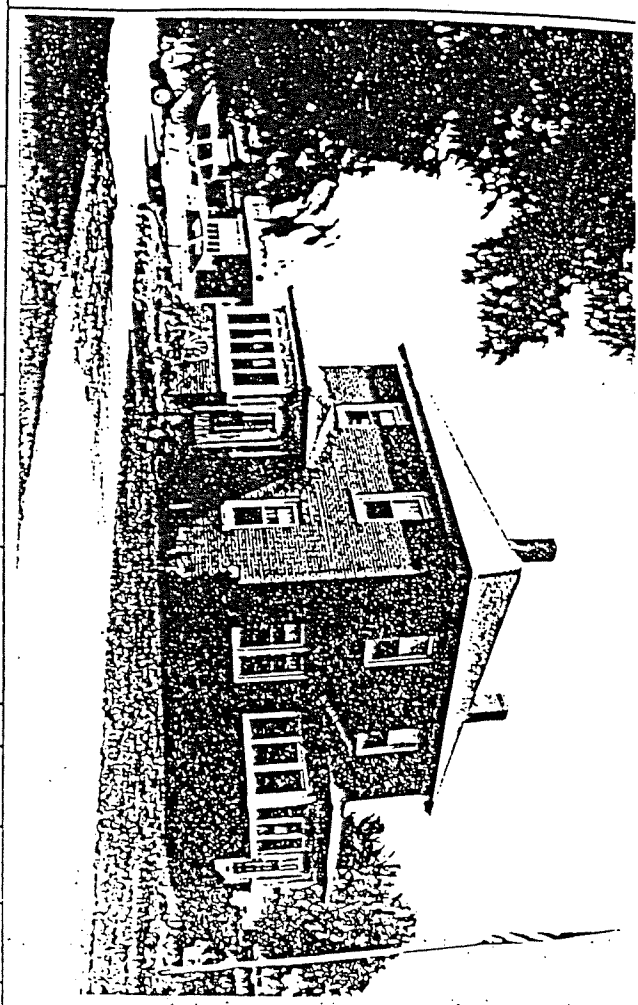
[ ] (c) **Otherwise adverse effects may be considered not adverse:**
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: The project limits have been changed. The project will end prior to the property. No slope encroachments or ROW acquisitions will occur on the property resulting in no effect, no 4(f) impacts.

Mitigation:

NHDHR Inventory # 508		CODE
Included in Area	D	
Town/City	Keene	K01
County	Cheshire	03C
Address	523 Winchester Street (Route 10)	
Current Owner	Sturtevant, Alice & Walter	
Property Name	MacDonald/Bergeron House	
Acreage	0.35	
Tax map/parcel #	85-1/7	
UTM ref.	19.720740.4754460	
USGS Quadrangle	Keene, NH-VT scale 1:25000	
Use: present	domestic	DOM
original	domestic	DOM

NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES - INVENTORY FORM



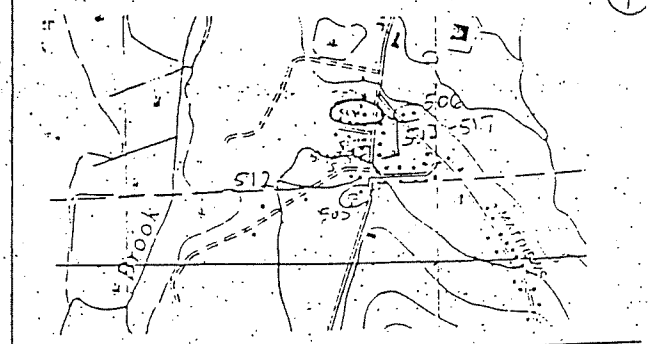
photographer facing: NW
photograph date: June 1997
roll# 16 frame# 8
negative stored at: NHDOT

Exterior building materials:

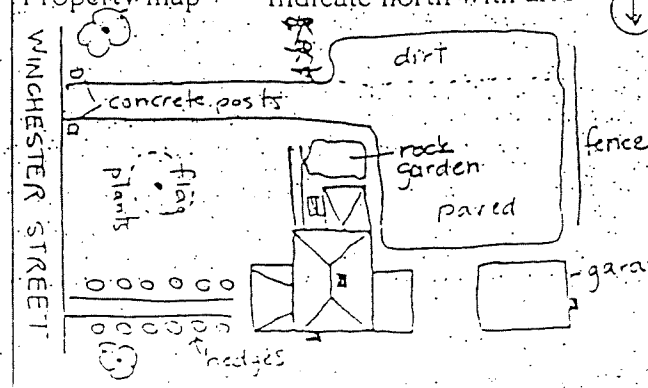
Roof: asphalt	ASP	Walls: brick	BRI
Foundation: brick	BRI	Chimney: brick	BRI
# of stories: 2		Roof shape: hip	
Chimney location: behind ridge, ext.		Entry location: sidehall	
Window type: 4/1		Plan configuration: square	

Major Alterations	-	
Condition	good	
Outbuildings	garage	
Setting	busy road, residential area	
Builder	Theodore Bergeron	
source	(Sturtevant 1997)	
Original construction date	c.1926	
source	see text	
☐ multiple building campaigns (see text)		
Style:	Square House	AAS
Moved?	no date -	
Surveyor	Lynne Emerson Monroe	
Recorded by	Kari Ann Lapre, T. Hill	
Date of field survey	June 1997	

Location map indicate north with arrow



Property map indicate north with arrow



(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project:	Keene-Swanzey	**Inventory #:**	508
Date of group review:	9/24/97, 10/22/97, 11/19/98	**Area:**	
Participants:	NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.	**Town / City:**	Keene
Property name:	MacDonald/Bergeron House	**County:**	Cheshire
Address:	523 Winchester Street		
Agency:	NHDOT, NHS-STP-T-F-011-1(4), 10309	**Reviewed for:**	[X] R&C

Individual Properties
NR SR
[x] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[ ] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts
NR SR
[ ] [ ] Eligible
[x] [ ] Not eligible
[ ] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [ ] A (Event) [ ] B (Person) [x] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: Map/parcel 85-1/7 0.35 acres

Significance: The MacDonald/Bergeron house is eligible as an example of the Square House type, widely popular in Keene in the early 20th century. The house is significant for its brick construction and as the work of an identified contractor. The house reflects the common characteristic elements of the Square House type in its two story with hip roof form, and period details such as the 4/1 windows and sun porches. More importantly, it reflects variation within the class as one of only two identified brick Square Houses in Keene, both of which were built by Theodore Bergeron.

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36 CFR 800.9 Criteria of Effect & Adverse Effect

[x] (a) **Effect:** undertaking may alter National Register-qualifying characteristics and features of
[ ] location [x] setting [ ] use

[x] (b) **Adverse effect:** may diminish the integrity of [ ] design [x] setting [ ] materials [ ] workmanship [ ] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[ ] (c) **Otherwise adverse effects may be considered not adverse:**
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: Slope encroachment, ROW acquisition and removal of landscaping on the property required for the widening of Winchester Street will result in an adverse effect and a 4(f) impact. NH DOT and FHWA have incorporated lane reductions north of Matthews Road to lessen impacts to the property. Widening to the east is not advisable due to the streetscape of large mature trees, the elimination of these would further alter the historic setting of the property.

Mitigation: A landscaping plan will be developed to the extent practicable subject to review by the NH DHR and FHWA. Relocation of the concrete posts will be considered.

November 19, 1998, November 13, 1997, October 22, 1997, September 24, 1997

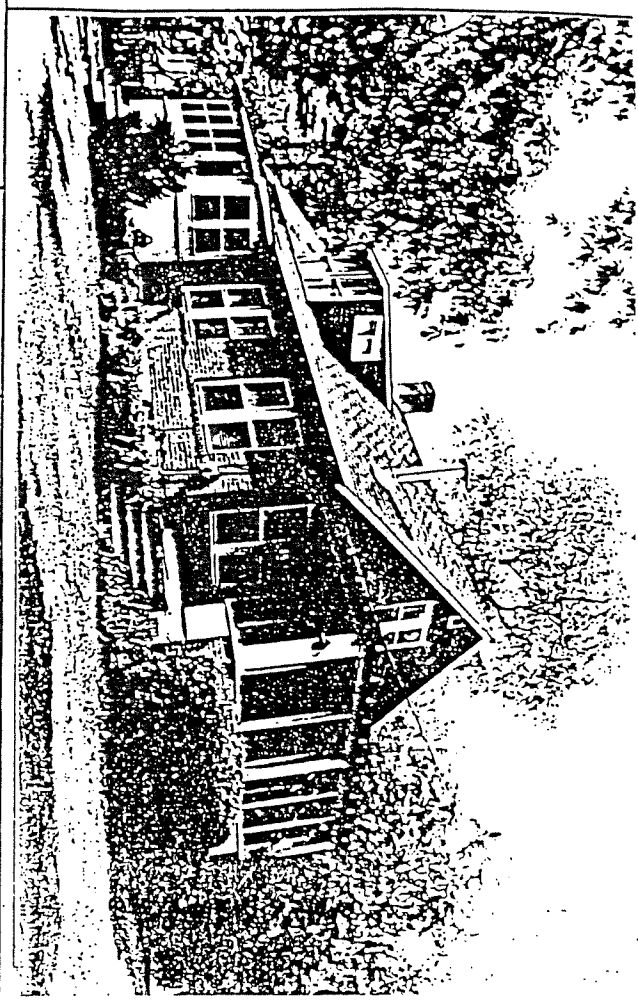
NHDHR Inventory # 509

NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES - INVENTORY FORM

		CODE
Included in Area	D	
Town/City	Keene	K01
County	Cheshire	03C
Address	531 Winchester Street (Route 10)	
Current Owner	Powers, Stephanie	
Property Name	-	
Acreage	0.5	
Tax map/parcel #	85-1/2	
UTM ref.	19.720720.4754380	
USGS Quadrangle	Keene, NH-VT scale 1:25000	
Use: present	domestic	DOM
original	domestic	DOM

Exterior building materials:

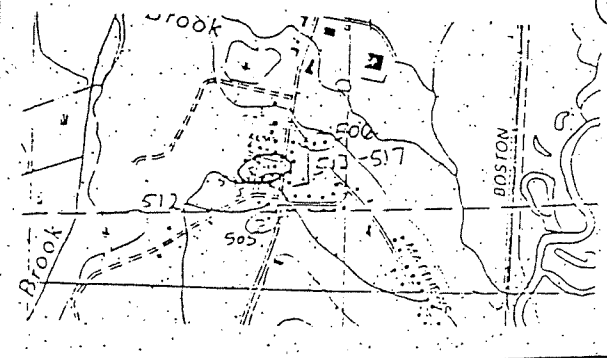
Roof: asphalt	ASP	Walls: brick	BRI
Foundation: concrete block	CON	Chimney: brick	BRI
# of stories: 1½		Roof shape: gable	
Chimney location: ridge		Entry location: center gable	
Window type: 3/1, 2/1 (gable)		Plan configuration: rectangle	



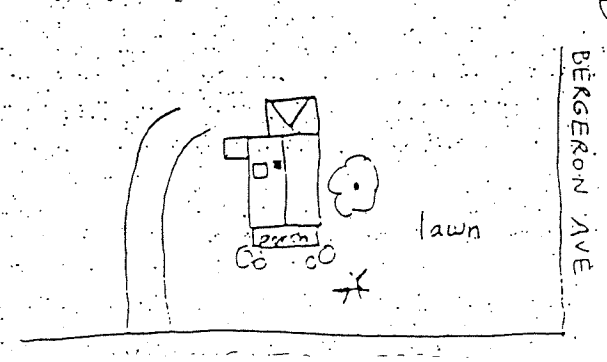
photographer facing: NW
photograph date: June 1997
roll# 16 frame# 10
negative stored at: NHDOT

Major Alterations	-	
Condition	good	
Outbuildings	attached garage	
Setting	residential, busy highway	
Architect/Builder	Theodore Bergeron	
source	(Sturtevant 1997)	
Original construction date	c.1930	
source	see text	
☐ multiple bulding campaigns (see text)		
Style:	Bungalow	ABG
Moved?	no date -	
Surveyor	Lynne Emerson Monroe	
Recorded by	Kim And Laprey/ T.Hill	

Location map indicate north with arrow



Property map indicate north with arrow



(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project: Keene-Swanzey
Date of group review: 9/24/97, 10/22/97, 11/19/98
Participants: NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.

Inventory #: 509
Area:
Town / City: Keene

Property name:

County: Cheshire

Address: 531 Winchester Street
Agency: NHDOT, NHS-STP-T-F-011-1(4), 10309

Reviewed for: [X] R&C

Individual Properties
NR SR
[x] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[ ] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts
NR SR
[ ] [ ] Eligible
[x] [ ] Not eligible
[ ] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [ ] A (Event) [ ] B (Person) [x] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: Map/parcel 85-1/2 0.5 acres

Significance: The house is eligible as a good example of the Bungalow house type, widely popular in Keene in the early 20th century. Characteristic of the style are the front porch, exposed rafters and 3/1 window sash. The house is notable as one of a relatively small number of brick houses of this period and type. It is also significant for its documentation of brick construction methods and as the work of an identified mid-and late 20th century contractor, Theodore Bergeron.

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36 CFR 800.9 Criteria of Effect & Adverse Effect

[x] (a) **Effect:** undertaking may alter National Register-qualifying characteristics and features of
[ ] location [x] setting [ ] use

[ ] (b) **Adverse effect:** may diminish the integrity of [ ] design [ ] setting [ ] materials [ ] workmanship [ ] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[x] (c) **Otherwise adverse effects may be considered not adverse:**
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: Slope encroachment and ROW acquisition on the property required for the widening of Winchester Street will result in no adverse effect and a 4(f) impact. Widening to the east is not advisable due to the streetscape of large mature trees, the elimination of these would further alter the historic setting of the property. The lenght of sidewalk along the west side of Winchester Street will end at Bergeron Avenue, lessening impacts to the property.

Mitigation: Restoration of the lawn area will occur.

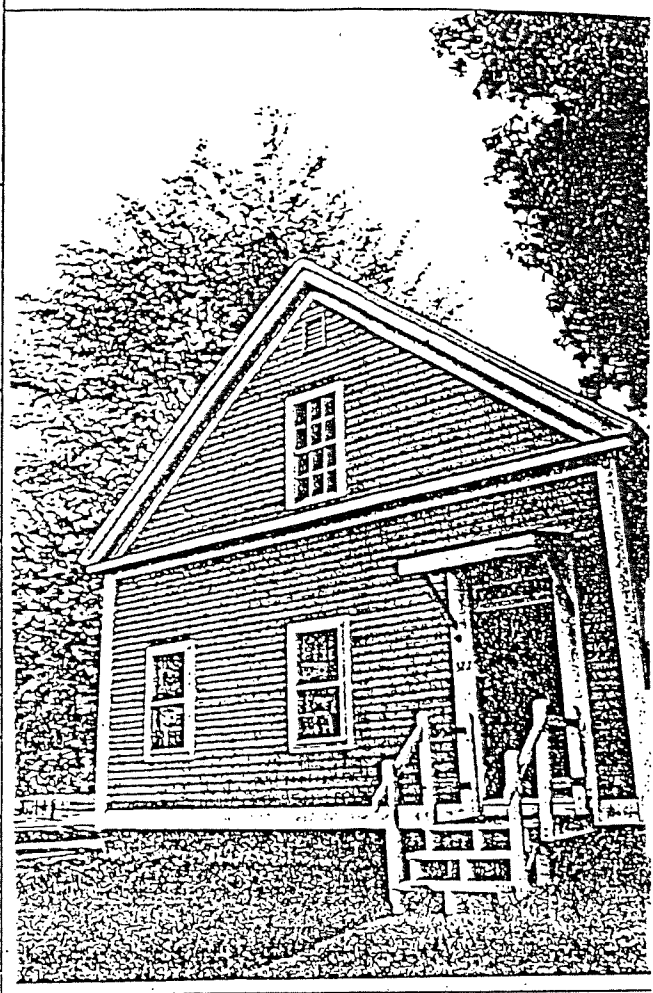
NHDHR Inventory # 526

NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES - INVENTORY FORM

		CODE
Included in Area	-	
Town/City	Keene	K01
County	Cheshire	03C
Address	332 Winchester Street	
Current Owner	Keene State College	
Property Name	Daniel Goodnow House	
Acreage	6.75	
Tax map/parcel #	165-1/3	
UTM ref.	19.721240.4755840	
USGS Quadrangle	Keene, NH-VT scale 1:25000	
Use: present	vacant offices	EDU
original	domestic/farm	DOM/ AGR

Exterior building materials:

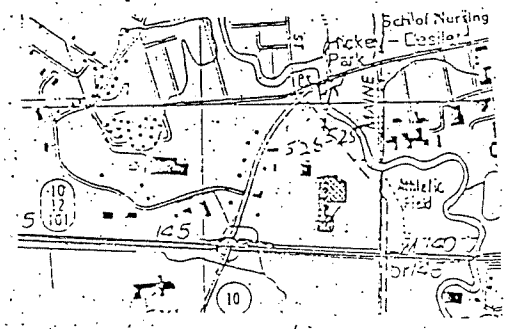
Roof: slate, asphalt	STT ASP	Walls: clapboard	WWB
Foundation: granite block	STG	Chimney: brick	BRI
# of stories: 1½		Roof shape: gable	
Chimney location: off ridge, ell		Entry location: sidehall	
Window type: 6/6, 3/3		Plan configuration: rectangle	



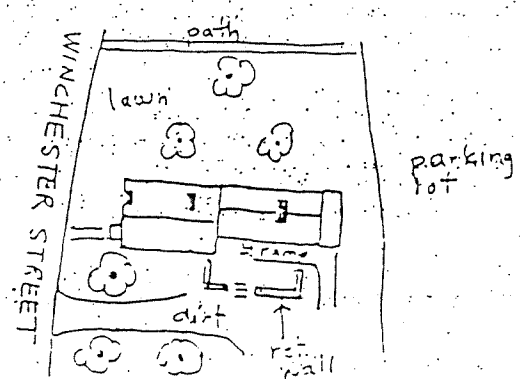
photographer facing: NE
photograph date: June 1997
roll# 17 frame# 21
negative stored at: NHDOT

Major Alterations	rear addition, handicap ramp	
Condition	good	
Outbuildings	none	
Setting	modern commercial strip	
Architect/Builder	unknown	
source	-	
Original construction date	c.1840	
source	see text	
☐ multiple bulding campaigns (see text)		
Style:	Greek Revival	MGR
Moved?	no date -	
Surveyor	Lynne Emerson Monroe	
Recorded by	Kari Ann Laprey/ T.Hill	
Date of field survey	June 1997	

Location map indicate north with arrow



Property map indicate north with arrow



(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project: Keene-Swanzey
Date of group review: 9/24/97, 10/22/97
Participants: NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.

Inventory #: 526
Area:
Town / City: Keene

Property name: Daniel Goodnow House

County: Cheshire

Address: 332 Winchester Street
Agency: NHDOT, NHS-T-F-011-1(4), 10309

Reviewed for: [X] R&C

Individual Properties
NR SR
[x] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[ ] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts
NR SR
[ ] [ ] Eligible
[ ] [ ] Not eligible
[x] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [ ] Setting [x] Materials [x] Workmanship [x] Feeling [ ] Association

Criteria: [ ] A (Event) [ ] B (Person) [x] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: Footprint of house

Significance: The Daniel Goodnow House is notable for its exceptional use of the kneewall frame with "eyebrow" or "kneewall" windows in each sidehall bay, to light a fully-developed second story. The house has an unusual variation of the sidehall plan, with the chimney located at the front wall, between the two windows of the front elevation and just behind the pedimented gable. The Daniel Goodnow House appears to represent a conjunction and vernacular interpretation of the three important elements of early 19th century domestic architecture in New Hampshire: the "three-room" or "Hemenway" plan, derived from the medieval "hall and parlor" type; the kneewall form of the 1 1/2 story cottage type; and Greek Revival idioms, expressed in the pedimented gable and sidehall entrance. It appears to be a part of a kneewall building tradition, based on Dutch precedents from New York, that came into New Hampshire from the west and - as here - merged with the local vernacular forms.

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36 CFR 800.9 Criteria of Effect & Adverse Effect

[x] (a) **Effect:** undertaking may alter National Register-qualifying characteristics and features of [x] location [x] setting [x] use

[x] (b) **Adverse effect:** may diminish the integrity of [x] design [x] setting [x] materials [x] workmanship [x] feeling [x] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[ ] (c) Otherwise adverse effects may be considered not adverse:
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: The proposed physical destruction of the house as a result of the proposed widening and relocation of Winchester Street will result in an adverse effect and a 4(f) impact.

Mitigation: HABS documentation will be undertaken and the house will be marketed for removal and preservation off-site with covenants, to ensure retention of the house's significant historic features. If the house is not successfully marketed with covenants, it will be marketed without covenants.

November 13, 1997, October 22, 1997, September 24, 1997

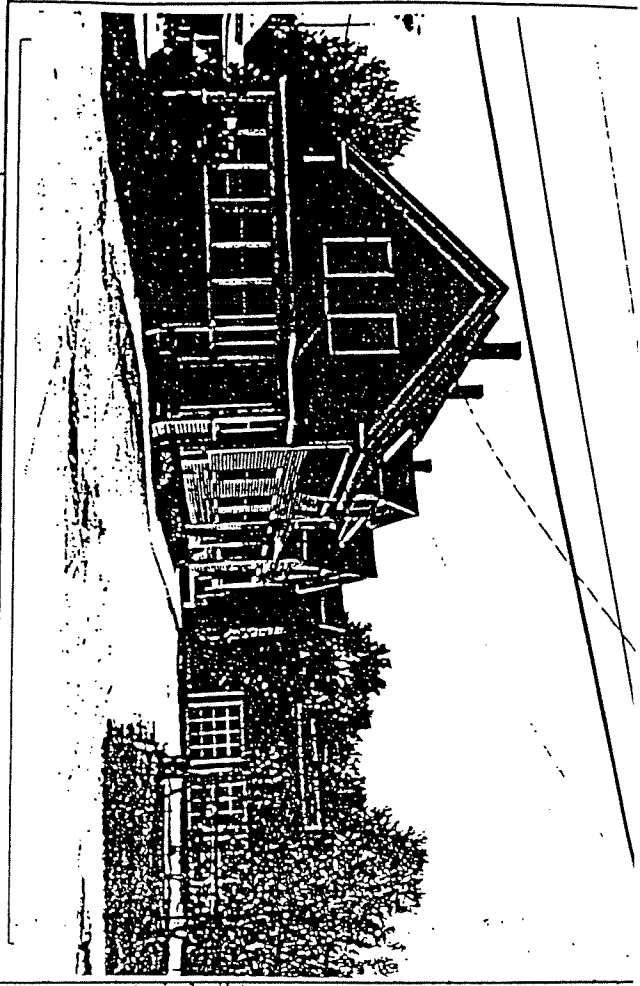
NHDHR Inventory # 539

NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES - INVENTORY FORM

		CODE
Included in Area	B	
Town/City	Keene	K01
County	Cheshire	03C
Address	158 Island Street	
Current Owner	Cappellucci, Ralph	
Property Name	Driscoll House & Farm	
Acreage	0.824	
Tax map/parcel #	51-3/11	
UTM ref.	19.721300.4756140 (approx.)	
USGS Quadrangle	Keene, NH-VT scale 1:25000	
Use: present	apartments	DMD
original	domestic/farm	DOM/ AGR

Exterior building materials:

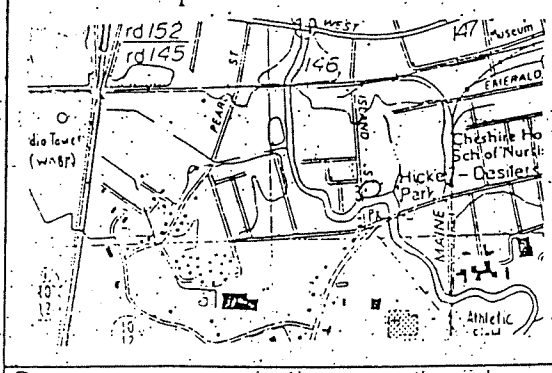
Roof: asphalt	ASP	Walls: clapboard	WWB
Foundation: brick	BRI	Chimney: brick	BRI
# of stories: 1½		Roof shape: gable	
Chimney location: ridge		Entry location: sidehall	
Window type: 2/2		Plan configuration: rectangle	



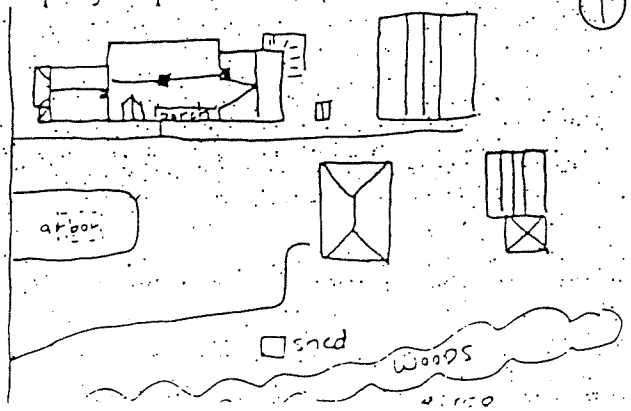
photographer facing: NE
photograph date: July 1997
roll# 18 frame# 18
negative stored at: NHDOT

Major Alterations	see text	
Condition	good	
Outbuildings	(2) barns, garage, (2) sheds	
Setting	busy residential through street	
Architect/Builder	unknown	
source	-	
Original construction date	c.1878	
source	see text	
[X] multiple bulding campaigns (see text)		
Style:	Victorian era	LVT
Moved?	no date -	
Surveyor	Lynne Emerson Monroe	
Recorded by	Kari Ann Laprey	
Date of field survey	July 1997	

Location map indicate north with arrow



Property map indicate north with arrow



(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project:	Keene-Swanzey	**Inventory #:**	539
Date of group review:	9/24/97, 10/22/97	**Area:**	
Participants:	NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.	**Town / City:**	Keene
Property name:	Driscoll House and Farm	**County:**	Cheshire
Address:	158 Island Street		
Agency:	NHDOT, NHS-T-F-011-1(4), 10309	**Reviewed for:**	[X] R&C

Individual Properties

NR SR
[x] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[ ] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts

NR SR
[ ] [ ] Eligible
[x] [ ] Not eligible
[ ] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [x] A (Event) [ ] B (Person) [ ] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: Map/parcel 51-3/11 0.824 acres

Significance: The Driscoll House and Farm is eligible as a dairy operation by an immigrant family in a residential neighborhood. Nationally, technology and legislation were encouraging farmers. Locally, in the 1920's, the population increased at double the rate of the preceding decades, creating a demand for fresh milk. The buildings extant on the farm reflect various aspects of the milk dealing business. The most important is the gambrel roofed barn, an example of the most common dairy barn type of the period. The dairy or milk room was located in an older structure attached to the ell off the back of the house. Separate milk rooms became common during the early 20th century when they were mandated by state and city regulations intended to prevent the spread of tuberculosis. Regulations required that milk be placed into its final delivery container in the milk room. The location of the farm within the center of Keene reflects the importance of market proximity, due to the perishability of fresh milk and reduced transportation costs. It would have been convenient to stable and milk the cows so close to the milk routes, while bringing feed in from outlying areas.

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36 CFR 800.9 Criteria of Effect & Adverse Effect

[x] (a) Effect: undertaking may alter National Register-qualifying characteristics and features of
[ ] location [x] setting [ ] use

[x] (b) Adverse effect: may diminish the integrity of [ ] design [x] setting [ ] materials [ ] workmanship [ ] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[ ] (c) Otherwise adverse effects may be considered not adverse:
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings;* or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: Slope encroachment and ROW acquisition required for the widening of Island Street will result in an adverse effect and 4(f) impacts.

Mitigation: Fill slopes for the proposed bridge abutment will be designed to minimize impacts to the extent practicable.

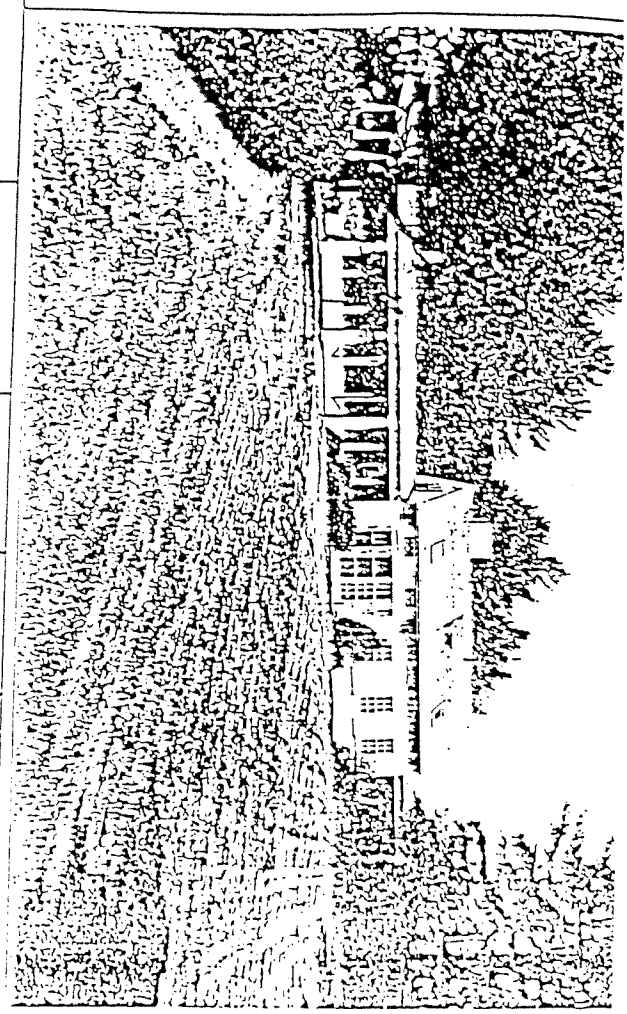
November 13, 1997, October 22, 1997, September 24, 1997

Included in Area	-	
Town/City	Keene	K01
County	Cheshire	03C
Address	73 Base Hill Road	
Current Owner	Anne Jacobs Trust	
Property Name	The Bounty (Barry Faulkner House & Studio)	
Acreage	22.6 + 3.8	
Tax map/parcel #	911-13-23 + 911-13-7	
UTM ref.	19.719180.4755680	
USGS Quadrangle	Keene, NH-VT scale 1:25 000	
Use: present	residence	DOM
original	summer residence/ artist's studio	DOM/ CTP

Exterior building materials:

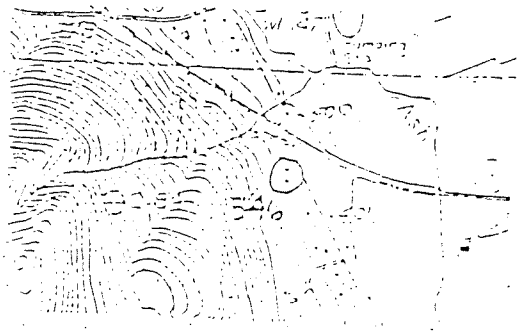
Roof: wood shingle metal	WSH MET	Walls: clapboard	WWB
Foundation: brick	BRI	Chimney: brick	BRI
# of stories: 1 ½	-	Roof shape: gable	-
Chimney location: front wall	-	Entry location: center	-
Window type: 6/6	-	Plan configuration: rectangle	-

Major alterations	-
Condition	good
Outbuildings	garage, studio, new garage
Setting	landscaped yard
Architect/Builder	Eric Cugler
source	(Faulkner 1973)
Original construction date	(c.1840) c.1937-38
source	see text
[X] multiple building campaigns (see text)	
Style	Colonial Revival RCR
Moved	no date -
Surveyor	Lynne Emerson Monroe
Recorded by	Karl Laprey/T.Hill
Date of field survey	[illegible]



photographer facing: NE
photograph date: June 1997
roll# 22 frame# 7
Negative stored at: NHDOT

Location map: indicate North with arrow



Property map: indicate North with arrow

SEE SHEET 10

(July 1993)

NHDHR Determination of Eligibility / Effect (36 CFR 800)

Project:	Keene-Swanzey	**Inventory #:**	546
Date of group review:	9/24/97, 10/22/97	**Area:**	
Participants:	NHDHR, NHDOT, FHWA, McFarland-Johnson, Elizabeth D. Hengen, Preservation Co.	**Town / City:**	Keene
Property name:	The Bounty (Barry Faulkner House & Studio)	**County:**	Cheshire
Address:	73 Base Hill Road		
Agency:	NHDOT, NHS-T-F-011-1(4), 10309	**Reviewed for:**	[X] R&C

Individual Properties

NR SR
[x] [ ] Eligible (district N/A)
[ ] [ ] Eligible, also in district
[ ] [ ] Eligible, only in district
[ ] [ ] Not evaluated for individual eligibility
[ ] [ ] Listed in the National Register of Historic Places

Districts

NR SR
[ ] [ ] Eligible
[ ] [ ] Not eligible
[x] [ ] Not evaluated as a district
[ ] [ ] Listed in the National Register of Historic Places

Integrity: [x] Location [x] Design [x] Setting [x] Materials [x] Workmanship [x] Feeling [x] Association

Criteria: [x] A (Event) [x] B (Person) [x] C (Architecture) [ ] D (Archaeology) [ ] E (Exception)

Level: [x] Local [ ] State [ ] National

Eligible Acreage: Map/parcel 911-13-23 22.6 acres

Significance: The Bounty is significant under Criterion A for its associations with the regional artists' colonies in the Monadnock region; Barry Faulkner was closely tied to those in Dublin and Cornish. The Bounty is significant under Criterion B as the residence and studio of artist Barry Faulkner. Faulkner was a nationally significant muralist whose work is featured in many significant public buildings, e.g., the nation's capitol and state capitol buildings, as well as private homes. He was also locally significant as a Keene native who painted several murals depicting the city in local buildings. The Bounty is eligible under Criterion C as a good example of the work of Eric Gugler, a nationally renowned architect and is an excellent early 20th century property with summer residence, artist's studio and grounds intact. This residence reflects Gugler's passion for classical formality combined with the special whimsical details inspired by his friends. The complex is a highly successful solution to the job of creating a summer home and studio from an existing farmhouse.

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36 CFR 800.9 Criteria of Effect & Adverse Effect

[ ] (a) Effect: undertaking may alter National Register-qualifying characteristics and features of
[ ] location [ ] setting [ ] use

[ ] (b) Adverse effect: may diminish the integrity of [ ] design [ ] setting [ ] materials [ ] workmanship [ ] feeling [ ] association. Adverse effects include but are not limited to:

(1) physical destruction, damage, or alteration of all / part of the property;
(2) isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
(3) introduction of visible, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4) neglect of a property resulting in its deterioration or destruction; and
(5) transfer, lease, or sale of the property.

[ ] (c) Otherwise adverse effects may be considered not adverse:
(1) When the property is of value only for potential contribution to...research, and when such value can be substantially preserved through...appropriate research...in accordance with professional standards and guidelines;
(2) when the undertaking is limited to rehabilitation of buildings & structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with *The Secretary of the Interior's Standards for Rehabilitation, and Guidelines for Rehabilitating Historic Buildings*; or
(3) when the undertaking is limited to transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Comments: No effect on the property with no 4(f) impacts. Some benefit will occur with the dead ending of Base Hill Road and shifting the intersection with NH Route 9 to the east, away from the property. Extension of the driveway will occur within the highway right-of-way.

Mitigation: Existing landscaping will be maintained in front of the property along Base Hill Road.

Advisory Council On Historic Preservation

ACT/INF		INITIALS/DATE
✓	DA	
✓	ADA	
	BR	
	CS	
	AAE	
✓	AE	
✓	EPM	
	SPM	
	PL	
	TFS	
	PSA	
	SEC	
	OMC	

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

MAY 11 1999

Ms. Kathleen O. Laffey
Division Administrator
Federal Highway Administration
279 Pleasant Street, Suite 204
Concord, NH 033011-7502

REF: Upgrading of Routes 9, 10, 12, and 101
Keene-Swanzey, New Hampshire

Dear Ms. Laffey:

The enclosed Memorandum of Agreement for the referenced project has been accepted by the Council. This acceptance completes the requirements of Section 106 of the National Historic Preservation Act and the Council's regulations. We recommend that you provide a copy of the fully-executed Agreement to the other signatories.

Should you have any questions, please contact me at (202) 606-8532.

Sincerely,

Druscilla J. Null

Druscilla J. Null
Program Analyst
Office of Planning and Review

Enclosure

KEENE-SWANZEY
NHS-STP-T-F-011-1(4)
10309

MEMORANDUM OF AGREEMENT
SUBMITTED TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
PURSUANT TO 36 CFR PART 800.6(a)

WHEREAS, the Federal Highway Administration (FHWA) has determined that upgrading the NH Routes 9, 10, 12 and 101 transportation corridor in the town of Swanzey and the city of Keene will have an effect on the following properties that are eligible for the National Register of Historic Places:

Main Street Historic District, Keene (Area A),
Park-Fairview Historic District, Keene (Area C),
Dickinson/Atwood House, 169 Ash Hill Road, Swanzey (Inventory #503),
MacDonald/Bergeron House, 523 Winchester Street, Keene (Inventory #508),
531 Winchester Street, Keene (Inventory #509),
Goodnow House, 332 Winchester Street, Keene (Inventory #526), and
Driscoll House and Farm, 158 Island Street, Keene (Inventory #539),

and has consulted with the New Hampshire State Historic Preservation Officer (NHSHPO) pursuant to regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, the New Hampshire Department of Transportation (NHDOT) participated in the consultation, has solicited public comment through the public hearing process, and has been invited to concur in this Memorandum of Agreement; and

WHEREAS, following consultations with FHWA and NHSHPO, NHDOT has avoided project impacts to The Bounty (Inv. #546) by retaining the existing driveway access, and to the Smith/Wilder/Bardwell Farm (Inv. #505) by eliminating all work along its NH Route 10/Winchester Street frontage,

NOW, THEREFORE, FHWA and the NHSHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

Stipulations

I. Mitigation of Effects Through Highway Design

A. NHDOT will minimize slope impacts to Inventory #212c in the Main Street Historic District and design the fill slopes for the Island Street bridge over the Ashuelot River in a way that minimizes their impacts to the Driscoll House and Farm (Inv. #539).

B. The project will incorporate lane reductions on Winchester Street north of Matthews Road to lessen property acquisition at the MacDonald/Bergeron House (Inv. #508) and 531 Winchester Street (Inv. #509) and the removal of nearby mature street-side trees. The length of sidewalk along the west side of Winchester Street will end at Bergeron Avenue, lessening impacts to 531 Winchester Street (Inv. #509).

C. NHDOT will work with the property owners of the Dickinson/Atwood House (Inv. #503) to redesign the property's driveway access in a historically sensitive manner. To the extent possible, the location of abandoned portion of Ash Hill Road in front of the Dickinson/Atwood House will be delineated by leaving the base course in place.

II. Mitigation of Effects Through Landscaping

NHDOT will design and implement landscaping plans to lessen the effects of street widening and tree removal in the Main Street Historic District, for Inventory #307 and #308 in the Park-Fairview Historic

District, and for the MacDonald/Bergeron House (Inv. #508). In addition, NHDOT will relocate the retaining wall, plaque and entry walls at Inventory #212a in the Main Street Historic District (Area A). These landscaping plans will be designed in consultation with and approved by NHSHPO and FHWA.

III. Acquisition of Historic Properties

At the current owners' requests, NHDOT will acquire the Elisha Lane House (Inv. #212-a) in the Main Street Historic District and the Daniel Goodnow House (Inv. #526). In the event that the property owner requests acquisition due to a lack of access, NHDOT also will purchase the Elisha Lane Carriage House (Inv. #212-c) in the Main Street Historic District. If the owners of the Daniel Goodnow House elect, the house will be reconveyed to them with protective covenants for relocation. FHWA shall make funds up to the costs of demolishing the structure available for relocation. If said owners do not elect the reconveyance alternative the structure will be marketed to the public for relocation in accordance with Stipulation IV.

IV. Marketing of Historic Properties

A. The Elisha Lane House (Inv. #212-a)

1. Following the reconfiguration of the driveway, which will provide access to two properties in back of the Elisha Lane House, NHDOT will offer the house for sale with preservation and/or maintenance covenants (see Attachment A for draft covenants). NHDOT, in consultation with NHSHPO, will develop a notice to include, at a minimum, the following information:

   a. description of the building;
   b. notice that the building is eligible for the National Register as a contributing element to the Main Street Historic District;
   c. notice that NHDOT will transfer the structure with consideration for the offer that best protects the building's historical values;
   d. notice of the requirement that the building will be transferred subject to covenants regarding its preservation and maintenance (Attachment A), and that it must be maintained in accordance with the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*.

2. The contents of the advertisements, the publications in which they appear, and the frequency of publication must be approved by NHSHPO and FHWA. The advertising period will last a minimum of 60 days.

3. If marketing has not been successful after a period of 30 days from the first day of advertisement, the NHSHPO may approve the conveyance of the house without the preservation and maintenance covenants provided for in Stipulation IV.A.1. Upon such approval, notice of the restrictive covenants may be removed from the advertisements.

B. Daniel Goodnow House (Inv. #526)

1. If the current owners of the Daniel Goodnow House do not elect the reconveyance alternative described in Stipulation III, NHDOT will offer the Daniel Goodnow House for sale to the public with preservation and/or maintenance covenants (see Attachment A for draft). NHDOT, in consultation with NHSHPO, will develop a notice to include, at a minimum, the following:

   a. description of the building;
   b. notice that the building is eligible for the National Register for its architectural significance;
   c. notice that NHDOT will transfer the structure with consideration for the offer that best protects the building's historical values;

d. note that FHWA will make funds up to the cost of demolishing the structure available for moving the structure; and
e. notice of the requirement that the building will be transferred subject to covenants regarding its preservation and maintenance (Attachment A), and that it must be maintained in accordance with the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.*

2. The contents of the advertisements, the publications in which they appear, and the frequency of publication must be approved by NHSHPO and FHWA. The advertising period will last a minimum of 60 days.

3. If marketing has not been successful after a period of 30 days from the first day of advertisement, the NHSHPO may approve the conveyance of the house without the preservation and maintenance covenants provided for in Stipulation IV.B.1. Upon such approval, notice of the restrictive covenants may be removed from the advertisements. If efforts to market the house are unsuccessful, the structure may be demolished, following recordation as described in Stipulation V.

C. The Elisha Lane Carriage House (Inv. #212-c)

1. If NHDOT acquires the Elisha Lane Carriage House, following improvements to its driveway access, NHDOT will offer the building for sale with preservation and/or maintenance covenants (see Attachment A for draft). NHDOT, in consultation with NHSHPO, will develop a notice to include, at a minimum, the following information:

a. description of the building;
b. notice that the building is eligible for the National Register as a contributing element to the Main Street Historic District;
c. notice that NHDOT will transfer the structure with consideration for the offer that best protects the building's historical values, with priority given to relocation within the Main Street Historic District;
d. note that FHWA will make funds up to the cost of demolishing the structure available for moving the structure; and
e. notice of the requirement that the building will be transferred subject to covenants regarding its preservation and maintenance (Attachment A), and that it must be maintained in accordance with the approved approaches in *the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.*

2. The contents of the advertisements, the publications in which they appear, and the frequency of publication must be approved by NHSHPO and FHWA. The advertising period will last a minimum of 60 days.

3. If marketing has not been successful after a period of 30 days from the first day of advertisement, the NHSHPO may approve the conveyance of the carriage house without the preservation and maintenance covenants provided for in Stipulation IV.C.1. Upon such approval, notice of the restrictive covenants may be removed from the advertisements. If efforts to market the carriage house are unsuccessful, NHDOT will offer the Carriage House to the city of Keene for municipal use.

V. Recordation of Historic Properties

Prior to any action addressed under this Memorandum of Agreement to the Elisha Lane House (Inv. #212-a), the Elisha Lane Carriage House (Inv. #212-c) and the Daniel Goodnow House (Inv. #526), NHDOT shall contact the Historic American Buildings Survey (HABS National Park Service (NPS), Chesapeake/Allegheny System Support Office, US Custom House, 200 Chestnut Street, Philadelphia

PA 19106) to determine what level and kind of recordation is required for the property. Unless otherwise agreed to by NPS, NHDOT shall ensure that all documentation is completed and accepted by HABS prior to any disturbance of the property, and that copies of this documentation are made available to NHSHPO and appropriate local archives designated by the NHSHPO.

VI. Protection of Historic Properties

The NHDOT shall ensure that upon acquisition of any historic properties, they are immediately secured and protected against damage, unauthorized occupancy and vandalism until the measures agreed upon in this agreement are implemented. These protective actions may include expedited marketing prior to transfer or leasing or renting the property until its transfer.

VII. Dispute Resolution

Should the NHSHPO object within 30 days to any plans or specifications provided for review or action proposed pursuant to this agreement, FHWA shall consult with the objecting party to resolve the objection. If FHWA determines that the objection cannot be resolved, FHWA shall request the further comments of the Council pursuant to 36 CFR Part 800.6(b). Any Council comment provided in response to such a request will be taken into account by FHWA in accordance with 36 CFR Part 800.6(c)(2) with reference only to the subject of the dispute; FHWA's responsibility to carry out all actions under this agreement that are not the subjects of the dispute will remain unchanged.

Execution of this Memorandum of Agreement by FHWA and NHSHPO, its subsequent acceptance by the Council, and implementation of its terms evidence that FHWA has afforded the Council an opportunity to comment on plans to upgrade the NH Routes 9, 10, 12 and 101 transportation corridor in Swanzey and Keene, New Hampshire, and that FHWA has taken into account the effects of the undertaking on historic properties.

FEDERAL HIGHWAY ADMINISTRATION

By: _____ Date: 4/5/99
NH Division Administrator

NEW HAMPSHIRE STATE HISTORIC PRESERVATION OFFICE

By: Nancy C. Dutton Date: 4/2/1999
NH State Historic Preservation Officer

Concur:

NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

By: _____ Date: 3-31-99
Director of Project Development

ACCEPTED by the Advisory Council on Historic Preservation

By: _____ Date: 5/6/99
(for) Executive Director

Attachment A
Memorandum of Agreement
KEENE-SWANZEY
NHS-STP-T-F-011-1(4)
10309

DRAFT HISTORIC PRESERVATION DEED COVENANTS
December, 1998

The Grantor, the State of New Hampshire, by and through its Department of Transportation, hereby conveys the above-described premises, subject to the terms of the following provisions that are hereby created by the Grantor hereby reserving the following provisions, under New Hampshire Revised Statutes Annotated RSA 477:45-47, and by the Grantor and Grantee hereby covenanting to abide by and enforce the following provisions.

The Grantee, *[name]*, covenants and agrees for himself or herself, his/her heirs, administrators, successors, and assigns, by accepting this deed, that the said herein conveyed premises shall be subject to the following preservation provisions, and to do or refrain from doing thereon or with respect thereto all acts required or prohibited by the said provisions.

1. **Applicability**: The provisions to which the herein conveyed premises are subjected are:

   A. Grantor herein shall mean the State of New Hampshire, by and through its Department of Transportation, its successors or assigns.
   B. Grantee herein shall mean the Grantee of this deed, its heirs, administrators, successors and assigns.
   C. All preservation provisions contained herein shall be binding on both the Grantor and Grantee.
   D. The provisions specified herein shall apply to the herein conveyed premises unless the Grantor provides the Grantee with a specific written waiver for any specific act in contravention thereof.
   E. The burden of these provisions shall run with the land *[and/or buildings]* and shall be binding upon all owners of any interest therein. The right of enforcement of these provisions by the Grantor shall be as provided in New Hampshire Revised Statutes Annotated RSA 477:45-47 (Chapter 391, Laws of 1973, and Chapter 301, Laws of 1979), and as such statutes may be amended. The benefit of the provisions and the right to enforce them shall be assignable by the Grantor to any governmental body or any entity whose purposes include preservation of structures or sites of historical significance; and if the Grantor ceases to exist without having so assigned the benefit and right to enforce the provisions, then a qualified successor to the Grantor may be named by a New Hampshire court of competent jurisdiction.

2. **General Intent**: In the event the Grantor and Grantee have a difference of opinion about the meaning of a specific term or condition recited below, they shall be guided in interpretation by:

   A. The purpose of these preservation provisions is to preserve the significance, integrity, and architectural and historical values that make the property eligible for the National Register of Historic Places.
   B. All changes to the premises subject to these provisions will be in the spirit of contributing to the public purpose of protecting and preserving the premises in conformance with the Standards for Review (below), or as required by local, state, and federal legislation for the public benefit.
   C. The provisions shall apply to the exterior of the building. Insofar as feasible, repair, replacement, alterations and additions should be made in-kind, with forms and materials

that match or are compatible with the historic forms and materials; except that exterior color choices are not subject to these provisions.

OR

C. Interior features of architectural or historical interest shall be preserved and maintained.

OR

C. The preservation provisions shall not apply to the interior of the buildings on the premises, unless change to the interior would cause change to the exterior; in which case only the exterior aspect of the changes would be subject to these provisions.

D. Auxiliary buildings, such as a garage, barn, tool shed, greenhouse, etc., will be allowed on the property only as incidental to the main house.

E. When requested, the Grantor, through its State Historic Preservation Office, shall give freely of advice pertaining to the maintenance, repair, restoration or rehabilitation of the house and grounds.

3. **Interpretation**: In the event of a disagreement between Grantor and Grantee as to the interpretation or application of these provisions, either party may request that the matter be submitted to binding arbitration, or in the event that either party does not wish to submit to binding arbitration, Grantor or Grantee may petition to the Cheshire County Superior Court for relief.

4. **Standards for Review**: The Grantor shall consider the following Standards for Review in exercising any authority created by these provisions to inspect the property subject to these provisions, and to review and approve any proposed construction, alteration, rehabilitation, relocation, demolition, change in use, subdivision, sale, or other transfer of property rights:

A. [itemized list of photographs documenting the appearance and condition of the premises at the time of the execution of the preservation provisions].

B. *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (1995)*, as they may be amended from time to time. Copies of the *Standards* are on file with the Grantor and the State Historic Preservation Office.

5. **Inspection and Compliance**: The Grantee agrees that the State of New Hampshire, by and through its Division of Historical Resources/State Historic Preservation Office, shall have the right to inspect the property subject to this easement at reasonable times, to ascertain whether these provisions are being met.

6. **Maintenance and Administration**: The Grantee agrees to assume the total costs of continued maintenance, repair, and administration of the property, in a manner that complies with *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (1995)* so as to preserve the architectural, historical and/or cultural integrity of the features, materials, appearance, workmanship and environment, in order to protect and enhance those significant characteristics that make it eligible for the National Register of Historic Places. The Grantee shall maintain the property at all times and keep it in a state of good repair, and shall not allow the appearance of the property to deteriorate in any material way. Nothing herein shall prohibit the Grantee from seeking financial assistance from any source.

7. **Alterations**: The Grantee agrees that no alterations shall be made to the existing structure and premises without the prior written consent of the Grantor, by and through its Division of Historical Resources/State Historic Preservation Office, its successors or assigns, except for:

A. ordinary repair and maintenance to conserve architectural, historical and/or cultural values; or

B. actions required to mitigate a casualty or other emergency promptly reported to the Division of Historical Resources/State Historic Preservation Office, its successors or assigns.

8. **Notification and Approval**: The Grantee shall notify the Grantor, by and through its Division of Historical Resources/State Historic Preservation Office, in writing, when proposing any of the activities described above, with the exception of 7.A. and 7.B., at least sixty (60) days in advance of the start of work, in sufficient detail for the Grantor to make a reasoned judgment as to their appropriateness. The Grantor shall review the proposal for work and approve, disapprove, or approve with modifications the work in writing within thirty (30) days of the receipt of the notice. Failure of Grantor to notify Grantee of approval, disapproval, or approval with modifications within thirty (30) days shall constitute approval. Only work approved by the Grantor shall be undertaken. The Grantee shall permit the Grantor access during such work to insure its proper performance.

9. **Change of Use, Subdivision, or Transfer**: The Grantee agrees that the use of the property subject to these preservation provisions, shall not be changed; nor shall it be subdivided; nor shall easements or other property rights be granted, sold, or transferred, without the prior written consent of the Grantor, by and through its Division of Historical Resources/State Historic Preservation Office, its successors or assigns. In the event a transfer of the property is proposed, the Grantee shall notify the Grantor in writing at least 90 days before such transfer. Said notice shall contain the identity of the proposed transferee, its intentions for use of the premises, and the agreed upon price. Should the Grantor so desire, Grantor in its sole discretion, may exercise its option to purchase the premises from Grantee at the price agreed upon between Grantee and its prospective transferee. Should Grantor fail to notify Grantee of its intention to repurchase within 45 days prior to the proposed sale, Grantor shall lose that right with regard to said Grantee, but retains the right to exercise such option upon subsequent conveyances.

10. **Enforcement**: This Historic Preservation Deed Easement shall be a binding servitude and run with the land and be binding upon the Grantee, its heirs, successors, transferees, and assigns, in perpetuity. These provisions shall be inserted by the Grantee, its heirs, successors, transferees, and assigns, verbatim or by express reference, in any deed or other legal instrument by which it divests itself of either the fee simple title or any lesser estate in the property, or any part thereof.

11. **Exclusion**: The Grantee agrees that the Grantor, by and through any of its agencies, in no way assumes any obligation whatsoever for maintaining, repairing or administering the property.

12. **Continuation**: In the event that the property is damaged or destroyed through the willful action or negligence of the Grantee, the Grantor shall initiate legal and appropriate administrative or judicial actions.

13. **Grantee Liability**: The Grantee covenants to indemnify and hold harmless the State of New Hampshire (Grantor) from and against any losses suffered by the Grantor and any claims, liabilities, or penalties asserted against the Grantor by or on behalf of any person on account of, based on, resulting from or arising out of (or which may be claimed to have arisen out of) acts or omissions of the Grantee relating to this easement. Nothing herein contained shall be construed to be a waiver of the sovereign immunity of the State of New Hampshire.

14. **Exercise of Rights and Remedies**: Failure of the Grantor to exercise any right or remedy granted under this Historic Preservation Deed Easement shall not have the effect of waiving or limiting the exercise by the Grantor of any other right or remedy or the invocation of such right or remedy at any other time.

15. **Reparability**: Any portion of this Historic Preservation Deed Easement found to be contrary to law shall not invalidate any other portions or the whole of this Easement.

16. **Other Conditions**: NONE.

APPENDIX D
HEARING REPORTS

REPORT OF THE COMMISSIONER

KEENE - SWANZEY
NHS-STP-T-F-011-1(4)
10309

NH RTE 9, 10, 12, & 101
BYPASS UPGRADE

PUBLIC HEARING

April 8, 1998 **Keene State College (Young Student Center)** **7:00 P.M.**

AS A RESULT OF THE PUBLIC HEARING ON THE ABOVE REFERENCED PROJECT, THE FOLLOWING LAYOUT IS ESTABLISHED AS SHOWN ON THE PROJECT HEARING PLANS:

Beginning at a point in the existing traveled way of NH Route 9 approximately four-tenths (0.4) of a mile west of its intersection with Base Hill Road, then running easterly for approximately three (3.0) miles along NH Routes 9, 10, 12, & 101, and ending at a point in the existing traveled way of NH Route 101 approximately one-third (0.33) of a mile east of its intersection with Optical Avenue.

The layout includes reconstruction of the existing NH Routes 9, 10, & 12 interchange and extends southerly approximately one and seven tenths (1.7) miles through the West Street interchange to the NH Routes 9, 10, 12, & 101 intersection at the end of the existing Keene By-Pass.

The layout also includes the reconstruction of Winchester Street beginning at its intersection with Island Street and Pearl Street, and extending southerly along Winchester Street approximately one and five tenths (1.5) miles to a point in the existing traveled way of Winchester Street approximately two-tenths (0.2) of a mile south of its intersection with Matthews Road at the Keene/Swanzey Town Line.

The layout also includes reconstruction of Main Street beginning at its intersection with Appleton Street and extending southerly three tenths (0.3) of a mile along NH Route 12 (Main Street) to the NH Route 12 bridge over the Branch River.

The layout also includes reconstruction and relocation of a section of NH Route 12 beginning at a point in the existing traveled way two-tenths (0.2) of a mile south of its intersection with NH Route 32, then running northerly on a new location approximately four-tenths (0.4) of a mile to a new intersection with NH Route 101 and Optical Avenue.

The layout also includes the reconstruction of the NH Route 10, Ash Hill Road and Base Hill Road intersection in the Town of Swanzey, including the southerly relocation of Ash Hill Road to be opposite Whittemore Farm Road.

REPORT OF THE COMMISSIONER

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FURTHERMORE, AS A RESULT OF THE ABOVE REFERENCED PUBLIC HEARING, THE LIMITATION OF ACCESS ALONG THIS HIGHWAY CORRIDOR SHALL REMAIN AS ESTABLISHED UNDER KEENE, P-3185, P-3435-A, P-3435-B, P-3435-C, P-3436, P-3436-A, P-2962-B, P-2962-J AND KEENE-SWANZEY, P-3234 AND P-1583 PROJECTS. THE FOLLOWING LIMITATION OF ACCESS IS ESTABLISHED AT PROPERTIES WHERE ALTERATIONS ARE REQUIRED BY THE LAYOUT:

NH RTE 9, 10, 12 & 101 (EAST/WEST HIGHWAY CORRIDOR)
CITY OF KEENE

ANN F. JACOBS TRUST (NH RTE 9 STA. 122+00, RT.)
JACOBS, ANN F. & CARL B., TRUSTEES
(Parcel 10) Zero (0) point of access along NH Rte 9. Access provided via Base Hill Road.

STATE OF NEW HAMPSHIRE (NH RTE 9 STA. 145+50, LT.)
(Parcel 18) Zero (0) point of access along NH Rte 9. Access provided via new Right-of-Way to Ash Brook Road.

DILL, FREDERICK L. & CAROL ANN (NH RTE 10/12/101 STA. 168+00, LT.)
(Parcel 21) Zero (0) point of access along NH Rte 10/12/101. Access provided via Key Road.

BRECKWOLDT, ALEXANDER E. (NH RTE 10/12/101 STA. 172+00, LT.)
(Parcel 24) Zero (0) point of access along NH Rte 10/12/101. Access provided via Key Road.

BRESSARD AND BLACK AUTOMOTIVE SERVICES, INC. (NH RTE 10/12/101 STA. 175+50, LT.)
(Parcel 25) Zero (0) point of access along NH Rte 10/12/101. Access provided via Key Road.

WINCHESTER KEY LIMITED PARTNERSHIP (NH RTE 10/12/101 STA. 177+00, LT.)
(Parcel 26) Zero (0) point of access along NH Rte 10/12/101. Access provided via Key Road.

PUB VENTURES OF NEW ENGLAND, INC. (NH RTE 10/12/101 STA. 179+00, LT.)
(Parcel 27) Zero (0) point of access along NH Rte 10/12/101. Access provided via Key Road.

SHEEHAN, THOMAS J. & GARVERICK, JOYCE S. (NH RTE 12/101 STA. 190+00, RT.)
(Parcel 30) Zero (0) point of access along NH Rte 12/101. Access provided via Winchester Street.

REPORT OF THE COMMISSIONER

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STATE OF NEW HAMPSHIRE (NH RTE 12/101 STA. 197+00, LT. & RT.)
(ASHUELOT RAILROAD CORRIDOR)
(Parcels 31A & 31B) Zero (0) point of access along NH Rte 12/101.

SHEEHAN, THOMAS J. & (NH RTE 12/101 STA. 200+00, RT.)
GARVERICK, JOYCE S.
(Parcel 33) Zero (0) point of access along NH Rte 12/101.

STRETCH, WILLIAM A. & MARINA S. (NH RTE 12/101 STA. 215+50, LT.)
(Parcel 44) Zero (0) point of access along NH Rte 12/101.

TURNER-BUSCH, INC. (NH RTE 12/101 STA. 217+00, LT.)
(Parcel 45) Zero (0) point of access along NH Rte 12/101.

SHANKS, JAMES A., JR. (NH RTE 12/101 STA. 218+50, LT.)
COUGHLIN, JOHN R., JR.
COUGHLIN, JOHN R.
(Parcel 46) Zero (0) point of access along NH Rte 12/101. Access provided on North Main Street.

ALLEN, SHERMAN, V., JR. (NH RTE 12/101 STA. 220+00, RT.)
(Parcel 49) Zero (0) point of access along NH Rte 12/101. Access provided on South Main Street.

MARKEM CORPORATION (NH RTE 101 STA. 258+00, LT.)
(Parcel 53B) Zero (0) point of access along NH Rte 101. Access provided on Optical Avenue.

NH RTE 9, 10, 12 & 101 (NORTH/SOUTH HIGHWAY CORRIDOR)
CITY OF KEENE

BARRETT, ELLIS S. (NH RTE 9/10/12 STA. 230+00, LT.)
BARRETT, AUBREY W.
(Parcel 61) Zero (0) point of access along NH Rte 9/10/12. Access provided via Ash Brook Road.

ROBERTS COMMUNICATIONS, INC. (NH RTE 9/10/12 STA. 238+00, LT.)
(Parcel 69) Zero (0) point of access along NH Rte 9/10/12.

PUBLIC SERVICE COMPANY OF NH (NH RTE 9/10/12 STA. 243+25, LT.)
(Parcel 70) Zero (0) point of access along NH Rte 9/10/12.

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STATE OF NEW HAMPSHIRE (NH RTE 9/10/12 STA. 243+75, LT.)
(CHESHIRE RAILROAD CORRIDOR)
(Parcel 70A) Zero (0) point of access along NH Rte 9/10/12.

KING, KENNETH M., JR. (NH RTE 9/10/12 STA. 248+00, LT.)
HEATH, CHARLES A.
D/B/A H&K ASSOCIATES
(Parcel 73) Zero (0) point of access along NH Rte 9/10/12. Access provided via West Street.

FAIRBANKS PLAZA, L.L.C. (NH RTE 9/10/12 STA. 248+00, RT.)
(Parcel 72) Zero (0) point of access along NH Rte 9/10/12. Access provided via West Street.

SHAKOUR DIVERSIFIED, INC. (NH RTE 9/10/12 STA. 254+00, LT.)
(Parcel 74) Zero (0) point of access along NH Rte 9/10/12. Access provided via West Street.

REALTIES, INC. (NH RTE 9/10/12 STA. 260+00, LT.)
(Parcel 88) Zero (0) point of access along NH Rte 9/10/12.

RELOCATED NH ROUTE 12 / NH ROUTE 32 / ROSE LANE
CITY OF KEENE & TOWN OF SWANZEY

LACOSTE, RENDAL M. (RELOC. NH RTE 12 STA. 109+50, LF. & RT.)
LACOSTE, GERRI C.
(Parcel 215) Zero (0) point of access along NH Rte 12.

ADAMS, SUZANNE T. (RELOC. NH RTE 12 STA 110+50, LF. & RT.)
(Parcel 215A) Zero (0) point of access along NH Rte 12.

SCHIERIOTH, HERMAN K. (RELOC. NH RTE 12 STA. 112+00, LT.)
SCHIERIOTH, ELAINE, H.
(Parcel 216) Zero (0) point of access along NH Rte 12.

SCHIERIOTH, HERMAN K. (RELOC. NH RTE 12 STA. 112+00, RT.)
SCHIERIOTH, ELAINE, H.
(Parcel 224) Zero (0) point of access along NH Rte 12. Access provided via new public street.

CHESTNUT GREEN CONDOMINIUMS (RELOC. ROSE LANE STA. 3+00, LT.)
(Parcel 206) Zero (0) point of access. Access provided via new public street.

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UNITED STATES OF AMERICA (RELOC. NH RTE 12 STA. 115+00, LT.)
ARMY CORP OF ENGINEERS
(US ARMY RESERVE CENTER)
(Parcel 218) Zero (0) point of access along NH Rte 12. Access provided via South Main Street and/or Rose Lane.

WYMAN, ROSEMOND M. (RELOC. NH RTE 12 STA. 119+00, RT.)
(Parcel 56) Zero (0) point of access along NH Rte 12. Access provided via relocated Rose Lane.

CITY OF KEENE (RELOC. NH RTE 12 STA. 116+50, LT. & RT.)
(Parcel 52A) (RELOC. NH RTE 12 STA. 119+00, LT.)
Zero (0) point of access along NH Rte 12. Access provided via existing and relocated Rose Lane.

EXCEPTIONS TO THE LIMITATION OF ACCESS ARE AS FOLLOWS:

NH ROUTE 10 / BASE HILL ROAD / ASH HILL ROAD
TOWN OF SWANZEY

YALE UNIVERSITY FORESTRY SCHOOL (NH RTE 10 STA. 8+00, RT.)
(Parcel 226B) Zero (0) point of access along NH Rte 10. Access provided thru adjacent Parcels 226A and 226.

BELLETETES, INC. (NH RTE 10 STA. 8+00, LT.)
(Parcel 227) Zero (0) point of access along NH Rte 10. Access provided via Whittemore Farm Road.

AR-GE PROPERTIES (NH RTE 10 STA. 13+00, RT.)
(Parcel 228) One (1)point of access along NH Rte 10. Access also provided via Whittemore Farm Road.

DESROSIERS, ARTHUR J. & DEBORAH A. (NH RTE 10 STA. 13+00, RT.)
(Parcel 229) Zero (0) point of access along NH Rte 10. Access provided through relocated Ash Hill Road and/or existing Ash Hill Road.

CONLON, JOSEPH & PHYLLIS (NH RTE 10 STA. 16+00, RT.)
(Parcel 230) Zero (0) point of access along NH Rte 10. Access provided via existing Ash Hill Road.

GRANITE BANK (NH RTE 10 STA. 19+00, RT.)
(Parcel 231) Zero (0) point of access along NH Rte 10. Access provided via existing Ash Hill Road.

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ESTATE OF EVERETT M. NIMS (Parcel 237)	(NH RTE 10 STA. 23+00, RT.) Two (2) points of access along NH Rte 10. One point of access to be located opposite Base Hill Road.
JOYCE FAMILY TRUST RUTH E. JOYCE IRREVOCABLE TRUST RUTH E. JOYCE, TRUSTEE (Parcel 238)	(NH RTE 10 STA. 18+50, LT.) Two (2) points of access along NH Rte 10.
STATE OF NEW HAMPSHIRE DISTRICT 4 MAINTENANCE FACILITY (Parcel 239)	(NH RTE 10 STA. 23+00, LT.) Zero (0) point of access along NH Rte 10. Access provided via Base Hill Road.
YALE UNIVERSITY SCHOOL OF FORESTRY (Parcel 242)	(NH RTE 10 STA. 28+00, LT.) Zero (0) point of access along NH Rte 10. Access provided through uncontrolled section of Right-of-Way.
YALE UNIVERSITY SCHOOL OF FORESTRY (Parcel 243)	(NH RTE 10 STA. 29+00, RT.) Zero (0) point of access along NH Rte 10. Access provided through uncontrolled section of Right-of-Way.

The following are my decisions for resolutions of issues raised at the Public Hearing:

1) Kevin Flynn (Ar-Ge Properties; Parcel 228) requested existing access to NH Rte 10 be located at an area suitable for development of their property, the existing septic system to be replaced (if impacted), and loss of trees along the property's border to be replaced.

One (1) point of access is granted to Parcel 228 along the NH Route 10 highway frontage. The location of the access point will be perpetuated at the existing driveway location. The owner may establish a new location for the access through the Department's Driveway Permit process.

The loss of trees and impacts to the septic system resulting from the project will be treated as elements of Right-of-Way impacts and will be compensated in accordance with State and Federal law.

2) Herman and Elaine Schierioth (Parcel 224) requested to retain ownership of the parcel remnant and requested one point of access along Relocated NH Route 12 with full access to the City of Keene's public Spur Road.

The request for access to relocated NH Rte. 12 is denied. Request to retain ownership of remnant property (Parcel 224 on Relocated NH Rte 12) is granted. No control of access is proposed along the City's public Spur Road.

3) Paul and Katherine Pisspanen (Parcels 174 & 175) requested retaining all existing driveways at their present locations along 537 -- 543 Main Street.

The request is granted. Existing driveways will be maintained along the lower section of Main Street including Parcels 174 and 175.

4) Attorney Daniel Callaghan and Frank Minchella, on behalf of FGP Keene, Inc., owners of Riverside Plaza (Parcel 31), requested the secondary driveway be retained as a right turn in and out access from Winchester Street. Attorney Callaghan further requested consideration of establishing an access easement through the parking area of Keene State College. Jay Kahn, Keene State College Vice President for Finance & Planning, expressed the College's objection to granting this egress through their property and indicated their willingness to an open dialogue with FGP Keene, Inc. to discuss mutually beneficial connection options independent of the Department's highway project.

The request for retaining the secondary access driveway to the Riverside Plaza is granted. The request to establish an access easement through the Keene State parking lot for Riverside Plaza is denied. The Department has no authority under current State law to acquire or secure private access easements across the Keene State College property. Any private agreement established between the two adjacent property owners can be executed independent of the Department's project.

5) John Berglund, by petition, requested the construction of a NH Rte 10 bypass of Winchester Street through the previously acquired State corridor and limiting the level of improvements along Winchester Street to within the existing Right-of-Way. Stephanie Powers expressed her opposition to the proposed improvements along Winchester Street and requested the construction of a NH Rte 10 bypass of Winchester Street through the State owned corridor. John MacLean, Keene City Manager, endorsed the easterly alignment alternative for the lower Winchester Street widening. Anne Creamer (Parcel 133) expressed support for the lower Winchester Street easterly alignment alternative versus the westerly alignment shift.

The construction of a NH Route 10 bypass of Winchester Street on a new location does not relieve the traffic congestion and does not address the safety issues along the east-west corridor of NH Rte 9, 10, 12, and 101, nor does it result in a reduction of required traffic lanes along lower Winchester Street. Furthermore, the construction of a Winchester Street bypass on new location has been determined not to be practicable nor permittable by Federal and State permitting agencies.

The upgrade along the existing corridor of Winchester Street will provide acceptable service life through the design year of 2015. The easterly expansion of lower Winchester Street results in minimum Right-of-Way impacts along the City street. Furthermore, the easterly widening along the lower section of Winchester Street will utilize an existing

Right-of-Way previously established through subdivision and reserved for street expansion.

6) Deborah Baldwin-Swartout, by petition, requested Lucinda Terrace be "dead-ended" at its intersection with Winchester Street and that access to this residential street be maintained through Matthews Road. Robert and Joanne Nadeau (Parcel 102) expressed concern for the impacts to their property caused by the turn-around and the widening of Winchester Street. Mr. and Mrs. Nadeau requested total acquisition of their property, located at the corner of Winchester Street and Lucinda Terrace, to accommodate the full turn-around to "dead end" Lucinda Terrace.

The request to "dead-end" Lucinda Terrace is granted. The request for total acquisition of the Nadeau property (Parcel 102) for the construction of the turn-around is granted. Compensation and relocation assistance will be provided in accordance with State and Federal law.

7) Gary Davis (by petition), Sally LaMar, Evelyn Huston, Father Daniel Sabatos, Mike Casner, Winifred Sullivan, Micheal Walsh and Ruth Swanson expressed concern regarding the alternatives presented and requested additional studies be completed. Mr. Davis and Mr. Casner suggested the incorporation of a comprehensive public transportation program and a coordinated work-time release schedules with area companies. Father Sabatos requested consideration of alternatives resulting in lower level improvements. For example, Father Sabatos recommended the development of right turn lanes at Winchester Street and Main Street, and to connect an extension of Key Road to the NH Rte 9, 10, and 12 northbound highway. Furthermore, he requested consideration of public transportation consisting of jitney type busses to serve the City of Keene. Ms. Huston (Monadnock Sierra Club) suggested consideration of coordination of traffic signals, staggering work shifts, and the development of "park and ride" lots with shuttle service to downtown Keene. She recommended the "park and ride" lots be developed with the layout of the multi-use trail for alternative transportation uses. Ms. LaMar requested consideration of simple realignments with synchronized signals. Mr. Sullivan requested consideration of mass public transit. Ms. Swanson requested lower impact alternatives such as car pooling and flex hours for industry. John Summers requested the incorporation of "park and ride" lots at the trail heads for the pedestrian and bicycle trails, possibly at the terminus of the old railroad corridors.

Alternatives were discussed throughout the two-year Citizen Advisory Task Force (CATF) involvement period resulting in regional consensus to the upgrade of the existing corridor as presented in the proposed layout. In addition to the corridor upgrades, the project encompassed a review of traffic demand measures. These measures, such as mass transit, employee shuttle service, and flex work hours, will not reasonably address the transportation deficiencies along the NH Rte 9, 10, 12, and 101 highway corridor. The Department encourages and supports continued development of practical traffic management measures, including but not limited to, car pool parking lots. The Department will continue to assist the City of Keene and the Southwest Region Planning Commission (SWRPC) in identifying resources to successfully implement viable traffic reduction measures. The Department's Car Pool Coordinator will assist SWRPC and

business employers in the development of employee based carpooling and ride sharing programs.

8) Gary Davis (by petition), Heike Davis, Mike Casner, Robert Farrar, Jeananna Farrar, Marcus McCarroll, Heather Morrison and Tony Redington requested roundabouts be incorporated at the intersections along the bypass. Edwin Wheeler requested consideration of traffic rotaries. Mr. Redington expressed doubt in the Department's future projected traffic growth for the City of Keene and the southwest NH region and believes that lower traffic growth will support the construction of roundabouts.

The project's forecast of future traffic volumes utilized an expansion of the Keene Traffic Model, a computer traffic modeling application, which uses the existing and future lanes within the study area. The original Keene Traffic Model was upgraded and expanded to incorporate the full study area within the City of Keene and the Town of Swanzey. The Keene Planning Department, Swanzey Planning Board and the SWRPC were consulted for the forecast of local and regional land uses within the traffic model area. The expanded traffic model was calibrated to meet Federal guidelines and exceeded the Federal requirements for model acceptance. The Department remains confident with the traffic projections as established by the Keene Traffic Model.

Roundabouts (and rotaries) have again been reviewed for use along the NH Rte 9, 10, 12, and 101 corridor. They have been determined to be an inappropriate application for the intersections at the terminus of the Bypass, Winchester Street, Main Street and Optical Avenue along the NH Rte 10, 12, and 101 corridor, and at the Winchester Street intersection with Island Street and Pearl Street. The heavy traffic volumes and the general imbalance of traffic distribution exceeds the capacity criteria of a single lane or a multiple lane roundabout.

9) Ranger Curran, Jr. requested no improvements be undertaken at the NH Rte 9 intersection with Base Hill Road and the West Street intersection with Park Avenue because he felt it will continue to encourage traffic to short cut through residential streets. Mr. Curran requested the local roads be restricted to no thru traffic. Denise Wheeler said the level of improvements along West Street is too excessive and requested consideration of less intrusive changes along the West Street corridor.

The improvements along the NH Rte 9, 10, 12, and 101 bypass corridor, including the intersections of Base Hill Road and West Street/Park Street, will improve safety and reduce congestion along the NH Rte 9, 10, 12, and 101 corridor and will encourage the use of the bypass instead of the local highway system. The improvements at the NH Rte 9, 10, and 12 interchange with West Street will accommodate the existing and future traffic demand for the West Street corridor. Any reduction in traffic lanes would result in unwarranted delays and safety concerns. The Department will coordinate with the City of Keene to ensure appropriate street signs are provided to encourage the use of the State highway system.

10) James Robertson (President of Cheshire Oil Company) requested left turn access be permitted to the West Street Citgo station (Parcel 82).

The request to allow left turn access to West Street Citgo Gas Station is denied for safety and capacity reasons. Left turning traffic between the ramp terminus and the Kmart Plaza traffic signal will cause major disruptions to the traffic flow resulting in delays and a high potential for turning accidents.

11) Attorney Gary Kinyon, representing the owners of the Key Road Car Wash (Parcel 19), requested engineering studies be undertaken for an extension of Key Road to the bypass system. Attorney Kinyon asked serious consideration be given to modify the West Street interchange configuration to allow the Key Road extension to intersect in the vicinity of the northbound off-ramp at West Street. Attorney Kinyon indicated the study for the Key Road extension should be undertaken in cooperation with the City of Keene to arrive at a practical, safe and cost effective solution to the long term problem.

The Department will assist and cooperate with the City of Keene in a City sponsored study to determine the feasibility for an extension of Key Road to West Street. The request to modify the NH Rte 9, 10, and 12 interchange configuration to accommodate an extension of Key Road is denied. Any extension of Key Road will need to be designed to not jeopardize the NH Rte 9, 10, 12, and 101 Bypass improvements and must result in no loss of capacity or safety at the interchange.

12) Attorney Gary Kinyon, representing the owners of the Key Road Car Wash (Parcel 19), requested the construction of a third exit lane on the Key Road approach to Winchester Street and the acquisition of the required Right-of-Way. Attorney Kinyon also requested a review of issues raised by Ms. Laurie Rauseo, Transportation Planning Consulting Services, in support of the additional lanes to this Key Road approach. Ms. Rauseo stated the projected traffic volumes do not consider the Key Road and Meadow Street gated access being removed, which allows for free local traffic flow between the residential and commercial area. Ms. Rauseo further noted that the projected traffic volumes from the Traffic Model are based upon invalidated traffic data for the Key Road approach which may have skewed the approach volumes. Ms. Rauseo also indicated that no consideration was given to the Saturday peak traffic flow condition and the Department's capacity analysis for the intersection underestimated the Winchester Street intersection delays at Key Road. Ms. Rauseo explained the intersection analysis uses assumptions for permissive left turns, saturation flow rates and lost time per cycle which are not consistent with the Department's standard analysis approach.

The original 1990 Traffic Model was calibrated using actual traffic data for Key Road. The expanded 1994 Traffic Model was also calibrated for the existing traffic counts for the Key Road approach utilized from the 1994 Riverside Plaza traffic report for the site expansion. The Traffic Model did not model traffic projections with full access between Key Road and Meadow Road. The removal of this gate is under the authority of the City of Keene.

The intersection level of service analysis for the Winchester Street intersection with Key Road for the projected 2015 PM traffic volumes with the two-lane approach at Key Road and adjustments for saturation flow rates, lost time per cycle and no permissive left turn movements continues to result in acceptable level of service design conditions. An analysis of the 1994 Saturday peak hour traffic volumes at the Winchester Street/Key Road/Riverside Plaza intersection validate that the Saturday peak hour traffic volumes are not the controlling design hour volumes for this intersection. The additional turn lane on the Key Road approach is unsupported and not warranted based upon traffic volumes.

However, the construction of the additional exit lane at the Key Road approach to Winchester Street will be included in the project if the private property necessary for the added lane is made available through either a donation of the land or an easement prior to the final design and Right-of-Way acquisitions for this portion of the project.

13) Attorney Howard Lane, representing Michael Carbone (Parcels 155 & 155A), requested shifting Island Street away from the Carbone property to maintain the on-street parking for the businesses. Attorney Lane also requested the total acquisition of the Carbone properties along Island Street, should the shift not be provided, with the property owner being given the option to re-purchase the remnants of the parcels from the Department.

Shifting Island Street to allow on-street parking along the Carbone's frontage of Parcels 155 and 155A will result in adverse impacts to the City park (Parcel 157) and a property (Parcel 159) eligible for National Register of Historic Places, both located on the easterly side of Island Street. The request for a shift of Island Street is denied due to adverse impacts to the public park and historic property.

The request for total acquisition of the Carbone properties (Parcels 155 & 155A) at the intersection of Pearl Street, Island Street and Winchester Street is recognized. The request for total acquisition will be evaluated during the appraisal and acquisition process. However, as a minimum, the Department will acquire the building next to the Ashuelot River on Parcel 155A to allow for temporary staging during the construction of the Island Street bridge. Upon completion of the Winchester Street project and the Island Street bridge over the Ashuelot River, the property owner will be able to utilize the construction staging area for the development of a private off-street parking area to serve the property's businesses.

14) Attorney Ellen Arnold, representing the Keene Chrysler/Plymouth Dealership (Parcel 142), requested the Winchester Street intersection at Kit Street be signalized to provide full access, via the fourth leg of the intersection for the dealership, with provisions to include a southbound left turn lane (on Winchester Street) for turns into the Dealership. Attorney Arnold further requested re-alignment of Kit Street southerly to Wetmore Street and retention of full access to the existing dealership drive for Keene Chrysler/Plymouth Dealership through an extension of the dual use center turn lane. State Senator Clesson Blaisdell supports these alterations as requested. Jonathan Wentworth (Allstate Insurance Company, Parcel 29) does not

support the signalization of the Kit Street intersection with provisions for full access to the Keene Chrysler/Plymouth Dealership.

Maintaining full access opposite the Kit Street intersection for the Keene Chrysler/Plymouth Dealership, with southbound left turn lane provisions along Winchester Street and traffic signalization, would be contrary to the City of Keene's long term planning for the Winchester Street corridor. The City adopted on July 28, 1997, the "Lower Winchester Street Corridor Study," (dated April 28, 1997), which outlines planning strategies for implementing a permanent solution for safe and orderly access along lower Winchester Street. The strategies include, but are not limited to, driveway consolidations and future street provisions.

The Department supports the City in its efforts to implement the Corridor Study improvements, including the development of permanent egress and access to the commercial/industrial area of Kit Street through a southerly extension of Kit Street to Wetmore Street as described at the Public Hearing. Implementation of this local frontage road would avert the need for future traffic signals at the Kit Street intersection with Winchester Street and place the traffic signals further south at Wetmore Street. This will provide efficient and orderly movement of traffic flow along Winchester Street and alleviate potential traffic congestion within close proximity of the proposed NH Rte 10, 12, and 101 interchange at Winchester Street. Prior to the implementation of the Kit Street extension by the City, should traffic signals be warranted at Kit Street and Winchester Street intersection based on existing traffic flow, temporary traffic signals will be provided.

Full access to the Keene Chrysler/Plymouth Dealership (Parcel 142) can be accommodated through a new driveway located at the southern property limits. The new driveway will provide for full left turn access to the Dealership through the proposed dual use/center turn lane. The existing driveway can be maintained and will be limited to only right turn egress and access to Winchester Street. Request for signalization of Kit Street is not granted.

Internal site adjustments to accommodate the new access location will be addressed through the Department's Right-of-Way process in accordance with State and Federal laws.

15) Attorney Howard Lane requested access to the Sheehan property (Parcel 30) be developed through a drive opposite Kit Street and requested reconfiguration or relocation of the drainage outlets to reduce the drainage easement within the property. Attorney Lane further requested relocation of the multi-use trail around the perimeter of the Sheehan parcel to further minimize impacts to the property.

Access to the property (Parcel 30) will be accommodated along its property frontage as designated by the proposed layout. The request for direct access opposite Kit Street is not granted. The final drainage configuration will be designed to minimize property impacts and drainage easements where practical. The multi-use trail has been defined to

run generally parallel to the highway within the State Right-of-Way with high visibility for safety. The request to relocate the trail around the perimeter is not granted.

However, the trail will be extended under the multi-use trail structure over NH Rte 12, and 101 at the State owned Ashuelot Railroad corridor. The multi-use trail loop connection along the west side of the railroad corridor will be eliminated to reduce the impacts to Parcel 30.

16) Ralph Gregory (Parcel 236A) requested the alignment for Ash Hill Road be adjusted to not disturb the existing stone wall and mature trees along the frontage of his property. Mr. Gregory also requested to maintain the outlet of the cellar underdrain into the ditch of Ash Hill Road as previously agreed to by the Swanzey Road Agent.

The alignment for Ash Hill Road will be designed to save the existing stone wall and mature trees along the property's frontage and the cellar drain will be perpetuated.

17) Richard Wilder requested realignment of the NH Rte 10 approach to Base Hill Road to adjust the highway's vertical grade and improve the intersection sight distance.

The proposed vertical and horizontal alignment along NH Rte 10 are engineered to improve the intersection sight distance through the Base Hill Road/Ash Hill Road intersection.

18) Robert and Joanne Nadeau (Parcel 102) requested sidewalks be constructed along Winchester Street from Matthews Road south to the Swanzey town line.

An extension of the sidewalk along the westerly side of Winchester Street from Bergeron Avenue to the Swanzey town line will result in adverse impacts to a National Register of Historic Places eligible property (Parcel 97A) and can not be accommodated. However, a curbed grass panel seven (7) foot wide will be constructed on the easterly side of Winchester Street south of Matthews Road, and on the westerly side of Winchester Street south of Bergeron Avenue to the limits of the NH Rte 10 reconstruction. The grass panels will provide an informal area for pedestrians along this highway segment.

19) Amy Pfiel (Parcel 188) requested compensation for Main Street moving closer to her house and asked for improvements of the existing sidewalks along Main Street as part of this project. Ms. Pfiel further requested that the improvements along Main Street be designed to save the existing mature oak and maple trees along the historic district section.

The improvements along Main Street will result in no compensable acquisition from Parcel 188. The request to improve the Main Street sidewalks is granted. The sidewalks within the Main Street reconstruction limits and within the existingRight-of-Way will be upgraded. Care will be taken to minimize the loss of existing mature trees along Main

Street. Landscape treatments will be provided within the Main Street Right-of-Way to mitigate the loss of existing vegetation.

20) Paul and Katherine Pisspanen (Parcel 204) requested total acquisition of their property located at 14 Old Homestead Highway (NH Rte 32) due to hardships with traffic noise, construction disturbance and pollution. Mr. & Mrs. Pisspanen requested no sidewalks be constructed along Old Homestead Highway south of the Main Street intersection and, should the property not be acquired by the State, requested compensation for loss of property.

The request for total acquisition is denied. Placement of noise barriers are not appropriate nor feasible, due to limited Right-of-Way and the property's access requirements. Disturbance during construction will be short term and will be minimized to the fullest extent practicable. Air quality will improve with completion of the proposed improvements compared to the no-build condition due to improved efficiency of traffic movements and the NH Rte 12 highway realignment.

The highway improvements along Parcel 204 will result in the acquisition of a narrow strip of Right-of-Way along the property's frontage. Compensation for the impacts will be provided in accordance with State and Federal law. No sidewalks have been proposed along NH Rte 32 south of Main Street.

21) Attorney Gary Kinyon, representing Mr. John Coughlin and Mr. James Shanks of 441 Main Street (Parcel 46), requested alternative access be provided to 441 Main Street via an access road to Appleton Street which could also provide public access for 11 King Court (NYNEX Building; Parcel 45) and 15 King Court (Indian King Framery; Parcel 44). Attorney Kinyon further requested total acquisition of 441 Main Street should access to Main Street via Appleton Street not be approved. John R. Coughlin, Sr. expressed his concern for the impacts to the property at 441 Main Street.

Request for public street access to Appleton Street for properties along King Court (Parcels 44 & 45) and 441 Main Street (Parcel 46) is denied. Alternatives for a public street connection between King Court and Appleton Street were reviewed during the preliminary design phase with the Citizens Advisory Task Force and were determined not prudent or feasible due to the cost and impacts along Appleton Street. Residential properties along Appleton Street would be impacted by a connection and the existing narrow city street would require widening to meet the City's current street standards causing adverse impacts to the Main Street Historic District.

The request for total acquisition of 441 Main Street (Parcel 46) is granted.

22) Kenneth Bakke, (President of Turner-Busch, Inc.; Parcel 45) requested to retain the use of the NYNEX commercial property at 11 King Court and to provide access to the property through an existing private Right-of-Way along Richard and Patricia Greene's property located on Main Street (Parcel 185).

The request for access to Main Street is recognized. The Department will work with Turner-Busch, Inc. to develop an easement over 441 Main Street (Parcel 46), adjacent to the Green property, to provide a joint driveway for Turner-Busch, Inc. property (Parcel 45) and also the Stretch property (Indian King Framery; Parcel 44) to Main Street. The Department acknowledges that in order to provide access to Main Street for the Stretch property, Turner-Busch, Inc. must be agreeable to the granting of access rights across their property, similar to the parties existing easement to King Court. Provided that the Department and the property owners can reach a mutual agreement for the provisions of a joint access, the construction of the driveway access to Main Street will be incorporated into the highway improvements by the Department.

Should Turner-Busch, Inc. and the Department not reach a mutual agreement for a joint easement to gain access to Main Street by the time of Right-of-Way negotiations for this phase of the project, then the Department will acquire the property through the normal Right-of-Way procedure. Compensation and relocation assistance will be provided in accordance with State and Federal law.

23) Chief Earl Nelson (Chesterfield Police Department) requested no restrictive traffic control measures be established along the State highways in the Town of Chesterfield as a result of the Keene highway construction. Chief Nelson also requested traffic control personnel and flaggers be equipped with two-way radio communication.

No restrictive traffic control measures are anticipated along NH Rte 9 in the Town of Chesterfield for the construction of the Keene-Swanzey highway improvements. However, should certain measures, such as advanced construction signage, be required in the Town of Chesterfield, the Department will advise the Chesterfield Board of Selectmen.

Traffic control personnel will be equipped with appropriate communication equipment as required to maintain traffic flow during construction.

24) Guy Pearson (Portland Glass Company; Parcel 120), Henry Tawil (Best Western Sovereign Hotel; Parcel 23), and Jonathan Wentworth (Allstate Insurance Company; Parcel 29) and Paul Stevens (Family Ties Restaurant; Parcel 153) expressed concern for impacts to their businesses resulting from loss of access during construction and general construction delays. Mr. Wentworth further requested specific commitments to minimize problems associated with dust caused by highway excavation and fill embankments, construction noise and traffic. Mr. Wentworth requested a contact person be available to address concerns during construction.

Dust control will be maintained in accordance with the Department's construction specifications. Some temporary construction noise will result from the construction activities but will be limited to reasonable hours. During final design, traffic control measures and construction phasing will be developed to minimize disruptions caused by construction. A Traffic Control Plan (TCP) will be included in each contract. Certain construction operations may necessitate evening and/or nighttime construction. These limitations will be identified during final design and be incorporated in the TCP.

Furthermore, an on-site Contract Administrator from the Department's Bureau of Construction will be assigned to the project. The Contract Administrator will coordinate construction activities with the contractor, address construction issues with the property owners (and area business owners) and ensure compliance to the Department's contract specifications. The Contract Administrator's field office will be located within the project area and will be accessible by phone.

25) Mayor Patricia Russell and Rhett Lamb (Keene Planning Director) requested the continuation of public participation through an extension of the Citizen Advisory Task Force (CATF) for the final design engineering, land acquisition (Right-of-Way), Federal and State permitting and construction schedule development. Christine Cunningham requested an equestrian be nominated to the final design task force.

The request for continuation of an advisory task force through final design, Right-of-Way acquisition and construction schedule development is granted. An Advisory Task Force (ATF) will be established in cooperation with the Town of Swanzey and the City of Keene to assist the Department in community feedback. The purpose of the ATF will be to provide a public forum for exchange of ideas and viewpoints during the final engineering design phase. The ATF will function as an advisory group.

Three ATF members will be appointed from each community by the Keene City Council and the Swanzey Board of Selectmen. The community members from the Town of Swanzey and the City of Keene will consist of one technical City/Town staff person, an elected or an appointed public official (i.e.: City Councilor, Selectmen, Planning Board, Conservation Commission, etc.) and one local citizen representative at-large. One member shall be appointed by the Southwest Regional Planning Commission (SWRPC). A technical member from NH Department of Resources and Economic Development (DRED), as well as US Federal Highway Administration (FHWA), will be invited to participate in the ATF to represent the interests of equestrians, snowmobilers, etc.

The ATF committee will elect a committee chairperson to assist the Department in preparation of the meeting agendas and be the ATF contact person. The ATF will normally meet quarterly throughout the final design phase of the project for the anticipated final design duration of four years. The ATF meetings will be held within the local communities.

26) Mayor Patricia Russell requested the sequence of the construction projects be in accordance with the schedule presented at the November, 1997 Public Informational meeting.

The general order of construction projects will be prioritized based upon the November, 1997 project schedule and be reviewed with the final design Advisory Task Force. The actual construction schedule will be dependent upon the completion of final design engineering plans and documents, federal and state permit approvals, prioritized construction phases and sequence for traffic management, Right-of-Way clearance and availability of federal funding.

27) Robert Dabroski (Tire Warehouse; Parcel 50) requested the raised median island be shortened to maintain full turn access to the Tire Warehouse business southern most driveway on South Main Street.

The request to shorten the island is granted. A center turn lane will be provided to permit left turn access. However, should future turning traffic along this location interfere with the safe traffic flow and operation of Main Street, the Department at the City's request, will extend the raised median island to the relocated Martel Court intersection.

28) Evelyn Huston, Attorney John Rab (Keene Conservation Commission), Kendall Lane, Barbara Skuly (Swanzey Conservation Commission) and Roger Sweet (SWRPC Ashuelot River Local Advisory Committee) requested the replacement and mitigation for wetland and floodplain impacts be equal replacement and the future development of the mitigation sites closely correspond to the wetland/floodplain areas being impacted. Mr. Lane requested continued attention to the protection of natural and recreational resources, and to implement appropriate stormwater management into the improvements. Ms. Skuly requested the replanting of disturbed vegetated areas along the river and stream banks to provide a natural buffer. Henry Tawil (Best Western Sovereign Hotel, Parcel 23) expressed concern that the highway drainage and future wetland/floodplain mitigation sites next to the Hotel not cause off-site drainage problems.

Five priority sites have been identified for joint wetland mitigation and floodplain compensation. The floodplain compensation has been developed to provide replacement within each watershed and to mitigate wetland impacts equal to the area being lost by the highway improvements.

Vegetation impacts along the stream banks and river buffers will be kept to a minimum. Some limited landscaping will be provided to enhance and accelerate the vegetative growth along the disturbed locations.

During final design, appropriate stormwater management practices will be employed and, to the maximum extent possible, the proposed wetland mitigation sites will be used for treatment of stormwater and water quality management. The final drainage configuration will be designed to minimize property impacts and drainage easements.

29) Attorney John Rab (Keene Conservation Commission) expressed the Commission's support for the installation of the second large culvert at Ash Swamp Brook to allow the passage of the 100 year storm and the elimination of the split-flow floodway. Attorney Rab requested the installation of additional larger culverts along the highway corridor to facilitate wildlife migration and to enhance hydraulic connectivity/conductivity.

The project will incorporate a new structure at Ash Swamp Brook to facilitate the passage of the 100 year storm in accordance with Federal Emergency Management Agency (FEMA) approval. Existing cross culverts along the NH Rte 9, 10, 12, and 101 corridor will be maintained, where required, to facilitate hydraulic connectivity between watersheds and floodplains.

The request to provide additional culverts for wildlife migration is denied. No sensitive wildlife resources were identified that would warrant the larger culverts. However, consideration for increasing culvert sizes for hydraulic requirements will be reviewed during final drainage design.

30) William Zimmerman asked for confirmation that hydraulic changes being proposed by the project, which affects the floodplains, will not impact his property at 163 Pearl Street, especially during flood conditions.

The highway alterations along NH Rte 9, 10, 12, and 101 and the proposed flood map revisions will not affect the drainage systems installed by the Soil Conservation Services along Pearl Street. The after construction condition will remain unchanged as a result of the project.

31) Kendall Lane (SWRPC Transportation Advisory Committee), Attorney John Rab (Keene Conservation Commission), Roger Sweet (SWRPC Ashuelot River Local Advisory Committee) and Henry Tawil (Best Western Sovereign Hotel; Parcel 23) requested landscaping be provided for aesthetic and ecological benefits. Mr. Rab requested a detailed landscape plan be implemented for the entire highway project and a wetland mitigation landscape plan be submitted to the Conservation Commission for their review. He further requested a scrub/shrub swamp landscape buffer around the flood retention and wetland mitigation sites, planting of trees along the highway corridor and provisions for landscape plantings along the multi-use trail. Mr. Sweet requested the use of native forbs and shrubs for the project's landscaping. Mr. Tawil requested landscaping with earth embankments for the Winchester Street overpass to enhance the views from the Best Western Hotel.

Landscaping will be provided and given particular attention at the NH Rte 12 and 101 Single Point Diamond Interchange (SPDI) at Winchester Street, along the Winchester Street corridor, at the Hickey-Desilets Park, and Main Street Historic District. Landscape treatments will be provided at other eligible historical properties as identified in the Environmental Assessment and at the wetland mitigation areas as required by the State and Federal permitting agencies. The level and scope of the landscaping will be reviewed during final design with the Advisory Task Force.

Care will be taken to minimize the loss of existing trees within the project limits. The landscape treatments for the wetland mitigation sites will be reviewed with the Keene Conservation Commission and will include landscaping native to the region.

32) Henry Tawil (Best Western Sovereign Hotel; Parcel 23) indicated the existing business sign for the Best Western will be too low and blocked from view by the roadway fill. Mr. Tawil requested "blue signs" be provided on the highway to identify services at the interchanges such as gas stations and hotels.

Loss of visibility to commercial signs due to highway alterations is not compensable under current State law. Should the business choose to alter the sign, then it will need to follow local zoning criteria and regulations.

"Blue Signs" (i.e.: business directional signs) are not permitted within the NH Rte 9, 10, 12, and 101 Limited Access Right-of-Way. However, generic service symbol signing, identifying general services such as food, gas, and lodging, will be provided along NH Rte 9, 10, 12, and 101 in accordance with the Department's policies and procedures.

33) Patrick Eggleston and George Corrette expressed their opposition for the highway improvements due to the environmental impacts. Mr. Eggleston voiced his opinion that no user friendly bike path will be constructed, wetlands will not be replaced, flooding will be a problem, and wildlife migration routes will be destroyed. The improvements will be unsightly and businesses will be encouraged to continue to develop within the floodplains.

The project's impacts to the environment have been documented in the Environmental Assessment. The highway alterations have been designed to minimize and balance the environmental impacts.

Wetland and floodplain compensation will be provided and appropriate stormwater management will be reviewed and utilized during final design. The project will continue to be designed to minimize impacts, where practical, throughout the final design phase. Commercial development within designated floodplains remains a local issue and is controlled through City regulations.

34) Barbara Skuly (Swanzey Conservation Commission) requested every effort be made to protect the West Street wellhead for the City of Keene and its water supply. Ms. Skuly advises this aquifer is shared by the Town of Swanzey through numerous private wells and is recognized as a potential future water source for the Town of Swanzey. Ms. Skuly further noted that it is unclear as to when and how the wetland impacts resulting from the NH Rte 10, Base Hill Road and Ash Hill Road intersection improvements will be mitigated.

The highway alterations within the West Street wellhead protection zone will incorporate groundwater protection measures as established by the Department of Environmental Services and will include the appropriate Best Management Practices (BMP's) during construction.

The wetland impacts at the NH Rte 10 intersection with Base Hill Road and Ash Hill Road will be mitigated on-site where practical. Additional off-site mitigation will be provided within the mitigation sites identified for the project. The timing of mitigation activities will be an element of the Wetland permits. Appropriate stormwater management will be reviewed during final design and incorporated where practical.

35) Roger Sweet (SWRPC Ashuelot River Local Advisory Committee) requested a copy of the soil and groundwater testing for the Rose Lane site on the City of Keene property.

The request is granted. A copy of the Phase II subsurface investigation report will be forwarded to the SWRPC and the City of Keene Planning Department when completed.

36) Suzanne Burbank (Parcel 48) requested the plantings of cedar hedging and/or erection of a fence to preserve the privacy of their home on 41 Boston Place. Thomas Sintros requested the planting of coniferous trees beginning in the vicinity of Beaver Brook, running westerly towards the Main Street intersection and northerly along Main Street for approximately 50 to 100 yards. Mr. Sintros additionally requested the erection of a fence (privacy sound barrier) along the western and southern boundaries of his property at 31 Boston Place because of the loss of sound and visual privacy resulting from the removal of the Keene Housing Authority apartment unit on Main Street. Mr. Sintros further requested compensation for cleaning-repairs of his house siding, windows, inground pool, pool filter and vehicles due to construction activities performed nearby. In addition, Mr. Sintros requested compensation for any health issues related to the pollution.

There are no compensable acquisition from either Burbank's or Sintros' properties.

Erection of a privacy fence is denied. Appropriate landscaping of the remnant parcel of the Keene Housing Authority property (Parcel 47) will be considered during final design. Request for plantings of coniferous trees along NH Rte 101 between Beaver Brook and Main Street intersection is denied. During final design, all reasonable attempts will be exercised to minimize impacts to wooded areas and to maintain the existing natural buffer of wooded areas. Noise barriers along Main Street are not appropriate nor feasible due to limited Right-of-Way and numerous driveways.

General cleaning of private property due to nearby construction is not compensable under current State law. The improvements, as proposed, will create efficient movement of traffic and will result in improved air quality and a decrease in vehicle pollution emissions over the no-build condition.

37) Ruth Swanson expressed concern with increased noise and air pollution resulting from the project. Stephanie Powers (Parcel 108) requested noise abatement measures to be implemented along her property on lower Winchester Street and requested compensation for devaluation of property values caused by future growth changes along Winchester Street as well as the highway impacts to her property.

The improvements to be undertaken will create efficient movement of traffic and result in overall improvements to air quality and decreased vehicle pollution emissions over the no-build condition. No appreciable change will result in the general noise levels along the NH Rte 9, 10, 12, and 101 corridor and/or Winchester Street. In areas where certain properties meet and/or exceed the noise abatement criteria, the construction of noise barriers and/or other mitigation measures have been determined to be not feasible due to limited Right-of-Way and the numerous residential and commercial access points.

Loss of landscaping will be treated as an element of Right-of-Way compensation. Some limited landscaping will be considered for properties where the existing landscape screen was lost due to the project, provided landscape easements are donated. Landscape treatments will be developed during final design and reviewed with each property owner providing the necessary landscape easements.

Compensation for Right-of-Way impacts will be in accordance with State and Federal law.

38) Jill Wood, employee of Texaco Gas Station (Riverside Plaza, Parcel 31), requested consideration of a solution which does not require the acquisition of the Texaco Station on Winchester Street.

The improvements along Winchester Street are designed to provide a cost effective solution balancing all impacts, the needs of the community and corridor traffic growth. The tenants of the Texaco gas station will be provided relocation benefits in accordance with State and Federal law.

39) Attorney Daniel Callaghan, representing Riverside Plaza, (Parcel 31) and Frank Minchella (Riverside Plaza) requested the transfer of a thirty-five (35) foot strip of existing Right-of-Way along the NH Rte 12 and 101 frontage to Riverside Plaza as part of the compensation for the loss of property along Winchester Street which will allow Riverside Plaza to replace on-site, the lost commercial area and to comply with local parking regulations. Attorney Donald Gartrell, representing the Savings Bank of Walpole, requested that every consideration be given to minimize the reduction of parking within the Riverside Plaza and to accommodate a relocation of the Bank's facilities on this present site. AttorneyGartrell and Don Tisdale (President of the Savings Bank of Walpole) requested early coordination and fast-track consideration of relocation assistance to facilitate the Savings Bank ofWalpole relocation. They indicated additional time and coordination will be required for the Bank's relocation due to the complicated federal requirements associated with the banking industry. Mr. Tisdale asked that consideration be factored into the acquisition process for special investments made in the property by the Savings Bank of Walpole and the Bank's specialized banking equipment.

The request for a land exchange is denied. The loss of parking and commercial buildings resulting from the project will be included as an element ofRight-of-Way compensation in accordance with State and Federal law.

The request to minimize impacts to the existing parking is granted and will be coordinated during final design. Relocation assistance will be provided to the tenants of the impacted businesses in accordance with State and Federal laws and regulations. The request for early relocation assistance to the Savings Bank ofWalpole is granted. Should the bank obtain concurrence from the property owner, and local approvals, on-site relocation will also be provided. Consideration of real property investments made by the tenant will be addressed in the Right-of-Way appraisal process and the relocation of the specialized banking equipment will be addressed through the Department's Relocation Assistance program.

40) Jay Kahn (Keene State College Vice President for Finance & Planning) requested early acquisition and compensation for the College's property (Parcel 147) at 332 Winchester Street and replacement of the impacted parking in Keene State's parking lot on the adjacent Public Service property (Parcel 156), contiguous to the existing lot. Mr. Kahn and Stan Yarosewick

(President of Keene State College) requested early acquisition of the properties along King Court (Indian King Framery Parcel 44 & NYNEX Parcel 45) and an early opportunity for negotiations to transfer the properties to the College for their use.

The request for early acquisition of 332 Winchester Street (Parcel 147) is granted.

The loss of parking will be handled as a functional replacement. The request to provide replacement parking on the adjacent property is granted.

Should Parcel 44 and Parcel 45 along King Court be acquired through the normal Right-of-Way process, the request to make these properties available to Keene State College is granted subject to review, approval and compensation through applicable statutes.

41) Suzanne Adams (Parcel 215A) requested early acquisition for property located at 698 Main Street.

The request is granted. Compensation and relocation assistance will be provided in accordance with State and Federal law.

42) Steve and Amy Piispanen (Parcel 184) requested total acquisition of 23 Sheridan Way and to provide early relocation assistance.

The requests are granted. Compensation and relocation assistance will be provided in accordance with State and Federal law.

43) Evan John, proprietor of Indian King Framery, and William Stretch, Jr., owner, (Parcel 44) requested the option of continuing the ownership (and business operation) for as long as possible, even until the point construction begins and King Court is eliminated. They further requested special consideration for relocation compensation and assistance when the property is acquired.

With the potential opportunity for Parcel 44 to gain access to Main Street via Parcel 45 (Turner-Busch, Inc.) and Parcel 46 (441 Main Street), acquisition of Parcel 44 may no longer be necessary. The Department will coordinate with this property owner and the Parcel 45 property owner to provide access rights across the property, similar to the parties existing access arrangements to King Court.

Should the property owner(s) of Parcel 44 not be satisfied with the arrangements for access to Main Street or the easement not be in place by the time of Right-of-Way negotiations for this phase of the project, the Department will acquire the property through the normal Right-of-Way procedure. Compensation and relocation assistance will be provided in accordance with State and Federal law.

44) Robert Morton (Parcel 202) requested to be informed of the general timing and schedule for the acquisition of his rental property at 718 Main Street.

Acquisition and relocation assistance will be provided through the normal Right-of-Way acquisition process unless the property owner elects to seek early acquisition in writing to the Department. Early acquisition could occur within one year from the date of approval of the layout and design approval. Otherwise, the normal acquisition process could take up to two years before formal Right-of-Way appraisals are completed. Compensation and relocation assistance will be provided in accordance with the State and Federal law.

45) Rosamond Wyman requested total acquisition of the Laidlaw Bus Terminal and Servicing Facility property at 32 Rose Lane (Parcel 56) due to hardships imposed by the proposed project and the age of the property owner. Ms. Wyman indicated Laidlaw Bus Company recently elected not to renew the lease, in her opinion, due to the proposed highway location, and she believes the impacts resulting from the project will affect the property values based upon its highest and best use.

The request for total acquisition of 32 Rose Lane is denied. The impacts caused by the project do not support the request for total acquisition. Access will be provided through a new Rose Lane connector. The project's impacts will be evaluated through the Department's normal Right-of-Way acquisition procedures and the Department's Right-of-Way appraisals will be based upon the highest and best use of the site. Compensation will be provided in accordance with State and Federal law.

46) Marion Rocheleau (Parcel 214) requested total acquisition of the property at 701 Main Street.

The request for total acquisition is denied. The level of impacts resulting from the highway improvements do not support total acquisition of the property. The impacts caused by the project will be evaluated through the Department's Right-of-Way acquisition procedure and will be compensated in accordance with State and Federal law.

47) Attorney Steven Bragdon, representing the owners of the Fairbanks Plaza (Kmart; Parcel 72), Tom Hanna and Oscar Plotkin (Vice President of Fairbanks Plaza, LLC), requested that alternatives be studied to reduce the level of impacts to the Fairbanks Plaza located on West Street. Attorney Bragdon indicated that the impacts caused by the proposed project will result in a reduction of parking below the national standards and will result in non-compliance with the City of Keene's regulations. In addition, the loss of green space will result in non-compliance with the City's landscape rules. Mr. Hanna expressed concern with the loss of parking and the potential implications for the lease agreement with Kmart which specifies the number of required spaces along the business frontage. Mr. Plotkin requested an extension of the comment period to allow Costello, Lamasney and deNapoli, Inc. (CLD) sufficient time to study alternatives for the layout and to submit them to the Special Committee. Timothy Golde, CLD, requested consideration to eliminate the multi-use trail between the northbound off ramp and Kmart Plaza and to construct a pedestrian tunnel under NH Rte 9, 10, and 12 along the State owned Cheshire Railroad corridor. Mr. Golde further recommended, should the multi-use trail not be placed in a tunnel, shifting the NH Rte 9, 10, and 12 interchange westerly a sufficient distance to minimize impacts to the property. This would involve the construction of retaining walls to limit the

impacts to the Kmart parking along the northbound off ramp. Tim Gawenus (CLD) supplemented Mr. Golde's testimony with the submission of two alternatives which attempt to minimize the level of impacts to the Kmart Plaza. The options included: 1) shifting West Street twelve (12) feet to the north, eliminating the eastbound right turn lane to the Kmart Plaza, and providing a tunnel under NH Rte 9, 10, and 12 for the pedestrian/bicycle trail; 2) shifting West Street twelve (12) feet to the north, eliminating the eastbound right turn lane to the Kmart Plaza, and shifting the interchange westerly approximately fifty (50) feet to allow the multi-use trail to be constructed adjacent to the northbound off ramp.

The Department has evaluated the proposed alternatives, as presented by CLD, and determined both options will result in adverse impacts to other properties located on the north side of West Street and within the Park-Fairview historic district. Elimination of the eastbound right turn lane to the Plaza will result in excessive eastbound backups (vehicle queues) through the northbound NH Rte 9, 10, and 12 off ramp intersection with West Street. The extension of the multi-use trail under NH Rte 9, 10, and 12 will result in unwarranted impacts to the environment (i.e.: wetlands and floodplains) and will not result in a cost effective solution. The request to shift the NH Rte 9, 10, and 12 interchange and/or extending the multi-use trail through a tunnel under the state highway is denied.

However, the Department will construct a retaining wall between the northbound off ramp and the multi-use trail to maintain the parking along the westerly side of the Plaza, will reduce the West Street lane widths (provide eleven (11) foot lanes), and adjust the median transition along West Street in order to minimize the encroachment into the Fairbanks Plaza and the loss of parking. The impacts to the property will be appraised through the Department's Right-of-Way acquisition process and compensation will be provided in accordance with State and Federal law.

48) Kenneth King and Charles Heath objected to the impacts to his undeveloped property (Parcel 73) located in the southwest quadrant of the NH Rte 9, 10, and 12 interchange with West Street. Mr. King expressed concern for the loss of access resulting from the limitation of access along the property.

Access restrictions are being pursued for safety reasons due to the close proximity of the southbound ramp of the NH Rte 9, 10, & 12 interchange with West Street and the adjacent intersection of Park Street and West Street. Restriction of access and the loss of property rights will be addressed through the Department's Right-of-Way acquisition process and compensation will be provided in accordance with State and Federal law.

49) Jim Strickland, Bell Atlantic Phone Company, requested Right-of-Way acquisitions include all easements needed for the relocation of the Bell Company's facilities, including but not limited to aerial lines and poles, supporting structures (i.e.: anchor guys, push braces, underground connections, tree trimmings, etc.) and underground facilities.

The Department will coordinate utility relocations in accordance with the Department's Utility Accommodation Manual and work with the utility companies to facilitate their relocation.

50) William Appel requested the construction of a ten (10) foot wide paved multi-use trail. Clifford & Helene Bauer, Bruce Bohannon (Keene Snowmobile Club), Attorney James Clark-Dawe, Tom Coneys, Christine Cunningham, Joan Ganotis, Evelyn Huston (Monadnock Sierra Club), Rhett Lamb (Keene Planning Director), Patrick Manion (Pathways for Keene), Attorney John Rab (Keene Conservation Commission), John Summers (with petition from Friends of Pisgah), Paul Vahey (NH Snowmobile Association) and Micheal Walsh requested the construction of a ten (10) foot wide paved multi-use trail and a six (6) foot wide unpaved gravel platform for recreational uses such as equestrians and snowmobiles. Clair Schoch requested the multi-use trail be unpaved.

The Department will construct an independent multi-use trail with a paved surface width of ten (10) feet flanked by two (2) foot wide gravel shoulders. The proposed pathway along NH Rte. 9, 10, 12, and NH Rte. 101 will be over 5.4 miles in length and serve as an important link between the paths being planned and constructed by the City and those being developed along the abandoned railroad corridors.

Expanding the trail to accommodate a six (6) foot wide unpaved/gravel area for multi-uses, such as snowmobiles and equestrians, is outside the scope of this highway project and funding. The Department will incorporate the construction of a wider trail provided the incremental costs (not including environmental mitigation, final design engineering, Right-of-Way acquisition or construction supervision) are paid by others.

51) Clifford and Helene Bauer requested the City of Keene not be assessed any charges for the multi-use trail construction and to consider funding from other sources, such as snowmobile registration, for the wider gravel path expansion. Attorney James Clark-Dawe suggested that funding of a wider trail could be obtained from the Department of Resources & Economic Development (DRED). Patrick Manion (Pathways for Keene) requested identification of other funding sources for the trail expansion in order to accommodate multi-users. Pamela Snitko requested the funding of the path expansion be paid by the highway project. Tom Coneys requested the Department to find the means to plan, acquire (the needed property), construct and maintain the trails and the expansion. John Summers requested the multi-use trail be maintained by the State of NH.

The construction cost for the ten (10) foot wide paved multi-use trail will be paid for by the highway project. Should the incremental construction costs for trail expansion be paid by others (excluding the cost of final design engineering, environmental mitigation, right of way acquisition, and construction supervision), the Department will incorporate the construction of the wider trail into the contract plans. Levying fees from snowmobile registration to cover the cost of expanding the width of the trail is not within the authority of the Department.

Surface maintenance of the new multi-use trail will be the responsibility of the Department. Winter maintenance will not be provided by the Department.

52) Attorney James Clark-Dawe, Tom Coneys, Kendall Lane, Patrick Manion, John Summers, Cifford and Helene Bauer, Bruce Bohannon, Evelyn Huston, Earl Nelson, Jonathan Wentworth, and Richard Wilder expressed concern with the at-grade crossing for the multi-use trail at the signalized intersections along the corridor and requested that other alternatives be developed to cross the city streets at West Street, Winchester Street and Main Street. Tom Coneys, Kendall Crocker and Paul Vahey expressed concern that the at-grade crossings at the signalized intersections will not accommodate multi-uses such as snowmobiles. Mr. Vahey recommended implementing suggestions previously provided by the Department of Resources & Economic Development (DRED). Attorney Clark-Dawe requested bicycles be allowed to cross West Street by widening the NH Rte 9, 10, and 12 bridge, or allow the use of the breakdown lane by bicyclists. Mr. Manion, Mr. & Mrs. Bauer, Ms. Huston, and Mr. Nelson requested consideration of overpasses or tunnels for the multi-use trail crossings at the major streets.

The multi-use trail system has been designed to accommodate safe crossings of the NH Rte 9, 10, 12, and 101 limited access corridor via combinations of tunnel, bridge and at-grade crossings using signal phasing for bicyclists and pedestrians. Bicyclists may need to dismount and walk across the at-grade intersection crossings. Appropriate trail signage will be provided to inform the users of the at-grade crossings and the need for caution. The construction of tunnels and/or bridges in lieu of the at-grade crossings along the trail system will result in an unwarranted expenditure of public transportation funds, additional impacts to the environment (wetlands, floodplains, etc.), acquisition of additional Right-of-Way and is, therefore, denied.

The Department will coordinate with DRED to determine the appropriateness of the street crossings for recreational uses such as snowmobiles. The use of the multi-use trail system for snowmobiles will require the issuance of permits for crossings and connecting trails within the Department's jurisdiction. The Department recognizes the concerns for the trail crossings at the signalized intersections by snowmobiles and equestrians. Crossing by equestrians may require dismounting of the horse and walking across the intersection during the pedestrian phasing.

53) Bruce Bohannon requested an overpass multi-use structure be provided across NH Rte 9, 10, and 12 along the Cheshire Railroad corridor (south of West Street interchange). Richard Wilder requested the multi-use trail for the Ashuelot Railroad corridor crossing NH Rte 12 and 101 (west of Winchester Street) go under the highway (i.e.: tunnel) to enhance safety from the potential of objects being dropped from an overhead structure.

A multi-use tunnel under NH Rte 9, 10, and 12 (at the Cheshire Railroad crossing) or under NH Rte 12 and 101 (at the Ashuelot Railroad crossing) cannot be accommodated under the existing highway due to high seasonal groundwater. The construction of the tunnel would require the state highway to be raised in elevation, resulting in unwarranted environmental impacts and additional costs. The existing pedestrian/bicycle trail along

the Kmart Plaza will be perpetuated and extended under the West Street structure to maintain a safe connector to the proposed trail system on the west side of NH Rte 9, 10, and 12. The multi-use trail bridge over NH Rte 12 and 101 (crossing of the Ashuelot trail) will be designed to accommodate appropriate fencing for safety considerations.

54) Patricia Gayle Beaudoin (Equestrians of Cheshire County), Kathleen Hiney (NH Horse Council), and Lisa Derby-Oden (NH Horse Council) indicated equestrians have a legal right to use the State highways. Ms. Oden indicated that requiring equestrians to use the multi-use trail does not meet the State statute requirements for equestrian's legal right to use the highway system. Ms. Hiney requested alternative accommodations be provided for the equestrians versus the use of the paved trail if restricted from the highway. Christine Cunningham, Joan Ganotis, Ms. Beaudoin and Ms. Hiney noted the proposed access across the highway at at-grade intersections by equestrians is not acceptable and requested suitable crossings be provided. Ms. Cunningham requested the multi-use bridge deck surface for the Ashuelot Trail crossing of NH Rte 12 and 101 be compatible for horse crossings (i.e.: no open grate surface).

Legal use of the highways by equestrians will not be restricted. Equestrian use of the multi-use trail will be permitted. The Department acknowledges equestrians can use the grass embankment slopes adjacent to the paved trail. The Department recognizes equestrian crossings of the at-grade intersections may require the equestrian to dismount and walk the horse during the protected pedestrian phase. The multi-use structure over NH Rte 12 and 101 along the Ashuelot Trail will provide for a solid deck system (no open grate decking).

55) Sally LaMar recommended not accommodating snowmobiles and equestrians along the pedestrian and bicycle trail system. John Summers inquired why the pedestrian and bicycle overpass structure needs to be designed for snowmobiles and/or equestrians.

The multi-use trail will not be restricted to only pedestrians and bicycles. The proposed trail system will provide recreational trail connections between publicly owned, abandoned railroad corridors. The connections between the abandoned railroad corridors allow other recreational and seasonal users (such as snowmobiles, cross country skiers, and equestrians) access to the State owned corridors.

56) William Appel requested the Department of Resources & Economic Development (DRED) and the City of Keene develop a trail program which conforms to the Statewide Trail Management Plan and the City's Master Plan.

The development of a trail program by DRED and/or City of Keene is encouraged by the Department.

57) Rhett Lamb (Keene Planning Director) requested the construction of the pedestrian and bicycle trail system to occur as early as possible in the construction program. Stan Yarosewick (President of Keene State College) and Jay Kahn (Keene State College Vice President of Finance

and Planning) requested early construction of the multi-use trail structure along the Ashuelot Trail over NH Rte 12 and 101.

The Department will advance the construction of the Ashuelot corridor multi-use trail bridge over NH Rte 12 and 101 as much as practical. The construction of the full trail system will be completed as early as possible to enhance safety while maintaining continuity in the project's design and construction program. The sequence and timing for multi-use trail construction will be determined during final design and reviewed with the Advisory Task Force.

58) Henry Tawil (Best Western Hotel; (Parcel 23) requested direct access be provided to the multi-use trail be provided from the hotel parking lot on Kit Street.

The request for direct access is denied. Access through the limited access Right-of-Way to the multi-use trail will only be permitted through public street access locations for safety reasons.

59) William McAllister (Public Water Access Advisory Board), Barbara Skuly (Swanzey Conservation Commission) and Roger Sweet (SWRPC Ashuelot River Local Advisory Committee) requested construction of a trailhead parking area in the vicinity ofMartel Court, and further requested construction of a canoe/cartop boating access to the Ashuelot River at the confluence of the Beaver Brook/Branch River, and the boat access be designed in accordance with the NH Department of Fish and Game design criteria.

Request for construction of a trailhead parking area in the vicinity of Martel Court is granted. The location and number of spaces will be determined during final design and will be reviewed with the Advisory Task Force. If practical, the trailhead parking will incorporate river access limited to cartop boats in accordance with NH Department of Fish and Game criteria.

Date: 12-29-98

Leon S. Kenison, PE
Commissioner
New Hampshire Department
of Transportation

REPORT OF THE SPECIAL COMMITTEE

FOR

KEENE-SWANZEY, NHS-STP-F-T-011-1(4), 10309

APRIL 8, 1998 **KEENE STATE COLLEGE** **7:00 P.M.**

Upon the foregoing Petition, the Governor and Executive Council assembled on November 19, 1997, appointed:

Hon. Bernard A. Streeter, Councilor, District No. 5, Nashua
Hon. Peter J. Spaulding, Councilor, District No. 2, Hopkinton
Hon. Ruth L. Griffin, Councilor, District No. 3, Portsmouth

a Special Committee to hold a hearing in accordance with the provisions of Chapter 230:45, RSA, Chapter 231:5, RSA and Chapter 4:30-a, RSA to determine whether there is occasion for the layout of the N.H. Routes 9, 10, 12 & 101 corridor in the City of Keene and N.H. Route 10 intersection in the Town of Swanzey.

Upon said hearing held in the Keene State College, Mabel Brown Room at the Young Student Center, 24 Madison Street in the City of Keene on Wednesday, April 8, 1998, after interested parties appeared, and having heard and read all of the evidence the Special Committee received, for the accommodation of the public there is occasion for the laying out of the highway petitioned for and the limitation of access.

Given under our hands this 3rd day of February, 1999.

Bernard A. Streeter

Peter J. Spaulding

Ruth L. Griffin

SPECIAL COMMITTEE