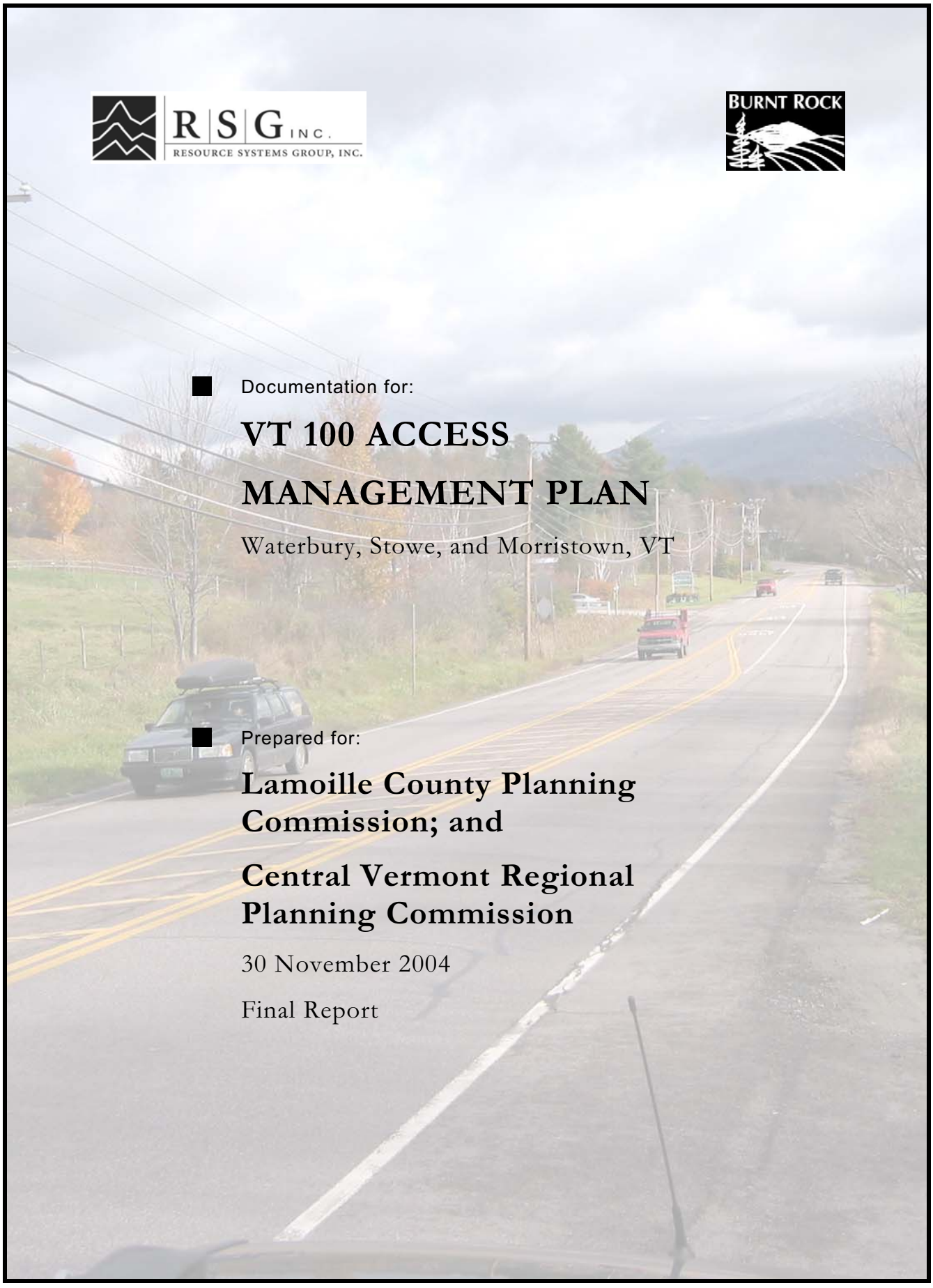

RSG INC.
RESOURCE SYSTEMS GROUP, INC.

BURNT ROCK

Documentation for:

VT 100 ACCESS MANAGEMENT PLAN

Waterbury, Stowe, and Morristown, VT

Prepared for:

Lamoille County Planning Commission; and

Central Vermont Regional Planning Commission

30 November 2004

Final Report

100 Dorset Street, Suite 20 ▪ South Burlington, Vermont 05403

RSG INC.
RESOURCE SYSTEMS GROUP, INC.

MEMORANDUM

To: David Pelletier, Lamoille County Planning Commission
Steve Gladczuk, Central Vermont Regional Planning Commission
From: Joseph Segale, P.E.
Subject: VT 100 Access Management Plan
Date: 30 November 2004

Resource Systems Group, in partnership with Burnt Rock Associates in Community Planning, is pleased to present the attached final report for the VT 100 Access Management Plan. The study area extends along VT 100 from US 2 in Waterbury, through Stowe, to VT 15 in Morristown.

The attached plan:

- Evaluates existing land use and transportation system issues and includes sketch plans to address existing access management deficiencies;
- Estimates build-out and twenty-year development scenarios for parcels adjacent to VT 100 and identifies land use, traffic, and access management issues for the year 2025;
- Develops and analyzes highway system alternatives and makes recommendations to address 2025 issues; and
- Recommends administrative tools to help implement effective access management techniques through municipal land use plans and regulations, and coordination between the three towns and the Vermont Agency of Transportation.

This plan updates the work completed in the 1993 *VT Route 100 Corridor Study,* which identified access management and land use planning as two areas that should be investigated further to help preserve mobility along VT 100 without additional travel lanes.

The recommendations can be used by the LCPC, CVRPC, and VTrans as they work together to identify and implement different transportation projects along VT 100. The land use recommendations should be reviewed by the different municipalities in the study area and incorporated into land use plans and regulatory documents as they are developed and updated.

Thank you for the opportunity to assist the LCPC, CVRPC, and members of the Project Advisory Committee with developing this plan.

100 Dorset Street, Suite 20 ▪ South Burlington, Vermont 05403
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VT 100 ACCESS MANAGEMENT PLAN PROJECT ADVISORY COMMITTEE

This plan would not have been possible without the local knowledge, expertise, support, and time offered by the members of the Project Advisory Committee.

Jane C. Brown – Waterbury Resident

Paul Brown – Cold Hollow Cider Mill, Central VT Chamber, Waterbury Tourism Council

Ernie Englehardt – VTrans

Heather Furman – Stowe Land Trust

Steve Gladczuk – Central Vermont Regional Planning Commission

Tom Jackman – Town of Stowe Planning Director

Mark Leonard – Morristown Zoning Administrator

Steve Lotspeich – Town and Village of Waterbury Community Planner

Kimberly Murray – VTrans Planning Coordinator

Aimee Neveau – VTrans Planning Coordinator

Dave Pelletier – Lamoille County Planning Commission

Barbara Pfitzenmayer – Stowe Planning Commission Member

Steve Rae – Morristown Conservation Commission

EXECUTIVE SUMMARY

The purpose of the VT Route 100 Access Management Plan is to improve the efficiency and safety of VT 100 from US 2 in Waterbury, through Stowe, to VT 15 in Morristown using access management techniques, highway system improvements, and land use planning and regulations. Access management is the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. Effective access management is built upon the following principles:

- Provide a specialized roadway system based upon mobility for through traffic and access to adjacent land;
- Provide appropriate intersection design, control, and spacing to provide efficient transitions from one roadway classification to another;
- Limit direct access between adjacent land uses and higher speed roads while promoting access between land use and minor, low speed roads;
- Limit or separate the number of conflict points between traffic entering and exiting driveways and streets; and
- Remove turning traffic from through traffic lanes.

This plan:

- Evaluates existing land use and transportation system issues and includes sketch plans to address existing access management deficiencies;
- Estimates build-out and twenty-year development scenarios for parcels adjacent to VT 100 and identifies land use, traffic, and access management issues for the year 2025;
- Develops and analyzes highway system alternatives and makes recommendations to address 2025 issues;
- Presents and recommends different administrative tools to help implement effective access management techniques through municipal plans and regulations, and coordination between the three towns and the Vermont Agency of Transportation; and
- Evaluates whether or not the recommendations made in the 1993 *VT Route 100 Corridor Study* are still reasonable based on current conditions and projected traffic volumes in 2025.

This plan was a joint effort between the Lamoille County Planning Commission (LCPC) and the Central Vermont Regional Planning Commission (CVRPC) using funds provided through the VTrans Transportation Planning Initiative program. A Project Advisory Committee with representatives from all three towns assisted with technical and policy questions, local knowledge, and public outreach efforts.

The plan was completed by Resource Systems Group, Inc. (RSG) and Burnt Rock Inc., Associates in Community Planning (BRI).

EXISTING TRANSPORTATION SYSTEM FINDINGS

- Traffic volumes on VT 100 grew significantly faster than the statewide average over the last twenty years. The majority of this traffic begins and/or ends somewhere in Waterbury, Stowe, or Morristown. A smaller percentage of trips pass completely through the corridor. This finding underscores VT 100's function as a minor arterial which must:
    1. Serve travel within the corridor for and between the local residents and businesses;
    2. Provide access to adjacent land and the local road system; and
    3. Link the corridor to the statewide highway system which ultimately makes the people and businesses accessible to the rest of the world.
- The ability of VT 100 to serve all of these functions is beginning to deteriorate. It is becoming more difficult to enter VT 100 from the major local roads during the peak hours. Excessive delays have been documented in this study at the intersections of VT 100 with Stagecoach Road, VT 108, and Moscow Road in Stowe; and Guptil Road, Laurel Lane, and Stowe Street in Waterbury. Inefficient transitions currently exist to the statewide arterial and interstate system at the VT 100 intersections with the I-89 on and off ramps and US 2 in Waterbury.
- As a minor arterial, VT 100 should provide a reasonable level of mobility. VTrans policy suggests that LOS C is appropriate along rural facilities. Many of the VT 100 rural road sections in the study area are currently operating at LOS D.
- Poor access management can cause further deterioration in mobility and safety. Existing locations where driveways do not meet access management design guidelines are concentrated in the seven areas listed below. Deficiencies include inadequate spacing between driveways and intersections, inadequate spacing between driveways, lack of well defined edges, and multiple access points for individual parcels. Many opportunities exist to improve access at these areas by consolidating driveways, providing cross connections between adjacent parcels, and relocating access from VT 100 to side streets for corner parcels.
    1. Blush Hill Road/Stowe Street to north of Colbyville in Waterbury;
    2. In the vicinity of the Cabot Creamery Annex and Shops, East Wind Drive, and McNeil Dr. in Waterbury;
    3. Waterbury Center;
    4. Lower Stowe Village;
    5. Stowe Village from School Street to West Hill Road;
    6. North of Stagecoach Road in Stowe; and
    7. Brooklyn Street – Bridge Street to VT 15 in Morrisville.

LAND USE INVENTORY, PLANNING, AND REGULATORY FINDINGS

- Single-family dwellings are the dominant land use within the entire corridor, although to a lesser extent in village and transitional areas. The conversion of residential dwellings to commercial uses has occurred throughout the corridor, however, and the continued conversion has the potential to significantly change land use and associated traffic patterns.
- Commercial uses are generally concentrated in village/hamlet areas, and to a lesser, but still significant, in transitional areas on the edges of villages. Mixed use development is common in established village centers and single or mixed use commercial development is prevalent in transitional and rural areas.
- The open, rural character of much of the corridor is largely attributable to a relatively small number of large parcels, including existing farms and some forested parcels. Consequently, the subdivision and/or development of a few properties could have a significant impact on the character of the corridor and traffic patterns on Route 100.
- Overall land use patterns are similar in each of the three municipalities along the length of the corridor. Generally, the historic pattern of village centers and hamlets connected by a rural highway corridor is still present. However, strip development – a linear, automobile-oriented development pattern dominated by commercial uses – has emerged along several sections of Route 100, especially adjacent to existing village centers and, to a lesser extent, along once rural highway segments that are not contiguous to historic villages.
- Waterbury, Stowe, and Morristown include policies in their municipal plans that support managing access along VT 100 and have each adopted land use regulations that include administrative processes through which highway access may be regulated in accordance with locally adopted standards. However, access management provisions included in zoning, subdivision, and local road ordinances vary in their application and level of detail.
- VTrans owns and maintains most of VT 100 in the study area and manages access in accordance with its Access Management Program Guidelines. The guidelines provide the basis for access permitting on state highways and are used in the planning and development of VTrans roadway construction projects. As a condition of any access permit issued by VTrans, State statutes require compliance with all local ordinances and regulations relating to highways and land use. To ensure that access management requirements are fairly, effectively and consistently applied, there is a need to improve the coordination between VTrans and the local officials responsible for adopting and administering local road ordinances and land use regulations.

FUTURE CONDITIONS

- Under the twenty-year (2025) development scenario, most of the traffic growth in the study area will be driven by development beyond parcels that front VT 100. This additional traffic will access VT 100 through its intersections with national, state, and local highways. As a result, high levels of congestion are projected at almost every stop-controlled side street approach to Route 100, and at

the two existing signalized intersections at Blush Hill/Stowe Street in Waterbury and VT 15 in Morristown. Providing efficient and safe transitions between local, collector, and arterial highways is a key access management principle. Therefore, the poor intersection performance is identified as the primary access management issue documented in the study area. In addition to the need for intersection improvements, this finding suggests that access management techniques should be applied not just along VT100, but also on the municipal highway network that is under local jurisdiction.

- Findings based on a build-out analysis of the parcels directly adjacent to VT 100 suggest that, under existing municipal land use regulations, there is significant development potential along the corridor. Under a full build-out scenario, the number of dwelling units conceivably could quadruple over its entire length, and the amount of commercial space within Waterbury's Route 100 District alone could increase twenty-fold. In addition to generating more traffic, the need for access to future development could result in the installation of more than 650 new driveways.
- The greatest potential for residential development – in terms of both frontage lots and dwelling units – is between Randolph Road and Morristown Corners Road in Morristown. The greatest potential for commercial development is within the Route 100 District in Waterbury. There are few natural constraints to development along the corridor; therefore local land use regulations and other types of development restrictions will likely have a much greater influence on future corridor development.

TRANSPORTATION SYSTEM FINDINGS AND RECOMMENDATIONS

Transportation system recommendations are described below and presented in Figures E-1, E-2, and E-3 for Waterbury, Stowe, and Morristown respectively.

- The sketch plans shown in Figures E-4 through E-16 have been developed for each access management focus area and suggest potential solutions to the identified problems. These sketch plans provide concepts that may be implemented as opportunities arise – such as a VTrans reconstruction project or redevelopment of an existing development.
- The potential need for a four lane cross section along VT 100 between I-89 to south of Colbyville is a significant change from the *1993 VT 100 Corridor Study*. For the southern most section of VT 100, it does not appear possible in 2025 to maintain a tolerable level of congestion without adding more through lanes. A two lane cross-section will provide adequate levels of mobility through the rest of the study area.
- Construct the New Town Road between Stowe Street and Guptil Road in Waterbury. A conceptual alignment is shown in Figure E-1. The New Town Road improves access management from a system-wide perspective by expanding upon the specialized street system that serves local travel. It will provide local residents with an alternate route to VT 100 connecting Waterbury Center, Colbyville, and the Village. It can include provisions for pedestrians and could provide a safe alternative bike route to VT 100. The New Town Road has the potential to reduce traffic significantly on VT 100 and should be designed and constructed before adding new through lanes to VT 100.

- Construct the Route 100 Alternate Truck Route in Morrisville (See Figure E-3). The Route 100 Alternate Truck Route will improve access management from a system-wide perspective by (1) providing a specialized highway facility designed to accommodate through traffic, (2) removing through traffic on VT 100 through the center of Morrisville thereby allowing the local street system to better serve local circulation and access to adjacent land, and (3) by improving the connection between VT 15 and VT 100.
- The functional areas of the intersections of VT 100 near the proposed Alternate Truck Route should be protected by designating sections of the state highways as limited access. Direct access from adjacent land to the state highway in these areas would not be permitted. The LCPC TAC should work with VTrans to evaluate the potential impacts to property, identify other access options to affected property, and consider purchasing access rights if necessary.
- A critical issue that was identified in the public outreach efforts was the importance of bicycle travel for residents and tourists along VT 100. Any roadway design changes should incorporate the recommendations of the "Vermont Pedestrian and Bicycle Facility Panning and Design Manual" published in April, 2003. This manual was developed with support and input from VTrans, the Federal Highway Administration, the state's 12 regional planning commissions, the general public, as well as other parties.
- To provide efficient connections between the local road system and VT 100, and VT 100 and the state and national highway routes, the mix of turn lanes at unsignalized intersections, traffic signals, and roundabouts presented in Figures E-1, E-2, and E-3 is recommended to address the projected congestion and existing safety problems identified in the corridor through 2025. The final design for a specific location should be selected and refined through the VTrans Project Development Process which includes a detailed assessment of natural and cultural resource impacts, costs, right-of-way requirements and other critical aspects in the context of a public process.

ADMINISTRATIVE RECOMMENDATIONS

Improving access design and location over the long term can be accomplished through municipal plans, regulations, and the development review processes in each of the three towns. In addition, to ensure that access management requirements are fairly, effectively, and consistently applied, there is a need to improve the coordination between VTrans and the local officials responsible for adopting and administering local road ordinances and land use regulations.

This plan identifies the following list of regulatory and non-regulatory administrative tools that can be referenced as local plans and regulations are updated. Also included is a list of strategies that can help improve coordination between VTrans, Waterbury, Stowe, and Morristown.

Municipal Plans

Existing municipal plans already provide the statutory basis for both non-regulatory programs and regulatory changes that could promote better access management along the VT 100 corridor. In future plan updates, the following should be considered:

1. Incorporation, by reference or attachment as appropriate, recommendations included in this plan – including updated access management strategies, road and intersection improvements.

2. A review, under the land use element, of proposed land use districts along the corridor and in the vicinity of connecting roads, to include a review of allowed uses and densities of development – particularly in relation to projected traffic conditions, available road frontage, the potential for new accesses or interconnecting roads, and intersection function.

3. Incorporating a section under the transportation element that specifically addresses access management, to include the assignment of road functional and access management classifications (as shown on the transportation map), references to existing or proposed state access management guidelines, the identification of needed access management improvements, and a list of recommended regulatory and non-regulatory access management tools or techniques for local application.

Non-regulatory Access Management

Several of the plans and bylaws reviewed include references to capital budgets and programs, official maps, and other non-regulatory tools described here that, if adopted, could enhance local access management programs, particularly with regard to identifying, reserving land for, and funding needed infrastructure improvements. These types of programs, however, may require some additional administrative capacity. The following should be considered as appropriate for each municipality:

1. The adoption of this plan as the municipal access management plan for the VT 100 corridor, to support local access management review, municipal and regional project development, and coordinated access management with the other municipalities along the corridor and the Agency of Transportation.
2. The adoption of a local capital budget and program that schedules recommended access, road and intersection improvements in relation to regional and state transportation improvement programs, and identifies proposed sources of local financing, which could include road impact fees.
3. The adoption of an official map that at minimum shows the location of land reserved for recommended public infrastructure improvements, including new or expanded road rights-of-way and associated access, intersection, sidewalk and recreation path locations (e. g, the ATR and the New Town Road).

4. The adoption of a road impact fee ordinance that allocates the costs of infrastructure improvements resulting from additional growth to new development along the corridor. A municipal plan and capital improvement program also are required for impact fee ordinance development and adoption.
5. The continued acquisition of land or interests in land, through negotiated dedication or purchase, to further access management goals in association with broader land conservation and open space protection objectives, particularly along less developed rural and scenic segments of the VT 100 corridor. Sources of potential assistance and funding include VTrans' Enhancement Grant Program, the Vermont Housing Conservation Board, the Vermont Land Trust, the Stowe Land Trust, and the Municipal Planning Grant program.

Regulations

All three municipalities have adopted some access management provisions in their regulations that apply largely to nonresidential development or subdivisions along VT 100. These generally include zoning district, use, site plan, conditional use, and/or subdivision standards – though they vary markedly by municipality in their extent and application. All three municipalities also have local road policies or ordinances in effect.

The following are also recommended for consideration to better manage access along VT 100:

1. Redefine zoning districts along Route 100 as recommended in municipal plans (e.g., the Route 100 District), with consideration given to allowed uses (potential trip generation rates); district density, lot size and frontage requirements; and available or planned connecting roads that would serve development in the district.
2. Adopt an "Access Management Overlay District" along one or more segments of the Route 100 corridor – for example, within the seven areas where existing access deficiencies are concentrated – to require recommended improvements to individual parcels as they come under review. Another option is to incorporate access management standards specific to VT 100 as district standards within the zoning districts bordering the corridor (e.g., as Stowe and Waterbury have done to a limited extent).
3. Adopt basic access management (curb cut and driveway) standards that apply to all development within general regulations under local zoning. This could include simply adopting state and local guidelines by reference. Currently most access management standards under land use regulations do not apply to single or two-family dwelling units on existing lots along the corridor.
4. Update site plan, conditional use and/or subdivision review standards as appropriate – to include a review of existing access management, intersection, parking and road standards for consistency with local road policies and ordinances, and for state highways, with the state's management guidelines. In addition:
    - Waterbury should consider, as feasible, the adoption of subdivision regulations to more effectively regulate the creation of lots, access to multiple properties, associated road and

access infrastructure improvements, and requirements for master planned and phased development.

- Stowe should review access management standards under site plan, conditional use and subdivision review for consistency and, with the existence a development review board, consider consolidating access management requirements as applied to the development or redevelopment or existing lots under one review process (e.g., by incorporating all site plan review criteria under conditional use review).
- Morristown and Morrisville should consider strengthening access management review criteria under both site plan and conditional use review.

5. Specifically incorporate state access management program guidelines, local road policies, and related access management standards in local land use regulations as appropriate for consideration in local development review.
6. Define in local land use regulations the timing and sequence of review for obtaining state or local highway access approval in relation to local zoning permits and approval. This should include application referral and/or consultation requirements as appropriate.

Coordination

Ongoing cooperation between Waterbury, Stowe, Morristown and Morrisville, the Lamoille County and Central Vermont Regional Planning Commissions, the Agency of Transportation, and local property owners, is necessary to effectively address development, traffic and associated access management issues along the VT 100 corridor. Opportunities and methods for coordination identified include:

1. The establishment of the Route 100 project advisory committee as a permanent subcommittee of each regional commission's transportation advisory committee, to be coordinated through regional commission and municipal staff.
2. The adoption of consistent access management review guidelines and standards that apply specifically to the VT 100 corridor.
3. The adoption of an "Intergovernmental Access Management Agreement" between the three municipalities, the Agency of Transportation, and potentially the two regional planning commissions, to coordinate access and development review for projects requiring access to VT 100.
4. Continued participation in joint corridor planning and project development efforts through the two regional planning commissions, particularly with regard to the development of regional plans and transportation improvement programs, to incorporate priority VT 100 road, intersection, and access management improvements as recommended in this plan.

5. Collective participation in the development and legislative approval of the state transportation improvement program, to include the scheduling of priority projects along the VT 100 corridor for state and federal financing.
6. Collective and individual participation in state Act 250 proceedings for development proposed on VT 100, to ensure that related traffic, access and infrastructure impacts – particularly as they cross municipal boundaries – are adequately addressed in the permitting process.

Growth Management

Access management and land use policies within the Route 100 corridor can have a significant impact on traffic safety and highway capacity. With 87% of projected traffic increases to result from development beyond parcels that directly abut VT 100 in the study area, however, town-wide land use planning and growth management policies are required to influence future traffic conditions. A comprehensive planning program that addresses area-wide growth should include the following:

- Growth management policies that ensure that the rate of development is coordinated with the provision of facilities needed to support that development. Related programs include capital budgets and programs to identify anticipate facility deficiencies and coordinate capital expenditures; impact fees to fund capital facilities, including highway improvements, attributable to new development; and development phasing programs to manage the rate of growth.
- Land use policies that discourage scattered development and reinforce existing and new growth centers. Related programs in "rural' portions of the communities include land conservation and open space protection; and development regulations that maintain low overall development densities. In addition, promoting concentrated development in new and existing village centers can enhance opportunities for transit and pedestrians and reduce traffic.
- Transportation policies that promote transit and the development of an interconnected road network that reduces reliance on Route 100, especially for short trips within the communities. Related programs include designation compact, transit-friendly growth centers; supporting opportunities for alternative transportation modes (e.g., bike paths); and limiting long dead-end cul-de-sacs in favor of planning development that results in an interconnected road network through subdivision standards and/or the adoption of an official map depicting future road connections.

Figure E 1: Waterbury Highway System Recommendations

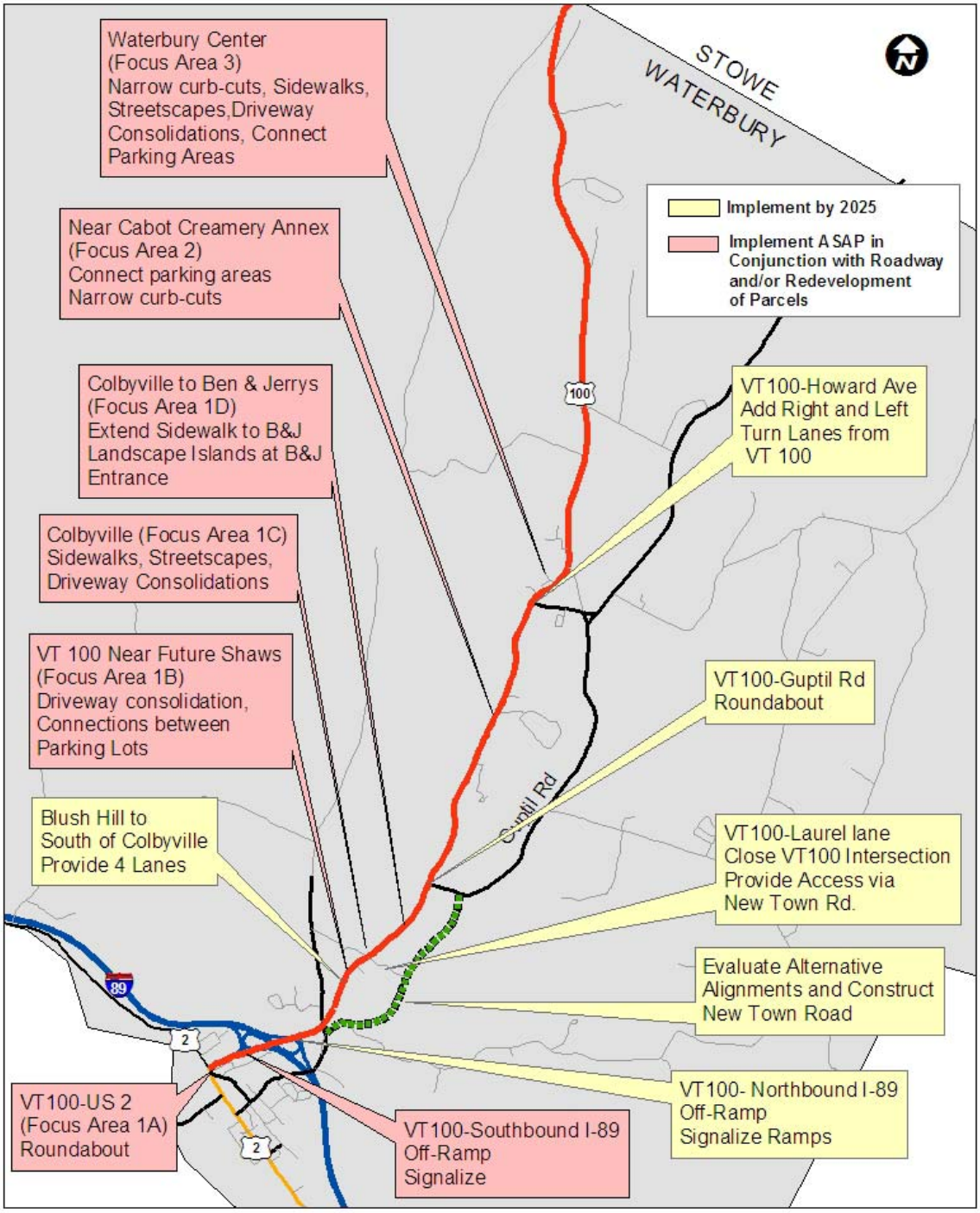


Figure E 2: Stowe Highway System Recommendations

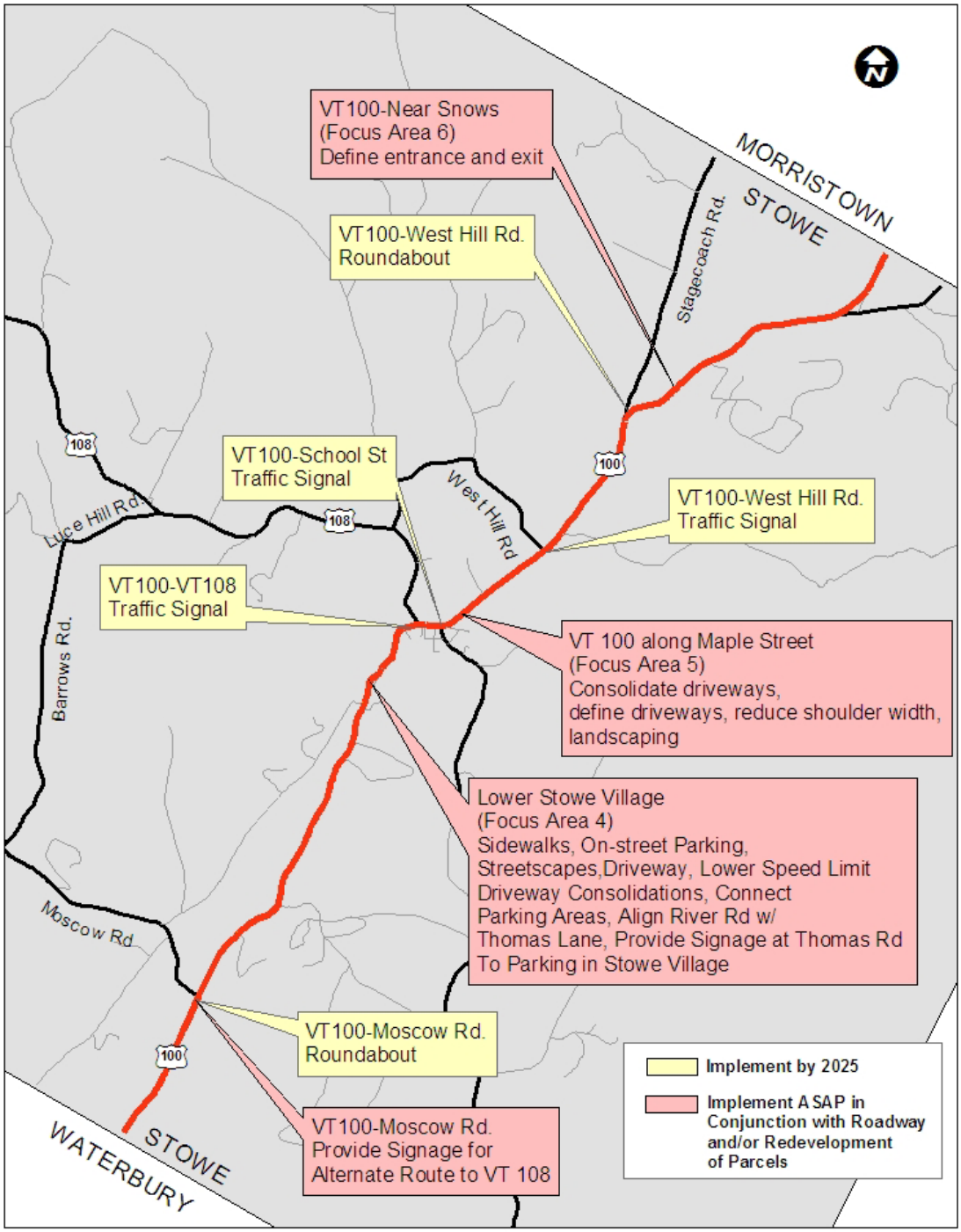


Figure E 3: Morristown Highway System Recommendations

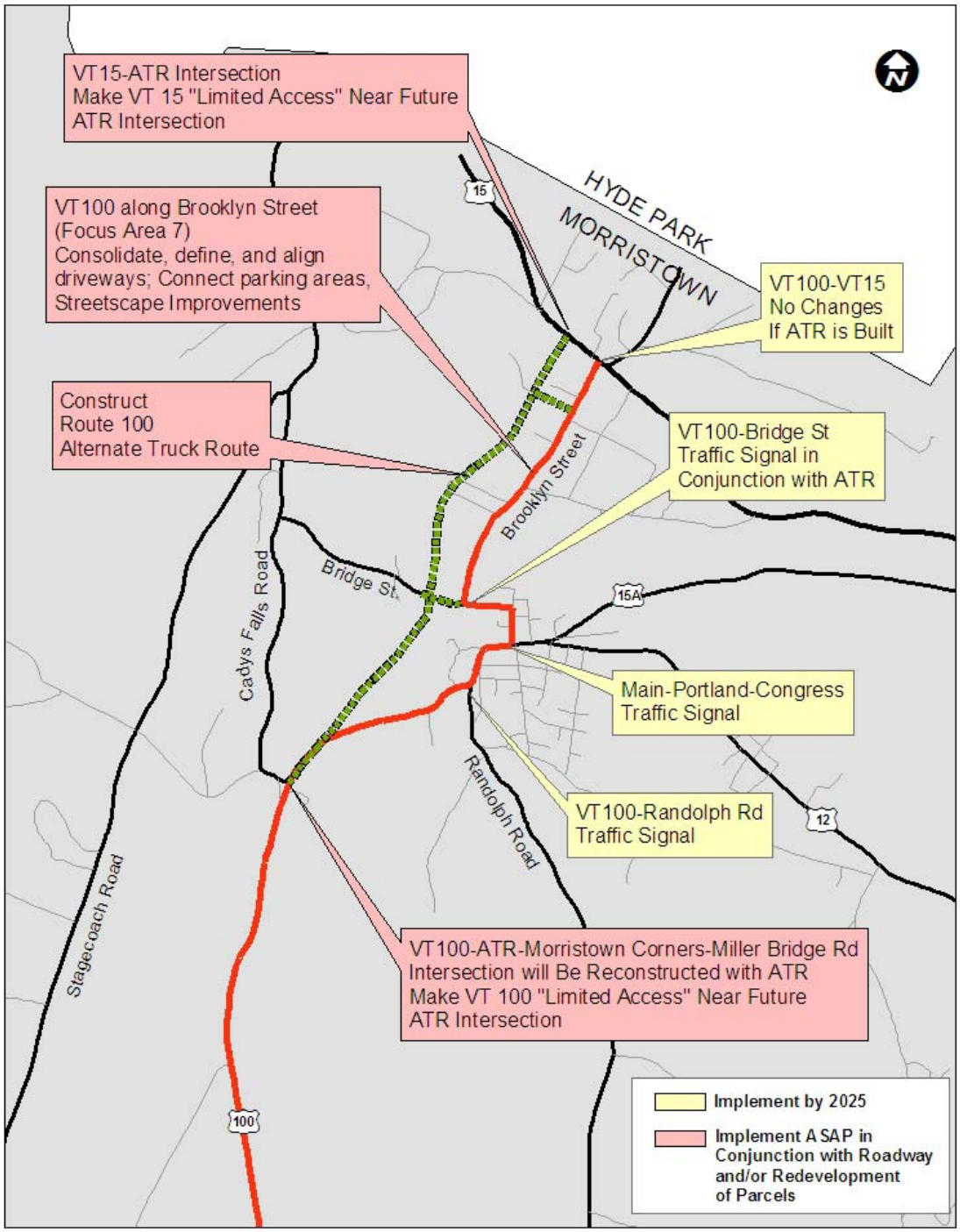


Figure E 4: Focus Area 1A - US 2-VT 100 Intersection

Figure E 5: Focus Area 1B - Blush Hill to Colbyville

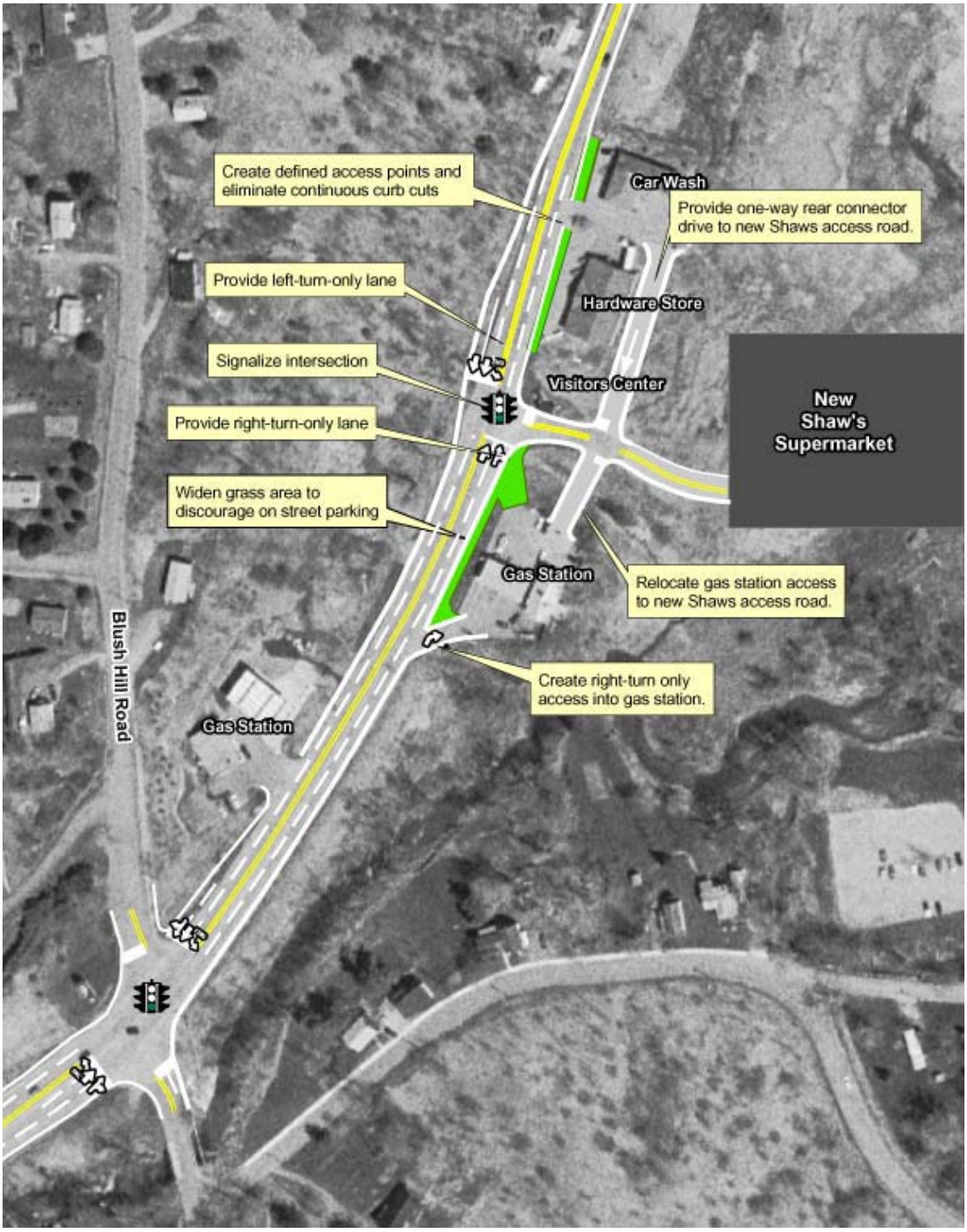


Figure E 6: Focus Area 1C – Colbyville

Figure E 7: Focus Area 1D - North of Colbyville

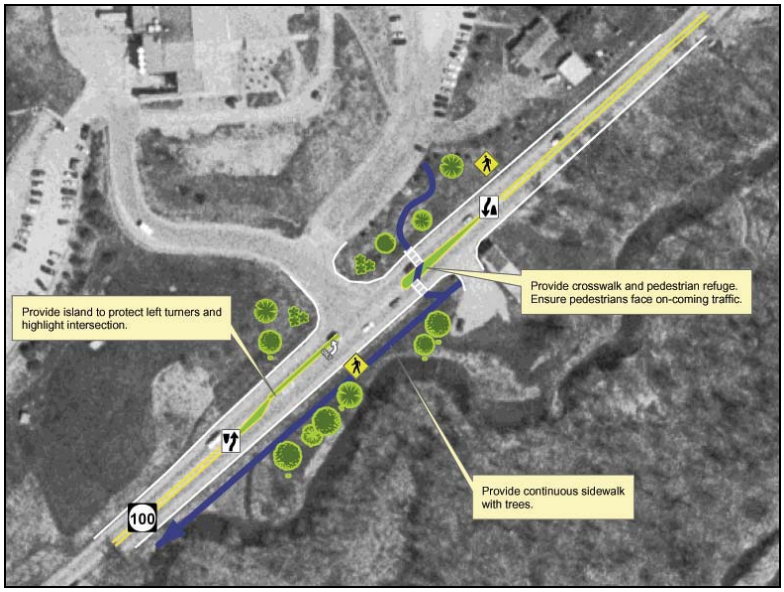


Figure E 8: Focus Area 2 - Cabot Creamery Annex

Figure E 9: Focus Area 3 - Waterbury Center

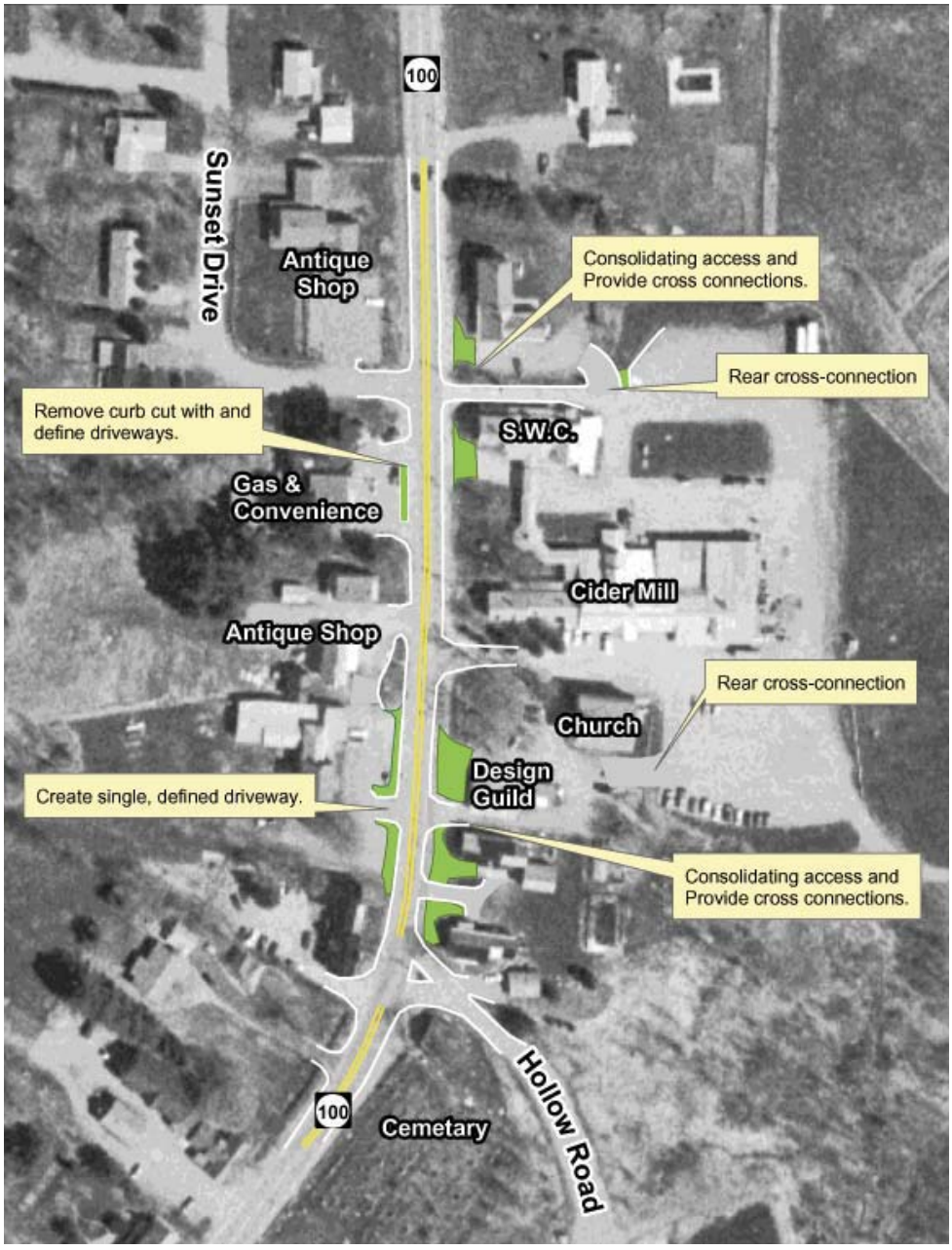


Figure E 10: Focus Area 4A - Lower Stowe Village

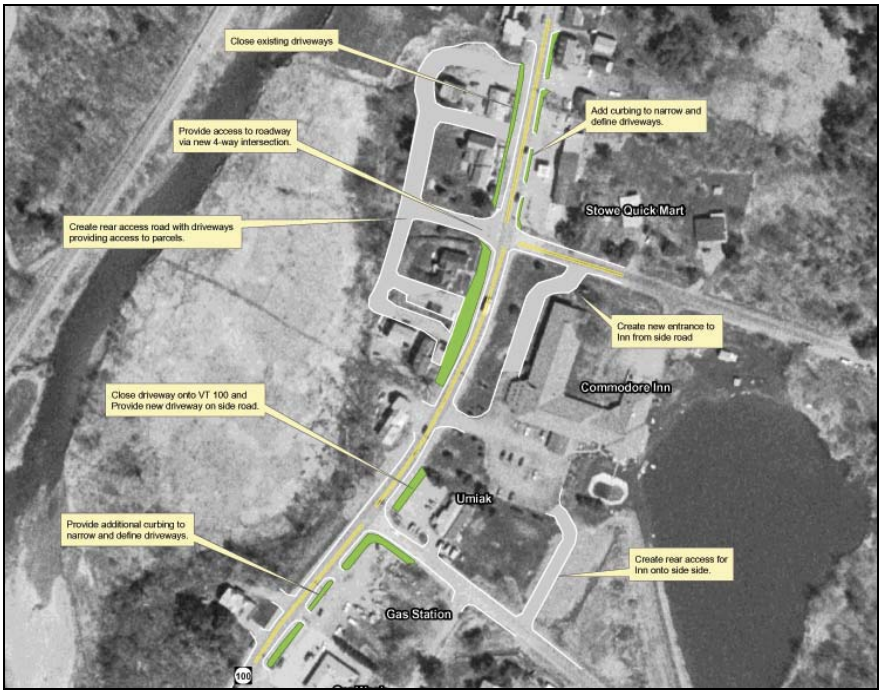


Figure E 11: Focus Area 4B - Lower Stowe Village near River Road

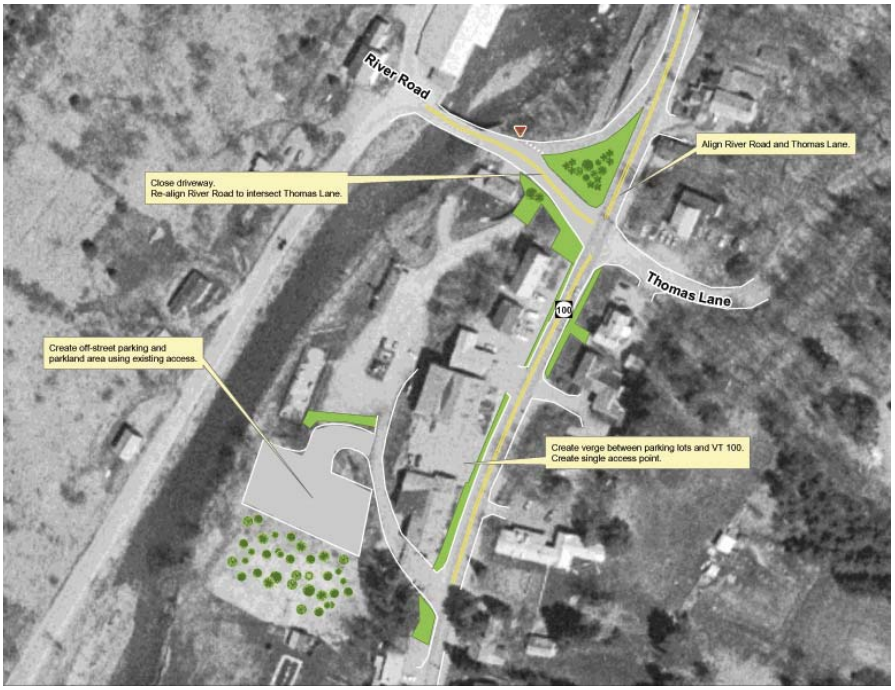


Figure E 12: Focus Area 5 - Maple Street in Stowe

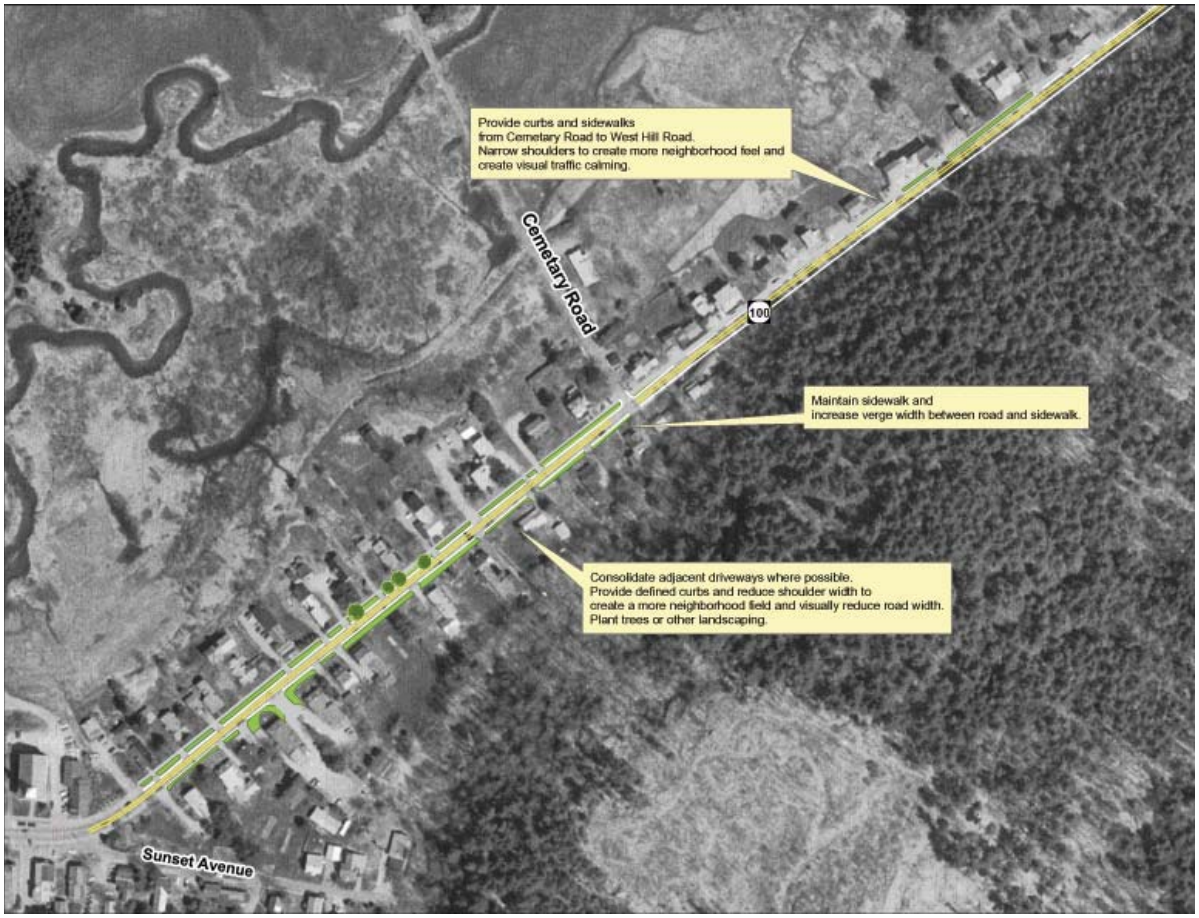


Figure E 13: Focus Area 6A - South of Stage Coach Road in Stowe

Figure E 14: Focus Area 6B - Near Snows in Stowe

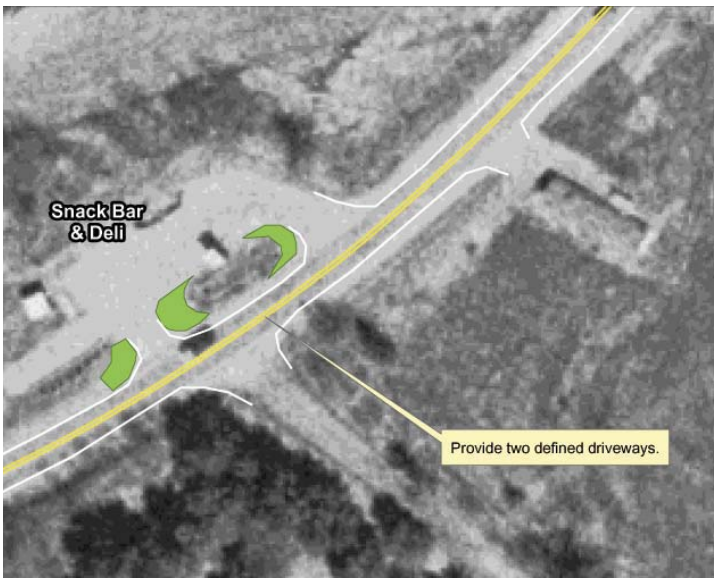
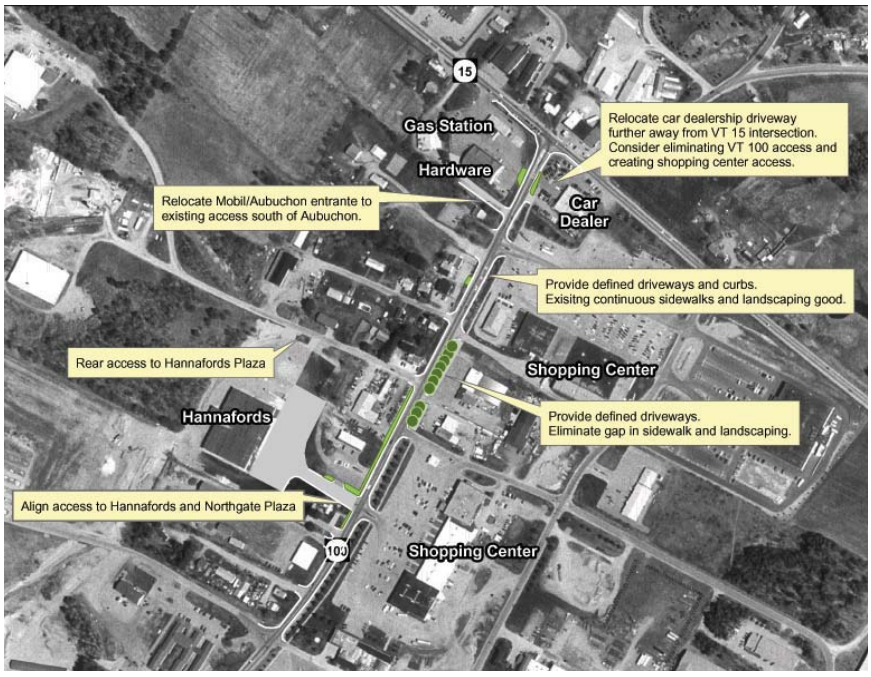


Figure E 15: Focus Area 7A - South end of Brooklyn Street in Morristown

Figure E 16: Focus Area 7B - North end of Brooklyn Street in Morristown



INTRODUCTION

The purpose of the VT Route 100 Access Management Study is to improve the efficiency and safety of VT 100 from US 2 in Waterbury, through Stowe, to VT 15 in Morristown using access management techniques, highway system improvements, and land use planning and regulations. Access management is the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. Its benefits include:

- Improved highway operation by decreasing delays and blocking;
- Improved safety by eliminating conflict points;
- Support for economic development through improved access;
- Support for local land use plans;
- Improved aesthetics and community character by incorporating landscaping, sidewalks, and lighting into design of intersections and driveways; and
- Deferring the need for costly and disruptive roadway projects.

STUDY ORIGINS

This study updates the work completed in the 1993 *VT Route 100 Corridor Study*[1]. The 1993 study recommends a list of roadway and intersection projects designed to address existing geometric deficiencies, safety problems, and congestion hot spots projected for the year 2011 along VT 100 between US 2 and VT 15. The recommendations include adding truck-climbing lanes to rural sections of Route 100, widening of shoulders, installing auxiliary turn lanes at intersections, and installing traffic signals. The plan also recommends the upgrade and expansion of the local roadway network to accommodate local travel needs on alternative routes to Route 100.

The 1993 plan's recommendation that Route 100 remain as a two-lane highway is described as a compromise where a "tolerable" amount of congestion is acceptable during the peak periods in order to avoid the negative social and environmental impacts associated with widening Route 100 to four lanes. The plan further concludes that in order to maintain a tolerable amount of congestion with a two-lane cross section, it will be necessary to use VT Route 100 as efficiently and effectively as possible. Although the 1993 VT 100 Corridor Study recognizes the importance of preserving the function, operation, and safety of Route 100, access management and land use, two of the most important tools available for achieving these goals, are addressed only in general terms. Appendix A contains a summary of the 1993 study and a status report on its recommendations.

This 2004 VT 100 Access Management Study evaluates whether or not the recommendations made in the 1993 study are still reasonable based on current conditions and projected traffic volumes in

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[1] *Vermont Route 100 Corridor Study Final Report;* Prepared by JHK & Associates for the Vermont Agency of Transportation; October 1993.

2025. It differs from the 1993 plan in its focus on access management and land use planning and regulations.

STUDY PROCESS AND ORGANIZATION

This study was a joint effort between the Lamoille County Planning Commission (LCPC) and the Central Vermont Regional Planning Commission (CVRPC) using funds provided through the VTrans Transportation Planning Initiative program. A project advisory committee (PAC) reviewed drafts of project memoranda, and assisted with technical and policy questions, local knowledge, and public outreach efforts. The PAC included town planning staff from all three communities, citizen representatives from conservation and planning commissions, and LCPC, CVRPC, and VTrans planners. The study was completed by Resource Systems Group, Inc. (RSG) and Burnt Rock Inc., Associates in Community Planning (BRI). Public outreach efforts included meetings in all three communities and with the LCPC and CVRPC Transportation Advisory Committees following the assessment of existing conditions to gather early input on issues and concerns. A second round of public meetings will present the results of this document and will be summarized in the final plan.

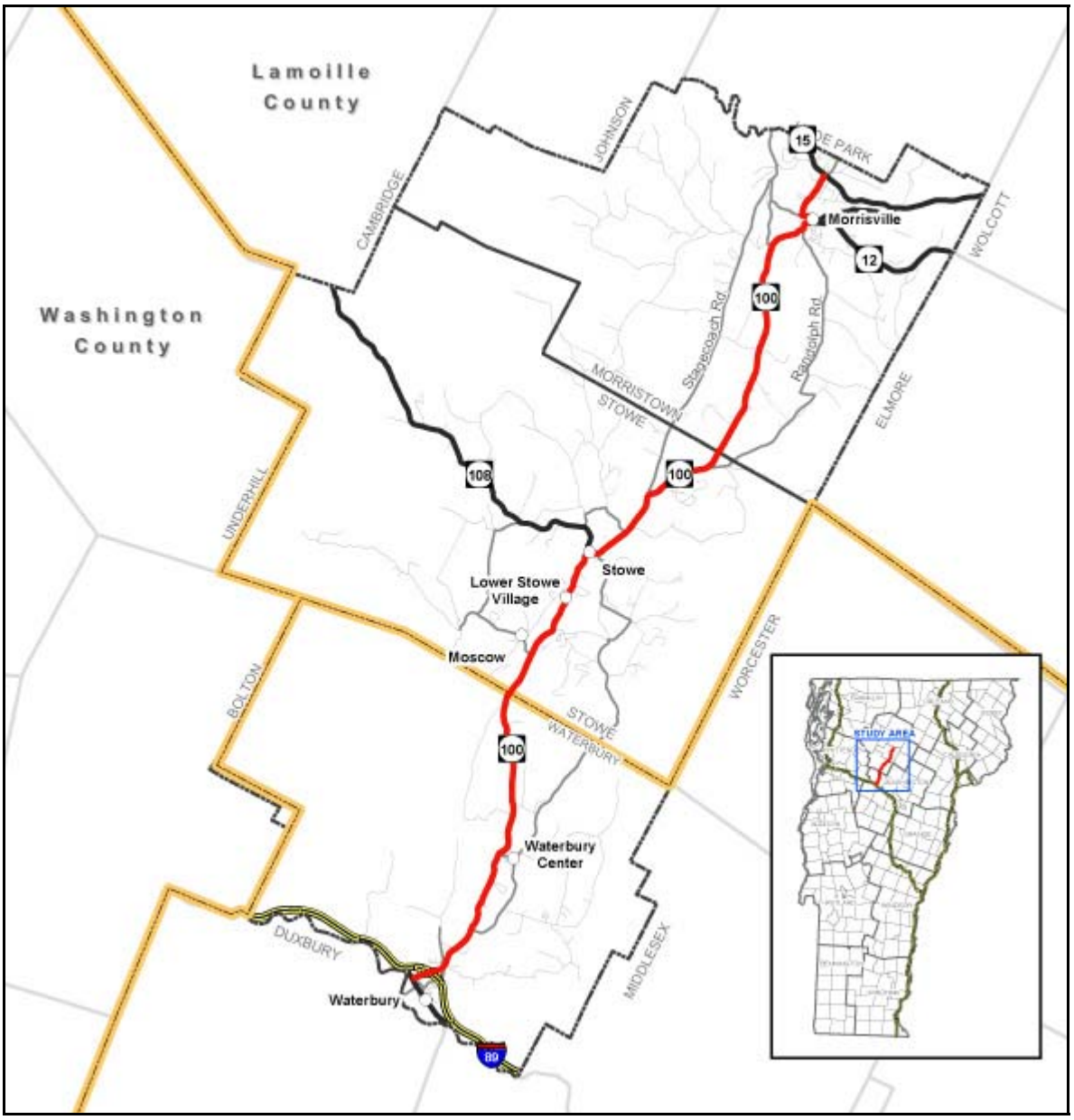
This draft study includes the following major sections:

- Section 1.0 provides and overview of access management concepts and describes state and local access management regulations;
- Sections 2.0 and 3.0 focus on existing land use and transportation system issues and include recommendations to address existing access management deficiencies;
- Section 4.0 summarizes comments from public meetings held throughout the study area;
- Section 5.0 identifies land use, traffic, and access management issues for the year 2025;
- Section 6.0 develops and analyzes alternatives to address the 2025 issues and makes recommendations;
- Section 7.0 presents land use planning and regulation options and recommendations.

STUDY AREA

The study area is shown in Figure 1. It includes VT Route 100 from US 2 (North Main Street) in Waterbury, through Stowe to the VT 100-VT 15 intersection in Morrisville. The study evaluates the intersections of VT 100 with US 2, VT 15, I-89 Exit 10 ramps, all collector roads and several important local streets. The study intersections were selected because they are critical connections between VT 100 and the local highway systems in each town and VT 100 with the statewide and national highway systems.

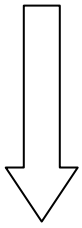
Figure 1: Study Area



SECTION 1.0 – ACCESS MANAGEMENT OVERVIEW

Access management is the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. An effective access management plan is built upon the following principles which extend from the system-wide to location specific levels:

System-wide



Location Specific

- Provide a specialized roadway system based upon mobility for through traffic and access to adjacent land;
- Provide appropriate intersection design, control, and spacing to provide efficient transitions from one roadway classification to another;
- Limit direct access between adjacent land uses and higher speed roads while promoting access between land use and minor, low speed roads;
- Limit or separate the number of conflict points between traffic entering and exiting driveways and streets; and
- Remove turning traffic from through traffic lanes[1].

The Highway Functional Classification System provides the framework for applying the system-wide principles. The VTrans Access Management Classification System and Standards and local land use regulations provide the design standards for applying the location specific principles. The following sections provide a description of these classification systems and their designations within study area.

ACCESS MANAGEMENT: SYSTEM-WIDE CONCEPTS

From a system-wide perspective, access management is concerned with providing a specialized roadway system related to function and providing appropriate transitions from one roadway classification to another. As shown in Figure 2, the study area contains a specialized road network that consists of highways classified as interstate, minor arterials, major collectors, minor collectors, and local streets. These roadways are connected to VT 100 at the study intersections listed in Table 1. The intersections most important to developing an access management plan for VT 100 provide the connections between VT 100 and the statewide system at US 2, VT 15, and I-89 and between VT 100 and the local road system through the collector and local streets. The ability of these intersections to provide safe and efficient connections between the different roadway classifications is an important system-wide access management principle which is analyzed further in this plan.

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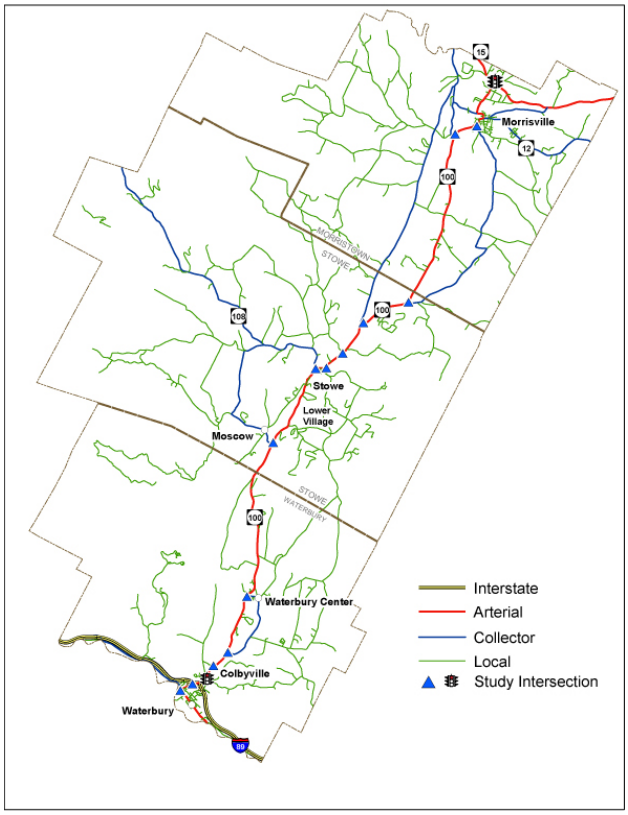
[1] Modified from *Access Management Program Guidelines* (VTrans, 2001) and the *Access Management Manual* (TRB, 2001)

Table 1: Functional Classification of Study Intersections

VT 100 Intersection With:	Connection Between Minor Arterial and:
US 2 (North Main Street)	Minor Arterial
I-89 Ramps	Interstate
Blush Hill/Stowe Street	Local
Laurell Lane/Crossroad	Local
Guptil Road	Collector
Howard Avenue	Local
Moscow Road	Major Collector
VT 108	Major Collector
School Street	Local Street
West Hill Road	Local Street
Stagecoach Road	Major Collector
Randolph Road (north and south)	Minor Collector
Portland/Congress/Main	Major Collector
Bridge Street	Minor Collector
Miller Bridge Road	Local Street
Morristown Corners	Major Collector
VT 15	Minor Arterial

Figure 2: Highway Functional Class

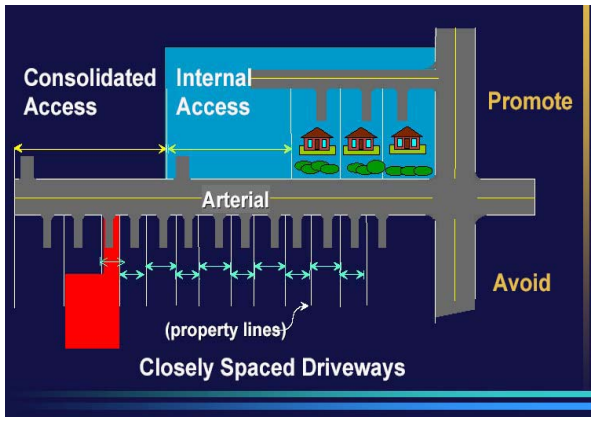


ACCESS MANAGEMENT: LOCATION SPECIFIC DESIGN CONCEPTS

Location specific access management strategies are most concerned with how adjacent property accesses the highway system through proper design and location of driveways. Figure 3 demonstrates many of the following key concepts:

- Promote access through collector roads rather than through higher speed arterials;
- Reduce the number of potential conflict points by:
    - consolidating and sharing driveways,
    - providing adequate separation distance between driveways, and between driveways and intersections, and
    - aligning driveways on opposite side of a road; and
- Remove turning traffic from through traffic lanes.

Figure 3: Location Specific Access Management Concepts



Examples of good and bad location specific access management techniques.

Left turn lane from VT 100 northbound to Ben & Jerry's factory separates through traffic from turning traffic.

REGULATING ACCESS

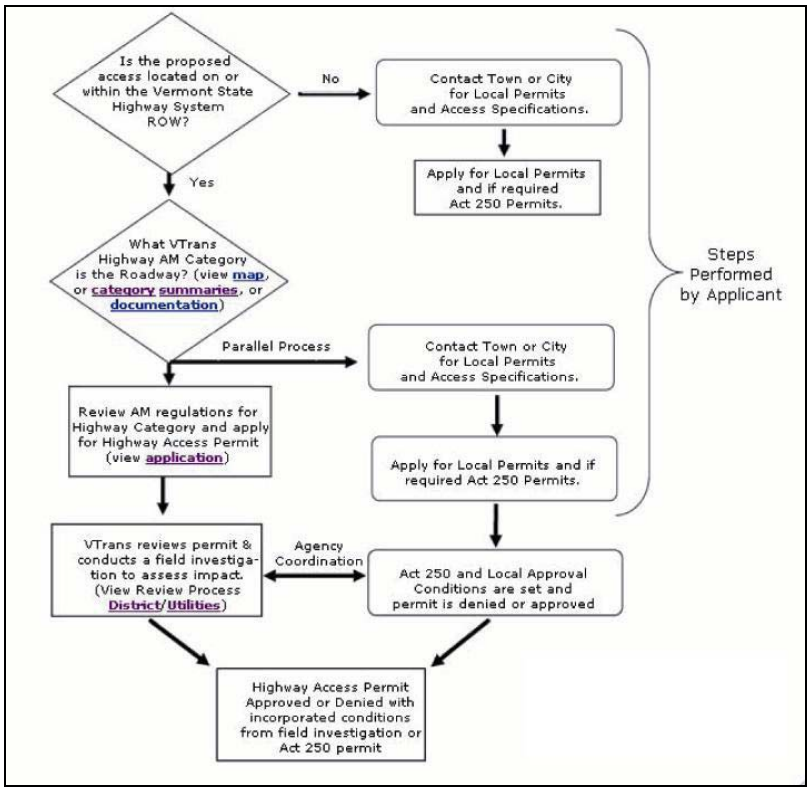
Most of Vermont 100 is owned by the state in the study area. The exceptions, where VT 100 is a Class 1 town highway, and is therefore owned and maintained by the municipalities are located:

- Within the village limits of Stowe - approximately between Cliff Street and ½ way between Cemetery Road and West Hill Road; and
- Within the village limits of Morrisville – approximately between Jersey Way and Herrel Street.

As shown in Figure 4, jurisdiction affects the process for granting access permits. For sections of VT 100 owned by the state of Vermont, an access permit is required by the state and will be issued if the access management guidelines described below are satisfied. However, as a condition of any access permit issued by VTrans, State statutes require compliance with all local ordinances and regulations relating to both highways and land use. As a result the parallel process indicated in Figure 4 is required for development projects seeking access to state highways.

Along class 1 town highways, it is not necessary to obtain an access permit from VTrans, although a local permit is required. VTrans is allowed, however, to invoke joint jurisdiction on Class 1 town highways when necessary to ensure safety and operational standards are not significantly affected by a proposed access or change in highway design.[1]

Figure 4: VTrans Highway Access Permit Process[2]



[1] According to Al Wright, VTrans Utility and Permits Unit, VTrans has only invoked joint jurisdiction once. VTrans invoked joint jurisdiction to require changes in the design of a roundabout on a class 1 town highway in Manchester because the design did not accommodate buses or trucks.

[2] This flowchart can be used interactively on the VTrans Access Management Web Site at www.vtaccessmanagement.info/

VTrans Access Management Classification System and Standards

VTrans has established an Access Management Program that assigns all segments of the State's Highway System into one of six access management categories. The standards provide the basis for access permitting on state highways and are used in the planning and development of VTrans roadway construction projects. Existing highways are not required to meet the design standards. However, the standards are applied to all new access permits and construction projects.

The *Access Management Program Guidelines* have two sections. Section One describes the characteristics of each access category in terms of functional class and average annual daily traffic (AADT) and the associated access management standards. The access management standards, which are summarized in Table 2**,** specify whether or not direct access from the roadway to adjacent property is permitted, the type of driveway design factors to be considered, and type of turning movement allowed (Traffic Operations).

Assuming a permit application satisfies the requirements of Section One, Section Two of the *Access Management Program Guidelines* provides specific geometric standards for driveway width and turning radii, surfacing and pavement markings, need for turn lanes, corner sight distance, spacing between driveways, and corner clearances between driveways and intersections with public streets.

The access management categories within the VT 100 study area are shown in Figure 5 and include:

- Category 1: Interstates – I-89 and its ramps at Exit 10;
- Category 2: Limited or Controlled Access Highways – The vicinity of the I-89 Exit 10 ramps between Blush Hill Road and US 2.
- Category 3: Principal and Minor Arterials – VT 100 from Guptil Road to VT 15 excluding the sections through Waterbury Center, the Village of Stowe, and Morrisville; and
- Category 6: Urban Sections – VT 100 from Blush Hill Road to Guptil Road and the urban/village sections of through Waterbury Center, the Village of Stowe, and Morrisville.

These categories were designated by the Transportation Advisory Committees (TAC) of the Lamoille County and Central Vermont Regional Planning Commissions in consultation with VTrans based on functional classification, average annual daily traffic (AADT), local plans and zoning and existing and future land use.

As shown in Figure 5, most of the VT 100 study area falls within access category three or six. These two categories share the following key provisions:

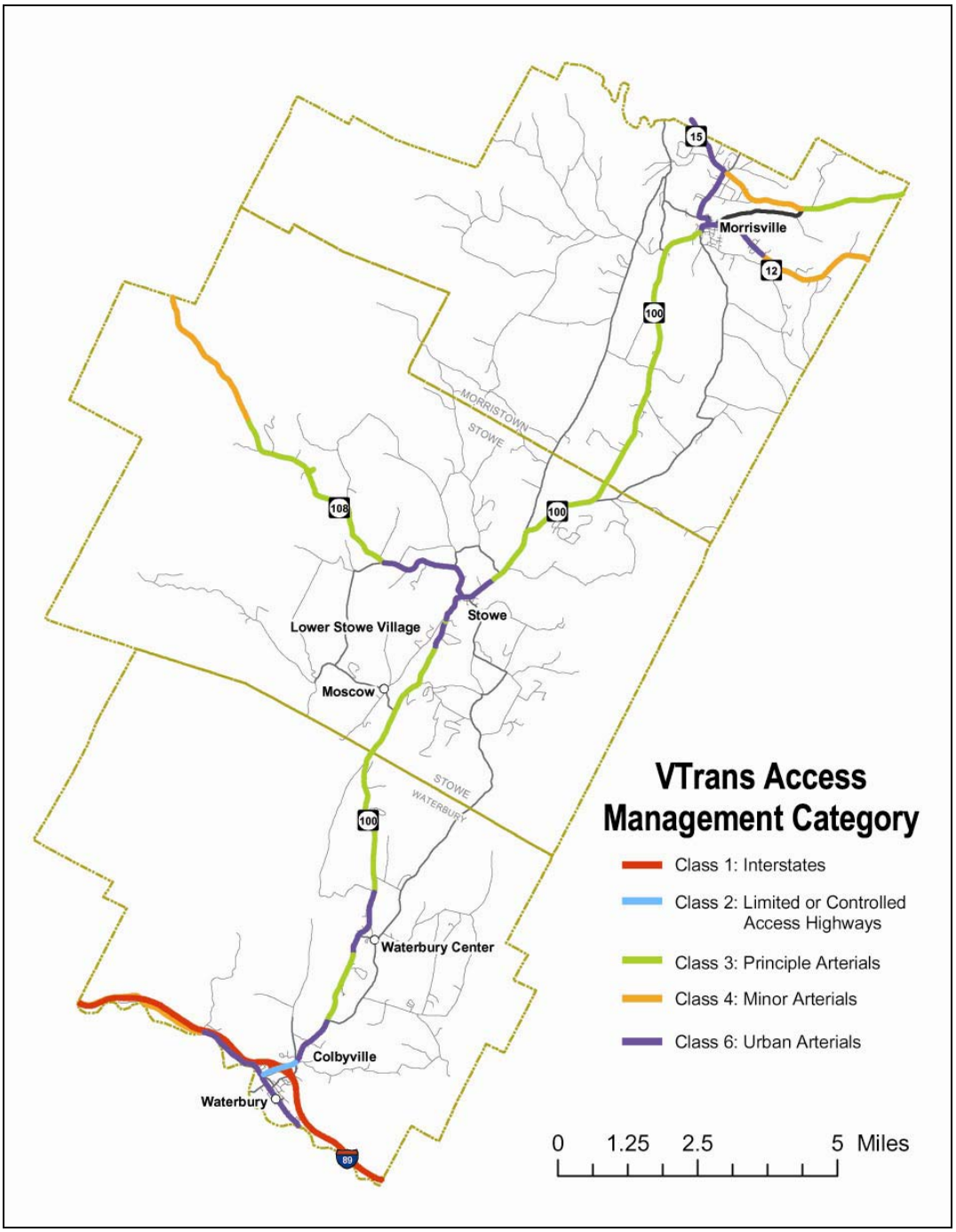
- Private direct access to VT 100 may be denied when a property has the opportunity to access the highway system on a minor street that connects with VT 100;
- If no reasonable options exist, or if the access would cause un-safe or poor operating conditions on the minor street, the property may be granted direct access to VT 100;

- Where direct access is allowed, only one access to the parcel, or to contiguous parcels under the same ownership, is permitted; and
- No additional access points will be allowed if the parcel is subdivided. All access to newly subdivided parcels shall be provided internally from the existing access unless a new access permit is submitted and approved.

Table 2: VTrans Access Management Categories

Access Category	Functional Class and AADT Characteristics	Direct Property Access	Driveway Design Factors	Traffic Operations and Movements Allowed	Design Features
1	- Interstates	No	Not Applicable	Access only provided at Interchanges with public highways	Grade-Separated Interchanges
2	- Other Principal Arterials - Limited Access Major Collectors	No – Except by Access Rights	Number, Spacing and Locations	Access at intersections with public highways	At-Grade or Grade-Separated intersections at ½ to 1 mile intervals
3	- Other Principal Arterials - Minor Arterials (AADT > 5,000) - Non-limited Access Major Collectors on State Highway and Class 1 Town Highways (AADT greater than 5,000)	Deny, Restrict or Allow	Number, Spacing and Locations	May limit turning movements	- Physical Barriers (Medians or Islands) - Traffic signal spacing requirements - Left and/or Right Turn Lanes Required - Spacing of public highway intersections that are or may be signalized (1/4 to ½ mile)
4	- Minor Collectors - Minor Arterials and Class 1 Town Highways (< 5,000 AADT) - Non-limited Access Major Collectors on State Highway and Class 1 Town Highways (Less than 5,000 AADT)	Yes	Number, Spacing and Locations	All turns in & out May limit turning movements	- Spacing of public highway intersections that are or may be signalized (1/4 to ½ mile)
5	- Frontage or Service Road	Yes	Number and location	All turns in and out	- Traffic signal spacing not less than 500 feet.
6	- May have any functional class but are urban in nature.	Deny, restrict, or allow	Number and location		- Traffic signal spacing not less than 500 feet.

Figure 5: VT 100 VTrans Access Management Categories



Local Access Management Regulations

At the local level, roadway access is regulated under subdivision, site plan and/or conditional use review by Planning Commissions, Development Review Boards, or Boards of Adjustment. Table 3 lists the basic access management provisions included within the regulations of the three study area towns.

Table 3: Summary of Local Access Management Provisions

Town	Access Management Provisions	Regulations
Waterbury	▪ 1 Curb cut/development ▪ May limit access to secondary, frontage, or common access roads. ▪ Designation of a portion of a lot as a right-of-way for frontage or a common access road may be required to encourage shared access points with future development ▪ Installation of acceleration or deceleration lanes on the street adjacent to the driveway	Administered through site plan review by Planning Commission or conditional use review by Board of Adjustment
Stowe	▪ 1 Curb cut/development ▪ May limit Access to Secondary Road ▪ May require shared access and connections between adjacent parking areas ▪ Define driveway entrances with curbing ▪ Provide interconnected network of streets within Stowe and Lower Stowe village centers ▪ Access to subdivision limited to one per 1,000 feet of road frontage on state highways ▪ Access to lots created by subdivision shall be only from a permitted access road or driveway consistent with all state and local standards.	Administered through site plan review, conditional use review, and subdivision approval by the Development Review Board.
Morristown	▪ Non-residential driveways must be located at least 75 feet from nearest intersection ▪ Gas and service stations limited to 2 access points ▪ Minimum distance of 125 feet between intersections of a subdivision street network	Administered through site plan review, conditional use review, and subdivision approval by the Development Review Board.

SECTION 2.0 – EXISTING LAND USE CONDITIONS

Land use and development along a road corridor affect access management in two fundamental ways:

- The types, patterns and overall densities of development, controlled largely through zoning and subdivision regulations, determine trip generation rates which affect traffic flow to and from the site; and
- Linear densities of development, controlled through local frontage and access management requirements, determine the number of access points and spacing along the route.

This section presents land use conditions along the corridor, from a visual survey of dominant land use features, a review of local plans and bylaws for the three municipalities, and an analysis of available land use data.

VISUAL INVENTORY

Much of the VT 100 study area has been identified, though not officially designated, as a scenic corridor that passes through several historic villages, forested areas, and open fields and meadows that offer panoramic views of the Green Mountains with the following dominant landscape features:

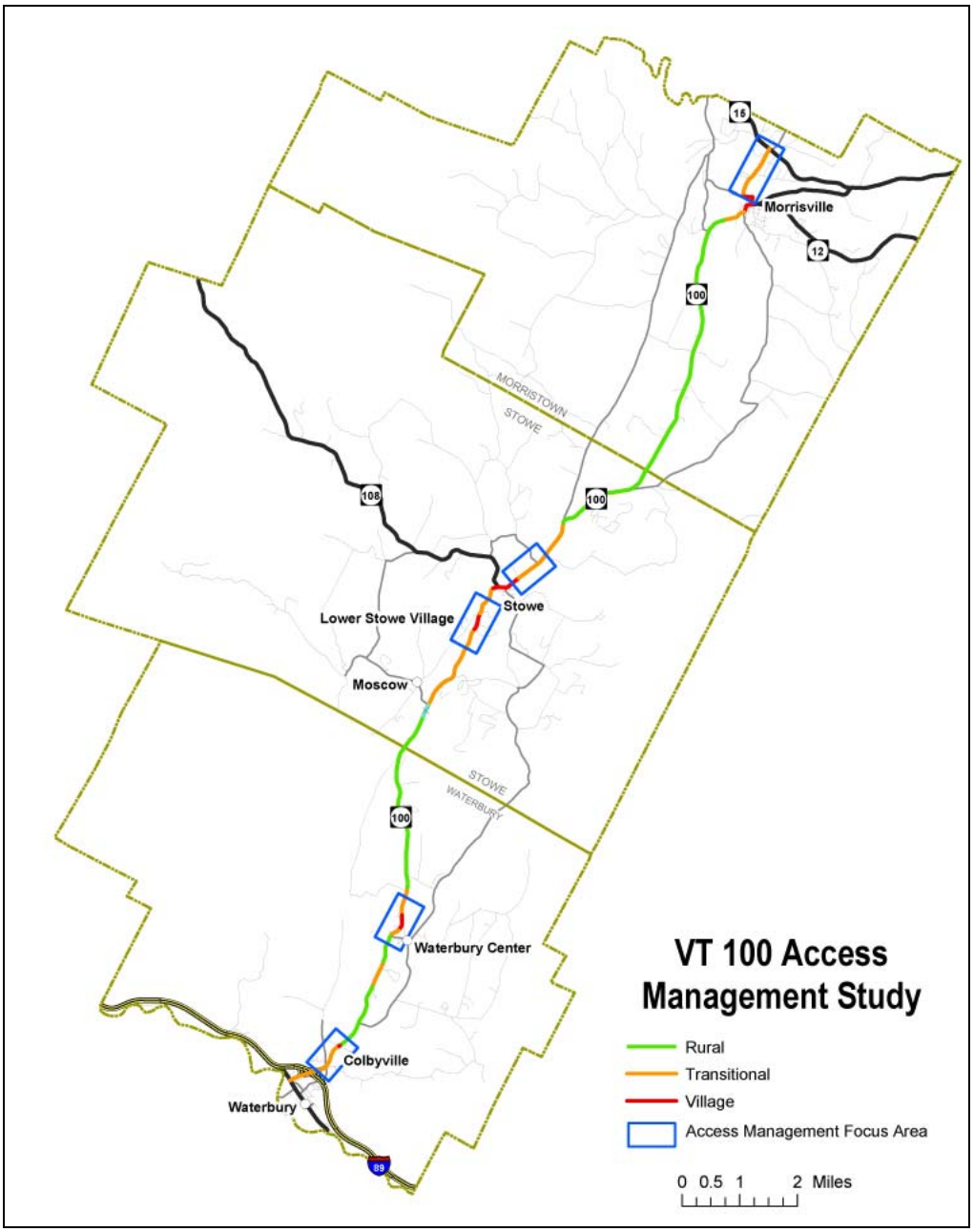
Villages and hamlets – including Colbyville, Waterbury Center, Lower Village, Stowe Village, and Morrisville – which are characterized by higher densities of compact, mixed use development, including residential, commercial, and public uses. Many of these areas are listed on the Vermont register of historic places, and retain much of their historic character. Stowe Village and Morrisville's central business district are also on the National Register of Historic Places.

Rural areas, characterized by extensive open space – including forest land, farm fields and meadows – which in many sections offer panoramic views of the Green Mountains to the west, and in Morristown views of Mount Elmore to the east. These areas include state lands associated with the Waterbury Reservoir, lower densities of residential and limited commercial development, including working farms, scattered residences, home-based businesses, other commercial enterprises typically found in rural areas (e.g., bed and breakfasts, nurseries, snack bars, campgrounds) and the Morrisville-Stowe State Airport.

Transition areas, generally located along Route 100 outside of historic village centers, or in the vicinity of major intersections such as the I-89 interchange at Exit 10, and south of Route 15. These areas, which historically were rural in nature, have been experiencing varying degrees of commercial and, to a lesser extent, residential strip development.

Appendix C includes photos documenting the dominant landscape features in each of these areas.

Figure 6: Dominant Landscape Features



MUNICIPAL PLANS AND BYLAWS

Municipal plans and bylaws for the three towns (including incorporated villages) along the corridor, identified in Table 4, were reviewed to identify specific goals, policies and recommendations concerning land use and development along Route 100, related access management strategies, and implementation to date through local land use regulations.[1]

> *The regional significance of the corridor was firmly cemented – figuratively and literally – when the state constructed Route 100 as a concrete highway in 1932, the same year that the electric trolley from Waterbury to Stowe Village was abandoned.*
>
> *~ Stowe Town Plan, 2003*

Table 4: Municipal Plans and Bylaws Reviewed

	Municipal Plan	Zoning Bylaw	Subdivision Regulations
Waterbury	September 2003 (draft)	March 2001	None
Stowe	December 2003 (draft)	May 2002	February 2002
Morristown	March 2003	June 2002	June 2002

Municipal Plans

The municipal plans for all three towns:

- Recognize the importance of Route 100 as a regional transportation corridor that links I-89 with points north, and serves commuter, tourist, and local traffic;
- Acknowledge the corridor's historic, rural and scenic character, and that Route 100 serves as a gateway to each community;
- Recognize that since the construction of the I-89 interchange, traffic along Route 100 has increased steadily and that Route 100 is being transformed from a rural, residential transportation route to a growing commercial strip, particularly between Stowe and Waterbury; and
- Recommend the use of access management techniques to help manage traffic and functional conflicts, though not necessarily only in relation to Route 100.

Specific plan recommendations for each town regarding land use and access management are summarized in Table 5.

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[1] The municipal plans for Stowe and Waterbury were reviewed in draft form, and have since been officially adopted by the municipalities. The municipal plans reviewed serve as the plans for both the towns, and separately incorporated villages, including Waterbury Village and Morrisville. Stowe Village, included in the Stowe Town Plan, is no longer a separately incorporated village. Zoning and subdivision regulations reviewed also cover both towns and incorporated villages.

Table 5: Summary of Municipal Plan Recommendations

	Route 100 Corridor	Land Use/Development	Access Management
Waterbury	▪ Pursue funding for improvements to Route 100 in Waterbury Center, to improve vehicular and pedestrian safety and mobility, and to enhance commerce and tourism ▪ Create a "Master Plan" for the Route 100 corridor to include designation of "development nodes ▪ Allow for and support development with pedestrian amenities	▪ Preserve open space along Route 100 through the clustering of development ▪ Allow for future development in designated nodes ▪ Amend current zoning to encourage clustering and open space preservation ▪ Evaluate whether current regulations in the Route 100 district are addressing plan goals	▪ Limit accesses off Route 100 for existing and proposed development ▪ Pursue access management strategies to reduce turning movements and improve circulation ▪ Work closely with VTrans to limit access points on Route 100 for existing and proposed development
Stowe	▪ Implement the Route 100 corridor plan ▪ Incorporate traffic calming and pedestrian improvements in village centers ▪ Provide sidewalks in Lower Village ▪ Plan for bike paths along shoulders ▪ Monitor traffic conditions at the Route 100/108 intersection annually ▪ Improve Route 100/West Hill Rd intersection ▪ Evaluate alternatives to improve Route 100/River Road intersection	▪ Consider expanding the Meadowland Overlay District and associated TDR program to include farmland located in the Route 100 corridor ▪ Stowe Village and Lower Village are designated growth centers, encourage high density, mixed use development in these areas, avoid strip development ▪ Work with other communities to support compact settlement, rural landscapes and open space, and prevent sprawl and strip development along Route 100 ▪ Review/coordinate zoning regulations with Waterbury and Morristown to provide a level of consistency for development along the corridor	▪ Continue, through regulations, to carefully control access to public roads
Morristown	▪ Participate in Route 100 corridor planning to address curb cuts, and potential impacts on town roads from changes made within the corridor, including changes to address Stowe's traffic problems	▪ Address the type and amount of development along Route 100 in local zoning ▪ Create a new zoning district for Route 100 to maintain traffic flows, avoid conflicts between the airport and neighboring uses, and conserve the agricultural landscape and protect scenic views ▪ Consider the impact of bypass construction on roads, access	▪ Limit accesses south of village to allow for smooth travel ▪ Future land use decisions must take into account the primary function of the roads which development is accessing ▪ Reference VTrans access management program for state highways

Municipal Zoning and Subdivision Regulations

A total of 21 zoning districts along Route 100 have been identified from available zoning maps. Districts for each town (and incorporated villages) were reviewed for minimum dimensional standards and the number and types of allowed uses. A comparative summary is provided in Table 6. More detailed analyses of regulations for each town is included in Appendix C**.** The information in Table 6 is intended only to provide a general indication of:

- The number and types of zoning districts by town;
- The range in overall densities of development allowed, from minimum lot size requirements;
- The range in linear densities of development allowed (and access separation), from minimum lot frontage or lot width requirements, and
- The variety of development allowed, based on the estimated number of principal uses listed.

As expected, the highest densities and greatest variety of development are allowed within zoning districts that correspond to historic villages and hamlets – including Waterbury Village, Waterbury Center, Stowe Village, the Lower Village, and Morrisville. Minimum lot sizes in these areas typically range from 8,000 to 20,000 square feet, depending on the type of district and the availability of municipal water and/or sewer services. Minimum frontage or lot width requirements are also reduced in relation to lot size. If not already built out, these districts would have the most potential for new access development.

Additional commercial development is allowed along Route 100 in districts within or adjacent to historic downtown and village areas, in moderate density commercial or business park districts. These zoning districts typically have minimum lot sizes of around one acre and may exclude residential uses. They also most closely correspond with the "transitional" areas identified in the initial land use survey, some of which are already experiencing access management problems.

Moderate densities of development are allowed along most "rural" segments of the corridor, as specified for agricultural/rural residential or low to medium density residential districts that follow much of its length. Lot sizes in these districts generally range from one to two acres; minimum frontage requirements vary from 90 to 200 feet. Allowed development is limited largely to agriculture, forestry, low density residential and recreational uses, though Stowe and Morristown also provide for limited lodging and/or resort development.

Waterbury is the only town to specifically designate a Route 100 zoning district, which extends from Waterbury Village to Waterbury Center, and from Waterbury Center to the town border. Allowed development densities in this district are lower – the minimum required lot size is two acres for residential uses and five acres for other types of development. Corresponding minimum frontage requirements range from 200 to 400 feet. Of particular note, a wide variety of development that would presumably benefit from Route 100 frontage is allowed within this district, including residential, commercial, public, semi-public, and light industrial uses.

Waterbury is also the only town to designate two areas of relatively low density development – a Recreation District that appears to coincide with a golf course, and a Conservation District for state lands associated with the Waterbury Reservoir. Both of these districts have ten acre minimum lots sizes, and exclude all but agriculture, forestry, low density residential development and/or recreational uses. The potential for additional access development in these areas is low.

Table 6: Summary of Municipal Zoning Regulations

	Waterbury	Stowe	Morristown
Zoning Districts	Zoning Districts: 7 Village Residential [VR] Village Commercial [VCOM] Route 100 [RT100] Town Neighborhood Commercial [TNC] Town Commercial [TCOM] Conservation-State [CNS] Recreation [REC]	Zoning Districts: 6 Village Commercial [VC-10] Village Commercial [VC-30] Lower Village Commercial [LVC] Village Residential [VR-20] Agricultural/Rural Residential [RR-1] Agricultural/Rural Residential [RR-2]	Zoning Districts: 8 Rural Residential Agricultural [RRA] Business Office Park [BOP] Commercial [COM] Low Density Residential [LDR] Medium Density Residential [MDR] High Density Residential [HDR] Central Business [CBD] Neighborhood Commercial [NC]
Minimum Lot Size	10,000 sq. ft. – 10 acres	10,000 sq. ft. – 2 acres	8,000 sq. ft. – 2 acres
Minimum Lot Frontage/Width	None – 400 ft.	60 ft. – 200 ft.	60 ft. – 90 ft.
Number Principal Uses (#)	13 to 51	17 to 35	14 to 21
Permitted Uses	5 to 21	3 to 4	0 to 12
Conditional Uses	8 to 30	13 to 31	6 to 14

Notes:
1. Listed zoning districts are limited to those districts that border Route 100, as determined from available zoning maps.
2. Minimum lot size provides a general indication of allowed densities of development; however other density requirements may also apply within specific districts, or to particular uses; clustering in planned residential and planned unit development is also generally allowed.
3. Morrisville and Stowe have minimum lot width rather than road frontage standards, which were used to approximate frontage requirements. These give some indication of allowed linear densities of development, and access separation distances.
4. The number of uses is intended to provide a general indication of the variety of development allowed, and the level of review received; most permitted uses, however, are also subject to site plan review. It should be noted that allowed uses are not consistently listed by town or zoning district. For comparison purposes, the number of allowed uses was estimated from principal uses listed for each zoning district; accessory uses were specifically omitted. In addition, Stowe and Morristown allow for uses which are not listed, but are determined to be of the same general character as listed uses.

EXISTING LAND USE

Land uses within the Vermont Route 100 corridor are the result of a number of factors, including physical constraints to development, market conditions, land use regulations and the preferences and decisions of several hundred past and current land owners. The type, location and pattern of

development have helped to define the character of the corridor between Route 2 and Route 15, and are a significant consideration with regard to current and future highway efficiency and capacity.

In the absence of recent land use and land cover data, E-911 and grand list data were used to document land uses along the corridor. Grand list data, however, could not consistently be linked to GIS parcel data in each of the three communities, which limited its use for this purpose. Parcel data were used to determine the pattern of land ownership within the corridor, by zoning district, while land uses were identified using E-911 data.

Single-family dwellings are the dominant land use within the entire corridor, although to a lesser extent in village and transitional areas. The conversion of residential dwellings to commercial uses has occurred throughout the corridor, however, and the continued conversion has the potential to significantly change land use and associated traffic patterns along sections of highway.

Commercial uses are generally concentrated in village/hamlet areas, and to a lesser, but still significant, in transitional areas. Available data do not reveal the number or location of mixed-use structures; however the field inventory suggests that mixed use development is common in established village centers, and that single or mixed use commercial development is prevalent in transitional and rural areas.

The open, rural character of much of the corridor is largely attributable to a relatively small number of large parcels, including existing farms and some forested parcels. Consequently, the subdivision and/or development of a few properties could have a significant impact on the character of the corridor and traffic patterns on Route 100.

Appendix C includes additional detail and maps that show existing zoning and land use for each town.

EMERGING LAND USE PATTERNS

Settlement patterns along certain segments of Route 100 have been changing within the last twenty years, as identified from the visual survey, orthophotos, municipal plans, and from an analysis of available land use data. As expected, the "transitional areas" identified above offer the best examples of emerging settlement patterns along the corridor. These include, but are not limited to, the following corridor segments:

- South of Colbyville in Waterbury;
- South of the Lower Village in Stowe; and
- North of Morrisville to the Route 15 intersection.

These areas are characterized by the conversion of large areas of open land or low density residential development to commercial uses that benefit from the visibility and traffic volumes offered by ready access to Route 100. Such development is allowed, if not encouraged, under current land use regulations. This type of development typically includes commercial shopping centers, retail outlets,

office and industrial parks, and services for the traveling public, and is characterized by large building footprints, expansive parking areas, and potentially multiple access points.

The result is an emerging pattern of auto-oriented, commercial strip development outside of historic villages and hamlets, and at major intersections, which has been identified in all three municipal plans as an undesirable form of sprawl. Given increasing traffic volumes associated with ongoing development in the region, all three towns indicate the potential for additional commercial strip development along Route 100. This is particularly true for key large parcels in the vicinity of historic settlements and major intersections.

There are concerns that this type of development, if left unchecked, could adversely affect the existing rural and scenic character of Route 100, and the vitality of traditional commercial centers. It is also acknowledged that along some road segments, for example in the vicinity of Blush Hill in Waterbury, frontage development has already resulted in traffic congestion, failed intersections, and the need for access, road and traffic control improvements.

All three municipal plans include recommendations for revisions to local bylaws that:

- Concentrate or cluster development in historic villages, growth centers or "nodes;"
- Limit commercial strip development along rural and scenic segments of Route 100; and
- Incorporate stronger access management standards.

EXISTING LAND USE FINDINGS

Municipal Plans and Bylaws

- Waterbury, Stowe and Morristown all have adopted municipal plans that acknowledge the regional transportation function of Route 100, and its historic, rural and scenic character. All three plans include policies to support traditional settlement patterns and to prevent strip development and sprawl along the corridor outside of designated village growth centers or nodes.
- Each of the three municipal plans includes policies to manage access along Route 100 – particularly outside of designated growth areas – as a means of maintaining highway safety and efficiency.
- Waterbury, Stowe and Morristown have each adopted land use regulations that include administrative processes through which highway access may be regulated in accordance with locally adopted standards.
- Existing land use regulations generally predate, and therefore do not necessarily incorporate recently adopted land use and access management policies. For example:
  - The Route 100 District in Waterbury allows for a wide range of commercial uses (albeit at low to moderate densities) that may encourage a pattern of strip development outside of village centers.

  - The Commercial District in Morristown allows for a pattern of strip development outside of the historic village center.

- Stowe's Rural Residential 2 District does not allow for commercial uses typically associated with strip development (e.g., retail sales); however it does allow for moderate densities of residential and limited lodging and resort development along the corridor outside village areas.
- In each of the three communities, the moderate residential densities allowed outside of villages and hamlets – one dwelling per every two acres along most of the corridor – may foster a pattern of residential strip development, especially in conjunction with current frontage requirements.
- Access management provisions included in local regulations vary in their application and level of detail. Only Waterbury has adopted access management requirements that are specific to Route 100.

Existing Land Use

- Single-family dwellings are the dominant land use within the entire corridor, although to a lesser extent in village and transitional areas. The conversion of residential dwellings to commercial uses has occurred throughout the corridor, however, and the continued conversion has the potential to significantly change land use and associated traffic patterns along sections of highway.
- Commercial uses are generally concentrated in village/hamlet areas, and to a lesser, but still significant, in transitional areas. Available data do not reveal the number or location of mixed-use structures; however the field inventory suggests that mixed use development is common in established village centers, and that single or mixed use commercial development is prevalent in transitional and rural areas.
- The open, rural character of much of the corridor is largely attributable to a relatively small number of large parcels, including existing farms and some forested parcels. Consequently, the subdivision and/or development of a few properties could have a significant impact on the character of the corridor and traffic patterns on Route 100.

Emerging Settlement Patterns

- Overall land use patterns are similar in each of the three municipalities along the length of the corridor. Generally, the historic pattern of village centers and hamlets connected by a rural highway corridor is still present. However, strip development – a linear, automobile-oriented development pattern dominated by commercial uses – has emerged along several sections of Route 100, especially adjacent to existing village centers and, to a lesser extent, along once rural highway segments that are not contiguous to historic villages.

SECTION 3.0 EXISTING HIGHWAY SYSTEM CHARACTERISTICS AND PERFORMANCE

This section describes general highway, traffic and travel characteristics in the study area; describes existing access management deficiencies and possible solutions for seven focus areas,; and identifies congestion and safety issues.

GENERAL HIGHWAY CHARACTERISTICS

Route 100 is a two lane highway throughout most the study area. The typical cross section outside of the built-up areas of Stowe Village and Morrisville consists of twelve-foot travel lanes and shoulders that vary from one to four feet wide with speed limits from 40 to 50 miles per hour (See Figure 7). The exceptions include:

- The interchange area between US 2 and Blush Hill Road where long merge lanes to and from the off-ramps create three and four lane cross sections; and
- A one-thousand foot section of VT 100 located between Blush Hill Road and Colbyville that has a three lane cross section consisting of two travel lanes and a center two-way left turn lane.

Within Stowe Village and most of Morrisville, the cross section includes two travel lanes with curbs, green strips, sidewalks, and on-street parking. Speed limits vary from 25 to 35 miles per hour. Intersections with local streets are much more frequent and there is a high density of commercial and residential driveways.

Within the small village sections of the study area at Colbyville, Waterbury Center, and Lower Stowe Village, VT 100 continues as a two-lane highway with shoulders (See Figure 8). These small village areas include a mix of residential and commercial land uses with direct access to VT 100. There are typically no curbs, sidewalks, or green strips through these areas. A 40 mile per hour speed limit is common through these sections.

Figure 7: VT 100 North of Stagecoach Road

Figure 8: VT 100 through Waterbury Center

There are two signalized intersections in the study area at VT 100 with Blush Hill Road and Stowe Street in Waterbury and VT 100 with VT 15 in Morrisville. A traffic signal is planned at the driveway of the proposed Shaws located approximately eight-hundred feet north of the Blush Hill Road intersection. The intersection of VT 100 with VT 108 in the center of Stowe Village is controlled by an all-way stop. All other intersections are controlled with a stop sign on the side street approach or approaches to VT 100.

TRAVEL PATTERNS

Traffic Volumes

Table 7 on the following page provides the Annual Average Daily Traffic volumes (AADT) along the corridor for locations where data are available. AADT is the average number of vehicles that travel on a given road during a day (twenty-four hours) for a given year. AADT includes weekdays and weekends. Not surprisingly, traffic volumes are highest in the vicinity of the I-89 interchange at the southern end of the study area. North of the interstate, traffic volumes are somewhat consistent with a couple of exceptions. Traffic volumes increase between Laurell Lane and Guptil Road, and then decrease north of Guptil Road. This change occurs because Guptil Road is a collector street that collects and distributes local traffic to and from VT 100. The same dynamic occurs at Stagecoach Road which connects southbound local system traffic to VT 100.

Origins and Destinations

Table 8 on the following page presents the results of an origin and destination survey conducted for the *1993 VT 100 Corridor Study*. The survey was conducted on a Wednesday in October of 1991. Although the data are now over ten years old, they are still helpful in understanding the overall

function of VT 100. The vast majority of trips on VT 100 in the study area begin and/or end somewhere in the corridor (defined as "local" trips). A smaller percentage of trips pass completely through the corridor. These data underscore VT 100's role in (1) serving travel within the corridor for and between the people and businesses located there and (2) linking the corridor to the statewide system which ultimately makes the people and businesses accessible to the rest of the world.

Table 7: VT 100 Average Annual Daily Traffic for the Year 2002

Section	2002 AADT
Between I-89 Ramps	14,500
Howard Ave & Gregg Hill Road	10,700
Laurell Lane & Guptil Rd	12,300
Moscow Rd to River Road	10,900
VT 108 & School Street	11,000
School Street & Stagecoach Road	11,200
Stagecoach Rd to Morristown Corners Rd	6,900
Bridge Street to VT 15	10,700

Table 8: Local and Through Trips in the VT 100 Corridor in 1991

	Morning		Afternoon	
	Local Trips	Through Trips	Local Trips	Through Trips
South of Stowe	54.4 %	45.6%	63.2%	36.8%
North of Stowe	71.7%	28.3%	63.6%	36.4%

Historical Traffic Growth

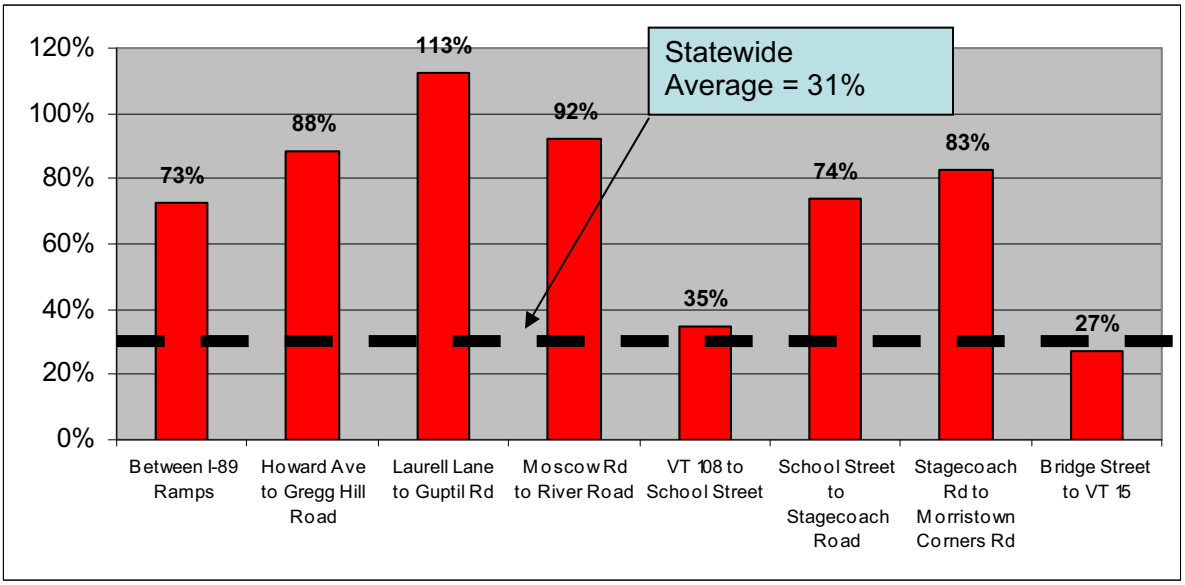
Figure 9 shows the percent change in traffic volumes from 1982 to 2002 at specific locations along the corridor.

Figure 9 indicates that:

- Traffic growth is higher in the VT 100 study area than the statewide average for rural and primary roads of 31%[1];
- Traffic is growing faster south of Stowe Village; and
- Traffic is growing faster on the rural and small village sections of the study area and slower in the larger areas of Stowe Village and Morrisville.

[1] *Continuous Traffic Counter Grouping Study and Regression Analysis Based on 2003 Traffic Data,* Vermont Agency of Transportation

Figure 9: Traffic Growth along the VT 100 Corridor 1982 to 2002



EXISTING ACCESS MANAGEMENT ISSUES

RSG conducted a field inventory and assessment of areas with concentrations of commercial driveways in September 2003 along VT 100 from US 2 in Waterbury to VT 15 in Morrisville. Existing deficiencies were concentrated within the areas shown in Figure 10. These sections include:

1. Blush Hill Road/Stowe Street to north of Colbyville
2. In the vicinity of the Cabot Creamery Annex and Shops, East Wind Drive, and McNeil Dr.;
3. Waterbury Center;
4. Lower Stowe Village;
5. Stowe Village from School Street to West Hill Road;
6. North of Stagecoach Road; and
7. Brooklyn Street – Bridge Street to VT 15.

Appendix B identifies specific issues within each of the seven focus areas using orthophotos. Sketch plans have been developed for each focus area to delineate potential solutions to the identified deficiencies. In instances where recommendations for improvement have been made in previous plans, those elements were carried forward into these conceptual drawings and noted accordingly.

The issues were identified based on the following screening criteria taken from the *Access Management Program Guidelines* and other literature:

- ***Adequate spacing of public highway intersections that are currently or may be signalized.*** If traffic signals are necessary along a major road, their spacing will greatly affect its ability to efficiently serve through traffic at a desired speed. The spacing requirements are significantly different for the two access categories in the study as follows:
    - Category 3: - ¼ to ½ mile
    - Category 6: Minimum of 500 Feet

  Under existing conditions, spacing between traffic signals is not an issue because there are only two traffic signals in the study area, at the VT 100 intersections with Blush Hill Rd/Stowe Street and with VT 15, are on opposite ends of the corridor.
- ***Limit direct access from adjacent parcels to VT 100.*** No more than one access point should be provided from VT 100 to an individual parcel or to contiguous parcels under the same ownership. If the parcel is adjacent to a local street that intersects with VT 100, access to that parcel should be eliminated from VT 100 and provided at the local street. (as long as the relocated access would not cause safety or operational problems on the local street).
- ***Well defined edges and proper access width.*** Driveways should be designed with clearly defined borders that safely channel traffic from the street to parking area. Wide open curb cuts cause confusion by mixing entering and exiting traffic, creating additional conflict points, and often obscuring sidewalks.
- **Adequate spacing between driveways**. Adequate distance to allow the distance and time necessary for drivers to react to vehicles entering and exiting a driveway. There are currently no national standards for driveway spacing. In the Bennington Access Management Guidebook, completed by RSG for the Bennington County Regional Planning Commission in 1997, a review of national literature found that driveway spacing guidelines ranged from 150 to 200 feet. VTrans uses the lower limit of the AASHTO stopping sight distances listed in **Error! Reference source not found.** as a guideline for driveway spacing. RSG considered both the VTrans guidelines and the general guideline of 150 to 200 feet in identifying sections with inadequate driveway spacing.

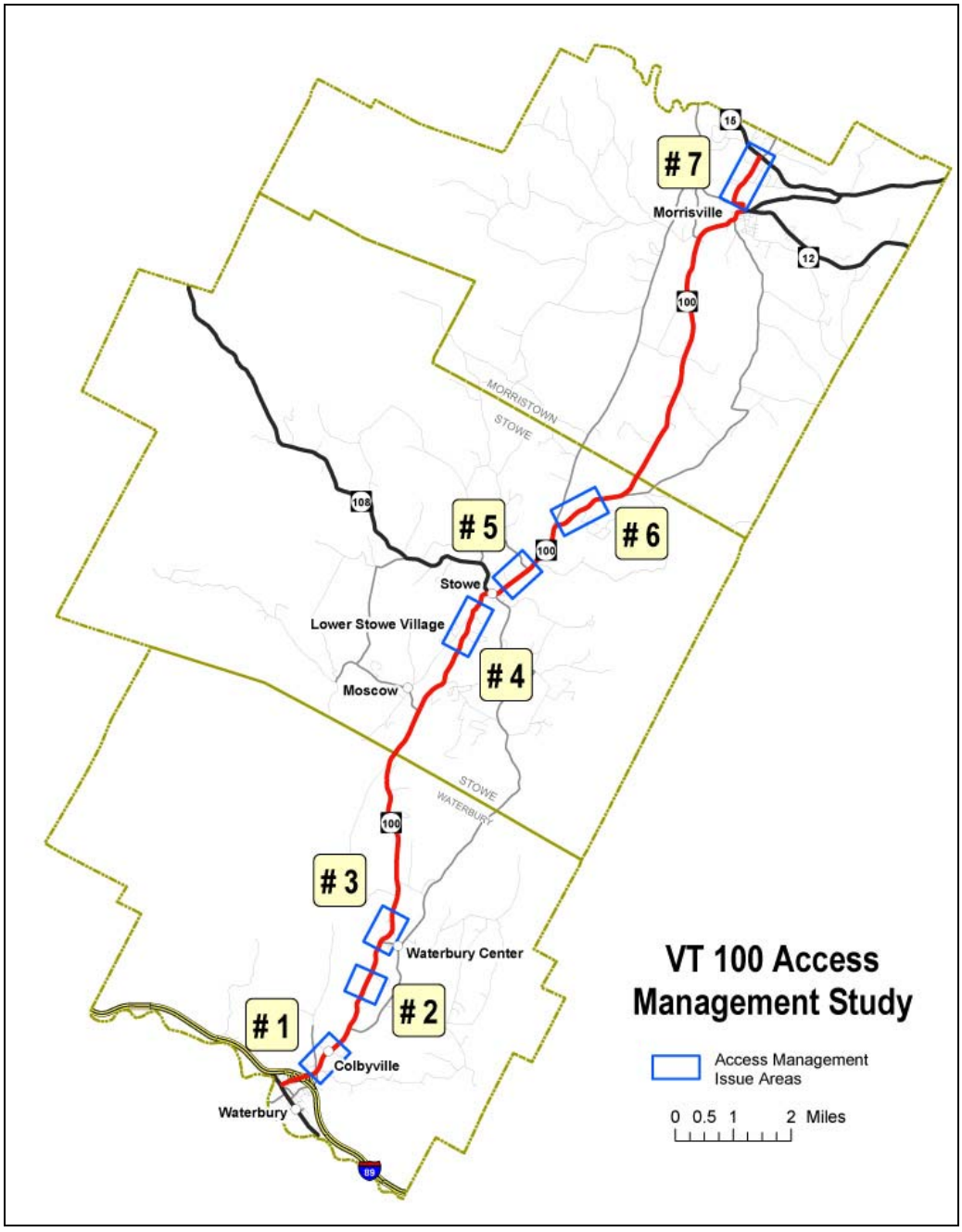
Table 9: Unsignalized Driveway Spacing Guidelines[1]

Posted Speed or Design Speed (MPH)	Unsignalized Access Spacing (Feet)
20	125
25	150
30	200
35	225
40	275
45	325
50	400
55	450

- **Adequate corner clearance between driveways and major intersections.** Traffic entering and exiting driveways that are located too close to the functional area of an intersection cause serious traffic conflicts. An intersection's functional area is where vehicles accelerate and decelerate, maneuver between turn and through lanes, and form queues while waiting to pass through. The size of a functional area will vary at each intersection based on lane configurations, traffic signal timings ,and traffic volumes. Corner clearance distance recommended in the *Access Management Program Guidelines* vary from 75 feet to 230 feet depending on (1) whether or not the driveway is located on an entering or exiting approach to an intersection; and (2) the turning movement allowed at the driveway.

[1] *Vermont Agency of Transportation Access Management Program Guidelines*; July 2000; page 29.

Figure 10: Existing Access Management Focus Areas



CONGESTION

Providing efficient transitions from one roadway classification to another is a key principle of access management. The transition is provided by the study intersections that connect the local and collector streets to VT 100 and connect VT 100 to the statewide system at US 2, VT 15, and I-89 at Exit 10.

A key input to measuring congestion is traffic volumes through intersections and along road segments. Intersection turning movement counts were performed at each of the study intersections by VTrans on various dates from 1999 to 2002. These counts were adjusted to the design hour volume (DHV) for 2003. The design hour volume is defined as the 30th highest hour of traffic over the course of the year and is, as its name implies, used for the analysis and design of highway facilities. Appendix F contains traffic volumes for the study intersections.

Level of Service (LOS)

Level of Service (LOS) is the standard measure used to quantify the operational performance of intersections and road segments as perceived by the driver. The grades A, B, C, D, E and F are the five possible LOS ratings. An LOS A indicates that the facility is operating exceptionally well with free flow, while an LOS F indicates that demand exceeds capacity and the facility is failing. There is almost universal agreement that levels of service A, B and C are acceptable and LOS F is not. Whether or not LOS D is acceptable depends on the location of the intersection or road segment in question. On rural highway facilities where speeds are often higher and drivers expect a higher level of mobility, LOS D may not be acceptable. In urban areas and activity centers where drivers expect and are accustomed to greater delays, an LOS D is often wide spread and considered acceptable. In some cases, LOS E may be acceptable in urban areas and activity centers.

The VTrans policy on level of service is:

- LOS C is desirable for rural facilities;
- LOS D is desirable for urban facilities; and
- LOS E or F may be permitted in an urban setting if the remedy, such as adding new lanes, would significantly impact the surrounding natural or built environment.

Intersection Level of Service

Level of service for both signalized and stop-controlled intersections is measured in terms of average delay per vehicle. The delay, referred to as control delay, includes the time required to slow down when approaching an intersection, the time a vehicle is stopped, the time required for a line of vehicles (the queue) to move up to the intersection, and the time required to accelerate. Table 10 presents the relationship between LOS and control delay.

Table 10: Relationship between Level of Service and Delay for Intersections

LOS	Characteristics	Stop-Controlled (Seconds)	Traffic Signal (Seconds)
A	Little or no delay	< 10	< 10.0
B	Short delays	> 10 and < 15	> 10 and < 20
C	Average delays	>15 and < 25	>20 and < 35
D	Long delays	> 25 and < 35	> 35 and < 55
E	Very Long delays	> 35 and < 50	> 55 and < 80
F	Extreme delays	> 50	> 80

Table 11, Table 12, and Table 13 present LOS for each lane of each study intersection for the 2003 DHV in Waterbury, Stowe, and Morristown respectively. Inefficient transitions currently exist between the local and collector road system and VT 100 at the following locations:

- LOS E for left turn from Stagecoach Road;
- LOS F for left and right turns fro West Hill Road;
- LOS E or F for several movements at VT 108;
- LOS E from Moscow Road;
- LOS F for left and right turns from Guptil Road;
- LOS F for left and right turns from Laurel Lane; and
- LOS F for vehicles exiting Stowe Street.

Inefficient transitions currently exist between VT 100 and the statewide arterial and interstate system at the following locations:

- LOS F for left and right turns from I-89 Exit 10 northbound off Ramp;
- LOS F for left turns from I-89 Exit 10 southbound off Ramp; and
- LOS F for left turn from VT 100 southbound to US 2 eastbound.

Table 11: 2003 Intersection LOS – Waterbury

	2003 PM Peak Hour			
Study Intersection	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**
VT 100 - US 2				
EB LTR - US 2	A	8	0.11	0.38
WB LT - US 2	A	8	0.00	0.00
SB LT - VT 100	F	100+	1.64	93.60
SB R - VT 100	B	12	0.29	1.24
VT 100 - I-89 SB Ramps				
EB L - I-89 Ramps	F	100+	1.58	83.43
EB R - I-89 Ramps	B	14	0.34	1.56
VT 100 - I-89 NB Ramps				
WB L - I-89 Ramps	F	100+	0.80	7.68
WB R - I-89 Ramps	F	100+	1.10	35.10
VT 100 - Blush Hill Rd				
Overall	**C**	**21**		
EB LTR - Blush Hill Rd.	C	29	0.45	53.00
WB LTR - Stowe St.	F	100+	1.13	108.00
NB L - VT 100	A	3	0.24	10.00
NB TR - VT 100	A	8	0.78	441.00
SB L - VT 100	B	11	0.66	181.00
SB TR - VT 100	A	4	0.53	196.00
VT 100 - Laurel Lane				
NB LTR - VT 100	B	11	0.02	0.05
SB LTR - VT 100	B	11	0.02	0.05
WB LTR - Laurel Lane	F	89	0.12	0.41
EB LTR - Crossroad	F	97	0.20	0.74
VT 100 - Guptil Road				
SB LT - VT 100	B	11	0.02	0.05
WB LR - Gutpil Road	F	100+	1.43	28.40
VT 100 - Howard Avenue				
SB LT - VT 100	A	9	0.01	0.02
WB LR - Howard Ave	C	24	0.15	0.52

Hihglights LOS E or F

Table 12: 2003 Intersection LOS – Stowe

	2003 PM Peak Hour			
Study Intersection	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**
VT 100 - Moscow Road				
NB LTR - VT 100	A	8	0.09	0.28
SB LTR - VT 100	A	8	0.00	0.00
WB LTR - Driveway	C	24	0.01	0.03
EB LTR - Moscow Road	E	36	0.39	1.82
VT 100 - VT 108				
Overall	**F**	**85**		**
EB LR - VT 108	E	35		**
NB L - VT 100	C	18		**
NB T - VT 100	F	215		**
SB T - VT 100	C	24		**
SB R - VT 100	B	14		**
VT 100 - School Street				
WB LT - VT 100	A	9	0.07	0.24
NB LR - School Street	C	21	0.50	2.91
VT 100 - West Hill Road				
NB LT - VT 100	A	9	0.07	0.22
EB - LR - West Hill Road	F	100+	1.41	41.28
VT 100 - Stagecoach Road				
EB LT - VT 100	A	9	0.18	0.65
SB L - Stagecoach Road	E	38	0.04	0.11
SB R - Stagecoach Road	B	11	0.15	0.52

Hihglights LOS E or F

** Vehicle queues not estimated for all-way stops

Table 13: 2003 Intersection LOS – Morristown

Study Intersection	2003 PM Peak Hour LOS	Delay (Seconds)	v/c	95% queue (Feet)
VT 100 - Randolph Road				
SB LT - VT 100	A	9	0.00	0.00
WB LR - Randolph Road	C	19	0.14	0.49
VT 100 - Miller Bridge Road				
NB LT - VT 100	A	9	0.06	0.18
EB LR - Miller Bridge Road	B	13	0.22	0.86
VT 100 - Morristown Corners Road				
NB LT - VT 100	A	8	0.00	0.00
EB LR - Morristown Corners Rd	C	17	0.17	0.60
VT 100 - Randolph Road				
SB L - VT 100	A	8	0.02	0.06
WB L - Randolph Road	B	15	0.09	0.30
WB R - Randolph Road	A	10	0.06	0.18
VT 100 - VT 15				
Overall	**B**	**15**		
EB LT - VT 15	B	12	0.39	101.00
EB R - VT 15	B	13	0.56	37.00
WB LTR - VT 15	B	17	0.69	163.00
NB L - VT 100	B	17	0.70	260.00
NB TR - VT 100	A	9	0.19	25.00
SB LTR - Business	A	8	0.02	0.00

Hihglights LOS E or F

Two-Way Rural-Road Segment Level of Service

Level of service for two lane highways has been determined in accordance with Chapter 20 of the 2000 Highway Capacity Manual. This methodology is not applicable within the sections of VT 100 passing trough the village and highway commercial areas. It is only appropriate for the rural sections of highway where speeds are posted between 45 and 50 miles per hour.

A key factor in calculating LOS for two lane segments is whether or not the highway is assumed to be Class I or Class II facility. As defined by the 2000 Highway Capacity Manual, motorists expect high speeds on Class I highways. Class I highways are primary arterials and major intercity routes that provide primary links in the state and national highway systems. Class I facilities serve longer trips but also serve commuter traffic.

Class II highways are facilities on which motorists do not necessarily expect a high level of speed. Class II facilities serve scenic or recreational routes and may pass through rugged terrain. They serve relatively short trips and connect with Class I facilities. VT 100 is assumed to be a Class II facility in the LOS results presented below because it is clearly a scenic and recreational route; provides a link to the national and state highway facilities; and, as indicated in the origin-destination survey completed in 1993, local, and therefore, shorter trips account for a significant amount of traffic on VT 100. LOS for Class II highways is measured in terms of the percent of time vehicles spend following other vehicles as shown in Table 14.

Table 14: LOS Criteria for Two-Lane Highways in Class II

LOS	% Time Spent Following
A	< 40
B	40-55
C	55-70
D	70-85
E	> 85

The key inputs include traffic volumes, shoulder and lane width, terrain type (level, rolling, mountainous) directional split, percentage of trucks, percentage of no-passing zone, the number of access points per mile, the posted speed, and traffic volumes.

As indicated in Table 15, existing LOS is D along the rural road segments between I-89 in Waterbury to Stagecoach Road in Stowe.

Table 15: 2003 PM Peak Hour Rural Road Segment LOS Results

	2003			
Segment	LOS	V/C	% Time Spent Following	Avg. Travel Speed
1. Guptil Road to Howard Road	D	0.42	77%	37.0
2. North of Waterbury Center to Moscow Road	D	0.36	73%	39.3
3. Moscow Road to south of Lower Stowe Village	D	0.37	74%	26.9
4. West Hill Road to Stagecoach Road	D	0.37	75%	21.0
5. Stagecoach Road to Randolph Road	C	0.24	63%	35.9
6. Randolph Road to Morristown Corners Road	C	0.29	67%	38.0

SAFETY

Table 16 and Table 14 summarize the total number of crashes that were reported along VT 100 between 1997 and 2001 at the study intersections and road segments respectively. Crash reports are filed by the Vermont State Police when a fatality or incapacitating injury is involved, and/or property damage equals or exceeds $1,000.

In order to put these numbers into perspective, the number of crashes is divided by the number of vehicles passing through each intersection and road section. The result is a crash rate which can be compared to all other intersections and road sections on the state system. An intersection or road section is identified as a high accident location (HAL) when the actual crash rate (crashes per million

vehicles) exceeds a critical crash rate. The critical rate varies by functional class and is calculated using the most recent statewide averages that are developed by VTrans.[1]

As shown in Table 16, none of the intersections are identified as high accident locations. There are however, several road segments identified as high accident locations as follows:

- In Stowe, between River Road and Highland Avenue;
- In Stowe between Stagecoach Road and Randolph Road;
- In Morrisville between Randolph Road and Bridge Street; and
- In Morrisville between Bridge Street and VT 15 (Brooklyn Street).

Table 16: Study Intersection High Accident Location Analysis *(Listed South to North)*

Intersection Name	Total Crashes	Actual Crash Rate (Crashes per Million Vehicles)	Critical Crash Rate (Crashes per Million Vehicles)	Actual Rate Divided By Critical Rate	Potential HAL?	Study Area Ranking
US 2 & VT 100	5	0.29	0.80	0.37	No	8
VT 100 - I-89 Southbound Ramps	2	0.12	0.81	0.15	No	12
VT 100 - I-89 Northbound Ramps	1	0.05	0.77	0.06	No	16
VT 100 - Blush Hill Road - Stowe Street	6	0.28	0.76	0.37	No	7
VT 100 - Laurel Lane - Crossroad	3	0.17	1.39	0.12	No	14
VT 100 - Guptil Road	2	0.11	0.79	0.14	No	13
VT 100 - Howard Avenue	0	0.00	0.90	0.00	No	17
VT 100 - Moscow Road	6	0.64	0.94	0.69	No	5
VT 100 & VT 108	2	0.13	1.42	0.09	No	15
VT 100 - School Street	5	0.47	1.56	0.30	No	9
VT 100 - West Hill Road	10	0.69	0.84	0.82	No	3
VT 100 - Stagecoach Road	9	0.74	0.87	0.84	No	2
VT 100 - Randolph Road	2	0.22	0.94	0.23	No	10
VT 100 - Miller Bridge Road	7	0.83	0.96	0.86	No	1
VT 100 - Morristown Corners Road	6	0.74	0.97	0.76	No	4
VT 100 - Randolph Road	2	0.31	1.77	0.17	No	11
VT 100 & VT 15	8	0.53	0.83	0.64	No	6

In general, accident rates are higher in the northern section of the study area and lower in the central and southern sections. With the exception of the section between River Road and Highland Avenue in Stowe, the actual to critical crash ratios drop significantly for all road segments south of Randolph Road. The section of VT 100 along Brooklyn Street between Bridge Street and VT 15 is ranked as the worst location in the study area. This section of VT 100 serves a commercial area and is characterized by numerous driveways.

[1] VTrans recently released average statewide crash rates based on 1998-2002 data. These average rates provide a reasonable benchmark for this study, which utilizes crash data from 1997-2001 - a comparable time period.

In addition to evaluating crash rates, the type and cause of crashes should be evaluated with the purpose of identifying any regular crash patterns. Over 70 percent of access-related crashes involve left turning vehicles[1]. Examples include:

- Left turn-broadside between a vehicle turning left into a driveway and vehicle turning left out of a driveway
- Left turn/Right turn opposite direction collision – A vehicle turning left from the highway into a driveway crashes into a vehicle turning right into the same driveway from the opposite direction; and
- Rear end collisions – A through vehicle crashes into the rear end of vehicle slowing down or stopping before making a left turn from the highway to the driveway.

Other access-related crashes include:

- Rear end collision – A through vehicle crashes into the rear end of vehicle slowing down before making a right turn from the highway to the driveway;
- Right turn broadside – A vehicle traveling through on the highway collides with a vehicle exiting a driveway

The crash data readily available from VTrans do not provide sufficient detail to evaluate the manner and cause of crashes. Over 60% of the crash causes in the study area fall under the "other" category. While a significant number of crashes are related to rear-end collisions, the data are not specific enough to determine whether or not poor access design was a factor.

FINDINGS: EXISTING TRANSPORTATION AND ACCESS MANAGEMENT CONDITIONS

General Issues:

- Traffic growth is slowing but is faster than statewide average rates for similar types of facilities.
- The vast majority of trips on VT 100 in the study area begin and/or end somewhere in the corridor (defined as "local" trips). A smaller percentage of trips pass completely through the corridor. These data underscore VT 100's function as a minor arterial which must

  (1) Serve travel within the corridor for and between the people and businesses located there; and

  (2) Link the corridor to the statewide system which ultimately makes the people and businesses accessible to the rest of the world.

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[1] Access Management Manual, Figure 1-6, page 10.

System-Wide Access Management Issues:

- Inefficient transitions currently exist between the local and collector road system and VT 100 at the following locations:

    - LOS E for left turn from Stagecoach Road;
    - LOS F for left and right turns fro West Hill Road;
    - LOS E or F for several movements at VT 108;
    - LOS E from Moscow Road;
    - LOS F for left and right turns from Guptil Road;
    - LOS F for left and right turns from Laurel Lane; and
    - LOS F for vehicles exiting Stowe Street..

Inefficient transitions currently exist between VT 100 and the statewide arterial and interstate system at the following locations:

- LOS F for left and right turns from I-89 Exit 10 northbound off Ramp
- LOS F for left turns from I-89 Exit 10 southbound off Ramp
- LOS F for left turn from VT 100 southbound to US 2 eastbound
- As a minor arterial, VT 100 should provide a reasonable level of mobility. VTrans policy suggests that LOS "C" is appropriate along rural facilities. Many of VT 100 rural road sections in the study area are currently operating at LOS D.

Locations with Specific Access Management Issues:

Existing locations where driveways do not meet access management design guidelines are concentrated in the seven areas listed below. Deficiencies include inadequate spacing between driveways and intersections, inadequate spacing between driveways, lack of well defined edges, and multiple access points for individual parcels. Many opportunities exist to improve access at these areas by consolidating driveways, providing cross connections between adjacent parcels, and relocating access from VT 100 to side streets for corner parcels.

1. Blush Hill Road/Stowe Street to north of Colbyville
2. In the vicinity of the Cabot Creamery Annex and Shops, East Wind Drive, and McNeil Dr.;
3. Waterbury Center;

4. Lower Stowe Village
5. Stowe Village from School Street to West Hill Road
6. North of Stagecoach Road; and
7. Brooklyn Street – Bridge Street to VT 15.

SECTION 4.0 PUBLIC MEETINGS

LOCAL AND REGIONAL CONCERNS MEETINGS

Five local and regional concerns meetings were held throughout the corridor in January and February of 2004 to gather input on the first phase of the study. Meetings were held on:

- January 27, 2004 - with the Central Vermont Regional Planning Commission Transportation Advisory Committee;
- January 28, 2004 - with the Lamoille County Regional Planning Commission Transportation Advisory Committee;
- February 9, 2004 - with the Stowe Planning Commission;
- February 17, 2004 - with the Morrisville Planning Commission; and
- February 19, 2004 - with the general public, business owners, and town officials at the Thatcher Brook Elementary School in Waterbury.

The first two meetings were held at the regularly scheduled meetings of the Transportation Advisory Committees (TAC) to the regional planning commissions. The TACs are responsible for updating and maintaining regional transportation plans, providing input to VTrans on regional transportation priorities, and advising the regional planning commissions on technical aspects of transportation. The TACs also provide a forum for coordinating transportation needs and projects across town boundaries. The Stowe and Morrisville meetings were conducted at regularly scheduled planning commission meetings while the Waterbury meeting was a general public forum held specifically for the purpose of gathering input on this study.

The consultants summarized the study purpose and scope of work, provided an explanation of access management and its benefits, and presented detailed information on the assessment of existing land use and transportation issues in the study area. Meeting participants were invited to comment on the analysis of existing conditions and to provide feedback on access management issues. A complete list of comments from all meetings is provided in Appendix D.

COMMON THEMES

- *Need for improved coordination between the VTrans access permit process and municipal development permitting process:*

  Along the section of VT 100 owned by the State of Vermont, which includes the entire corridor except for class 1 town highway sections in Morrisville and Stowe, an access permit from VTrans is required for new driveways, or for modifications to existing driveways. Municipal access approval from the local legislative body (selectboard, trustees) is required for class 1 town highway sections. State and local access approval, however, by statute must also be consistent with local zoning and

subdivision regulations (19 VSA §1111). These regulations typically also include access management provisions. This presents issues of overlapping jurisdiction, and the need for coordination prior to and during local and state permitting processes. Options to improve coordination and review between VTrans or the local legislative body, and the local planning commission, board of adjustment and/or development review board, need to be further identified.

- *Need for better communication and coordination on issues related to VT 100 between the towns of Waterbury, Stowe, and Morristown:*

  VT 100 is a critical transportation asset to all three communities. Decisions made in one town can impact the efficiency and safety of VT 100 and therefore affect all towns in the corridor. Regional planning commissions provide a forum for discussing and addressing cross-town issues. However, Waterbury, which is the gateway to the VT 100 corridor, is in a different regional planning commission than Stowe and Morristown.

  Establishing a transportation management association (TMA) should be considered in the corridor. TMAs are private, non-profit, member-controlled organizations that provide transportation services in a particular area[1]. TMAs provide an institutional framework for addressing transportation issues and often focus on Transportation Demand Management Programs[2].

- *Need to enhance and improve bicycle and pedestrian facilities:*

  The need for and importance of bicycle and pedestrian facilities was raised at every meeting. Bicycle travel along the corridor is an important recreational resource and tourist attraction. Bicycle facilities should be provided along VT 100 and incorporated into paving and other improvement projects whenever possible. Access management improvements are also beneficial to bicycle and pedestrian travel. Limiting curb cuts reduces potential conflicts and reconstruction projects designed to address access management problems can often incorporate sidewalks and bike lanes.

- *Concern about implementation of projects recommended in the 1993 VT 100 Corridor Plan:*

  The limited number of projects recommended in the 1993 study that have been implemented over the last ten years was a concern raised at all meetings. There should be clear responsibly for project implementation (project champions) in the corridor. Opportunities and strategies beyond the VTrans project development process are necessary.

- *Neutral reaction to access management:*

  There were no strong negative or positive views stated about access management. This lack of intense reaction is important to note because implementation of access management techniques through the state and local permit processes may be viewed as restrictive or burdensome. This

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[1] Victoria Transport Policy Institute, TDM Encyclopedia. http://www.vtpi.org/tdm/tdm12.htm.

[2] Examples of TDM programs include carpool/vanpool incentives, staggered work schedules and flex time, ridesharing programs including guaranteed ride home, transit subsidies, and bike/walk incentives

neutral reaction may be due to the lack of specific recommendations at this time, recognition that access management techniques are usually flexible, or recognition that access management techniques are reasonable and benefit land owners and travelers.

DRAFT PLAN PUBLIC MEETINGS

The September 13, 2004 draft of this plan was presented at planning commission meetings in Morristown (September 21, 2004), Waterbury (September 23, 2004) and Stowe (October 4, 2004). Meeting minutes from each meeting are contained in Appendix D.

Comments include:

- Concern related to the impact of traffic signals on through traffic;
- Mixed support for roundabouts;
- Concern over how the four lanes recommended for VT 100 between Blush Hill and Colbyville would transition back to a two-lane cross-section and how that transition would affect safety;
- The owner of the mobile station and convenience store located directly south of the future entrance to Shaws in Waterbury had a specific concern with the conceptual access management design shown Figure E-5 in the Executive Summary. He stated that the design would limit truck access and may discourage customers traveling southbound from stopping at his store and asked that it be revised.

SECTION 5.0 FUTURE LAND USE, TRAFFIC, AND ACCESS MANAGEMENT ISSUES

This section analyzes the effect of future year development on the operation and safety of VT 100. A twenty-year planning horizon has been assumed, which corresponds approximately to the year 2025. The number of new dwelling units and amount of commercial space that could occur over the next twenty years on parcels adjacent to VT 100 has been estimated based on emerging settlement patterns, zoning, and physical and natural constraints. The amount of traffic generated by the twenty-year land use scenario is estimated and combined with regional background traffic growth and traffic from developments along or near the study area that are anticipated in the near term but are not yet built. The 2025 land use scenario also produced an estimate of the number of potential new driveways based on existing regulations. Level of service analysis results are presented for the study intersections and rural road segments based on 2025 traffic volumes and the number of new driveways. The impact of the new driveways on safety is also estimated.

FUTURE LAND USE SCENARIOS

Development for parcels with direct access to VT 100 was estimated for build-out and twenty-year scenarios. The build-out scenario provides some insights into how current regulations and physical constraints may affect long term development along VT 100. While the build-out estimate is useful

in understanding overall trends, the twenty-year scenario provides the information necessary to identify near-term impacts and potential solutions. Estimates are presented for the number of new residential units, residential driveways, and commercial square footage and units for the following road segments:

- Segment 1 - Guptil Road to Howard Avenue;
- Segment 2 - North of Waterbury Center to Moscow Road;
- Segment 3 - Moscow Road to Sylvan Park Road;
- Segment 4 – West Hill Road to Stagecoach Road;
- Segment 5 – Stagecoach Road to Randolph Road (south end); and
- Segment 6 – Randolph Road to Morristown Corners Road.

Frontage parcels located within these districts comprise approximately 3,220 acres (82% of the total study area). The remainder of the parcels fronting VT 100 lie within the existing village centers. Land use projections within the village centers of Colbyville, Waterbury Center, Stowe Village, and Morrisville were not developed because the parcels fronting VT 100 in these areas can accommodate only a negligible amount of new development under existing regulations.

Development potential outside of the village centers was evaluated taking into consideration regulatory constraints (e.g., zoning) and physical site limitations (e.g., wetlands). Site features that do not pose a regulatory constraint (e.g., primary agricultural soils) were not used to reduce anticipated future development density. Development potential was evaluated based upon three factors: (1) potential additional frontage lots; (2); potential additional highway accesses (curb cuts); and (3) potential additional development units. Potential development was quantified as residential dwelling units in predominately residential districts (Stowe and Morristown) and as both dwelling units and commercial units in mixed-use districts (Waterbury). Results and comments are presented below. Appendix E provides a detailed methodology.

Full Build-out Projections

Total development potential was estimated for parcels fronting upon Route 100 and located within the following three zoning districts: Route 100 District (Waterbury), Rural-Residential-2 District (Stowe) and the Rural-Residential/Agriculture District (Morristown). In addition to the general assumptions described above, it must be noted that build-out estimates typically provide a general indication of development potential under current regulations and physical conditions. No consideration was given to current or projected market conditions or landowner desires. In addition, the analysis is based upon the most recent grand-list and GIS data available. Consequently, the estimates should only be considered as a general indication of development potential – not an accurate indicator of anticipated development within a foreseeable time horizon.

Table 17 presents the residential build-out estimates for each of the six road segments. In Stowe, current subdivision regulations place greater restrictions on the number of driveways that may serve newly created lots fronting upon Route 100. Consequently, the total number of new driveways is considerably lower than the potential number of new frontage lots in that town.

Estimates of commercial space are summarized for highway segments 1 and 2 in Table 18. The commercial build-out was limited to Waterbury for several reasons, including:

- The greater mix of allowed commercial uses, including those that are commonly associated with automobile-oriented development patterns (e.g., retail, restaurant), than is the case in the RR-2 District in Stowe and the RR-A District in Morristown;
- The zoning district's boundaries, which are more consistent with commercial strip zoning than either the Stowe or Morristown districts, which are generally more consistent with rural-residential zoning; and
- Commercial development activity over the past 10+ years which has occurred within the Route 100 corridor in Waterbury outside of designated commercial centers to a greater degree than in Stowe and Morristown.

Table 17: Residential Build-out Estimates

Segment	Existing Driveways	Potential New Driveways	Potential Total Driveways (based on zoning)[1]	Existing Residential Units	Potential New Residential Units	Potential Total Residential Units (based on zoning)[2]
1	30	60	88	34	90	124
2	55	78	124	56	162	213
3	32	10	27	34	90	121
4	39	4	33	46	35	79
5	43	9	41	52	58	105
6	96	251	340	111	578	670
Total	**295**	**412**	**653**	**333**	**1013**	**1312**

[1] Potential total driveways under zoning does not account for pre-existing conditions (e.g., parcels served by multiple-driveways). Thus, the total assumes all lots will be in compliance with zoning, thereby under estimating the actual potential total.

[2] The estimate for total potential dwelling units is slightly below the actual number of existing dwellings plus the potential number of new units due to several pre-existing parcels occupied by multi-family dwellings, duplexes or accessory apartments. These estimates are based on one single-family dwelling per each two (2) acres, which effectively under estimates the total potential residential build-out under current zoning.

Table 18: Commercial Build-out Estimates

Segment	Existing Commercial Units	Potential New Commercial Units	Potential Total Commercial Units (based on zoning) [1]	Existing Commercial Footprint Sq. Ft.	Potential Commercial Footprint Sq. Ft. (based on zoning) [1]
1	11	45	46	44,020	661,500
2	11	70	76	34,720	1,027,246
Total	**22**	**115**	**122**	**78,740**	**1,688,746**

Full Build-out Projections: Findings and Conclusions

Despite the limitations inherent in estimating future development, the following conclusions may be gleaned from the data summarized in Table 17 and Table 18.

1. Under current zoning regulations, there is significant development potential within the corridor. The number of dwelling units could conceivably quadruple in number over the entire length of the corridor, while the amount of commercial space along the corridor in Waterbury could increase twenty-fold.

2. With the exception of conservation easements placed on a few large farm-parcels, development constraints are relatively limited within the corridor. Therefore, local land use regulations, coupled with market conditions and landowner desires, will likely have a much greater influence on future development trends than physical constraints.

3. Substantial potential exists for commercial development along the Route 100 corridor in Waterbury. While commercial development potential in Stowe and Morristown was not addressed, it is noteworthy that both towns allow limited commercial and community activities (e.g., resource extraction, lodging, private clubs) within their respective rural residential districts. The lack of build-out projections for such uses should not imply that no commercial activity will occur along the corridor in those towns within the foreseeable future.

4. The greatest potential for residential development – in terms of both frontage lots and dwelling units – is along Section 6 from Randolph Road to Morristown Corners Road (not surprising as this is the both the least developed and longest road segment). The least amount of development potential exists within the shorter, more densely developed road segments in Stowe (segment #3 through segment #5).

5. Stowe's current regulatory policies limiting the number of driveways to one per every 1,000 linear feet of frontage along Route 100, if consistently enforced, will likely be very successful in limiting the number of future driveways with direct access to Route 100;

6. Past land conservation efforts have significantly reduced the development potential, and corresponding number of potential driveways, within the corridor; and

7. Substantial potential for residential development exists along the Route 100 corridor in Morristown. When combined with the 90 feet minimum frontage requirement in the RR/A

District, this could potentially result in a significant increase in the number of frontage lots and driveways with direct access to Route 100.

Twenty-year Development Projections

Considering past trends, and recent development activity, an average annual rate of residential development of 1.3% in Waterbury and Morristown and 3.0% in Stowe was used to estimate the twenty-year development scenario. As with full build-out estimates, this projection is meant to illustrate a reasonable rate of development based on historic precedent. The 20 year residential development scenarios for each of the six segments is presented in Table 19.

Commercial development scenarios were based upon the average annual increase in commercial space (measured as the building footprint) experienced during the 1990s within both Segment #1 (10%) and Segment #2 (12%) in Waterbury. This scenario is presented in Table 20.

Table 19: Twenty-Year Residential Development Scenarios

Segment	Existing Driveways	Potential New Driveways	Potential Total Driveways	Existing Residential Units	Potential New Residential Units	Potential Total Residential Units
1	30	7	37	34	8	42
2	55	14	69	56	21	77
3	32	19	51	34	20	54
4	39	23	62	46	27	73
5	43	25	68	52	31	83
6	96	24	120	111	28	139
Total	**295**	**112**	**407**	**333**	**135**	**468**

Table 20: Twenty-Year Commercial Development Scenarios

Segment	Existing Commercial Units	Potential New Commercial Units	Potential Total Commercial Units	Existing Commercial Footprint Sq. Ft.	Existing Total Commercial Sq. Ft.	New Commercial Footprint (Sq. Ft.)[1]	New Commercial Total Sq. Ft.	Total Potential Commercial Sq. Ft.
1	11	9	20	44,020	52,800	50,898	61,077	113,877
2	11	9	20	34,720	41,660	36,143	43,371	85,031
Total	**22**	**18**	**40**	**78,740**	**94,460**	**87,041**	**104,448**	**198,908**

[1] Total new commercial square feet is estimated by applying the existing ratio of 1.2 square feet of total commercial floor area within the district for every 1.0 square feet of commercial building footprint.

When reviewing Table 20 it should be noted that the amount of actual commercial space, as measured as the total square footage of all occupied floors, is greater than the existing or potential commercial space measured as building footprint. Presently, 78,740 square feet of commercial building footprint exists in the district, although those buildings encompass approximately 94,460 square feet of total commercial space. This relatively low ratio of total square footage to building footprint (1.2:1) is consistent with a general tendency of highway oriented commercial development to be comprised predominantly of single-story buildings. However, attempts to predict the impact of the commercial space on roads or other facilities should be based on total square feet.

Twenty-Year Projections: Findings and Conclusions

1. Based upon past trends, residential development may be expected to be spread relatively evenly over the corridor, with a somewhat higher rate of growth expected in Stowe. Market conditions, however, could significantly alter this expectation. Highway segments located exclusively in Stowe – especially #4 and #5 – are the most densely developed of the six segments and have the least amount of total development capacity. Segment #6, however, has significant development potential. The extent to which Stowe will maintain its historically high rate of housing development, and the impact that regional growth pressure will have on areas such as Morristown with direct highway access and large areas of developable land, is at best uncertain.
2. Housing development in the three communities consists of small-scale, incremental land subdivision and construction, as well as less frequent medium to large scale housing developments on single parcels. A relatively small number of landowners could conceivably develop the total number of dwellings projected over the 20 year period in a single year.
3. Commercial development projections are based upon recent trends characterized by a combination of relatively small (2,000 square feet – 9,000 square feet) new commercial buildings and additions to existing buildings. As with the residential development scenarios, a single landowner could, under current zoning, exceed the entire 20 year projection with a single project. Furthermore, as traffic increases on Route 100 it is reasonable to expect that market conditions will increasingly favor commercial activities that rely on high traffic volumes, thereby increasing the rate of commercial development beyond historical trends.

FUTURE TRAFFIC VOLUMES

Traffic volume estimates for 2025 include the following three components:

1. Background traffic growth;
2. Trip generation from anticipated but not yet built development along or near the study area; and
3. Trip generation from the twenty year development scenario which includes an estimated increase in dwelling units and commercial space in parcels with road frontage on VT 100 as described in the previous section.

Background Traffic Growth

Background traffic growth accounts for the estimated increase in traffic volumes even if no development occurred within the study area. Because traffic growth along VT 100 has not been consistent with statewide average trends, the growth factors specific to the VT 100 study shown in Table 21 were developed using historical count data along the study area. Appendix E provides more detail on the methodology.

Table 21: Background Traffic Growth for Study Area (2004 to 2025)

Description	2004 to 2025 Background Traffic Growth
Stowe Village (VT 100-VT 108 Intersection)	28%
VT 100-VT 15 Intersection	46%
All Other Sections Between US 2 and VT 15	50%

Traffic from Anticipated Development

Table 22 lists the development projects which are anticipated but not yet built along or near the study area. Figure 11 shows the approximate locations. These developments were identified with assistance from the planners in Morrisville, Stowe, and Waterbury. There are no significant developments currently under consideration in Morristown.

Traffic generated by the new development was distributed to the VT 100 corridor in proportion to the existing traffic patterns. For Shaws and the Stowe Mountain Resort projects, the trip generation and distribution were taken directly from the traffic impact studies prepared for the local and Act 250 permit review processes. The trip generation for the other projects was estimated using rates from the Institute of Transportation Engineer's (ITE) *Trip Generation Manual 7th Edition*.

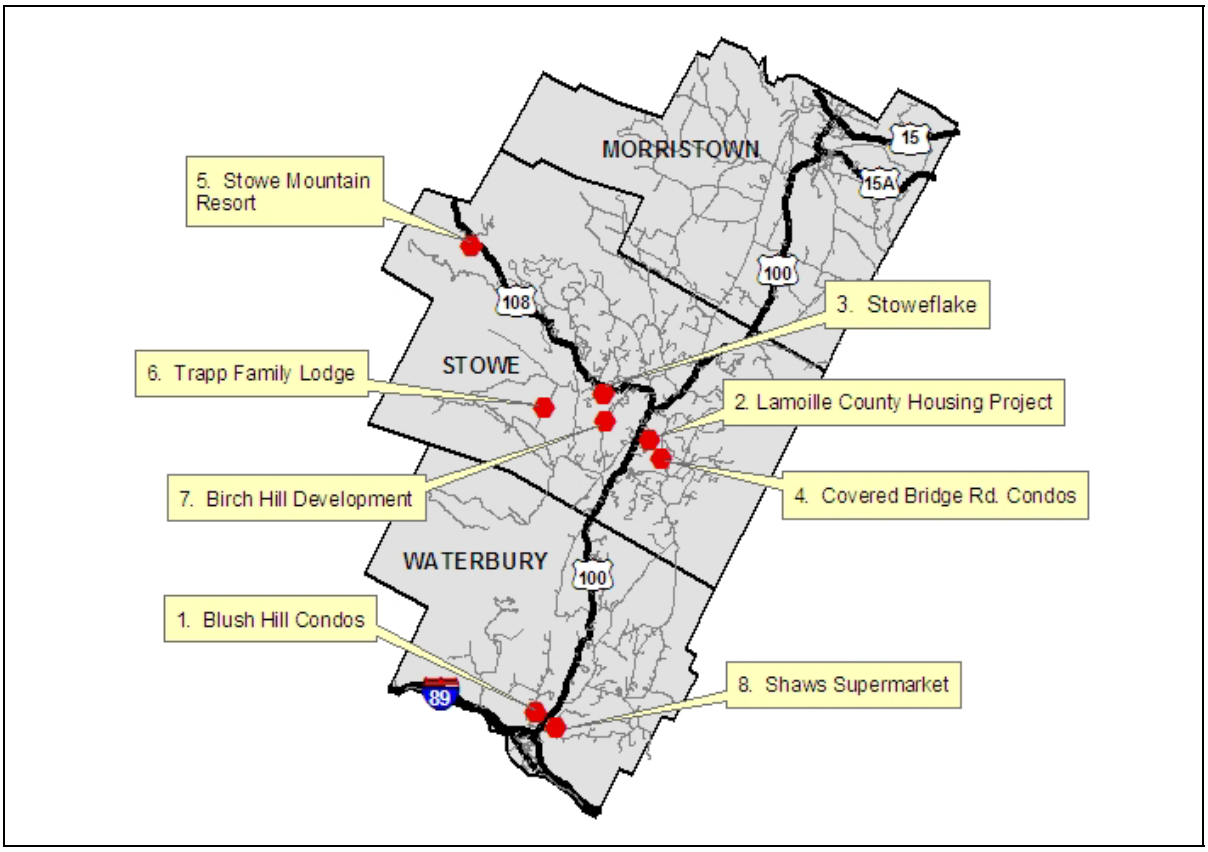
Table 22: Trip Generation Estimate from Anticipated Development

Project (See Figure 7 for Location)	Number of Units	*Commercial Uses (Square Feet)*	ITE Trip Gen Description and Code	ITE Trip Gen Rate	PM Peak Hour Trips Added to Highway Network		
					Total	In	Out
1. Blush Hill Condos	50	0	Residential Condominium (230)	0.52	26	17	9
2. Lamoille Housing Partnership	30	0	Apartment (220)	0.62	19	12	7
3. Stoweflake	50	0	Resort Hotel (330)	0.49	25	11	14
4. 30 Condos off Covered Bridge Rd.	30	0	Residential Condominium (230)	0.52	16	10	5
5. Stowe Mountain Resort	467	40,375	Resort Hotel and Commercial Hamlet	See Note 1	152	25	127
6. Trapp Family Lodge	40	0	Luxury Condominium (233)	0.56	22	5	17
6. Trapp Family Lodge II	45	0	Luxury Condominium (233)	0.56	25	6	19
7. Birch Hill Development	100	0	Single Family Detached (210)	0.67	67	44	23
8. Shaws Supermarket	0	56,000	Supermarket	See Note 2	398	203	195

Note 1:Trip generation estimate from "Traffic Impact Analysis of the Proposed Stowe Mountain Resort 2000 Plan - Revised, 6/10/99" and " Addendum to Traffic Impact Analysis of the Proposed Stowe Mountain Resort 2000 Plan, 6/15/99"; Resource Systems Group.

Note 2: Trip generation estimate from "Shaws Supermarket Waterbury, Vermont Traffic Impact Study"; Lamoureux & Dickinson; February 12, 2003. Includes adjustment for pass-by trips.

Figure 11: Approximate Location of Anticipated but-not-yet-built Development Projects



Traffic from Twenty-year Land Use Scenario

The vehicle trip generation rates from ITE's *Trip Generation Manual 7th Edition* shown in Table 23 were applied to twenty-year growth projections of dwelling units and commercial space for parcels with direct access to VT 100. All of the dwelling units are assumed to be single-family detached housing. The commercial space was assumed to be specialty retail which is defined in the *Trip Generation Manual* as follows:

…small strip shopping centers that contain a variety of retail shops and specialize in quality apparel; hard goods; and services, such as real estate offices, dance studios, florists and small restaurants.

Table 23: Average Trip Generation Rates Use Applied to 20 Year Development Projections

Description	ITE Land Use Code	ADT Rate	PM Peak Hour Rate	Units
Single Family Detached Housing	210	9.57	1.01	Per Dwelling Unit
Specialty Retail	814	44.32	2.71	Per 1,000 SF

Table 24 shows the resulting vehicle trip generation estimate throughout the day and during the PM peak hour. The table shows the amount of new traffic added to the highway. Commercial uses often attract customers from traffic that is already passing by the site as well as customers that may be making a special trip for the goods and services offered. To account for this dynamic, it is common traffic engineering practice to eliminate the pass-by trips from the overall traffic added to a highway by new commercial development. The adjustment for pass-by trips is shown in Table 24 and eliminates double counting of trips that were traveling the roadway even before the commercial development was added.

Table 24: Trip Generation Estimate for Households and Commercial Uses Projected Along VT 100

VT 100 Section	New Dwelling Units	Commercial Uses (Square Feet)	Pass-By Trip Reduction	Trip Generation - New Trips Added to VT 100			
				ADT	Total PM	PM - In	PM - Out
Guptil Road to Howard Road	8	61,077	45%	1,292	82	38	45
Waterbury Center to Moscow Road	21	41,371	50%	1,123	78	38	39
Moscow Road to Sylvan Park Road	20	0	0	191	20	13	7
W. Hill Road to Stage Coach Road	27	0	0	258	27	17	10
Stage Coach Road to Randolph Road	31	0	0	297	31	20	12
Randolph Road to Morristown Corners Road	28	0	0	268	28	18	10
Total Study Area				3,429	267	143	124

The traffic generated above was distributed to the study intersections and road segments in proportion to existing traffic patterns.

Summary of 2025 Traffic Volumes

Table 25 shows how traffic from background growth, anticipated development, and the 20 year growth estimated for parcels adjacent to VT 100 affects the total traffic volume entering each study intersection. Traffic volumes are projected to increase by an average of 54% through the study area intersections. The percent increase range from a low of 38% at the VT 100-VT 108 intersection in the center of Stowe Village to a high of 88% at the VT 100-Moscow Road intersection. Traffic volume increases are lowest in Stowe Village because the background growth rate is much lower. Traffic volume increases are highest at Moscow Road because it is impacted by 20 year corridor growth, traffic from anticipated development as well as background traffic growth.

The predominant force behind the projected traffic increases along VT 100 is background growth. It accounts for 87% of the projected overall traffic growth in the corridor. Anticipated development contributed 11% on average to the projected increase in traffic. Development along the corridor only accounts for 2% of the traffic increases projected to 2025 implying that most of the growth will occur outside of the study area.

Table 25: Summary of Traffic Growth by Intersection

		2003 to 2025 Traffic Volume Increase Due To:			*2025 Traffic Volume*			*% Increase Due to*		
VT 100 Intersection With:	**2003 Design Hour Volume**	**20 Year Growth Along Corridor**	**Anticipated Development**	**Back-ground Growth**	**Total**	**Total Increase**	**% Increase**	**Corridor Growth**	**ODVs**	**Back-ground Growth**
US 2	1,879	0	103	903	2,885	1,006	54%	0%	10%	90%
I-89 Southbound Ramps	1,832	0	103	881	2,816	984	54%	0%	10%	90%
I-89 Northbound Ramps	2,240	0	103	1,076	3,419	1,179	53%	0%	9%	91%
Blush Hill Rd. - Stowe St.	2,383	0	251	1,145	3,779	1,396	59%	0%	18%	82%
Laurel Lane	1,921	0	169	923	3,013	1,092	57%	0%	15%	85%
Guptil Rd.	2,019	41	167	970	3,197	1,178	58%	3%	14%	82%
Howard Avenue	1,258	81	135	605	2,079	821	65%	10%	16%	74%
Moscow Rd.	1,054	50	370	507	1,981	927	88%	5%	40%	55%
VT 108	1,737	9	172	473	2,391	654	38%	1%	26%	72%
School Street	1,212	0	82	583	1,876	664	55%	0%	12%	88%
West Hill Rd.	1,694	15	77	814	2,600	906	53%	2%	8%	90%
Stagecoach Rd.	1,381	30	0	664	2,075	694	50%	4%	0%	96%
Randolph Rd.	1,034	29	0	497	1,560	526	51%	5%	0%	95%
Miller Bridge Rd.	955	13	0	459	1,427	472	49%	3%	0%	97%
Morristown Corners Rd.	920	0	0	442	1,362	442	48%	0%	0%	100%
Randolph Rd.	739	0	0	355	1,095	355	48%	0%	0%	100%
VT 15	1,614	0	0	725	2,339	725	45%	0%	0%	100%
				Study Area Average:		**825**	**54%**	**2%**	**11%**	**87%**

CONGESTION IN 2025

Intersection Level of service Results in 2025

Table 26, Table 27, and Table 28 present intersection level of service results for Waterbury, Stowe, and Morristown respectively. The future year analyses assume that no modifications have been implemented at any of the study intersections. LOS results are presented for each lane of the intersection. For signalized intersections, the overall intersection LOS is also presented.

The two signalized intersections in the study area at VT 100/Blush Hill/Stowe Street and VT 100/VT 15 are projected to have capacity problems in 2025. Overall LOS is projected to drop from C to F at the VT 100/Blush Hill Road/Stowe Street intersection between 2003 and 2025. Overall level of service is projected to drop from B to D for the VT 100/VT 15 intersection. Level of service is projected to drop from B to F for the left turn from VT 100 to VT 15 and from B to E for the westbound left/though lane on VT 15.

At the stop controlled intersections, poor level of service is projected on the minor street approaches to VT 100. With the exception of the VT 100 intersections with Randolph Road and Miller Bridge

Road in Morristown, an LOS of E or F is projected by 2025 on at least one minor street approach at each of the stop controlled intersections.

Table 26: 2003 and 2025 Intersection Level of Service - Waterbury

	2003 PM Peak Hour				2025 PM Peak Hour			
Study Intersection	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**
VT 100 - US 2								
EB LTR - US 2	A	8	0.11	0.38	A	9	0.20	0.73
WB LT - US 2	A	8	0.00	0.00	A	8	0.00	0.00
SB LT - VT 100	F	100+	1.64	93.60	F	100+	5.50	287.12
SB R - VT 100	B	12	0.29	1.24	C	17	0.53	3.37
VT 100 - I-89 SB Ramps								
EB L - I-89 Ramps	F	100+	1.58	83.43	F	100+	5.42	100+
EB R - I-89 Ramps	B	14	0.34	1.56	E	37	0.73	7.30
VT 100 - I-89 NB Ramps								
WB L - I-89 Ramps	F	100+	0.80	7.68	F	100+	3.81	64.32
WB R - I-89 Ramps	F	100+	1.10	35.10	F	100+	3.02	202.39
VT 100 - Blush Hill Rd								
Overall	**C**	**21**			**F**	**153**		
EB LTR - Blush Hill Rd.	C	29	0.45	53.00	F	92	0.87	186.00
WB LTR - Stowe St.	F	100+	1.13	108.00	F	100+	1.71	565.00
NB L - VT 100	A	3	0.24	10.00	E	63	0.88	110.00
NB TR - VT 100	A	8	0.78	441.00	F	100+	1.33	1843.00
SB L - VT 100	B	11	0.66	181.00	F	100+	1.35	430.00
SB TR - VT 100	A	4	0.53	196.00	C	23	0.88	584.00
VT 100 - Laurel Lane								
NB LTR - VT 100	B	11	0.02	0.05	B	12	0.03	0.09
SB LTR - VT 100	B	11	0.02	0.05	B	15	0.02	0.06
WB LTR - Laurel Lane	F	89	0.12	0.41	F	100+	1.00	3.46
EB LTR - Crossroad	F	97	0.20	0.74	F	100+	2.13	7.78
VT 100 - Guptil Road								
SB LT - VT 100	B	11	0.02	0.05	C	16	0.04	0.12
WB LR - Gutpil Road	F	100+	1.43	28.40	F	100+	10.48	102.71
VT 100 - Howard Avenue								
SB LT - VT 100	A	9	0.01	0.02	B	11	0.01	0.04
WB LR - Howard Ave	C	24	0.15	0.52	F	100+	0.71	5.12

Hihglights LOS E or F

Table 27: 2003 and 2025 Intersection Level of Service – Stowe

	2003 PM Peak Hour				2025 PM Peak Hour			
Study Intersection	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**
VT 100 - Moscow Road								
NB LTR - VT 100	A	8	0.09	0.28	A	10	0.19	0.71
SB LTR - VT 100	A	8	0.00	0.00	A	10	0.00	0.01
WB LTR - Driveway	C	24	0.01	0.03	F	91	0.09	0.28
EB LTR - Moscow Road	E	36	0.39	1.82	F	100+	3.09	51.08
VT 100 - VT 108								
Overall	**F**	**85**		**	**F**	**100+**		**
EB LR - VT 108	E	35		**	F	100+		**
NB L - VT 100	C	18		**	D	35		**
NB T - VT 100	F	215		**	F	100+		**
SB T - VT 100	C	24		**	F	100+		**
SB R - VT 100	B	14		**	C	18		**
VT 100 - School Street								
WB LT - VT 100	A	9	0.07	0.24	B	10	0.14	0.49
NB LR - School Street	C	21	0.50	2.91	F	100+	1.33	51.79
VT 100 - West Hill Road								
NB LT - VT 100	A	9	0.07	0.22	B	10	0.14	0.47
EB - LR - West Hill Road	F	100+	1.41	41.28	F	100+	6.75	149.94
VT 100 - Stagecoach Road								
EB LT - VT 100	A	9	0.18	0.65	B	10	0.31	1.35
SB L - Stagecoach Road	E	38	0.04	0.11	F	100+	0.18	0.64
SB R - Stagecoach Road	B	11	0.15	0.52	B	14	0.28	1.17

Hihglights LOS E or F

** Vehicle queues not estimated for all-way stops

Table 28: 2003 and 2025 Intersection Level of Service – Morristown

	2003 PM Peak Hour				2025 PM Peak Hour			
Study Intersection	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**
VT 100 - Randolph Road								
SB LT - VT 100	A	9	0.00	0.00	B	10	0.00	0.00
WB LR - Randolph Road	C	19	0.14	0.49	E	46	0.41	1.99
VT 100 - Miller Bridge Road								
NB LT - VT 100	A	9	0.06	0.18	A	10	0.10	0.35
EB LR - Miller Bridge Road	B	13	0.22	0.86	C	21	0.46	2.51
VT 100 - Morristown Corners Road								
NB LT - VT 100	A	8	0.00	0.00	A	9	0.00	0.01
EB LR - Morristown Corners Rd	C	17	0.17	0.60	E	36	0.42	2.13
VT 100 - Randolph Road								
SB L - VT 100	A	8	0.02	0.06	A	8	0.03	0.11
WB L - Randolph Road	B	15	0.09	0.30	C	22	0.21	0.81
WB R - Randolph Road	A	10	0.06	0.18	B	11	0.10	0.33
VT 100 - VT 15								
Overall	**B**	**15**			**D**	**53**		
EB LT - VT 15	B	12	0.39	101.00	B	16	0.43	231.00
EB R - VT 15	B	13	0.56	37.00	B	20	0.62	50.00
WB LTR - VT 15	B	17	0.69	163.00	E	64	1.01	644.00
NB L - VT 100	B	17	0.70	260.00	F	100+	1.12	695.00
NB TR - VT 100	A	9	0.19	25.00	C	20	0.30	45.00
SB LTR - Business	A	8	0.02	0.00	B	17	0.02	0.00

Hihglights LOS E or F

Level of service for vehicles turning left from VT 100 to the side street is projected at D or better for all of the stop-controlled study intersections through 2025. However, the delay calculations used in the Highway Capacity Manual for stop controlled intersections assume that vehicles turning left from a major street (like VT 100) to a minor street will not block through traffic on the major street. An additional measure is provided by the Highway Capacity Software that presents the probability that left turning vehicles will not block through vehicles. The results are presented in Table 29 for 2003 and 2025. A value of 0.90 for example, means there is a 90 percent chance that through vehicles will not be blocked (and a 10% chance they will be blocked). The rule of thumb is that the probability should not be less than 0.85 (or, more than a 15% chance that through vehicles are blocked).

In 2003, blocking of through vehicles on VT 100 by left turning vehicles is a potential problem at the VT 100/ Stagecoach Road intersection. By 2025, vehicles waiting to turn left from VT 100 to a side street are projected to block through traffic more frequently at Stagecoach Road and at Moscow Road, School Street, and West Hill Road.

Table 29: Probability that Vehicles Turning Left from the Major Street to a Minor Street will not block Through Traffic

	2003		2025	
Study Intersection	NB Left	SB Left	NB Left	SB Left
VT 100 - I-89 SB Ramps	1.00	--	1.00	--
VT 100 - I-89 NB Ramps	1.00	--	1.00	--
VT 100 - Blush Hill Rd	Not Applicable at Traffic Signal			
VT 100 - Laurel Lane\Crossroad	0.98	0.98	0.97	0.98
VT 100 - Guptil Road	--	0.97	--	0.96
VT 100 - Howard Avenue	--	0.99	--	0.99
VT 100 - Moscow Road	0.91	--	0.81	--
VT 100 - VT 108	Not Applicable at 4-Way Stop			
VT 100 - School Street	--	0.93	--	0.86
VT 100 - West Hill Road	0.93	--	0.86	--
VT 100 - Stagecoach Road	0.82	--	0.69	--
VT 100 - Randolph Road	--	1.00	--	1.00
VT 100 - Miller Bridge Road	0.94	--	0.90	--
VT 100 - Morristown Corners Road	1.00	--	1.00	--
VT 100 - Randolph Road	--	0.98	--	0.97
VT 100 - VT 15	Not Applicable at Traffic Signal			

	EB Left	WB Left	EB Left	WB Left
VT 100 - US 2	0.89	--	0.80	--

Blocking probability exceeds acceptable practice

Road Segment Level of Service Results for 2025

Level of service for two lane highways has been determined in accordance with Chapter 20 of the 2000 Highway Capacity Manual. The key inputs include shoulder and lane width, terrain type (level, rolling, mountainous) directional split, percentage of trucks, percentage of no-passing zone, the number of access points per mile, the posted speed, and traffic volumes. Traffic volumes and the number of access points are the factors projected to change between 2003 and 2025 as shown in Table 30 and Table 31 respectively.

Table 30: Existing and Projected AADT by Segment

Segment	2003 AADT	2025 AADT	Absolute Difference	Percent Change
1. Guptil Road to Howard Road	12,300	18,300	6,000	49%
2. North of Waterbury Center to Moscow Road	10,700	16,100	5,400	50%
3. Moscow Road to south of Lower Stowe Village	10,900	16,400	5,500	50%
4. West Hill Road to Stagecoach Road	11,200	16,700	5,500	49%
5. Stagecoach Road to Randolph Road	6,900	10,200	3,300	48%
6. Randolph Road to Morristown Corners Road	8,200	12,100	3,900	48%

Table 31: Existing and Projected Access Points by Road Segment

Segment	Access Points in 2003	Access Points in 2025	Absolute Difference	Percent Change
1. Guptil Road to Howard Road	30	37	7	23%
2. North of Waterbury Center to Moscow Road	55	69	14	25%
3. Moscow Road to south of Lower Stowe Village	32	51	19	59%
4. West Hill Road to Stagecoach Road	39	62	23	59%
5. Stagecoach Road to Randolph Road	43	68	25	58%
6. Randolph Road to Morristown Corners Road	96	120	24	25%

LOS results for the road segments are presented in Table 32 for 2003 and 2025. The key observations are:

- LOS is projected to drop from D to E between Guptil Road and Howard Avenue;
- Although the 2025 projected LOS remains within the "D" category, conditions are approaching LOS "E" (percent time following near 85%) along sections of VT 100 between Waterbury Center-Moscow Road, Moscow Road-Lower Stowe Village, and West Hill Road-Stagecoach Road;
- LOS is projected to drop from C to D on the two segments between Stagecoach Road and Morristown Corners Road;
- The projected decrease in travel speed throughout the corridor from 9 to 26% is affected by the amount of traffic forecasted and the number of new driveways. The traffic volume increase is the dominate factor affecting the speeds in this situation.
- The amount of time it takes to travel between VT 15 and US 2 will increase by at least seven minutes. Of this total, four minutes may be attributed to decreasing speeds on the roadway segments and three minutes to the delay encountered at the Blush Hill Road/Stowe Street intersection. This estimate does not include delays within the Morrisville, Stowe Village, Waterbury Center, or Colbyville.

Table 32: Road Segment Level of Service

Segment	2003 LOS	2003 V/C	2003 % Time Spent Following	2003 Avg. Travel Speed	2025 LOS	2025 V/C	2025 % Time Spent Following	2025 Avg. Travel Speed	Percent Change in Travel Speed 2003 to 2025
1. Guptil Road to Howard Road	D	0.42	77%	37.0	E	0.61	86%	31.6	-15%
2. North of Waterbury Center to Moscow Road	D	0.36	73%	39.3	D	0.54	83%	34.6	-12%
3. Moscow Road to south of Lower Stowe Village	D	0.37	74%	26.9	D	0.55	84%	20.0	-26%
4. West Hill Road to Stagecoach Road	D	0.37	75%	21.0	D	0.55	84%	17.4	-17%
5. Stagecoach Road to Randolph Road	C	0.24	63%	35.9	D	0.34	72%	32.1	-11%
6. Randolph Road to Morristown Corners Road	C	0.29	67%	38.0	D	0.41	76%	34.5	-9%

Close to the LOS E threshold

SAFETY IN 2025

The impact on safety of the additional access points estimated over the next twenty years along VT 100 has been estimated based on a methodology provided in *NCHRP Report 420 – Impacts of Access Management Techniques*. The methodology estimates the percent change in accident rates along a roadway segment based on the number of un-signalized intersections per mile (including driveways), the number of signalized intersections per mile, and the type of median. The technique can be used to test the impact of different access management strategies that reduce curb cuts and/or include different types of medians (undivided, two-way-left-turn lane, and non-traversable) and is useful in showing how new access points affect the number of crashes. Table 23 shows how the new access points affect the accident rate. The accident rate is the number of crashes that are expected to occur per million vehicle miles traveled.

Table 33: Estimated Increase in Crash Rates Due to New Access Points 2003 to 2025

Segment	Increase in Driveways	Increase in Accident Rate
1. Guptil Road to Howard Road	23%	9%
2. North of Waterbury Center to Moscow Road	25%	9%
3. Moscow Road to south of Lower Stowe Village	59%	26%
4. West Hill Road to Stagecoach Road	59%	36%
5. Stagecoach Road to Randolph Road	58%	31%
6. Randolph Road to Morristown Corners Road	25%	11%

Table 34 translates the accident rates into number of crashes per year. Although the percent increase in the accident rates are significant, the result is an increase of just 5 new crashes per year by 2025 throughout the study area.

Table 34: Estimated Increase in Crashes per Year Related to New Access Points

Segment	2003 Crash Rate (Acc/MVM)	2003 Annual Crashes	2025 Crash Rate (Acc/MVM)	2025 Annual Crashes
1. Guptil Road to Howard Road	0.19	1	0.21	2
2. North of Waterbury Center to Moscow Road	0.27	4	0.29	4
3. Moscow Road to south of Lower Stowe Village	0.59	3	0.75	4
4. West Hill Road to Stagecoach Road	0.60	2	0.81	3
5. Stagecoach Road to Randolph Road	1.49	5	1.96	7
6. Randolph Road to Morristown Corners Road	0.81	12	0.89	13
Acc/MVM - Accidents per Million Vehicle Miles	Total	28	Total	33

FINDNGS: 2025 TRAFFIC, SAFETY AND ACCESS MANAGEMENT ISSUES

- The predominant force behind the projected traffic increases along VT 100 is background growth. It accounts for 87% of the projected overall traffic growth in the corridor. Development projects that are anticipated to be built in the near term, contributed 11% on average to the projected increase in traffic along the study area. Development directly adjacent to VT 100 accounts for only 2% of the traffic increases projected to 2025.
- The finding that most of the traffic growth in the study area will be driven by growth beyond the parcels that front VT 100 is significant. This additional traffic will access VT 100 through its intersections with the state and national highway systems at US 2, VT 15, VT 108 and I-89 and at its many intersections with the local road systems in Waterbury, Stowe, and Morristown. As a result, high levels of congestion are projected at almost every stop controlled side street approach to VT 100 and at the two signalized intersections at VT 100/Blush Hill Road/Stowe Street and VT 100/VT 15.
- After vehicles have accessed VT 100 through one of the intersections, travelers will continue to experience delays as they move along the highway. These increasing traffic volumes will also result in congestion along the rural road segments where travelers expect higher speeds.
- Poor intersection performance is the primary access management issue projected in the study area. A goal of access management is to provide efficient and safe transitions from one roadway classification to another. This transition is provided at the study intersections which are projected to have congestion problems by 2025. The most common strategies recommended in an access management plan involve reducing the number of driveways with direct access to an arterial, and locating and designing the driveways that must access the arterial in a manner that reduces conflicts between through and turning vehicles. Proper driveway design and location is necessary to preserve as much capacity as possible as VT 100 road segments approach LOS E. However, this analysis shows that the number of new driveways estimated in the twenty-year scenario, have a negligible impact on congestion and safety when compared to the effect of background traffic growth and traffic from anticipated development. Given the projected intersection problems, a critical access management issue to address is related to how driveway location affects intersection operation. Design standards or other access management regulations that encourage adequate spacing between

the functional areas of an intersection and driveways should be included in local regulations for all three towns.

SECTION 6.0 HIGHWAY SYTEM: ALTERNATIVES AND RECOMMENDATIONS

The key finding in Section 4.0 regarding future conditions is that most of the traffic growth in the study area will be driven by growth beyond the parcels that front VT 100. This additional traffic will access VT 100 through its intersections with the state and national highway systems at US 2, VT 15, VT 108 and I-89 and at its many intersections with the local road systems in Waterbury, Stowe, and Morristown. As a result, high levels of congestion are projected at almost every stop controlled side street approach to VT 100 evaluated in this study and at the two signalized intersections at VT 100/Blush Hill Road/Stowe Street and VT 100/VT 15.

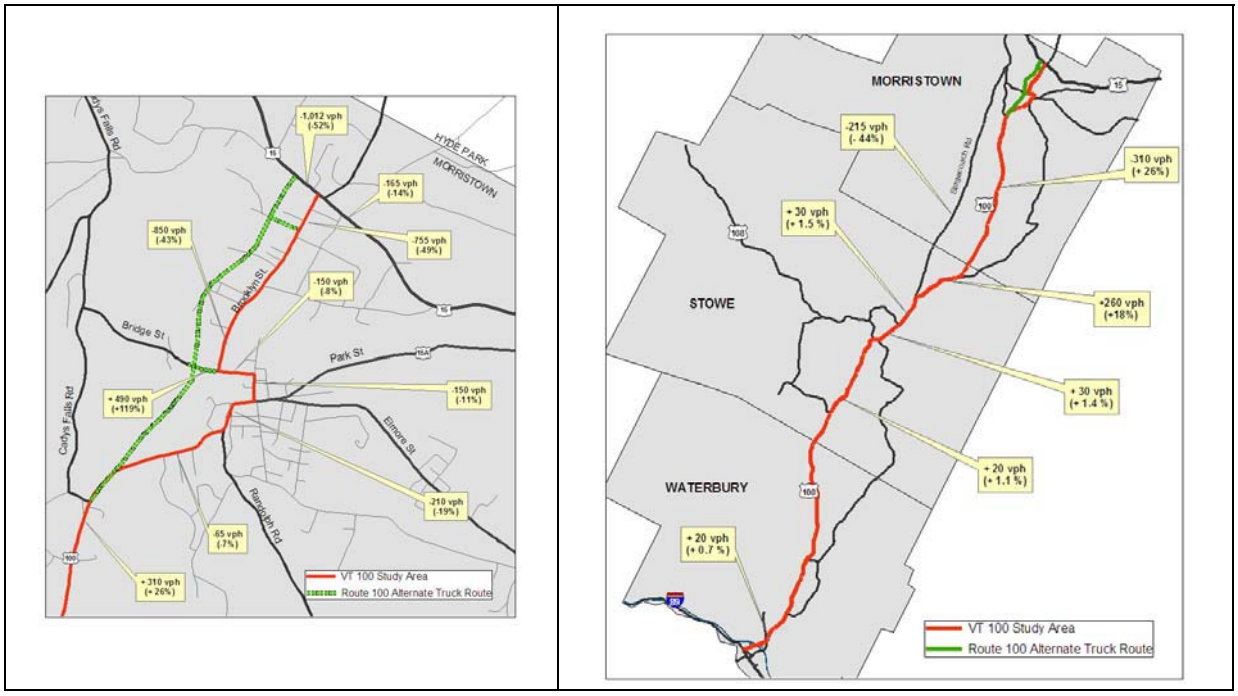
This section evaluates first the effect of the Route 100 Alternate Truck Route and a New Town Road in Waterbury on intersection performance to determine if these might address any of the congestion issues projected for 2025. Six corridor-wide alternatives that mix intersection design options are then evaluated and recommendations presented.

IMPACTS OF THE ALTERNATE TRUCK ROUTE ON THE VT 100 STUDY AREA

The Route 100 Alternate Truck Route is The ATR is approximately 1.7 miles and if built would connect VT 15 west of the VT 100 intersection to VT 100 just north of Morristown Corners. This new road will be a limited access facility with access provided only at the public road intersections at VT 15, Stafford Lane, Bridge Street, and VT 100. The function of the ATR in the network will be to provide a higher level of mobility for through traffic. There will be no direct access (driveways) to adjacent parcels. Figure 12 shows the general alignment and projected effect of the ATR on 2025 peak hour traffic volumes in Morrisville and for the entire study area. These estimates are based upon traffic modeling work completed by VTrans (See Appendix E for more information).

The ATR's impact on VT 100 traffic volumes is most significant between VT 15 and Stagecoach Road and minimal south of Stagecoach Road. The ATR's greatest impact on VT 100 is along Brooklyn Street where traffic volumes are projected to decrease between 40 and 50 percent. Between Bridge Street, (which will provide a connection to the ATR) and Randolph Road, the ATR is projected to reduce traffic volumes on VT 100 between 8% to 19%. South of its future intersection with VT 100 near Morristown Corners, the ATR is projected to increase traffic by as much a 26%. Much of this traffic is diverted from the Cady's Falls/Stagecoach Road corridors. As shown in Figure 2, south of Stagecoach Road, the projected increase in traffic is relatively insignificant (30 to 20 more vehicles per hour which is less than 1.5% of the total traffic volume).

Figure 12: Effect of the Alternate Truck Route on Projected 2025 Design Hour Volumes in Morrisville and the Study Area



The effect of the ATR on level of service, delay, and queues on the intersections most impacted is presented in Table 35. The analysis is based on existing lane geometry and intersection control (traffic signal or stop sign). The ATR affects traffic volumes differently throughout the VT 100 corridor. As a result, delay is reduced at some intersections and increased at others. The following comments summarize the most significant changes:

- LOS is improved significantly at the VT 100 intersection with VT 15;
- Delay increases and LOS worsens on the Bridge Street eastbound approach to VT 100. Traffic volumes are projected to increase on the eastbound approach because Bridge Street will provide a connection to the ATR;
- Although LOS remains at E or F, delays are reduced significantly on the Portland Street and Lower Main Street approaches to the Main/Portland/Congress Street intersection;
- Delay increases on the Randolph Road-South End intersection with VT 100 due to the increase in through traffic on VT 100; and
- Delays increase on the Stagecoach Road approach to VT 100. The probability that a vehicle turning left from VT 100 to Stagecoach Road will block a northbound through traveling vehicle decreases.

The ATR will be effective at removing through traffic from Morrisville where most of VT 100 is identified as a high accident location. However, it will not address all of the projected congestion problems on VT 100 between VT 15 and the future ATR/VT 100 intersection. Therefore, additional modifications are considered below.

Table 35: 2025 LOS for relevant intersections with and without the ATR

	2025 PM Peak Hour					2025 PM Peak Hour with ATR				
Study Intersection	LOS	Delay (Seconds)	v/c	95% queue (Feet)	Prob. Q Free	LOS	Delay (Seconds)	v/c	95% queue (Feet)	Prob. Q Free
VT 100 - Stagecoach Road										
EB LT - VT 100	A	9	0.18	< 1	0.69	A	10	0.20	< 1	0.80
SB L - Stagecoach Road	E	38	0.04	< 1		F	108	0.08	< 1	
SB R - Stagecoach Road	B	11	0.15	< 1		C	15	0.18	< 1	
VT 100 - Randolph Road - South End										
SB LT - VT 100	B	10	0.00	< 1	1.00	B	11	0.00	0.00	1.00
WB LR - Randolph Road	E	46	0.41	2		F	88	0.60	7.00	
VT 100 - Randolph Road - North End										
SB L - VT 100	A	8	0.03	< 1	1.00	A	8	0.03	< 1	1.00
WB L - Randolph Road	C	22	0.21	< 1		C	20	0.20	< 1	
WB R - Randolph Road	B	11	0.10	< 1		B	11	0.10	< 1	
VT 100 - Main, Portland, Congress										
VT 100 EB - Lower Main - LTR	F	329	1.65	(1)		F	186	1.31	(1)	
WB - Upper Main - LTR	F	183	1.31	(1)		F	178	1.30	(1)	
NB - Congress - LTR	F	60	0.92	(1)		F	60	0.92	(1)	
VT 100 SB - Portland - LTR	F	268	1.51	(1)		F	205	1.36	(1)	
VT 100 - Bridge St										
EB - Bridge St - LT	F	441	1.76	384		F	58	0.96	313	
VT 100 WB - Bridge St - RT	A	2	0.08	6	0.77	A	5	0.23	23	0.77
VT 100 SB - Brooklyn St-LR	A	0	0.00	0		A	0	0.00	0	
VT 100 - VT 15										
Overall	**D**	**53**				**B**	**16**			
EB LT - VT 15	B	16	0.43	231		B	11	0.51	132	
EB R - VT 15	B	20	0.62	50		A	8	0.07	19	
WB LTR - VT 15	E	64	1.01	644		C	25	0.87	259	
NB L - VT 100	F	103	1.12	695		B	15	0.59	151	
NB TR - VT 100	C	20	0.30	45		A	9	0.07	25	
SB LTR - Business	B	17	0.02	0		A	8	0.02	11	

Hihglights LOS E or F

Potential blocking of through traffic on VT 100 by vehicles turning left to side street

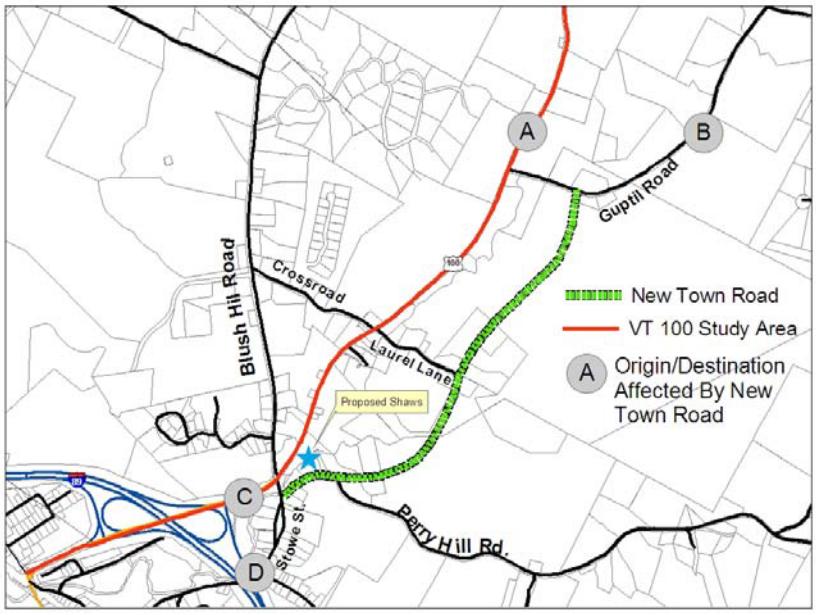
(1) Queue estimates not provided for all-way stops

The ATR will connect with VT 100 near the intersection of Miller Bridge Road and Morristown Corners. The existing intersection will be replaced by the new VT 100-ATR intersection. VT 100 in this area is currently designated as Category 3 under the VTrans Access Management program. This designation should be upgraded to Category 2 along VT 100 near the future intersection of the ATR. The distance should extend as long as any planned turning lanes. Class 2 does not allow direct access to the highway thereby eliminating future conflicts between vehicles exiting driveways and the functional area of the future intersection.

IMPACTS OF THE NEW TOWN ROAD

A possible New Town Road in Waterbury between Stowe Street and Guptil Road is shown in Figure 13 . It was originally recommended in the 1993 VT 100 Corridor Study. The function of the New Town Road in the overall highway system would be to improve circulation for local travel. By providing an alternate route to VT 100 between the Stowe Street/Blush Hill and Guptil Road intersections, the New Town Road would remove shorter local trips from VT 100 and has the potential to reduce traffic along VT 100.

Figure 13: New Town Road



Referring to Figure 13, the origin destination pairs that are most likely to be affected by the New Town Road are between:

- Points A and D;
- Points B and C; and
- Points B and D.

In addition to the trips diverted between the origin and destination points listed above, this analysis also assumes that a connection is provided between the proposed Shaws and the New Town Road. It was assumed that all trips between Guptil Road and Shaws and between Stowe Street and Shaws, as identified in the traffic impact study, would utilize the New Town Road to enter and exit Shaws. The analysis also assumes that vehicular access to Laurel Lane would be provided through the New Town

Road (this assumption means the Laurel Lane/VT 100 intersection would be closed). Appendix E describes the methodology used the estimate the vehicles trips diverted by the New Town Road.

The New Town Road is projected to carry between 6,900 and 7,700 vehicles per day in 2025 as shown in Table 36 (approximately 660 – 770 PM peak hour trips). As shown in Table 38, the same number of vehicle trips would be diverted from VT 100 reducing traffic volume between Stowe Street/Blush Hill Road and Guptil Road by approximately 23%.

Table 36. Projected 2025 PM Peak Hour and AADT on New Town Road

Section	PM Peak Hour	AADT
Guptil Road to Shaws	688	6,900
Shaws to Stowe Street	774	7,700

Table 37: Effect of New Town Road on VT 100 - 2025 AADT

Section of VT 100	Without New Town Road	With New Town Road	Change	Percent Change
Guptil Road to Shaws	31,900	25,000	-6900	-22%
Shaws to Blush Hill/Stowe Street	33,400	25,700	-7700	-23%

Table 38 presents level of service results with and without the New Town Road for the intersections that would be affected by the change in traffic patterns. The following comments summarize the most significant changes resulting from the New Town Road:

- The VT 100-Shaws intersection improves significantly from an overall LOS F to LOS B and the vehicle queues appear to decrease significantly. However, the reduction in vehicle queues is the result of through traffic being metered at the VT 100/Blush Hill/Stowe Street intersection.
- Minor reductions in delay result at the Stowe Street/Blush Hill Road/VT 100 intersection, but overall LOS remains at F and long vehicle queues are projected on the northbound and southbound approaches.
- Delays are reduced somewhat for the Crossroad and Laurel Lane approaches to VT 100 but remain excessive. This analysis did not account for trips that might be diverted if Laurel Lane is connected to the New Town Road. The number of trips to and from Laurel Lane is relatively minor (27 PM peak hour trips). Laurel Lane should be connected to the New Town Road and its intersection to VT 100 closed. The connection to VT 100 could remain as a pedestrian and bicycle link. This modification is logical from an access management perspective. It is preferable to connect a local street, such as Laurel Lane, to a collector like the New Town Road rather than directly to an arterial highway. Removing the Laurel Lane/VT 100 intersection would eliminate a location with poor sight distance and would

create an opportunity to create more parking and/or a public green space with access to the river in the center of Colbyville. Laurel Lane should not be connected to both VT 100 and the New Town Road because it would become a through route to and from the New Town Road and would load more traffic through an already dangerous intersection.

- Delays for vehicles exiting Guptil Road to VT 100 are projected to decrease as a result of the New Town Road. However, the probability that a vehicle waiting to turn left from VT 100 to Guptil Road will block southbound through vehicles will increase. The potential blocking problem is caused as more southbound vehicles turn left from VT 100 to Guptil Road to access the New Town Road

Table 38: LOS for Relevant Intersections with and without the New Town Road

	2025 PM Peak Hour					2025 PM Peak Hour with New Town Road				
Study Intersection	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**	**Prob. Q Free**	**LOS**	**Delay (Seconds)**	**v/c**	**95% queue (Feet)**	**Prob. Q Free**
VT 100 - Blush Hill Rd										
Overall	**F**	**131**				**F**	**112**			
EB LTR - Blush Hill Rd.	E	80	0.77	207		D	54	0.38	156	
WB LTR - Stowe St.	F	216	1.29	596		F	182	1.19	531	
NB L - VT 100	E	79	0.85	209		D	53	0.65	104	
NB TR - VT 100	F	174	1.32	2181		F	161	1.29	2302	
SB L - VT 100	F	221	1.29	463		F	176	1.09	205	
SB TR - VT 100	C	26	0.88	1042		C	24	0.84	979	
VT 100 - Shaws										
Overall	F					B	17	0.90		
WB - LR	F	169	1.15	512		F	140	1.03	373	
NB Thru - VT 100	F	143	1.26	2391		A	4	0.88	52	
NB Right - VT 100	A	6	0.14	61		A	0	0.08	1	
SB Left - VT 100	F	180	1.08	236		D	54	0.86	100	
SB Thru - VT 100	B	14	0.83	861		A	6	0.63	358	
VT 100 - Laurel Lane										
NB LTR - VT 100	A	0	2.00	2	0.97	A	0	0.00	1	0.98
SB LTR - VT 100	A	1	0.00	0	0.98	A	0	0.00	2	0.98
WB LTR - Laurel Lane	F	426	0.56	35		F	107	0.19	15	
EB LTR - Crossroad	F	579	1.07	65		F	116	0.35	31	
VT 100 - Guptil Road										
SB LT - VT 100	A	2	0.04	3.00	0.96	B	13	0.32	34	0.68
WB LR - Gutpil Road	F	(1)	10.48	(1)		F	(1)	4.01	(1)	

Hihglights LOS E or F

Potential blocking of through traffic on VT 100 by vehicles turning left to side street when probability of queue free state is less than 0.85.

(1) Delay exceeds calaculable limits

INTERSECTION ALTERNATIVES ANALYSIS

While both projects would be important additions to the roadway network in the study area, neither the ATR nor the New Town Road will eliminate the need to address the identified congestion problems at the study area intersection. Table 39 identifies the types of modifications appropriate to consider at each study intersection. The modifications include adding turn lanes to VT 100, installing traffic signals, or constructing roundabouts. Appendix E presents the traffic engineering warrant analyses and other methods used to screen alternatives appropriate for specific locations.

Table 39: Intersection Design Alternatives

Study Intersection	Alternatives				
	Do Nothing	Turn Lanes to VT 100	Traffic Signal	Roundabout	Others
VT 100 - US 2	Roundabout currently proposed				
VT 100 - I-89 SB Ramps	Yes	Yes	Yes	Yes	
VT 100 - I-89 NB Ramps	Yes	Yes	Yes	Yes	
VT 100 - Blush Hill Rd	Yes	Existing Signalized Intersection		No	Additional turning lanes to signalized intersection, consider effect of Laurel Lane Connector
VT 100 - Laurel Lane-Crossroad	Yes	Yes	No	No	Consider effect of Laurel Lane Connector and eliminating left turns from Crossroad
VT 100 - Guptil Road	Yes	Yes	Yes	Yes	Consider effect of Laurel Lane Connector
VT 100 - Howard Avenue	Yes	Yes	Yes	No	
VT 100 - Moscow Road	Yes	Yes	No	Yes	
VT 100 - VT 108	Yes	No	Yes	No	
VT 100 - School Street	Yes	Yes	Yes	No	
VT 100 - West Hill Road	Yes	Yes	Yes	No	
VT 100 - Stagecoach Road	Yes	Yes	Yes	Yes	
VT 100 - Randolph Road (South)	Yes	Yes	No	No	
VT 100 - Miller Bridge Road	Will be reconstructed as part of Alternate Route 100				
VT 100 - Morristown Corners Road	Will be reconstructed as part of Alternate Route 100				
VT 100 - Randolph Road (North)	Yes	Yes	Yes	No	
VT 100 - VT 15	Yes	Existing Signalized Intersection		Yes	Additional turning lanes to signalized intersection

The following six corridor wide alternatives were constructed from the design alternatives listed in Table 39:

Alternative 1- Do Nothing: Assumes no changes to the existing highway system with the exception of a roundabout at the US 2/VT 100 intersection. This alternative provides a baseline for comparison purposes;

Alternative 2 – Turn Lanes: Adds turn lanes at the unsignalized intersections where turning lane guidelines are satisfied;

Alternative 3 – Traffic Signals with Lanes as Required: Adds traffic signals where warrants are satisfied as identified in Table 39. Additional turn lanes are added with the traffic signals as necessary. Intersections where traffic signal warrants are not satisfied receive turn lanes if volumes satisfied the guidelines;

Alternative 4 – Roundabouts with Traffic Signals: Roundabouts are assumed where identified in Table 39. Traffic signals remain at warranted locations not appropriate for roundabouts;

Alternative 5 – Best Mix of Roundabouts and Traffic Signals: This alternative differs from Alternative 4 by replacing the roundabouts at the I-89 off-ramps with traffic signals and additional lanes; and

Alternative 6 –Best Mix with ATR and New Town Road: Some changes are made to Alternative 5 based on the effect of the ATR and New Town Road.

Table 40 describes the assumed modifications for each intersection under all six alternatives.

Table 40: Description of Intersection Alternatives

VT 100 Intersection with:	Alt 2 - Add Turn Lanes	Alt 3 - Signals with Lanes as Required	Alt 4 - Roundabouts with Signals	Alt 5 - Best Mix of Roundabout and Signals	Alt 6 - Changes with ATR and New Town Road
US 2	Roundabout	Roundabout	Roundabout	Roundabout	Roundabout
I-89 SB Ramps	No Changes to Existing	TS - with (2) VT 100 NB Thru Lanes	Roundabout	Same as Alt 3	Same as Alt 3
I-89 NB Ramps	No Changes to Existing	TS - with (2) VT 100 NB Thru Lanes	Roundabout	Same as Alt 3	Same as Alt 3
Blush Hill Rd	No Changes to Existing	Convert NB VT 100 from (1) Left, (1) Thru, and (1) Right to (1) Left, (1) Thru and (1) Thru with shared right, Convert Stowe St WB to (1) Left and (1) Shared Right/Thru	Same as Alt 3	Same as Alt 3	Same as Alt 3
Shaws Entrance	VT 100 NB - (1) Thru (1) Right, VT 100 SB (1) Thru (1) Left, Shaws (1) Shared Right/Left	Convert NB VT 100 from (1) Thru and (1) Right to (1) Thru and (1) Shared Thru-Right	Same as Alt 3	Same as Alt 3	Same as Alt 3
Laurel Lane	Add left turn lanes to NB and SB VT 100	Same as Alt 2	Same as Alt 2	Same as Alt 2	Connect Laurel Lane to new Town Road. Eliminate Laurel Lane/VT 100 Intersection
Guptil Road	Add VT 100 NB Right lane and VT 100 SB Left Lane	TS - Add VT 100 NB Right lane, VT 100 SB Left Lane, and left and right lanes on Guptil Road	Roundabout	Roundabout	Roundabout
Howard Avenue	Add VT 100 NB Right lane and VT 100 SB Left Lane	Same as Alt 2	Same as Alt 2	Same as Alt 2	Same as Alt 2
Moscow Road	Add VT 100 NB Left lane and VT 100 SB Right Lane	TS -No additional lanes	Roundabout	Roundabout	Roundabout
VT 108	No Changes to Existing	TS -No additional lanes	Same as Alt 3	Same as Alt 3	Same as Alt 3
School Street	Add VT 100 SB Left Lane	TS -No additional lanes	Same as Alt 3	Same as Alt 3	Same as Alt 3
West Hill Road	Add VT NB Left lane and VT 100 SB Right Lane	TS - Left and Right Turn Lanes on West Hill, Add left turn lane to VT 100 NB	Same as Alt 3	Same as Alt 3	Same as Alt 3
Stagecoach Road	Add VT 100 NB Left Lane	TS - Add VT 100 NB Left Turn Lane	Roundabout	Roundabout	Roundabout
Randolph Road (SO)	Add VT 100 NB Right Lane	No changes to existing	No changes to existing	No changes to existing	No changes to existing
Miller Bridge Road	No Changes to Existing	No changes to existing	No changes to existing	No changes to existing	Reconfigured as part of ATR
Morristown Corners Road	No Changes to Existing	No changes to existing	No changes to existing	No changes to existing	Reconfigured as part of ATR
Randolph Road (NO)	Add VT 100 SB left turn lane	TS -No additional lanes	Same as Alt 3	Same as Alt 3	Same as Alt 3
VT15A / Portland / Main	No Changes to Existing	TS with left turn lane added to Portland St SB, and Left Turn lane added to Main St. St EB	Same as Alt 3	Same as Alt 3	TS with l Left Turn lane added to Main St. EB
Bridge St	No Changes to Existing	TS with left turn lane added to Bridge St WB	Same as Alt 3	Same as Alt 3	TS - No lane additions
VT 15	TS - No Changes to Existing	TS - Add left turn lane VT 15 Westbound	Roundabout	Roundabout	No changes to existing TS or Lanes

An access management plan should provide adequate levels of mobility for through traffic and efficient connections between different highway classifications. To evaluate these two somewhat opposing goals, the following corridor-wide performance measures are used:

- Total Through Traffic Delay – Total hours of delay during the PM peak hour experienced by all vehicles passing through all intersections on VT 100;
- Total Side Street Delay – Total hours of delay during the PM peak hour experienced by all vehicles exiting a side street on to VT 100;
- Total Delay – Combined through and side street delay.

Total delay equals the number of vehicles multiplied by the average delay per vehicle. Table 41 provides the through traffic and side street delay by intersection. Table 42 summarizes total delay by alternative. Table 43 shows the percent change in total delay relative to Alternative 1 – Do Nothing.

Comments on Alternative 2 – Add Turn Lanes

Adding turn lanes to VT 100 results in a minor reduction in corridor-wide through traffic and side street delay of minus 1 and 4 percent respectively. The turn lanes may address some short term issues, particularly at the VT 100 intersections with Stagecoach Road and West Hill Road which have high crash rates. However, adding turn lanes will not address the longer term access and congestion issues.

Comments on Alternative 3 – Add Traffic Signals

Adding traffic signals where warranted produces a significant decrease in both through traffic and side street delay throughout the corridor by 22 and 96 percent respectively. To achieve this reduction in total through traffic delay, it was necessary to add through lanes between the I-89 ramps and the future Shaws intersection. These additional through lanes would result in a 4-lane cross section on VT 100 from the I-89 ramps to just north of the proposed Shaws intersection as shown in Figure 14 on page 67. Without these additional through lanes, the projected vehicle queues would be substantial. It was also necessary to include additional turn lanes along with new traffic signals at Guptil Road, West Hill Road, Stagecoach Road, Portland/Main/Congress St, and Bridge Street.

Comments on Alternative 4 – Roundabouts with Traffic Signals

This alternative reduces both through traffic and side street total delay significantly. Through traffic delay is reduced by 45% and side street delay by 96%. The improvement in through traffic delay relative to Alternative 3 is attributed to the operational benefits of roundabouts which, under the right circumstances, reduce delay for all movements at an intersection. The roundabouts were all assumed to be single lane with a total diameter of 130 feet. The I-89 ramps were the only locations where operational problems were evident with the roundabouts. The southbound ramp operated at LOS E and the northbound ramp at LOS F. The rural roundabout locations at Guptil Road, Moscow Road, and Stagecoach Road resulted in improved operation relative to traffic signals. Additional through and turning lanes were included at traffic signals not assumed to be roundabouts

as described in Alternative 3. As a result, a four-lane cross section between Blush Hill/Stowe Street to south of Colbyville is also part of this alternative.

Comments on Alternative 5 – Best Mix of Roundabouts and Traffic Signals

The only difference between Alternatives 4 and 5 is that traffic signals, rather than roundabouts, are assumed for the I-89 off-ramps. The result is a slight improvement in through traffic delay from a decrease of 45% with Alternative 4 to a decrease of 50% with Alternative 5. The decrease in side street delay remains un-changed at 96%.

Comments on Alternative 6 - Best Mix with ATR and New Town Road

This alternative results in the largest decrease in through traffic total delay of 60% and side street delay by 97%. The ATR eliminates the need to change the intersection of VT 15 with VT 100 and the need to add turn lanes at the intersections of VT 100 with Bridge St. and Portland/Main/Congress. The New Town Road proposed in Waterbury does not change the intersection modifications proposed as part of Alternative 5. Additional through lanes on VT 100 between Blush Hill/Stowe Street to south of Colbyville remain necessary to address queuing problems. However, by reducing the number of vehicles traveling through on VT 100, the New Town Road is effective at reducing overall through traffic delay. In addition, the New Town Road would provide an opportunity to close the Laurel Lane/VT 100 intersection, which will eliminate a conflict point on VT 100.

Table 41: Total PM Peak Hour Delay by Intersection and Alternative (Hours)

	Alternative 1 - Do Nothing				Alt 2 - Add Turn Lanes				Alt 3 - Signals with Lanes as Required			
VT 100 Intersection With:	Descrip	VT 100 Delay	Side St. Delay	Total	Descrip	VT 100 Delay	Side St. Delay	Total	Descrip	VT 100 Delay	Side St. Delay	Total
US 2	Round	13.3	6.1	19.4	Round	13.3	6.1	19.4	Round	13.3	6.1	19.4
I-89 SB Ramps	U	0.0	1704.6	1704.7	U	0.0	1704.6	1704.7	TS + TL	9.6	3.6	13.3
I-89 NB Ramps	U	0.0	569.1	569.1	U	0.0	569.1	569.1	TS + TL	12.1	11.7	23.8
Blush Hill Rd	TS	109.5	20.3	129.8	TS	109.5	20.3	129.8	TS + TL	10.1	23.1	33.3
Shaws Entrance	TS	69.1	9.4	78.5	TS	69.1	9.4	78.5	TS + TL	13.0	6.5	19.5
Laurel Lane	U	0.5	3.7	4.2	U + TL	0.1	3.6	3.7	U + TL	0.0	3.6	3.6
Guptil Road	U	0.0	427.8	427.8	U + TL	0.1	305.6	305.6	TS + TL	124.5	4.1	128.6
Howard Avenue	U	0.1	2.0	2.1	U + TL	0.0	1.7	1.7	U + TL	0.0	1.7	1.7
Moscow Road	U	1.4	34.7	36.1	U + TL	0.5	31.0	31.5	TS	5.6	2.1	7.7
VT 108	AWS	185.2	22.1	207.3	AWS	185.2	22.1	207.3	TS	101.2	43.9	145.1
School Street	U	0.5	20.3	20.9	U + TL	0.3	20.3	20.6	TS	2.2	6.2	8.3
West Hill Road	U	2.2	670.8	673.0	U + TL	0.3	670.8	671.1	TS + TL	7.6	6.2	13.9
Stagecoach Road	U	3.3	0.6	3.9	U + TL	0.9	0.6	1.5	TS + TL	1.8	1.5	3.3
Randolph Road (SO)	U	0.1	0.8	0.9	U + TL	0.0	0.7	0.7	U	0.0	0.7	0.7
Miller Bridge Road	U	0.0	0.0	0.0	U	0.0	0.0	0.0	U	0.0	0.0	0.0
Morristown Corners Road	U	0.0	0.0	0.0	U	0.0	0.0	0.0	U	0.0	0.0	0.0
Randolph Road (NO)	U	1.6	0.0	1.6	U + TL	1.6	0.0	1.6	TS	2.4	0.3	2.7
VT15A Portland/Main	AWS	83.5	49.6	133.1	AWS	83.5	49.6	133.1	TS + TL	10.7	14.5	25.2
Bridge St	U	0.6	0.4	1.0	U	0.6	1.0	1.6	TS	48.0	4.4	52.4
VT 15	TS	17.2	14.8	31.9	TS	17.2	14.8	31.9	TS + TL	17.2	14.8	31.9
Totals		488	3,557	4,045		482	3,431	3,914		379	155	534

	Alt 4 - Roundabouts with Signals				Alt 5 - Best Mix of Roundabout and Signals				Alt 6 - Changes with ATR and New Town Road			
VT 100 Intersection With:	Descrip	VT 100 Delay	Side St. Delay	Total	Descrip	VT 100 Delay	Side St. Delay	Total	Descrip	VT 100 Delay	Side St. Delay	Total
US 2	Round	13.3	6.1	19.4	Round	13.3	6.1	19.4	Round	13.3	6.1	19.4
I-89 SB Ramps	Round	35.3	20.3	55.5	TS + TL	9.6	3.6	13.3	TS + TL	6.2	6.4	12.7
I-89 NB Ramps	Round	7.6	0.0	7.6	TS + TL	12.1	11.7	23.8	TS + TL	10.8	0.7	11.4
Blush Hill Rd	TS + TL	10.1	23.1	33.3	TS + TL	10.1	23.1	33.3	TS + TL	13.8	3.2	17.1
Shaws Entrance	TS + TL	13.0	6.5	19.5	TS + TL	13.0	6.5	19.5	TS + TL	4.4	2.2	6.6
Laurel Lane	U + TL	0.1	3.6	3.7	U + TL	0.0	3.6	3.6	U + TL	0.0	2.6	2.6
Guptil Road	Round	5.3	12.5	17.8	Round	5.3	12.5	17.8	Round	4.8	6.5	11.3
Howard Avenue	U + TL	0.0	1.7	1.7	U + TL	0.0	1.7	1.7	U + TL	0.0	1.8	1.8
Moscow Road	Round	2.3	1.2	3.5	Round	2.3	1.2	3.5	Round	2.4	1.2	3.5
VT 108	TS	101.6	43.9	145.5	TS	101.2	43.9	145.1	TS	105.9	46.5	152.4
School Street	TS	2.3	6.2	8.5	TS	2.2	6.2	8.3	TS	3.3	7.4	10.7
West Hill Road	TS + TL	8.7	5.5	14.1	TS + TL	7.6	6.2	13.9	TS + TL	7.4	7.0	14.4
Stagecoach Road	Round	3.2	0.3	3.5	Round	3.2	0.3	3.5	Round	3.4	0.2	3.5
Randolph Road (SO)	U	0.0	0.7	0.7	U	0.0	0.8	0.8	U	0.0	1.2	1.2
Miller Bridge Road	U	0.0	0.0	0.0	U	0.0	0.0	0.0	New	0.0	0.0	0.0
Morristown Corners Road	U	0.0	0.0	0.0	U	0.0	0.0	0.0	New	0.0	0.0	0.0
Randolph Road (NO)	TS	2.4	0.3	2.7	TS	2.4	0.3	2.7	TS	2.6	0.2	2.8
VT15A Portland/Main	TS + TL	10.7	14.5	25.2	TS + TL	10.7	14.5	25.2	TS + TL	4.9	6.2	11.0
Bridge St	TS	48.0	4.4	52.4	TS	48.0	4.4	52.4	TS	11.1	1.3	12.4
VT 15	Round	3.3	3.3	6.6	Round	3.3	3.3	6.6	TS - Existing	3.5	4.7	8.2
Totals		267	154	421		244	150	394		198	105	303

Description Key

U = Unsignalized - Stop sign on side streets
U + TL = Unsinalized with Turn Lanes Added
AWS = All-way stop sign
Round = Roundabout
TS = Traffic Signal
TS + TL = Traffic Signal with Additional Lanes

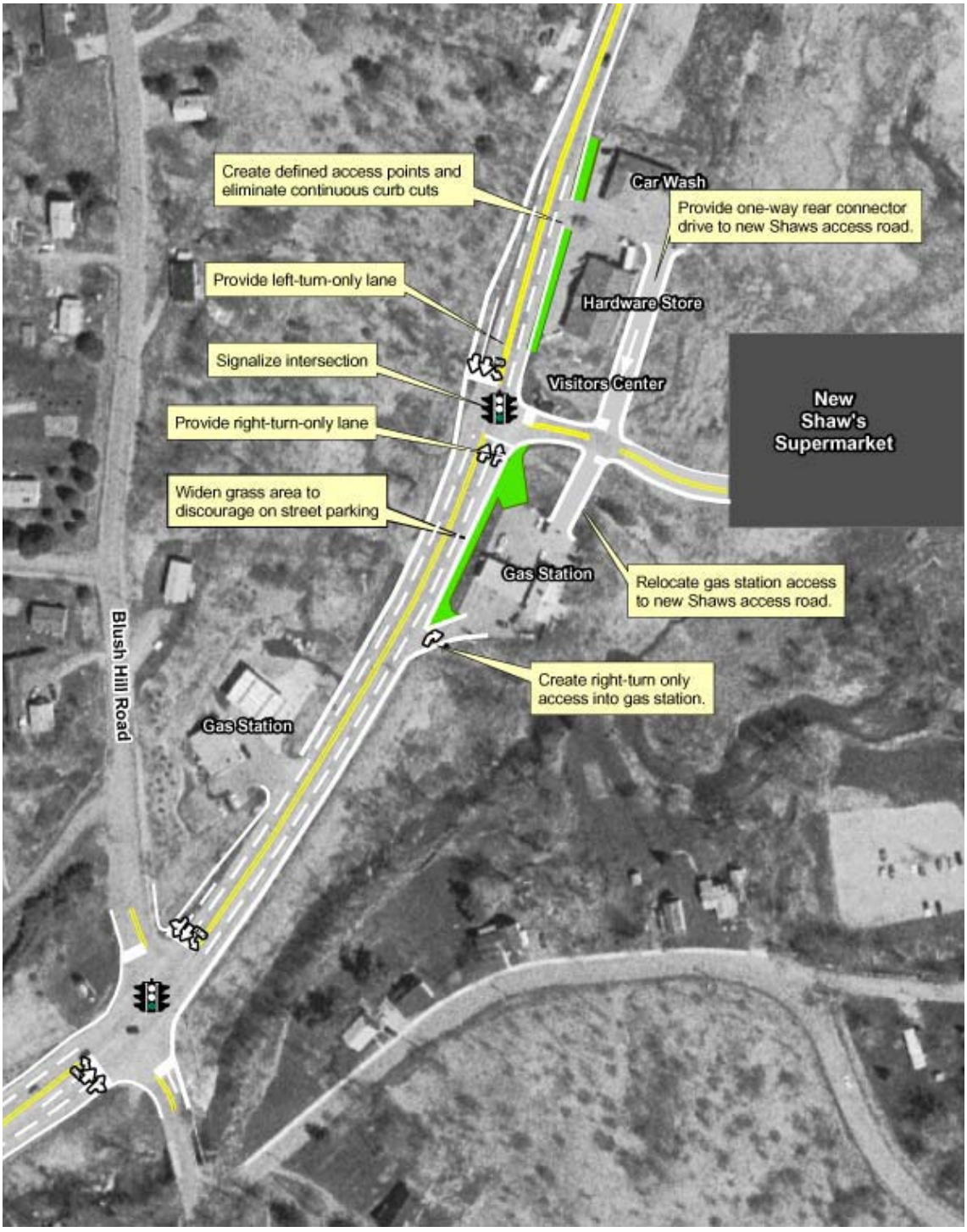
Table 42: Corridor-wide PM Peak Hour Total Delay (hours) by Alternative

Alternative	VT 100	Side Street	Total
Alternative 1 - Do Nothing	488	3,557	4,045
Alt 2 - Add Turn Lanes	482	3,431	3,914
Alt 3 - Signals with Lanes as Required	379	155	534
Alt 4 - Roundabouts with Signals	267	154	421
Alt 5 - Best Mix of Roundabout and Signals	244	150	394
Alt 6 - Changes with ATR and New Town Road	198	105	303

Table 43: Percent Change in Corridor Delay by Alternative Relative to Alternative 1 – Do Nothing

Alternative	VT 100	Side Street	Total
Alt 2 - Add Turn Lanes	-1%	-4%	-3%
Alt 3 - Signals with Lanes as Required	-22%	-96%	-87%
Alt 4 - Roundabouts with Signals	-45%	-96%	-90%
Alt 5 - Best Mix of Roundabout and Signals	-50%	-96%	-90%
Alt 6 - Changes with ATR and New Town Road	-60%	-97%	-93%

Figure 14: Four Lanes between Blush Hill and North of the Proposed Shaws Intersection



COMPARISON TO RECOMMENDATIONS FROM THE 1993 VT 100 CORRIDOR PLAN

The VT Route 100 Corridor Study completed in 1993 recommends a list of roadway and intersection projects designed to address existing geometric deficiencies, safety problems, and congestion hot spots projected for the year 2011. The recommendations include adding truck-climbing lanes to rural sections of Route 100, widening of shoulders, installing auxiliary turn lanes at intersections, and installing traffic signals. The plan also recommends the upgrade and expansion of the local roadway network to accommodate local travel needs on alternative routes to Route 100. Table 44, Table 45 , and Table 46 compare the 1993 recommendations in Waterbury, Stowe, and Morristown respectively to the findings from this study, which identified needs through 2025.

Table 44: VT 100 Corridor Study Recommendations Located in Waterbury – 1993 Study Versus 2004 Study

Recommended in 1993 Study through 2011	2004 Status	Recommendations Through 2025
Provide signing to existing Park and Ride lot (near Stowe Street)	Completed	Not applicable
Blush Hill intersection – Install Traffic Signal	Signalized in 2000 with new pavement markings and traffic signs	Additional through and turn lanes may be necessary. See Figure 4.
Provide 2-Lane Roadway with Curb and Gutter and sidewalks from Colbyville to Blush Hill Road	Not completed. Modification anticipated as part of Shaws Supermarket.	A four lane cross-section may be necessary
Laurell Road intersection in Colbyville – Install Traffic signal, lower roadway grade, add northbound and southbound left turn lanes	Not completed.	Traffic signal not recommended. Turn lanes warranted. Consider providing access to Laurel Lane from New Town Road and eliminating VT 100 intersection.
Improve/Provide Town Road (Guptil Rd to Stowe Street)	Not completed.	No change in recommendation.
Guptil Road Intersection – Add traffic signal and NB right turn lane, SB left turn lane	Not completed.	Roundabout should be considered in lieu of traffic signal.
Howard Road intersection – Alter roadway alignment to improve sight distance	Not completed.	No change in recommendation
Hollow Road – Reconstruct to standard "T" intersection and relocate utility pole	Not completed.	Add turn lanes
Provide 2-Lane Roadway with Curb and Gutter and sidewalks in Waterbury Center	Not completed.	No change in recommendation. Some more access management modifications added.
Provide truck climbing lanes between Gregg Hill Road intersections	Not completed.	No change in recommendation.

Table 45: VT 100 Corridor Study Recommendations Located in Stowe – 1993 Study versus 2004 Study

Recommended in 1993 Study through 2011	2004 Status	Recommendations Through 2025
Provide signing for alternative path to VT 108 on approach to Moscow Road	Not completed.	No change in recommendation.
Moscow Road intersection – add NB left turn lane and additional lane on Moscow Road approach. Add traffic signal	Not completed.	Roundabout should be considered in lieu of traffic signal.
Near Goldbrook Road – Flatten horizontal curve to improve sight distance	Not completed.	No change in recommendation.
River Road intersection – Channelize intersection to eliminate conflicting movements	Not completed.	No change in recommendation. Some more access management modifications added.
Provide curbs and sidewalks through Stowe Village and lower Stowe Village	Completed	Not applicable
Reconstruct Sunset Road as standard T intersection	Not completed.	Not analyzed in this study
Provide Additional Lane on Rte 108 approach	Not completed.	Traffic signal recommended
Provide curbs and sidewalks through Stowe Village to West Hill Road	Sidewalk does not extend to West Hill Road.	No change in recommendation. Some more access management modifications added.
West Hill Road Intersection –Add SB right turn lane on Rte 100 and additional lane on West Hill Road. Add traffic signal	Not completed.	Traffic signal recommended with NB left turn lane and additional lane on West Hill Road.
Improve/Construct Town Roads from VT 108 to VT 100 (Cape Cod Road and West Hill Road).	Completed.	Not applicable
Stagecoach Road Intersection – Reconstruct to Standard T intersection	Not completed.	Roundabout should be considered.
Randolph Road Intersection - Reconstruct to Standard T intersection	Not completed.	No change in recommendation.
Close Tinker Road intersection with VT 100	Not completed.	Not analyzed in this study

Table 46: VT 100 Corridor Study Recommendations Located in Morrisville – 1993 Study versus 2004 Study

Recommended in 1993 Study through 2011	2004 Status	Recommendations Through 2025
Just south of Joe's Pond Road - Flatten horizontal curve by shifting roadway easterly	Not Complete.	Not analyzed in this study.
Replace bridge over Rider Brook	Complete	Not applicable
Build Morrisville Bypass	Not completed. In VTrans Capital Program	No change in recommendation.

FUTURE CONDITIONS: FINDINGS AND RECOMMENDATIONS

The potential need for a four lane cross section along VT 100 between I-89 to south of Colbyville is a significant change from the 1993 VT 100 Corridor Study. Although recommended shoulder and travel-lane widths vary by location in the corridor, the 1993 plan recommends that Route 100 remain as a two-lane highway. This recommendation is described as a compromise where a "tolerable" amount of congestion is acceptable during the peak periods in order to avoid the negative social and environmental impacts associated with widening Route 100 to four lanes. For the southern most section of VT 100, it does not appear possible in 2025 to maintain a tolerable level of congestion without adding more through lanes. Without the additional through lanes, queues exceeding 2,000 feet may extend north and south of the Blush Hill/Stowe Street intersection during AM and PM peak hours of typical weekdays. This situation occurs now, but only during Fall Foliage season or during other special events. A two lane cross-section will provide adequate levels of mobility through the rest of the study area.

A critical issue that was identified in the public outreach efforts was the importance of bicycle travel for residents and tourists along VT 100. Any roadway design changes should incorporate the recommendations of the "Vermont Pedestrian and Bicycle Facility Panning and Design Manual" published in April, 2003. This manual was developed with support and input from VTrans, the Federal Highway Administration, the state's 12 regional planning commissions, the general public, as well as other parties.

Establishing a transportation management association (TMA) should be considered in the corridor. TMAs are private, non-profit, member-controlled organizations that provide transportation services in a particular area. TMAs provide an institutional framework for addressing transportation issues and often focus on Transportation Demand Management Programs

The New Town Road is projected to reduce traffic on VT 100 between Blush Hill and Guptil Road by as much a 23 percent and results in a significant decrease in through traffic delay in the corridor. While this reduction was not found to eliminate the projected congestion and queuing problems on VT 100, the New Town Road has its own value in the transportation system that make it a worthwhile project to pursue. The New Town Road improves access management from a system-wide perspective by expanding upon the specialized street system that serves local travel. It will provide local residents with an alternate route to VT 100 connecting Waterbury Center, Colbyville, and the Village and, as recommended in previous studies, it can include provisions for pedestrians and could provide a safe alternative bike route to VT 100. The New Town Road should be designed and constructed before adding new through lanes to VT 100.

The Route 100 Alternate Truck Route also has its own value beyond its direct effect on intersection modifications at various locations. It will improve access management from a system-wide perspective by (1) providing a specialized highway facility designed to accommodate through traffic, (2) removing through traffic on VT 100 through the center of Morrisville thereby allowing the local

street system to better serve local circulation and access to adjacent land, and (3) by improving the connection between VT 15 and VT 100. It eliminates the need for any changes at the VT 100/VT15 intersection and reduces the need for turn lanes at the VT 100 intersections with Bridge Street and Portland/Main.

To provide efficient connections between the local road system and VT 100, and VT 100 and the state and national highway routes, a mix of turn lanes at unsignalized intersections, traffic signals, and roundabouts is necessary to address the projected congestion and existing safety problems identified throughout the rest of the corridor. This analysis has focused on the operational aspects of the different design choices and suggests the best mix from a corridor-wide perspective. These recommendations assume both the ATR and the New Town Road are constructed. The final design for a specific location should be selected and refined through the VTrans Project Development Process which includes a detailed look at natural and cultural resource impacts, costs, right-of-way requirements and other critical aspects in the context of a public process.

Table 47: Intersection Recommendations

VT 100 Intersection with:	Recommendation
US 2	Roundabout
I-89 SB Ramps	Traffic Signal with additonal through lanes
I-89 NB Ramps	Traffic Signal with additonal through lanes
Blush Hill Rd	Add turn lanes to Stowe Street and through lanes on VT 100 to existing signalized intersection.
Shaws Entrance	Add through lanes to proposed signalized intersection.
Laurel Lane	Connect Laurel Lane to new Town Road. Eliminate Laurel Lane/VT 100 Intersection
Guptil Road	Roundabout
Howard Avenue	Add VT 100 NB Right lane and VT 100 SB Left Lane
Moscow Road	Roundabout
VT 108	Traffic Signal -No additional lanes
School Street	Traffic Signal -No additional lanes
West Hill Road	Traffic Signal - Left and Right Turn Lanes on West Hill, Add left turn lane to VT 100 NB
Stagecoach Road	Roundabout
Randolph Road - south end	No changes to existing
Miller Bridge Road	Will be reconstructed as part of ATR project
Morristown Corners Road	Will be reconstructed as part of ATR project
Randolph Road - north end	Traffic Signal -No additional lanes
VT15A / Portland / Main	Traffic Signal with (1) Left Turn lane added to Main St. EB
Bridge St	Traffic Signal -No additional lanes
VT 15	No changes to existing Traffic Signal or Lanes

SECTION 7.0 LAND USE PLANNING AND REGULATIONS: OPTIONS AND RECOMMENDATIONS

This study has addressed both the need for and potential benefits of improved access management within each of the three municipalities long VT 100. As a state highway, direct access to the highway corridor, outside of Stowe Village and Morrisville, is under the direct control of the Vermont Agency of Transportation. Municipalities, however, have the ability to manage development along Route 100 through local land use regulations and other locally applied access management techniques. And, as noted previously, under state law (19 V.S.A. §1111) state highway access approval must be consistent with local land use regulations.

Given the direct connection between land use and the transportation network that access provides, addressing access management along VT100 is necessarily a shared responsibility between the three municipalities and the Vermont Agency of Transportation. This section identifies how current and anticipated access deficiencies along the corridor – and potentially elsewhere along the connecting road network – may be addressed locally, in cooperation with VTrans and the Lamoille County and Central Vermont Regional Planning Commissions.

Findings based on a build-out analysis of the VT 100 corridor also suggest that, under existing municipal land use regulations, there is significant development potential along the corridor. Under a full build-out scenario, the number of dwelling units conceivably could quadruple over its entire length, and the amount of commercial space within Waterbury's Route 100 District alone could increase twenty-fold. In addition to generating more traffic, the need for access to future development could result in the installation of more than 650 new driveways.

The greatest potential for residential development – in terms of both frontage lots and dwelling units – is between Randolph Road and Morristown Corners Road. The greatest potential for commercial development is within the Route 100 District in Waterbury. There are few natural constraints to development along the corridor; therefore local land use regulations and other types of development restrictions will likely have a much greater influence on future corridor development.

It is also important to note that, under the 20-year (2025) build-out scenario, most of the traffic growth in the study area will be driven by development beyond parcels that front VT 100. This additional traffic will access VT 100 through its intersections with national, state and local highways. As a result, high levels of congestion are projected at almost every stop-controlled side street approach to Route 100, and at the two existing signalized intersections. Poor intersection performance has been identified as the primary access management issue documented in the study area. In addition to the need for intersection improvements, this suggests that access management techniques should be applied not just along VT100, but also on the municipal highway network that is under local jurisdiction.

ADMINISTRATIVE ACCESS MANAGEMENT TOOLS

The purpose of access management, as discussed previously, is to provide reasonable or improved vehicular and pedestrian access to properties and development along a road corridor, while preserving the capacity of the road network to safely and efficiently handle traffic. Administrative access management tools and techniques include both regulatory and non-regulatory options for managing the pattern of development, and access to that development, along a state or municipal highway system. As such, these generally focus on the land rather than the road side of the right-of-way. Several access management tools and techniques are described briefly here, and in more detail in the following publications available from VTrans through its "Vermont Access Management" web site (www.vtaccessmanagement.info/):

- VTrans' *Access Management Program Guidelines* (July 1999, Rev. February 2004)
- *Vermont Best Practices for Access Management* (Resource Systems Group, March 2004)
- A listing of access management tools and techniques (with local examples)
- Access management definitions,
- A permitting flow chart, and
- Useful links to other state and national access management resources.

Other key state design standard publications often referenced in local road policies and, where appropriate, under municipal ordinances and regulations include:

- *Vermont State Standards for the Design of Transportation Construction, Reconstruction and Rehabilitation on Freeways Roads and Streets* (July 1997), and
- VTrans' Standard Drawings, including "Standards for Residential and Commercial Drives" (B-71) and "Standards for Town & Development Roads" (A-76).

The focus here is on administrative access management that may be employed by a municipality, for VT 100 or other state highways in coordination with Vermont Agency of Transportation, and locally along the interconnecting town highway system.

The Municipal Plan

All three municipalities have adopted comprehensive municipal plans that are intended to serve as the basis for local policies, ordinances, land use regulations and infrastructure improvement programs. Municipal plans are also given weight in regional transportation and land use planning, in the identification of needed transportation improvements and priorities, and project development, and in state regulatory proceedings such as Act 250 where traffic and access management issues are a common consideration.

There are two required elements of the municipal plan in which access management should be addressed – the land use and transportation elements. Proposed patterns and densities of development along the VT 100 corridor, and elsewhere along the road network, should be identified in the land use element and on the proposed land use map. These could include recommended changes to underlying zoning districts along the corridor, and/or the adoption of an "access management overlay district" as described below.

Conformance with the Municipal Plan

Under statutory changes to the Vermont Planning and Development Act (24 VSA Chapter 117) that went into on July 1, 2004 (Act 115), municipal programs and land use regulations intended to implement the municipal plan must now clearly conform to plan policies and recommendations. Accordingly, prior to adoption, the Planning Commission must determine that a proposed bylaw:

- Conforms with or furthers the goals and policies contained in the municipal plan;
- Is compatible with future land uses and densities of development proposed in the plan; and
- Carries out, as applicable, any specific proposals for any planned community facilities.

Access management techniques recommended for use locally, and associated access management policies or guidelines, should be identified in the transportation element of the plan.[1] For consistency, this should include consideration and incorporation of state access management guidelines noted above, as appropriate.

Proposed access, road and intersection improvements – including relevant recommendations from this study – also should be identified and addressed in the transportation element. Road functional classes and access management categories should be identified on the transportation map, along with the general locations of proposed road and intersection improvements and rights-of-way for new roads, such as the Alternative Truck Route in Morristown or the New Town Road in Waterbury.

In addition to local bylaw and ordinance amendments, the municipal plan also provides the basis for other implementation tools that may have a direct or indirect bearing on local access management, which are described in more detail below, and must also be in conformance with plan goals, policies and recommendations:

- Supporting plans, including access management or road improvement plans,
- Land acquisition programs,
- A municipal capital budget and improvement program, and
- An "official map" that identifies the location of proposed public rights-of-way,

The recommendations in this study should be considered by local planning commissions and select boards for incorporation in updated or amended municipal plans, in order to be given weight in the

[1] The 2003 Waterbury Town Plan includes a good example of a section devoted specifically to access management.

update of local bylaws and in regional and state project development and regulatory proceedings (see sidebar). At minimum, the recommendations should be incorporated by reference as appropriate.[1]

NON-REGULATORY ACCESS MANAGEMENT TOOLS

Access Management Plan

An access management plan is a type of strategic plan that is more focused and limited in scope than the comprehensive plan, and more detailed in the level of analysis, alternatives, and recommendations presented. An access management plan should include sufficient information to identify access management improvements for specific properties as they come under review, or as needed to support project development and financing. An access management plan may also serve as the basis for the creation and administration of an "access management overlay district" under local zoning; or for interagency agreements or memoranda that coordinate access permitting and required improvements along a particular stretch of highway or at key intersections.

Where it is determined that this overall access management plan for VT 100 includes enough detail for managing access at particular locations – for example within the seven areas evaluated – it may also serve as an access management plan for these areas. Recommended intersection improvements, and associated analyses, should also be sufficient to support and further project development as appropriate. For these purposes, this VT 100 Access Management Plan should be incorporated in municipal plans, by attachment or reference.

Land Acquisition

The public acquisition of land or interests in land – through negotiated dedication or condemnation – may serve two purposes related to access management: acquisition may be used to obtain ownership or interest in property fronting a road specifically to control access or rights-of-way within that area (e.g., at the Exit 10 interchange area); or to control or limit the development of adjoining parcel, for example through the purchase of development rights in support of land or open space conservation.

Land acquisition compensates property owners and ensures long-term control or protection; however, it can be prohibitively expensive, particularly in areas undergoing active development. A few large parcels along VT 100 have been protected through local conservation efforts. This has significantly reduced their development potential, and therefore the need for additional access. Locally supported land conservation efforts along the corridor – particularly along rural segments in

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[1] The municipal plans for all three municipalities reference the 1993 *VT 100 Corridor Study*. The 2003 Stowe Plan also identifies the current status of specific infrastructure improvements recommended in the 1993 study, with includes a recommendation that this study continue to serve as the basis for the identification and prioritization of needed improvements to the local transportation network.

the vicinity of village centers – may serve local access management as well as land conservation goals. Such projects may also more effectively compete for available funding through the Vermont Housing and Conservation Board, VTrans' Enhancement Grant Program, and other programs that help fund land acquisition.

Capital Budget & Program

A municipal capital budget and program, often referred to as a "capital improvement program," is a locally adopted fiscal management tool that schedules needed capital projects – including proposed road and infrastructure improvements or land acquisitions – for the coming fiscal year, and for the following five-year period. It also identifies estimated costs and sources of financing for each project – which may include local property taxes, impact fees, state funding, and other available loan and grant programs.

Publicly funded access management and infrastructure improvements, such as those recommended in this plan, should be considered for incorporation in local capital improvement programs that are coordinated with regional and state transportation improvement programs. Stowe is currently in the process of developing a capital program and budget.

Impact Fee Ordinance

If a municipality has an adopted capital budget program in place it can also, with some additional analysis of growth trends, adopt a local impact fee ordinance (e.g., a road impact fee) to help pay for capital improvements necessitated by growth within the corridor – including road, intersection, access or sidewalk improvements, and associated land or right-of-way acquisition. This is one method used to allocate the costs of needed public improvements among several development projects. Costs are assigned to each, generally by formula, in proportion to their relative impact. Since impact fee ordinances require the adoption of a capital budget and program, an analysis of growth trends in relation to the local tax base, and the local capacity to administer the funds collected, few Vermont municipalities have adopted them to date.

Official Map

Even fewer Vermont municipalities have adopted official maps, but where they exist (e.g., South Burlington) they can be an effective tool for promoting the development of a planned, interconnected, road network. The intent is to identify and reserve, in advance of development or redevelopment of an area, the location of proposed road rights-of-way, intersections and access areas, or other proposed public improvements such as recreation paths, sidewalks and parking areas. If a development is then proposed within an area reserved on the official map, it may be subject to conditional use review to allow conditions to be placed on the property; or it may be denied if the municipality is willing to initiate proceedings to acquire its interests within 120 days of denial. This may have particular application in areas where new connecting roads such as the New Town Road in

Waterbury are proposed, or where road widening, intersection improvements, or public parking areas recommended in this study are proposed.

REGULATORY ACCESS MANAGEMENT TOOLS

Regulating access in association with the regulation of land development is a much more common method of managing access at the local level. Local road ordinances and land use regulations are a cost effective, if sometimes politically challenging, way to preserve road and intersection capacity and thereby reduce or delay the need for costly infrastructure improvements. Waterbury, Stowe and Morristown all have adopted basic access management provisions in their local land use regulations, as described under Section 1.0. Waterbury's current regulations also include access management requirements that are specific to the Route 100 corridor.

Statutory Requirements

Existing lots, development and associated accesses are grandfathered under state and local regulation – however they can be brought into conformance when changes to a property are proposed that trigger development review. This could result simply from a request to relocate an existing access, but typically also involves:

- subdivision or re-subdivision of an existing lot,
- development or redevelopment of an existing property,
- a change in the use of a property, or
- an addition or expansion that results in significant increases in trip generation rates, or alters on- or off-site site circulation patterns.

Required frontage on, or access to, public roads or public waters: Land development may be permitted on lots that do not have frontage either on a public road or public waters, provided that access through a permanent easement or right-of-way has been approved in accordance with the standards and processes specified in the bylaws. This approval shall be pursuant to subdivision bylaws adopted in accordance with §4418, or where subdivision bylaws have not been adopted or do not apply, through a process pursuant to standards defined in bylaws adopted for the purpose of assuring safe and adequate access. Any permanent easement or right-of-way providing access to such a road or waters shall be at least 20 feet in width [24 V.S.A. §4412 3)].

The content of local bylaws is governed in part by the requirements of state statutes, found in the Vermont Planning and Development Act (24 V.S.A. Chapter 117). As noted, under recent amendments to the Act, proposed municipal bylaws or amendments pertaining to access management should support and conform to goals, polices and recommendations included in the municipal plan.

Under Chapter 117, local bylaws must include one required statutory protection, intended to ensure that opportunity is provided for reasonable access to existing non-frontage, or landlocked, lots (see sidebar). Often municipalities limit this type of access approval to pre-existing, nonconforming parcels that do not meet applicable frontage requirements (e.g., landlocked or "flag" lots) and, for purposes of access management, require that all newly subdivided lots meet applicable lot frontage (or width) requirements on both public and private roads.

Under the Act, a municipality also may prohibit the development of a pre-existing lot that is less than 40 feet in width, thereby limiting the need to provide direct access to small, nonconforming frontage lots.

Chapter 117 also enables several methods of development review that may incorporate access management and related infrastructure requirements, as briefly described below. Specific access management provisions found in local regulations, by type of regulation, are presented in Table 48.

Important considerations in developing a regulatory access management program include: 1) determining the type, magnitude and/or location of development that should trigger access review and, 2) determining the appropriate type or level of review that will be required. For access management purposes all development – including access to single family homes – should be reviewed. For smaller projects on existing lots, administrative access approval under a local road ordinance or zoning bylaw may be sufficient. For subdivisions or larger development projects, reviewed by the Planning Commission, Board of Adjustment or Development Review Board should be required.

A distinction should also be made between recommended guidelines and regulatory standards. Guidelines – such as local road policies or state access management guidelines – allow for more flexible application in the real world, but may be difficult to enforce under local regulations. Regulatory standards or requirements are more easily enforceable, however, without some provision for their modification or waiver, may be unreasonable, especially when applied to a nonconforming lot.

Table 48: Regulatory Access Management Options

Regulatory Access Management Options	May be Defined or Applied Under:					
	Zoning Map	Zoning District Standards	General Zoning Standards	Site Plan Review	Conditional Use Review	Subdivision Review
Zoning District Designations						
1. Avoid "ribbon" or "strip" zoning along road corridors	Y					
2. Define compact development districts – nodes, villages, growth centers – in appropriate locations (e.g., adjacent to existing centers, major intersections)	Y					
3. Define "Access Management Overlay District(s)" to apply access management criteria to a particular corridor or intersection	Y					
Land Uses (by Zoning District)						
1. Consider allowed uses in relation to context, trip generation, transit		Y				
2. Rural: agriculture, forestry, low density residential		Y				
3. Village/Growth Center: mixed commercial, residential, civic		Y				
Densities of Development (by Zoning District)						
1. Limit scale, density of development along undeveloped sections		Y				
2. Rural: low overall density, large lots, wide frontage, deep setbacks and/or clustered development off the road		Y				
3. Village/Growth Center: high density, small lots, reduced frontage and setbacks, increased height, coverage		Y				
General Access Standards						
1. Limit access (curb cuts) to one per lot, or one per specified length of road frontage, consistent with access separation guidelines			Y	Y	Y	Y
2. Require access from a secondary road where feasible			Y	Y	Y	Y
3. Require that new or relocated driveways be aligned with facing driveways where feasible			Y	Y	Y	Y
4. Allow driveway and parking areas within side yard setbacks			Y	Y	Y	
5. Separate curb cuts and road intersections; set minimum distances			Y	Y	Y	
6. Require the relocation, consolidation or elimination of non-conforming accesses upon development or redevelopment			Y	Y	Y	
7. Define access and driveway design standards (e.g., width, length, alignment, grade) which may vary by the type of use			Y	Y	Y	
8. Limit access and driveway widths to the design width, require curbing or other access control features			Y	Y	Y	
9. Require adequate driveway length for storage and stacking			Y	Y	Y	
10. Require driveway turn around areas; prohibit direct parking that requires backing into rights-of-way (except for on-street parking)			Y	Y	Y	
11. Specify access requirements for Class IV (seasonal) roads			Y			
Site Layout Standards						
1. Rural: minimize the linear density of development along roads, maximize internal site circulation (access to outparcels)				Y	Y	Y
2. Village/Growth Center: maximize connectivity, create or maintain a pedestrian scale and orientation				Y	Y	Y
Site Layout Standards, continued						
3. Village/Growth Center: reduce or eliminate on-site parking requirements (e.g., based on the availability of on-street, shared or public parking, or the use of parking or transit credits)				Y	Y	Y
4. Limit parking to the side or rear of buildings				Y	Y	Y
5. Require shared access and interconnected parking with adjoining properties and uses (joint and cross access) where feasible; or access easements that connect to adjoining parcels in the event they are developed or redeveloped.				Y	Y	Y
6. Require pedestrian sidewalks or paths between buildings, parking areas, and where feasible to adjoining parcels.				Y	Y	Y
7. Require the installation of mid-block pedestrian crossings where appropriate				Y	Y	Y
8. Require the installation of public transit facilities, where served.				Y	Y	Y
9. Require the installation of bicycle racks for commercial, industrial, civic, multi-family and recreational uses.				Y	Y	Y
Multi-Property Standards						
1. Allow for or require planned unit (and planned residential development); to include requirements for clustering					Y	Y
2. Require the submission of a master plan for phased development, showing planned access points, road and pedestrian extensions						Y
3. Require that the pattern of subdivision ensures proper access and street layout in relation to existing or proposed roadways						Y
4. Discourage or prohibit the creation of flag and other irregularly shaped lots that do not meet access or frontage requirements						Y
5. Require that newly subdivided parcels be served by existing or planned accesses; limit the creation of new accesses associated with resubdivisions						Y
6. Require access to individual lots from internal (e.g., service, development) roads						Y
7. Define road and road intersection standards						Y
8. Discourage the creation of dead-end roads, including cul-de-sacs						Y
Infrastructure Requirements						
1. Require traffic impact analyses for larger projects, to be paid for by the developer, to determine traffic and infrastructure impacts associated with a proposed development					Y	Y
2. Require the installation of on- and/or off-site access, road and/or traffic management improvements necessitated by the development, to be paid for by the developer				Y	Y	Y
3. Require bonding to ensure that required improvements are installed and maintained				Y	Y	Y

Zoning Regulations

Zoning regulations typically govern the type and density of development on existing lots, within designated zoning districts. They may also include access management standards that apply to all development (general standards), or that are specific to a particular zoning district (district standard) or type of use (use standard).

Zoning Districts. For purposes of access management, zoning district designations should be reviewed in relation to recommended access management strategies. For example:

- Zoning districts should be delineated to avoid strip (or ribbon) commercial and residential development along the corridor; and to promote higher densities of concentrated, mixed use development in areas served by an interconnected road network, shared or on-street parking, pedestrian paths and sidewalks, and public transit. Such districts may be defined to include expanded historic village centers, or new growth centers (or "nodes" as recommended in the 2003 Waterbury Town Plan) at key intersections or areas that allow for the development of an interconnected road network. Zoning districts may also incorporate specific access management standards for identified "transitional areas" that are intended for further development or redevelopment.
- Allowed uses within each district should be reviewed in relation to potential trip generation rates and associated access requirements. For example, both Morristown and Stowe currently restrict development along rural segments of the VT 100 corridor to agriculture, forestry, outdoor recreation, and moderate to low densities of residential development. This in effect limits the need for additional commercial accesses in these areas, though access to residential properties remains a consideration.
- District dimensional requirements – and in particular minimum lot size and frontage (or lot width) requirements – should be reviewed in relation to desired densities of development. For example Waterbury requires a five-acre minimum lot size for commercial development within the Route 100 District, and 10 acres within other conservation districts along the VT 100 corridor. This helps promote relatively low overall densities of development. District frontage requirements should be reviewed in relation to minimum lot sizes to avoid the creation of long, narrow lots; and also in relation to recommended access separation distances which vary based on the posted or design speed of the adjoining road. In districts where the minimum frontage requirement is less than the recommended access separation distance (e.g., within a village area), provisions for shared access and parking, and access to on-street or other off-site parking will be necessary.

General Access Standards. Typically, general standards apply to all development including the development or redevelopment of existing lots for which other types of access approval may not be required, such as single- or two-family dwellings. Access guidelines or standards that apply to all development – including curb cut and driveway standards – should be considered for incorporation

under a local road policy or ordinance that is referenced in the zoning regulations, or under general zoning requirements along with parking and other similar standards. Consideration should be given to whether access management requirements under state rules (for VT 100 and other state highways) and local road policies or ordinances (for local roads), if adopted by reference, are sufficient to manage the siting and design of accesses and driveways, or whether additional general standards may be needed.

For purposes of coordination, general access management standards under zoning regulations should at minimum reference the need for an applicant to obtain access approval from VTrans for state highways, or from the Selectboard for access to local roads, prior to the issuance of a zoning permit. This is an easy way to ensure under zoning that the access to a lot that is being developed is consistent with existing state and local access requirements. In addition, the following standards or guidelines should be considered under general regulations, or incorporated by reference to related state and municipal guidelines as appropriate:

- A limit of one access per lot, or specified length of road frontage (in relation to separation distances),
- A requirement that lot frontage and access requirements shall apply to both public and private road rights-of-way,
- A requirement that if a lot has frontage on two roads, access shall be provided from the secondary or less traveled road,
- A requirement that new accesses shall either be aligned with facing accesses or intersections, or be offset in accordance with specified separation distances.
- Access separation distances from adjoining and facing accesses and intersections – based on posted or design speeds, minimum stopping distances and intersection function areas (e.g., as recommended under VTrans' *Access Management Program Guidelines*),
- Adequate separation between driveways and intersections to protect the functional operating areas of intersections. Protecting the operation of intersections between VT 100 and the local road system and VT 100 and US 2, VT 15, and I-89 is a critical access management issue. Driveways should not be located within the functional areas of these intersections.
- Corner sight distances (e.g., as recommended under VTran's *Access Management Program Guidelines*),
- Access design standards (dimensions, grade, surfacing) which vary in relation to the type of development to be served (e.g., VTrans' Standard Drawing B-71 for residential and commercial drives),
- Requirements for curbing or other edge defining features that limit vehicular access to the approved access, and

- Requirements for driveway turnaround areas to avoid the need to back out into the road right-of-way.

Provisions under this section could also allow for modifications or waivers of required standards on appeal to the Board of Adjustment or Development Review Board, or for projects that are otherwise subject to review by the Planning Commission, Board of Adjustment or Development Review Board. These should include related determinations that such modifications are necessary and appropriate:

- to ensure reasonable, safe and adequate emergency, vehicular or pedestrian access to and from the site; and/or
- to allow for more functional site layout and design where physical constraints or lot limitations exist.

District & Use Standards. In cases where the town-wide application of stringent access management standards is considered unnecessary, inappropriate, or politically untenable, the case can often be made for applying such standards only within certain zoning districts – for example in areas zoned for commercial development, such as Waterbury's Route 100 District, or within a designated "**access management overlay district**" (see Sidebar). Another option is to apply more stringent access standards to particular uses that generate a lot of traffic (e.g., in excess of 75 trips per peak hour). For example, gas stations standards often include specific access management requirements.

Site Plan Review

Site plan review by the Planning Commission or Development Review Board typically regulates site layout and design of an individual lot that is intended for single or mixed use, and may be applied under zoning (or through a separately adopted bylaw) to all but single and two-family dwellings, which are exempted by statute. Site plan review generally includes standards for adequate traffic access, parking and circulation, and landscaping and screening. All three municipalities along VT 100 incorporate site plan review requirements in their regulations. Waterbury makes use of site plan review to apply access management requirements within the Route 100 zoning district. Site design standards appropriate for consideration under site plan include the following:

Access Management Overlay Districts

An access management overlay district is a special type of zoning district that overlays one or more underlying zoning districts along a road corridor, or within an interchange or intersection area. Typically such districts are designated to implement an adopted access management plan.

Access management overlay districts are used to apply access management requirements to development within specific corridor segments or at key intersections where access management improvements are anticipated or required. They are especially effective for regulating access along developing commercial corridors or in the vicinity of interchange areas.

Such districts also may allow for the application of access management standards along a particular corridor such, as VT 100, which other-wise may be considered too restrictive for town-wide application.

- Reference to general access management requirements (access and driveway standards) described above.
- Provisions for the elimination, relocation and/or consolidation of nonconforming accesses.
- Allowances for on-street or other off-site parking where appropriate (e.g., in village areas).
- A requirement to site or cluster structures on the lot in a manner that minimizes the need for multiple, individual road accesses, and that accommodates a pedestrian scale of development where buildings and parking areas are sited within easy walking distance of each other.
- Requirements for shared access and shared or interconnected parking areas, to be used by all structures or uses on the site, and by any adjoining parcels which currently or subsequently come under common ownership.
- Prohibitions against parking within front setback areas, particularly immediately adjacent to road rights-of-way; and a requirement that, to the extent feasible, parking areas are to be located to the side or rear of buildings, to limit access and parking within or adjacent to road frontage areas, and to allow for interconnected access (cross connections) with adjoining parking areas.
- Requirements that off-street parking areas must be visually and functionally separated from the road right-of-way through the use of curbing, green strips, fencing, landscaping or other edge defining features that also serve to limit vehicular access.
- Requirements that off-street parking areas include adequate on-site maneuvering areas and aisles, which may include detailed parking design and layout standards as appropriate.
- Requirements for the installation of pedestrian sidewalks or paths that link structures and parking areas on the site, and connect the site to adjoining parcels and/or the existing pedestrian network.
- Provisions for handicapped access and parking.
- Requirements for the installation of safe, well-defined, crossing areas where vehicular accesses cross or otherwise affect pedestrian, bicycle or handicapped access facilities.
- Requirements for easements to adjoining parcels to accommodate future cross connections for shared parking, and for shared or interconnected vehicular and pedestrian access.
- Provisions for the installation of public transit facilities (e.g., bus shelters) where appropriate.
- Provisions allowing for connections to existing recreation and bicycle paths where appropriate.
- A requirement that the developer pay for any necessary site and infrastructure improvements necessitated by the proposed development.

- Requirements for bonding or other forms of surety acceptable to the Selectboard, to ensure that required improvements are installed and maintained.

Again, it may be appropriate to allow for modifications or waivers from these provisions under circumstances specified in the bylaw.

Conditional Use Review

Conditional use review by the Board of Adjustment or Development Review Board is intended to evaluate the impacts of a proposed development, identified in the bylaw as "a conditional use," on traffic and roads in the vicinity, other municipal facilities and services, adjoining properties, and the character of the area. The zoning regulations for Waterbury, Stowe and Morristown all incorporate conditional use review, which include very limited access management requirements. Conditional use review criteria should at minimum include:

- Reference to general access management and site plan standards described above.
- Requirements for the review of development within rights-of-way or other areas identified on the official map, to include the negotiated dedication of land or interests in land where agreed to by the applicant.
- Requirements for traffic impact analyses that identify trip generation rates, evaluate potential impacts to local traffic patterns and to the functional capacity of roads and intersections in the vicinity of the development (e.g., in relation to anticipated or required levels of service), and recommend needed traffic control and/or infrastructure improvements.
- A requirement that the developer must pay for any on- or off-site access and infrastructure improvements necessitated by the proposed development – particularly in accordance with any adopted capital budget and program or impact fee ordinance.
- A requirement for bonding or another form of surety acceptable to the Selectboard, to ensure that required improvements are installed and maintained.

Where site plan review does not exist, conditional use review standards may incorporate access standards more often found under site plan review – for example standards that require the elimination, consolidation or relocation of nonconforming accesses. Where site plan and conditional use review both apply to a particular project, access management standards under each should be reviewed to make sure they are consistent. In order to ensure that such standards are consistently applied, Chapter 117 now includes provisions for site plan review criteria to be incorporated under conditional use review, effectively eliminating the need for duplicate review processes. Specifying the sequence of review and/or consolidating review procedures and standards under one review process

can help avoid the potential for two boards to apply conflicting access management requirements to the same project.

Subdivision Review

Subdivision review by the Planning Commission or Development Review Board, which regulates the creation of new lots through the subdivision (or re-subdivision) or existing parcels, is perhaps one of the most effective tools for controlling the pattern of development, and associated access requirements, along a highway corridor. Subdivision regulations can be used to control access to multiple properties, and typically include related infrastructure requirements. Morristown and Stowe have adopted subdivision regulations. Waterbury regulates subdivisions to a more limited extent under site plan review. Stowe's subdivision regulations include a 1000-foot access separation distance requirement along VT 100 (or 600 feet within village districts) which in effect requires shared access for lots that cannot meet this separation distance.

For purposes of access management, subdivision review standards should be reviewed and updated with consideration given to the following guidelines or requirements:

- Subdivided lots in village areas should reflect village patterns of development, share access and on-site parking or incorporate on-street or other off-site parking as appropriate, and provide sidewalks or other pedestrian connections between adjoining lots.
- Subdivided lots in rural settings should be clustered or grouped (e.g., in association with a planned unit or planned residential development) to allow for shared access, common or interconnected parking areas, and pedestrian connections between lots.
- The pattern of subdivision should ensure adequate and safe access and street layout in relation to existing and planned roads and intersections – including those depicted on the official map, if one exists.
- Newly subdivided parcels should be served only by existing or planned accesses, which should be designed to accommodate any further subdivision or re-subdivisions.
- Access to individual lots shall be provided only from shared driveways or from an internal development or service road.
- The Commission/Board may require the elimination, relocation and/or consolidation of nonconforming accesses serving subdivided properties.
- Subdivisions of up to three lots may be required to share a driveway, even if each lot meets district frontage requirements
- Access or development roads serving four or more lots should meet specified road and intersection standards (e.g., VTrans' Standard Drawing A-76, or *Vermont State Standards for the Design of Transportation Construction, Reconstruction and Rehabilitation on Freeways, Roads and Streets,* October 1997).

- Permanent dead-end roads and cul-de-sacs should be avoided, except where physical site constraints prohibit through connections to adjoining parcels.
- Access or road easements to the boundaries of adjoining parcels shall be provided to accommodate future cross connections, and shall be shown on the subdivision plat.
- Traffic impact studies, the installation of needed traffic control, road and intersection improvements necessitated by the proposed subdivision, the phasing of development in accordance with an adopted capital improvement program, and/or bonding may also be required to ensure that the transportation infrastructure serving the subdivision is adequate.

Subdivision regulations may also include requirements for the submission of "master plans" and phasing schedules for larger projects that extend over several years, and associated requirements – as specified in the conditions of approval, or through a development agreement with the town – regarding the construction specifications, timing and installation of necessary access, road and intersection improvements.

ACCESS MANAGEMENT COORDINATION

At the local level, effective access management requires close coordination and communication between the Select Board, which is responsible for adopting and administering local road ordinances (including the issuance of highway access permits), and those local officials responsible for administering local land use regulations – including the Zoning Administrator, Planning Commission, Board of Adjustment or Development Review Board. For access management along VT 100, and other roads in the state highway system, this level or coordination should extend to the Agency of Transportation, which is responsible for approving access to the state highway system. The following are options for ensuring the access management requirements are fairly, effectively and consistently applied.

Adoption of Consistent Review Standards

Access management guidelines or standards included in local land use regulations should be reviewed for consistency with similar standards found under local road ordinances. In turn, the municipality should consider the adoption of state access management and design standards where appropriate, particularly as they apply to development to be accessed by the state highway network. Often local or state guidelines or standards are incorporated by reference in local bylaws.

As noted above, the access management standards within the land use regulations that apply to different types or levels of development review should be reviewed for consistency.

Referral Requirements

Local ordinances and regulations should specify the timing and sequence of highway access approval in relation to development review, and any related requirements for application referrals to the Selectboard or VTrans for highway access approval.[1] At minimum, the regulations should allow for, or require, consultation with local and state officials (by the applicant and/or the local official or board) prior to the issuance of zoning permits and approvals under local land use regulations. In addition local land use regulations should also include:

- For projects that require only administrative review (e.g., the issuance of a zoning permit), a requirement that no zoning permit shall be issued until access approval is obtained, to ensure that access to the proposed development meets local or state access requirements.[2]
- For projects that require Planning Commission or Board approval under zoning (e.g., site plan or conditional use review), the regulations should specify that highway access approval be obtained after the issuance of site plan or conditional use approval, to ensure that access requirements are consistent all other requirements of local development approval.
- For subdivision review, it is often common that highway access approval be obtained following preliminary plat approval, but prior to final plat approval, to ensure that proposed roads, intersections and accesses are consistent with both local and/or state requirements.

Access Management Agreements

An especially effective way of coordinating access management and permitting along state highways such as VT 100 is the use of an "Intergovernmental Access Management Agreement" or memorandum of understanding. Such agreements are increasingly being used in Vermont, and around the country, to coordinate access management between multiple jurisdictions along specified road corridors or interchange areas. The agreement, entered into between the state and one or more municipalities, typically:

- Identifies the road segment or interchange area covered under the agreement, as shown on an accompanying map,

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[1] For example, during the course of developing this plan, Morristown amended its subdivision regulations to specifically require that "applicants for subdivisions which front on state highways must solicit written comment from the Vermont Agency of Transportation, Utilities & Permits Unit, regarding the proposed access from new lots onto the state highway. The Agency's comments must be submitted for the DRB's review of the application."

[2] Unfortunately, for access management purposes, the statutory requirement under Chapter 117 that all applications for development within 500 feet of interstate entrance or exit ramps be referred to the Agency of Transportation for review and comment was eliminated under Chapter 117 as of July 1, 2004 with the adoption of Act 115.

- Identifies those parties having jurisdiction and their respective permitting authority and responsibilities,
- Identifies the access management category of the segment(s) in question,
- References an attached comprehensive access management plan, accepted by all parties, to meet current and future capacity demands and public safety requirements, while also providing reasonable access to local development within the designated area,
- Specifies that all parties regulate access and development in accordance with the agreement, and associated procedures to coordinate state agency and local development review,
- Limits new accesses to approved locations shown on the map, and requires that existing accesses be brought into conformance when they come under review,
- Specifies that transportation planning and traffic management operations will be consistent with the adopted agreement, and
- Includes provisions for amending the agreement, and/or the access management plan.

Examples of such agreements are available from the Agency of Transportation's Utilities and Permits Unit.

Participation in Joint Planning, Project Development and Permitting

This access management plan is the most recent example of long-standing, coordinated efforts among the three municipalities and two regional planning commissions along the corridor to address shared interests and concerns relating to VT 100. Such efforts date from at least the early 1990s, which resulted in the adoption of the 1993 *VT 100 Corridor Study*. It was clear from meetings associated with access management plan development that there is a strong interest in sustaining coordinated planning, project development and review efforts as needed to implement recommendations included in this plan. Continued coordination can be accomplished through a number of means, including:

- Municipal incorporation and adoption of VT 100 access management plan recommendations in updated municipal plans and bylaws as appropriate.
- Ongoing municipal participation in the joint transportation planning efforts of the Central Vermont Regional and Lamoille County Planning Commissions, through active municipal representation on their respective transportation advisory committees. This could include establishing the VT 100 Project Advisory Committee as a permanent subcommittee of each TAC.
- Continued municipal participation, through regional planning commission representation and staff, in the development of regional land use plans, transportation plans and

transportation improvement programs. This could include coordinated municipal and regional plan updates that incorporate VT 100 access management recommendations, and the identification and scheduling of recommended road, intersection and access management improvements along Route 100 in local and regional transportation plans, and the regional transportation improvement program.

- A joint interagency access management agreement for VT 100, as described above, that is intended to coordinate access management and development review along the corridor.
- Collective participation in the development and legislative approval of the state's transportation improvement program, including project planning and development efforts, and the scheduling of priority VT 100 infrastructure improvements for state and federal funding.

- Collective participation through the regional planning commission and/or individual municipal participation in state Act 250 review proceedings, to ensure that traffic, development, and associated access management concerns are adequately addressed in the state permitting process.

ADMINSTRATIVE ACCESS MANAGAMENT RECOMMEMDATIONS

Municipal Plans

All three existing municipal plans include references to the importance Route 100 as a regional transportation corridor, the 1993 VT 100 Corridor Study, and associated recommendations for needed infrastructure improvements – including road, pedestrian and recreation path improvements along the corridor. Each plan also includes recommendations for better access management through local road policies and development regulations. The plan for Waterbury includes a section in its transportation element that is specific to access management.

Each plan also includes relevant land use recommendations that, if implemented, could affect pattern of development and the need for additional access along the VT 100 corridor:

- The Waterbury plan includes a recommendation that development along Route 100 be concentrated in designated "nodes" which, if implemented through local regulations, would result in a major rezoning of the current Route 100 district and in effect limit commercial development along much of the length of the corridor.
- The Stowe plan includes recommendations to expand the Meadowland Overlay District, and associated transfers of development rights, to include open land along the Route 100 corridor. This could have the effect of further limiting development along VT 100 outside of village zoning districts.

- The Morristown/Morrisville plan also suggests potential rezoning and access management as needed to protect the rural character of Route 100 south of the Morrisville, and in relation to the Alternative Truck Route.

As such, existing municipal plans already provide the statutory basis for both non-regulatory programs and regulatory changes that could promote better access management along the VT 100 corridor. In future plan updates, the following should be considered:

1. Incorporation, by reference or attachment as appropriate, recommendations included in this plan – including updated access management strategies, road and intersection improvements.

2. A review, under the land use element, of proposed land use districts along the corridor and in the vicinity of connecting roads, to include a review of allowed uses and densities of development – particularly in relation to projected traffic conditions, available road frontage, the potential for new accesses or interconnecting roads, and intersection function.

3. Incorporating a section under the transportation element that specifically addresses access management, to include the assignment of road functional and access management classifications (as shown on the transportation map), references to existing or proposed state access management guidelines, the identification of needed access management improvements, and a list of recommended regulatory and non-regulatory access management tools or techniques for local application.

Non-regulatory Access Management

Several of the plans and bylaws reviewed include references to capital budgets and programs, official maps, and other non-regulatory tools described here that, if adopted, could enhance local access management programs, particularly with regarding to identifying, reserving land for, and funding needed infrastructure improvements. These types of programs, however, may require some additional administrative capacity. The following should be considered as appropriate for each municipality:

1. The adoption of this plan as the municipal access management plan for the VT 100 corridor, to support local access management review, municipal and regional project development, and coordinated access management with the other municipalities along the corridor and the Agency of Transportation.
2. The adoption of a local capital budget and program that schedules recommended access, road and intersection improvements in relation to regional and state transportation improvement programs, and identifies proposed sources of local financing, which could include road impact fees.

3. The adoption of an official map that at minimum shows the location of land reserved for recommended public infrastructure improvements, including new or expanded road rights-of-way and associated access, intersection, sidewalk and recreation path locations (e. g, the ATR and the New Town Road).
4. The adoption of a road impact fee ordinance that allocates the costs of infrastructure improvements resulting from additional growth to new development along the corridor. A municipal plan and capital improvement program also are required for impact fee ordinance development and adoption.
5. The continued acquisition of land or interests in land, through negotiated dedication or purchase, to further access management goals in association with broader land conservation and open space protection objectives, particularly along less developed rural and scenic segments of the VT 100 corridor. Sources of potential assistance and funding include VTrans' Enhancement Grant Program, the Vermont Housing Conservation Board, the Vermont Land Trust, the Stowe Land Trust, and the Municipal Planning Grant program.

Regulations

All three municipalities have adopted some access management provisions in their regulations that apply largely to nonresidential development or subdivisions along VT 100, as described elsewhere in this plan. These generally include zoning district, use, site plan, conditional use, and/or subdivision standards – though they vary markedly by municipality in their extent and application. All three municipalities also have local road policies or ordinances in effect.

In lieu of recommending specific changes to each set of regulations, it is suggested that the access management criteria listed above by type of review, and in model language provided under Appendix F, be considered as appropriate for application in each municipality under future bylaw updates. The following are also recommended for consideration to better manage access along VT 100:

1. Redefine zoning districts along Route 100 as recommended in municipal plans (e.g., the Route 100 District), with consideration given to allowed uses (potential trip generation rates); district density, lot size and frontage requirements; and available or planned connecting roads that would serve development in the district.
2. Adopt an "Access Management Overlay District" along one or more segments of the Route 100 corridor – for example, within the seven areas where existing access deficiencies are concentrated – to require recommended improvements to individual parcels as they come under review. Another option is to incorporate access management standards specific to VT 100 as district standards within the zoning districts bordering the corridor (e.g., as Stowe and Waterbury have done to a limited extent).

3. Adopt basic access management (curb cut and driveway) standards that apply to all development within general regulations under local zoning. This could include simply adopting state and local guidelines by reference. Currently most access management standards under land use regulations do not apply to single or two-family dwelling units on existing lots along the corridor.
4. Update site plan, conditional use and/or subdivision review standards as appropriate – to include a review of existing access management, intersection, parking and road standards for consistency with local road policies and ordinances, and for state highways, with the state's management guidelines. In addition:
    - Waterbury should consider, as feasible, the adoption of subdivision regulations to more effectively regulate the creation of lots, access to multiple properties, associated road and access infrastructure improvements, and requirements for master planned and phased development.
    - Stowe should review access management standards under site plan, conditional use and subdivision review for consistency and, with the existence a development review board, consider consolidating access management requirements as applied to the development or redevelopment or existing lots under one review process (e.g., by incorporating all site plan review criteria under conditional use review).
    - Morristown and Morrisville should consider strengthening access management review criteria under both site plan and conditional use review.
5. Specifically incorporate state access management program guidelines, local road policies, and related access management standards in local land use regulations as appropriate for consideration in local development review.
6. Define in local land use regulations the timing and sequence of review for obtaining state or local highway access approval in relation to local zoning permits and approval. This should include application referral and/or consultation requirements as appropriate.

Coordination

Ongoing cooperation between Waterbury, Stowe, Morristown and Morrisville, the Lamoille County and Central Vermont Regional Planning Commissions, the Agency of Transportation, and local property owners, is necessary to effectively address development, traffic and associated access management issues along the VT 100 corridor. Opportunities and methods for coordination identified to date could include:

1. The establishment of the Route 100 project advisory committee as a permanent subcommittee of each regional commission's transportation advisory committee, to be coordinated through regional commission and municipal staff.
2. The adoption of consistent access management review guidelines and standards that apply specifically to the VT 100 corridor.

3. The adoption of an "Intergovernmental Access Management Agreement" between the three municipalities, the Agency of Transportation, and potentially the two regional planning commissions, to coordinate access and development review for projects requiring access to VT 100.
4. Continued participation in joint corridor planning and project development efforts through the two regional planning commissions, particularly with regard to the development of regional plans and transportation improvement programs, to incorporate priority VT 100 road, intersection, and access management improvements as recommended in this plan.
5. Collective participation in the development and legislative approval of the state transportation improvement program, to include the scheduling of priority projects along the VT 100 corridor for state and federal financing.
6. Collective and individual participation in state Act 250 proceedings for development proposed on VT 100, to ensure that related traffic, access and infrastructure impacts – particularly as they cross municipal boundaries – are adequately addressed in the permitting process.

Growth Management

Access management and land use policies within the Route 100 corridor can have a significant impact on traffic safety and highway capacity. With 87% of projected traffic increases to result from development beyond parcels that directly abut VT 100 in the study area, however, town-wide land use planning and growth management policies are required to influence future traffic conditions. A comprehensive planning program that addresses area-wide growth should include the following:

- Growth management policies that ensure that the rate of development is coordinated with the provision of facilities needed to support that development. Related programs include capital budgets and programs to identify anticipate facility deficiencies and coordinate capital expenditures; impact fees to fund capital facilities, including highway improvements, attributable to new development; and development phasing programs to manage the rate of growth.
- Land use policies that discourage scattered development and reinforce existing and new growth centers. Related programs in "rural' portions of the communities include land conservation and open space protection; and development regulations that maintain low overall development densities. In addition, promoting concentrated development in new and existing village centers can enhance opportunities for transit and pedestrians and reduce traffic.
- Transportation policies that promote transit and the development of an interconnected road network that reduces reliance on Route 100, especially for short trips within the communities. Related programs include designation compact, transit-friendly growth centers; supporting opportunities for alternative transportation modes (e.g., bike paths); and limiting long dead-end cul-de-sacs in favor of planning development that results in an interconnected road network

through subdivision standards and/or the adoption of an official map depicting future road connections.

SECTION 8.0 SUMMARY

The *1993 VT 100 Corridor Study* identified access management and land use planning as two important strategies to maintaining a tolerable level of congestion along VT 100 through 2011. This plan focuses on those two strategies under existing conditions and in the planning year of 2025.

This plan presents recommendations for the highway system that will improve access management from the system-wide and location specific perspectives. System-wide access management principles include providing a specialized road network and providing efficient connections between local, collector, and arterial highways. The specialized road network in the study area will be improved by constructing the Route 100 Alternate Truck Route in Morristown, which will accommodate through traffic, and the New Town Road in Waterbury, which will improve local circulation and reduce local trips on VT 100. A mix of intersection modifications, including providing turn lanes on VT 100, traffic signals, and roundabouts has been recommended to provide for efficient connections between VT 100 and the local road system and between VT 100 and the national and state highway systems at US 2, I-89, and VT 15.

Location specific access management principles are most concerned with how adjacent property accesses the highway system through proper design and location of driveways. Existing locations where driveways do not meet access management design guidelines are concentrated within seven areas along the corridor. Recommendations have been made to improve access at these locations such as consolidating driveways, providing cross connections between adjacent parcels, and relocating access from VT 100 to side streets for corner parcels.

Improving access design and location over the long term can be accomplished through municipal plans, regulations, and the development review processes in each of the three towns. In addition, to ensure that access management requirements are fairly, effectively and consistently applied, there is a need to improve the coordination between the VTrans and the local officials responsible for adopting and administering local road ordinances and land use regulations. This plan identifies a list of regulatory and non-regulatory administrative tools that can be referenced as local plans and regulations are updated. Also included is a list of strategies that can help improve coordination between VTrans, Waterbury, Stowe, and Morristown.

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