Report and Technical Documentation for:

BURKE MOUNTAIN AREA TRANSPORTATION INFRASTRUCTURE STUDY

Burke & Lyndon, VT

Prepared for:

Northeastern Vermont Development Association

Town of Burke

Town of Lyndon

25 September 2007

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BURKE MOUNTAIN AREA TRANSPORTATION INFRASTRUCTURE STUDY

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1.0 INTRODUCTION

The Burke Mountain Area Transportation Infrastructure Study is a joint effort of the Town of Burke, the Town of Lyndon, the Village of Lyndonville, the Burke Mountain Resort, the Northeastern Vermont Development Association (NVDA), the Vermont Agency of Transportation (VTrans), and local residents and business owners to develop a transportation improvement plan to accommodate both regional growth and the Burke Mountain Resort development plans while maintaining and enhancing the roadways, village centers, and pedestrian and bicycle facilities in the study area.

This study was developed with the assistance of a steering committee made up of representatives from the towns of Lyndon, Burke, East Haven, Victory, Kirby, St. Johnsbury, Sutton and Newark. As part of the steering committee process NVDA received several comments from towns considered outside the study area expressing their concern for the potential impact that anticipated development may have in their towns. NVDA is committed to addressing these concerns by updating the Corridor Management Plan for VT 114 north of the study area for this project.

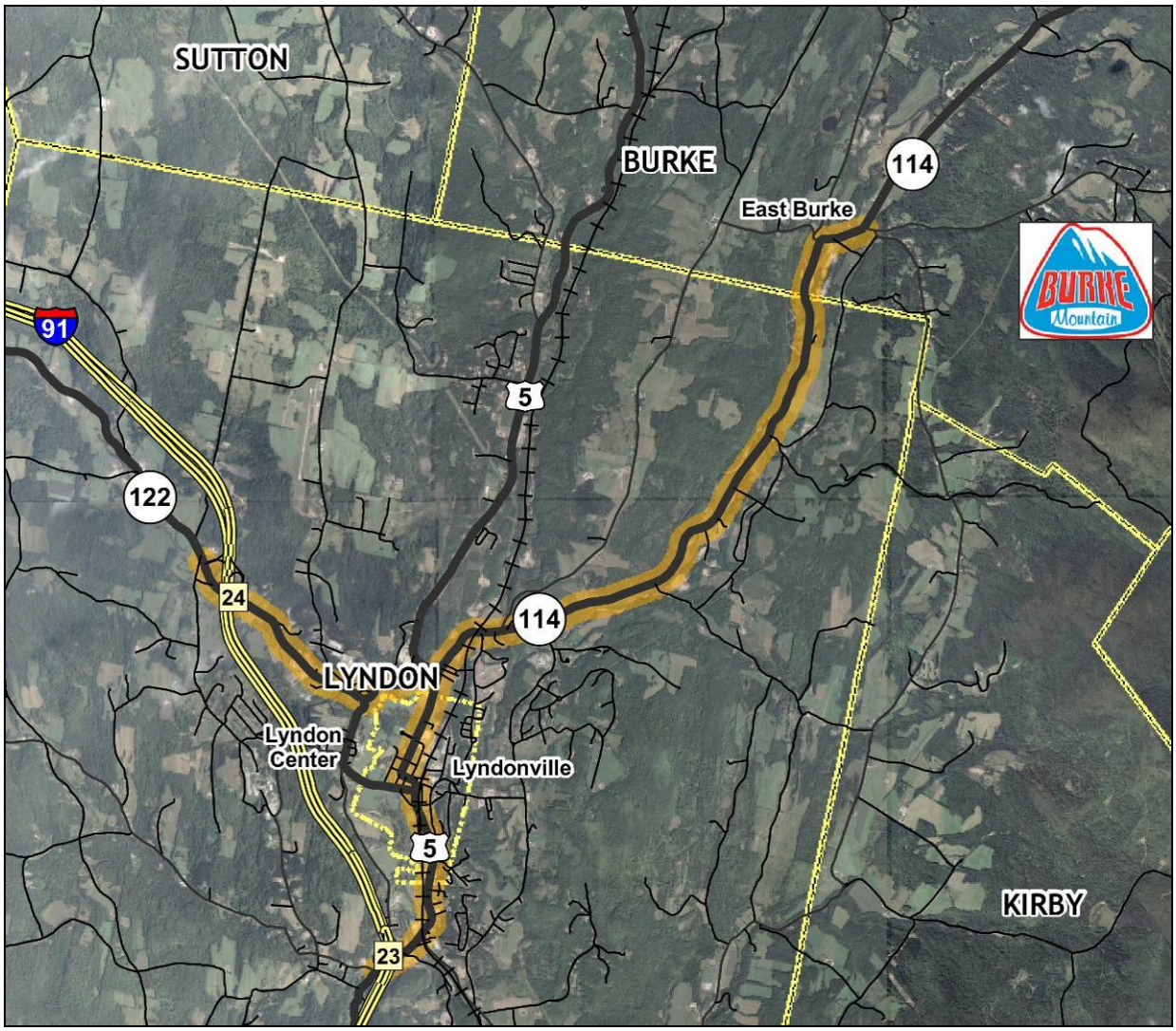
The development of the final plan is the results of the series of tasks as shown below.

Table 1: Study Tasks

TASK 1: Identify Existing & Future Conditions	April-May
TASK 2: Local Concerns Meeting	June
TASK 3: Develop and Evaluate Alternatives	July
TASK 4: Alternatives Analysis Public Meetings	August
TASK 5: Final Report and Final Public Meetings	September

The project study area (shown below in Figure 1) focuses on the current and future transportation infrastructure needs and land use regulation recommendations in Burke and Lyndon, as well as a review of related needs in the surrounding towns. The major transportation facilities in the study area include: I-91 Exit 23 and 24, US 5, VT 114, VT 122, Back Center Road, and Stevens Loop. This plan will identify transportation improvements for all modes and recommend changes to existing land use regulations to help accommodate future growth in a sensible manner.

Figure 1: Study Area – Core Area Highlighted in Orange

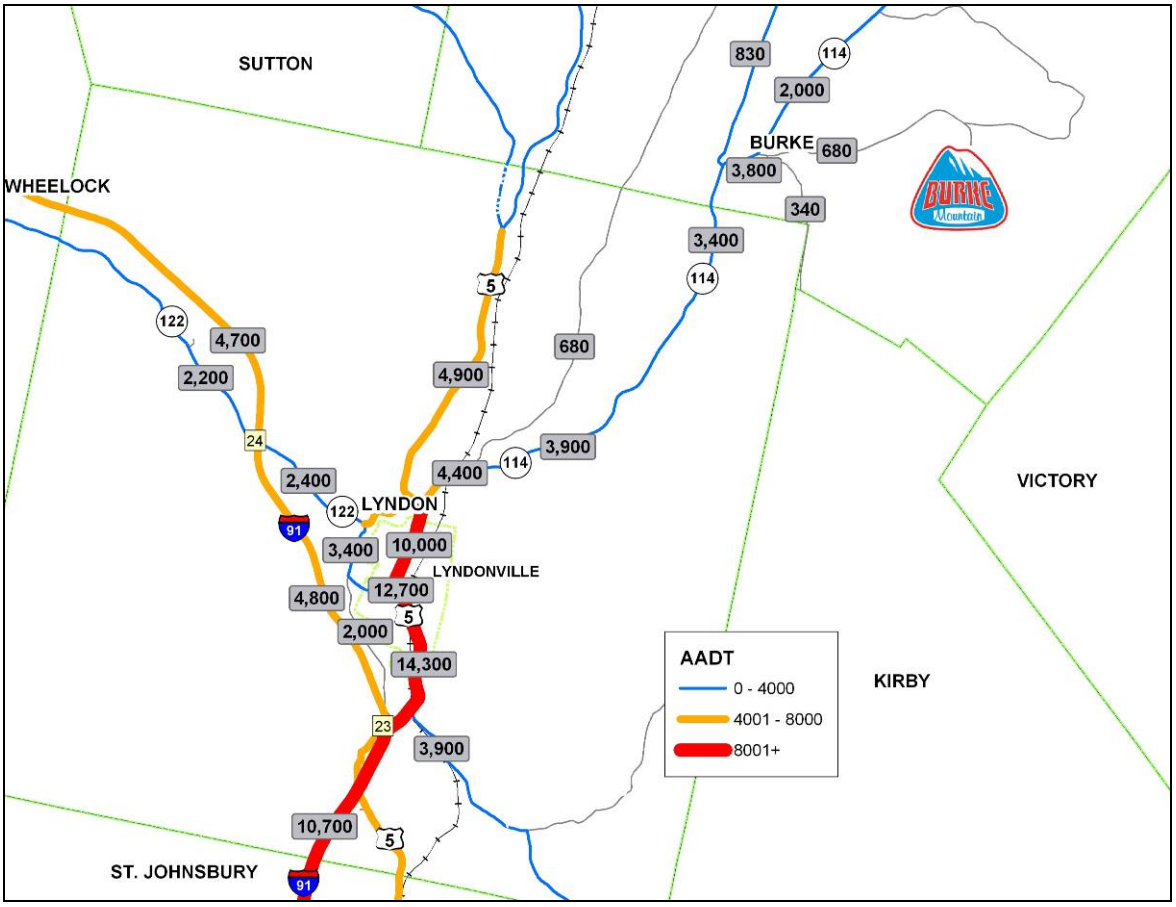


2.0 EXISTING CONDITIONS

2.1 AVERAGE ANNUAL DAILY TRAFFIC VOLUMES

Figure 2 below shows the most recent Average Annual Daily Traffic (AADT) volumes on study area roadways.[1] The figure shows the highest volumes in the study area along US 5 in Lyndon, with the Broad Street section carrying the highest volumes (in excess of 14,000 vehicles per day).

Figure 2: Study Area AADT Volumes

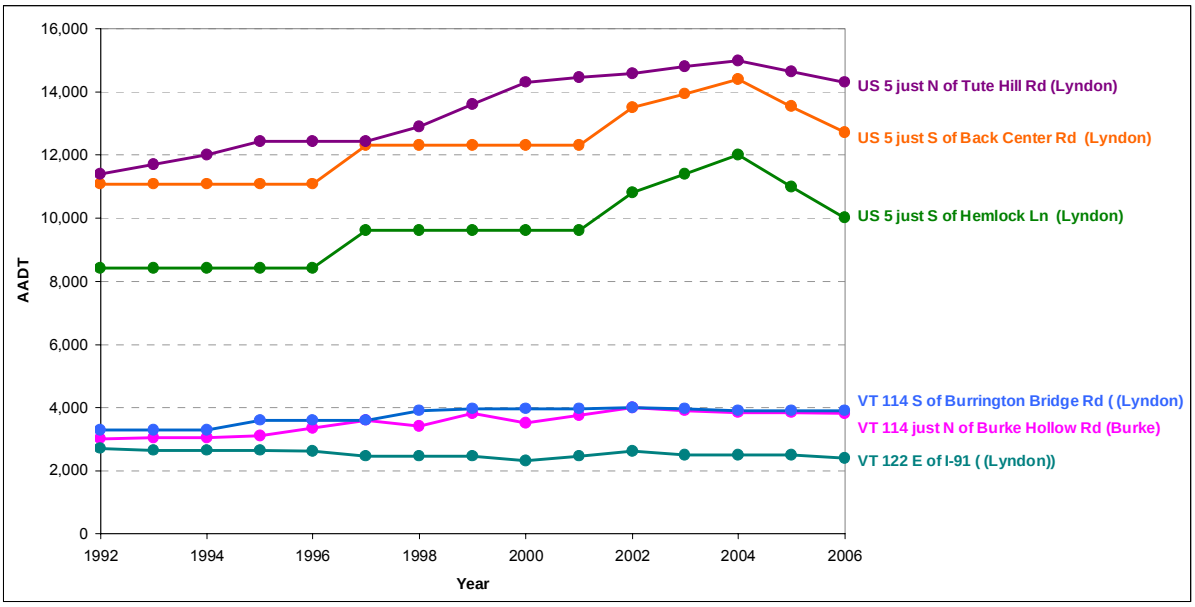


[1] The most recent AADT volumes are taken between 2003 and 2006.

Figure 3 below shows the historical AADT volumes at six locations across the study area over the last 15 years. Key points include the following:

- The data indicate a general reduction in traffic volumes along US 5 in Lyndon between 2004 and 2006 (top three lines).
- Volumes along VT 114 in both Lyndon and Burke, as well as volumes along VT 122 in Lyndon, have remained relatively steady in the past 15 years (bottom three lines).

Figure 3: Historical AADT Volumes at Select Locations across the Study Area[1]

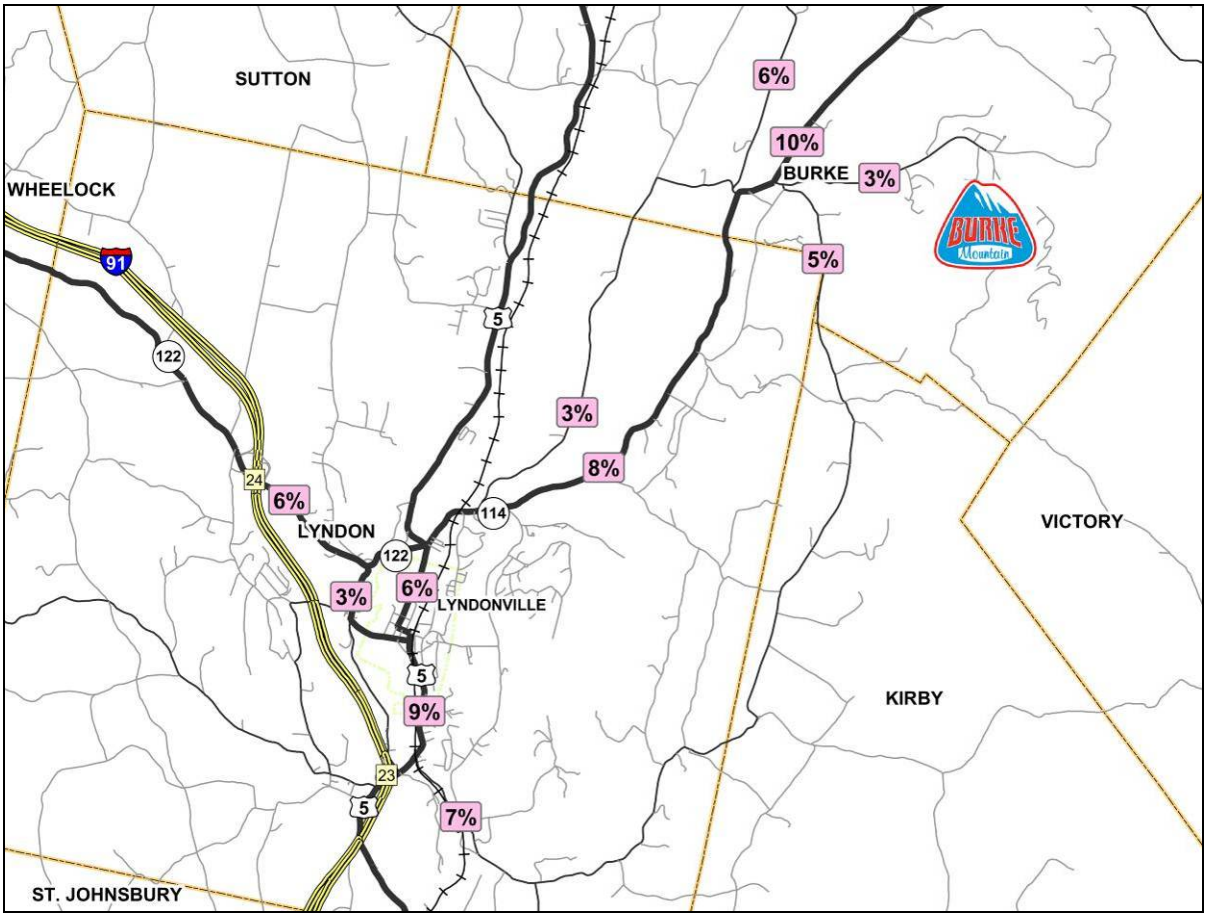


2.2 TRUCK VOLUMES

Figure 4 indicates the percentage of trucks on different road segments in the study area. Truck percentages tend to be greatest on the major roadways in the area (US 5, VT 122, VT 114), which are all classified as rural major collectors. The statewide average truck percentage on rural major collectors is 6%. Most of the study area roads have truck percentages greater than 6% with the greatest percentage of truck traffic (10%) occurring along VT 114 just north of Mountain Road. This is likely due to the high volume of lumber and freight trucks traveling to and from Island Pond and the relatively low volume of automobile traffic in the section.

[1] The counter located on VT 114 just north of Burke Hollow Road in Burke is a VTrans Continuous Traffic Count station. The other count data were obtained from temporary counters.

Figure 4: Truck Volume Percentages



2.3 INTERSECTION CONGESTION & DELAY

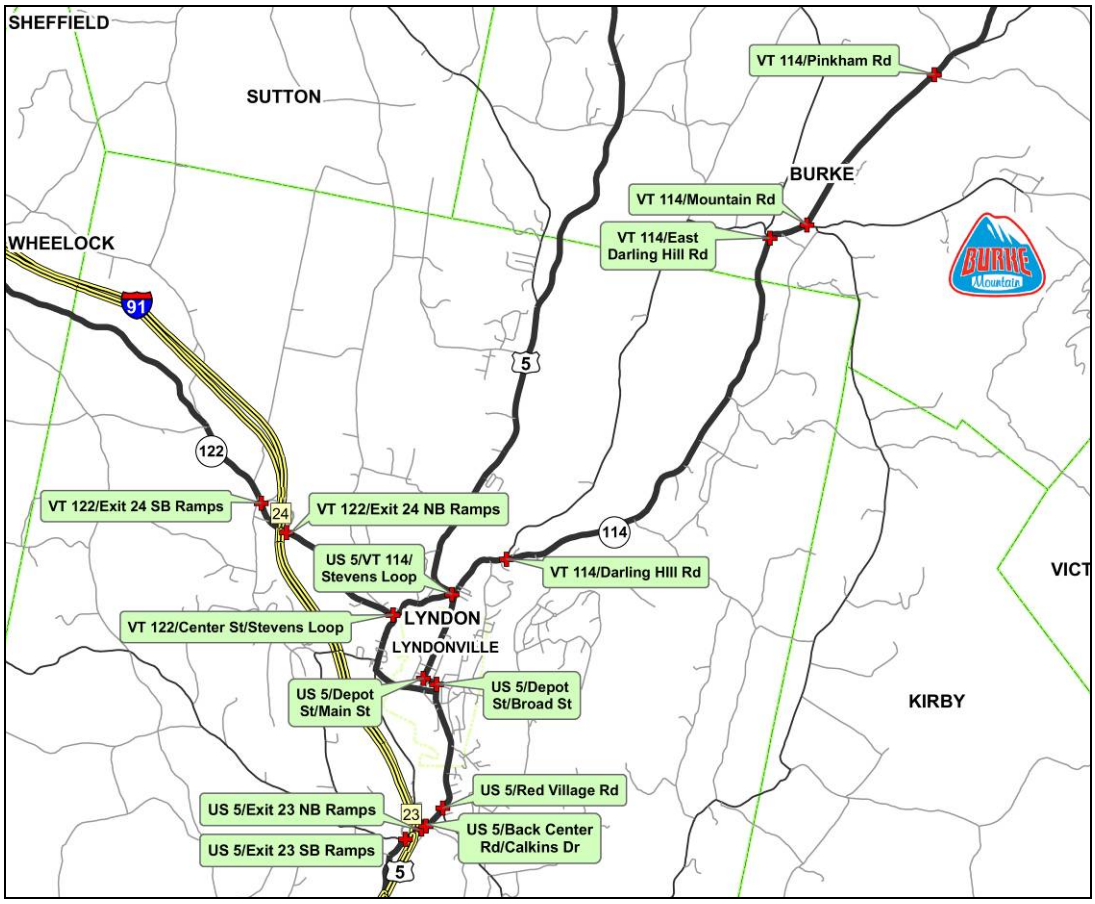
A Level of Service (LOS) analysis is the analytical tool used to estimate congestion at intersections. LOS is a qualitative measure rating the operating conditions as perceived by motorists driving in a traffic stream. The *Highway Capacity Manual* (HCM) defines six grades of LOS at an intersection, ranging from LOS A (free-flow conditions) to LOS F (extreme delays).

The VTrans policy on level of service is:

- Overall LOS C should be maintained for state-maintained highways and other streets accessing the state's facilities.
- Reduced LOS may be acceptable on a case-by-case basis when considering, at minimum, current and future traffic volumes, delays, volume to capacity ratios, crash rates, and negative impacts as a result of improvement necessary to achieve LOS C.
- LOS D should be maintained for side roads with volumes exceeding 100 vehicles/hour for a single lane approach (150 vehicles/hour for a two-lane approach) at two-way stop-controlled intersections.

Traffic congestion and average delay was calculated at 14 intersections throughout the study area (see Figure 5). Congestion is estimated for Saturday AM and PM peak hour conditions (ski season), including trips generated by the proposed Burke Mountain Resort expansion, in the base year (2007) and 20 years in the future (2027).

Figure 5: Analyzed Intersections



2.3.1 Future Year (2027) Traffic Growth Assumptions

The background traffic volumes were grown to 2027 conditions based on historical growth trends at nearby VTrans counter locations. Utilizing these trends, the average growth rates for the study area volumes ranged from 0.6%-1.0% per year. This growth assumption is in line with statewide growth estimates for rural primary and secondary roads of approximately 1% per year.

2.3.2 Burke Mountain Resort Expansion Trip Generation

The number of new trips generated by the expanded Burke Mountain Resort is based on the most recent estimated growth in residential housing (900 residential units) and the proposed increase in ski-lift capacity (40% increase).

A Saturday PM peak hour trip generation rate of 0.34 trips per occupied unit[1] was used to calculate the number of trips that would be generated by the 900 residential units. The same trip generation rate was utilized for the AM peak hour as well. Conservatively assuming that all 900 units are occupied, we estimate the new residential units will generate 306 new peak hour trips during both the AM and PM peak hours.[2]

The proposed expansion at Burke Mountain Resort will increase the lift-carrying capacity by approximately 40%. To estimate the growth in trips generated by the increased lift carrying capacity, the existing entering trips during the AM peak hour and the existing exiting trips during the PM peak hour were both increased by 40%, resulting in 39 new AM peak hour trips and 54 new PM peak hour trips.[3]

The total number of AM and PM peak hour trips generated by the new residential units and the increased lift capacity are as follows:

- AM Peak Hour: 345 trips
- PM Peak Hour: 360 trips

These new trips were then distributed onto the surrounding transportation network based on background traffic distributions and assumptions based on mountain trip-making characteristics.

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[1] Trip generation rate based on a ski vehicle intercept study conducted for the Mountain Club Resort at Mount Snow, Bruno Associates, 1996.

[2] 0.34 trips per unit x 900 residential units = 306 peak hour trips

[3] AM Peak Hour: 98 existing entering trips x 40% = 39 new AM peak hour trips; PM Peak Hour: 134 existing exiting trips x 40% = 54 new PM peak hour trips

2.4 LEVEL OF SERVICE RESULTS

Table 2 shows the LOS results for the two signalized intersections during the Saturday AM and PM ski season peak hours in 2007 and 2027. The signalized LOS analysis utilized existing signal timings which were field verified in May 2007. Overall, both intersections operate at LOS A or B.

Table 2: Signalized LOS Results

	Saturday AM Peak Hour				Saturday PM Peak Hour			
	2007		2027		2007		2027	
Signalized Intersections	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
US 5/VT 114/Stevens Loop								
Overall	**B**	**11**	**B**	**12**	**B**	**12**	**B**	**15**
EB, along Stevens Loop	A	6	A	6	A	6	A	7
WB, along VT 114	B	11	B	12	B	15	C	20
NB, along US 5	B	12	B	13	B	12	B	13
SB, along US 5	B	12	B	14	B	11	B	12
US 5/Back Center Rd/Calkins Dr								
Overall	**A**	**6**	**A**	**6**	**A**	**6**	**A**	**6**
EB, exiting Back Center Rd	D	37	D	37	D	37	D	37
WB, exiting Calkins Dr	D	36	D	36	D	36	D	36
NB, along US 5 toward VT 114	A	3	A	3	A	3	A	3
SB, along US 5 toward Exit 23	A	3	A	3	A	3	A	3

Table 3 shows the unsignalized LOS results for the Saturday AM and PM peak hours in 2007 and 2027. The volume-to-capacity (v/c) ratio is also given. A v/c ratio greater than 1.00 indicates volumes are greater than the capacity of the movement.

Most movements operate at acceptable LOS. Movements that experience significant delay are listed below and highlighted in Table 3:

- Westbound movements exiting Depot Street at the US 5/Depot Street/Broad Street intersection
- Westbound movements exiting Red Village Road at the US 5/Red Village Road intersection

Table 3: Unsignalized LOS Results (red highlighting = substandard LOS)

	Saturday AM Peak Hour						Saturday PM Peak Hour					
	2007			2027			2007			2027		
Unsignalized Intersections	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c
VT 114/Pinkham Rd												
WB Left/Right, exiting Pinkham Rd	A	10	0.00	A	10	0.01	A	9	0.00	A	9	0.00
SB Left/Through, along VT 114 toward US 5	A	<1	0.00	A	<1	0.00	A	<1	0.00	A	<1	0.00
VT 114/Mountain Rd												
WB Left/Right, exiting Mountain Rd	B	15	0.40	C	15	0.41	C	16	0.54	C	17	0.55
SB Left/Through, along VT 114 toward US 5	A	<1	0.01	A	<1	0.01	A	<1	0.01	A	<1	0.01
VT 114/East Darling Hill Rd												
EB Left/Right, exiting Post Office Drvwy	B	14	0.14	B	15	0.17	C	15	0.13	C	17	0.16
NB Left/Through, along VT 114 toward East Haven	A	<1	0.01	A	<1	0.01	A	<1	0.02	A	<1	0.02
VT 114/Darling Hill Rd												
EB Left/Through, along VT 114 toward East Haven	A	<1	0.01	A	<1	0.01	A	<1	0.02	A	<1	0.02
SB Left/Right, exiting Darling Hill Rd	B	10	0.02	B	11	0.03	B	12	0.03	B	13	0.03
US 5/Depot St/Main St												
WB Left//Right, along US 5/Depot St	A	<1	0.02	A	<1	0.02	A	<1	0.02	A	<1	0.03
NB Through/Right, along Main St	C	24	0.21	D	31	0.30	C	19	0.09	C	22	0.12
US 5/Depot St/Broad St												
EB Left/Through/Right, exiting US 5/Depot St	C	16	0.52	C	23	0.70	B	15	0.46	C	19	0.59
WB Left, exiting Depot St	F	>100	3.61	F	>100	9.35	F	>100	1.43	F	>100	3.48
WB Through/Right, exiting Depot St	F	52	0.46	F	>100	0.70	E	45	0.33	F	78	0.52
NB Left/Through/Right, along US 5/Broad St	A	7	0.32	A	7	0.36	A	8	0.33	A	8	0.38
SB Left/Through/Right, exiting Angie's Alley	A	<1	0.00	A	<1	0.00	A	<1	0.00	A	<1	0.00
US 5/Red Village Rd												
WB Left/Right, exiting Red Village Rd	D	29	0.47	F	84	0.81	C	21	0.37	D	35	0.58
SB Left, along US 5 entering Red Village Rd	A	9	0.08	A	10	0.11	A	9	0.07	A	9	0.10
US 5/I-91 Exit 23 NB Ramps												
WB Left/Through/Right, exiting Ramps	B	14	0.47	C	18	0.57	B	13	0.43	C	16	0.53
NB Left, along US 5 entering Ramps	A	9	0.01	A	9	0.01	A	9	0.01	A	9	0.02
US 5/I-91 Exit 23 SB Ramps												
EB Left/Right, exiting Ramps	B	12	0.06	B	14	0.09	B	12	0.03	B	13	0.04
NB Left, along US 5 toward VT 114	A	9	0.01	A	9	0.02	A	9	0.01	A	9	0.01
VT 122/Center St/Stevens Loop												
EB Left/Through/Right, along VT 122 toward US 5	A	<1	0.01	A	<1	0.01	A	<1	0.00	A	<1	0.00
WB Left/Through/Right, along VT 122 toward Exit 24	A	3	0.07	A	4	0.08	A	3	0.05	A	3	0.05
NB Left/Through/Right, exiting Center St	B	13	0.22	C	15	0.29	B	12	0.15	B	13	0.19
SB Left/Through/Right, exiting Pudding Hill Rd	C	17	0.23	C	20	0.31	B	12	0.10	B	13	0.13
VT 122/I-91 Exit 24 NB Ramps												
EB Left/Through, along VT 122 toward US 5	A	<1	0.00	A	<1	0.00	A	<1	0.00	A	<1	0.00
SB Left/Right, exiting Ramps	A	10	0.09	A	10	0.10	B	11	0.13	B	11	0.16
VT 122/I-91 Exit 24 SB Ramps												
EB Left/Through, along VT 122 toward US 5	A	2	0.03	A	2	0.04	A	3	0.02	A	3	0.03
SB Left/Right, exiting Ramps	B	11	0.06	B	11	0.07	B	10	0.03	B	11	0.04

2.5 ROAD SEGMENT LEVEL OF SERVICE

A Level of Service (LOS) analysis was conducted on seven road segments within the study area. Similar to intersection Level of Service, a road segment level of service analysis identifies the level of service from the driver's perspective using the following measures:

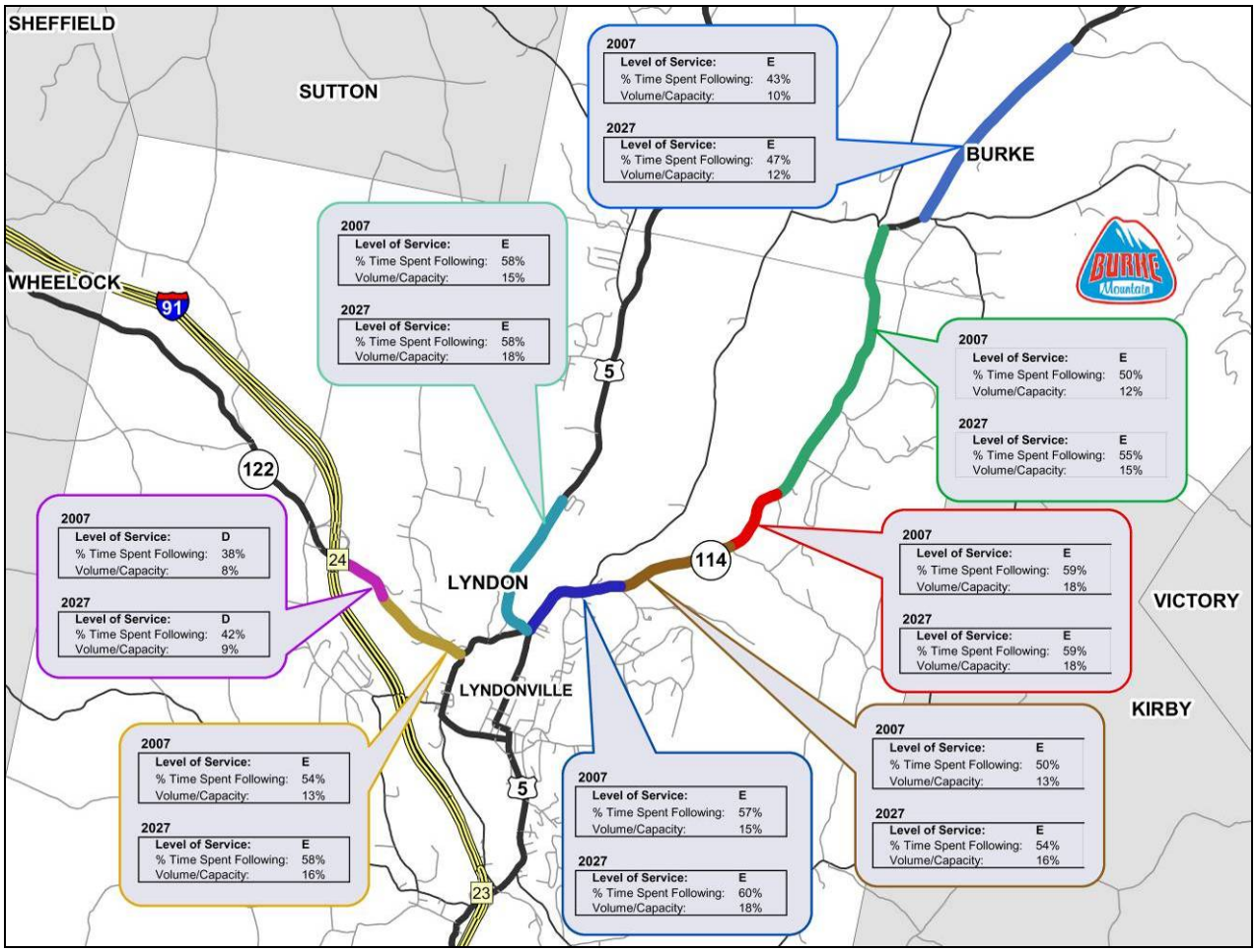
- LOS Grade (A through F);
- Volume to Capacity Ratio (v/c); and
- Average Time Spent Following Another Car.

A rural road segment LOS is calculated based on a number of factors including lane geometry, type of roadway, terrain, traffic volume, percent passing zones, number of driveways, and speed. The LOS

is particularly guided by a vehicle's ability to maintain free-flow speed. Thus, obstructions to free-flow conditions, such as a high percentage of trucks, steep terrain, and no passing zones, lead to poor levels of service.

Figure 6 shows the road segment LOS results for the seven road segments during 2007 and 2027 PM peak winter conditions. The figure shows all segments operating at LOS D or worse under all conditions. The worst measures are found on VT 114 north of US 5.

Figure 6: Road Segment Level of Service



2.6 CRASH ANALYSIS

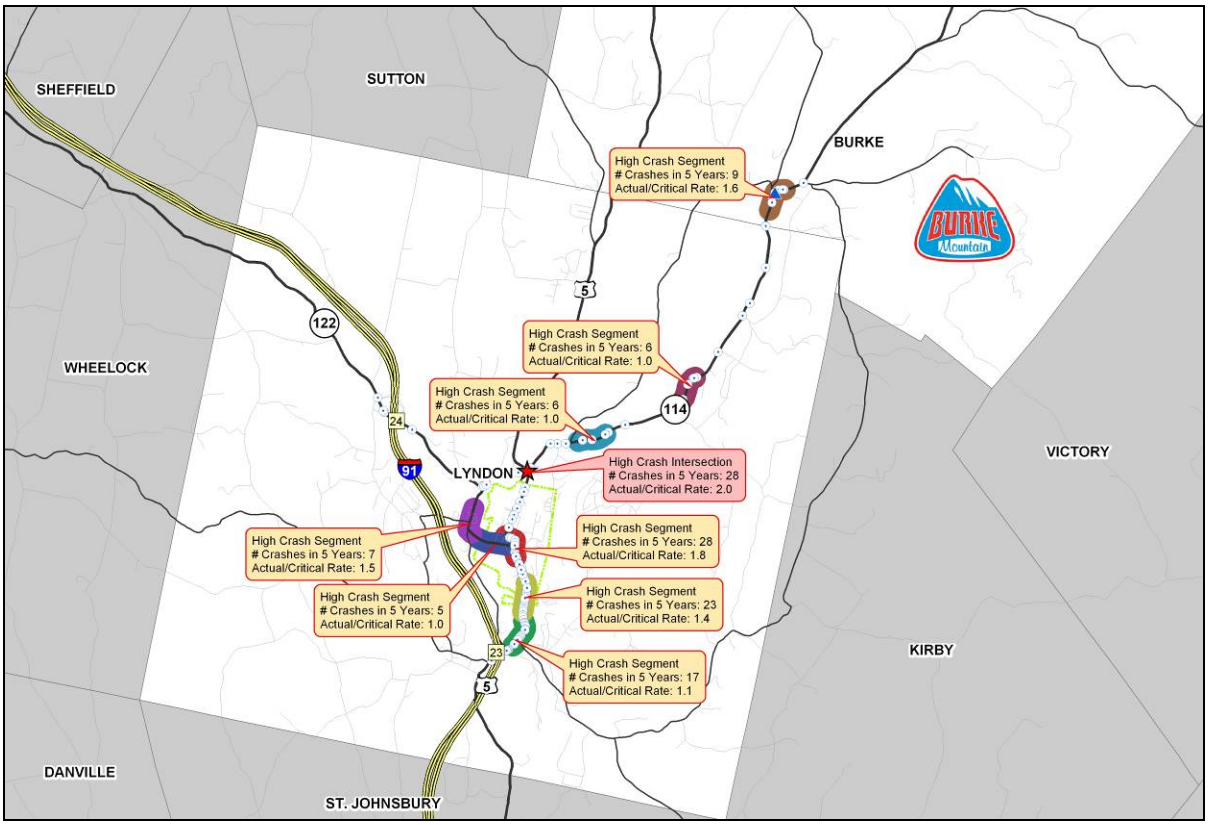
VTrans maintains a statewide database of reportable crashes[1] on the state and town road systems. Between 2001 and 2005, a total of 189 reportable crashes were reported in the core study area along US 5, VT 114, and VT 122/Stevens Loop.

In order to be classified as a High Crash Location (HCL), an intersection or road section (0.3 mile section) must meet the following two conditions:

1. It must have at least 5 crashes over a 5-year period
2. The Actual Crash Rate must exceed the Critical Crash Rate.

There are eight High Crash Location Segments and one High Crash Location Intersection designated by VTrans in the study area. The location of all reported crashes in Burke and Lyndon and the critical information pertaining to the High Crash Locations are shown in Figure 7.

Figure 7: Reportable Crashes 2001-2005 (Source: VTrans)



[1] A reportable crash is a crash involving $1,000 or more in property damage, an injury, or a fatality.

Of the 189 crashes along the core study roads, the greatest number of crashes occurred along US 5 in Lyndonville (71 crashes). Table 4 shows the breakdown in number of crashes by day of week, roadway, and municipality.

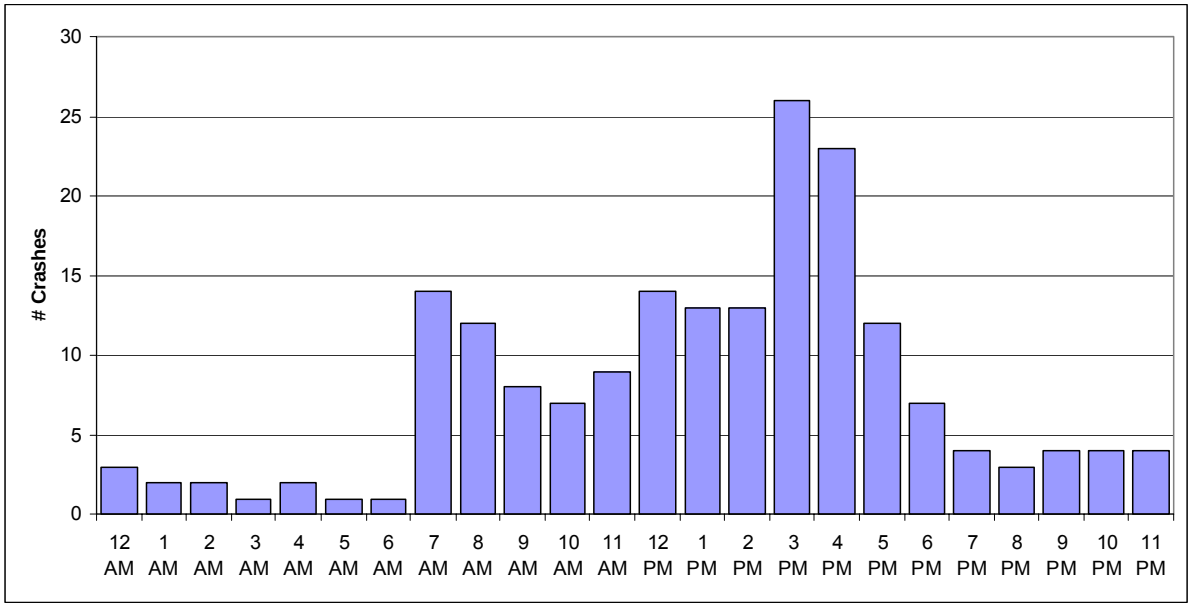
Table 4: Crashes by Day, Route and Municipality

	US 5 Lyndon	US 5 Lyndonville	VT 114 Lyndon	VT 114 Burke	VT 122 Lyndon	
Sun	5	6	6	1	2	20
Mon	10	4	6	3	2	25
Tue	7	8	6	1	2	24
Wed	8	15	2	2	2	29
Thu	6	13	5	3	0	27
Fri	9	14	7	2	3	35
Sat	11	11	4	1	2	29
	56	71	36	13	13	189

About half of all 2001-2005 crashes occurred during the ski season (November-March) and half during the off-season (April-October).

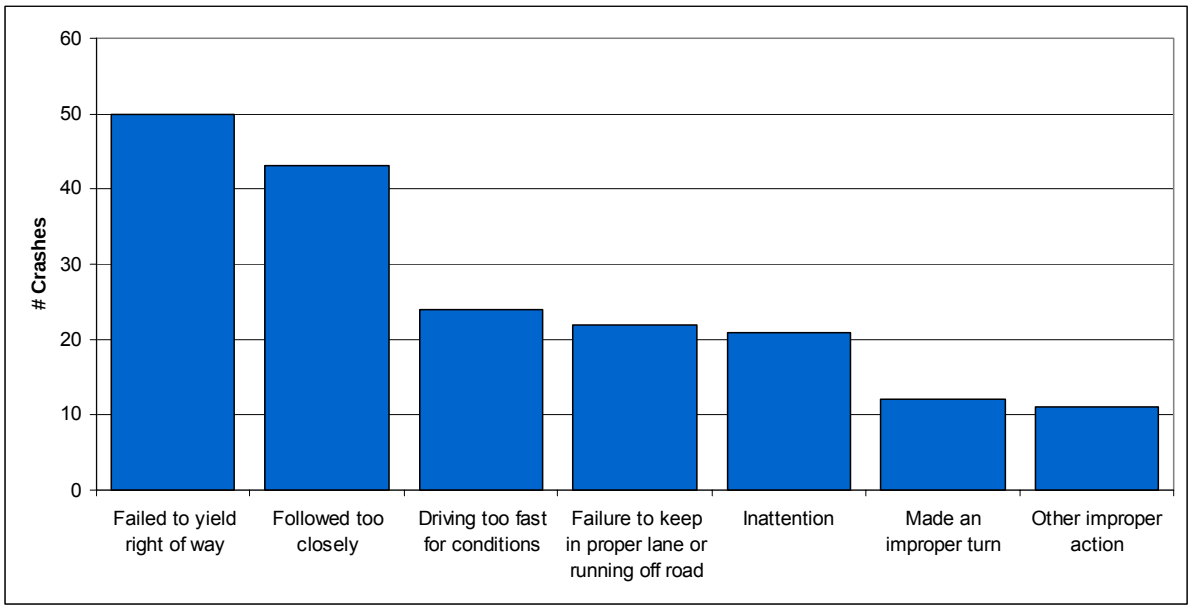
Crashes tend to cluster around the PM peak hour of commuting traffic, roughly 3:00 PM-5:00 PM (Figure 8).

Figure 8: Crashes by Time of Day



Contributing circumstances that were cited more than 10 times among the 189 crashes are shown in rank order in Figure 9.

Figure 9: Contributing Circumstances

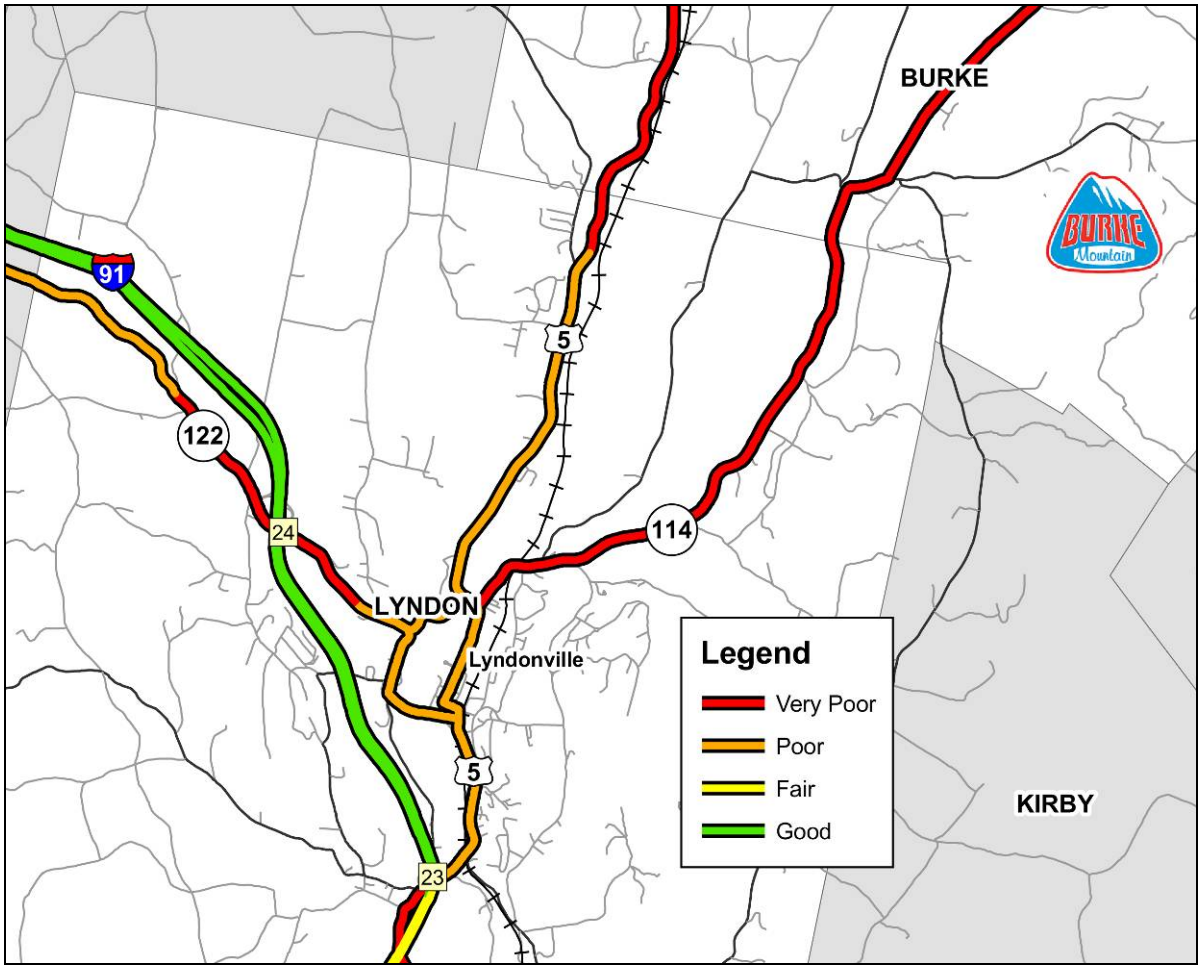


2.7 PAVEMENT CONDITIONS

Each year, VTrans updates its Pavement Management Report which provides an overview of current pavement conditions across the state, recent paving projects, and upcoming paving jobs. Figure 10 below shows the latest pavement conditions as reported in the 2006 annual pavement report. The pavement conditions are calculated based on field measurements of structural integrity, roughness index, and pavement rutting.

Figure 10 shows sections of US 5, VT 122, and VT 114 rated as in either poor or very poor condition. VTrans' goal is to have no more than 25% of the state's road in "Very Poor" condition in any given year. VTrans is currently working on plans to reconstruct portions of Broad Street which will greatly improve conditions along this segment. To prioritize new pavement rehabilitation projects, VTrans scores the road segment based on the pavement condition index (shown in map below), a benefit to cost ratio, the segment's regional importance, and the project's momentum.

Figure 10: 2006 Pavement Conditions



2.8 RAIL SERVICE

The Washington County Railroad (Vermont Rail System) operates one northbound and one southbound freight train per day, Monday-Friday, between Bellows Falls and Newport. Trains do not operate on a schedule and train operations fluctuate due to service demands, but the southbound train generally passes through Lyndonville at roughly 11:00 AM and the northbound train at roughly 4:00 PM. Passenger service is not currently available, but special excursions are offered at various times of the year.

Any increase in train traffic (freight or passenger) along this line would directly impact traffic operations at the three at-grade rail crossings in the study area.

Figure 11 shows the railroad route in the vicinity of the study area.

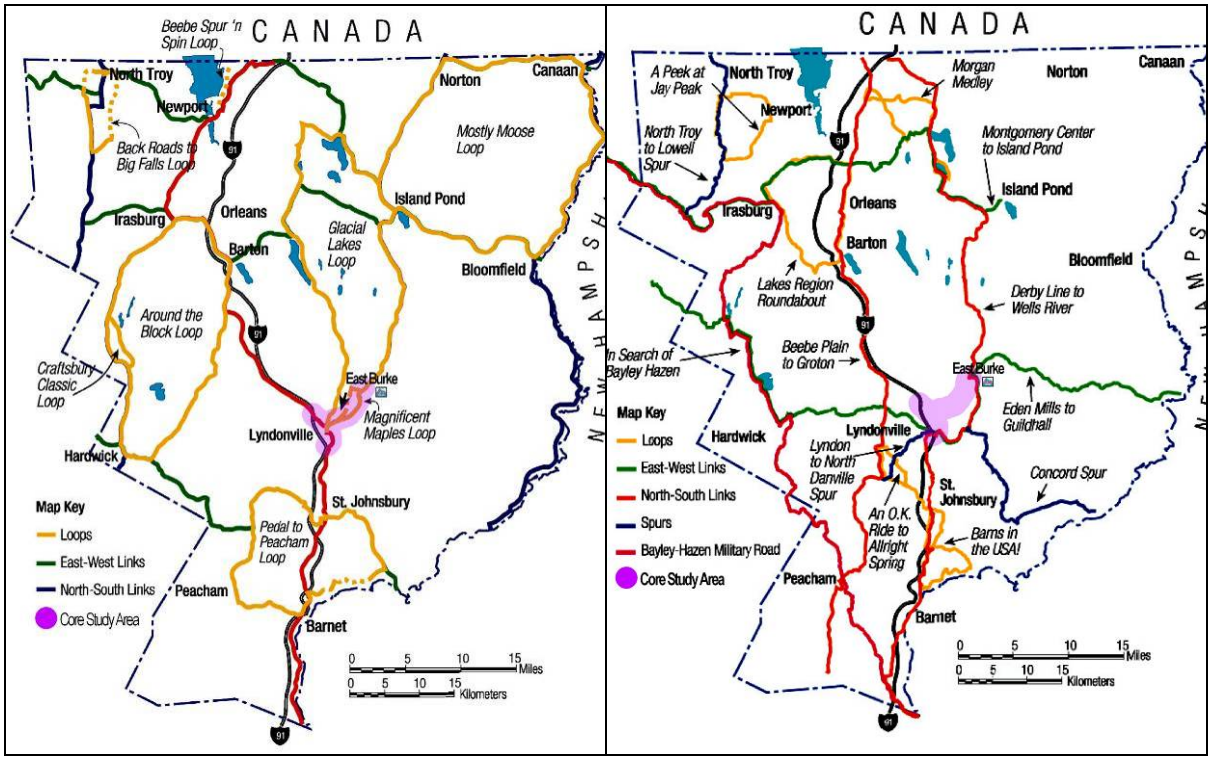
Figure 11: Washington County Railroad Map[1]

2.9 BICYCLE ROUTES

Vermont's Northeast Kingdom is well-known for great on- and off-road bicycling. Figure 12 shows the identified bicycle routes through the study area as identified in *Cycling in the Kingdom* (NVDA, 2000) and *Cycling the Kingdom's Back Roads* (NVDA, 2003). Although these routes are unofficial, they provide a good starting point for all levels of bicyclists looking to tour the Northeast Kingdom. As the map shows, a number of identified routes pass through the study area.

[1] http://www.vermontrailway.com/maps/wacr_conn_map.html

Figure 12: Regional Bicycle Routes[1]

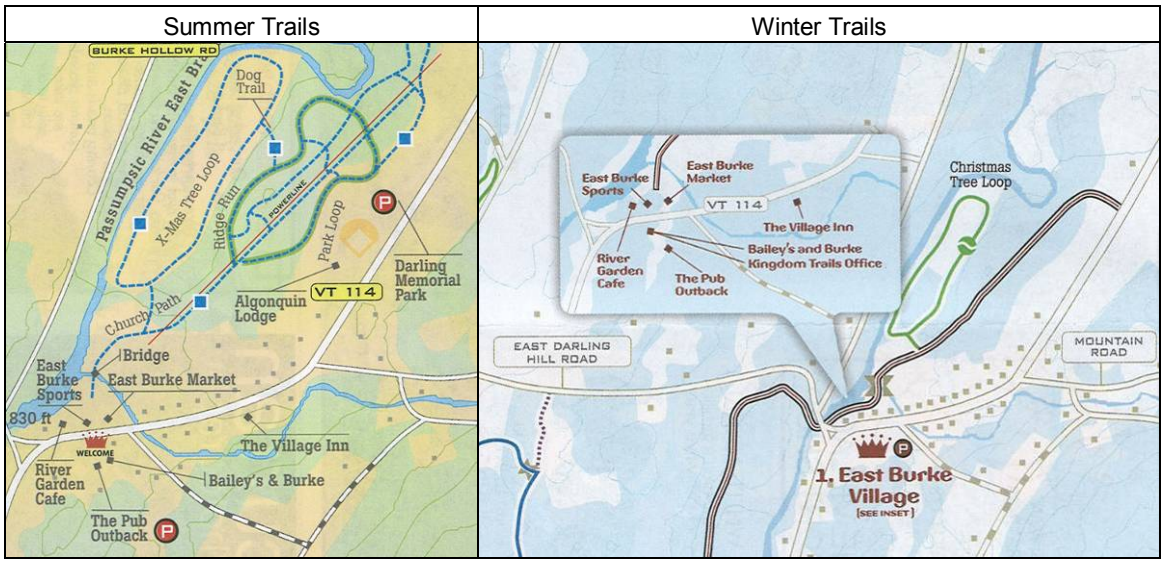


2.10 KINGDOM TRAILS

Kingdom Trails also offers summer and winter recreational trails for mountain biking, hiking, and cross-country skiing. There are also snowmobile trails that run through East Burke. Figure 13 shows the trail system in East Burke in the summertime and wintertime.

[1] Northeastern Vermont Development Association, *Cycling in the Kingdom* and *Cycling the Kingdom's Back Roads.*

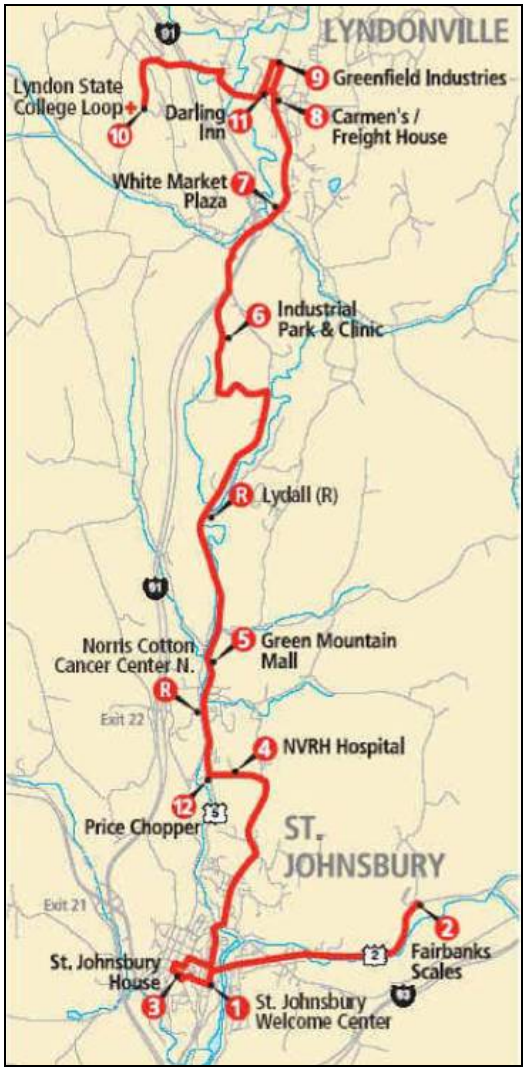
Figure 13: Kingdom Trails System- East Burke



2.11 PUBLIC TRANSIT SERVICE

Rural Community Transportation (RCT) runs the Jay-Lyn Jumper bus route which provides service between St. Johnsbury and Lyndonville on weekdays between 6:30 AM and 5:30 PM on 2-hour headways. Deviations from the bus route up to ¼ mile can be made upon request to (RCT). Figure 14 shows the existing bus route which has designated stops in the study area at White Mountain Plaza, downtown Lyndonville, and Lyndon State College.

Figure 14: Jay-Lyn Jumper Bus Route and Schedule[1]



WEEKDAYS — ST. JOHNSBURY TO LYNDONVILLE

St. Johnsbury Welcome Ctr. (1)	Fairbanks Scales (2)	St. Johnsbury Welcome Ctr. (1)	St. Johnsbury House (3)	NVRH Hospital (4)	Norris Cotton Cancer N. (R)	Green Mtn. Mall (5)	Industrial Pk & Clinic (6)	White Market Plaza (7)	Carmen's / Freight House (8)	Greenfield Industries (9)
6:35	6:45	R	7:00	7:10	R	7:15	R	R	7:30	7:35
8:30	8:45	8:55	9:00	9:10	R	9:15	9:20	9:25	9:30	9:35
10:30	10:45	10:55	11:00	11:10	R	11:15	11:20	11:25	11:30	11:35 A
1:30	1:45	1:55	2:00	2:10	R	2:15	2:20	2:25	2:30	2:35 P
3:30	3:45	R	4:00	4:10	R	4:15	4:20	4:25	4:30	4:35

R This stop by request only.

Please note: This is a deviated route, departure times are approximate.

WEEKDAYS — LYNDONVILLE TO ST. JOHNSBURY

Lyndon State College Loop + (10)	Darling Inn (11)	White Market Plaza (7)	Industrial Pk & Clinic (6)	Green Mountain Mall (5)	Price Chopper (12)	Norris Cotton Cancer N. (R)	NVRH Hospital (4)	St. Johnsbury House (3)	St. Johnsbury Welcome Ctr. (1)
7:45	7:50	7:55	8:00	8:10	8:15	R	8:18	8:25	8:30
9:45	9:50	9:55	10:00	10:10	10:15	R	10:18	10:25	10:30 A
11:45	11:50	11:55	12:00	12:10	12:15	R	12:18	12:25	12:30 P
2:45	2:50	2:55	3:00	3:10	3:15	R	3:18	3:25	3:30
4:45	4:50	4:55	5:00	5:10	5:15	R	5:18	5:25	5:30

+ Lyndon State College Loop: You may request pickups at the entrance to Wheelock, Steven's Dining Hall, or Vail Hall.

Please note: This is a deviated route; departure times are approximate.

2.12 FUNCTIONAL CLASSIFICATION

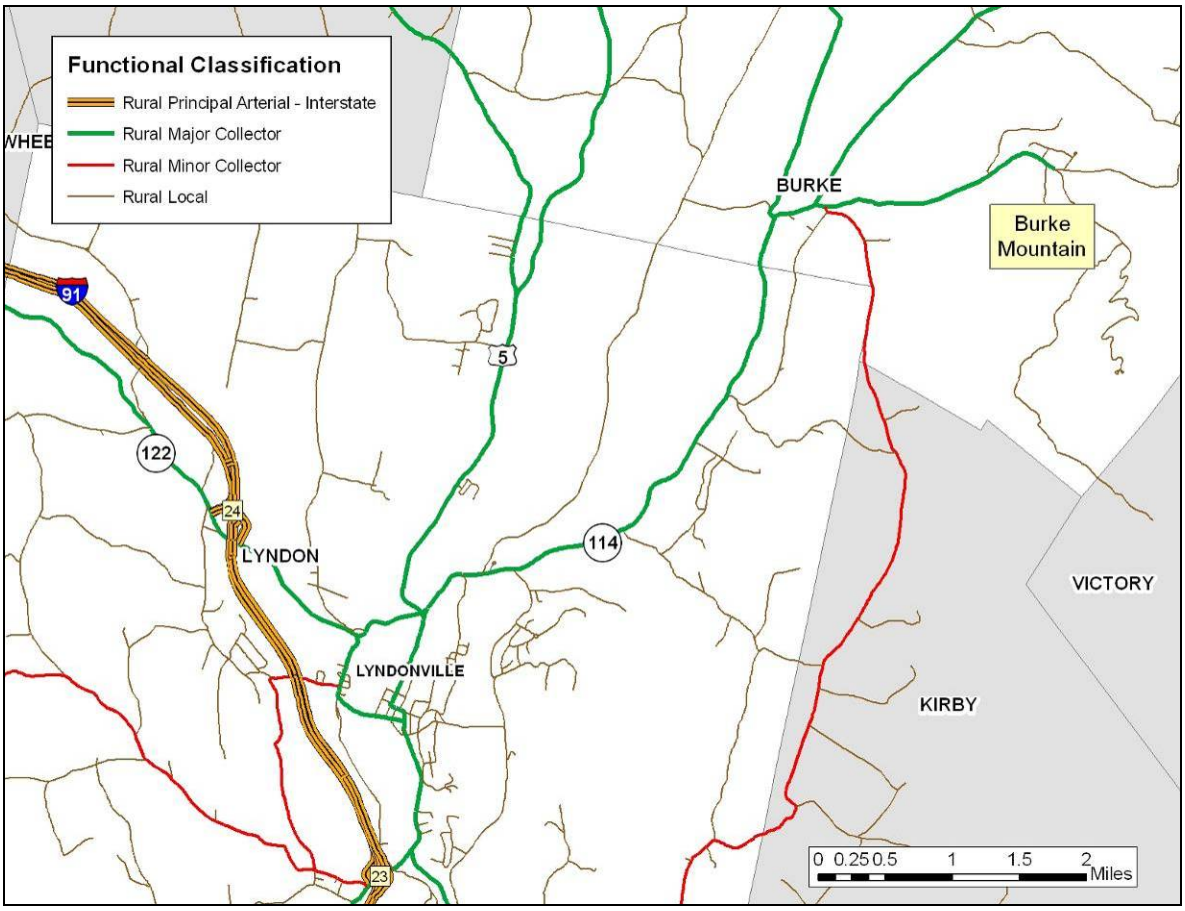
The Federal Highway Administration's roadway functional classification system is organized as a hierarchy of facilities, based on the degree to which the roadway serves mobility and access to adjacent land uses. Freeways and interstate highways, at the top of the hierarchy, are devoted exclusively to vehicle mobility, with no direct access to adjacent land. Arterials and Collectors provide

[1] Current as of 30 May 2007 (http://www.riderct.org/bus_schedule.htm)

both mobility and access to adjacent land uses. The local road system is devoted exclusively to providing local access, with limited capacity and relatively slow speeds.

The figure below shows that US 5, VT 114, VT 122, and Stevens Loop are classified as major collectors and serve the primary role of providing a connection between the local road network and the arterial network. Most other roadways in the study area are classified as local roads.

Figure 15: Functional Classification

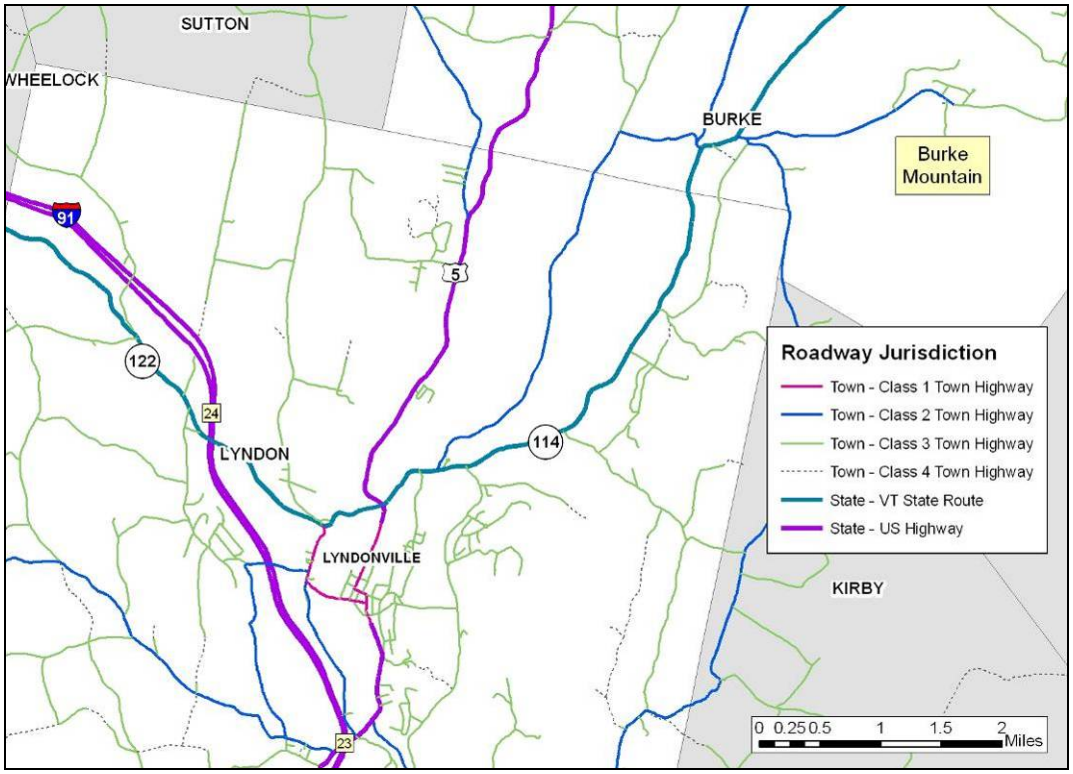


2.13 ROADWAY JURISDICTION

- State Route: Forms the primary transportation network through the State and is the responsibility of VTrans. State routes include all state numbered highway routes not designated as Class 1 town highways and US highways.

- Class 1 Town Highway: Forms the extension of state numbered highway routes through a town, and which carry a state highway route number. Class 1 town highways are subject to concurrent jurisdiction between the Municipality and VTrans on several matters.
- Class 2 Town Highway: Those town highways selected as the most important highways in each town. As far as practicable they shall be selected with the purposes of securing trunk lines of improved highways connecting two towns and to places which by their nature have more than a normal amount of traffic. Class 2 highways are primarily the responsibility of municipalities.
- Class 3 Town Highway: All other town highways that are "negotiable under normal conditions all seasons of the year by a standard pleasure car." Class 3 town highways, including sidewalks, crosswalks, and parking, are the responsibility of municipalities.
- Class 4 Town Highway: All other town highways are considered Class 4 town highways. The majority of these receive limited or no maintenance.

Figure 16: Roadway Jurisdiction



2.14 LAND USE ISSUES

2.14.1 Introduction

Applicable planning and zoning documents of towns within the project's study area, which includes the towns of Burke and Lyndon, were reviewed and assessed for their effectiveness in addressing transportation and related issues. Relevant excerpts from each of the towns' planning and zoning documents are also included in Appendix A.

The study area is typically defined by its rolling hills, lofty peaks and river valleys. The western portions of Burke are mountainous and forested, providing spectacular scenery and views. Lyndon on the other hand provides the hub of commerce and transportation for Burke and the surrounding area and can be considered a bedroom community for St. Johnsbury (Figure 17).

Tourism related to recreation is a dominant feature of the economy and growth in this region. Testimony to this fact is the collaboration with National Geographic in developing a geotourism program for the Northeast Kingdom. This program allows Vermont to promote tourism that enhances and sustains the environment, culture, and heritage of tourism destinations. A key summer activity highly promoted in the area is biking and cycling. Every year hundreds of people travel the shoulders of local roads to enjoy the region's spectacular scenery.

Burke Mountain Resort is also listed as one of the geotoursim destinations. The Ginn Corporation, recent purchaser of the resort, is in the process of expanding it to a 4-season operation, offering a new golf course, over 800 residential units, and facilities for other non-winter recreational activities. The expanded resort will create hundreds of new jobs and will provide a boost to the local economy. It will also result in secondary growth that will likely have a significant impact on the local transportation system, and the potential for impacts to the rural and historic village character.

The transportation corridors are an integral part of the communities' daily life and provide easy access to the region's breathtaking scenery and recreational resources. These characteristics make it a popular area to live, work, and play. The expansion at Burke Mountain coupled with impending growth indicates the need to address transportation and land use management in an effective and efficient manner in order to maintain and preserve the core values of the communities. A review of how each town addresses these important elements follows.

Figure 17: Land Use Map

2.14.2 Town of Burke

2.14.2.1 Community Profile

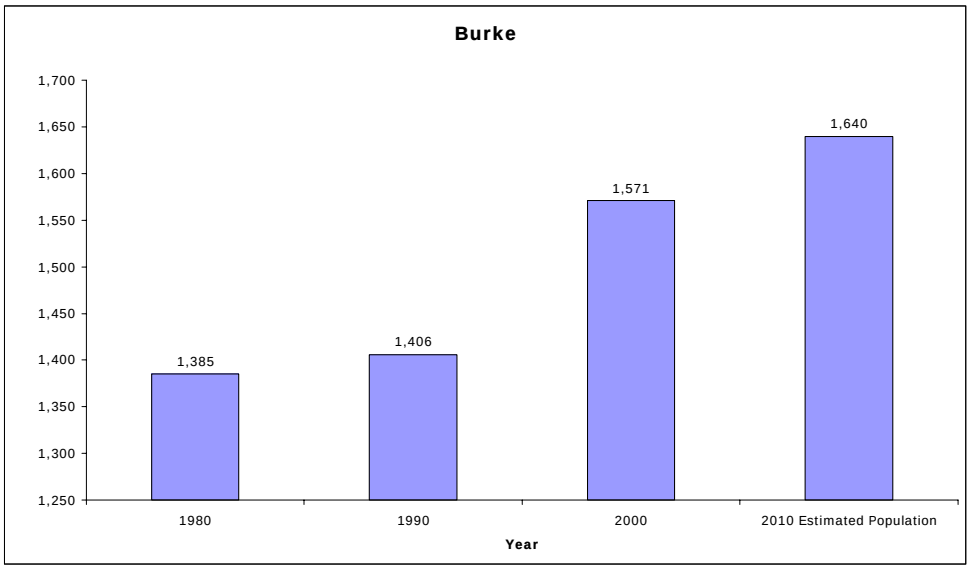
The Town of Burke, Vermont is located in the northeast corner of Caledonia County. Residents of Burke rely heavily on the main transportation corridors, Route 5 and Route 114. Route 114 runs in a north – south manner through the eastern section of the town while Route 5 travels along the southwestern portion of the town. Today, most homes and businesses are concentrated in the village centers of West Burke, Burke Hollow and East Burke, which is adjacent to the Burke Mountain ski area.

The Town of Burke hosts Burke Mountain Ski Resort, (the home of the prestigious Burke Mountain Academy ski school) as well as Kingdom Trails Association (KTA), which is responsible for the upkeep of recreational trails in the area. Aside from a few small farms and other modest businesses, the ski resort and KTA are the principal source of economic activity within the town, along with a modest amount of tourism.

2.14.2.2 Demographics

Since its charter in 1782, Burke has constantly fluctuated in population. However, in the past 20 years the town has seen a steady increase in residency (Figure 18). Using a regression analysis the town has a projected population of 1,640 persons by the year 2010. This is an increase of 4.4% between the years of 2000 and 2010. Population density as of the year 2000 was 46.14 people per square mile.

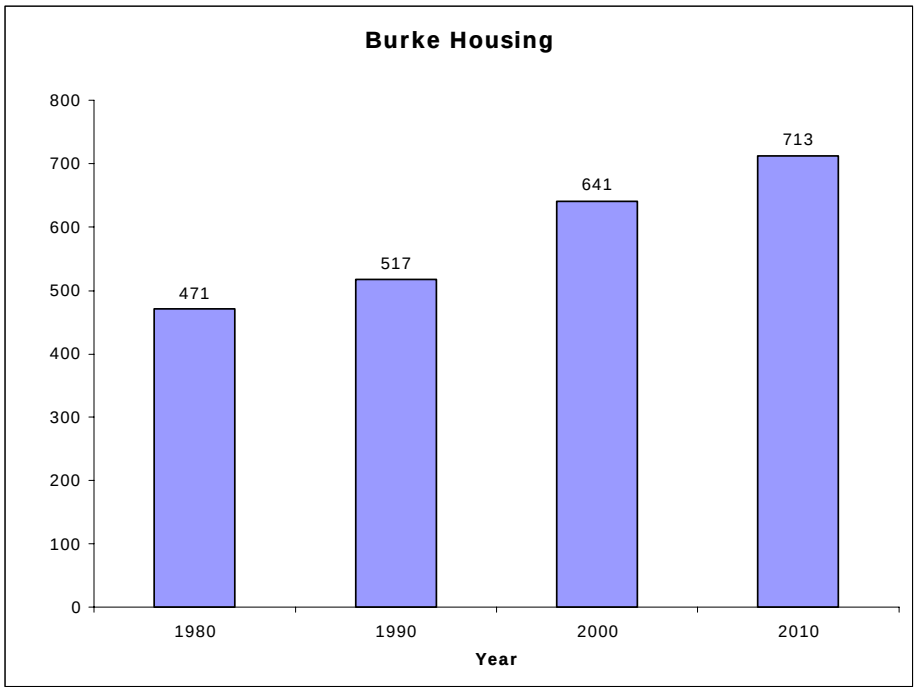
Figure 18: Town of Burke Population Data



2.14.2.3 Housing Units

In 2000, there were 641 households in Burke and a total of 892 housing units, 203 of which were seasonal, recreational or occasional use (Figure 19). If development growth continues as it has over the past two decades, the projected number of housing units for the year 2010 is 713. However, this number will likely more than double with the resort's impending development of over 800 residential units.

Figure 19: Town of Burke Housing Data



2.14.2.4 Economics

Recreation and tourism are the chief contributors to Burke's economy. The Burke Mountain Resort, which is home to the Burke Mountain Academy ski school, provides many employment opportunities for residents, although most are seasonal positions. Other employment in town is limited within the town lines, making commuting to other employment centers commonplace. Very few conventional farms are still in operation today. In 2005 the unemployment rate was 3.2%, a decrease from 3.7% in 2000.

2.14.2.5 Assessment and Summary of Land Use and Planning Documents

The Town of Burke is a dynamic community characterized by its rural and scenic landscape. Existing land uses are the result of historic development patterns typically seen throughout Vermont - small

village centers surrounded by working farms, open meadows, forests, and low-density residential development. Most of the retail and commercial services are based outside of Burke, with 90% of the town's workforce traveling out of town for employment (Vermont Indicators Online). Population growth and development in Burke has been slow but steady over the last decade; however, with a large multi-seasonal resort development planned for an existing and approved PUD in the Burke Mountain Ski area, it is expected to dramatically increase. Over 800 housing units are planned, along with typical resort amenities, which will more than double the town's housing units in a very short amount of time. The overall impact of the Burke Mountain development will therefore be significant to the town and surrounding area. As such, the Town recently adopted a revised town plan and zoning bylaw at the end of 2006. Burke also has subdivision regulations, which date back to 1990.

The Town Plan describes Burke's roads as "generally in good shape and adequate to accommodate current traffic volumes" (p. 13). However, the town does not maintain a formal, long-term road improvement program, which would account for any new large development, such as the one proposed at the Burke ski area. In particular, there are no references to or strategies for addressing potential resort impacts, especially traffic-related conflicts at the intersection of Route 114 and the access road (Mountain Road). Furthermore, the plan acknowledges "a high volume of trucks, many from Canada, travel through East Burke Village" along Route 114 en route to Interstate 91 (p. 14). This heavy truck traffic, compiled with the impending tourist traffic, has the potential to cause severe impacts at this intersection and in the village, which are not accounted for in the Town Plan. Increased traffic and conflicts, particularly from ski traffic, may not be able to be accommodated if there is no corresponding growth or long-term improvement program for the local road network.

The plan does provide goals and strategies for other important transportation elements, such as access management, traffic calming and pedestrian and bicycle facilities. These include techniques for managing highway access (e.g. shared driveways, turning lanes, and minimum curb-cut widths), slowing traffic in settled areas (e.g. textured crosswalks, street-tree plantings and landscape/streetscape), and enhancing walking/biking opportunities (e.g. interconnecting sidewalks, delineated bicycle lanes, and formalizing informal trails). However, most provisions are only abstract and advisory in effect and do not provide clear, specific guidance on how and where these improvements should be implemented. This lack of clarity and ambiguity can lead to inconsistent decision-making by municipal officials and inadvertently allow inappropriate development.

The town has effectively addressed future growth and development by proposing multiple zoning districts. These include specific areas for mixed-use and low-, medium-, and high-density development. In particular, the town has identified three specific village centers where the majority of the development, residential and commercial, should occur. The plan states "The village centers should be separated by rural/residential areas, and not be allowed to grow together into one continuous development" (p. 10). By focusing dense, mixed development in the village centers, distances between origins and destinations can be shortened, walking and bicycling will become more attractive, and transit services will be more feasible. The town would also like to pursue "opportunities for enhancing the streetscapes [in the village], including planting of trees and

shrubbery in strategic locations" (p. 11). Improvements such as these can reduce vehicle use by increasing pedestrian comfort, convenience, and enjoyment and encourage walking.

Unfortunately, the zoning bylaw currently in force does not apply the multiple districts identified in the town plan. At the time of this review, Burke only has a single zoning district. Land use regulations must therefore be applied equally to all uses throughout the entire town. This increases the potential for sprawl, particularly for commercial uses along the town's highways. This type of development, if left unchecked, will lead to multiple access points and traffic congestion and conflicts along the town's major transportation routes (i.e. Routes 5 and 114). Zoning does include conditional use standards, which, if adequately implemented and enforced, could help to mitigate any adverse impact. For example, one condition that may be applied to a permit includes "controlling the location, width, and number of vehicle access points" (p. 7). However, even though zoning contains some valuable guidelines for managing development, many are not specific enough on where and when they should be applied, nor are they a guarantee that the municipal panel will consistently implement such conditions.

The current zoning also lacks site plan review. Site plan review is a concise and efficient process for determining a proposed development's compliance with applicable regulations, as well as the goals and strategies of the town plan. Typically, site plans are required any time construction will result in a new structure or intensification of land use. This can occur when new structures are built, when the use of an existing building changes, or when improvements are made to vacant land or land surrounding a building. Site plan review is an important tool that leads to better development proposals, smoother design implementation, and, ultimately, better built environments. This is a very valuable tool that should be implemented, particularly if multiple districts are not adopted.

The Town's subdivision regulations provide another layer of procedures and standards that help guide growth and development. They adequately address potential impacts to the transportation system by including specific design standards for street layout, access and traffic. For example "Projects that are judged to generate traffic that exceeds the existing capacity of adjacent roadways, or intersections shall be phased in a manner that allows the improvement of said capacity" (p. 14). The Commission may also "restrict the number of curb cuts, or impose special intersection design requirements along all Town Highways in the interest of preserving their visual character" (p. 15).

The Town is in the process of reviewing and adopting revised zoning and subdivision regulations, which include several new measures that address growth management and related transportation impacts. These include multiple zoning districts concentrating development in the three village centers, a Conservation & Scenic Overlay district, site plan review, and a cluster subdivision ordinance. Also included is a Resort District that permits the uses and development proposed by the Ginn Corporation for the Burke Mountain area. If adopted these measures will greatly improve the regulatory process and will help to ensure that development occurs in a manner and location that is appropriate and desired by the town.

2.14.3 Town of Lyndon/Village of Lyndonville

2.14.3.1 Community Profile

Lyndon, also located within Caledonia County, Vermont is considered by most "the gateway to the Northeast Kingdom." The town is bounded on the north by Burke and is comprised of nearly 23,000 acres, which is comparable in size to most Vermont towns. The town serves as a transportation hub for many of its surrounding towns, especially at the convergence of Routes 5, 122, 114 and I-91.

Located within the southern portion of Lyndon, the village of Lyndonville is the hub of activity within the town boundary and includes a small "downtown" area. This part of town houses Lyndon State College, which brings a wealth of seasonal residents along with their associated capital. Lyndon is also home to the Vermont Children's Theater, Cobleigh Public Library, Lyndon Outing Club, several churches and many other community services. The town has a diverse economy built mainly around manufacturing.

2.14.3.2 Demographics

Lyndon's population has been growing since the 1980's (Figure 20). There has been an overall increase in population of 1.43% from 1990 to 2000, which is about 1/6th the total population growth for Caledonia County for the same time period. Using a regression analysis the projected population in Lyndon for the year 2010 will be 5,772 residents. In the year 2000 the population density of the town was 137.02 persons per square mile.

It is important to show the demographics of Lyndonville, separate than those of Lyndon because they show an opposite trend (Figure 21). Although the population of the town of Lyndon is gradually increasing and has been over the past 20 years, the population in Lyndonville is slowly declining. Through regression analysis, it is predicted that this trend will continue giving a total population of Lyndonville of 1120 persons.

Figure 20: Town of Lyndon Population Data

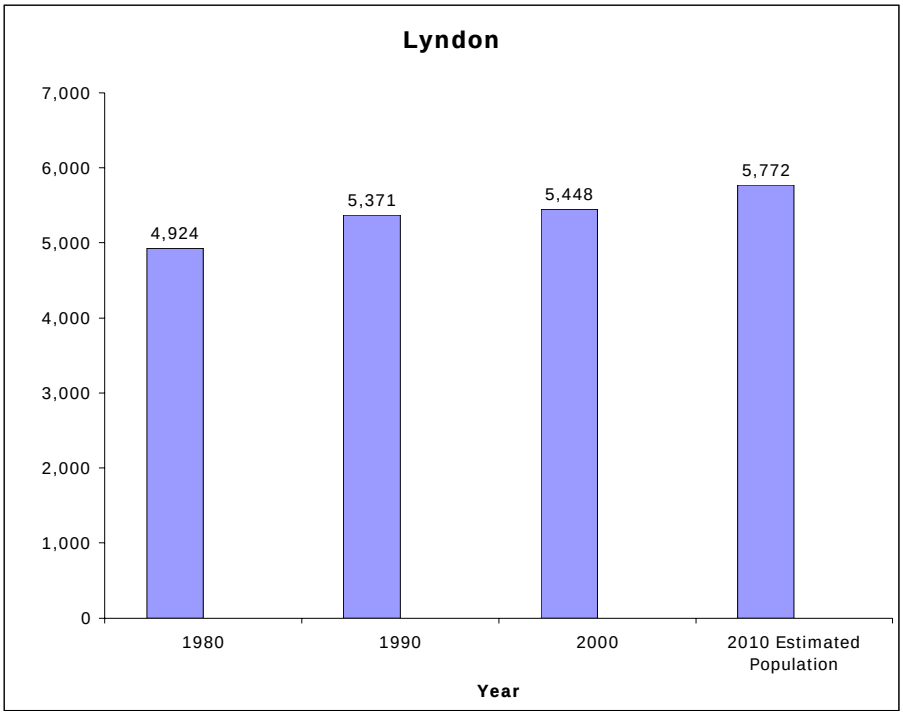
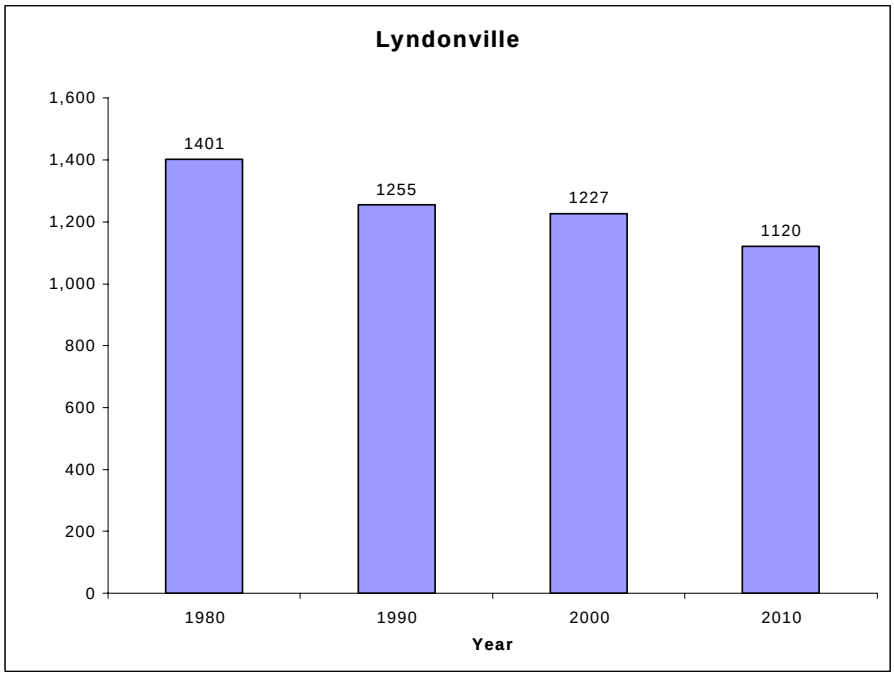


Figure 21: Village of Lyndonville Population Data



2.14.3.3 Housing Units

In 2000, there were a total of 2,190 housing units in the Town of Lyndon, 33 of which were seasonal, recreational, or occasional use (Figure 22). Linear regression analysis provides an estimated number of housing units, given the growth trend over the past 20 years would be 2,245. Out of the 2,190 housing units present in the year 2000 in the town, 1,227 of them were located in the village of Lyndonville (Figure 23). It is interesting to note the increase in housing units, and corresponding decrease in population.

Figure 22: Town of Lyndon Housing Data

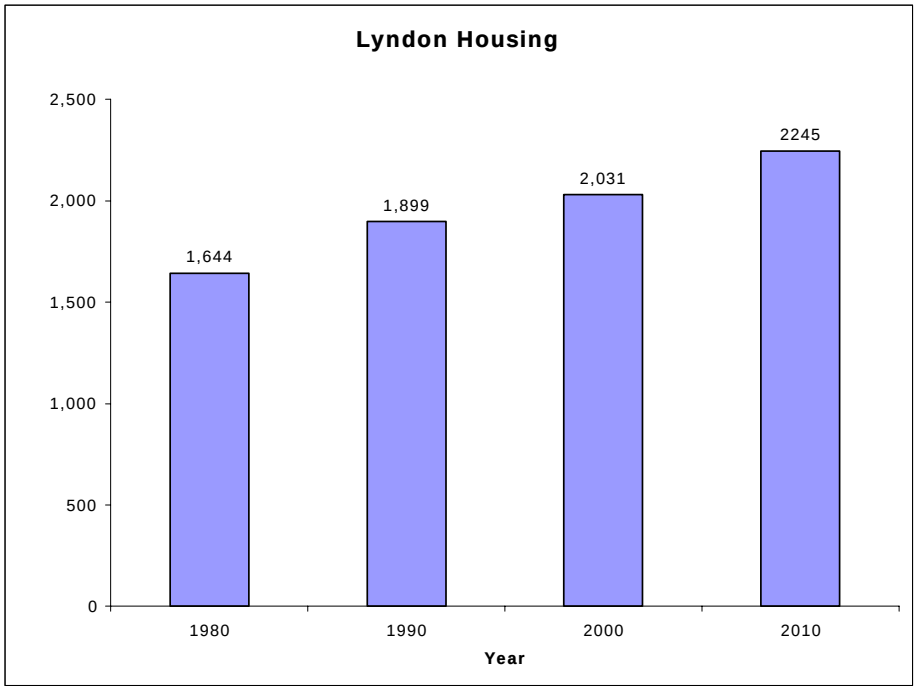
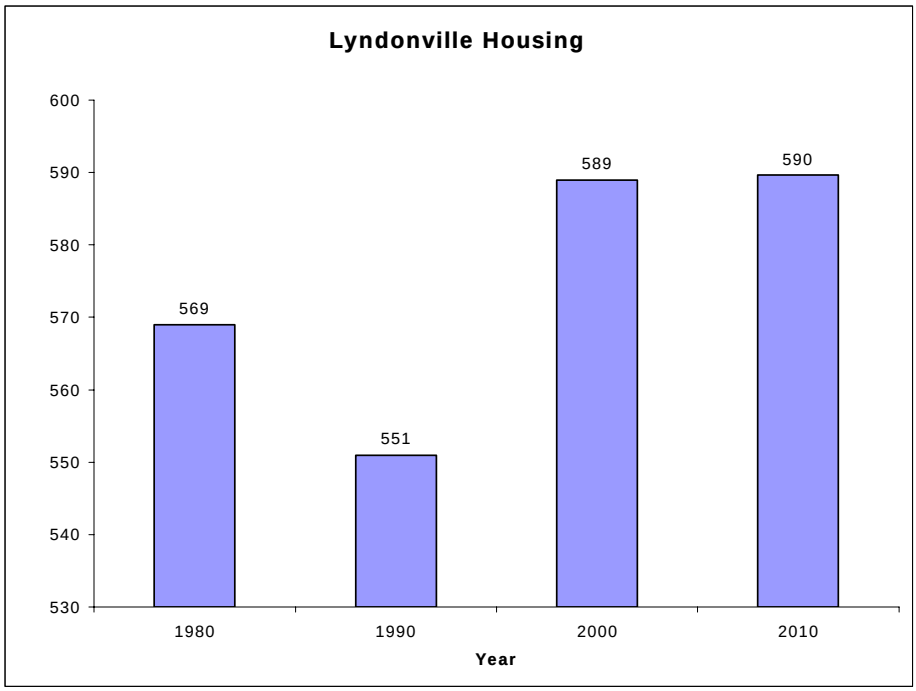


Figure 23: Village of Lyndonville Housing Data



2.14.3.4 Economics

Lyndon has a diverse economy based around manufacturing, retail, wholesale and service industries. Other employment opportunities, which contribute to the local economy, include banking, real estate, insurance, government service, tourism and agriculture. The most common occupations within the town are in manufacturing, education and health care related services. Due to the fact that Lyndonville is a part of the town of Lyndon, their economies are one in the same. The most vital aspect of the economic environment in Lyndonville, however, is Lyndon State College, which provides a large number of employment opportunities and is responsible for bringing large sums of money into the local market. It is also important to note that logging and wood processing are lucrative businesses in the area and contribute significantly to the financial system of Lyndon. In 2005 the unemployment rate was 2.8%.

2.14.3.5 Assessment and Summary of Land Use and Planning Documents

Lyndon is a diverse community characterized by rolling green hills and valleys on both sides of the Passumpsic River. Unlike Burke, there are numerous commercial, retail and industrial establishments in the town, which provide employment for more than 700 people. Its attractive surroundings and accessibility to two exits from Interstate 91, Route 5, Caledonia County State Airport, and the Connecticut River Line operated for Vermont Rail by Washington County Railroad, also make it a

bedroom community for St. Johnsbury and other nearby municipalities. As such, population and related development have been on the rise and are anticipated to continue. Lyndon is also closely tied to Burke Mountain Resort and is expected to feel the impacts associated with the resort's expansion.

Lyndon has an adopted town plan, zoning bylaw and subdivision regulations. However, the town plan dates back to 1999. If a plan is more than 5 years old, it is considered expired and not applicable. The town is currently in the process of updating the plan but do not anticipate completing it until next year. Although the document is not applicable at this time, a cursory review was still completed.

It is the community's desire to "anticipate its future needs and plan for meeting these needs in an orderly and well thought through manner" (p. i). As development pressures increase, the town recognizes the demand for services and the need for ongoing highway maintenance and improvement to ensure safety and enhance appearance. Rightfully so, the *Transportation* section of the plan outlines several recommendations to accomplish this goal, such as "strict enforcement of speed limits", "improving the crosswalk and sidewalk system" and "continually monitoring and updating traffic flows on Vermont Routes 5, 114, and 122" (p. 7). The plan also suggests that "there is often insufficient parking in the Village" and provides some strategies to remedy the problem such as "conducting a parking study", "posting a 2-hour parking rule" and conducting a "meeting to address establishing as many as three off street parking areas in the vicinity of South Main Street, Elm Street, and the north end of Broad Street" (p. 35). The plan points out that traffic congestion through the Village on Route 5 "is serious and getting worse" and proposes a "redesign of Broad Street, which includes turning lanes, installing curbing, creating specific 'enter' and 'exit' areas, and possibly installing at least one traffic light to interrupt traffic flow" (p. 35). The plan also suggests "improving an alternate route around the Village such as through Lyndon Center or over Lily Pond Road" (p. 35).

While the plan often mentions growth and land use throughout the document, it does not have a specific section devoted to land use. For example on page 14 it advises "traditional land uses should not be displaced or disappear…Growth should occur in an orderly fashion, so as not to fragment prime farmland and forestland." However, there are no specific goals or strategies to guide proper development, nor does the plan articulate or delineate zones or districts for where this development should occur. The land use element is critical to ensure growth and development does not exceed capacities of local facilities and services, as well as maintaining and preserving important natural resources, scenic and historic features.

A review of the zoning bylaw does provide some further guidance for interpreting the town plan. Ten zoning districts are delineated which help to focus growth and development in appropriate areas. For example, the Main Street District provides for uses that are "compatible in a mixed-use area, with an emphasis on providing incentives to the owners of land and buildings to improve North Main Street's appearance and to keep commercial activity concentrated in or near the Village Commercial District." Other districts such as the Village Commercial and Commercial also encourage and promote mixed, concentrated development. When reviewing site plans, the Planning Commission may impose conditions with regard to the character of the area affected and the

adequacy of vehicular circulation, traffic access, parking and loading, but zoning does not provide specific, clearly stated standards particularly for traffic and access management. Conditional use also indicates that development shall not adversely affect traffic on roads and highways, but again, no standards for interpretation are provided. This lack of clarity and ambiguity can lead to inconsistent decision-making by municipal officials and inadvertently allow inappropriate development.

3.0 RECOMMENDATIONS

Figure 5 below provides a listing of recommendations identified in recent plans and studies in the project area. As the table shows, one of these recommendations has been implemented (US 5/VT 114 signal), and one is awaiting funding for final design and construction.

Table 5: Recommendations from Previous Studies

Location	Recommendation	Status	Source
US 5 (Broad Street) - Lyndonville	Widen Broad Street to a 3-lane section with center two-way left-turn lane, landscaping, and consolidated curb cuts.	VTrans Final Scoping Report Approved; Awaiting Funding for Final Design & Construction	1, 2, 3
Broad/Depot Street Intersection - Lyndonville	Reconfigure intersection to better accommodate eastbound left-turning trucks.	Not Yet Started	1
Lyndonville	New pedestrian/bicycle facilities between downtown and Lyndon State College	Not Yet Started	1
US 5/VT 114 Intersection - Lyndon	Install traffic signal or roundabout	Complete - Signal Installed	4, 5
VT 114/Brook Road Intersection - Lyndon	Improve sight distance at intersection	Not Yet Started	4
VT 114/Murray Hill Road Intersection - Lyndon	Improve sight distance at intersection	Not Yet Started	4
VT 114/Mountain Road - Burke	Improve geometry and sight distance at intersection	Not Yet Started	4
East Burke Village	Construct gateways, sidewalk, crosswalk, and on-street parking	Not Yet Started	4

Sources:

1. "US Route 5 Access Management Plan" T.Y.Lin for NVDA; September 1997
2. "1998 Final Scoping Report, Lyndon STP0113(57)SC", US Route 5, VTrans, 1998
3. "Amendment to 1998 Final Scoping Report, Lyndon STP0113(57)SC", US Route 5, VTrans, 2005
4. "VT Route 114 Corridor Analysis Study" North Woods Engineering for NVDA, November 1998
5. "VT 114/VT 122/ US 5 Intersection Study", Summit Engineering for NVDA, September 2003

Based on our assessment of existing and future conditions, an overview of previous recommendations, and stakeholder input, we have identified the recommendations shown below in Table 6 grouped into the following categories:

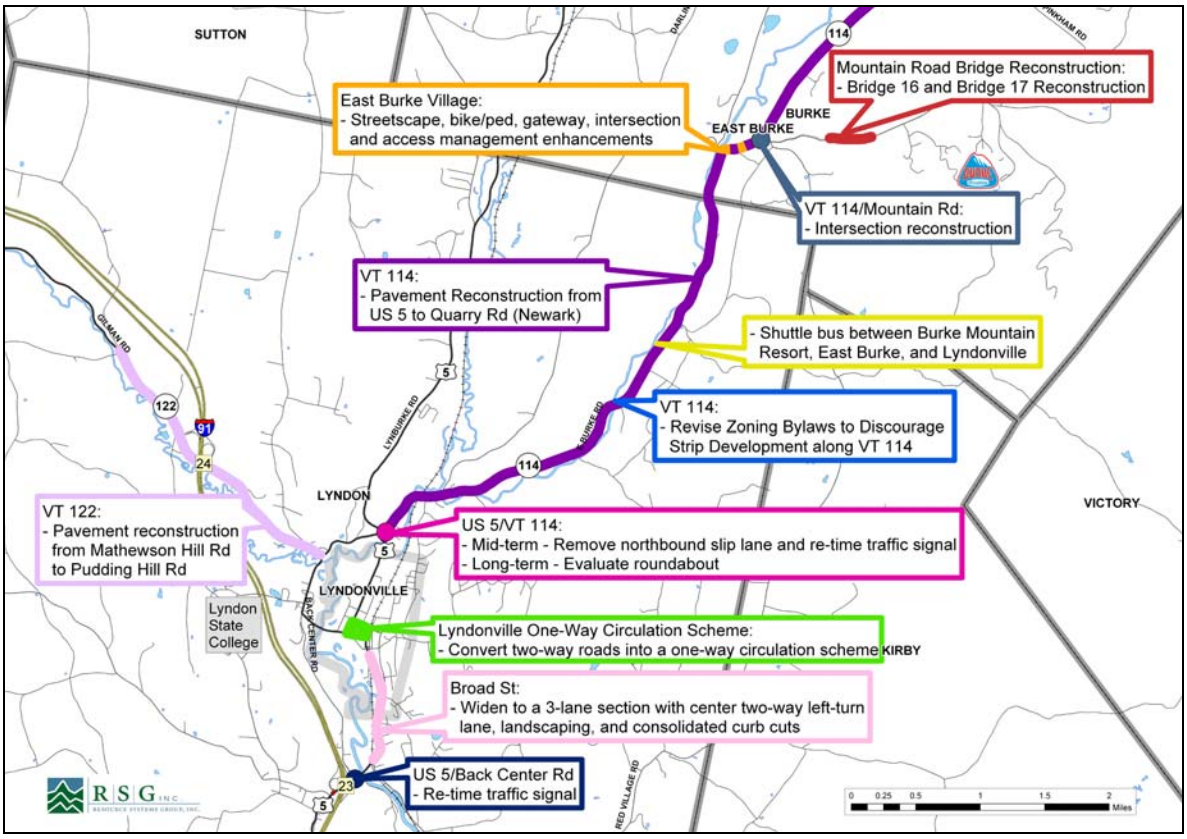
- Access Management
- Intersection Improvements
- Village Enhancements
- Transit Expansion
- Pavement and Bridge Reconstruction
- Land Use Recommendations

Table 6: Summary of Study Area Recommendations

Location	Description
Access Management	
US 5 (Broad St)	Widen Broad Street to a 3-lane section with center two-way left-turn lane, landscaping, and consolidated curb cuts.
Intersection Improvements	
US 5/VT 114	Remove northbound slip lane and re-time traffic signal
US 5/VT 114	Evaluate roundabout
US 5/Back Center Rd	Re-time traffic signal
Village Enhancements	
East Burke	Streetscape, bike/ped, gateway, intersection and access management enhancements
Lyndonville	Convert two-way roads into a one-way circulation scheme
Transit Expansion	
Study Area	Shuttle bus between Burke Mountain Resort, East Burke & Lyndon
Pavement Reconstruction	
VT 122	Matthewson Hill Road to Pudding Hill Road
VT 114	US 5 to Quarry Road (Newark)
Bridge Reconstruction	
Burke	Replacement of BR 16 and BR 17 over Dish Mill Brook

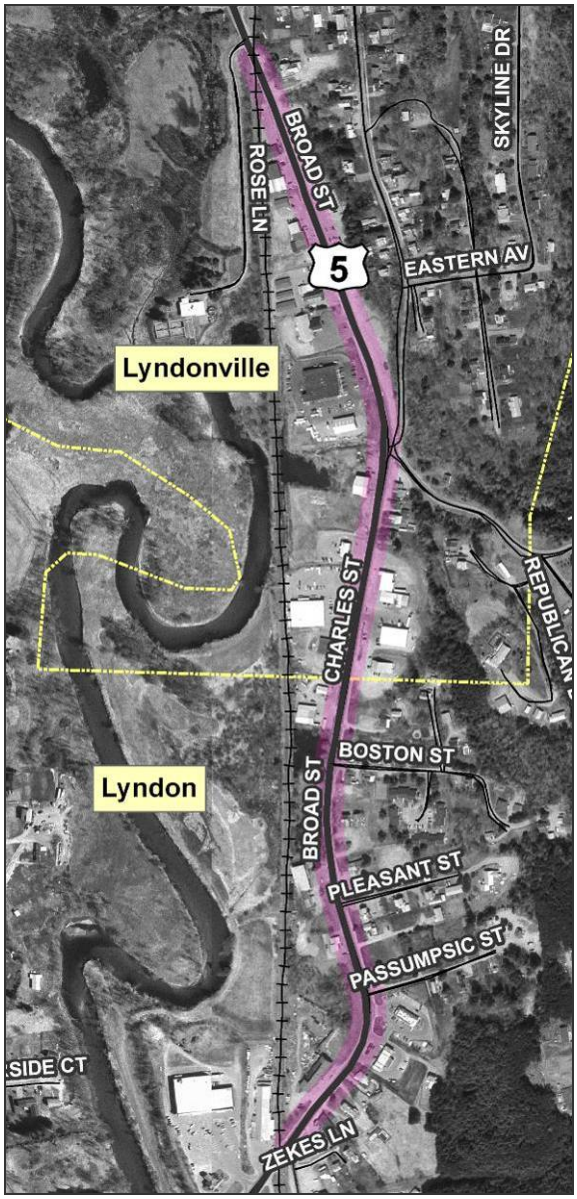
The general location of the various recommendations are shown in Figure 24 and described in detail in subsequent sections.

Figure 24: Locations of Recommendations



3.1 ACCESS MANAGEMENT

Figure 25: US 5 Access Management Study Area



3.1.1 US 5 (Broad Street)

VTrans has approved a Final Scoping Report to widen the section of Broad Street shown in Figure 25 to a three-lane section with a center two-way left turn lane, added landscaping, and consolidated curb cuts. This $6,000,000 project is currently waiting on funding for final design and construction.

3.2 INTERSECTION IMPROVEMENTS

3.2.1 US 5/VT 114/Stevens Loop

The US 5/VT 114/Stevens Loop intersection currently operates at overall LOS B. Although the average delay per vehicle is acceptable according to VTrans standards, there are still operational concerns due to its designation as a High Crash Location intersection (2001-2005). Table 7 shows intersection LOS under current signal timings, optimized signal timings, and with a roundabout during 2007 and 2027 peak periods.

Table 7: US 5/VT 114/Stevens Loop Alternatives LOS Results

	Saturday AM Peak Hour				Saturday PM Peak Hour			
	2007		2027		2007		2027	
US 5/VT 114/Stevens Loop	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Existing Signal Timings								
Overall	**B**	**11**	**B**	**12**	**B**	**12**	**B**	**15**
EB, along Stevens Loop	A	6	A	6	A	6	A	7
WB, along VT 114	B	11	B	12	B	15	C	20
NB, along US 5	B	12	B	13	B	12	B	13
SB, along US 5	B	12	B	14	B	11	B	12
Optimized Signal Timings								
Overall	**B**	**11**	**B**	**12**	**B**	**12**	**B**	**14**
EB, along Stevens Loop	A	6	A	6	A	6	A	6
WB, along VT 114	B	11	B	12	B	13	B	17
NB, along US 5	B	12	B	13	B	13	B	14
SB, along US 5	B	12	B	14	B	12	B	13
Roundabout								
Overall	**A**	**6**	**A**	**7**	**A**	**7**	**A**	**8**
EB, along Stevens Loop	A	8	A	9	A	7	A	8
WB, along VT 114	A	8	A	9	A	9	B	11
NB, along US 5	A	4	A	5	A	4	A	4
SB, along US 5	A	7	A	9	A	7	A	8

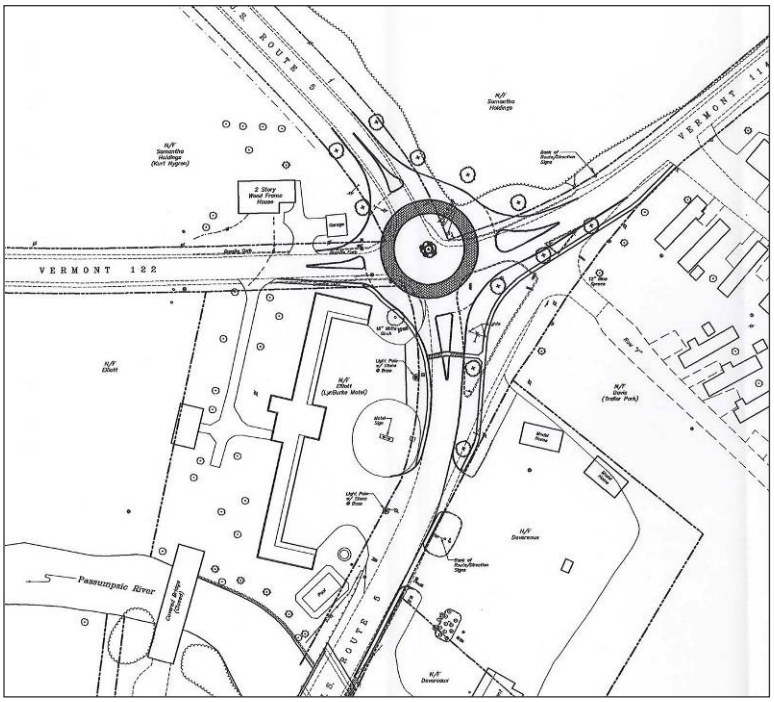
As a mid-term recommendation, the signal timings should be optimized and the northbound slip lane (from US 5 onto VT 114) should be removed and replaced with a new northbound right turn lane and splitter island as shown in Figure 26. This reconfiguration of the northbound approach should address the primary safety concern at the intersection which involves high-speed northbound vehicles failing to yield at their merge onto VT 114. The resulting congestion and queuing results indicate there would be no significant degradation in intersection operations by replacing the slip lane with a traditional right-turn lane and island.

Figure 26: US 5/VT 114 Mid-Term Recommendations

As a long-term recommendation, a roundabout should be considered at this intersection. Roundabouts can reduce the amount and severity of crashes relative to a signalized or stop-controlled intersection (51% decrease in total crashes, 73% decrease in injuries, and 32% decrease in

property damage only crashes).[1] Figure 27 shows a potential alignment of a roundabout at the US 5/VT 114/Stevens Loop intersection developed as part of a previous planning exercise.[2]

Figure 27: Potential Roundabout Alignment at the US 5/VT 114/Stevens Loop Intersection (source: NVDA)



3.2.2 US 5/Back Center Road

The US 5/Back Center Road/Calkins Drive intersection currently operates at overall LOS A, as shown in Table 8. However, the minor legs (Back Center Road and Calkins Drive) operate at LOS D. The average delay per vehicle for the minor legs could be improved to LOS C with optimized signal timings.

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[1] Adapted from "Roundabouts An Informal Guide"; US DOT, Federal Highway Administration Publication No.. FHWA-RD-00-67

[2] Summit Engineering, *VT 114, VT 122 & US 5 Intersection Study in the Town of Lyndon, Vermont*, 15 September 2003.

Table 8: US 5/Back Center Road/Calkins Drive Alternatives LOS Results

	Saturday AM Peak Hour				Saturday PM Peak Hour			
	2007		2027		2007		2027	
US 5/Back Center Rd/Calkins Dr	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Existing Signal Timings								
Overall	**A**	**6**	**A**	**6**	**A**	**6**	**A**	**6**
EB, exiting Back Center Rd	D	37	D	37	D	37	D	37
WB, exiting Calkins Dr	D	36	D	36	D	36	D	36
NB, along US 5 toward VT 114	A	3	A	3	A	3	A	3
SB, along US 5 toward Exit 23	A	3	A	3	A	3	A	3
Optimized Signal Timings								
Overall	**A**	**6**	**A**	**6**	**A**	**6**	**A**	**6**
EB, exiting Back Center Rd	C	27	C	28	C	27	C	28
WB, exiting Calkins Dr	C	27	C	27	C	27	C	27
NB, along US 5 toward VT 114	A	4	A	4	A	4	A	4
SB, along US 5 toward Exit 23	A	3	A	4	A	3	A	4

3.3 VILLAGE ENHANCEMENTS

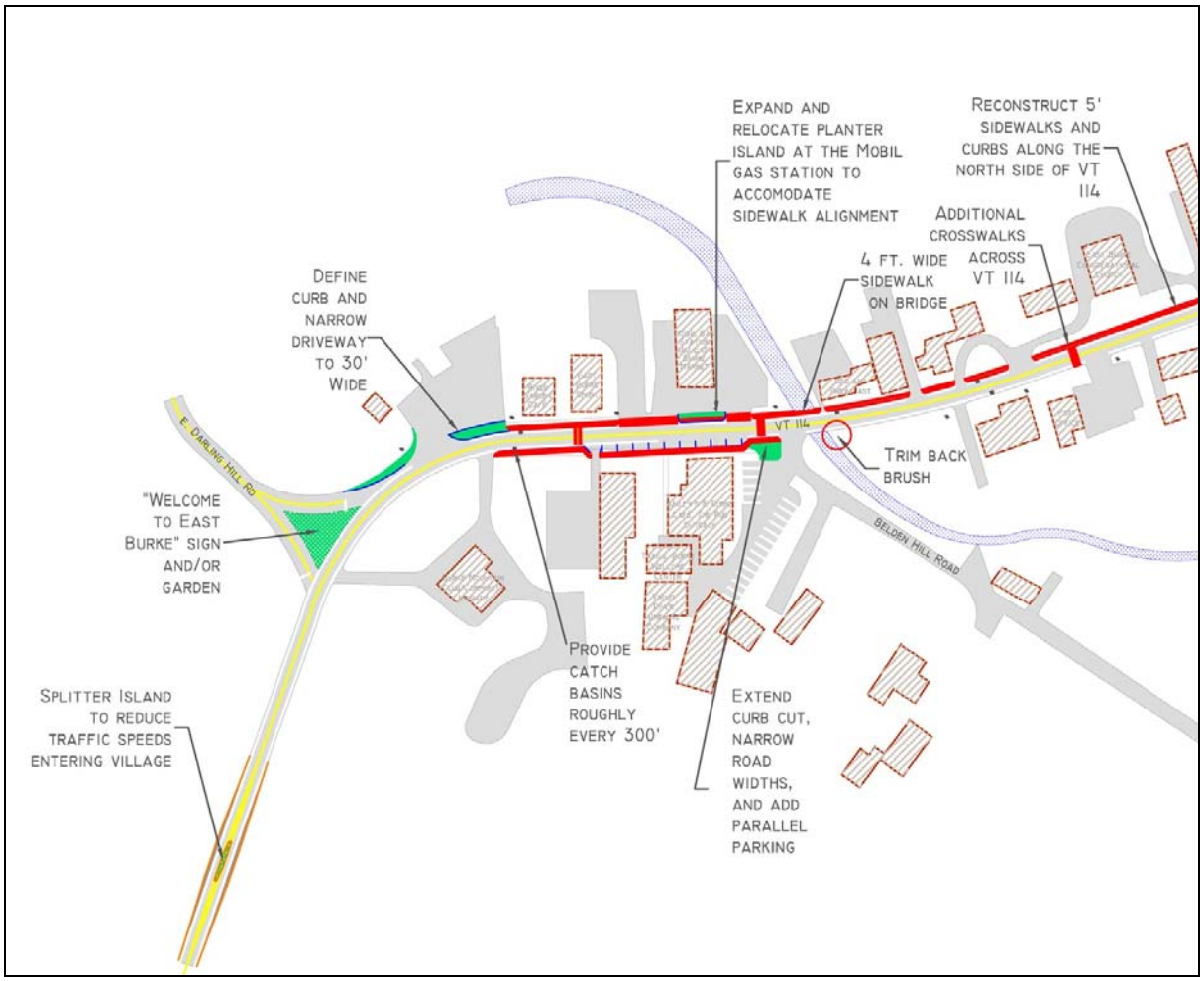
3.3.1 East Burke

The following recommendations have been developed for East Burke Village (see Figure 28 and Figure 29):

- Construct curbed splitter islands along VT 114 on both side of the village (south of East Darling Road and north of Mountain Road) to reduce traffic speeds entering the village.
- At the VT 114/East Darling Hill Road intersection, add a "Welcome to East Burke" sign and enhance the landscaping.
- Narrow the driveway width serving the River Garden Café to 30 feet and better define the curb line to channel entering and exiting vehicles at a common point.
- Construct/reconstruct 5-foot sidewalks with granite curbs along the north side of VT 114 (with a 4-foot sidewalk on the bridge) between the River Garden Café and Mountain Road, and along the south side of VT 114 between the Burke Mountain Club Driveway and Belden Hill Road.
- Add new stormwater drainage infrastructure along VT 114 to accommodate runoff diverted by new sidewalks and curbing.
- Expand and relocate the planter island at the Mobil gas station to accommodate the improved sidewalk alignment.
- Narrow the Belden Hill Road approach to VT 114 with a landscaped island.
- Add formal parallel parking in front of Bailey's and Burke (9 spaces).
- Trim back the brush at the southeast corner of the VT 114/Belden Hill Road intersection to improve sight distance.

- Enhance signage for bicyclists, such as "Share the Road" signs.
- Consider a future sidewalk extension to the recreational fields north of Mountain Road.
- Improve sight distance for vehicles exiting Mountain Road onto VT 114 by reconstructing the intersection to reduce the vertical curve on VT 114 north of Mountain Road (see Figure 30).[1]

Figure 28: East Burke Recommendations (western portion)



[1] Other alternatives considered included a flashing light, an all-way stop-controlled intersection, a stop sign on the southbound approach on VT 114, reducing the vertical curve, a roundabout, and police control during peak resort periods. Of these alternatives, the intersection reconstruction alternative best addresses the existing operational and safety concerns at the intersection.

Figure 29: East Burke Recommendations (eastern portion)

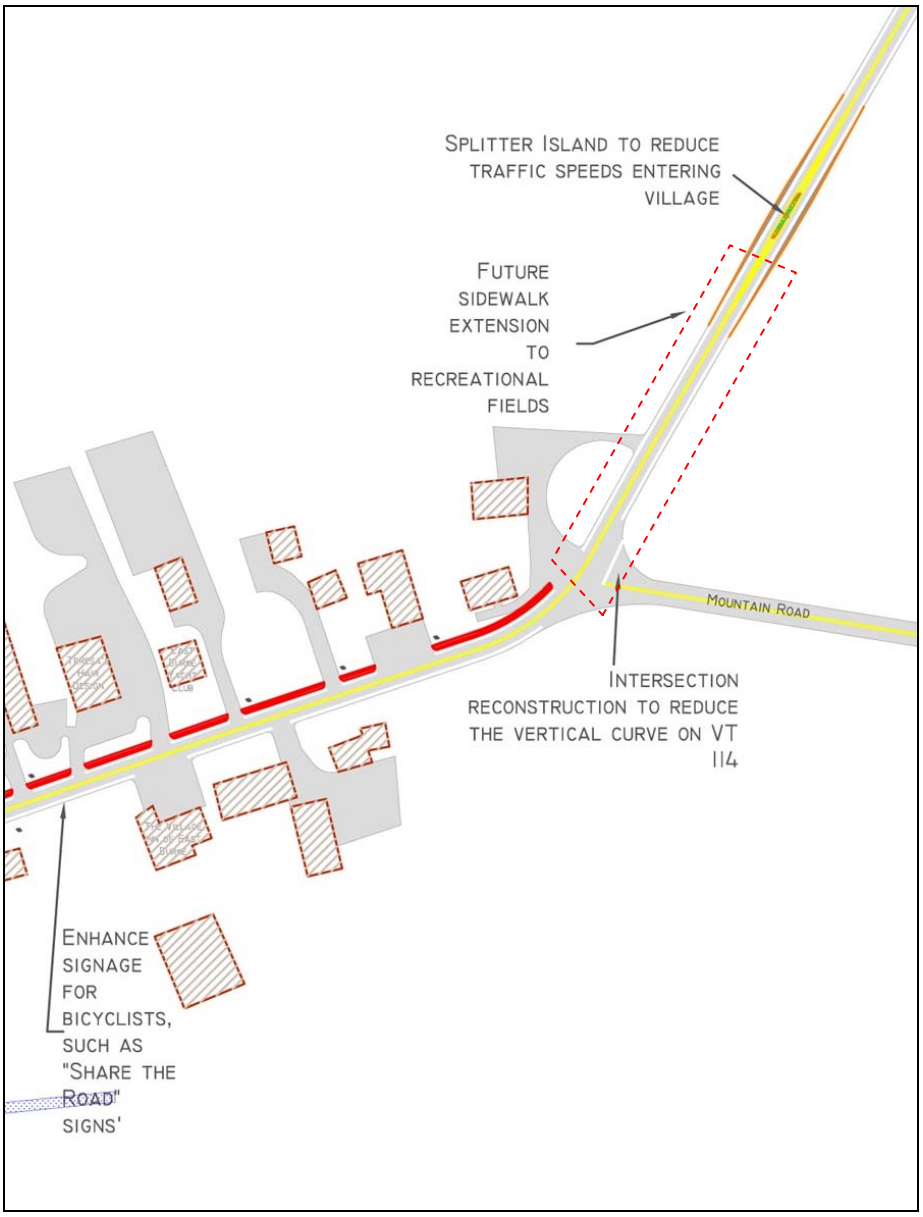


Figure 30: Limited Corner Sight Distance at Mountain Road Looking North on VT 114

3.3.2 Lyndonville

3.3.2.1 Downtown Traffic Circulation & Parking Capacity

During our assessment of existing conditions and public outreach sessions, a number of issues related to traffic circulation, congestion, and parking in Lyndonville were raised. These issues include:

- Traffic congestion on the eastbound and westbound approaches at the Depot Street/Broad Street intersection;
- Potentially confusing circulation pattern and traffic control at both Broad Street/Depot Street and Depot Street/Main Street intersections (i.e. turning traffic has the right of way);
- High rate of reported crashes along northern Broad Street and Depot Streets (28 reported crashes between 2001 and 2005);
- Relatively high number of heavy trucks traveling through the village; and

- Lack of parking capacity for downtown merchants and residents.

A first attempt at identifying traffic flow and safety improvements for downtown Lyndonville focused on improvements to the Broad Street/Depot Street intersection. In particular, we examined an all-way stop, traffic signal, and roundabout scenario at the intersection. Table 9 shows the LOS results for the US 5/Depot Street/Broad Street intersection under existing conditions as well as the proposed intersection alternatives.

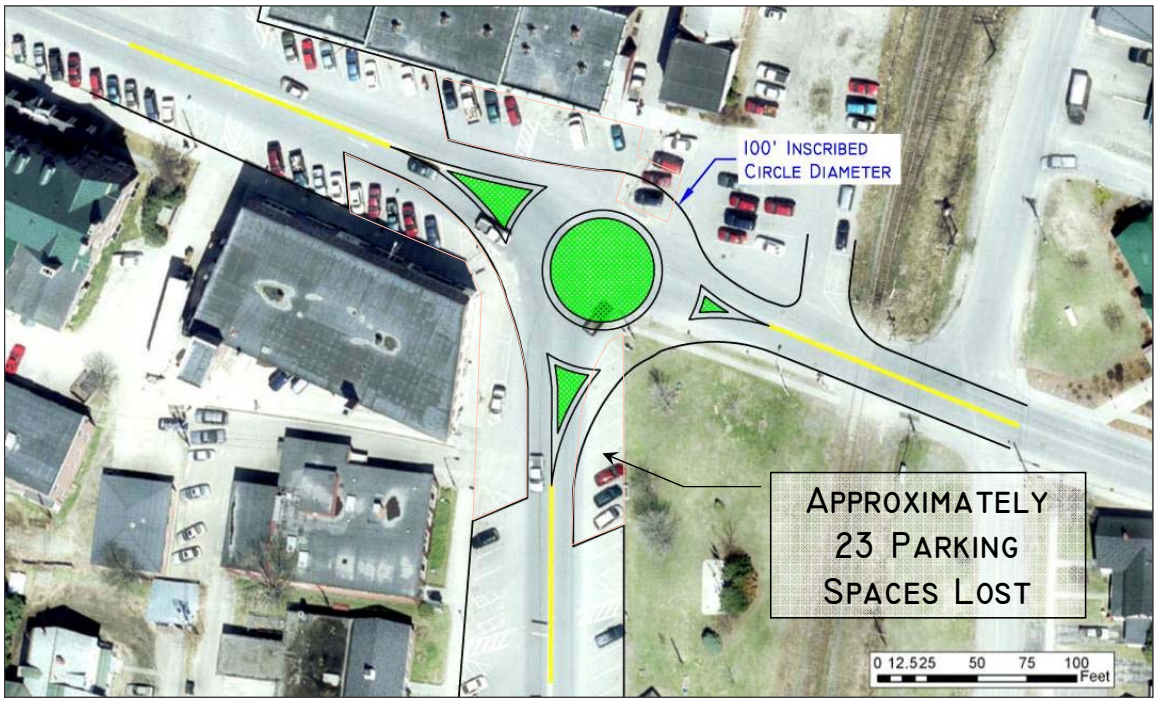
Table 9: US 5/Depot Street/Broad Street Alternatives LOS Results

	Saturday AM Peak Hour				Saturday PM Peak Hour			
	2007		2027		2007		2027	
US 5/Depot St/Broad St	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Unsignalized (Existing)								
EB Left/Through/Right, exiting US 5/Depot St	C	16	C	23	B	15	C	19
WB Left, exiting Depot St	F	>100	F	>100	F	>100	F	>100
WB Through/Right, exiting Depot St	F	52	F	>100	E	45	F	78
NB Left/Through/Right, along US 5/Broad St	A	7	A	7	A	8	A	8
SB Left/Through/Right, exiting Angie's Alley	A	<1	A	<1	A	<1	A	<1
All-Way Stop								
Overall	**F**	**>100**	**F**	**>100**	**F**	**73**	**F**	**>100**
EB Left/Through/Right, exiting US 5/Depot St	F	71	F	>100	D	30	F	51
WB Left/Through/Right, exiting Depot St	B	12	B	12	B	10	B	11
NB Left/Through/Right, along US 5/Broad St	F	>100	F	>100	F	>100	F	>100
SB Left/Through/Right, exiting Angie's Alley	B	11	B	11	A	<1	A	<1
Signalized								
Overall	**B**	**12**	**B**	**16**	**B**	**12**	**B**	**14**
EB, along Depot St toward Charles St	A	8	A	9	A	7	A	8
WB, along Depot St toward Main St	B	16	B	18	B	14	B	17
NB, along US 5 toward Main St	B	16	C	21	B	16	B	18
Roundabout								
Overall	**A**	**5**	**A**	**5**	**A**	**4**	**A**	**4**
EB, along Depot St toward Charles St	A	2	A	3	A	2	A	2
WB, along Depot St toward Main St	A	7	A	8	A	7	A	8
NB, along US 5 toward Main St	A	6	A	6	A	6	A	6

Table 9 shows that while the all-way stop option results in overall LOS F conditions, the traffic signal and roundabout alternatives significantly improve traffic operations at the intersection.

We then developed sketches of the roundabout and traffic signal alternatives at the intersection. Figure 31 shows the potential alignment of a roundabout at the US 5/Depot Street/Broad Street intersection.

Figure 31: Potential Roundabout Alignment at the US 5/Depot Street/Broad Street Intersection



Upon reviewing these intersection sketches with the project steering committee members, Town officials, and the public, it became clear that the adverse impacts that both the roundabout and traffic signal alternatives have on downtown parking make them undesirable.

A second set of alternatives were investigated to improve downtown Lyndonville's traffic circulation, safety, and parking capacity involving a one-way traffic circulation pattern. The following three circulation options were examined:

1. Clock-wise traffic circulation on Depot Street, Main Street, Center Street, and Broad Street. Single lane flows on all streets. One-way southbound Elm Street flow.
2. Clock-wise traffic circulation on Depot Street, Main Street, Center Street, and Broad Street. Single lane flows on all streets. One-way northbound Elm Street flow.
3. Clock-wise traffic circulation on Depot Street, Main Street, Center Street, and Broad Street. Two-lane flows on Depot Street and Center Street. One-way southbound Elm Street flow.

Figure 32 and Figure 33 on the following pages show afternoon peak hour traffic volumes and traffic flow patterns. The boxes at the four corner intersections indicate which approach experiences the most delay under that scenario, and the estimated delay (in seconds) for that approach. The orange stop bars in the alternative figures signify stop-controlled approaches.

Figure 32: Downtown Lyndonville Circulation (2007 Peak Hour Volumes)

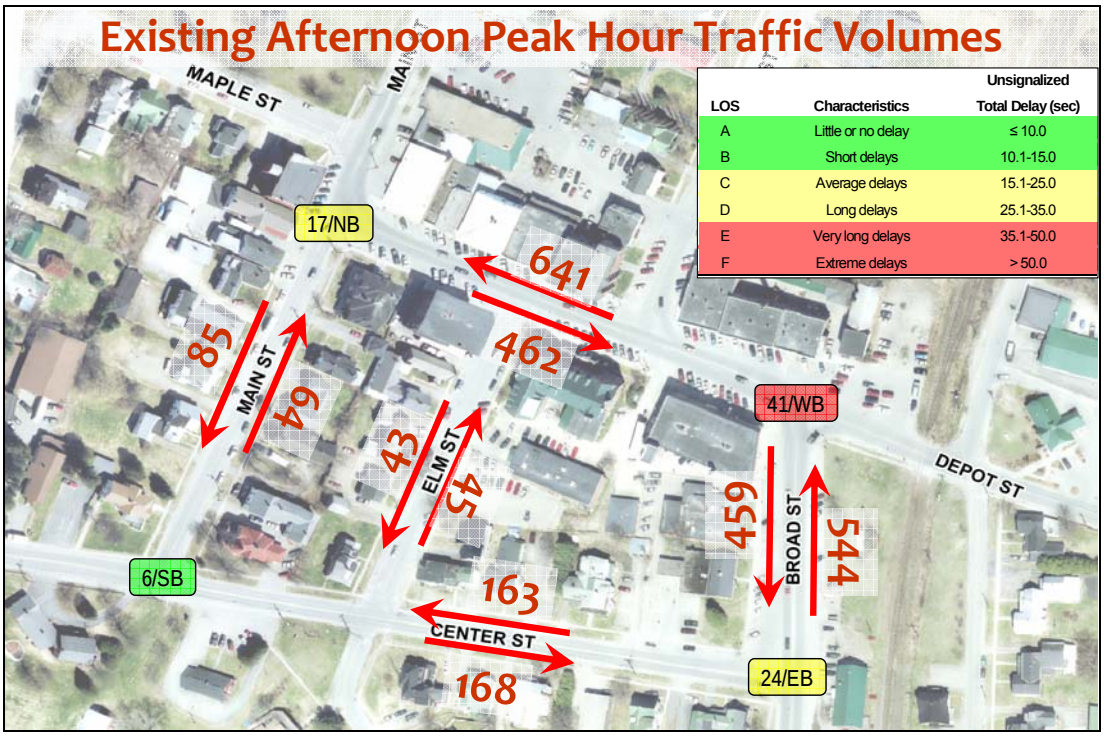
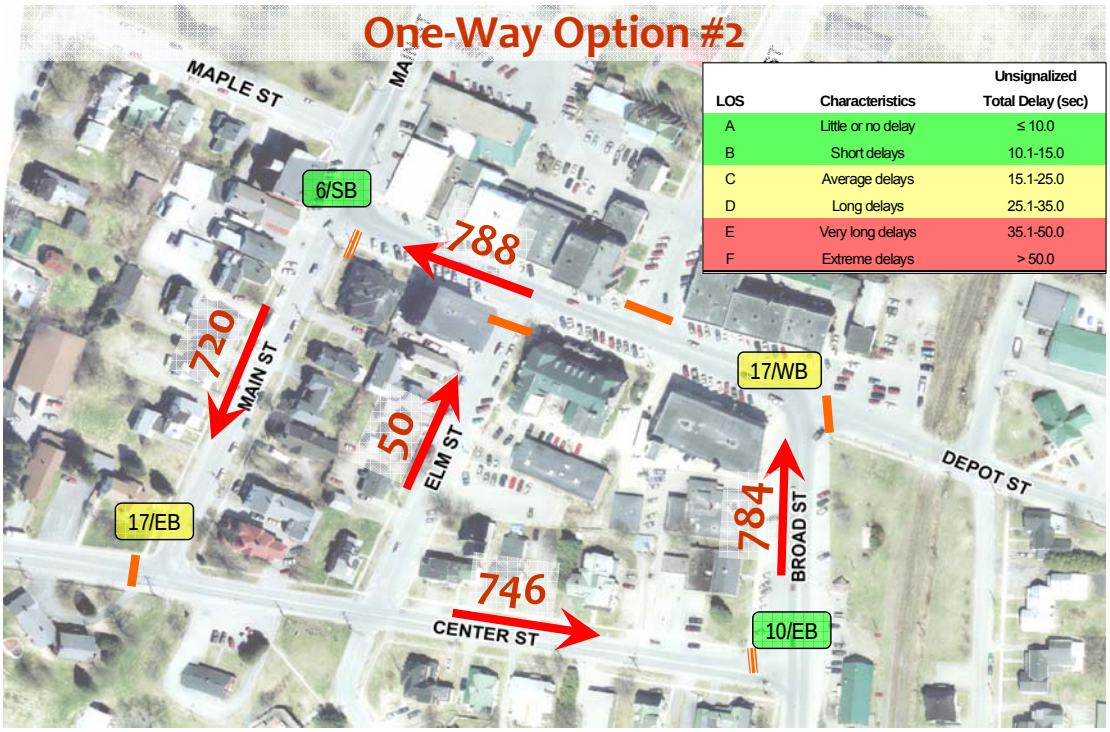
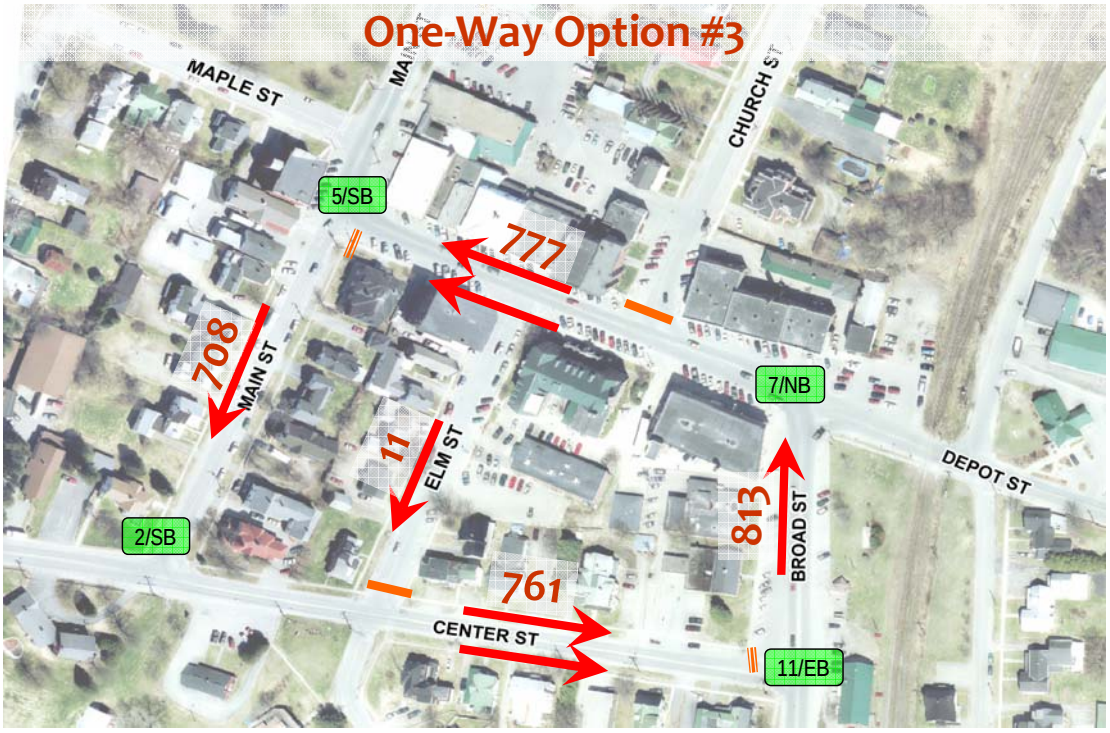


Figure 33: Downtown Lyndonville Circulation cont.



LOS	Characteristics	Unsignalized Total Delay (sec)
A	Little or no delay	≤ 10.0
B	Short delays	10.1-15.0
C	Average delays	15.1-25.0
D	Long delays	25.1-35.0
E	Very long delays	35.1-50.0
F	Extreme delays	> 50.0



Upon review the three circulation alternatives with the Lyndonville Village Trustees, Alternative #2 emerged as a preferred alternative due to the importance of providing northbound flows on Elm Street and the opportunities for increased parking with single lane flows around the circle.

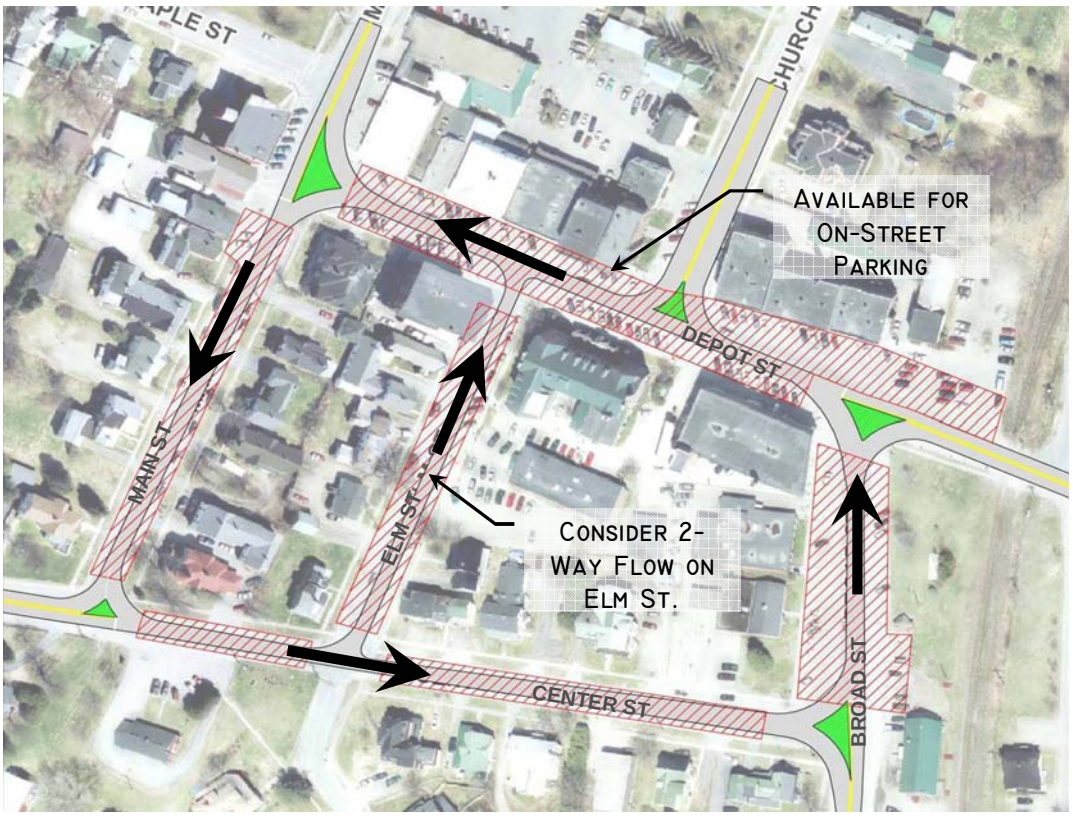
Table 10 below shows the potential to gain approximately 30 additional parking spaces by implementing the one-way circulation pattern identified in Alternative #2. The additional spaces would be generated by adding new parallel or head-in parking in areas currently taken up by the two-way traffic flows, or by converting from parallel to head-in parking.

Table 10: Increase In Parking Capacity - Alternative #2

	Existing	Alternative 2	Net Change
Main Street *(between Depot & Center)*	19	28	+ 9
Elm Street *(between Depot & Center)*	31	43	+ 12
Broad Street *(between Depot & Center)*	43	No Change	No Change
Depot Street *(between Broad & Main)*	70	No Change	No Change
Center Street *(between Broad & Main)*	3	22	+ 19

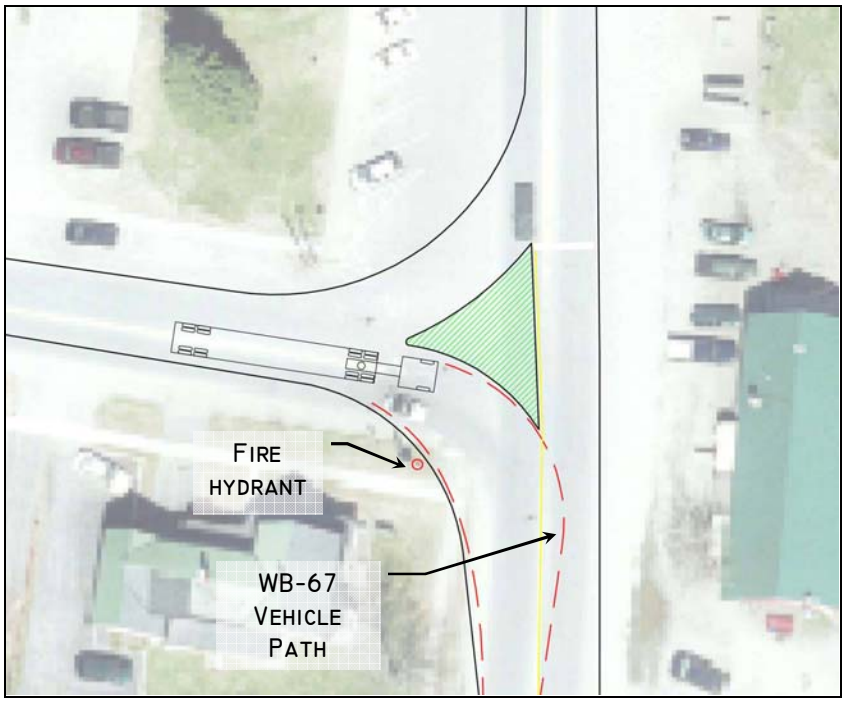
Figure 34 below shows a more detailed plan for the Alternative #2 lane assignments, traffic flow pattern, intersection geometrics, and parking availability.

Figure 34: One-Way Circulation Plan (Alternative #2)



One object of concern associated with the transition to one-way circulation is accommodation of truck turning movements at the four corner intersections. In particular, the eastbound right turn from Center Street to Broad Street is of particular concern due to the relatively narrow existing geometry and the presence of a hydrant at the southwest corner of the intersection. Figure 35 below shows the path tracked by a WB-67 (interstate semi-trailer) design vehicle through the re-aligned intersection. As the figure shows, the truck movement could be accommodated but would encroach slightly into the northbound Broad Street approach to the intersection. A preferable, but more costly alternative would involve relocating the hydrant back from the current edge of pavement a sufficient distance to allow for WB-67 truck turning movements without encroaching into the on-coming lane of travel.

Figure 35: WB-67 Truck Turning Movement at Center Street/Broad Street Intersection



Another significant benefit of the one-way circulation recommendation is the fact that it is relatively easy and inexpensive to implement (at a minimum, new signs and pavement markings) and that it can be reversed without significant cost or impact should it prove ineffective. Section 4.0 provides additional detail regarding implementation measures.

3.4 TRANSIT EXPANSION

The Ginn Corporation has been in discussions with Rural Community Transportation to establish shuttle service between Lyndon, Burke, and Burke Mountain Resort. This would provide an important link for mountain visitors who are staying in Lyndonville, as well as mountain employees

who live in Lyndonville. Shuttle service may begin as soon as winter 2007. For cost estimating purposes, we have assumed that a new bus would be purchased and that service would run 8 hours per day 7 days a week for 5 months of the year.

3.5 PAVEMENT AND BRIDGE RECONSTRUCTION

3.5.1 Pavement Reconstruction

There are two sections in the study area that are rated by VTrans in their 2006 Pavement Management Report as "Very Poor" (Figure 36 and Figure 37). Efforts to include these sections of roadway on the VTrans pavement reconstruction prioritization list should be undertaken as neither of these sections is currently in VTrans' 3-year paving program.

Figure 36: VT 122 Pavement Reconstruction

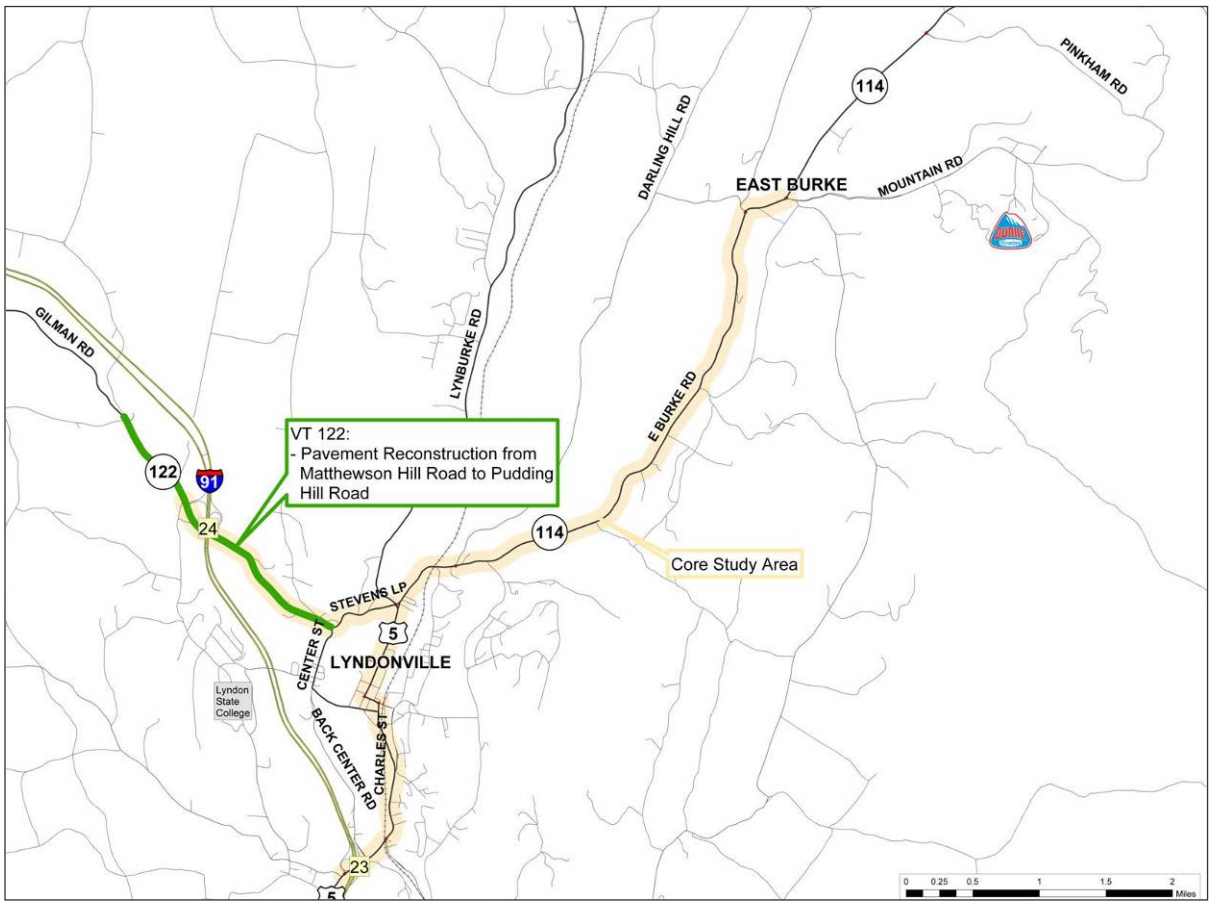
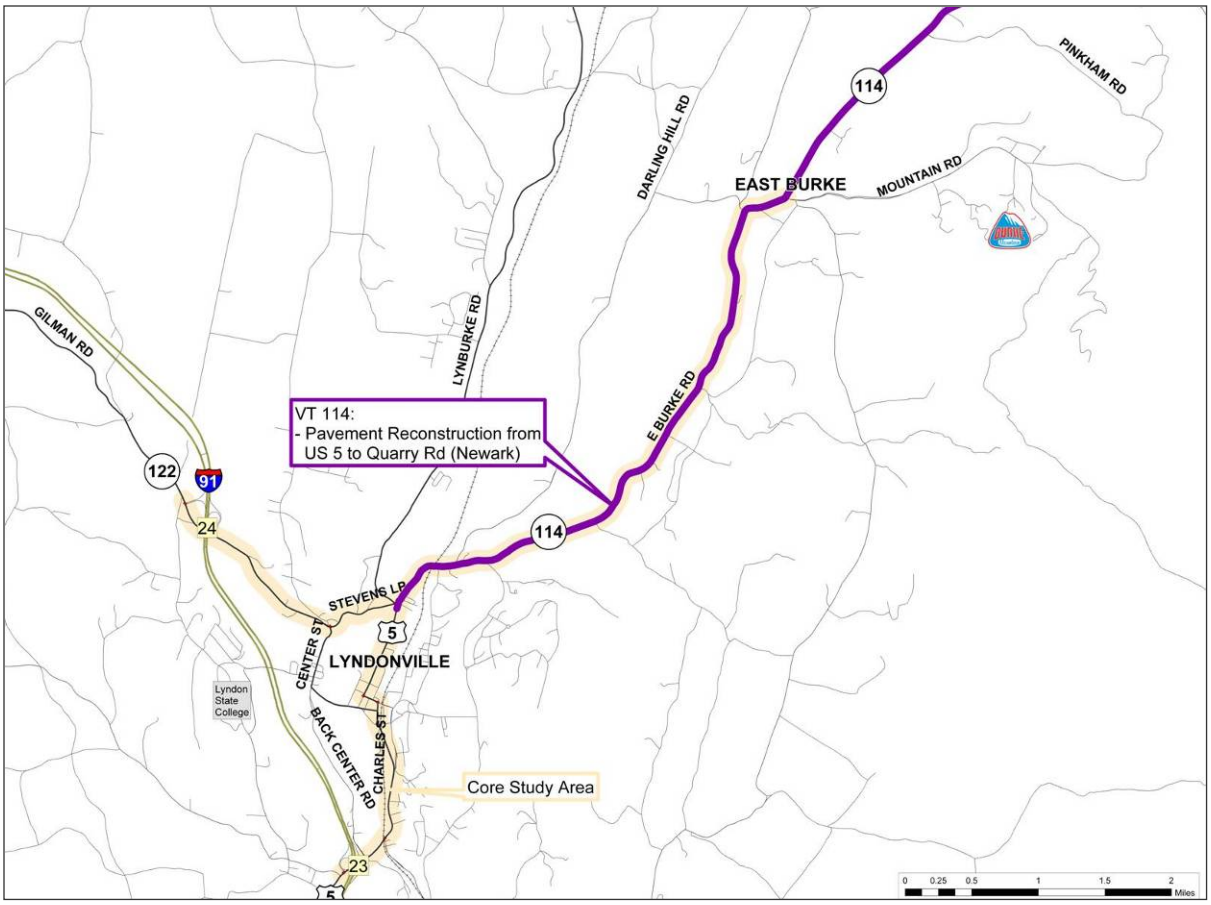


Figure 37: VT 114 Pavement Reconstruction



3.5.2 Bridge Reconstruction

The replacement of Bridge 16 and Bridge 17 over Dish Mill Brook is part of the NVDA's Transportation Project Priority List and is currently programmed in the VTrans STIP for construction in 2007-08.

3.6 LAND USE RECOMMENDATIONS

3.6.1 Review

Lyndon and Lyndonville provide the area with retail, commercial, and industrial services while Burke offers a rural and scenic atmosphere more appealing for recreation, leisure and second home development. Both towns wish to maintain their historic character and rural traditions. The Burke Mountain Resort is in the process of expanding to a 4-season operation, offering a new golf course, hundreds of new residential and seasonal units, expanded employment opportunities and other

significant improvements. The expanded resort will create hundreds of new jobs and will provide a boost to the local economy. It will also result in a doubling of residential units and incidental traffic. Population and growth are steadily on the rise and are certain to continue this trend with the impending Burke Mountain expansion. This development is guaranteed to have a dramatic impact on the local transportation system, primarily on Routes 5 and 114.

Although both towns have some form of land use regulation or development control, as indicated in Table 11, most documents could use some strengthening in terms of transportation and land use planning. Each recognizes the importance of controlling growth and has some degree of reference to this, but neither have specific design standards or guidelines for development that would help municipal officials make consistent decisions. This may have a negative impact on roads and the character of the area because broad references do not constitute a clear standard. Inconsistency in decision-making can inadvertently lead to inappropriate and unwanted development patterns.

Table 11: Status of Municipal Documents to Data

● = adopted and in force ○= expired and not applicable N/A = does not have	Town Plan	Zoning Bylaw	Subdivision Regulations
Town of Burke	●(2006)	●(2006)	●(1990)
Town of Lyndon	○(1999)	●(1996)	●(1996)

There is a strong connection between land use and transportation, which is greatly impacted by any number of external influences. Characteristics of density, concentration and mix of uses, accessibility, employment opportunities, housing availability, layout, design and timing of land development, and more, play a significant role in reducing the demand on the transportation system. These elements should be addressed in some manner to help maintain existing roadways and mitigate or eliminate potential impacts. Each town has the "building blocks" to do so, from site plan guidelines and design standards to zoning and subdivision regulations.

3.6.2 RECOMMENDATIONS

As a starting point, each community should adopt this study by reference in its town plan or zoning regulation until such time it is feasible to do the research, review, analysis, and public involvement necessary to incorporate the recommendations provided herein. A second important task would be to strengthen the transportation, traffic, and access management review criteria in their general regulations, site plan or conditional use review. This includes limiting the number of curb cuts, coordinating site uses among separate properties, implementing other traffic calming measures, and specifically defining those situations that would be considered undue, adverse, or by requiring a traffic impact analysis for certain developments. Remember that any initiative cited in a town's

regulatory document is only effective if it is supported, implemented and enforced by the governing body. In addition:

The **Town of Burke** should consider any combination of the following initiatives in order to provide the maximum benefit for managing growth and development and a viable transportation system (note that the following recommendations apply to both the existing and proposed zoning and subdivision regulations):

1. Develop a land preservation program undertaken through the planning commission, a local conservation commission, or community/regional land trust that identifies and prioritizes land for preservation and undertakes preservation through a variety of voluntary techniques. Include donation of conservation easements, acquisition of land or conservation easements, bargain sales of land, and limited development schemes.
2. Initiate a local conservation commission, land trust or other entity to implement and administer the land preservation program.
3. Develop design review standards or guidelines for the villages or delineate a design overlay district to include specific measures that maintain historic character of the area. This would include detailed initiatives for site development, architecture, signs, landscaping, parking, access and overall circulation. Design review is most effective when it is coupled with carefully developed public strategies to invest in improvement to streets and sidewalks, public parks and plazas, and civic facilities and transit.
4. Initiate a local affordable housing agency or similar entity, or work with a regional entity, to identify and develop affordable housing options.
5. Research the potential for an inclusionary zoning ordinance, which would either encourage or require developers to make a portion of the housing units (e.g. 15 to 20 percent) in a new development available and affordable to low- and moderate-income households. Ensure that the ordinance contains incentives/offsets to compensate property owners and developers for the foregone revenue associated with producing homes at below-market prices or rents. The most common incentive is a density bonus to allow the construction of more homes than would normally be allowed under zoning. Another useful incentive is to provide developers with a fast-track approval process.
6. Implement site plan review as outlined in the proposed zoning, which assures that, in addition to health and safety issues, proposed structures and site work are well integrated into the context of the neighborhood and the unique characteristics of the site itself.
7. Develop and implement an enhancement plan for the gateways identified in the Town Plan.
8. Restrict the number of curb cuts per parcel to one, or none if alternative access exists through a secondary road or a shared driveway. Or, restrict curb cuts to one per X feet of highway in specific districts, or by specific uses. Promote or require one shared access for subdivisions so that individual accesses are not needed.

9. Develop a coordinated sign ordinance so that commercial signs complement the character of the area. Require PUD's such as the Burke Mountain development to provide a unified master sign plan.
10. Require buildings to front on the road to create a pedestrian friendly environment. Setbacks should be based on distances that are in context with the historic character of the area.
11. Include standards for subdivisions and PUD's that encourage or require the installation of sidewalks or paths that link adjoining parcels or the existing or proposed multi-modal transportation network.
12. Require that the developer pay for any unnecessary infrastructure improvements or secure a bond or other surety agreement to ensure that required improvements are installed.
13. Implement an impact fee ordinance to cover capital expenditures imposed by new development. Bear in mind that impact fees are intended to pay for the provision of new facilities and the expansion of existing facilities, not for the maintenance of existing facilities, and require that there be a capital budget and a multiyear capital improvements program. Any impact fee ordinance developed should consider certain waivers or exemptions, such as for affordable housing projects, storage sheds, or other accessory dwelling units.
14. In conditional use and/or site plan review, require developers to submit visual impact, traffic impact and other related analyses (i.e. land use, economic) to help evaluate potential impacts that may result from new development.
15. Prohibit cul-de-sacs and dead-end roads in subdivisions.
16. Adopt an official map to help plan and budget for existing and future uses, including roads, sidewalks, recreation paths, rights-of-way, parking areas, transit stops, open space, etc. If a development is proposed in an area identified on the official map, then it may be subject to conditional use review.
17. Building upon the Conservation & Scenic Overlay district, develop a detailed inventory of historic, scenic and environmental resources and clearly identify where they are located so new development and transportation improvements can avoid these areas or be implemented in a manner that is sensitive and responds to them. This inventory should include scenic roads and key vantage points.
18. Develop a more detailed design review and impact analyses capability for the Resort District.

The **Town of Lyndon** should consider any combination of the following initiatives in order to provide the maximum benefit for managing growth and development and a viable transportation system:

1. Update or rewrite its town plan as a matter of priority. The town plan provides a solid foundation for regulatory documents, like zoning, and assists in Act 250 permitting. The Town Plan from 1999 provides an excellent starting point and can be updated to account for

recent trends, needs, and opportunities. An important piece to include in the update would be a separate Land Use section, which specifically addresses future land use and development.

2. A zoning rewrite to coordinate with and implement the new town plan should also occur simultaneously or shortly after the adoption of the town plan.
3. Consider an overlay district for the Route 114 corridor, which has site specific standards for addressing residential, commercial, and new development activities that address the protection of critical environmental resources, traffic management and scenic views.
4. Another key measure is to implement a traffic management section in the zoning that would include specific provisions such as limiting curb cuts, providing adequate sight distances and encouraging transit.
5. Construct an official bike lane along major cycling routes, such as Routes 114 and 5. Identify and construct pull-offs and "places to pause" for bicyclists, to include picnicking facilities such as tables and wastebaskets.
6. Initiate a local land trust or entity, or work with a regional entity, to identify and purchase conservation properties and open space.
7. Initiate a local affordable housing agency or similar entity, or work with a regional entity, to identify and develop affordable housing options.
8. The off-street parking regulations of Article VI should be strengthened by including specific standards or guidelines. The following guidelines are recommended where feasible to reduce parking requirements, thus creating incentives and the environment for increased pedestrian, transit and bicycle travel:
    a. Provide short-term parking in the most convenient locations and long-term parking in peripheral locations and where it can most easily be intercepted by transit. For example, construct long-term parking lots in the three areas identified in the town plan (South Main Street, Elm Street, and the north end of Broad street) and provide access to transit. Consider parking fees, which could result in denser and more compact development by reducing the number of personal vehicles used in commutes and the number of parking spaces required to accommodate them.
    b. Coordinate site uses among separate properties. Reduce the total number of parking spaces needed to accommodate customers where multiple destinations are accessible from the same parking lot.
    c. Reduce parking requirements for development in close proximity to transit.
    d. Locate and configure site plans and parking to prioritize direct pedestrian access between building entrances, sidewalks and transit stops. Require that parking be located

behind buildings where possible, to the sides of buildings when necessary, and on corner lots away from street intersections.

e. Establish parking maximums, rather than minimums, for office buildings and other employment centers where alternative transportation exists (minimums often result in more parking being provided than is needed to meet demand).

f. Allow the use of public on-street spaces when considering the total number of parking spaces needed for a development.

9. Restrict the number of curb cuts per parcel to one, or none if alternative access exists through a secondary road or a shared driveway. Or, restrict curb cuts to one per X feet of highway in specific districts, or by specific uses. Promote or require one shared access for subdivisions so that individual accesses are not needed.

10. Develop site landscaping standards and an overall landscape standard for specific corridors, particularly in the village and at the village gateways, to create an intimate, friendly feeling (street trees, placement, numbers required) and to help slow vehicles.

11. Develop design review standards for the village/commercial districts or delineate a design overlay district to include specific measures that maintain historic character of the area. This would include detailed initiatives for site development, architecture, signs, landscaping, parking, access and overall circulation. Design review is most effective when it is coupled with carefully developed public strategies to invest in improvement to streets and sidewalks, public parks and plazas, and civic facilities and transit.

12. Require that developers pay for any necessary infrastructure improvements or secure a bond or other surety agreement to ensure that required improvements are installed.

13. Include standards for subdivisions and PUD's that encourage or require the installation of sidewalks or paths that link adjoining parcels or the existing or proposed multi-modal transportation network.

14. Replace the current Planned Residential Development provision, which only applies to residential development, with a Planned Unit Development (PUD) regulation. A PUD merges zoning and subdivision controls, allowing developers to plan and develop a large area as a single entity, with the design flexibility to mix land uses, housing types, and densities, and to phase large developments over a number of years. It also provides a way to customize development standards to the specific land under consideration, thereby minimizing environmental disturbance and alteration of existing topography, particularly in comparison with conventional forms of development. PUD's would be especially beneficial for limiting sprawl-like development along Route 114, where the Burke Mountain Resort expansion will likely have an impact on growth along this stretch of road.

4.0 IMPLEMENTATION PLAN

Each of the recommendations developed in this report is designated as short-term, mid-term, or long-term based on the relative cost, need, and ability to implement. To assist each of the Towns in moving the identified recommendations forward, an implementation matrix was developed which identifies project cost estimates, implementation timeframe, potential funding sources, and implementing partners (Table 12).

Table 12: Implementation Matrix

Location	Description	Timeframe	Order of Magnitude Cost Estimate*	Potential Funding Source(s)**	Implementing Partners
Access Management					
US 5 (Broad St)	Widen Broad Street to a 3-lane section with center two-way left-turn lane, landscaping, and consolidated curb cuts.	Long-Term	$6,000,000	STP	NVDA, VTrans, Town of Lyndon
Intersection Improvements					
US 5/VT 114	Remove northbound slip lane and re-time traffic signal	Mid-Term	$390,000	STP, PRIVATE	VTrans, NVDA
US 5/VT 114	Evaluate roundabout	Long-Term	$700,000	STP, PRIVATE	VTrans, NVDA
US 5/Back Center Rd	Re-time traffic signal	Short-Term	$10,000	STP	VTrans
Village Enhancements					
East Burke	Streetscape, bike/ped, gateway, intersection and access management enhancements	Mid-Term	$475,000	TE, MUNI, PRIVATE	NVDA, VTrans, Burke Mountain Resort, Town of Burke
East Burke	VT 114 vertical curve reduction	Mid-Term	$530,000	STP, PRIVATE	NVDA, VTrans, Burke Mountain Resort, Town of Burke
Lyndonville	Convert two-way roads into a one-way circulation scheme	Short-Term	$5,000-10,000	TE, MUNI	NVDA, VTrans, Town of Lyndon
Transit Expansion					
Study Area	Shuttle bus between Burke Mountain Resort, East Burke & Lyndon	Short-Term	$224,000	PTP, PRIVATE	NVDA, Burke Mountain Resort, RCT
Pavement Reconstruction					
VT 122	Matthewson Hill Road to Pudding Hill Road	Long-Term	$4,900,000	STP	VTrans
VT 114	US 5 to Quarry Road (Newark)	Long-Term	$19,600,000	STP	VTrans
Bridge Reconstruction					
Burke	Replacement of BR 16 and BR 17 over Dish Mill Brook	Short-Term	$1,870,000	BR/BH	VTrans

* NOTE: Cost figures are estimates and should be used for preliminary planning purposes only.

** The following funding source abbreviations are used:

(STP) - Surface Transportation Program
(BR/BH) - Bridge Replacement/Bridge Rehabilitation
(TE) - Transportation Enhancements
(PTP) - Public Transportation Program
(MUNI) - Municipal/Local
(PRIVATE) - Private landowners, developers

Many of these recommendations, particularly those involving village enhancements or roadway expansion, will need additional scoping and engineering to determine exact alignments, impacts, and costs. The final selection of a preferred design will be determined through the VTrans project development process.

The order-of-magnitude cost estimates are conceptual in nature and should be used for general planning purposes only. Additional investigation and refinements are necessary to provide more precise cost estimates. The cost estimates are based on several sources:

- VTrans Bicycle and Pedestrian Program Unit Cost Database
- 2006 VTrans Average Bid Price Listing
- New York State DOT Generalized Cost Estimates
- Recent VTrans bid results
- Engineering judgment

4.1 POTENTIAL FUNDING SOURCES

The potential funding sources identified in the implementation matrix are provided as guidance to assist with project implementation. The list of funding sources includes the following:

- Surface Transportation Program/VTrans Capital Program
- Bridge Replacement/Bridge Rehabilitation
- Transportation Enhancements Program
- Public Transportation Program
- Local Funds through the Municipal Capital Budget
- Private sources

Each of these funding sources is described in more detail below.

4.1.1 (STP) Surface Transportation Program/VTrans Capital Program

STP funds have the most flexible uses of any federal transportation funds. STP funds may be used for highway, transit, and non-motorized facility construction and improvements. Facilities must be classified by the State as eligible for federal-aid, although sidewalk projects on local roads that are not on the federal-aid system may also be eligible for STP funding. The non-federal match is 20 percent. For projects that are completely on the state system, the state typically covers the 20% match. When local road or bridges are involved, a local match of 10-20% may be required depending on the classification of the highways involved and other factors.

Projects utilizing STP funds are typically prioritized by a regional planning commission relative to other projects in a region and must pass through the VTrans scoping and project development

process. The project development process may take several years and does not necessarily guarantee that funds will be waiting when the studies are completed. This type of funding source is not recommended for a project that needs to be implemented in less than five years.

4.1.2 Bridge Replacement/Bridge Rehabilitation

Federal funding (with state matching funds) for highway bridge replacement and bridge rehabilitation.

4.1.3 Transportation Enhancements (TE) Program

Federal reimbursement grants for projects that enhance multi-modal transportation goals in the areas of historic preservation, bike and pedestrian paths, scenic protection, archeological planning, mitigation of highway water runoff, tourist and welcome centers, and transportation museums. Preservation projects must have a direct, evident and strong relationship to the surface transportation system. Proximity to a road alone is not sufficient. Buildings listed in the National Register and/or located within a state scenic byway or along an alternate designated scenic or historic route are most competitive. Project costs range from $10,000 to approximately $350,000 and a 20% non-federal fund match is required. Local, state and federal governments and non-profit organizations may apply

More information is available at: http://www.aot.state.vt.us/progdev/Sections/LTF/LTF.htm

4.1.4 Public Transportation Program

Public transportation programs receive revenue from the mass transit account of the HTF (a proportion of the motor fuel tax), the general fund, and interest. The FTA programs that provide funding for transit services with the most relevance to the State of Vermont are:

- Urbanized Formula program: funding to transit agencies in urbanized areas allocated through a formula;
- Non-urban and Rural Transit Assistance program: funding for transit operators in rural area and urban areas with a population of less than 50,000;
- Elderly and Persons with Disabilities program: funding to private and non-profit organizations meeting the transportation needs of senior citizens and persons with disabilities; and
- Other funding is occasionally provided through special programs, such as Access to Job grants or transfers from the Surface Transportation Program (STP).

4.1.5 Local Funds through the Municipal Capital Budget

The municipal capital budget can be used to match Federal or State funded projects, or to finance all of a project. The particular projects may be identified in advance through a municipal Capital

Improvement Plan and should be included in the appropriate budget year(s) for approval at Town Meeting. Larger projects are often funded through municipal bonds.

The Vermont Municipal Bond Bank (VMBB) is a quasi-state agency administered by a board of directors that includes four members appointed by the Governor and the State Treasurer. VMBB operates by purchasing a bond from a municipality. The municipality must have approved the issue of the bond by vote of the legislative body. The VMBB bundles together several individual municipal bonds and sells them as a package to individual or institutional investors. In this way VMBB can secure preferential rates for its municipal Vermont clients.

Bond transaction costs are assumed by VMBB, which is an important advantage of this source of financing. The interest rate accompanying any bond issue is determined at the date of sale. Bond payback terms are typically 20 years for highway-related improvements and 30 years for water/sewer improvements. Payments are made on a monthly basis, and can be calculated for level or declining principal balance.

Local governments have several options available to raise revenue for paying back a bond. The most common options are briefly described below. Careful review of the advantages of each method, including reliable estimates on how these options affect local tax rates, is necessary before selecting an appropriate funding mechanism.

Special Assessment Tax District: A special assessment district can be created where property owners, which presumably benefit from the investment, pay a special tax to cover the cost of bond payments. Special assessment districts could be established for a designated area of the town or can be designated town-wide.

Tax Increment Financing District: A tax increment financing district (TIF) can be established that dedicates the non-school taxes generated by increased property value to paying off the bond. A TIF is most appropriate where property values are expected to increase significantly.

Transportation Impact Fees. Through impact fees, new developments pay a 'fair-share' of the costs related to updating and improving infrastructure based on the amount of 'impact' the development would have on that infrastructure.

Local Option Sales Taxes: The State of Vermont allows the following taxes to be collected as part of the Local Option Sales Tax: A one percent sales tax; a one percent meals and alcoholic beverages tax; and a one percent rooms tax. The local option sales tax is permitted for VT municipalities that were affected a certain way by Act 60 and Act 68. The legislature is considering a bill that will make it available to all VT municipalities.

4.1.6 PRIVATE SOURCES

The most common private source of funding for new infrastructure comes from a landowner or developer paying for new or enhanced access to a site or paying for transportation enhancements to offset the impacts of a proposed development. Other private sources may include local non-profit

groups, the Vermont Association of Snow Travelers, the Burke Mountain Resort, a neighborhood civic organization, and others.