Vermont Corridor Management Handbook

Vermont Agency of Transportation

July 2005

Vermont Corridor Management Handbook

prepared for

Vermont Agency of Transportation

prepared by

Cambridge Systematics, Inc.
100 CambridgePark Drive, Suite 400
Cambridge, Massachusetts 02140

July 2005

Table of Contents

Vermont Corridor Management Handbook

prepared for

Vermont Agency of Transportation

prepared by

Cambridge Systematics, Inc.
100 CambridgePark Drive, Suite 400
Cambridge, Massachusetts 02140

July 2005

Background

Transportation needs are most effectively addressed at the corridor level rather than on a piecemeal basis.

The Vermont Corridor Management Handbook

This Corridor Management Handbook (CMH) was developed to provide a technical resource for state and regional agency planners and their consultants who are undertaking development of a transportation corridor management plan. The handbook also may be helpful to a broader set of people who are involved in corridor planning efforts – local officials; planning, zoning, and public works staff; transit service providers; corridor residents and businesspeople; and other interests.

Purpose of the Handbook

The idea for this handbook grew out of the recognition that many of Vermont's transportation needs can be most effectively addressed at the corridor level rather than on a piecemeal basis. Limited resources for transportation improvements at all levels of government are dictating more creative and collaborative approaches to solving – and preventing transportation problems. A corridor approach offers the opportunity for communities to collectively plot a future strategy which makes the best possible use of available resources, takes advantage of synergies to produce the best outcomes, and has a greater chance of becoming a reality – than would otherwise be the case if each community acted on its own.

Vermont Corridor Management Handbook – What's Included?	
OBJECTIVES	Purpose, scope, and intended outcomes of a corridor plan.
PROCESS	Steps involved in developing a corridor plan.
TECHNICAL ANALYSIS	Data sources and analysis methods.
PARTICIPATION	Methods for involving stakeholders and the public.
SOLUTIONS	Approaches to selecting appropriate corridor management strategies, including both transportation and land use strategies.
IMPLEMENTATION	Mechanisms for implementation of corridor study recommendations and monitoring performance of the corridor over time.

Best Practices for Corridor Planning

This handbook lays out a set of best practices for corridor planning. Agencies embarking on a corridor planning effort are encouraged to follow these best practices and produce corridor management plans that are:

Corridor Planning is:
Comprehensive
Proactive
Visionary
Collaborative

- *Comprehensive*, based on a full understanding of the dynamics of transportation and all interacting influences within the corridor;
- *Proactive*, seeking to identify and address transportation-related problems before they arise, rather than after they have grown to the point of being intolerable;
- *Visionary* in nature, meaning that the recommended strategies for the corridor arise from a shared vision for the corridor established by local communities and state agencies with jurisdiction over the corridor; and
- *Collaborative*, meaning that transportation agencies, local governments, stakeholders and the public at large all participate in the development, implementation and monitoring of the corridor plan.

A successful corridor management plan is a living document that provides a blueprint for action.

A successful corridor management plan is one that state and regional planning agencies, municipalities, and other stakeholders in the corridor use as a blueprint for future action. The plan should be a *living* document that is updated periodically in response to changing conditions and needs. An effective corridor management plan is not a wish list of projects that may never be funded, but rather a balanced set of realistic transportation and land use strategies. Some of these strategies may be pursued immediately; others may need to wait for an appropriate or opportune time. The critical ingredient for success is a shared commitment to take responsibility for seeing that the strategies in the plan are implemented.

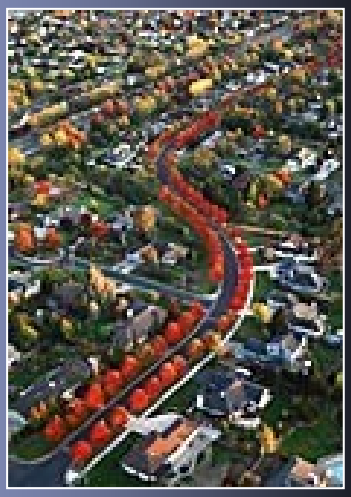
The Benefits of Corridor Management

Why undertake a corridor management plan effort?

- To identify and address transportation deficiencies before they turn into critical problems that can affect quality of life and limit economic development;
- To allow for development of coordinated transportation and land use solutions along a corridor – a far more effective approach than individual piecemeal initiatives that may act at cross-purposes;
- To bring diverse stakeholders together (local, regional, and state agencies, property owners, and others) and agree on mutually beneficial strategies as well as ongoing mechanisms for cooperatively pursuing these strategies;
- To save money by implementing non-capital intensive strategies (such as operational improvements, access management, or land use policies) as an alternative to expensive transportation capital investments;
- To develop creative strategies for supporting sustainable economic development in corridor communities; and
- To ensure that transportation needs are addressed in a manner that preserves and enhances Vermont's natural environment and the unique character of its communities.

Definitions

What is a Corridor?



A ***corridor*** is defined as:

"A broad geographic band …

connecting population and employment centers…

served by various transportation modes…

within which passenger and freight travel, land use, topography, environment and other characteristics are evaluated for transportation purposes."

A corridor can vary in length from one mile to over 100 miles. In Vermont, most corridor studies will be defined to include a stretch of roadway, its right-of-way (including utilities, drainage, traffic control devices, and parallel sidewalks or pathways), adjacent land use development, and elements that compose the scenic view. In many cases, it will be appropriate to also include one or more parallel roadways and/or rail lines.

The definition of a ***corridor study area*** includes the corridor itself as well as nearby land areas and transportation facilities (e.g., airports, freight terminals) that influence travel demand in the corridor. The geographic boundaries of the study area typically coincide with geographic units used for reporting population, employment and travel demand data, such as cities, towns, or census tracts. This allows for use of readily available information on likely future growth patterns and transportation needs. However, the study area definition should be based on an understanding of travel patterns and needs rather than on data availability considerations.

What is Corridor Management?

The term ***corridor management*** refers to the practice of identifying and implementing a mutually supportive set of strategies to maintain and enhance access, mobility, safety, economic development, and environmental quality along the transportation corridor. A ***corridor management study*** or ***corridor study*** is a comprehensive assessment of issues, needs, and potential solutions to address these objectives. A corridor study should consider all modes, including transit, bicycling, and walking, as well as automobile and commercial vehicle travel along the corridor. It should consider operational improvements and maintenance as lower-cost, lower-impact alternatives to capital investment strategies. It also should consider land use strategies that address the impacts of growth patterns and local land use decisions on traffic conditions and travel demand.

A corridor management study has a long-term focus, addressing land use and transportation strategies to be undertaken over a 20-year or greater time horizon. It is conceptual and strategic in nature, and will typically not focus on development of specific projects. However, one possible outcome is that one or more capital improvements may be recommended for more detailed planning and design work. A corridor management study does not involve the development of detailed engineering designs, or produce formal environmental documentation of project impacts.

What is a Corridor Management Plan?

The corridor management study should result in a ***corridor management plan*** that includes a package of recommended land use and transportation strategies that comprehensively address present and future transportation needs. Types of strategies included in the plan may include:

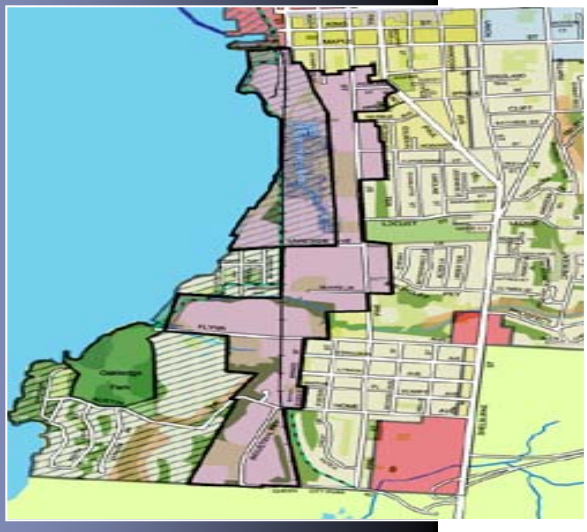
- Transportation improvements;
- Land use strategies such as zoning, land conservation, or access management;
- Landscaping, and preservation of right-of-way;
- Management tools and processes such as development guidelines, design guidelines, and plan oversight and monitoring; and
- Mechanisms for interjurisdictional cooperation.

A corridor management plan will ideally provide a mix of these strategies that are mutually reinforcing and consistent with an agreed-upon vision for the corridor. It also will provide a set of well-defined, prioritized actions, and define clear responsibilities to carry the strategies forward into implementation.

Must a Corridor Management Study be Comprehensive?

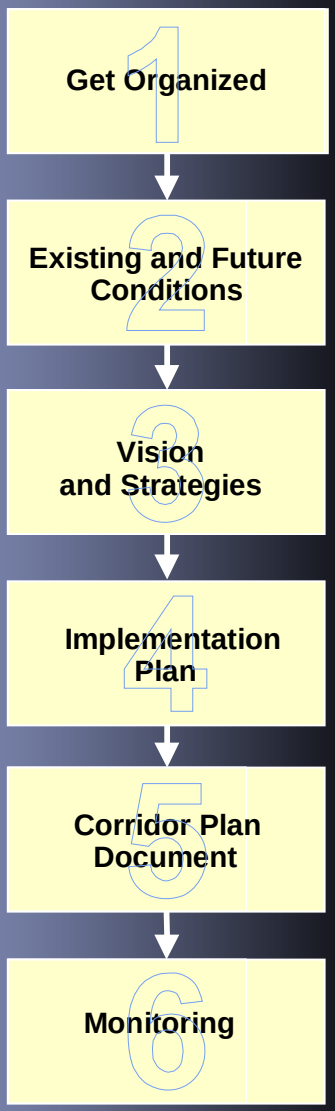
Studies are often performed that focus more narrowly on a specific topic within a corridor, such as access management or short-term solutions to traffic problems. These types of studies can be appropriate in many situations: to implement specific recommendations from a corridor management study, when funding is not available for a more comprehensive study, or when immediate, short-term needs and opportunities exist. This handbook can be used as a resource for these more narrowly focused studies. However, many of the intended benefits of a comprehensive corridor management study process – a synergistic approach that avoids conflicting, piecemeal actions, and an emphasis on broad participation, buy-in, and ongoing implementation – may not be realized with a more limited effort.

Relationship to Other Planning Activities



VTrans, the Chittenden County Metropolitan Planning Organization (CCMPO), the regional planning commissions (RPC), and local governments engage in a variety of other transportation and land use planning activities. The purpose of a corridor study is to support and complement these activities, rather than to duplicate them. Some of these other activities, and their relationship to corridor planning, are described in the following table.

Relationship between Corridor Planning and Other Planning Activities	
VTrans Long-Range Transportation Plan (LRTP) and Modal Policy Plans **[VTrans Policy and Planning Division]**	• Define goals, objectives, and strategies for consideration in corridor studies – covering highways rail, public transit, and airports. • Define corridors of statewide significance, such as the 16 origin-destination pairs identified in the Vermont Highway System Policy Plan (HSPP).
Regional Plans and Regional Transportation Plans (RTP) **[CCMPO and Regional Planning Commissions]**	• Define goals, objectives, and strategies for consideration in corridor studies. • Recommendations of corridor management plans should be consistent with the Regional Plan and the RTP. • Regional Plan and RTP updates should incorporate findings and recommendations of completed corridor studies.
State Transportation Improvement Program (STIP) **[VTrans Policy and Planning Division]**	• Official list of state-programmed transportation projects to be initiated over the next three years, identifying costs, funding sources and schedules. • A corridor study may result in specific project recommendations, which may be included in the STIP after going through the project development process.
Project Development Process **[VTrans Program Development Division]**	• A corridor study may recommend project concepts that then proceed through the project development process. • The corridor study can provide the basis for alternatives analysis and project definition, and also can be the process for establishing a Purpose and Need Statement. • The corridor study can provide inputs to the project development process (e.g., existing conditions, analysis of secondary and cumulative impacts), and should be scoped to minimize redundancy with planning analysis required for project development.
Design Standards **[VTrans Program Development Division]**	• State design standards for roadways and pedestrian/bicycle design should be used as a reference for developing corridor study recommendations. • The Level of Improvement (LOI) policy suggests the scope of improvements that may be considered in the corridor study.
Access Management Policies and Plans **[VTrans, CCMPO and RPCs, see also: http://www.vtaccessmanagement.info/AM_Vermont.htm]**	• Corridor plans should include consideration of access management strategies. • Strategies developed through corridor studies should be consistent with VTrans' classification of roadway segments by access management category, and with existing access management plans for the corridor.
Asset Management Policies and Programs **[VTrans Policy and Planning Division]**	• VTrans' asset management systems can help to identify the condition and deficiencies of pavement, bridges, and other roadway elements along a corridor. Asset management systems also can assist in estimating the costs of ongoing maintenance and preservation work. • A corridor study may result in recommendations regarding prioritization and coordination of projects in corridor.
Local Comprehensive Planning, Zoning Bylaws, and Capital Improvement Programs **[Individual Jurisdictions]**	• The corridor study should address relevant corridor land use issues, including impacts of transportation improvements on development, and impacts of future land use changes on transportation needs. • Local governments should incorporate recommendations emerging from corridor studies into comprehensive plan updates, bylaws (zoning and subdivision regulations) that implement these plans, and municipal capital improvement programs.
State Land Use Policies **[Vermont Statutes and State Agencies]**	• The scope, procedures, and recommendations of corridor studies should be compatible with statewide land use and development policies, including: the Vermont Land Use and Development Law (Act 250); Growth Management Act (Act 200, Title 24 VSA Chapter 117); Interstate Executive Order, Development Cabinet Law (Act 112); and Downtown Development Act.



Process, Products, and Outcomes of a Corridor Management Study

The corridor management study process involves six basic steps, which are described in the remaining sections of this handbook:

- **Step 1 –** Get Organized;
- **Step 2 –** Analyze Existing and Future Conditions;
- **Step 3 –** Develop Vision and Strategies;
- **Step 4 –** Develop Implementation Plan;
- **Step 5 –** Finalize Document; and
- **Step 6 –** Monitor Progress.

The outcome of the corridor management study process is the corridor management plan. The plan should be developed through consultation with corridor stakeholders and should have the support of VTrans, the RPCs and/or MPO, local jurisdictions, residents, and other key stakeholders with interests in the corridor.

While each corridor planning effort must be adapted to study area needs and available resources, a comprehensive corridor management plan should include the following elements:

- An assessment of existing and future transportation, land use, and environmental conditions and operations in the corridor;
- A package of recommended strategies and actions that comprehensively address future transportation needs;
- A list of implementation steps and responsibilities, including a recommended timeline for implementation, and any threshold conditions that should trigger particular improvements; and
- Documentation of the process by which the corridor plan was developed and recommendations selected.

Resources

The appendices to this handbook provide additional resources that may be helpful for corridor planning, including:

- **Appendix A –** Data Resources Inventory;
- **Appendix B –** Analysis Methods;
- **Appendix C –** Funding Sources;
- **Appendix D** – Municipal Planning Tools;
- **Appendix E** – Land Use Strategies for Transportation Corridors: Examples from Other States;
- **Appendix F –** Additional Resources (example plans, other useful reference documents); and
- **Appendix G** – Glossary of terms and acronyms.

Step 1 Getting Organized

Overview

Getting organized to begin a corridor management study involves forming an Advisory Group to direct the effort, identifying key concerns to be addressed, drafting a set of goals to provide a common understanding of the purpose of the study, defining the corridor boundaries, developing a work plan, and lining up resources to carry out the work program. A single individual or a small group can be designated to lead these startup activities. Under some circumstances, it may be desirable to obtain consultant support for front-end planning activities as well.

Getting Organized – Major Activities	
Form Advisory Group	• Identify key stakeholders • Recruit Advisory Group members
Establish Study Goals	• Review previous studies • Identify issues and concerns • Identify goals of corridor management study
Define Corridor Boundaries	• Identify transportation facilities included • Identify corridor endpoints • Identify area of influence
Develop Work Plan	• Develop public involvement plan • Develop work plan
Hold Public Meeting	• Review study goals, corridor boundaries, and work plan
Line Up Resources	• Define roles and responsibilities • Hire consultant(s) as needed • Obtain staff resource commitments

Form Advisory Group

The Advisory Group provides study oversight and will also ideally play a key role in implementation.

The initial step in pursuing a corridor management study is to form an Advisory Group. This group will provide both policy and technical direction throughout the study, and ideally will play a key role in building and maintaining support for implementation of the resulting corridor management plan.

The corridor management study typically will be initiated by VTrans, Regional Planning Commissions (RPC) and/or the Chittenden County Metropolitan Planning Organization (CCMPO) in order to address one or more issues of concern. The study initiator (or lead agency) should make a list of important corridor stakeholders and then identify from these stakeholders a set of candidates for the Advisory Group. At a minimum, the Advisory Group should include representatives of the local jurisdictions in the corridor study area, the RPCs and/or CCMPO, Transportation Advisory Committee(s), and VTrans. Inclusion of at least one citizen representative is strongly encouraged.

It is not necessary to include representation of the full set of stakeholders in the Advisory Group – the public involvement component of the study can be designed to provide broad opportunities for input. However, it is important that the agencies and organizations who will likely have responsibility for implementing study recommendations are represented on the committee, and are actively involved in the decision-making process.

Advisory Group members should be able to effectively and fairly represent the viewpoints within their agency or the concerns of their constituents, and should be expected to discuss study issues and communicate findings with others in their agency or jurisdiction.

The size of the Advisory Group can vary depending on the scale of the study, but it is best to keep the group to a manageable size (e.g., 10 to 20 people). Large scale corridor management studies can consider forming two advisory bodies – one which focuses on high-level policy direction and another that focuses on technical review and comment. The activities of these bodies should be closely coordinated.

Key Stakeholders for Corridor Studies

Federal and State Agencies	• Vermont Agency of Transportation – District Transportation Administrator, Policy and Planning Division, Program Development Division • Vermont Agency of Natural Resources • Vermont Agency of Commerce and Community Development (Departments of Economic Development, Tourism and Marketing, Housing and Community Affairs) • Federal Highway Administration (FHWA) Division Office
Transportation Providers	• Railroad Owners and Operators • Trucking Interests • Transit Service Providers
Regional Planning Agencies and Advisory Bodies	• Regional Planning Commissions (RPC) and/or the Metropolitan Planning Organization (MPO) • Regional Transportation Advisory Committees (TAC) • Local and Regional Economic Development Agencies
Local Jurisdictions	• Elected Officials (Select Board Members, City Council Members, Trustees, Planning Commissioners) • Planning, Community Development, Zoning, and Public Works Staff
Nonprofit Agencies	• Economic Development Organizations • Environmental/Smart Growth Advocacy Groups • Transportation Advocacy Groups
Businesses and Residents	• Abutting Property and Business Owners • Chambers of Commerce • Developers and Builders • Industries Relying on the Corridor for Goods Movement • Tourism Industry Representatives • Community and Neighborhood Groups

Establish Study Goals

Once the Advisory Group is formed, its first order of business is to develop a statement of goals for the corridor management study. This statement should describe what the existing or expected concerns are for the corridor, and how the corridor management plan is expected to help address these concerns.

This statement can be used as the basis for defining the corridor boundaries and developing the work plan.

Example Issues and Concerns

Typical issues and concerns that have been identified in other Vermont corridor studies include:

- Intersections or segments with unacceptable levels of congestion/delay;
- Intersections or segments with actual or perceived safety hazards (for motor vehicles, pedestrians, or other road users);
- Geometric deficiencies that create problems for trucks;
- Inadequate lane or shoulder widths for bicyclists;
- Areas with high existing or potential pedestrian usage that lack pedestrian facilities or crossings;
- Areas with unacceptable traffic noise or vibration impacts;
- Village areas with high levels of truck traffic;
- Substandard pavement or bridge conditions;
- Inadequate access to specific properties or establishments;
- Inconsistencies between access management classification guidelines and current design;
- Land use and growth patterns that exacerbate transportation deficiencies; and
- Lack of alternative transportation choices.

Development of the study goals should reflect the issues motivating the study and the perspectives of the Advisory Group members. Lead agency staff and the Advisory Group should review relevant existing studies and plans relating to the corridor. Such studies and plans may include previous corridor studies; town plans and local economic development plans; regional plans, including the regional transportation plan, TIP, and economic development plans; statewide transportation plans, including modal policy plans, the long-range transportation plan, and the STIP; Act 250 documents; and other plans such as watershed plans and wildlife corridor plans.

Early review of past efforts can help to define an appropriate focus for the current corridor study, by identifying issues and needs as well as solutions already recommended (or rejected). The goals and scope of the current corridor management study can be crafted with the benefit of this experience.

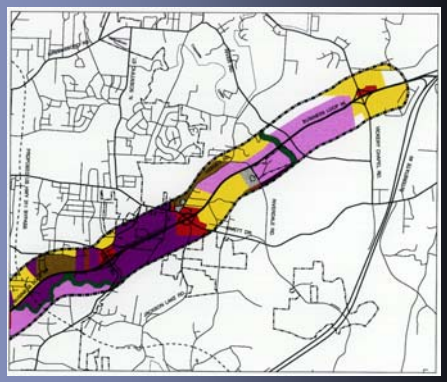
Advisory Group members also should be encouraged to discuss issues of concern with others in their organizations and other key stakeholders in their communities. This will help them to ensure the study is scoped with the full benefit of existing information and that its stated objectives reflect a wide range of perspectives.

It is quite possible that there will be conflicting objectives – for example, encouraging economic development and preserving scenic views. The challenge to be undertaken in the corridor management study is to acknowledge each objective and work out a balanced set of strategies that achieves the best possible compromise across them.

Sample Corridor Management Study Goals

- Ensure that future land use decisions across multiple jurisdictions are compatible with the likely future capacity of the roadway(s) in the corridor
- Address congestion problems during tourist seasons
- Reduce noise and safety concerns associated with heavy truck traffic in village areas
- Support continued development while managing impacts of additional truck traffic
- Address deterioration of bridge before load posting is required
- Address safety "hotspots"
- Minimize environmental impacts and support resource restoration
- Improve intermodal connections

The identified issues and concerns, as well as the established goals, should be revisited in Step 2 to determine if any revisions should be made based on what was learned from the data collection, analysis, and public outreach activities. They can be used as a reference point at each stage of the study to make sure that technical analysis, strategy development, and implementation planning activities are addressing the primary concerns that motivated the study. They also can be used to bring activities back into focus when and if "scope creep" starts to occur.



Define Corridor Boundaries

The initiation of a corridor study assumes a general geographic scope for the study. One of the first tasks of the Advisory Group, though, should be to more clearly define the corridor's boundaries – including the transportation facilities included, the endpoints, and the broader study area to be covered.

Defining the *transportation facilities* to be included will limit the scope of transportation data collection and strategy analysis. It is likely that the corridor study has been initiated in response to particular transportation-related needs and concerns. Therefore, the primary facility of concern (e.g., a roadway and its associated facilities such as pedestrian and bicycle paths) as well as intersecting and parallel transportation facilities (e.g., road, railroad, or non-motorized trail) should be included if they could make a significant contribution to reducing transportation problems in the corridor. Similarly, impacts from airports, transit hubs, and intermodal terminals should be addressed if they are either significant sources of corridor traffic, or influence the utilization of the primary facility.

Learn from past experience.

The corridor *endpoints* should be set broadly enough to include the identified locations of primary transportation-related need or concern, corridor transportation facilities as identified above, and any adjacent areas with a significant influence on transportation conditions in the corridor. For

example, if the study was initiated to address high levels of congestion in a series of towns along a particular state highway route, the endpoints should be set to include the towns of concern. In the towns at each end of the corridor, the endpoint should be established far enough outside the town center to encompass all problems and potential solutions for that particular town (e.g., access management, land use, alternate routes). If a neighboring community includes traffic generators that make a significant contribution to traffic in the corridor (such as a ski resort), it should be included as well.

Source: Resource Systems Group, Inc.

The corridor *study area* defines the scope of land use-related data collection (e.g., population and employment trends, major trip generators) and strategies, as well as municipal participation in the corridor study. It should be established to include the geographic area with the most significant influence on transportation conditions in the corridor. The corridor study area commonly includes the cities and towns that are traversed by the transportation facility or facilities being studied. It also may include adjacent towns that significantly contribute to corridor traffic (e.g., the corridor "travelshed"). Additional considerations may include viewsheds as well as environmental resources (e.g., watersheds, wetlands, wildlife habitat) impacted by the transportation facilities and related development. The boundaries should not be set so broadly that the study becomes unmanageable in scope, and should not include areas with only a minor and indirect influence on corridor conditions.

Once the exact corridor boundaries are established, the composition of the Advisory Group should be adjusted to ensure representation from all included communities.

Develop Work Plan

A work plan for the corridor study should include the following:

- Study goals;
- Map showing the definition of the corridor and study area boundaries;
- Study tasks, including data collection, future conditions analysis, analysis of options, and public involvement;
- Definition of major products; and
- Tentative schedule of milestones and key decision points, including who should be involved at each point.

The work plan should be in line with available resources. The major factors affecting the cost and duration of a corridor study are:

- Size of the corridor and complexity of issues;
- Data availability and additional data collection needs (see Step 2 and Appendix A for recommended corridor planning data and resources);

- Transportation model availability and extent of future conditions analysis needs (see Step 2 and Appendix B for analysis requirements and options); and
- Extent of public involvement activities (see below for a discussion of developing a public involvement plan).

A straightforward and noncontroversial plan will average 12 to 18 months from start to finish. More controversial or complex corridor management plans are likely to take longer.

It is important to set a realistic time schedule but also to keep the study process moving forward, in order to sustain the interest and active involvement of stakeholders. At the same time, if unexpected issues arise during the study process, it is important to maintain flexibility in order to ensure that these issues can be adequately addressed. For example, the study partners may discover sensitive community issues in a particular location that may require more extensive public outreach than originally anticipated. If doing so will have a significant impact on the study budget, either additional resources must be found, or more detailed planning should be deferred as a recommended follow-on activity to the current corridor study.

The Advisory Group should be relied upon to provide input into development of the work plan and detailed review of drafts. This ensures that their concerns are reflected early on in the process, and that they have the opportunity to weigh in on how to best focus the limited resources that are available. The members also can help to identify existing data sources or other resources that are available to help with the study.

Innovative Approaches to Public Involvement – Community Workshop in Suffield, Connecticut

The Town of Suffield, population 12,000, is located about 25 miles north of Hartford, Connecticut. As part of a regional growth visioning project, the town initiated a public planning process to develop a vision for future growth and transportation in the community. A key component of this process was a community visioning workshop, at which participants reviewed the results of a Visual Preference Survey taken by town staff and citizens; reviewed existing land use, zoning, and transportation patterns; mapped desired land uses; and identified transportation concerns and potential improvements.

About 40 elected officials, town staff, and citizens attended the three-hour workshop, held in summer 2001. Participants were then divided into small groups to undertake a series of visioning exercises. In these groups, participants were given base maps of the Suffield region and the town center, along with tracing paper and markers, and asked to draw on the maps and make recommendations.

After hearing final comments from participants, the project consultants synthesized the results of the workshops into a set of recommendations for the town, which were provided to town staff, elected officials, and workshop participants. As an outcome of the workshop and associated activities, the town undertook specific implementation steps, including zoning changes, land preservation, and streetscape improvements.

Public Involvement Plan

Public involvement is a critical component of the corridor planning process, serving two fundamental purposes. First, it ensures that the issues and needs of residents, businesses, travelers, and other interests in the corridor are adequately addressed through the study process and recommendations. Second, it helps ensure that people are aware of the study and understand the justification for its recommendations, which should lead to broader support for implementation activities. The public should be given

opportunities for input at all stages of the process, beginning with the establishment of goals for the study corridor.

A Vermont Public Participation Success Story: The Danville Project

The preliminary design process used for the Vermont Danville project showcases techniques for community participation and consensus building that also can be applied within the context of a corridor planning effort. This project includes the reconstruction of U.S. Route 2 through the village of Danville, reconstruction of town roads around the Danville town green, new underground utilities in the area of the green, a new traffic signal, lighting, landscaping, and artistic enhancements.

The Vermont Agency of Transportation (VTrans) entered into a unique partnership with the Vermont Arts Council (VAC) to ensure that the project would enhance the historic section of the village it traverses. In April of 2000, a Local Review Committee (LRC) was formed and consisted of a group of interested residents. Members include a school teacher, a local business owner, the town administrator, and others. In June of 2000, under the guidance of the LRC, VTrans and VAC hired an artist and a landscape architect to assist with the design and facilitate community involvement with the proposed aesthetic treatments on the project. The public was involved over a two-year process, through the LRC. Public involvement activities included a series of public meetings, workshops, school events, property owner visits, site walks and focus groups.

The resulting design was widely accepted within the community, because people saw that their ideas and concerns were being heard. At the same time, the public process provided an opportunity for people to better understand the function of the roadway, design issues, and other concerns of agency engineers. This allowed for development of a consensus on design tradeoffs that would have been much more difficult if this process had not occurred. The two-year consensus-building process allowed the project to move forward without public opposition, and produced a design that addresses important safety concerns while enhancing the historic character of the community.

The appropriate extent and type of public involvement activities will depend upon the nature of issues being addressed as well as the resources available for the corridor study. At a minimum, public involvement should include communication of corridor study issues through newsletters and media coverage, as well as opportunities for public comment at public meetings and through telephone, e-mail, or written channels. More in-depth public involvement may be conducted using methods such as surveys, focus groups, and interactive workshops. Advisory Group members (particularly elected officials) represent the public by the nature of their position and should be selected with the goal of representing the range of interests in the corridor.

Innovative Approaches to Public Involvement – Community Fair

The Rutland Regional Planning Commission, in association with town planners in Castleton, Vermont held a community fair to involve the public in the 2002 updates of the Castleton Town Plan. The fair provided a mechanism to share progress on the plan update and to learn about residents' views on topics of concern for the future of the town. The fair venue has allowed people to participate who might not otherwise have the time or interest to attend a standard public meeting, or who might have constraints such as child care. It also allows planners to establish an informal yet productive dialogue with residents.

The public involvement plan should specify the number, format, and timing of meetings to be held. It also should describe other communication and outreach activities (e.g., number of newsletters produced, extent of mailing list, groups to target in survey). While the study budget will constrain the extent of public involvement, the public involvement process should not be shortchanged. Failing to identify and address issues of community concern could limit support for the study's recommendations, and jeopardize the

success of implementation efforts. Input should be solicited from the early stages of the process – overlooking key issues until late in the study process may potentially require additional planning work to address these issues. In the long run, a good public involvement plan can actually save the stakeholder agencies money and lead to more feasible and beneficial study recommendations.

Hold Public Meeting

A public meeting should be held during the initial stages of the corridor planning study. The purpose of the meeting is to introduce people to the goals, scope, and timeline of the study, and to obtain feedback on these topics before they are finalized. The public should be asked to review the list of issues and concerns generated by the Advisory Group and confirm the goals that were established. Any additional issues that need to be considered can then be identified, and the study goals may be revised or expanded to encompass these issues, if necessary. Public input also can confirm the appropriate geographic scope of the corridor.

Line Up Resources

A mixture of agency staff and consultants is typically used for corridor studies. If resources for consultants are limited, a corridor study can be conducted using pooled agency staff resources, supplemented with consultants as needed for specialized tasks such as data collection and modeling.

Hire consultants as needed.

Once the scope, timeline, funding and public agency roles and responsibilities have been defined, a consultant or consultant team can be recruited through a Request for Proposals (RFP). The lead agency for the Corridor Management Study (with input from the Advisory Group) should write an RFP that clearly defines the scope of services expected and establishes the study's timeframe and budget.

Document agency responsibilities and commitments in a memorandum of understanding.

The involvement of agency technical staff experienced in the types of services expected will help ensure that expectations are consistent with available resources. Even when consultants are used, it is necessary to plan for and secure commitments of internal agency resources to work closely with the consultants and provide the necessary direction and oversight. Staff should be identified and managers contacted to ensure that the proposed staff will have adequate availability during the proposed timeframe of the study. Where staff from multiple agencies is involved, it may be helpful to draft a memorandum of understanding to document each agency's agreed-upon roles, responsibilities, and commitments of resources.

Step 2 Analyze Existing and Future Conditions

Overview

The second step in undertaking a corridor management study is to research, document and analyze existing and expected future conditions, issues, and needs in the corridor. This step will provide a foundation for identifying, evaluating, and selecting corridor management and improvement strategies.

Research and Document Existing and Future Conditions – Major Activities

- Collect information on existing conditions;
- Analyze future conditions and performance; and
- Present findings to stakeholders.

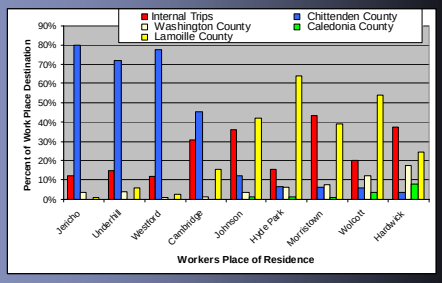
Collect Information on Existing Conditions

Weigh the costs of collecting data against its value.

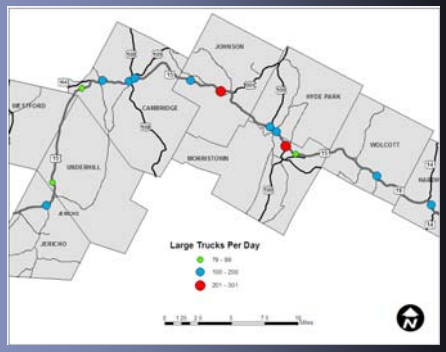
Data collection can be one of the most costly elements of a corridor study. It is important to tailor the data collection activities to the concerns expressed by stakeholders, and to those identified in the statement of study goals. Wherever possible, already existing data should be used. Some new data collection may be required, but the costs of obtaining this data should be carefully weighed against the value that this information will provide.

The data gathering effort should answer the following questions:

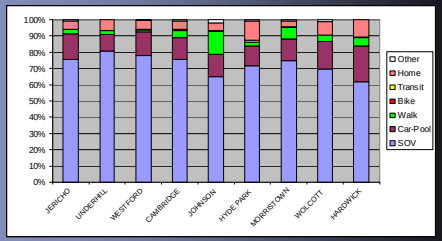
- What types of travel is the corridor now serving?
  - Travel composition: local, regional, interregional, or a mixture?
  - Trip purposes: commuter, recreational, other?
  - Traffic volumes, including both passenger and truck/freight movement.
- What transportation facilities and options now exist, what roles are they playing in the corridor and how are they performing?
  - Highways/roadways: functionality, capacity, safety, speed, access management category (if designated), and current spacing of access points;
  - Intersections/interchanges: capacity, traffic control in place;
  - Bicycle and pedestrian facilities;
  - Transit service (fixed route and paratransit);
  - Airports; and
  - Parallel rail facilities.



Source: Resource Systems Group, Inc.



Source: Resource Systems Group, Inc.



Source: Resource Systems Group, Inc.

- Where and when are transportation problems occurring?
  - Congestion/bottlenecks (data collection may need to be targeted to certain times of the day or seasons);
  - Operational issues (e.g., signal timing);
  - Traffic safety (accident rates, enforcement issues, identified hazards);
  - Railroad crossings; and
  - Vehicle/pedestrian conflicts.
- What characteristics of the corridor influence the range of solutions that could be considered?
  - Natural environment (e.g., topography, wetlands);
  - Built environment (e.g., location of buildings in relation to the right-of-way);
  - Land use and ownership; and
  - Environmental justice issues.
- What are possible and likely future development patterns that will affect transportation demand in the corridor?
  - Current, and allowable land uses in the corridor study area;
  - Permitted developments; and
  - Growth trends.

Describe the roles and functions of the transportation corridor.

Recommended specific types of information to be considered for any corridor study are presented below. Information on state highway characteristics can be obtained from the VTrans route log system. Appendix A provides information about this and a variety of other data sources. While the primary data collection focus should be on the roadway corridor being studied, it also may be desirable to collect and map data such as functional classification, ownership, and traffic volumes for other major roads in the study area, especially those that serve as parallel or relief routes.

While much of the information will be quantitative (e.g., traffic volumes, crash rates), some information will be qualitative or descriptive in nature. Examples of qualitative information include roadside aesthetics and the historic character of communities served by the corridor. Information will typically include or be presented as a combination of maps, narrative text, tables, and graphs. Aerial photographs also can be a very effective way to present information on the corridor. Information should include relevant historical information (e.g., 10-year population or traffic trends) in addition to a "current year" snapshot.

The information assembled and collected should be used to describe the primary roles and functions of the transportation corridor (e.g., local travel, interregional travel, truck travel, tourism, bicycle touring route). The roles and functions of the corridor also can be determined based on discussions with stakeholders and public input. Key issues should continue to be addressed in the study process, even if quantitative data are not available to document these issues (e.g., pedestrian and bicycle travel).

Minimum Data Requirements
Transportation Supply, Demand, and Performance

- Maps showing location of transportation facilities in the corridor, including major intersections or crossings;
- Average Annual Daily Traffic (AADT) on roadway segments of the corridor being studied, including historical (trend) data from the past 10 years if available;
- Volume and percentage of truck traffic;
- Characterization of freight movements in the corridor (e.g., types of commodities, tonnage if available);
- Turning movement volumes at major intersections (if available);
- Crash data – Locations of crashes, total number of crashes by severity (fatality, injury, property damage), and information on crash causes (to the extent available);
- Posted speed limits by roadway segment;
- Roadway functional class, ownership, and route designations (e.g., National Highway System, truck route, scenic byway);
- Roadway access control and existing access management classifications by segment;
- Roadway geometry by segment (number and width of lanes, shoulder widths);
- State Highway System sufficiency ratings;
- Type of intersection controls at major intersections (signalized, four-way stop, two-way stop, roundabout) and presence of turning lanes;
- Locations where sidewalks or parallel pathways exist;
- Locations of marked or signalized pedestrian crossings;
- Locations of railroads and railroad crossings;
- Public transportation services provided; and
- Locations of intermodal facilities (park-and-ride lots, rail terminals, airports, bus and train stations, ports) and description of size and/or services provided.

Additional Data from Analysis

Based on the above primary data items, analysis is required to produce the following measures of transportation system function and performance:

- Level of service*, volume-to-capacity ratios, and/or delay at major intersections;
- Level of service* and/or volume-to-capacity ratio along corridor roadway segments; and
- Crash rates (number of crashes per 100 million VMT) for intersections and roadway segments, and comparison to “critical” crash rates to identify high-accident locations.

*Level of service is a qualitative measure of traffic flow conditions, and is measured on a scale from A to F. Level of Service “A” represents free-flow traffic, “F” represents highly congested, stop-and-go conditions.

Minimum Data Requirements
Land Use, Socioeconomic, and Environmental

- Jurisdictional boundaries;
- Existing land use in the corridor study area (e.g., land use and zoning maps as available; allowable uses and densities; locations of buildings, orthophotographs);
- Existing policies regarding development and inventory of town plans, zoning, and subdivision regulations;
- Most recently available population, household, and employment estimates by town (including 10- or 20-year history/trends);
- Land use policy areas (designated growth centers, downtowns, historic districts);
- Key environmental features (rivers and streams, wetlands, farmland, conservation lands);
- Locations of major trip generators (e.g., ski resort, industrial park or plant), along with a description of size and demand characteristics;
- Identification of existing development patterns along the roadway corridor (rural, urban/village, transition);
- Description of the character of development along the roadway corridor (patterns; visual and aesthetic qualities; historic, cultural, and natural qualities); and
- Description of roadway terrain (flat, rolling, mountainous).

Analyze Future Conditions and Performance

The purpose of this task is to assess how land use and transportation conditions might be expected to change in the future, if additional corridor management or improvement strategies are not implemented. This work will help to develop a vision for the corridor (as discussed below in Step 3). To meet the long-term objectives of corridor planning, conditions should be evaluated over a 20-year time horizon. Key factors influencing these changes include the amount and nature of growth in population, employment, and special generators within the corridor; the characteristics of trips generated by this development; growth in background traffic levels (i.e., through traffic passing through the corridor); and any currently programmed transportation management or improvement projects.

Recognize uncertainty in future conditions.

Given the considerable uncertainty inherent in forecasting both future land use changes and traffic growth, it is recommended that "high" and "low" growth forecasts be developed and evaluated, rather than simply relying on a single forecast of future conditions. Evaluating a range of potential future conditions will be very helpful for development of strategies. For example, some strategies like signal retiming might be beneficial under both the "high" and "low" forecasts and therefore should be pursued regardless of conditions. On the other hand, other strategies like intersection redesign may become warranted only if "high" growth forecasts are realized. In such cases, the corridor study should define performance thresholds that trigger more detailed evaluation and/or implementation of the strategy. (See Step 4 for a discussion of thresholds and triggers.)

Appendix B provides a list of some available methods for forecasting future conditions, along with their applicability, advantages, disadvantages, and examples of their application in Vermont and other areas. Appendix A lists data sources that can be used in conjunction with these forecasting methods.

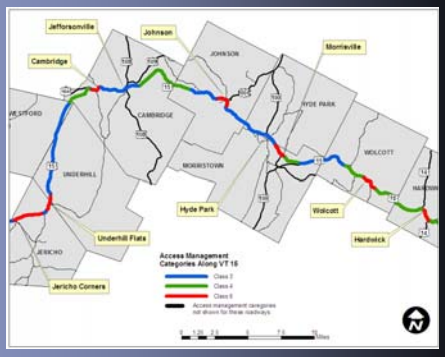
Future Conditions Data

At a minimum, the following data on future conditions should be evaluated:

- Twenty-year growth in corridor study area population, households, and employment;
- Land use and development patterns along the roadway in particular, as well as throughout the corridor study area;
- Future traffic volumes;
- Performance (level of service, volume-to-capacity ratios, delay, and/or queuing) at major intersections; and
- Performance (level of service, volume-to-capacity ratios, and/or travel speeds) along corridor roadway segments or for the corridor as a whole.

Supplemental data items that may be helpful include:

- Projected future truck volumes, especially if a truck route;
- Projected corridor travel times;
- Projected growth in visitor trip generation; and
- Projected changes in crash rates and total crashes.



Source: Resource Systems Group, Inc.

Present Findings to Stakeholders

This final task of Step 2 pulls together all of the information gathered so far, providing a resource base for identification of strategies.

The existing and future conditions and needs analysis should be documented in an interim report, including issues identified, methods used, and findings. Once the analysis and documentation of existing and future conditions is completed, the findings should be presented to corridor stakeholders and to the public for comment and validation. This second round of outreach will help ensure that key issues are not overlooked, and also will inform people on the findings of the existing and future conditions analysis.

After obtaining feedback from stakeholders and the public, the technical committee may consider revisions to the report as needed.

Have stakeholders and the public validate findings.

Step 3 Develop Vision and Strategies

Overview

The third step in undertaking the corridor study is to develop a common vision for the corridor and a set of corridor management and improvement strategies. These strategies should be specifically designed to address the issues and needs identified. The outcome of this step will be a limited set of prioritized strategies for the corridor that will move forward to implementation planning.

Develop Vision and Strategies – Major Activities

- Establish vision and goals for the corridor;
- Develop objectives and performance measures;
- Identify and screen potential strategies;
- Define and analyze strategies in more detail; and
- Select and prioritize strategies.

The vision identifies the key values in an ideal corridor.

Establish a Vision and Goals for the Corridor

Before developing strategies for the corridor, stakeholders should work to identify a common vision and goals for the corridor.

The *vision* is a concise statement that paints a picture of the desired future for the corridor – from both a land use and a transportation perspective.

The *goals* support the vision, and lay out desired long-range outcomes to be achieved by the corridor plan.

The initial set of goals for the corridor management study that were established by the Advisory Group prior to the study scoping (in Step 1) should serve as the starting point for this activity, which will involve developing a consensus across a broader set of stakeholders.

The process of establishing a vision and goals creates an opportunity for stakeholders to discuss the core function(s) of the corridor. For example, should the primary roadway in the corridor serve as a high-speed facility providing efficient access between different regions of the State? Or is it a "main street" of historic communities where speed for through traffic is traded off against creating a quality pedestrian environment? What type of development should occur along the corridor, and how should access be provided?

In many cases, corridors serve multiple functions. The vision and goals may acknowledge the need to balance competing desires, and that different strategies may be appropriate according to the roadway context (e.g., rural versus urban/village).

The corridor vision and goals should:

- Establish a unified vision across jurisdictional boundaries, even while recognizing different corridor development contexts (e.g., urban versus rural);
- Consider the range of social, economic, and environmental issues;
- Reflect existing roadway designations (e.g., functional class, access management category, NHS, truck route, scenic byway);
- Reflect existing policy documents such as local comprehensive plans and statewide and regional transportation plans;
- Incorporate and reflect current public input about how local residents view their communities and the transportation corridor; and
- Recognize the needs of those who may not be well-represented within the corridor planning process, such as through travelers from outside the study corridor or visitors from other states.

If possible, the vision and goals statements should be supplemented by graphics such as maps showing the roadway context (urban, transitional, rural) and growth policy areas (e.g., village conservation areas, designated growth centers, rural conservation areas), as well as by illustrations of typical development patterns and roadway cross-sections specific to these areas.

Example of Corridor Vision Statements and Goals

Vision Statement

The U.S. Route 7 transportation corridor between Burlington and Georgia Exit 18 provides an increasingly important link in the economic and social lives of the communities it serves. The parts of the transportation system within this corridor are closely interwoven with each other and with the economic and social life of the communities. This system should be enhanced to effectively serve person travel and goods movement within and through the study corridor, support municipal and regional land use visions and plans, preserve or enhance the quality of life for those living within the corridor, and should resolve the numerous identified site-specific problems. Although alternatives to private motor vehicle transportation should be fostered within the corridor, private autos and trucks using public roads and highways will remain the principal means of transport over the 20-year planning horizon of this study.

Goals

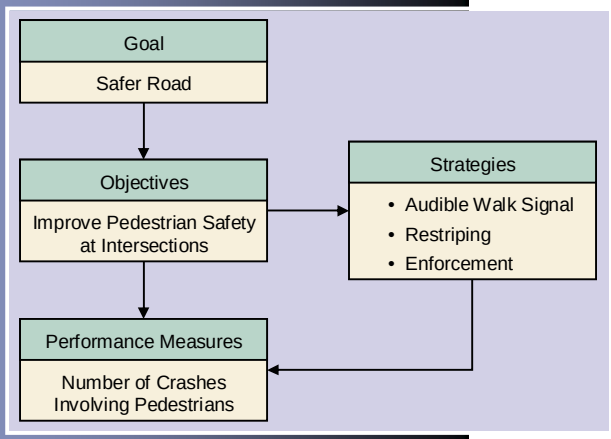
- Provide a safe highway and transport environment for highway users and abutters;
- Provide meaningful alternative means of transportation;
- Use transportation service and facilities to support, further, and enhance community land use and development strategies;
- Balance growth and economic development with environmental protection and community preservation;
- Design transportation facilities to complement the areas in which they are located; and
- Provide for sound and effective long-term fiscal management of necessary improvements within the corridor.

(Adopted from the U.S. Route 7 Winooski – Georgia Corridor Study.)

Develop Objectives and Performance Measures

Performance measures can be used to clearly define specific desired outcomes to be achieved.

For some small-scale corridor planning efforts, having a statement of vision and goals will be sufficient to move ahead with defining strategies. For larger efforts, it may be helpful to develop a set of more specific objectives and quantitative performance measures that back up the vision and goals. This will provide a useful framework for identifying strategies. It also will provide a framework for future monitoring to see if the actions taken were effective, and if additional actions are needed to achieve the desired outcomes.



For example, the *goal* of a safer road might be backed up with specific *objectives* for improving pedestrian safety at three key intersections. A *performance measure* could be defined based on the number of crashes involving pedestrians at the intersections. *Strategies* to achieve the objectives might include intersection redesign, stepped-up enforcement, or improved signage. The performance measure could be used in the future to determine how effective these strategies were, and if additional strategies are needed.

The following table lists some of the key impacts for consideration in corridor studies. It can be used as a resource for developing corridor goals and objectives.

Impacts to Consider in Corridor Studies

Mobility and Accessibility

- Travel time and delay for roadway corridor users;
- Access to jobs, services, other activities for transportation-disadvantaged; and
- Access for recreation and tourism uses.

Safety

- Motor vehicle safety; and
- Bicycle and pedestrian safety.

Economic Development

- Impacts on local property values and business sales;
- Local and regional business attraction and expansion; and
- Local, regional, and statewide freight mobility.

Environment

- Loss of productive agricultural and forest land;
- Loss of important habitats (wetlands, forests, prime wildlife habitat, endangered species habitat);
- Habitat connectivity and wildlife movement (land and water);
- Stream alteration and water quality; and
- Watershed impacts – runoff and Total Maximum Discharge Limits (TMDL).

Quality of Life

- Noise and vibration;
- Air pollution;
- Aesthetic and visual impacts;
- Impacts on recreational areas and open space; and
- Historic and archeological resources.

Secondary and Cumulative Impacts

- Transportation-induced growth patterns and related secondary impacts; and
- Cumulative impacts of past, present, and future transportation, land use, and other actions.

Some examples of commonly used quantitative measures of performance are shown below. These may be helpful for those corridor management efforts wishing to pursue a quantitative approach to analyzing strategies and monitoring future performance.

Examples of Performance Measures and Targets

Objective	Performance Measure	Target
Safety	• Number of major crashes per year	• Five percent reduction from 1998 to 2008
	• Number of high-crash locations	• Eliminate all those with identified cost-effective fix
	• Number of crashes involving pedestrians or bicyclists	• Reduce
	• Percent of corridor with adequate shoulders for bicyclists	• 100%
Mobility	• Average travel time between major cities	• No decline in average travel time from current levels
	• Intersection delay	• < 5% increase over 10 years
	• Maximum volume-to-capacity ratio	• 0.7
	• Number of geometric roadway deficiencies for large trucks	• Eliminate all those with cost-effective fix
	• Modal diversion (truck to rail)	• Increase in rail traffic on parallel facility
Transit Performance	• Passengers per hour on established route	• 100% at acceptable levels (locally defined)
	• Cost per passenger on established route	• 100% at acceptable levels (locally defined)
Resource Protection	• Loss of critical environmental habitat	• No net loss
	• Percent of growth occurring in designated growth centers	• 90%
	• Resident perception of community impact	• No target

For corridor plans that involve state highways, the performance measures established in the Vermont Highway System Policy Plan and subsequently adopted or updated in the VTrans Performance Measures Report (February 2005) should be considered. The Performance Measures Report also establishes measures that should be taken into consideration for other transportation modes, programs and facilities (e.g., bicycle and pedestrian, public transit, aviation, park-and-ride facilities).

Identify Strategies

Identify transportation improvements already in the works.

The first step in identifying strategies is to compile a list of transportation improvement projects that currently are underway, or which are programmed and have a high probability of moving forward. The Statewide Transportation Improvement Program (STIP) can be a good source of information for this. This set of projects should serve as a baseline for the development of additional transportation strategies. In addition, other planned programs or initiatives impacting the corridor that are not capital in

nature should be identified. These might include pending modifications to zoning codes, or bus service changes.

Review existing plans to see what has already been recommended.

After identifying what is likely to happen, the next step is to see what other strategies already have been recommended in existing planning documents. The statewide Capital Program and Project Development Plan (CPPDP) should be reviewed to identify projects affecting the corridor that have not yet been programmed in the STIP. All of these projects should be evaluated within the corridor management study for consistency with the established vision and goals for the corridor. A valuable result of the study will be a determination as to whether these projects should be eliminated from the CPPDP, move forward as is, or move forward with modification.

In addition to the Capital Program and Project Development Plan, other documents that may have recommended strategies for the corridor include previous corridor studies, local comprehensive plans, and statewide and regional transportation plans. The corridor management plan development process is a valuable opportunity to bring all of these proposed strategies together, rationalize them, and build consensus on what the priorities for the corridor should be over the next 20 years – given realistic funding scenarios.

Gather ideas from the stakeholder community.

Ideas also should be gathered from stakeholder and public input collected during the assessment of current conditions, issues, and needs. Initially, a full range of potential strategy types should be considered. Individual strategies (e.g., improve intersection at Main and Elm Streets) should be listed according to strategy type in order to facilitate further screening and analysis. At this stage, strategies may be conceptual in nature (e.g., initiate bus service between Cityland and Villageville) without specifying details (e.g., service frequencies, specific routing, and hours of operation).

Types of Corridor Management and Improvement Strategies

Strategy Type	Examples
Minor Roadway and Operational Improvements	• Improved signage and markings; • Signals and other intersection controls; • Bulbouts and pedestrian signals; • Off-road safety improvements (e.g., guardrails, vegetation clearance); • Drainage systems and maintenance practices to reduce environmental impacts, improve water quality, etc.; • On-street parking restrictions; • Designated truck routes; • Intelligent transportation systems (ITS) strategies such as traveler information and incident response; and • Seasonal and special event controls (e.g., traffic officer).
Major Roadway Improvements	• Lane additions at intersections; • Roundabouts; • Medians and channelization; • Shoulder widening; • Horizontal and vertical curve realignment; • Climbing lanes; • Passing lanes; and • New general-purpose lanes.

Types of Corridor Management and Improvement Strategies (continued)

Strategy Type	Examples
Zoning and Land Use	• Land use and zoning provisions to encourage concentrated development; • Designation of specific planning areas within town plans with guide-lines for development, resource protection, and access management; • Designation of scenic view corridor; • Site plan review requirements for developments along the corridor; • Subdivision regulations that encourage pedestrian connectivity and internal street connections to reduce traffic volumes on main roads; • Provisions to allow for shared parking among adjacent uses; • Growth management tools, such as development phasing and infra-structure concurrency requirements; • Overlay districts to protect critical resources; and • Performance standards for new developments.
Access Management	• Driveway consolidation; • Turn restrictions and medians; • Intersection spacing; and • Local street infrastructure.
New Facilities	• New/expanded interchanges; • Bypasses; and • Intermodal facilities.
Alternative Mode Improvements and Travel Demand Management	• Signs and markings (pedestrian crossings, bicycle lanes); • Sidewalk improvements; • Off-road bicycle/pedestrian paths; • Transit service improvements; • Travel demand management programs, such as rideshare programs and employer transit subsidies; • Rail capacity and service improvements; and • Intermodal facility and access improvements (passenger, freight).
Modal Connectivity Improvements	• Park-and-ride lots; • Bike racks on buses; and • Shuttle services.

Consider organizing strategies into packages.

Some corridor planning efforts may find it useful to develop separate "packages" of strategies. Packages can be used for a variety of purposes:

- To group together synergistic or complementary strategies with a common purpose (e.g., alternative modes including new park-and-ride lot and transit service changes; land use strategies including zoning to promote infill, incentives for rehabilitation of existing buildings, and driveway consolidation for access management).
- To define different sets of strategies to be pursued under varying future funding scenarios (e.g., one package with a major capacity improvement and an alternative package with a set of lower-cost

traffic management strategies). This can help to ensure that a realistic set of strategies is produced.

- To define different sets of strategies to be pursued under varying future growth patterns. If future growth patterns in the corridor are highly uncertain, developing packages of strategies for "high" and "low" growth scenarios can contribute to a better understanding among stakeholders of the interplay between transportation needs and land use in the corridor.

Strategies for Main Streets

In many Vermont communities, Main Street also is a state highway, serving significant volumes of both car and truck traffic. While this traffic often benefits the community by generating sales for local businesses, it also may adversely affect quality of life in the community because of noise, aesthetic, congestion, and safety impacts. Balancing the needs of through traffic with the needs of Vermont's urban and village communities is a common challenge in developing a corridor management plan.

One traditional solution to this problem has been the construction of a bypass to route traffic around the town. Yet this solution has become increasingly unacceptable in Vermont due to concerns that bypasses promote suburban "sprawl" development while draining vitality from the historic community centers, as well as to environmental and cost constraints. Communities in Vermont as well as other states are increasingly looking to less capital-intensive alternative strategies to improve community livability while still accommodating through traffic. Examples of these strategies include:

- The use of "gateway" treatments, such as splitter islands, neck-downs, signage, and other physical strategies, to slow traffic as it enters the town or village.
- Traffic calming treatments within the town or village to slow traffic and improve pedestrian safety, such as reduced lane and/or shoulder widths, marked or textured crosswalks, curb extensions, and median refuges.
- Driveway consolidation, signalization, turn restrictions, and other access management techniques to improve traffic flow and reduce crashes in congested areas.
- Low-cost intersection improvements, such as removing or relocating parking to create space for a turn lane.
- Signage and improvement of existing alternate routes that bypass the town center.
- Completion and/or improvement of sidewalks to make pedestrian travel easier for short trips.
- Pavement strategies, including maintenance and the use of low-noise pavements, to reduce noise and vibration from truck traffic.
- Building and site design guidelines to ensure that development in village centers supports pedestrian travel and is consistent with aesthetic and historic character.

Computer simulation of proposed U.S. 2 redesign in Danville.

Source: Dufresne-Henry and Vermont Agency of Transportation.

Use a screening process to identify strategies for detailed evaluation.

Develop Screening Criteria

Study partners should then work to develop a set of screening criteria that can be used to select a smaller number of strategies from the initial brainstormed list for more detailed definition and analysis. Criteria should consider feasibility; likely effectiveness in achieving the desired outcomes for the corridor; and consistency with established policy, plans and programs. Financial feasibility will be a key consideration in most corridor studies, both at the screening stage and later when strategies are prioritized and when implementation steps are defined. At each of these points, it is advisable to be aware of the full range of potential funding sources – including conventional Federal and state transportation resources, as well as potential innovative sources of funding such as Federal grant programs or local self-assessment (e.g., through a business improvement district). Some potential funding sources are described in Appendix C.

Study partners should use the screening criteria to eliminate those strategies that are not worth investing additional effort in analyzing. To a large extent, the screening process at this stage will be qualitative and will rely upon the judgment of study partners. It also may include simple quantitative measures, such as number of problem intersections addressed. A "checklist" approach may be taken, whereby the strategy is assigned a pass/fail assessment for each criterion.

Sample Screening Criteria

Criterion	Considerations
Feasibility	• Cost (initial capital and ongoing maintenance) is in line with likely availability of funding from Federal, state, local, and private sources. Necessary legal authority established and implementation mechanism exists or could be established. • Precedent exists for similar strategies. • Strategy would be likely to obtain needed degree of public and political support. • Strategy would not face insurmountable opposition.
Effectiveness	• Strategy would likely be an effective way to address goals and objectives (use these criteria to screen out clearly inferior options for achieving the same goal).
Consistency with Vision, Established Policies, Plans and Programs	• Corridor Vision and Goals; • State Transportation Plan and Modal Policy Plans; • Regional Plans; • State and Regional Growth Management Policies; • Local Comprehensive Plans; and • State Transportation Improvement Program.

The results of the initial screening will be a systematic analysis that can be communicated to the public, documenting the strategies that were considered, and the rationale for selecting strategies for further analysis.

Strategies should be sufficiently well-defined to permit meaningful evaluation; detailed design is not needed.

Define and Analyze Strategies in More Detail

Strategies that have passed the initial screening may need to be defined in greater detail so that they can be evaluated in a meaningful way. For example, if the strategy "intersection improvements" was suggested, more specific options for intersection improvements (install traffic signals, add turning lanes, construct roundabouts) should be identified. It is not necessary to produce detailed designs or operating plans during the corridor study process. This kind of work can be left to the implementation process for strategies that are recommended.

Each strategy or package of strategies should be evaluated in order to provide the basis for setting priorities and making recommendations. The evaluation can involve quantitative analysis, qualitative analysis based on expert judgment or a mixture of the two – depending on the scale of the corridor study, the nature of the identified strategies and the level of resources available. Regardless of the level of sophistication, the evaluation should seek to answer the following questions:

- How well would these strategies address the goals established for the corridor?
- What other impacts would they have – both positive and negative?
- If resources are limited, which strategies should be undertaken first?

Use of quantitative methods for strategy evaluation can be of great value in helping stakeholders to understand likely impacts of alternative strategies. If used skillfully and appropriately, they can lend considerable credibility to the corridor study results.

Use Appendix B as a resource for investigating alternative analysis approaches.

Appendix B provides a list of some available analysis tools and methods, along with their applicability, advantages, disadvantages, and examples of their application in Vermont and other areas. In general, as the sophistication of the tool increases, so do the data requirements. Prior to selecting a tool or method, it is always helpful to talk with others who have used it to get a solid understanding of what value it brings, what is required to use it (data, assumptions, skills) and what pitfalls to avoid. Analysis methods that are selected should be clearly explained and acceptable to stakeholders.

Qualitative evaluation will suffice for many types of strategies, and also can be used to provide a valuable supplement to quantitative analysis. For example, the evaluation of community impacts may involve interviews and meetings culminating in a statement of the positive and negative impacts of each strategy on corridor communities.

Present the results of the strategy analysis in an easily digestible format.

The results of the strategy analysis may be presented in different formats, including:

- A text description of findings (both quantitative and qualitative) of how each strategy performs on each of the evaluation criteria;
- Tables or matrices summarizing quantitative findings (e.g., travel time savings, crash reductions); and
- Graphics conveying impacts in visual terms (e.g., maps showing the degree of congestion by road segment/intersection, build-out development locations).

An evaluation matrix is commonly used to summarize all of the findings on a single page and to provide a clearly displayed comparison between strategies and their relative impacts. Columns of the impact matrix correspond to each strategy or strategy package. Rows correspond to each evaluation criterion or performance measure. A symbol is used to show how strongly (positively or negatively) each strategy rates on the specific criterion. In the example below, different packages of strategies for improving a corridor are compared based on six criteria. For each criterion, an assessment is shown as to whether the alternative would be better or worse than the existing conditions. An all-white circle indicates that the alternative would be the same as the existing condition; all green means "much better"; all red means "much worse." Partially filled-in circles represent points in between. Note that these strategy packages are not necessarily mutually exclusive; for example, spot improvements (traffic signalization, pedestrian crossings, etc.) could be combined with land use and access management strategies.

Sample Evaluation Matrix

= Much Better than Existing = Much Worse than Existing

	Spot Improvements	Transit and TDM	Road Reconstruction/ Realignment	Land Use/ Access Management	Bypass
Travel Time and Delay					
Safety					
Aesthetic Character					
Bike/Pedestrian Access					
Environmental Impacts					
Cost					

Select and Prioritize Strategies

The qualitative and quantitative information provided through the analysis process should be used to place strategies into priority categories. Strategies should be prioritized as "high," "medium," "low," or "not recommended," based on considerations such as:

- Magnitude of problem/need to be addressed (major, moderate, minor);
- Certainty of need (existing/immediate, forecast and likely to occur, forecast but speculative);
- Cost-effectiveness of proposed solutions (high, medium, low);
- Level of support for strategy (widespread, mixed, weak);
- Potential availability of adequate funding (likely, uncertain, unlikely); and
- Negative impacts associated with strategy (minimal/none, moderate, high).

If separate strategy packages were developed for different funding scenarios or growth scenarios, prioritization should be performed within each scenario. If this is done, there also should be a clear definition of which is considered to be the most likely scenario, and what future conditions would trigger moving to an alternative set of strategies.

Strategies may be classified as "not recommended" after either an initial screening or a more detailed evaluation. Strategies should receive a "not recommended" rating if they do not effectively or cost-effectively address corridor needs; are inconsistent with the corridor vision or other policies; or if funding or other supporting actions are unlikely to be achieved in any reasonable timeframe.

A consideration related to strategy priority is the potential implementation timeframe for each strategy. Strategies may be classified into "short-term" (less than five years), "medium-term" (five to 10 years), or "long-term" (more than 10 years) categories depending upon considerations such as:

- Priority level;
- Timeframe over which need is likely to occur;
- Expected availability of funding;
- Length of study process required to design and implement the strategy;
- Coordination with other relevant processes (e.g., local comprehensive plan updates, statewide transportation planning process); and
- Other considerations, such as expected time required to gather adequate support for the project.

While short-term strategies also may tend to be high-priority strategies, timeframe and priority level are not directly correlated. For example, some high-priority strategies may be classified as "long-term" because they require more funding than is likely to be available in the immediate future, or because they require a lengthy planning and development process.

The criteria and process for selecting strategies, as well as the results of analysis conducted, should be documented. Documentation should address the rationale behind the prioritization of strategies and any thresholds or triggers established. Documentation also should address the reasons why other strategies were rejected or eliminated from consideration. This will provide an important record to inform future updates of the corridor plan and help to keep people from "reinventing the wheel."

Step 4 Develop Implementation Plan

Overview

The fourth step in undertaking the corridor study is to develop an implementation plan for the prioritized strategies. The implementation plan will serve as a guide for the corridor study lead agency and for other corridor study stakeholders in carrying out the recommendations of the plan. This step involves the following tasks:

- Identify thresholds/triggers to undertake specific strategies, if they are not immediate priorities;
- Identify implementation steps and responsibilities for each recommended strategy;
- Identify interagency/intergovernmental relationships or agreements necessary to implement and monitor plan (e.g., monitoring committee, permit review procedures);
- Establish incentives and contingencies (e.g., state actions contingent upon local agency actions); and
- Identify monitoring activities and data sources.

Identify Thresholds/Triggers to Undertake Specific Strategies

Mid- and long-term strategies may include those that address an immediate need, but for which funding and/or supporting actions are not realistically achievable in the short term. Alternatively, they may address needs that are projected to exist in the future, but which currently do not warrant action. For these strategies, the implementation plan should specify threshold conditions that should trigger further action. Examples of thresholds may include:

- Intersection delay exceeds X seconds per vehicle;
- Traffic volumes exceed Y vehicles per day; and
- Truck traffic exceeds Z percent of total traffic volume.

Thresholds should be set to encourage proactive rather than reactive action – so that a problem can be addressed before it becomes critical.

VTrans Performance Targets

Criterion	Performance Threshold – Policy Level	Source
LOS to maintain for design period of roadway improvements	LOS C (normally) LOS D or E (allowed in built-up/urban areas or on case-by-case basis)	Traffic Impact Evaluation: Study and Review Guide, January 2003.
Maximum volume-to-capacity (v/c) ratio on state highways	0.9: Urban area downtowns 0.7: Rural corridors 0.8: Other (small towns/villages, suburban corridors, growth areas)	Vermont Highway System Policy Plan, 2004.
Minimum crash rate to define High-Crash Location	More than five crashes in a five-year period *and* crash rate (number of crashes per 100 million VMT) significantly greater than the average for that class of roadway	Vermont Agency of Transportation

Identify Implementation Tools, Next Steps, and Responsibilities

All the steps necessary to implement the plan should be identified. Some of these steps may pertain to the plan as a whole (e.g., communication); others will be specific to each recommended strategy. Examples of implementation steps may include:

- Communicate the plan's findings and recommendations to a broad audience to build public awareness and support.
- Encourage each jurisdiction to pass a formal resolution endorsing the corridor plan.
- Revise municipal comprehensive plans and/or bylaws consistent with corridor plan.
- Pursue development of specific projects consistent with the plan's strategies: Conduct more detailed project development and environmental documentation; or initiate addition to municipal capital improvement program.
- Pursue changes to the state Capital Program and Project Development Plan – to ensure that this document is updated based on the prioritized strategies for the corridor.
- Review recommendations through the Transportation Planning Initiative (TPI) process, and consider specific projects for inclusion in the regional and statewide transportation plan and state transportation improvement program (STIP).
- Pursue funding from existing programs such as Transportation Enhancements, Bicycle and Pedestrian, Highway Safety Improvement, Vermont Downtown Program, etc.
- Adopt other municipal implementation tools, such as transfer of development rights mechanism, zoning incentives, or expedited permitting for development consistent with corridor plan.
- Conduct outreach to property owners along the roadway corridor regarding access management benefits and techniques.
- Establish infrastructure impact fees or negotiate commitments from developers (e.g., to fund sidewalks, signals, transit improvements).
- Establish other private funding mechanisms (such as a business improvement district) or public-private partnerships to fund transportation improvements that support business expansion or otherwise enhance a community's economic climate.
- Study strategy in more detail once implementation threshold criteria have been met.

For each implementation step, the responsible agency and department(s) should be identified, as well as any implementation partners (e.g., state working with local government). An approximate time horizon should be identified that is consistent with implementation of the overall strategy within its defined category. The approximate funding required also should be listed, along with the proposed funding source (if known) or potential sources.

Appendix C lists some funding mechanisms that can be applied to implement recommendations from the corridor study. Appendix D contains a list

and description of municipal regulatory and non-regulatory tools for implementing development policies.[1]

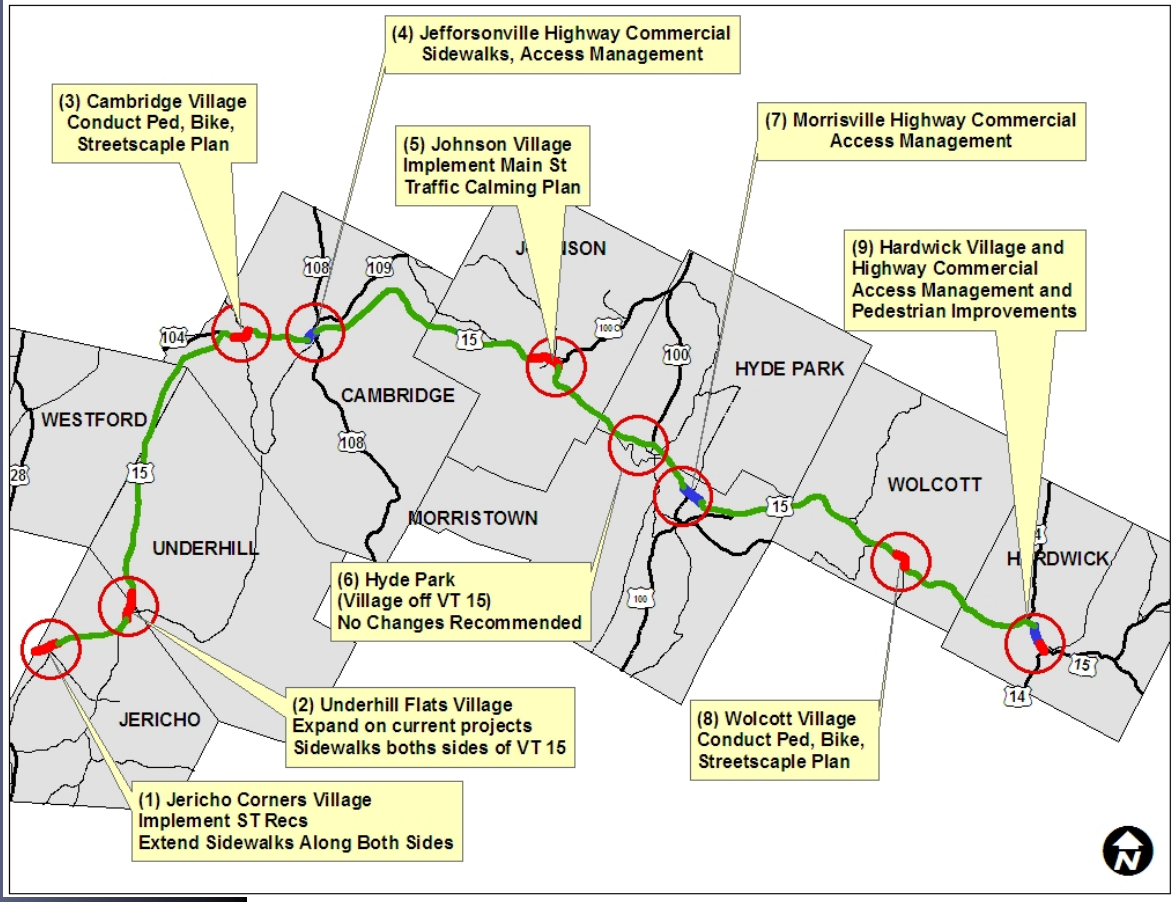
Appendix E provides examples of land use implementation strategies in the context of transportation corridor studies, as applied in other states.

Sample Implementation Recommendations
(from VT 15 Corridor Management Plan)

Area	Purpose	Need	Recommendations	Comments/Next Steps
Jericho Village	Improve safety for pedestrians and cyclists, connect village residential and commercial origins and destinations, enhance community character.	Traffic volumes expected to increase from 10,900 to between 15,000 and 20,000 vehicles per day; will have negative impact on pedestrian travel and quality of life.	**Short-Term** • New sidewalk in front of Keith Agency and Village Cup, extending from new VT 15 crosswalk from bridge. **Medium-Term** • Traffic calming devices along VT 15; • Signage indicating historic district; • Extension of historic light polices; • Bury utility lines; and • Improved access management. **Long-Term** • Sidewalks and bike lanes on both sides of VT 15; and • Additional crosswalks.	• Endorsed by Jericho Transportation Subcommittee; • Evaluate possibility of reducing posted speed to 25 mph when measures implemented; and • Conduct feasibility study of extending sidewalks; identify appropriate crosswalk locations.
Jericho, intersection VT 5/ Lee River Road	Improve intersection safety and efficiency for pedestrians, bicyclists, and motorists.	LOS F currently exists on Lee River Road; will worsen as traffic on VT 15 increases. Future conditions satisfy warrants for left- and right-turn lane on VT 15 and traffic signal.	**Short-Term** • Reconfigure intersection to include one-way exit along north side of Flat Iron with a simple T intersection on south side. **Medium-Term** • Evaluate right and left turns on VT and/or traffic signal. Incorporate proposed streetscape designs.	• Conduct scoping study to evaluate long-term intersection design alternatives.
Jericho, rural-suburban road segment (Cilley Hill to River Road)	Maintain a reasonable level of mobility for through traffic and improve local circulation options.	Projected traffic volumes will approach 11,500-15,000 vpd. Exiting from side streets and driveways will become more difficult. Vehicles turning from VT 15 will reduce speeds on VT 15.	**Short-Term** • Manage access for parcels directly adjacent to VT 15 by following VTrans guidelines. **Medium-Term** • Provide new street connections between adjacent subdivisions to create a local network accommodating vehicles, pedestrians, and bicyclists.	• Include access management guidelines in Jericho zoning and subdivision regulations consistent with VTrans Access Management Category 6; and • Town of Jericho should map easements to explore possible connections. Evaluate traffic impacts of providing connections.

Source: Resource Systems Group, Inc.

[1] Vermont Department of Housing and Community Affairs. Vermont Interstate Interchange Planning and Development Design Guidelines. June 2004. Internet: http://www.dhca.state.vt.us/Planning/InterstateInterchange.htm.



Source: Resource Systems Group, Inc.

Sample Land Use Recommendations
(from Draft VT 15 Corridor Management Plan)

Town	Recommendations
Jericho	• Consider site plan review as a requirement for all development along VT 15 corridor; and • Include provisions for shared access and driveways in subdivision regulations.
Westford	• Consider establishing an overlay district along VT 15 to establish zoning guidelines to implement existing town plan objectives of protecting scenic, historic, and natural resources.
Johnson Town/Village	• Adopt regulatory documents (such as zoning) to implement and enforce town/village Master Plan goals, or delineate VT 15 as a specific planning area and include development guidelines in the Master Plan.
Morristown/ Morrisville	• Establish minimum distance between curb cuts, consistent with VTrans Access Management Standards; and • Establish design guidelines and/or a landscape plan for the commercial district.
Wolcott	• Delineate areas of compact, mixed-use development at major intersections, and minimize development between these areas; • Establish other zoning districts (e.g., residential, agricultural, conservation) and lot requirements/densities; • Encourage sharing of access and parking for commercial developments; and • Allow Planned Residential Developments to promote concentrated development.

Source: Resource Systems Group, Inc.

Identify Relationships or Agreements to Implement and Monitor Plan

Implementation of many of the recommended strategies may involve partnerships or working relationships among different government agencies – e.g., between VTrans and local jurisdictions, or among local jurisdictions in the corridor. For example, implementation of an access management strategy may involve local zoning and subdivision changes, state and local permitting decisions, and state and local capital improvements. Specific processes or institutional relationships may need to be established. Some examples of interagency review and coordination include:

- Local jurisdictions and VTrans may establish Intergovernmental Agreements, inviting VTrans to review locally issued development permits and comment on consistency with established access management policies.
- VTrans, the RPC, and adjacent local jurisdictions may agree to review each jurisdiction's comprehensive plan, design guidelines, and/or zoning, to comment on consistency with the corridor plan and on potential impacts to corridor transportation conditions. Interagency review is not necessary for every plan or zoning change in corridor communities, but should be conducted for plan updates that could significantly affect development patterns in the community, or for land directly fronting on the corridor roadway.
- Local jurisdictions involved in regional and statewide transportation planning through the TPI initiative may comment on the inclusion of recommended corridor plan elements in regional and statewide plans and the statewide transportation improvement program.

Collaborative plan or permit review process is not meant to allow one agency to usurp another's legal authority, but rather to establish a process by which agencies can comment on the actions of other agencies with respect to consistency with agreed-upon plans and policies.

An institutional structure to ensure that the plan is implemented also is needed. The lead agency in the corridor planning effort bears primary responsibility for implementation. However, it also is important to ensure that all key stakeholders are involved in the implementation and monitoring process. One example of such a structure is the establishment of a committee that meets regularly (e.g., once or twice a year) to review implementation activities, their status, monitoring results, and actions needed. The implementation committee may be a continuation of the corridor Advisory Group, or it may be reconstituted to include other key stakeholders with implementation responsibilities.

Establish Incentives and Contingencies

The art of developing a successful and effective corridor plan involves packaging complementary strategies and spreading implementation responsibilities across multiple agencies. For example, access management can work in conjunction with intersection improvements to keep traffic moving and reduce conflict points and potential crashes. In cases where multiple parties are responsible for mutually supportive implementation actions, it may be desirable to make certain activities contingent upon other activities. For example, VTrans may specify that improvements to particular

intersections are contingent upon the local jurisdiction enforcing access management policies for new development. In this way, state funding can be used as an incentive for local jurisdictions to take ownership of their elements of the corridor plan.

Identify Monitoring Activities

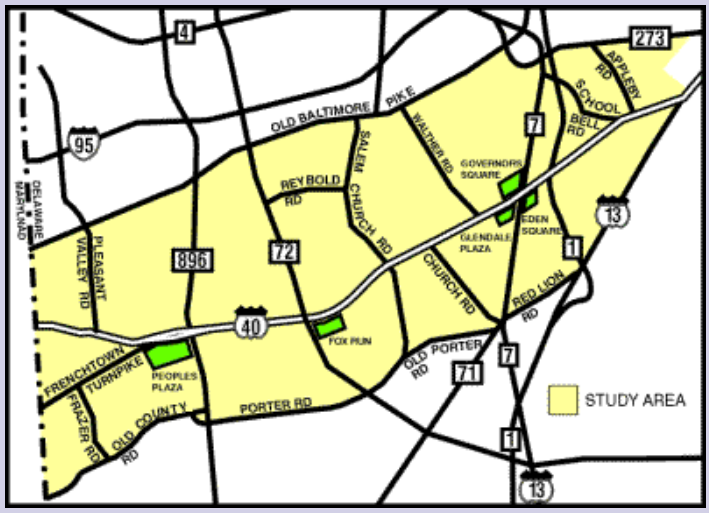
The final aspect of the implementation plan is an approach to monitoring corridor conditions. Monitoring has two purposes: first, to indicate to corridor stakeholders the effectiveness of strategies that have been implemented; and second, to indicate when further improvements or actions might be needed.

At a minimum, monitoring should be conducted using available data on corridor population and employment growth, development along or near the roadway, traffic volumes, and crashes. Some data sources already may be established (e.g., traffic counts); others may need to be established (e.g., a mechanism for tracking development permits). The agency/division/section responsible for specific monitoring activities should be identified and the type, frequency of data needed, as well as analysis methods specified. Performance thresholds also should be specified that indicate the need for further action or implementation of specific strategies. If a corridor implementation committee has been established, this committee should be briefed annually on monitoring results.

Delaware Route 40 Corridor Plan – Monitoring Activities

The Route 40 Corridor 20-Year Transportation Plan, adopted in June 2000, is a community-supported long-range management plan for a 10-mile segment of U.S. 40 between the Delaware-Maryland state line and suburban Wilmington. Initiated by the Delaware Department of Transportation in partnership with New Castle County and the Wilmington Area Planning Commission, the plan was prepared under the direction of a Steering Committee composed of civic leaders, elected officials, and business interests. The Plan includes an implementation strategy consisting of five components: corridor preservation, monitoring, triggering, citizen involvement, and project implementation.

For more information, see:
http://www.deldot.net/static/projects/rt40/index.htm.



Source: Delaware Department of Transportation.

A Corridor Monitoring and Triggering Report is prepared annually by the project team, comprised of staff from the participating agencies. Citizen involvement in implementation is accomplished through a Corridor Monitoring Committee. This committee meets quarterly with the project team to review conditions in the corridor and provide input into the timing and implementation of projects. Committee members also serve as advocates for the implementation of projects within their agencies and communities.

Delaware Route 40 Corridor Plan – Monitoring and Triggering Elements

Monitoring Element	Trigger	Resulting Actions
Land development	Major land development activity	Review transportation needs: • Level of service implications and strategy; • Transit service needs or opportunities; • Safety concerns; and • Pedestrian and bicycle needs.
Traffic	Deteriorating level of service ("D" or worse)	Implement strategies to: • Stabilize/reduce demand; or • Increase capacity.
Highway safety	Safety improvements recommended by the Highway Safety Improvements Program review team	Evaluate the compatibility of the proposed improvements with the Plan and the need to make adjustments to the Plan.
Transit service	Transit service changes proposed by Delaware Transit Corp.	Evaluate any ancillary improvements needed to complement the service changes, such as sidewalks or shelters that should be advanced in the Plan's implementation.
Status of projects in design, implemented, or other projects in the region	Transportation improvements not part of the Plan but affect the corridor and are proposed for implementation	Evaluate the compatibility of the proposed improvements with the Plan and the need to make adjustments to the Plan.
Any of the above		Assessment of potential changes may trigger one of the following options to best respond to the new conditions: • Continue project(s) as currently scheduled; • Move project(s) forward; or • Move project(s) back.

Source: Delaware Department of Transportation.

The monitoring process needs to be sustained over an extended period of time, realizing that individual staff and even agency structures may change over this time period. Techniques need to be established to ensure continuity and sustainability in implementation and monitoring efforts. One such technique is to ensure that the knowledge of the various tasks that need to be monitored is shared across multiple individuals, so that if one leaves, others can identify work gaps that need to be covered. An implementation committee that meets regularly can fulfill this role. Another technique is to include specific responsibilities in job descriptions or work assignments by managers (e.g., "monitor corridor plan implementation for Route 75").

Step 5 Finalize Corridor Plan Document

Overview

The fifth step in undertaking the corridor study is to assemble the materials and information prepared for Steps 1 through 4 into a corridor plan document, and to obtain approval and endorsements from partner agencies.

Finalize Corridor Plan Document – Major Activities

- Assemble materials into a corridor plan document;
- Obtain plan endorsements from stakeholder agencies; and
- Distribute plan and make it available to the public.

Assemble Materials into a Corridor Plan Document

The corridor plan document should include the following sections:

- Description of the corridor: existing transportation, land use, and environmental conditions;
- Corridor issues and needs identified as well as study objectives and process for conducting the study;
- Summary of previous studies conducted in the corridor;
- Expected future conditions in the corridor;
- Vision and goals established for the corridor;
- Strategies evaluated, methods used, and evaluation results;
- Recommended strategies and prioritization;
- Implementation and monitoring plan; and
- Any supporting materials such as detailed data, technical documentation, public involvement activities, etc.

Obtain Plan Endorsements

The corridor plan is meant to be a document that is accepted by all of the stakeholders in the planning process. In addition to the corridor Advisory Group and the sponsoring agency or agencies approving the plan document, the study partners should seek the endorsement of other agencies and jurisdictions participating in the study process. Ideally, the plan should be endorsed by the governing bodies of every local jurisdiction in the corridor through a formal city council or Town Select Board resolution. In addition, state or Federal resource agencies that have a significant interest in the corridor should be aware of the plan and supportive of its recommendations.

Local endorsement helps to ensure that local jurisdictions will "take ownership" of plan recommendations rather than viewing it as something that is being imposed upon them. As noted in Step 4, not just endorsing the plan, but also adopting it or incorporating its principles into existing agency and municipal policies and plans (and where relevant, zoning bylaws), is an important implementation step.

Distribute Plan and Make it Available to the Public

The plan should be distributed as widely as possible, especially to those who may have an interest or role to play in implementing the plan and monitoring its implementation progress. This includes making the plan publicly available through the Internet, libraries, and town halls; and publicizing the release of the plan. Publicity of the final plan should follow naturally from a good public involvement process. The more widespread the awareness and understanding of the plan, the more likely its recommendations are to be implemented.

Step 6 Implement and Monitor Corridor Plan

Overview

The final step in the corridor planning process, which continues indefinitely, is to implement and monitor the corridor plan.

Implement and Monitor Corridor Plan – Major Activities

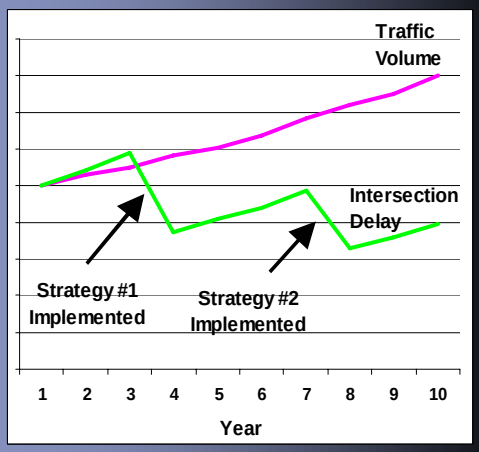
- Establish institutional relationships and agreements for implementation and monitoring;
- Undertake implementation steps;
- Monitor corridor conditions and status of actions; and
- Periodically update plan.

Establish Institutional Relationships and Agreements

Institutional working relationships, implementation committee, process flow changes, and agreements as recommended in Step 4 (Develop Implementation Plan) should be established. This is critical to make the corridor management plan a living document, and ensure that the necessary monitoring and implementation steps are taken. See Appendix E for examples of interagency agreements for coordinated corridor transportation and land use strategies.

Undertake Implementation Steps

Implementation steps should be undertaken per the corridor plan and timeline, including any steps that are triggered by performance monitoring.



Monitor Corridor Conditions and Status of Actions

The implementation committee or responsible agency staff should monitor corridor conditions at regular intervals, per the monitoring plan established in Step 4. The status of implementation actions also should be monitored. If recommended actions have not been taken, the reasons should be discussed with the responsible entities. These entities should work together to identify and overcome implementation barriers (e.g., lack of funding, political will) or agree that the strategy or action should be postponed to a later date.

Periodically Update Plan

The lead agency and corridor stakeholders should conduct periodic updates of the plan, every five to 10 years, to revise it in response to changing conditions and/or needs. Minor updates may include the addition or deletion of recommended actions. Major updates may include significant reprioritization of corridor strategies, for example, based on rapidly changing conditions in the corridor, an evolving vision of the corridor, or changes in funding availability. Corridor stakeholders and the public should be informed of updates and be given opportunities to provide input to updates that will directly affect them or for which they are an implementation partner.

Appendix A Data Sources Inventory

Data	Agency/Source	Description	Where to Obtain
Transportation			
Programmed Projects	VTrans	• Highway and bridge construction projects scheduled for implementation	VTrans Program Development
Traffic Counts	VTrans	• AADT by segment with Route Log information (tables or interactive maps) • Vehicle classification counts by segment • Turning movements	http://www.aot.state.vt.us/techservices/Documents/TrafResearch/Publications/pub.htm
Traffic Growth Factors	VTrans	• Growth factors (5 and 20 year) based on regression analysis	http://www.aot.state.vt.us/techservices/Documents/TrafResearch/Publications/pub.htm
Seasonal Traffic Counts and Adjustment Factors	VTrans	• Highest hourly counts at each site • Daily and monthly adjustment factors for seasonality	http://www.aot.state.vt.us/techservices/Documents/TrafResearch/Publications/pub.htm
State Highway Inventory – Route Logs	VTrans	• Inventory (width, curves/grades, classification, etc.) • ADT and crash history • Sufficiency ratings • Past projects • Structures	VTrans Mapping and GIS Unit
Traveler Characteristics		• Origins and Destinations • Trip Purposes	Primary data collection – Several techniques available (license plate video matching, roadside interview, postcard, etc.)
Online Map Center	VTrans	• Town highway maps	http://www.aot.state.vt.us/techservices/PlanSupport/MapGIS/Town_Maps1.htm
Statewide Travel Demand Model	VTrans	• Projections of traffic volumes on highways of statewide significance	VTrans Policy and Planning – Modeling section
Statewide Accident Database	VTrans	• Accident locations, severity, and causes	VTrans Program Development – Highway Research section Accident locations in GIS format at: http://www.vcgi.org/
Vermont Crash Data Resource Book	VT Dept. of Public Safety	• Summarizes crashes by severity (fatal, injury, total) by town	http://www.vthighwaysafety.com/resources.html
Pavement Management System	VTrans	• Pavement condition	VTrans Program Development – Pavement Management section Some information at http://www.vcgi.org/
Bridge Management System	VTrans	• Bridge condition, location of posted and weight-restricted structures	VTrans Program Development – Bridge section
Burlington Area Traffic Data (interactive maps and database)	CCMPO	• AADT by location • Turning movements • Bicycle/pedestrian counts	http://www.ccmpo.org/data/counts.html

Appendix A

Data Sources Inventory (continued)

Data	Agency/Source	Description	Where to Obtain
Transportation			
Transportation Network Spatial Data	Vermont Center for Geographic Information	GIS data files assembled from various primary sources, including: • Road centerline files • Functional classification of roads • Railroad centerline files • Railroad crossings • Automatic traffic recorder locations • Airport, park-and-ride locations • Urban areas as defined by VTrans • Pavement type and condition, roadway base materials • Roadway widths • Designated speed zones • AADT • Accident locations, high-accident locations	http://www.vcgi.org/
Digital Orthophotos	VT Department of Taxes – VT Mapping Program	• 1:5000 orthophotographic coverage of state (1/2 meter pixels) provides visual information on road geometry, development, access, land use • 1:1250 available for urban areas	Available on CD-ROM – See http://www.state.vt.us/tax/mapping.shtml
Statewide Travel Demand Model	VTrans	• Statewide projections of households through 2020 by TAZ.[1]	VTrans Policy and Planning – Modeling section
U.S. Census Data	U.S. Census Vermont State Data Center	• Population and household characteristics by town (1990, 2000) • Current population estimates • Employment and journey-to-work characteristics by town (CTPP) • Origins/destinations of commuters (CTPP)	http://www.census.gov http://crs.uvm.edu/census/

[1] Employment projections may be released upon execution of a nondisclosure agreement.

Appendix A

Data Sources Inventory (continued)

Data	Agency/Source	Description	Where to Obtain
Socioeconomic			
Burlington Area Census Data – Town Profiles from CTPP	CCMPO	• Household size, vehicle availability, and journey to work data	http://www.ccmpo.org/data/ctpp/
Center for Public Health Statistics	Vermont Department of Health	• Historical population data by town	http://www.healthyvermonters.info/pubs.shtml
Labor Market Information	Vermont Department of Employment and Training	• Historical employment data by town	http://www.vtlmi.info/
Vermont Community Profile Reports	Vermont Agency of Human Services	• Recent data and trends on various social indicators (health, employment, crime, etc.)	http://www.ahs.state.vt.us/publs.cfm
Vermont Sprawl Database	UVM – Center for Rural Studies	Summary town-level data (provided in spreadsheets) including: • Population and socioeconomic from census and DOH • Employment from census and DET • Land cover from UVM analysis • Transportation data (VMT, AADT, roadway mileage by class, total crashes, etc.) from VTrans • Household transportation and journey-to-work from U.S. Census • Tax data (total parcels, valuation) from VT Dept. of Taxes • Links to regional, state, and national data, including Census (official state data center for U.S. Census)	http://crs.uvm.edu/
Land Use and Environmental			
E911 Data		• Statewide GIS address database for 911 system (residential and commercial driveways)	http://www.vcgi.org/
Grand List Data		• Town-level list of taxable and nontaxable properties	From individual towns or cities

Appendix A

Data Sources Inventory (continued)

Data	Agency/Source	Description	Where to Obtain
Land Use and Environmental (continued)			
Parcel Data		• Size, shape, use, structures, assessed value, other information on parcels • GIS parcel data is publicly available for about two-thirds of Vermont towns and cities	From individual towns, cities, or RPCs See also http://www.vcgi.org/ (information on availability)
Vermont GIS Data (various)	Vermont Center for Geographic Information	GIS data files assembled from various primary sources, including: • Political boundaries • Land cover/land use • Lakes, ponds, watershed boundaries • Wetlands inventory • Rare, threatened, and endangered species • Core habitats • Cemeteries • Conserved lands • Elevation data	http://www.vcgi.org/
Vermont Conserved Lands Database	UVM – Center for Spatial Analysis	• GIS database of public and private conserved lands	http://www.uvm.edu/~envnr/sal/vtcons.html http://www.vcgi.org/
Digital Orthophotos	VT Department of Taxes –VT Mapping Program	• 1:5000 orthophotographic coverage of state (1/2 meter pixels) provides visual information on road geometry, development, access, land use • 1:1250 available for urban areas	Available on CD-ROM – See http://www.state.vt.us/tax/mapping.shtml
Digital Elevation Models	VT Department of Taxes –VT Mapping Program	• Files that allow generation of slope, aspect, perspective view, and contour data using specific software	Available on CD-ROM – See http://www.state.vt.us/tax/mapping.shtml
Windshield Survey		• Visual information on road geometry, development, access	Primary data collection
Community Planning (various)	VT Planning Information Center	• Variety of community planning resources – GIS data, land data, demographics, historic resources, air quality	http://www.vpic.info

Appendix B Analysis Methods

Type of Forecast	Available Methods	Applicability	Key Data Requirements	Advantages	Disadvantages
Future year population and employment in the corridor study area	Statewide travel demand model	Appropriate "baseline" forecast	(Existing data)	Existing, consistent statewide forecast of population and employment by town	Assumptions underlying forecasts may not fully reflect local conditions
	Trend analysis	Appropriate in absence of other data Can be tempered with judgment on expected future trends	Historical trends in study area population, employment, development permits	Reflects past/current trends	Assumes past/current trends will remain consistent in the future
	Build-out analysis	Appropriate for towns with rapid growth/approaching build-out in analysis period, or for studies taking long-term (>20 year) perspective	Study area zoning (allowable densities, types of uses) Locations of existing development Locations with environmental constraints to development	Reflects current local plans and policies Supports a "worst-case" scenario of growth	Not possible in towns without zoning; difficult without electronic zoning map Forecast year development may be much less than build-out
	Estimate future development based on known plans	Best for short-term studies, or areas with slow change Can be combined with longer-term estimation methods	Permitted or planned developments (industrial park expansion, subdivision applications)	Realistic picture of near-term future development	Likely to underestimate 20-year development
	Expert judgment (e.g., Delphi/expert panel method)		Past trends Permitted/planned developments Knowledge of corridor economic and planning environment	Can combine other methods and data to arrive at a consensus forecast	Subjective – Different "experts" are likely to disagree
	Scenario planning	Best for regions that want to conduct proactive and long-term planning for future growth	Varies; may utilize other planning and forecasting tools	Involves public and stakeholders in discussing alternative futures and their potential impacts	Process involving significant effort

Analysis Methods (continued)

Type of Forecast	Available Methods	Applicability	Key Data Requirements	Advantages	Disadvantages
Specific locations of future year development	Known plans method	(See above)			
	Build-out analysis	(See above)			
	GIS-based forecasting tools	Examine changes in development patterns based on major trans. investments and land use policies Provides inputs to detailed trans. model, GIS-based environmental analysis	Areawide population and employment control forecasts Planned land use/zoning Developmental constraints Transportation accessibility measures	Rational/consistent method for allocating development	Data and resource-intensive to develop and apply
Future traffic volumes on study area roadways	VTrans statewide travel demand model	Baseline traffic growth projections on major roads	(Existing data)	Accounts for forecast statewide development patterns and transportation network improvements	Not available for roads not included in statewide model
	VTrans growth factors	Baseline traffic growth projections	(Existing data)	Based on historic trends on roadway	Assumes historic growth trends will continue in future
	Traffic impact study	Assess impacts of growth policies regarding specific major developments, or general location of development in corridor	Locations, type, and size of new high-trip generators Trip generation rates (ITE manual or other source)	Accounts for traffic impacts specifically from study area development Can account for seasonal trip generation, e.g., from recreational sources	Needs to be added to background traffic levels Caution required to avoid double-counting
	Rural Traffic Shed Model[2]	Forecast traffic volumes from development in a "traffic shed" area served by a single major road	Future land use and development by "traffic shed" Trip generation rates associated with various land uses	Similar to an areawide trip generation study	Not tested in Vermont

[2] See: Federal Highway Administration. *Tool Kit for Integrating Transportation and Land Use Decision-Making*.

Analysis Methods (continued)

Type of Forecast	Available Methods	Applicability	Key Data Requirements	Advantages	Disadvantages
Intersection performance (delay, LOS) given future traffic volumes	Highway Capacity Manual (HCM) Chapters 16 and 17[3]	Estimate delay, LOS, V/C, queue lengths at controlled intersections	Traffic volumes (including turning movements), control type, through and turn lanes	Standard, widely applied methodology	Requires detailed traffic and geometric data for each intersection analyzed
Road segment performance (speed, LOS) given future traffic volumes	HCM Chapter 20	Estimate speeds, LOS for roadway segments	Traffic volumes, lane and shoulder widths, trucks, directional split, passing zones, free flow speed	Standard, widely applied methodology	Requires traffic and geometric data for each road segment analyzed LOS is subjective depending upon expectations for road
Corridor performance and delay	HCM Chapter 29	Combines intersection and segment level techniques; most applicable for urban, multimodal corridors	See above	Can account for demand-shifting between modes (e.g., highway and transit) and parallel facilities	Analysis procedures can be somewhat complex
Overall corridor travel time given future traffic volumes	Ski Corridor Travel Time Model (combines intersection and road segment methods)[4]	Best for analyzing: intersection improvements, roadway segment improvements, changes in study area trip generation	Same data requirements as for HCM analysis Requires corridor travel time data for validation	Proven overall corridor-level measure of travel time performance Sensitive to development traffic and mitigation measures	Does not provide reliable estimate under severely congested conditions
	Statewide travel demand model	Primary use is forecasting traffic volumes statewide – Not roadway-specific travel times	Change in capacity for roadway corridor	Reflects statewide travel patterns	Not sensitive to intersection or small-scale improvements Limited accuracy of speed estimation May require calibration for corridor-specific application
	Statewide travel demand model – Enhanced for corridor study area	Best for analyzing: shifting growth within study area locations, adding links to roadway network, major capacity upgrades	Refined level of detail on road network, study area population and employment	Can account for shifting of growth or trip generation within study area, traffic diversion to alternate facilities	May involve considerable effort Not sensitive to intersection or small-scale improvements

[3] Transportation Research Board. *Highway Capacity Manual 2000.* National Research Council, Washington, D.C., 2000.

[4] Developed for the Southern Windsor County Regional Planning Commission by Resource Systems Group, Inc.

Analysis Methods (continued)

Type of Forecast	Available Methods	Applicability	Key Data Requirements	Advantages	Disadvantages
Crash reductions from safety and operational improvements	NCHRP Report 500[5] – Information on effectiveness of strategies	Analyze potential safety benefits of various roadway and operational improvements	Existing conditions Improvement being proposed Traffic volumes	Low cost/easy to apply	Results reported from other studies – Actual benefits may vary widely depending upon context
Traffic reductions from alternative mode strategies	Sketch-plan assessment of mode shifts	Analyze vehicle traffic reduction or nonmotorized traffic increase from transit service, bicycle/pedestrian facilities, TDM strategies, pedestrian-friendly development	Observed or modeled travel behavior changes from similar strategies in other areas	Can provide quantitative estimate for this factor	May be difficult to find research from comparable situations
	Stated-preference surveys	Ask people to state choices for alternative modes under different scenarios	Survey – Original data collection	Can reflect specific facility/service improvement being proposed	Can be expensive to administer Survey must be carefully designed, otherwise people may overstate choices
Congestion and safety benefits of access management strategies	NCHRP Report 420[6]	Predict changes in crash rates based on addition of driveways, intersection spacing, median treatments	Number of unsignalized and signalized intersections per mile Type of median	Estimates based on empirical data	Crash rates and strategy impacts likely to vary depending upon context
	HCM Chapters 16, 17	Analyze delay at new/improved controlled intersections	(See above)		

[5] Transportation Research Board. *Guidance for Implementation of the AASHTO Strategic Highway Safety Plan Transportation Research.* National Cooperative Highway Research Program (NCHRP) Report 500, Volumes 1–13. National Academy Press, Washington, D.C., 2003-2004.

[6] Gluck, Jerome S., Herbert S. Levinson, and Vergil G. Stover. *Impacts of Access Management Techniques.* National Cooperative Highway Research Program (NCHRP) Report 420, National Academy Press, Washington, D.C., 1999.

Analysis Methods (continued)

Type of Forecast	Available Methods	Applicability	Key Data Requirements	Advantages	Disadvantages
Environmental and community impacts of transportation and development patterns	Qualitative assessment	Conduct sketch-level assessment of impacts of corridor strategies, based on professional and stakeholder knowledge	Various background data on existing conditions Proposed transportation and land use strategies	Low cost/easy to apply	Subjective – Will vary by person; non-quantifiable
	GIS-based community impact assessment tools	Scenario analysis of alternative transportation and development patterns producing indicators such as land developed, impermeable surface area, transit access, walkability, energy consumption	Existing and future land use/development patterns (GIS-based) Transportation network data Other land use, environmental data	Can assess a wide range of community impacts related to future development patterns	Data and resource-intensive Have primarily been applied in metropolitan area applications, not for rural areas
	Detailed analysis methods	Most appropriate for specific projects, typically conducted as part of the NEPA process	Varies depending upon impact and method	Provides in-depth information on impacts	Often data/resource intensive
Visual/aesthetic impacts	Visual preference surveys	Assess visual/aesthetic preferences	Images of different types of development or roadway design alternatives	Low cost – Can use existing images/ examples from other areas	Does not show what actual project or development would look like
	Computer visualization techniques – Land use	Develop computerized representations of alternative development scenarios	Planned land use, including location of development, density, other physical design parameters	Powerful tool to communicate visual/aesthetic impacts related to development scenarios/ alternatives	Requires detailed data Building design/ architecture may not resemble actual development
	Computer visualization techniques – Transportation facilities	Develop computerized representations of alternative transportation facility designs	Landscape/background Transportation facility design	Powerful tool to communicate visual/aesthetic impacts related to development scenarios/ alternatives	Requires detailed data Most appropriate for detailed project analysis, not corridor planning

Appendix C Funding Sources

Source[1]	Description	How to Apply/Obtain	Further Information
Surface Transportation Program	Federal transportation funding source that can be used for a variety of transportation projects, including highway preservation and capacity improvements, transit capital improvements, and pedestrian/bicycle improvements.	Regional and statewide program development is done by VTrans, the Regional Planning Commissions, and the Chittenden County MPO under the Transportation Planning Initiative.	VTrans Policy and Planning Division
Transportation Enhancements (TE)	Federal transportation funding source for transportation-related improvements, including sidewalks, curbs, trails, and restoration of historic structures. Estimated $4 million to be available in 2005 for Vermont.	TE grants are awarded through a competitive process by VTrans.	http://www.aot.state.vt.us/progdev/Sections/LTF/Enhancements%20Program/EnhancementsHomePage.htm
Recreational Trails	FHWA funding source for development and maintenance of recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Estimated $300,000 to be available in 2005 for Vermont.	Funds are available to municipalities, schools, nonprofit organizations, and intermunicipal districts through a competitive process administered by the Vermont Department of Forests, Parks, and Recreation.	http://www.vtfpr.org/recgrant/index.cfm
Transportation and Community and System Preservation Program (TCSP)	FHWA funding source for innovative programs to link transportation and land use. Funding levels in 2006 and subsequent years have not been determined.	Details of the funding allocation procedure in 2006 and subsequent years remain to be determined.	http://www.fhwa.dot.gov/tcsp/
Vermont Downtown Program	Downtown Transportation Fund provides funding for certain transportation-related projects, including streetscape and pedestrian improvements, in designated downtown areas. $800,000 annually designated for transportation improvements.	Grants awarded annually by state committee coordinated by DHCA. Requires 50% local match.	http://www.dhca.state.vt.us/DHP/programs/downtown.html
Urban Forestry Grants	Pay for planting of trees in towns and villages. Up to $65,000 to be provided in 2005.	Division of Forests, Parks, and Recreation	http://www.vtcommunityforestry.org/annbrochure.pdf
Municipal Capital Budget	Common source of funding for minor capital improvement projects.	Town must adopt in annual budget.	

Appendix C

Funding Sources (continued)

Source[1]	Description	How to Apply/Obtain	Further Information
Transportation Improvement District	Special assessment district where a special tax is levied on property owners who will benefit from specific transportation improvements.	Requires petition signed by certain percentage of property owners in district.	Title 24 VSA Chapter 26A § 2793
Impact Fees	Raise money to fund deficits caused by deterioration of system resulting from increased growth.	Requires adoption of capital budget and local impact fee ordinance.	Permitted by Title 24 VSA Chapter 131
Developer Agreements	Private funds to mitigate development impacts as determined through Act 250 review procedures or other negotiations.	Requires Act 250 hearing or negotiations with developer	
Community Development Block Grants	Federal (HUD) funds to support community redevelopment activities. May include transportation-related projects such as streetscaping, lighting, sidewalk/pedestrian amenities.	Must be applied in neighborhoods meeting certain economic criteria.	Vermont Community Development Program in the Department of Housing and Community Affairs http://www.dhca.state.vt.us/VCDP/index.htm
Municipal Planning Grant Program	State program that funds technical assistance for town planning, implementation of plans and ordinances, encouragement of citizen participation and education, and innovative demonstration planning projects.	Eligible applicants are **municipalities that have been confirmed** by their regional planning commission (including RPC approval of the town's adopted plan).	Vermont Community Development Program in the Department of Housing and Community Affairs http://www.dhca.state.vt.us/Planning/MPG.htm

[1] These are examples of current programs; other sources may be available, and programs may change.

Appendix D Municipal Planning Tools

Municipal Development Tools (Regulatory)	
Zoning Bylaws	Regulate the type and density of development. Administered by the ZA, PC, and ZBA, or DRB.
Zoning Districts	Standards defining allowed uses and densities of development (lot, setback, frontage, coverage requirements). Examples: Mixed Use, Industrial/Office, Traveler Service, Conservation districts.
Overlay Districts	Designated areas in which additional standards (e.g., design standards) will be applied to supplement or substitute for the standards of the underlying zoning district. May overlay one or more underlying zoning districts. Examples: Design Review, Scenic, Gateway, Corridor districts.
Site Plan Review	Standards that may apply to all allowed uses except for single- and two-family dwellings, including site layout and design, access, traffic and pedestrian circulation, landscaping and screening, and other standards as specified in the bylaws (e.g., building orientation, parking areas, and lighting). Administered by the PC or DRB; no warned public hearing is required.
Conditional Use Review	Standards applying to listed "conditional uses," to evaluate and avoid or mitigate project impacts on the capacity of existing or planned community facilities, the character of the area, traffic on roads and highways in the vicinity, other municipal regulations, the use of renewable energy resources, and other resources or facilities as specified in the bylaws (e.g., the design and location of structures and service areas, signs, landscaping). Administered by the ZBA or DRB; a warned public hearing is required.
Design Review	Standards applying to site layout and building design (typically within a design review district); planning study required to identify design issues and criteria. Administered by the PC or DRB; a design review board may serve in an advisory capacity to the PC, DRB. and applicants.
Parking Standards	Standards for the number of required parking spaces by district and/or use type; also may include standards for parking area design, layout and screening, loading and service areas. May be administered by the ZA, and/or in association with site plan or conditional use review.
Access Management Standards	Standards for limiting the number of access points per lot, frontage distance or use by district or road type; also may include access location and design standards, and reference other state and town access permits.
Sign Standards	Standards for the location, height, sign area, design, and illumination of on-premise signs. Also may be adopted as a separate ordinance.
Use Standards	Standards that apply to specific types of use, to more specifically regulate their sitting, layout, and design (e.g., gas stations, industrial/office parks).
Subdivision Bylaws	Regulate the pattern of development and supporting infrastructure. Administered by the PC or DRB; hearing required for final plat approval.

Appendix D

Municipal Planning Tools (continued)

Municipal Development Tools (Regulatory)(continued)	
Resource Protection Standards	Standards that limit the subdivision of, or otherwise protect, significant natural, cultural and/or scenic features (e.g., through the designation and sitting of building envelopes on lots).
Settlement Pattern Standards	Standards that encourage or require compatible lot and road layouts. Examples: traditional neighborhood, transit-oriented, or conservation/open space subdivision designs.
Infrastructure Standards	Standards for the provision and design of supporting infrastructure and utilities (e.g., context sensitive road and pedestrian design, water/sewer line extensions). Should be consistent with other municipal infrastructure standards, official map.
Master Planning	May include master plan, phasing requirements for larger projects, especially in relation to an adopted municipal capital budget and improvement program.
Planned Development [PUD, PRD]	Standards for planned unit development (PUD) or planned residential development (PRD), adopted under zoning and administered in association with subdivision review, which allow density modifications to promote clustered development and protect open space. Administered by the PC or DRB.

Key: *ZA – Zoning Administrator* *PC – Planning Commission*
ZBA – Zoning Board of Adjustment *DRB – Development Review Board*

Appendix D

Municipal Planning Tools (continued)

Municipal Development Tools (Non-Regulatory)

A municipality may use the following non-regulatory tools, alone or in conjunction with local bylaws, with the purpose of implementing a municipal plan and the state land use goals.

Capital Budget and Program	A municipality may adopt a five-year capital program, updated annually and divided into annual capital budgets, to provide for maintaining current and acquiring future capital improvements.
Tax Increment Financing	Pursuant to 24 VSA 53, subchapter 5 (§1891-1900), a municipality may issue bonds to pay for new infrastructure, such as roads, water and sewer lines, in a defined growth center, and apply the incremental tax revenues to pay off those bonds for up to 10 years.
Development Agreements	When it furthers the objectives of the municipal plan and is not possible under current regulations, a municipality may adopt a process, with standards and criteria for its application, to negotiate an agreement for review of a particular parcel that establishes the rights and obligations of all parties.
Transfer, Purchase or Acceptance of Development Rights	A municipality may specify sending and receiving areas in order to transfer, purchase, or accept the donation of development rights, to further the conservation or development objectives of a plan.
Supplemental Plans to the town plan, which may ultimately become incorporated into the town plan may include:	**Official Map –** A municipality may adopt an official map which identifies future municipal utility and facility improvements, such as road or path rights-of-ways, parkland, utility rights-of-way and other public improvements to provide the opportunity for the community to purchase land identified for public improvements prior to development for other use. **Access Management Plan –** A municipality may adopt an access management plan to manage traffic and access onto public roads from adjacent property. **Downtown, Village Center, or New Town Center Plan –** A municipality may adopt a plan for the development and revitalization of downtown and village centers, or to plan for a new town center. **Open Space Plan –** A municipality may adopt a plan to assess critical natural resources and to guide public and private conservation strategies.
Conservation Commission	A municipality may form a conservation commission to work on conservation and natural resource planning issues.

Source: Vermont Department of Housing and Community Affairs. *Vermont Interstate Interchange Planning and Development Design Guidelines*. 2004.

Appendix E

Land Use Strategies for Transportation Corridors: Examples from Other States

Colorado – Intergovernmental Agreements Address Highway Corridor Development

Local and state government agencies in Colorado make widespread use of intergovernmental agreements (IGA) to coordinate land use planning and transportation issues. For example, the Towns of Windsor and Severance entered into an IGA to harmonize planning and govern development along Highway 392 between the two towns. Their goal was to avoid rapid and poorly planned development along this highway corridor that might be exacerbated by municipal competition for tax revenue. The agreement, adopted in 2000, does the following:

- Solidifies the growth boundaries for both Windsor and Severance, agreeing upon areas where the boundaries of the two towns meet and directing development to areas within the towns' boundaries;
- Creates a Cooperative Planning Area (CPA) for joint planning, in which the towns share both the responsibility for and the benefits of development in this area with high industrial and commercial growth potential along Highway 392;
- Requires both towns to develop and implement a Corridor Development Plan for the CPA – containing specific elements – within 12 months of signing the intergovernmental agreement;
- As development occurs in the CPA, the intergovernmental agreement implements revenue sharing in which the towns divide the tax revenue from development in the CPA;
- Coordinates the development of an efficient and well-planned water and sewer service for the CPA; and
- Adopts a consistent and mandatory design standard for the CPA.

For more information, see: http://www.sprawlaction.org/halloffame/HWindson.html.

Florida – Corridor Management Ordinance and U.S. 98

Section 337.273, Florida Statutes, provides that local governments may designate a transportation corridor for management by including the corridor in the transportation element of the local comprehensive plan, and may thereafter adopt a corridor management ordinance to include criteria to manage the land uses within and adjacent to the transportation corridor. The statutes acknowledge that coordinating land use and transportation is important to alleviating traffic congestion and maintaining an effective transportation system, and that transportation corridor management can best be achieved through the inclusion of corridors in local government comprehensive plans.

The U.S. 98 corridor in Polk County represents a successful example of corridor management. In 2001, as development pressures began north of the city limits of Bartow, local officials saw the need to take action to prevent access and congestion problems along the previously undeveloped corridor. The Polk County Transportation

Florida Department of Transportation

Planning Organization, the MPO for the region, drafted an MOU in cooperation with the Florida DOT, the Cities of Bartow and Lakeland, and Polk County. The MOU established the basis for widening U.S. 98 to six lanes while providing transit service and developing a multi-use recreational trail. The MOU also outlined state and local objectives that can be met for the roadway through land development and subdivision regulations. Finally, the MOU identified the intention of all three local governments to amend their comprehensive plans to include a designated U.S. 98 corridor (pursuant to state statutes). The plans also would be amended for consistency with a corridor access management plan (CAMP) developed by FDOT in consultation with the jurisdictions.

The CAMP was ultimately adopted in 2004 and municipalities are in the process of updating their plans. A proposed service road system, which is beginning to be developed, will provide access to and between businesses accommodating more "local traffic" while allowing through traffic on the arterial. The Steering Committee charged with developing the CAMP continues to meet to ensure implementation, discussing the details of how proposed developments should comply with the CAMP.

Florida – Martin County Incorporates Access Management in Local Ordinances

Martin County, Florida's Roadway Design Ordinance (no. 561) includes a section on access management addressing the access classification of the roadway and related intersection spacing standards, corner clearance, access among properties, driveway spacing and design, and overlay zones. The ordinance also includes sections on mobility and connectivity, with the intent of discouraging the use of local streets for cut-through traffic while maintaining the overall connectivity of the roadway system for vehicle traffic, bicyclists, and pedestrians.

For more information, see: http://webserver.martin.fl.us/GOVT/depts/leg/ords/ord.561.html.

Indiana – Madison County Adopts a Corridor Overlay District

After adopting a new comprehensive plan in 2001, Madison County, Indiana (northeast of Indianapolis) passed a development ordinance that includes new road design standards, access control, corridor preservation, corridor overlay districts, and non-motorized facility requirements. Excerpts from the Corridor Overlay District Zoning Ordinance include:

- **Purpose** – The purpose of this Article is to establish an overlay district to address the unique characteristics of the properties adjacent to the major transportation corridors in Madison County except in Planned Unit Development districts.
- **Building Orientation** – All primary structures shall face the front of the lot on which they are located.

Appendix E

Land Use Strategies for Transportation Corridors: Examples from Other States (continued)

- **Landscaping** – Landscaping screening shall be provided around the perimeter of all parking areas which include 15 or more parking spaces.
- **Entrance Drives** – Entrance drives accessing lots from an arterial or collector road may be located no closer than 200 feet from any other drive on the same side of the public road, or 500 feet from any intersection of two public road rights-of-way. Interior driveways passing through front yards parallel to public roads shall be designed and constructed to stub into adjacent properties and included in cross access easements.
- **Shared Parking –** Parking areas restricted to patrons of the business located on each specific lot shall be prohibited.
- **Parking Location –** No more than 30 percent of the parking spaces provided on each lot may be placed between the front facade of the primary structure and the abutting public street.
- **Pedestrian Walkways –** Pedestrian walkways shall be provided across the frontage of all lots, connecting the lot, the primary structure, and parking areas to each other and with adjacent properties.

Source: Madison County Zoning Ordinance Article Four: Corridor Development Overlay District. http://www.mcplanning.net/.

Kentucky – Zoning Overlay District Complements Arterial Improvements in Bowling Green

In Bowling Green in southwestern Kentucky, the Kentucky Transportation Cabinet and the community had reached an impasse over the widening of Cemetery Road from two to five lanes, first proposed in the early 1980s to address congestion and safety issues on this heavily traveled road. Residents feared that the widened road, which serves as an important gateway connecting downtown Bowling Green to I-65, would be overwhelmed with strip development similar to Scottsville Road to the north.

Reviving the project in the mid-1990s, Cabinet district engineers worked with local stakeholders to select a new alignment for an arterial, redesign it as a four-lane divided boulevard, enact land use protections along the alignment through a zoning overlay district, and incorporate bicycle and pedestrian accommodations into the design. The overlay district, written by the city and county planning commission, specifies allowable uses, building design and landscaping features, and connections to the roadway and the shared-use path. The combination of design changes and land use protections allowed the project to move forward, and reconstruction of Cemetery Road was completed in 2004.

Kentucky Transportation Cabinet

Appendix E

New Jersey – Corridor Planning Integrates Transportation and Land Use

The New Jersey Department of Transportation (NJDOT) is undertaking nine corridor planning pilot studies throughout the State. The corridors involve arterial roads of two to 30 miles in length with congestion and/or safety problems. The corridor studies are addressing not just the roadway itself, but also local street networks that interface with the arterial roadway as well as adjacent land use patterns. In each case, the Department is working with local jurisdictions to address circulation systems, access management, and land use in the corridor. A significant objective of the corridor studies is to find solutions to transportation problems that are less capital-intensive than building multi-lane and limited-access highways, as NJDOT has realized that there is no way it can fund all of the statewide capital improvements that have been studied or planned throughout the State.

The Department's pilot studies are bringing in specialists to help communities reshape their land use and street network patterns. The Department is only funding studies in communities, though, that have expressed a willingness to work with the Department to include land use strategies as part of the solution set. In Trenton, for example, the State is working with the city on the redesign of Route 29, the Riverfront Parkway, currently a four-lane freeway walling off the downtown from the Delaware River. The city would like to convert the highway to a boulevard and realign it to reduce impacts on the downtown. The State has indicated its willingness to pursue the project, but only as long as the city undertakes land use and local road network planning in conjunction with the state highway redesign.

West Virginia – Putnam County Adopts a Corridor Land Use Plan

In rural Putnam County, West Virginia, the county led the development of a corridor land use plan to accompany the planned widening and realignment of U.S. 35 through the county, which would address safety and capacity problems on a major truck route. County officials expected that the project, in conjunction with planned utility expansions, would result in additional scattered development that would threaten scarce prime agricultural land in the river valley and change the existing rural character of development. Through a public involvement process, the county developed a community-supported plan for the corridor that would concentrate commercial development around interchanges and in specific industrial development areas, while limiting development outside of these areas to rural densities and uses. The county has since adopted zoning consistent with this plan. The project is especially noteworthy because it represents the first application of zoning in this rural area.

Wisconsin – WisDOT Participates in Local Comprehensive Planning

To preserve mobility and safety, ensure environmental protection, and support state-led smart growth efforts, the Wisconsin Department of Transportation (WisDOT) has begun over the past five to 10 years to work with communities on land use issues, improving the linkage between transportation planning, project development, and land use decision-making. WisDOT's approach has largely focused on outreach to local communities within the corridor planning process as well as within each community's comprehensive planning process. The agency does not have formal authority to participate in the local planning process, but they are working to build relationships with communities in order to be able to provide input on an informal basis.

District staff are provided with information on the status of local comprehensive plan development in their areas and are encouraged to work with local governments to provide input into these efforts. (State legislation passed in 1999 requires communities to adopt comprehensive plans and establishes a tracking system to monitor plan development.) For example, as part of a corridor planning process for State Highway 21, an important east-west corridor connecting Lake Winnebago and the Fox Valley to western destinations, WisDOT District 3 staff have worked with communities along the highway to ensure that protections are implemented to contain strip commercial development and to preserve right-of-way for future expansion or realignment. In the Town of Omro, west of Oshkosh, WisDOT staff attended local planning meetings and reviewed and commented on drafts of the town's comprehensive plan. In its adopted plan, the town reserved right-of-way for a limited-access bypass of the town, identified parallel and local street connections, and recommended zoning around interchanges to support commercial development.

For further information, see:

- WisDOT – http://www.dot.wisconsin.gov/localgov/land/
- State Highway 21 Corridor Study – http://www.dot.wisconsin.gov/projects/d3/index.htm

Appendix F Additional Resources

Examples of Corridor Studies and Management Plans

Vermont

Burlington-Essex Corridor. DMJM+Harris, et al. *Burlington-Essex Corridor Alternatives Analysis.* Prepared for Chittenden County MPO, Burlington, VT, 2001. http://www.ccmpo.org/VT15/

U.S. Route 7, Winooski-Georgia. Oman Analytics, et al. *U.S. Route 7 Winooski to Georgia Corridor Study: Corridor Transport Plan.* Prepared for Chittenden County MPO, 2001. http://www.ccmpo.org/US7/

VT 15, Jericho-Hardwick. Resource Systems Group, Inc. *VT 15 – Jericho to Hardwick Corridor Management Plan.* Prepared for Lamoille County Planning Commission and Chittenden County MPO, 2004. http://www.ccmpo.org/LibraryFiles/ or http://www.lcpcvt.org/

VT 100, Waterbury-Morristown. Resource Systems Group, Inc. *VT 100 Access Management Plan.* Prepared for Lamoille County Planning Commission and Central Vermont Regional Planning Commission, 2004. http://www.lcpcvt.org/

VT 30, Brattleboro-Winhall. Windham Regional Planning Commission. *Vermont Route 30 Corridor Management Study*, 1999.

Other States

Michigan – U.S. 31. The Northwest Michigan Council of Governments developed a Corridor Management Plan for U.S. 31 in Manistee County. The plan includes recommendations to manage growth, reduce congestion, enhance safety, improve roadway capacity, consolidate and eliminate driveways, improve intersections, improve driveway configuration and spacing, enhance non-motorized travel, and manage access in the corridor. http://www.nwm.org/Community/US31Corridor/

Minnesota – Trunk Highway 61. This 30-mile, two-lane roadway corridor along the Mississippi River and Lake Pepin connects to four-lane segments on either end. The Highway 61 Corridor Management Study, a report identifying transportation needs and planning options from Wabasha to Red Wing, was completed in April 2003. http://www.dot.state.mn.us/d6/projects/hwy61/

North Carolina. The North Carolina Department of Transportation is undertaking a series of strategic highway corridor studies that are addressing transportation and land use issues. http://www.ncdot.org/planning/tpb/SHC/documents/

Appendix F

Additional Resources (continued)

Related Vermont Policies, Guidelines, and Resources

VTrans Long-Range Transportation Plan (LRTP) and Modal Policy Plans

Vermont Agency of Transportation. *Vermont Long-Range Transportation Plan,* 2002.
http://www.aot.state.vt.us/planning/studies.htm

Vermont Agency of Transportation. *Vermont's Highway System Policy Plan*, 2004.

Vermont System Transportation Studies, including Airport System Policy Plan (1998), Rail Policy Plan (1998), and Public Transit Policy Plan (2000): http://www.aot.state.vt.us/planning/studies.htm

State Transportation Improvement Program (STIP)

Vermont Agency of Transportation. Statewide Transportation Improvement Program FFY04.
http://www.aot.state.vt.us/NewsPub.htm

Capital Program and Project Development Plan

Vermont Agency of Transportation. Capital Program and Project Development Plan FY 2005.
http://www.aot.state.vt.us/NewsPub.htm

Project Development Process

Vermont Agency of Transportation Project Development Process.
http://www.aot.state.vt.us/progdev/Sections/PDManual/01mantabl.htm

Design Guidelines and Standards

Chittenden County Regional Planning Commission. *Transit-Oriented Design (TOD) for Chittenden County – Guidelines for Planners, Policy-makers, Developers, and Residents.* First Edition, March 2002.
http://www.ccrpcvt.org/ (click on Publications for link to this document)

Vermont Agency of Transportation. Program Development Manuals, Guidelines and Publications
http://www.aot.state.vt.us/progdev/Progdev.htm

Vermont Agency of Transportation. *State Design Standards.* 1997.
http://www.aot.state.vt.us/progdev/standards/statabta.htm

Appendix F

Additional Resources (continued)

Vermont Agency of Transportation. *Pedestrian and Bicycle Facility Planning and Design Manual.* 2002. http://www.aot.state.vt.us/progdev/Documents/LTF/FinalPedestrianAndBicycleFacility/PedBikeTOC.html

Vermont Agency of Transportation. *Traffic Calming Study and Approval Process for State Highways.* 2003. http://www.aot.state.vt.us/planning/Documents/TrafficCalming.pdf

Vermont Department of Housing and Community Affairs. *Vermont Interstate Interchange Planning and Development Design Guidelines.* 2004. http://www.dhca.state.vt.us/Planning/InterstateInterchange.htm

Access Management Policies and Plans

Vermont Agency of Transportation. *Vermont Access Management.* 2004. http://www.vtaccessmanagement.info/

Asset Management Policies and Programs

Cambridge Systematics, Inc. *VTrans Asset Management Vision and Work Plan.* Prepared for Vermont Agency of Transportation, 2002. http://www.aot.state.vt.us/planning/Documents/VTrans%20Asset%20Mgmnt%20VW.pdf

State Land Use Policies and Community Planning

Vermont Agency of Natural Resources. *Riparian Buffer Guidance.* 2005. http://www.anr.state.vt.us/site/html/buff/buffer-final-2005.pdf

Vermont Department of Housing and Community Affairs. *Vermont Interstate Interchange Planning and Development Design Guidelines.* 2004. http://www.dhca.state.vt.us/Planning/InterstateInterchange.htm

Act 250 – State Land Use and Development Plans (Title 10 VSA Chapter 151). Vermont Environmental Board, http://www.state.vt.us/envboard/statute.htm

Vermont Municipal Planning and Development Act (Title 24 VSA Chapter 117). http://www.leg.state.vt.us/statutes/sections.cfm?Title=24&Chapter=117

Vermont Department of Housing and Community Affairs, Planning Division. http://www.dhca.state.vt.us/Planning/publications.htm

Vermont Planning Information Center. http://www.vpic.info/

Appendix F

Additional Resources (continued)

Corridor Planning Guidebooks and References

National Guidance

Smith, Steven A. *Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making.* National Cooperative Highway Research Program (NCHRP) Report 435, National Academy Press, Washington, D.C., 1999.

Transportation Research Board. *Guidance for Implementation of the AASHTO Strategic Highway Safety Plan Transportation Research.* National Cooperative Highway Research Program (NCHRP) Report 500, Volumes 1–13. National Academy Press, Washington, D.C., 2003-2004.

Williams, Christine N. *Cooperative Agreements for Corridor Management.* National Cooperative Highway Research Program (NCHRP) Synthesis Report 337, Transportation Research Board, Washington, D.C., 2004.

Idaho

Idaho Transportation Department. *Idaho Corridor Planning Guidebook.* Boise, ID, 1998. http://www.itd.idaho.gov/planning/reports/corrplan/coorguid.pdf

Delaware

Delaware Department of Transportation. *Corridor Capacity Preservation Program Guide*. http://www.deldot.net/static/pubs_forms/manuals/corr_cap/toc.html

Delaware Department of Transportation. *Route 40 Corridor Improvements: 2001 Corridor Monitoring and Triggering Program Report,* 2002. http://www.deldot.net/static/projects/rt40/pages/20yrlrp/2001corridorreport.htm

Florida

Williams, Kristine M., and Margaret A. Marshall. *Managing Corridor Development: A Municipal Handbook.* Center for Urban Transportation Research, 1996. http://www.cutr.usf.edu/research/access_m/ada70/corridor.pdf

Kentucky

Bluegrass Tomorrow and Glatting Jackson Kercher Anglin Lopez Rinehart, Inc. *Bluegrass Corridor Management Planning Handbook.* Prepared for Kentucky Transportation Cabinet, 2000. http://www.kytc.state.ky.us/Multimodal/Access.asp

Appendix F

Additional Resources (continued)

Ohio

Ohio Department of Transportation. *Project Development Process Manual.* 2004. http://www.dot.state.oh.us/pdp/

Oregon

Oregon Department of Transportation. *Main Street… When a Highway Runs Through It: A Handbook for Oregon Communities.* 1999. http://egov.oregon.gov/LCD/TGM/docs/mainstreet.pdf

Land Use and Growth Management Strategies

Arendt, Randall G. *Rural by Design.* APA Planners Press, Chicago, IL, 1994.

Daniels, Thomas L.; John W. Keller and Mark B. Lapping. *Small Town Planning Handbook.* APA Planners Press, Chicago, IL, 1995.

Kelly, Eric D. *Managing Community Growth: Policies, Techniques, and Impacts.* Praeger, 1994.

Nelson, Arthur C., and James B. Duncan. *Growth Management Principles and Practices.* APA Planners Press, Chicago, IL, 1995.

Smart Growth Network and International City/County Management Association. *Getting to Smart Growth: 100 Policies for Implementation*, and *Getting to Smart Growth II: 100 More Policies for Implementation*. http://www.epa.gov/smartgrowth/getting_to_sg2.htm or http://www.smartgrowth.org/library/

Vermont Department of Housing and Community Affairs, Planning Division. http://www.dhca.state.vt.us/Planning/publications.htm

Vermont Planning Information Center. http://www.vpic.info/

Public Involvement Methods

Chittenden County Metropolitan Planning Organization. *Public Involvement Plan.* http://www.ccmpo.org/getinvolved/pubinvolvement/pip.html

Federal Highway Administration. *Public Involvement Techniques for Transportation Decision-Making.* Publication No. FHWA-PD-96-031, 1996. http://www.fhwa.dot.gov/reports/pittd/cover.htm

Federal Highway Administration. *Tool Kit for Integrating Transportation and Land Use Decision-Making.* http://www.fhwa.dot.gov/planning/landuse/index.htm

Local Government Commission. *Participation Tools for Better Community and Land Use Planning.* http://www.lgc.org/freepub/land_use/participation_tools/index.html

Appendix F

Additional Resources (continued)

National Park Service. *Public Participation in Historic Preservation Planning.* http://www.cr.nps.gov/hps/pad/PlanCompan/PublicPartic/

University of Vermont, Center for Rural Studies. *Citizen Participation Strategies for Municipal Planning in Vermont.* Vermont Planning Information Center, http://www.vpic.info/edtraining/citpart.htm

Virginia Tech University, Department of Urban Affairs and Planning. *Partnerships and Participation in Planning.* http://www.uap.vt.edu/cdrom/

Vermont Danville Project web site: http://www.danvilleproject.com

GIS Tools

Community Build-Out Analysis Tool. University of Vermont – Center for Rural Studies. http://crs.uvm.edu/cpdp/buildout/;

CommunityViz. http://www.communityviz.com/. Applied to interchange area in Randolph, Vermont www.communityviz.com/downloads/resource%20library/ case%20studies/Randolph,%20VT.pdf

PLACE^{3}S. http://www.energy.ca.gov/places/

Smart Growth Index. http://www.epa.gov/smartgrowth/topics/sg_index.htm

What-If tool. http://www.what-if-pss.com/

Analytical Methods and Data Sources

Center for Rural Massachusetts. *Manual of Build-Out Analysis*, 1990. http://www.umass.edu/larp/crm/pastpublications.html

Dowling, Richard G. *Planning Techniques to Estimate Speeds and Service Volumes for Planning Applications.* National Cooperative Highway Research Program (NCHRP) Report 387, National Academy Press, Washington, D.C., 1997.

Federal Highway Administration. Scenario Planning web site. http://www.fhwa.dot.gov/planning/scenplan/

Federal Highway Administration. *Tool Kit for Integrating Transportation and Land Use Decision-Making.* http://www.fhwa.dot.gov/planning/landuse/index.htm

Appendix F

Additional Resources (continued)

Gluck, Jerome S., Herbert S. Levinson, and Vergil G. Stover. *Impacts of Access Management Techniques.* National Cooperative Highway Research Program (NCHRP) Report 420, National Academy Press, Washington, D.C., 1999.

Institute of Transportation Engineers. *Trip Generation, 7th Edition.* Washington, D.C., 2001.

Louis Berger & Associates, Inc. *Guidance for Estimating the Indirect Effects of Proposed Transportation Projects.* National Cooperative Highway Research Program (NCHRP) Report 403, National Academy Press, Washington, D.C., 2004.

Parsons Brinckerhoff Quade and Douglas, Inc. *Land Use Impacts of Transportation: A Guidebook.* National Cooperative Highway Research Program (NCHRP) Report 403, National Academy Press, Washington, D.C., 1999.

Transit Cooperative Research Program. *Traveler Response to Transportation System Changes:* Transit Cooperative Research Program (TCRP) Report 95 Chapters 1-18, National Research Council, Washington, D.C., 2004.

Transportation Research Board. *Access Management Manual.* Committee on Access Management, Transportation Research Board, Washington, D.C., 2004.

Transportation Research Board. *Highway Capacity Manual 2000.* National Research Council, Washington, D.C., 2000.

Appendix G Glossary

AADT – Annual Average Daily Traffic: The total number of vehicles passing a fixed point during a one-year period, divided by 365.

ADT – Average Daily Traffic: The average number of vehicles passing a fixed point in a 24-hour timeframe.

Access Management – The optimization of driveways and intersections to maintain safety at a roadway's full traffic-carrying capacity. A balance between access to properties and the necessity to preserve roadway capacity.

Asset Management – A strategic approach to managing transportation infrastructure – to enable more effective resource allocation and utilization, based upon quality information and analyses, to address facility preservation, operation, and improvement.

Buildout – The total amount of development that could occur in an area under existing legal and environmental constraints (such as adopted zoning regulations and topographical constraints).

Capacity – The volume of vehicles a road was designed to carry in a unit of time, such as an hour; this term also can be applied to transit or bicycle/pedestrian paths.

Channelization – Separation of conflicting traffic movements into defined paths of travel to facilitate the safe and orderly movement of vehicles, pedestrians, and bicycles.

Corridor – A broad geographic band connecting population and employment centers and served by various transportation modes, within which passenger and freight travel, land use, topography, environment, and other characteristics are evaluated for transportation purposes.

Crash Rate – The number of vehicular crashes on a given portion of a roadway system divided by the total number of vehicle miles of travel on that portion of the system during the same time period – typically expressed as the number of crashes per million vehicle miles of travel.

Cumulative Impacts – The impact on the environment which results from the incremental impact of an action (such as a transportation project) when added to other past, present, and reasonably foreseeable future actions.

Environmental Justice – The policy goal of identifying and avoiding disproportionate adverse impacts on minority and low-income individuals and communities.

FHWA – The U.S. Department of Transportation Federal Highway Administration, the Federal agency responsible for administration of Federal-aid highway funds.

Functional Class – The grouping of streets and highways into classes, or systems, according to the character of service they are intended to provide.

Appendix G

Glossary (continued)

GIS – Geographic Information System.

Goal – A general statement of an outcome to be achieved over the long term.

Growth Management – The framework used by communities to make informed decisions about how and where they grow.

HCM – Highway Capacity Manual.

IGA – Intergovernmental Agreement.

Induced Growth – Development that occurs in response to improvements made to the transportation system, typically as a result of improved accessibility or attractiveness of a location.

Intermodal – A transportation system connecting or including different modes of transportation.

Intermodal Facilities – Transportation facilities such as park-and-ride lots, rail terminals, airports, bus and train stations, and water ports that connect different modes of transportation, either for passenger or freight movement.

ITE – Institute of Transportation Engineers.

LOS – Level of Service: The classification of general traffic conditions. The level of service ranges from "A" (the best), to "F." It is a measure of how a highway or an intersection performs in terms of speed, travel time, freedom to maneuver, traffic interruptions, and delays.

LRTP – Long-Range Transportation Plan: The statement of the ways a region plans to invest in its transportation system. Federal regulations require that MPOs (serving urbanized areas of at least 50,000 population) develop an RTP that has at least a 20-year horizon and is updated at least every five years (three years in air quality nonattainment and maintenance areas).

MOU – Memorandum of Understanding.

MPO – Metropolitan Planning Organization: The organizational entity designated by law with lead responsibility for developing transportation plans and programs for urbanized areas of 50,000 or more in population.

NEPA – National Environmental Policy Act: A Federal law that requires agencies to evaluate and disclose environmental impacts of proposed actions. The process begins with an Environmental Assessment (EA) to determine if an action will have significant impacts. Major transportation projects will typically require a full Environmental Impact Statement (EIS).

Appendix G

Glossary (continued)

NHS – National Highway System: A system of nationally significant roadways designated in the 1991 Intermodal Surface Transportation Efficiency Act. The NHS includes the Interstate Highway System; other routes identified as having strategic defense characteristics; routes providing access to major ports, airports, public transportation and intermodal transportation facilities; and many principal urban and rural arterials which provide regional service.

Objective – An objective is related to a goal, and represents a more specific, measurable end to be reached.

Origin-Destination Survey – A survey of travelers to determine their trip origins and destinations. Origin-destination surveys may be conducted by telephone or mail within an area of interest, or by interview or postcard at specific transportation facilities of interest.

Overlay District – Additional zoning requirements that are superimposed upon existing zoning in specified areas as shown on a zoning map.

Peak Hour – The 60-minute period in the a.m. or p.m. in which the largest volume of travel is experienced.

RFP – Request for Proposals.

Right-of-Way – Land used generally for streets, sidewalks, alleys, or other public uses. Right-of-way also is used to refer to the distance between lot property lines which generally contains not only the street pavement, but also the sidewalks, grass area, and underground and aboveground utilities.

Riparian Buffer – A strip of grass, shrubs, and/or trees along the bank of a river or stream that filters polluted runoff and provides a transition zone between water and human land use.

Roadway – The portion of the street right-of-way which contains the street pavement and gutter and is used primarily as a channel for vehicular movement and secondarily as a drainage channel for storm water.

RPC – Regional Planning Commission.

RTP – Regional Transportation Plan: The statement of the ways a region plans to invest in its transportation system. Federal requirements apply to RTP development in urbanized areas of at least 50,000 population (see LRTP).

Scenario Planning – A framework for developing a shared vision for the future by analyzing various forces (e.g., health, transportation, economic, environmental, land use, etc.) that affect growth. Scenario planning is a collaborative process that tests various future alternatives for their ability to meet regional and community needs.

Screening 1) – The process of narrowing down a list of options for consideration based on established criteria.

Glossary (continued)

Screening 2) – A method of visually shielding or obscuring one abutting or nearby structure or use from another by fencing, walls, berms or mounting or densely planted vegetation.

Secondary Impacts – Impacts that are caused by an action (such as a transportation project) that occur later in time and farther removed in distance, but are still foreseeable. Also known as "indirect impacts."

Sketch-Level Analysis – A quick method for estimating the potential impacts of a transportation strategy, where an approximate, order-of-magnitude assessment is sufficient.

Stakeholder – A person or organization that holds an interest in the outcome of a project or study.

STIP – The Statewide Transportation Improvement Program: A multi-year capital program of transportation projects. In Vermont, the STIP incorporates the TIP for the Chittenden County MPO.

Strategy – An implementation step taken to achieve a goal: e.g., "undertake safety improvements at high-crash locations."

Surface Transportation Program – A Federal highway funding program category. Funds may be used for a wide variety of purposes, including: roadway construction, reconstruction, resurfacing, restoration and rehabilitation; roadway operational improvements; capital costs for transit projects; highway and transit safety improvements; bicycle and pedestrian facilities; scenic and historical transportation facilities; and, preservation of abandoned transportation corridors.

TAC – Technical Advisory Committee.

TIP – Transportation Improvement Program: A financially constrained three-year program listing specific projects and strategies from the long-range transportation plan that are prioritized for funding. By Federal regulation, TIPs must be developed for urbanized areas of at least 50,000 population.

TPI – Transportation Planning Initiative: A State of Vermont initiative designed to include all segments of the public in planning improvements to Vermont's transportation system.

Traffic Calming – A collection of measures to reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users. Traffic calming measures include roadway alterations such as gateways, dividing islands, curb extensions, textured crosswalks, and managed access to individual properties through shared or limited curb cuts. Streetscape design also plays an important role in traffic calming with enhancements such as lighting, signage, and landscaping, which reinforce village character and at the same time, improve aesthetics and human comfort.

Appendix G

Glossary (continued)

Travelshed – The total contributing area that generates trips that use the corridor.

Trigger – The value of a measurable indicator (e.g., average daily traffic, volume-to-capacity ratio, population density) that, when reached, will cause a set of agreed-upon actions to be taken (e.g., conduct traffic study).

Trip Generator – A land use that is an origin or destination for travelers.

Turning Movement – A vehicular movement through an intersection, defined by the lane and leg from which the vehicle originates and the lane and leg to which the vehicle travels after passing through the intersection. Turning movement counts determine the number of vehicles executing a given turning movement in a defined period of time.

Viewshed – The area within view of a defined observation point or corridor.

VMT – Vehicle Miles of Travel: A standard measure of travel activity, typically calculated by multiplying the average length of trip by the total number of trips (for an area), or by multiplying the length of a roadway segment by the ADT on that roadway (for a roadway segment).

Volume – The number of vehicles that pass through a given mile of road in a unit of time such as a day; this term also can be applied to transit or bicycle/pedestrian paths.

VPD – Vehicles per Day.

V/C – Volume-capacity ratio: The ratio of the traffic volume on a roadway to the capacity of the roadway over a given time period.