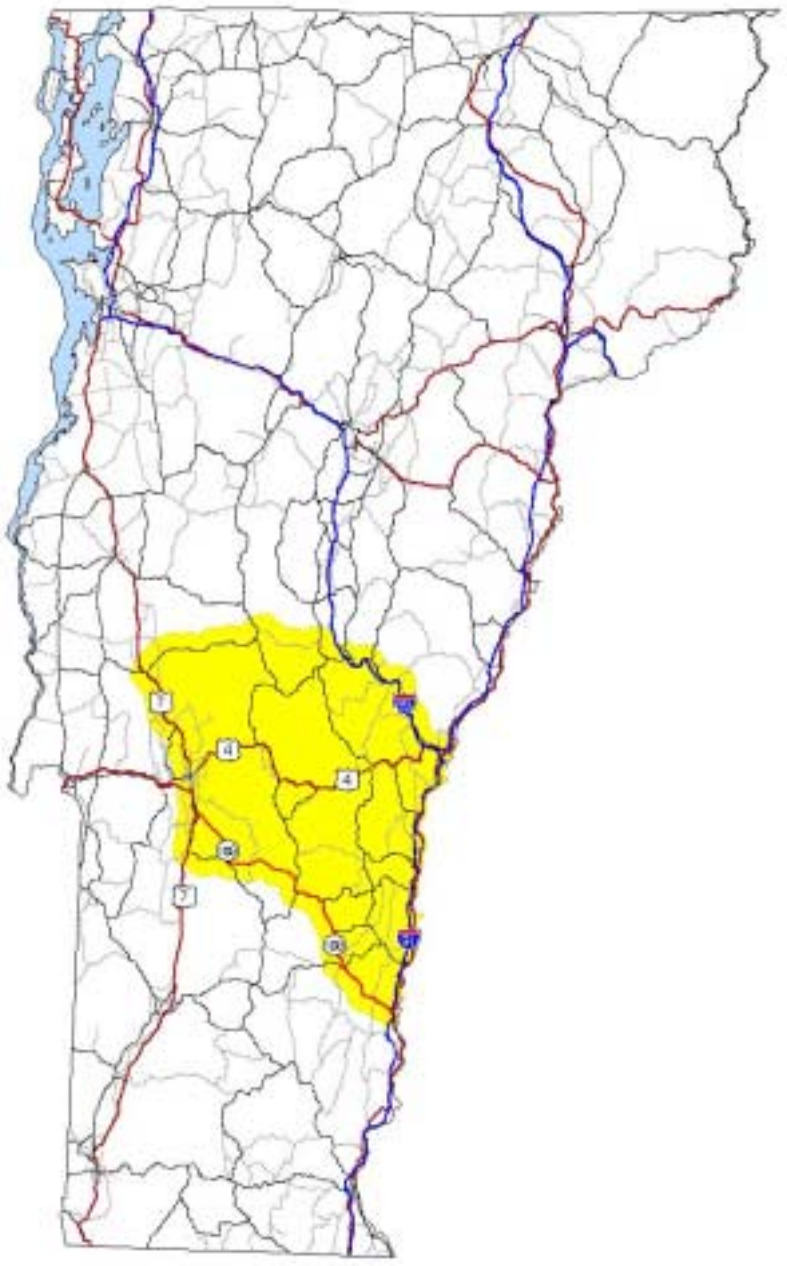
Vermont Agency of Transportation



East – West Highway Study

January 2001

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SECTION I: INTRODUCTION

One of the many difficult issues that the Vermont State Legislature faced during their 2000 session was balancing the demands for increased mobility of goods and services on the Vermont highways, with the preservation of the quality of life in our small villages. Manufacturers were demanding that 53' trailer trucks should be given greater access to their plants, suppliers and distributors while citizens living in small villages along state highways were complaining about the diminishing quality of life due to noise, pollution and congestion from increased truck traffic. The outcome of extensive public forums, committee discussions and expert testimonies was the passing of *Act* No.154 of 2000 by the Vermont House and Senate which among other items established the Vermont Truck Network (see Figure 1-1) where trucks with overall length less that 72' (including trucks with 53' trailers) could travel without permits. At the same time the bill mandated broader monitoring of truck traffic in the state by the agency of transportation (VAOT) as well as the prioritization of projects addressing safety improvements on the established truck network.

Especially acute is the problem between the Rutland region and New Hampshire (NH) market region where a large portion of the Rutland commodities are being shipped to and from. US Route 4 (US-4), a two lane state route that connects Rutland to White River Junction and the NH markets is perceived as inadequate to accommodate current and future truck traffic as well as the longer (53") trailers. Communities along US Route 4 have been outspoken in their opposition to allow longer trucks to go through their villages. VT Route 103 (VT-103) could also be considered an east-west corridor even though it does not directly link Rutland with major NH routes. As with most Vermont State highways this route has a variety of geometric constraints that prohibit the easy movement of big trucks, especially through the village centers. Residents that live along US-4 and VT-103 have expressed concerns about safety due to increased truck traffic. Discussions of long term (e.g., new highway, diversion of freight traffic from truck to rail) and short term (upgrades to existing highways) solutions to moving the goods in and out of our state with minimum disruption on peoples lives are continuing in various forums on the local and regional level.

In order to address the problem, the Vermont State Legislature in Act No. 156 mandated the Agency of Transportation to research this issue and report back to the legislature by January 15th, 2001. Specifically this section of the bill requires the following:

> *"The secretary of transportation shall develop a report incorporating past and current studies for the movement of freight by rail and commercial motor vehicles along the east-*

west corridor from Rutland to the New Hampshire border. The report shall take into consideration the resources available to the state, the current transportation capital program and project development plan, and improvements to the current transportation infrastructure which would have the potential to increase rail freight shipments through the corridor. This report should synthesize all previous studies related to the feasibility of constructing a new highway or reconstructing existing highways, and any combination of the two."

This report, developed in response to the legislative mandate stated above, is subdivided into the following sections:

I) Introduction

II) Literature Review: Overview of previous studies prepared for the existing east-west highways (US-4 & VT-103) as well as the Green Mountain Railroad which connects Rutland to Bellows Falls.

III) Three Modeling Scenarios of a New East-West (E-W) Highway: Using the Vermont Statewide Travel Demand Model, three modeling scenarios were run of a limited access east-west highway to estimate the percent traffic that could be diverted from US-4 and VT-103 onto the new highway.

IV) Maps of Natural Resources for Study Area: The study area for a possible east-west highway is defined and a number of Geographic Information Systems (GIS) maps developed of the natural resources (e.g., topography, rivers, lakes, wetlands, deer & bear habitats etc.) of the study area are presented.

V) Freight Movements by Truck & Rail: Using data developed during the early phases of the Vermont Statewide Freight Study, annual tonnage of freight flows by truck and rail are presented and discussed.

VI) US-4 & VT-103 Highway Projects in the Capital Program (2001-2005): Transportation projects scheduled for construction between 2001-2005 are mapped and their status discussed.

VII) Proposed Rail Maintenance Program & Estimated Costs to Upgrade Green Mountain Railroad (GMR): **Latest** estimates required to maintain and rehabilitate the 44 bridges along this line are presented as well as current maintenance program and costs of the GMR.

VIII) Estimated Costs of New East-West Highway: Based on the two new highway projects currently underway in Vermont (Bennington Bypass and Circumferential Highway) estimated costs per mile of a new east-west highway are presented.

IX) Discussion and Recommendations: A general discussion on the diverse information provided in this report is provided and a number of recommendations are listed.

Truck Network

State of Vermont

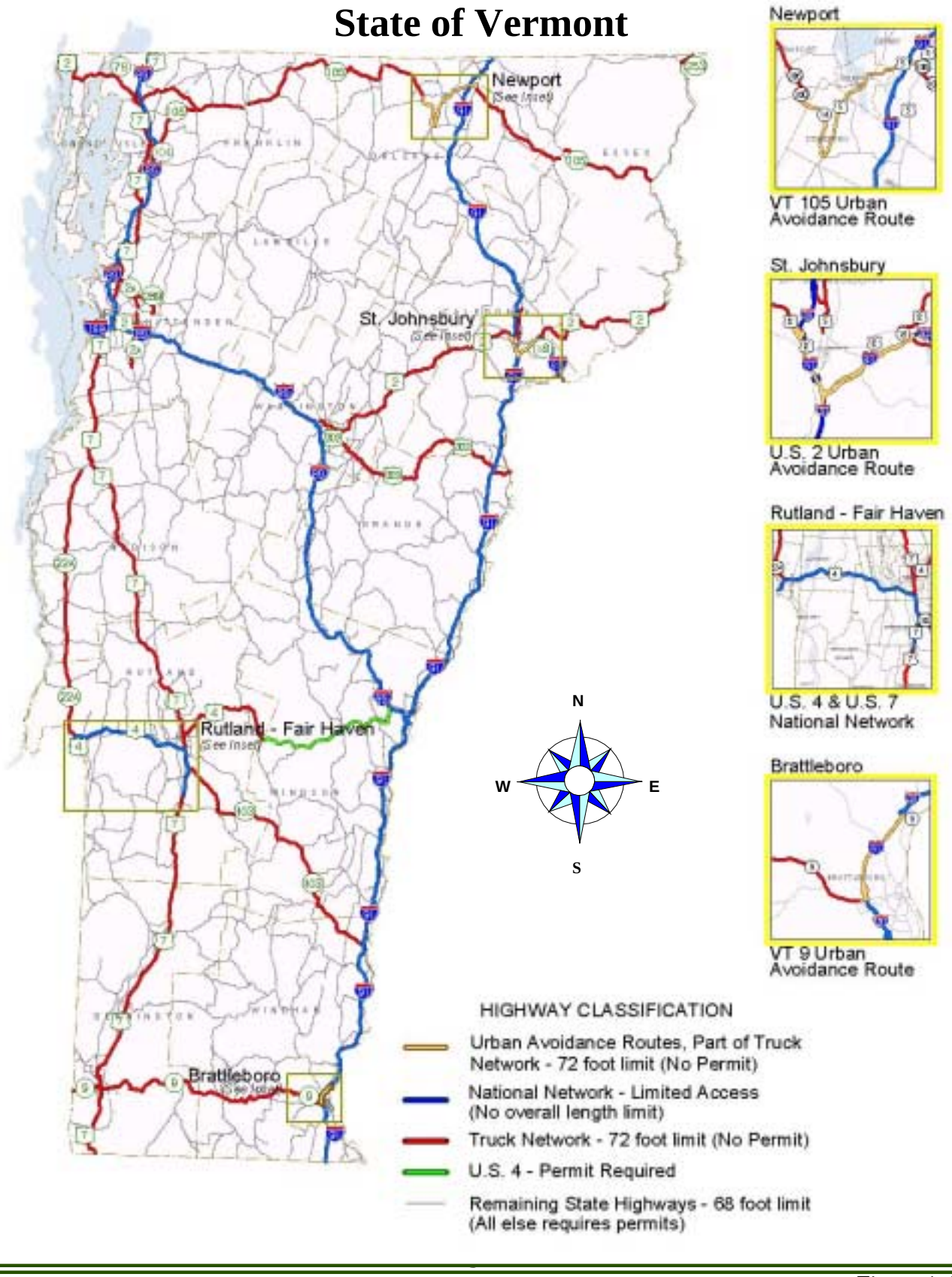

Figure 1-1

SECTION II: LITERATURE REVIEW

Following is a summary of planning studies and activities since the 1970's to the present that look at either limited bypass alternatives on existing routes or new alignment alternatives for the east - west corridor including the areas around US-4, VT-107/100 and VT-103. A freight marketing study of the Green Mountain Railroad is also summarized.

- *1972*, Route 4 in the Ottauquechee Valley: A Transportation Analysis, MIT Study
- *1974*, Chester Area - Bypassing the People: The Story of the Chester Bypass, Vermont Public Interest Research Group (VPIRG)
- *1984*, Rutland US-4 Southeast Bypass Corridor Planning Study, CE Maguire, Inc.
- *1984*, Rutland US-4/US-7 Bypass Planning Study, CE Maguire, Inc.
- *1984*, Rutland Northeast Bypass Corridor Planning Study, CE Maguire, Inc.
- *1985*, US Route 4: Bridgewater–Hartford, VAOT, Project Planning Division
- *1988*, US Route 4 Corridor Study, Andrews and Clark
- *1992*, US-4 Transportation and Land Use Report, TRORC
- *1995*, Vermont Long Range Transportation Plan (LRTP), Agency of Transportation
- *1997*, Rutland Draft Environmental Impact Statement
- *1997*, Report of the US Route 4 Task Force, TRORC
- *1999*, Staff Report to Two Rivers Ottauquechee Regional Commission (TRORC) & Transportation Advisory Committee (TAC) on VT-107/100 and US-4 Corridors
- *1999*, Recommendations to the 1999 Summer Study on Truck and Trailer Size - Established in Act No.34, 1999 for the 2000 Vermont Legislature, Two Rivers Ottauquechee Transportation Advisory Committee (TAC)
- *1999*, Freight Market Analysis of the Green Mountain Railroad Corridor, Main Line Management Services, Inc.
- 2000, Report on the 2000 Route 4 Forum, TRORC

Route 4 in the Ottauquechee Valley: A Transportation Analysis, MIT Study, 1972

The study considered traffic, environmental and economic issues. Problems described in 1972 are still with us today. There were monthly meetings, a task force, public meetings and other forums. The study area included US-4 from Hartland through Bridgewater. Three significant obstacles to traffic flow reported in the study along this corridor are:

- Lack of passing lanes along the corridor.
- The two congested village areas (Woodstock and Bridgewater) where through traffic conflicts with other highway and land uses.

- Trouble spots along the corridor where turning traffic and geometric features contribute to high accident rates, such as the intersection with VT-12 in Hartland, Taftsville and Bridgewater Corners.

The study outlined specific alternatives to dealing with the three types of issues. The study recommends a community based planning process to balance traffic with local resident's needs. It also urged future planners to use local knowledge and talent especially with regard to historical and environmental resources, bringing stakeholders on board early in the process of alternatives selection.

Short-term and long-term recommendations to improve traffic flow included minor changes to signage in villages, provision of well-marked spaces for drivers to pull-over to allow passing, construction of passing zones where possible as well as upgrading the road to what was called a "standard" two-lane highway outside the village areas.

Within village areas, the report concluded that while bypasses were not needed in 1972, they would possibly be needed within ten years. Tentative bypass routes considered to be the least destructive were shown following analysis of environmental, social and engineering impacts.

Chester Area - Bypassing the People: The Story of the Chester Bypass, Vermont Public Interest Research Group (VPIRG), 1974

This report was written in response to the Vermont Highway Department's (VHD's) plan for a limited access bypass to Route 103 east of the Chester village area, Chester Depot, and the area known as Stone Village. The study was initiated by VPIRG in response to citizen's concerns of the VHD's plan. The report looks at the impacts of the proposed bypass on the community and the surrounding environment and describes alternate courses of action. Route 103 winds it's way through the villages, with two sharp curves that considerably slow the traffic. This was seen as a safety issue by VHD. However, the report indicates that neither noise nor safety are really the issue, since the reduction of noise levels with the bypass would be insignificant and the accident levels of the improved highway outside the village areas would be much higher than in the village, where the traffic does slow down.

The report discusses impacts of the proposed bypass on the following: agriculture (taking of farm land), historic sites, local businesses, scenic quality, environmental pollution, disruption of streams and springs, and the need to realign other roads. There was also a safety concern with a proposed at grade railroad crossing.

The preferred alternative to the bypass was improvements to Route 103. The report suggested specific improvements to facilitate traffic flows:

- A bridge over the south branch of the Williams River needs to be widened.
- Decrease the curvature or exercise other means to improve sight distance at the curve south of the bridge over the middle branch of the Williams River,
- Make improvements to the *T-intersection* of VT-103 and VT-11since the narrow intersection forces tractor-trailers across the centerline. There was a recommendation to build a short bypass with removal of one house or widen the intersection and remove one house.
- Lessen the 48-degree curve located between the bridge over the Williams River and the historic Stone village.

The report also suggested an alternate bypass route along the west side of the railroad tracks, crossing the tracks north of Stone Village. This route was seen as less detrimental than VHD's choice, since it would bring traffic closer to the businesses in the village areas, have unlimited access, involve less land taking, and be less costly to build.

Rutland US-4 Southeast Bypass Corridor Planning Study, CE Maguire, Inc., July 1984

The purpose of this planning study was to determine the travel needs for a bypass route in the southeast quadrant of the Rutland urban area and to identify a route alignment within this quadrant that best satisfies motorists travel needs. Seven alignments (A-K) were considered in this study and the preferred alternative selected was alignment B. This alignment did not appear to have any serious, long-term negative impacts to the economy of the Rutland area. The location of the interchanges would have reinforced existing economic development patterns and reduce congestion through the City of Rutland's central business district.

The Vermont Agency of Transportation (VAOT) pursued this study as a continuing series of planning steps to identify the most beneficial corridor in the southeast quadrant of the urban area that would provide an optimum travel service and cause the least disruption to area residents and businesses. Several conditions led VAOT to conduct a corridor study for in the southeast quadrant of the Rutland urban area:

- The relatively large through traffic increase on US-4 as well as an increase in travel between US-7 south and US-4 east.
- Significant land use changes in the southeast quadrant.
- The prevailing lower Level of Service (LOS) for through travel on US 4 east-west direction as compared to the US-7 north-south direction LOS.

Following are some of the conclusions of this study:

- A need exists to provide alternate routings for trips that do not have origins and/or destinations in the central city.
- A need exists for greater traffic service for local traffic movements.
- It does not appear that a US-4 bypass will improve the competitive advantage of Rutland County.

Rutland US-4/US-7 Bypass Planning Study, CE Maguire, Inc., September 1984

In conjunction with the Southeast Bypass study, this planning study investigated all feasible combinations for an US-4/US-7 bypass in the Rutland area. Consideration for a fully circumferential highway was determined to be inefficient and not a part of this study. This study was an overview of what was anticipated with respect to each of the possible bypass corridors. The purpose was to determine and recommend a feasible bypass system that offered the best possible solution to accommodate travel needs while minimizing human and environmental impacts. The study recommended a bypass system that included southwest, southeast, and northeast components.

This study concluded the following:

- The transportation facility should be serving as a bypass for through traffic as well as provide a safe and improved route to move goods and services.
- A bypass facility should serve as a catalyst to encourage desired land use.
- A bypass facility built in the southeast quadrant of the city would have had the greatest positive impact and the least amount of undesirable effects.
- No substantial changes in current or proposed land use are foreseen if a “no-build” alternative is selected.
- A bypass facility would relieve traffic congestion within Rutland City.

Rutland Northeast Bypass Corridor Planning Study, CE Maguire, Inc. November 1984

This planning study was conducted for the northeast corridor bypass route in conjunction with the findings and recommendations of the Southeast Corridor Planning Study. Similar to the Southeast Bypass Corridor Planning Study, the purpose of this study was to identify alternative route alignments within the northeast quadrant that best satisfied the need for completing a bypass system that consists of the southwest and southeast components. There were six alignments considered. The preferred alternative for the northeast bypass component (Alignment A) is an extension of the southeast bypass preferred alignment. These bypass components form a complete bypass system for the Rutland urban area. This system was considered to be the best solution for fulfilling travel demand needs while minimizing adverse impacts to motorists, residents and natural resources.

This study concluded:

- A northeast bypass would decrease the congestion in Rutland City.
- A northeast bypass would cross flood hazard areas.
- There is little difference in the total impact to residential properties among the proposed bypass alignments.

US Route 4: Bridgewater–Hartford, VAOT, Project Planning Division, 1985

This analysis consists of a compilation of accident data on this segment of Route 4 between 1980 and 1984. Gathering this data was considered the first step in developing an improvement strategy for the US 4 corridor between these two towns. The report also stated that the key to the corridor improvement strategy would be early identification of the alignment of a Woodstock bypass. In addition, the writers of the report recognized that public support for the improvements and bypass was necessary. The report contains a chronology of events on the subject of Route 4 improvements and a bypass, beginning in August 1963.

US Route 4 Corridor Study, Andrews and Clark, 1988

This is a comprehensive planning study for US Route 4 from I-89 exit 1 in Hartford to the intersection of VT Route 100 in Killington. The study also evaluates VT-107 and VT-100 from the intersection of VT-107 to US-4 in Killington. This comprehensive study contains a great deal of data and analysis on traffic operations, safety, environmental and economic concerns.

The primary goal of the report was to provide free-flowing traffic until 2006. Public participation was lacking at the beginning of the study process. As a result there was little consideration to balancing the needs of through traffic with those of the communities along the corridor.

A large number of alternatives were evaluated including: no-build scenario, a 4-lane highway for both corridors (US-4 and VT-107/VT-100), construction of a tunnel under Mt. Tom, a series of bypasses in various configurations. The following conclusions were some of those reached in the draft report of this study:

- Improvements to VT-107/VT-100 corridor will not substantially alleviate conditions on Route 4 since only a fraction of the US- 4 traffic makes uninterrupted trips from White River to Killington. The majority of the trips on US-4, particularly in the Quechee and Woodstock areas are local, shorter trips and would not benefit from this diversion to VT-107/ VT-100.
- Four lanes were projected for US-4 for the year 2006 in order to operate at a level of service (LOS) C, on a scale of A to F. In 1988, LOS C was the target level of service for

VAOT but not an absolute standard. This target level of service drove the recommendation of widening US-4 to four lanes.

- Four lane bypasses are needed around both Woodstock and Bridgewater villages as widening through the villages would be impossible.

The enormous environmental and social impacts of these alternatives did not discourage the consultant from recommending them. The only acceptable scenario to the consultant included widening US-4 to four lanes and providing fixed village bypasses to meet the goal of "uninterrupted traffic flow". While the high costs and huge impacts were identified in the study they were largely ignored in the final analysis. The cost of the recommended upgrades to US-4 equaled to about 5 years worth of the total VAOT construction budget at the time.

The public reaction to the draft final report's proposals listed above was negative. The final report presented some alternative strategies for the corridor as summarized below:

- Proceed with short term, lower cost improvements to US-4 such as TSM (Transportation Systems Management option)
- The towns along the corridor should be given time to develop growth management strategies and alternative ways of meeting the area's transportation needs. If the region desires a two-lane highway, then growth will need to be controlled if not halted, and the use of alternative modes of transportation increased.
- The final action to be taken on US-4 will remain flexible based on outcome of the efforts mentioned above.
- A multi-regional task force should be established to develop growth management studies.

US-4 Transportation and Land Use Report, TRORC, 1992

The Two Rivers - Ottauquechee Regional Commission (TRORC) established a task force to evaluate Route 4. The Commission then conducted a study on future growth potential and to explore options of controlling traffic growth to avoid the need to expand the highway. Local and regional land use plans and zoning ordinances were reviewed to determine potential types of land uses along the corridor. The common views that were shared by the corridor towns included:

- Better land use management and transportation system management is needed to preserve the carrying capacity of the road.
- The importance of preserving scenic views and aesthetics of the highway.
- Improvements should be made to the highway to accommodate cyclists and pedestrians.
- Towns do not want strip type development but prefer to keep future growth in currently developed areas.
- While there were no specific ideas for access management there was general support for consolidation of curb cuts.

- Some sections of US-4 could be realigned to reduce accidents and increase corridor efficiency.
- The public should choose land use management techniques and road engineering solutions to maintain the usability of US-4.
- Zoning bylaws and zone locations must be coordinated between town boundaries.
- Trouble spots with poor geometry and sight distance etc. should be improved.

Vermont Long Range Transportation Plan (LRTP), Agency of Transportation, 1995

The LRTP recognizes that the interstate construction era is over and that environmental and cost concerns make new highway construction unlikely. The "solutions" recommended in the 1988 Andrews and Clark study would not be considered under the LRTP's overall plan for Vermont. On-alignment improvements are the preferred solution. The LRTP emphasized a strategic investment principle to guide construction investments; meaning money needs to be spent where it will do the most public good. Given that Route 4 is a major east-west highway across Vermont, this corridor would be a high priority for major investment under the LRTP.

Rutland Draft Environmental Impact Statement, 1997

One of the primary transportation issues in Rutland has been the traffic congestion that the traveling public experiences along US Routes 4 and 7. A process to address this issue began with the development of a Draft Environmental Impact Statement (DEIS) awarded to VAOT consultant Louis Berger & Associates Inc., in 1993. A draft was submitted in 1997 and is paraphrased below. The DEIS examined various alternatives intended to relieve traffic congestion, provide adequate and safe future capacity and support economic growth.

The alternatives considered include the following:

- No-Action
- Transportation Systems Management/Transportation Demand Management Measures
- Upgrade Existing Roadways
- Four different two-lane limited access arterials on a four-lane right-of-way. The impacts of the alternatives were evaluated with four lane Right-of-Way to cover future build-out.

The alternative selected was to upgrade the existing roadways mainly due to strong encouragement by federal agencies, such as the Environmental Protection Agency (EPA), to explore in detailed upgrades of existing road before moving ahead with a new roadway concept.

In order to expedite the project and address local issues and concerns, a Project Advisory Committee (PAC) was formed with two Rutland City Alderman and Town Selectmen, a VAOT Project Manager, a representative of the Rutland Redevelopment Authority, a Rutland RPC staff

member, and a consultant. This committee is currently working on the development of a draft scope of work, which will involve significant public input.

Report of the US Route 4 Task Force, TRORC, 1997

This report resulted from a cooperative effort among TRORC, VAOT and a task force of local officials and interested parties to evaluate alternatives to the standard engineering approaches that were rejected by local communities in the *1988 US Route 4 Corridor Study*. The task force was formed to prioritize project needs for the Route 4 corridor, identifying problems and suggesting possible improvements that would have local and regional support. The report recognized that Route 4 had been designated as part of the National Highway System (NHS), meaning that from a national and state level it is considered a major east-west route across central Vermont. The report suggested several things:

- As an alternative to increasing the carrying capacity by widening major roads or adding travel lanes, other means of increasing overall capacity of moving people through the corridor (by decreasing vehicular travel) were suggested. These included development of more park and ride facilities, improved pedestrian facilities in built-up areas and improved public transit, particularly between Woodstock and Upper Valley communities.
- Specific problems and on-alignment improvement projects on the older sections of Route 4 from Taftsville to Bridgewater Corners were suggested. These included "traffic calming" techniques in village areas, modest improvements to the roadbed, and intersection realignment.
- Some alternative standards to AASHTO guidelines - unless the corridor's needs justified otherwise - were suggested. These included widening roads to 30-32 feet instead of 40 feet in rural high speed sections, enabling 3 cars abreast in an emergency, and minimizing the need for a full 8-foot break-down lane by providing frequent well-marked pull-offs.

The report also included a summary of data on both Route 4 and Routes 107/100 from the 1988 Andrews & Clark report including road sufficiency, level of service, road width, accident rates and high accident locations, traffic volumes and patterns, driving time and distance, and bypass evaluations.

Staff Report to Two Rivers Ottauquechee Regional Commission (TRORC) & Transportation Advisory Committee (TAC) on VT-107/100 and US-4 Corridors, 1999

This report requested by the Two Rivers TAC compared the two corridors and discussed the impact of the National Highway System (NHS) designation, truck network designation, and truck safety enforcement. This report was written in response to the proposal to move NHS designation from US-4 to VT-107/100 route. This short report also contained the following policy recommendations: ▪ Increase enforcement of truck safety laws on VT-107/100 to bring it to the same level as US-4 in Woodstock.

- Allowable truck lengths should not be increased until proven that longer trucks can be safely operated on these routes.
- NHS designation should not be changed from US-4 to VT-107/100 at this time since both routes are far from ideal and both are important east-west corridors. Long range planning and improvement studies for both corridors should be conducted - potential improvements include road widening, straightening, passing lanes, bypasses, truck routes and access management. After costs and environmental impacts of improvements on both corridors are compared, NHS designation should be reviewed and possibly re-considered.

Recommendations to the 1999 Summer Study on Truck and Trailer Size - Established in Act No.34, 1999 for the 2000 Vermont Legislature, Two Rivers Ottauquechee Transportation Advisory Committee (TAC), 1999

The following concerns were expressed:

- Bowing to pressure to allow longer and longer trucks will degrade highways and villages. Alternatives should be sought such as subsidized freight transfers, tunnels, railroads or truck travel restrictions. Policies and investments should put villages first yet allow a vibrant economy. The cost of "just in time" delivery in Vermont may be too high to include more and longer trucks as well as many trucks traveling that are inefficiently loaded.
- Safety for all highway users is a priority. East west routes of US-4 and VT-107/100 have been evaluated for safety and there are many deficiencies. The TAC was opposed to opening these roads to 53' trailers if they were not improved to meet the minimum standards as outlined in the 1999 *Truck Network Analysis*. Single trip permits should be issued on US-4 if Rutland's economy is found to be negatively impacted. A regional corridor coalition is suggested to determine conditions for the permits such as avoiding VT-107 in winter months due to persistent ice or avoiding Woodstock in peak summer months. Enforcement and checking of truck equipment is also important and needs to be increased. The TAC had the following recommendations for the summer study group to adopt:

- Do not allow longer trucks on roads that have been determined to be unsafe for the length such as VT-100/107 and US-4.
- VAOT should explore new approaches including expanded rail, tunnels, subsidized freight transfers.
- Require VAOT to assign a higher percentage of spending (25%) for investments to protect communities from the negative aspects of transportation. The current allotment for enhancement and landscaping was not considered sufficient.
- Enforce existing regulations on truck travel routes where the greatest danger exists to residents and highway users. Avoid enforcement that shifts traffic from one route to another during enforcement details.

Report on the 2000 Route 4 Forum, TRORC, 2000

The purpose of the forum organized by the Two Rivers Ottauquechee Regional Commission (TRORC) was to hold a discussion by citizens, legislators, planners and engineers on Route 4 corridor issues and to explore long-term options - including improvements and bypasses. Panelists' of this forum presented the following topics:

- Traffic growth and consequent impacts of resulting congestion on communities was discussed as well as suggestions as to how to slow traffic growth.
- Public process and use of design tools that could result in new highway construction with the least visual and environmental impacts was presented. The example of a new interstate through Glenwood Canyon in Colorado was used.
- Highway tunnels in different parts of the world were presented with a discussion on how they have solved traffic problems without destroying scenic landscape and disrupting villages. Special emphasis was placed on an example of Swiss village, which was preserved due to the construction of a tunnel.
- "Green bypasses" were discussed as a way to divert trucks out of the villages, providing an asset by conserving the land along the scenic bypass. This is the parkway approach.
- The idea of a new East-West highway along the VELCO powerline easement from US-7 in Clarendon to the I-91 exit in Ascutney (#8) was presented.
- Roadway costs for paving, reconstruction and new construction, permitting process, and overall process for building a new highway were presented and discussed. It was pointed out that local input and dedication is needed for bottoms-up planning.
- National perspectives of costs -both in dollars and community impacts- as well as difficulties of building new highways and bypasses were presented. A need to consider alternate modes of transportation was discussed.

It was clear from this forum that people agree there is a need to continue looking at alternative solutions to the traffic issues on the east-west corridors. Some of these alternatives include

conducting a cost/benefit analysis of a possible new east-west route, considering upgrading existing highway routes and building potential bypasses (including the tunnel alternative), and considering ways to reduce traffic and provide traffic calming measures.

Freight Market Analysis of the Green Mountain Railroad Corridor, Main Line Management Services, Inc, 1999

This study was initiated by the Southern Windsor County Regional Planning Commission (RPC) to evaluate the potential of increasing overall freight traffic on the Green Mountain Railroad (GMR). In addition to investigating possible increases in overhead traffic (i.e., traffic that has no origin and/or destination in Vermont) this study looked at the potential of boosting utilization of the GMR by businesses located along the railroad line.

Following is a brief outline of the observations, conclusions and recommendations made by the consultant regarding current and future use of the GMR for freight hauling:

- Overhead traffic on the line is a significant portion of the overall business. This traffic could be enhanced by upgrading the line to allow for higher speeds and weights and by removing clearance constraints on other connecting lines such as the Bellows Falls tunnel on the New England Central line.
- Upgrading the track to FRA Class 2 or Class 3 standards would have positive impacts on both passenger and freight service using the line. Upgrading the line to accommodate Amtrak would also enhance the ability to handle more freight loads.
- The consultant commended GMR for it's connection to other major rail lines such as the Canadian Pacific that serve broader markets. A recommendation was made that GMR work with New England Central to establish a similar connection with CSX to provide freight flow to the south as well. This connection would increase the potential for long-haul freight movement to both the north and south.
- With the exception of the former Luzenac facility in Chester, the potential for development of new, rail-oriented businesses along the rail corridor is limited. The limitations are mostly due to adjacent topography as well as town zoning. A recommendation was made that Chester provide industrial zoning for the property adjacent to the rail line.
- Two specific industries were mentioned as having the potential for generating a significant increase in freight business: LP gas and logs. The consultant indicated that the development of transfer facilities to handle either of these products could generate 100-200 additional rail cars per year for either of the products. Cost estimates of $75,000-$125,000 for each facility were given.

Summary of Above Studies:

Common elements of the studies presented above are summarized in the following section:

Studies from the 70's and 80's:

- These studies focused mainly on highway traffic concerns, including safety and flows.
- Looked at ways to improve the vehicular corridors—looked at ***highway*** solutions, rather than any other alternatives.
- Considered bypass(es) as integral parts of the solution.
- Considered widening and straightening of existing routes (or portions) as an important part of the improvements.

Studies from the 90's:

- Broadened focus to look at quality of life issues and relationship of highway and traffic to land use, village character, local resident needs, etc. These studies recognized that any accepted solution must balance mobility and traffic flows with quality of life concerns.
- Recommended that alternative ways of calming and reducing the highway traffic be considered along with highway improvements.
- These studies still considered the notion of bypasses, but to a much lesser degree. Realization that a bypass may solve problems in one area, but create them in another.
- Recognized that relaxing AASHTO standards in terms of road width might be a possibility. *Note: VT Design Standards were adopted by the Agency in the mid-90's, allowing more flexibility in highway design and consideration of bicycle and pedestrian needs.*
- In general, these studies promoted upgrading existing highway corridors rather than building new ones.

Common Elements to All Studies:

- Recognition that there needs to be public buy-in to the solution(s). Most studies promoted a public participation process for input, including community based planning. However, it was not until the 90's that this process has actually been used, putting the task-force approach into place.
- Recognition that there will probably need to be both short-term and long-term solutions.

SECTION III: MODELING OF 3 NEW ALIGNMENTS OF AN EAST-WEST HIGHWAY USING THE STATEWIDE TRAVEL DEMAND MODEL

Travel Demand Models (TDM) are planning tools used to simulate the travel activities of population and employment centers. These are computer models widely used at statewide and regional levels to quantify impacts on the transportation system due to population, employment and highway network changes. TDM's are used to estimate future traffic volumes and establish new traffic patterns resulting from demographic changes such as major shifts in population and/or employment centers as well as roadway changes such as construction of new roads or upgrades of existing ones.

Using the Vermont Statewide Travel Demand Model, three scenarios of a new limited access E-W highway were modeled to determine the percent traffic that could be diverted onto the new highway from existing east-west roadways (i.e., US-4 & VT-103). ***It should be emphasized that these are not proposed design alignments but rather theoretical scenarios to study traffic pattern changes due to the presence of a new E-W highway.***

Modeling Scenarios & Results:

Three new E-W highway links connecting US-7 and I-91 were added to the existing highway network of the statewide travel demand model and subsequently the model was run for each of the three modeling scenarios shown in Figure 3-1. Each scenario was run using current year traffic and two sets of geometric (2 & 4 lanes) and speed (50 & 65 mph) conditions. A base scenario (i.e., no new E-W highway) was also run to establish base traffic conditions on US-4 and VT-103 which were then compared to the traffic from the three different E-W scenarios. Subsequently, the percent traffic change on US-4 and VT-103 due to the addition of a new E-W highway link was calculated. The different modeling scenarios analyzed are listed below:

- *Base Scenario:* Current highway network - no E-W highway
- *Scenario #1 (middle):* Approximate VELCO Power line alignment from US-7 in Clarendon to the I-91 exit in Ascutney (#8).
- *Scenario #2 (northern):* South of US-4 from US-7 in Rutland to I-91 (via US-5) at White River Junction.
- *Scenario #3 (southern):* North of VT-103 from US-7 in Clarendon to the I-91 exit in Rockingham (#6).

The study area topography of the modeling scenarios is illustrated in Figure 3-2 while Figures 3-3 to 3-5 show a more detailed topography as well as the terrain profile of these scenarios.

Results from the different modeling scenarios are summarized in the following tables:

Percent (%) Average Daily Traffic Diverted from US-4 onto Proposed E-W Highway					
Scenario #1 (Middle)		***Scenario #2 (Northern)***		***Scenario #3 (Southern)***	
2 lanes, 50mph	**4 lanes, 65mph**	**2 lanes, 50mph**	**4 lanes, 65mph**	**2 lanes, 50mph**	**4 lanes, 65mph**
13%	*16%*	*17%*	*18%*	*0%*	*1%*

Percent (%) Average Daily Traffic Diverted from VT-103 onto Proposed E-W Highway					
Scenario #1 (Middle)		***Scenario #2 (Northern)***		***Scenario #3 (Southern)***	
2 lanes, 50mph	**4 lanes, 65mph**	**2 lanes, 50mph**	**4 lanes, 65mph**	**2 lanes, 50mph**	**4 lanes, 65mph**
8%	*10%*	*2%*	*2%*	*5%*	*7%*

Model Accuracy:

Please note that the percent traffic reductions reported above are the averages over the entire length of US-4 and VT-103 corridors. Since the Vermont Statewide Travel Demand Model was calibrated to achieve a statewide and not a regional (or local) level of accuracy it would not be appropriate to report localized results and individual link (e.g., small roadway segment) traffic changes at this time. A more detailed (local) calibration of the model, which would have required tremendous amount of time, resources and funds, was needed to be able to report at the regional/local level. The statewide model was calibrated according to FHWA-ED-90-015

publication (Calibration and Adjustment of System Planning Models) to achieve a *percent region wide error of less than 5% with 95% confidence*.

Discussion:

The results from the different modeling scenarios indicate that the overall percent traffic being diverted from both US-4 and VT-103 onto the new east-west highway in any of the three scenarios is not substantial. The reduction of average daily traffic (ADT) on these routes ranges from 5% to 26%.

ADT's on US-4 range from a low of 4,700 vehicles/day in Bridgewater to 15,000 vehicles/day in Rutland and on VT-103 the ADT's range from approximately 4,000 in Wallingford to 10,000 in Ludlow.

Results also indicate that the percent traffic that could be diverted from US-4 and VT-103 depends heavily on the geographic location of the new highway. Scenario #2 (south of US-4) attracts more traffic from US-4 than VT-103. Similarly, scenario #3 (north of VT-103) attracts no traffic from US-4 while it diverts a small percent from VT-103.

Figure 3-1: Three Modeling Scenarios

Figure 3-2

Figure 3-3

Figure 3-4

Figure 3-5

SECTION IV: NATURAL RESOURCES MAPS OF STUDY AREA

During the early development stages of this study, there was consensus between Regional Planning Commissions (RPC) and VTrans staff that a comprehensive picture of the natural resources (and constrains) of the area under study should be mapped and presented. The boundaries of the study area were also selected during these initial discussions between affected RPC's (i.e., Rutland Regional Commission, Two Rivers - Ottauquechee Regional Commission, Southern Windsor County Regional Planning Commission, and Upper Valley - Lake Sunapee Regional Planning Commission) and VTrans.

Geographic Information System (GIS) maps were developed for a number of natural resources such as topography, rivers, lakes, wetlands, deer & bear habitats etc., of the study area. The Vermont Center for Geographic Information (VCGI), Regional Planning Commissions and the Agency of Transportation were the primary sources of the geographic data used to develop these maps.

Following is a list of the GIS maps presented in this section:

- *Figure 4-1:* Boundaries and topography of the study area.
- *Figure 4-2:* Functional classification of the highways in the study area.
- *Figure 4-3:* Water resources including rivers, lakes, reservoirs, wetlands, surface water source and wellhead protection areas.
- *Figure 4-4:* Federal, state and town conservation areas.
- *Figure 4-5:* Wildlife areas, including deer wintering, black bear habitats as well as endangered and threatened species.

These maps display the diversity and sensitivity of natural resources as well as the challenging topography of the study area.

Figure 4-1: Topography of the Study Area

Figure 4-2: FC of Highways

Figure 4-3: Water Resources

Figure 4-4: Conservation Areas

Figure 4-5: Wildlife Areas

SECTION V: FREIGHT MOVEMENTS BY TRUCK & RAIL

VERMONT STATEWIDE FREIGHT STUDY:

A Statewide Freight Study was initiated last fall (1999) by the Policy & Planning Division of AOT to establish an inventory of the current freight transportation system (highways, railroads, airports) of Vermont. This study is a fundamental first step in understanding freight flows in the state that will enable comprehensive freight infrastructure planning in the future.

Type and weight (in annual tonnage) of commodities being imported, exported and passed through state at the county level by mode were compiled, analyzed and a comprehensive freight profile of Vermont was developed.

The Vermont freight profile was mostly derived from the TRANSEARCH/Intermodal Freight Visual Database, a proprietary product by Reebie Associates, which was purchased by VTrans as part of this study. TRANSEARCH was customized for Vermont by expanding the standard range of commodities covered by the database to include products that are important to the Vermont economy such as mining/quarrying, raw milk, metal & wood products, precision equipment etc. The state was subdivided into 14 distinct market areas with each area corresponding to one of the 14 counties, this allowed for intrastate freight flow analysis. In addition to the 14 in-state market areas, 16 external market areas (US & Canada) were identified. The freight flows among these 30 market regions were then analyzed. The external markets utilized in the analysis are listed below:

Market Regions (BEA's):

- *Connecticut (**CT BEA 10**)*
- *Eastern Massachusetts (**MA BEA 3**)*
- *Western Massachusetts (**MA BEA10**)*
- *Maine (**ME BEA ALL**)*
- *New Hampshire (**NH BEA 3**)*
- *Northeastern New York State (**NY BEA 4**)*
- *Eastern New York State (excluding New York City area - **NY BEA 5**)*
- *Western and Southern New York State (including New York City area - **NY BEA NOT 4 or 5**)*
- *Rhode Island (**RI BEA ALL**)*
- *Midatlantic US*
- *Midwestern US*
- *Southeastern US*
- *Western US*
- *Quebec*
- *Eastern Canada*

- *Western Canada*

To supplement the freight study with local data and enhance the validity of the Vermont freight profile, origin-destination (O-D) and commodity truck surveys were conducted at 15 sites around the state during the summer of 2000. Questionnaires were sent to various Vermont based motor carriers, shippers/receivers to gather data on their operations, typical freight movements and any issues or concerns they might have with Vermont's transportation infrastructure. Personal interviews were conducted with a number of freight stakeholders to reinforce and clarify information gathered from the questionnaires.

Selected Results from the Vermont Freight Profile:

- Approximately 23.8 million tons of freight are moving into (30%), out of (12%), within (23%) and through (35%) Vermont by all modes (highway/truck, rail, air). This data indicates that Vermont is a destination/consuming state with a high percentage of through (no origins or destinations in the state) freight movements.
- Vermont is heavily dependent upon trucks for importing, exporting and moving commodities within the state. 91.4% of all commodities are being moved by truck, 6.6% by rail, 2% by other modes (e.g., unidentified combination of modes) and less than 1% by air.
- Top commodities *moving into, out of, and within Vermont by all modes* consist of: primary forest materials; clay, concrete, glass or stone; food or kindred products; intermodal, warehouse, distribution commodities.
- Top commodities *moving through Vermont by all modes* consist of: petroleum or coal products; lumber or wood products; clay, concrete, glass or stone; intermodal, warehouse, distribution commodities; pulp, paper, or allied products.
- Top commodities *moving into, out of, and within Vermont by truck* consist of: lumber or wood products; food or kindred products; intermodal, warehouse, distribution commodities; clay, concrete, glass or stone.
- Top commodities *moving into, out of, and within Vermont by rail* consist of: non metallic minerals; clay, concrete, glass or stone; food or kindred products; lumber or wood products.
- Analysis of Origin-Destination of commodity flows indicate that the majority of goods (by weight) that Vermont produces are being consumed within the state itself (36%). Other major trading partners include: New Hampshire (13%); New York (11%); Quebec and Eastern Canada (8%).

Using data from the Vermont freight profile and the O-D truck surveys, total commodity flows by county as well as key entry/exit gateways used by trucks to transport commodities in and out as well as through Vermont were plotted and presented in Figures 5-1 and 5-2 respectively. Figure 5-1 represents total commodity flow by county. It indicates that exports from Rutland County are the second largest by weight following Chittenden County with Windsor county ranking as fourth. As far as consumption (imports) of goods, both Rutland and Windsor counties are comparable. Figure 5-2 illustrates key entry and exit gateways. Interstate 91, at Vernon (Massachusetts border) is the single most used gateway in the state. Interstate 89 at Hartford (New Hampshire border) and US Route 4 at Fair Haven (New York border) were the second and third most used gateways.

Freight Flows by Truck on East-West Corridor:

Using the TRANSEARCH database, a number of ArcView maps were created and are presented in this section showing the major trading partners (imports and exports) for Rutland and Windsor counties. Figures 5-3 through 5-6 present the freight flows by truck (annual tonnage) for commodities originating and terminating in Rutland and Windsor counties. Detailed results of these freight flows were tabulated and are presented in Appendix A. Figure 5-3 indicates that the majority of Rutland county's consumer goods originate within Rutland itself, the state of New Hampshire and Chittenden county followed by a second tier of trading partners including Washington and Windsor counties, Quebec, areas of New York state, Massachusetts and Maine. Figure 5-4 illustrates the fact that the majority of Rutland's manufactured goods are being consumed by the county itself with Chittenden county ranking as the second most important trading region. A second level of exporting partners includes New Hampshire, the Mid Atlantic region as well as Windham and Washington counties. The ranking of the market regions exporting goods to Windsor county are shown in Figure 5-5. This figure indicates that New Hampshire, Windsor county, part of New York state and Chittenden county are the major exporting regions to Windsor county, while Rutland county is included in the second tier of exporting regions. Figure 5-6 shows that Windsor county exports goods primarily to Chittenden and trades within the county itself followed by Windham, New Hampshire, Rutland, Washington, section of New York state and the Mid Atlantic region.

The above figures indicate that as far as external markets are concerned Rutland and Windsor counties are trading (imports & exports) commodities with neighboring states, primarily with New Hampshire and the Western and Southern portions of New York State (including New York City). The analysis of intrastate freight movement data indicates that Chittenden County is the major trading partner of both Rutland and Windsor counties.

GREEN MOUNTAIN RAILROAD FREIGHT TRAFFIC:

The Green Mountain Railroad (GMR) is the only railroad line that traverses the defined study area (see Railroad & Airports Map at the end of this section). It connects with Vermont Railways (VTR) in Rutland and New England Central Railroad (NECR) at Bellows Falls and for the most part follows the alignment of VT-103.

Freight data (car loads/month) received from the GMR indicates that there has been a steady increase in traffic since 1995. Figure 5-7 exhibits this increasing trend in rail freight traffic on this line. The larger percentage of freight traffic is through (or bridge) traffic. Figure 5-8 shows GMR freight traffic for the year 2000. The largest percentage is bridge, followed by traffic that terminates in Vermont, then by traffic that originates in Vermont.

Limitations of Rail Freight Traffic in Vermont:

The increased competitiveness of the Vermont railroads, including GMR, and their viability as an alternative to truck traffic depends greatly on their ability to operate at the same weight limits as the national and Canadian Class I railroads. Currently, the Vermont system operates at 263,000 pounds per car where as the class I railroads operate at a minimum of 286,000 pounds and in some corridors as high as 315,000 pounds. This weight limitation of the Vermont railroads restricts their ability to accept interline traffic carrying 286,000 pounds (or potentially 315,000 pounds).

Currently, the rail industry trend of U.S. and Canadian Class I railroads is towards utilizing double- stacked cars that could accommodate up to four intermodal containers per car. Unfortunately, most of the Vermont railroads have no double-stack capability due to clearance constrains and this is a major impediment in capturing some of this growing business. A 1997 report prepared by VAOT identified thirty clearance restrictions for double stack traffic within the state with estimated costs to eliminate all of the constrains ranging from $ 34.8 to $40.4 million. The principle opportunity for double-stacked container movements is from the Vermont rail system connection to the Canadian rail lines. The Canadian National and Canadian Pacific have double-stacked clearances. The Vermont rail system connects to both of these carriers with Green Mountain Railroad being a potential route. To effectively expand the international container movements on Vermont rail lines, double-stacked clearance improvements need to be made.

Figure 5-1

Figure 5-2

Figure 5-3

Figure 5-4

Figure 5-5

Figure 5-6

Figure 5-7

Figure 5-8

Railroads & Airports Map

SECTION VI: US-4 & VT-103 HIGHWAY PROJECTS in the CAPITAL PROGRAM (2001-2005)

Based on the Capital Program and Project Development Plan, highway projects (excluding paving) scheduled for construction between 2001 and 2005 on US-4 & VT-103 were plotted and presented in Figure 6-1. Following is a brief summary on the status of these projects:

Cavendish-Ludlow, VT-103, NH F 025-1(30)

This project involves reconstruction of 1.13 miles of VT-103 in Cavendish and Ludlow including the replacement of two bridges. The roadway will be widened to Vermont National Highway System standards with minimal alignment changes. The project is currently in the preliminary design stage with an informational public meeting scheduled for January 2001. Construction is planned for 2005.

Woodstock, US-4, NH 020-2(31)

Reconstruction and rehabilitation of US-4 in the town of Woodstock, extending 2.331 kilometers through the village center. Curb, drainage, pavement and sidewalk reconstruction and rehabilitation, along with extensive reworking of the roadway and parking in the area of the village green are included in this project. Due to the complex nature of the project, the town was not able to reach consensus among the many affected property and business owners as to the final project design so no construction date is set at this time.

Rutland Town-Rutland City, US-4 & US-7, NH 020-1( )S

This is a traffic analysis project to identify possible US-4 and US-7 improvements in Rutland Town and Rutland City. It includes an analysis of the impact of the US-7 signalization system completed in 2000.

Rutland Town, US-4, NHG SGNL(5)S

This is an improvement project for traffic signals at the former shopping center on US-4 in Rutland Town where a Home Depot construction is planned in the near future. These improvements are scheduled for 2001.

Bridgewater-Woodstock, US 4, NH 020-2(33)SC

This is a scoping project to evaluate alternatives for reconstruction of US- 4 mainly in Bridgewater village. The project is 0.81 miles long and is primarily focused on creating a village character as the highway passes through the village. Gateway effects at either end of the project and sidewalk improvements are being included.

Chester, VT-103, BRF 025-1(35) - North Street Bridge
This is a replacement of deficient BR #12 on VT-103 (TH-1), over the Williams River. The project is currently in the final design and right-of-way acquisition phases. Target construction date is spring of 2001.

Wallingford, VT-103, F 025-1(31)
Improvement of the VT-103 horizontal alignment in the area of the Green Mountain Railroad overpass. This project will improve sight distance, which is obstructed by the massive stone piers of the overpass. The project is 0.323 kilometers long and is planned for construction 2005.

Hartford, US-4, PLH QGSP(2)
This project is a Local Transportation Facilities managed project for improvements to the Quechee Gorge visitors' center. It will include improved parking, handicap access, and trail improvements. Construction is planned for 2001.

Chester, VT-103, BRF 025-1(37) VT 103 - Bridge 9
This project was added to the program but has yet to see any activity. The project needs to be scoped to determine a course of action.

Chester, VT-103, BRF 025-1(28) - Bridge 8
This project is in the scoping stage.

Rockingham, VT-103, NH 025-1( )S - Bridge 4
This is a large culvert replacement project. Survey has been requested and conceptual plans development could begin with receipt of the survey.

Woodstock, US-4, BHF 020-2(32) - Bridge 50
A traffic control plan for the construction phase has been determined and now the project can proceed to Semi Final Plan.

A number of the projects listed above, such as the Cavendish-Ludlow (NH F 025-1(30)) and Woodstock (NH 020-2(31)) will facilitate movement of goods on the existing east-west highways (US-4 and VT-103). Also, coordination of traffic signals in Rutland City and Town will enable for smoother and faster flow of traffic in congested areas. In addition, replacement and upgrades of deficient bridges will contribute to safer conditions on the existing east-west corridors.

Figure 6-1

SECTION VII: PROPOSED RAIL MAINTENANCE PROGRAM & ESTIMATED COSTS TO UPGRADE GREEN MOUNTAIN RAILROAD

PROPOSED FY 2002 RAILROAD MAINTENANCE PROGRAM:

In order to give an overall picture of the rail improvement program, all proposed upgrade and maintenance projects included in the FY2002 Capital Program and Development Plan, at the time that this report was drafted, are listed below. Please note that the following is not a comprehensive list of the proposed rail program:

- *Statewide Projects:*
  - $500,000 for development and evaluation of future rail system projects.
  - $1,100,000 for rail crossing improvements on various railroads.
  - $150,000 for used tie disposal on state owned rail system.
  - $450,000 for property management (e.g., fencing, culverts, trestlework etc.) of state owned railroads.
  - $1,500,000 for short term repair of bridge abutments, piers and superstructures, to stabilize or reduce the rate of deterioration of bridges on the Green Mountain Railroad, Vermont Railway and Washington County Railroad.
  - $500,000 for long term repairs to existing abutments, piers and superstructures, to restore structural ability to accommodate rail equipment weighing $315,000 lbs on the Green Mountain Railroad, Vermont Railroad and Washington County Railroad.
  - $1,500,000 for participating in three-way partnerships with railroads and rail shippers to develop needed facilities including sidings, spurs and system development.
- *Green Mountain Railroad (GMR):*
  - $600,000 for track and roadbed improvements including purchase and installation of heavier weight rail to replace some of the 90 lbs, turnouts, ties, crossing maintenance, ballast, ditching, drainage, brush cutting and associated other track maintenance.
- *New England Central Railroad:*
  - $500,000 for installation of a power switch on the Wye in Essex Junction.
- *Northern Vermont Railroad (Berlin Branch):*
  - $650,000 for repair of existing culverts and stabilization of the railbed embankment along the Connecticut River.
- *Vermont Railway*

- $5,767,702 for rehabilitation of selected areas and operation of track from Hoosic, NY to Burlington for rail passenger service (includes federal earmarks).
- $250,000 for reconstruction of the "OMYA" bridge in Rutland, to restore it's structural ability to accommodate 315,000 lbs.

- *Washington County Railroad:*
  - $500,000 for reconstruction of railroad bridge over the Stevens Branch in Barre for granite transfer to restore structural ability and accommodate rail equipment weighing 315,000 lbs.
  - $360,000 for track and roadbed improvements, including rail, structures, ties, ballast, ditching and drainage and associated other track maintenance as well as lease subsidy.

Green Mountain Railroad Maintenance:

It is Rail Division's policy to upgrade the State-owned infrastructure of the rail lines that carry the largest amount of freight. This includes the Green Mountain Railroad and the Vermont Railway between Rutland and Burlington.

During the past 5 Years, $2,97,070 has been appropriated for the Green Mountain Railroad for track rehabilitation. Additionally during this time, over $700,000 has been spent to inspect selected structures over water and to rehabilitate those that are identified with deficiencies. With the increase in heavier weight freight, additional funds will need to be appropriated to bring the structures to the 286,000 pound or the 315,000 pound capabilities as well as installing heavier weight rail along portions of the line.

The Rail Enhancement Funds is available to the Railroad to encourage shippers to use rail facilities to ship or receive products. This fund has been used along the Green Mountain Railroad to increase the shipments of cement, oil, road salt, lumber, steel, crushed stone and plastics for local use.

The proposed Green Mountain Railroad maintenance budget for FY 2002 is $600,000, which includes general track and roadbed maintenance, installation of heavier rail at selected locations, and the purchase and installation of switches. In addition, the FY 2002 budget includes funding for short and long-term restoration of railroad bridges along the GMR.

The awareness by the agency of the importance of increased rail freight traffic is reflected in the proposed FY 2002 rail maintenance program. This program includes increased funding to upgrade track and bridges on state owned rail lines as well as create more opportunities for

shippers and receivers to utilize rail rather than trucks as the preferred mode of transferring goods.

ESTIMATED BRIDGE INSPECTIONS & COSTS FOR GMR:

The agency initiated a program for the inspection of all railroad bridges on state owned rail lines to obtain information on their structural integrity and general condition. Approximately two hundred twenty bridges (220) are included in the program. The Green Mountain Railroad (GMR) has forty-four (44) bridges along the fifty-mile corridor. GMR accounts for 20% of the state owned bridge population and has the highest number of bridges per average mile with the lowest composite rating of overall bridge condition.

VAOT's Rail Division initiated a railroad bridge inspection program with the goal of improving the condition of the railroad bridges on all state owned rail lines. The program is divided into two phases:

- Phase I - *Inventory & General Condition Survey:* This phase has been conducted twice in the past and is currently being scheduled on a two-year cycle for all structures.
- *Phase 2 - Detailed Inspection:* This phase has been initiated for structures that were rated as deficient under Phase I and are in need of rehabilitation or replacement.

Phase I:

Phase I has resulted in a bridge inspection report which includes a physical description of each bridge; a summary of the observed inspection findings and recommendations for immediate (0 to 2 years), short-term (2 to 5 years), and long-term (5 to 10 years) repairs; photographs detailing bridge layout and condition; inspection form; and a construction cost estimate form.

Detailed ratings and estimated costs for all GMR bridges were tabulated and are presented in table 7-1 at the end of this section. A brief summary of the GMR bridges condition is listed below:

Number of Bridges	**Condition**	**Required Action**
• *3 Bridges (7%)*	*Critical (Rating:2)*	*Immediate Action*
• *15 Bridges (34%)*	*Serious (Rating:3)*	*Short Term Rehabilitation*
• *16 Bridges (37%)*	*Poor(Rating:4)*	*Long Term Rehabilitation*
• *4 Bridges (9%)*	*Fair (Rating:5)*	*Maintenance / Rehabilitation*
• *4 Bridges (9%)*	*Satisfactory(Rating:6)*	*Improved Maintenance*

- *1 Bridge (2%)* *Good (Rating:7)* *Reactive Maintenance*
- *1 Bridge (2%)* *Very Good (Rating:8)* *Reactive Maintenance*

Phase II:

Phase II detailed inspections provide engineering services to address the following analyses:

- In-depth member by member inspection of the structure.
- Complete visual condition inspection of substructure elements.
- Structural load rating analysis of the existing superstructure.
- Preliminary evaluation of the overall hydraulic and scour characteristics within the area of influence of the abutments.
- Rehabilitation analysis to evaluate the repairs required to ensure the structural integrity of the bridge.
- Development of a recommended order of priority for rehabilitating each structure based on engineering principals and judgement.

Table 7-1: Bridge Rating and Repair Cost Summary of GMR

Table 7-1: Bridge Rating and Repair Cost Summary of GMR

SECTION VIII: ESTIMATED COSTS OF NEW EAST-WEST HIGHWAY

Following consultation with staff from the Project Development division and Special Projects unit of the agency, an estimated cost/mile was derived for a new east-west highway (2 & 4 lane configuration) connecting Rutland to the New Hampshire border. Costs from both the Bennington Bypass and the Circumferential Highway, the two new highway projects being designed and/or constructed currently in Vermont, were considered as a source for the cost estimate. Based on the topography, environmental resources and possible Right-of-Way issues of the study area, it was decided that the northern segment of the Bennington Bypass is the most appropriate project to base the cost estimates on.

The following table provides a detailed breakdown of the estimated cost/mile per category in year 2000 dollar value:

ESTIMATED COST ANALYSIS FOR NEW EAST-WEST HIGHWAY		
Category	*Two-Lane Highway Costs ($/mile in millions)*	*Four-Lane Highway Costs ($/mile in millions)*
Design	1.099	1.648
Archeology	0.146	0.146
Wetlands	0.055	0.082
Traffic Studies	0.047	0.07
Utilities	0.302	0.378
ROW (4 lanes)	0.901	0.901
Construction	9.069	13.603
Landscaping	0.181	0.272
Salaries	1.104	1.657
Miscellaneous	0.044	0.066
TOTAL:	*$12.948 millions/mile*	*$18.823 millions/mile*

Depending on the selected alignment of a new east-west highway, estimated total cost of the project would vary significantly. For demonstration purposes, the total costs to construct the three modeling scenarios were calculated based on the above cost/mile estimate. ***Total costs ranged from $408 to $492 millions for a two-lane highway and $593 to $715 millions for a four-lane highway***.

SECTION IX: DISCUSSION AND RECOMMENDATIONS

Discussion:

This transportation corridor is of great importance for the mobility of Vermont residents and visitors. It provides vital links for both Rutland and Windham counties to external markets within neighboring New Hampshire and the Western and Southern New York State, including New York City. Over the years all types of traffic, including the number of commercial vehicles and their size have continued to increase on the US 4 and VT Route 103 highways. There has been a commensurate increase to the traffic and safety problems on these routes, and increasing dissatisfaction of residents along the routes, particularly in village centers.

Despite numerous studies and considerable planning investment over many years, there is no consensus as to desirable solutions.

Planning studies prior to the 90's focused mainly on highway traffic corridors and highway solutions. They frequently did not take into consideration the concerns and opinions of local communities and residents, nor did they give much consideration to other alternatives such as greater emphasis on rail in the corridor, traffic management and calming strategies, or land use and transportation regulation. Studies during the 90's were increasingly based on public involvement and input and increasingly focused on quality of life issues. They also gave consideration to a broader range of possible solutions, including solving mobility problems in the corridor by means of greater emphasis on rail.

As an integral component of the east-west transportation corridor, the potential for the Green Mountain Railroad (GMR) to provide relief to highway mobility problems is limited. Improvements to the line, including upgrading the track and several bridges could increase the potential for future passenger and freight service, but, it is important to note that the GMR links to other railroad lines serving the state which also are in need of similar upgrades. Investments in the GMR infrastructure need to be implemented within a broader strategy and commitment for rail improvements throughout the state. (An example is removing clearance impediments for double-stack traffic within the state.) Improvements can better position the GMR to compete for passenger and freight traffic, but they will not result in major diversion of highway traffic to rail in the corridor.

The studies over the decades have led to better understanding of the complexity of these issues, and of peoples' concerns and opinions. This understanding has not, however, brought the interested parties any closer to a consensus as to what needs to be done. It has also led thinking

away from the issue of finding a solution on the existing highway and rail routes to considering the alternative of a new highway on new alignment.

The feasibility, alignment and cost of a new highway are bound the geographical and environmental constraints in the corridor. The feasibility of such a project and, ultimately, the alignment and major design features, would need an intensive and complex examination of alternatives and environmental impact analyses. If federal money is to be involved to any degree, a decision to go forward with scoping and design must be made within the framework of federal environmental protection and planning policy.

As with the concept of a US 4/ US 7 Bypass, which was studied over many years at considerable public expense and was finally abandoned in 1997, it is unlikely that the concept of a new east-west highway would prevail. Even if the concept was embraced, the environmental and social impacts of new highway construction of this magnitude would be enormous.

Based on the level of examination to date, the benefits of a new highway relative to the traffic problems it is intended to solve are minimal. A new limited access highway could serve as an alternative for commercial and other vehicular, but as indicated by the modeling of three alternative alignments, the overall percent of traffic that would be diverted from US 4 and VT Route 103 is not substantial. A new highway investment can provide modest relief, but will not solve the problems on US 4 and VT Route 103.

Cost is a major consideration. The estimates of cost for three possible alignment alternatives range from about one-half to three-quarters of a billion dollars in 2000 dollars. This is roughly equivalent to sixteen to twenty-five years of highway construction and improvement funding for state highways based on recent budgetary allocations. Either a major new source of funding would need to be found, or many years of necessary transportation improvements throughout the state would need to be deferred.

Recommendations:

The cost of constructing a new east - west corridor is prohibitive both from a consideration of costs, the impact to state's natural resources and the degree to which it would serve as a solution. Solutions to east west mobility in the corridor rest in wise land use planning, regulatory decision making and judicious investments in the major highway and rail infrastructure already existing in the corridor, and to the state infrastructure to which they connect.

APPENDIX A

TABULATED FREIGHT DATA

Tables included in this appendix provide information on the trading partners (market regions) of Rutland and Windsor counties derived from the TRANSEARCH database which provided Origin-Destination, type and weight of commodities being transported by mode in, out and through the state. Vermont was subdivided into 14 distinct market areas with each area corresponding to one of the 14 counties, which allows for intrastate freight flow analysis. In addition, 16 external market areas (US & Canada) that Vermont trades with were identified and freight flows among these 30 market regions were determined. The external markets are listed below:

Market Regions (BEA's):

- *Connecticut (**CT BEA 10**)*
- *Eastern Massachusetts (**MA BEA 3**)*
- *Western Massachusetts (**MA BEA10**)*
- *Maine (**ME BEA ALL**)*
- *New Hampshire (**NH BEA 3**)*
- *Northeastern New York State (**NY BEA 4**)*
- *Eastern New York State (excluding New York City area - **NY BEA 5**)*
- *Western and Southern New York State (including New York City area - **NY BEA NOT 4 or 5**)*
- *Rhode Island (**RI BEA ALL**)*
- *Midatlantic US*
- *Midwestern US*
- *Southeastern US*
- *Western US*
- *Quebec*
- *Eastern Canada*
- *Western Canada*

Quantity and Origin of Inbound Commodities to Rutland by Truck

Trade Region	*Annual Tonnage*	*Percent(%)*
Rutland County	212,643	16.77%
NH BEA 3	182,696	14.41%
Chittenden County	141,295	11.14%
Washington County	83,061	6.55%
Quebec	74,641	5.89%
NY BEA NOT 4 OR 5	73,968	5.83%
ME BEA ALL	62,610	4.94%
MA BEA 3	57,582	4.54%
Windsor County	53,147	4.19%
Southeast	52,881	4.17%
Mid Atlantic	34,004	2.68%
Windham County	33,819	2.67%
Midwest	31,311	2.47%
Franklin County	26,609	2.10%
Bennington County	26,363	2.08%
Addison County	18,196	1.44%
CT BEA 10	13,491	1.06%
Caledonia County	13,081	1.03%
Orleans County	12,449	0.98%
Western Canada	12,121	0.96%
Orange County	11,379	0.90%
NY BEA 5	9,678	0.76%
MA BEA 10	7,970	0.63%
West	7,549	0.60%
Essex County	5,779	0.46%
Lamoille County	3,799	0.30%
NY BEA 4	2,776	0.22%
Eastern Canada	2,603	0.21%
Grand Isle County	156	0.01%
RI BEA ALL 3	146	0.01%
TOTAL=	*1,267,803*	*100%*

Quantity and Origin of Outbound Commodities from Rutland by Truck

Trade Region	*Annual Tonnage*	*Percent (%)*
Rutland County	212,643	20.43%
Chittenden County	145,291	13.96%
NH BEA 3	88,733	8.53%
Windham County	85,152	8.18%
Washington County	58,262	5.60%
Mid Atlantic	56,505	5.43%
Windsor County	45,822	4.40%
Quebec	39,109	3.76%
ME BEA ALL	36,723	3.53%
Franklin County	34,181	3.28%
MA BEA 3	29,059	2.79%
NY BEA NOT 4 OR 5	25,747	2.47%
Bennington County	25,351	2.44%
Orange County	25,245	2.43%
Addison County	25,012	2.40%
Caledonia County	22,438	2.16%
Midwest	17,151	1.65%
Orleans County	14,745	1.42%
Western Canada	10,279	0.99%
Lamoille County	8,673	0.83%
Essex County	6,817	0.66%
CT BEA 10	6,064	0.58%
Southeast	5,465	0.53%
NY BEA 4	4,088	0.39%
West	3,927	0.38%
MA BEA 10	3,577	0.34%
RI BEA ALL 3	1,902	0.18%
NY BEA 5	1,517	0.15%
Grand Isle County	915	0.09%
Eastern Canada	268	0.03%
TOTAL=	*1,040,661*	*100%*

Quantity and Origin of Inbound Commodities to Windsor by Truck

Trade Region	*Annual Tonnage*	*Percent (%)*
NH BEA 3	141,766	13.84%
Windsor County	128,340	12.53%
NY BEA NOT 4 OR 5	107,235	10.47%
Chittenden County	90,531	8.84%
Washington County	77,694	7.59%
Quebec	68,705	6.71%
ME BEA ALL	57,564	5.62%
Rutland County	45,822	4.47%
MA BEA 3	40,913	3.99%
Southeast	40,271	3.93%
Franklin County	26,127	2.55%
Windham County	26,020	2.54%
Bennington County	23,620	2.31%
Mid Atlantic	23,529	2.30%
Midwest	21,358	2.09%
Western Canada	19,275	1.88%
Addison County	16,528	1.61%
West	15,480	1.51%
Caledonia County	9,148	0.89%
CT BEA 10	7,708	0.75%
Orange County	7,223	0.71%
NY BEA 5	6,642	0.65%
Orleans County	6,240	0.61%
MA BEA 10	5,519	0.54%
Essex County	4,732	0.46%
Lamoille County	2,509	0.24%
Eastern Canada	2,420	0.24%
NY BEA 4	1,139	0.11%
Grand Isle County	184	0.02%
RI BEA ALL 3	32	0.00%
TOTAL=	***1,024,274***	***100%***

Quantity and Origin of Outbound Commodities from Windsor by Truck

Trade Region	*Annual Tonnage*	*Percent (%)*
Chittenden	138,831	16.78%
Windsor	128,340	15.51%
Windham	58,175	7.03%
NH BEA 3	57,620	6.96%
Rutland	53,147	6.42%
Washington	49,364	5.97%
NY BEA NOT 4 OR 5	48,854	5.91%
Mid Atlantic	40,286	4.87%
Franklin	30,032	3.63%
Quebec	27,166	3.28%
Bennington	24,683	2.98%
Addison	21,948	2.65%
Orange	21,327	2.58%
Caledonia	18,488	2.23%
Southeast	16,351	1.98%
ME BEA ALL	14,034	1.70%
Orleans	13,991	1.69%
Midwest	13,442	1.62%
MA BEA 3	13,063	1.58%
Lamoille	9,649	1.17%
Essex	6,154	0.74%
Western Canada	6,126	0.74%
West	5,934	0.72%
CT BEA 10	4,313	0.52%
Grand Isle	1,931	0.23%
NY BEA 5	1,761	0.21%
MA BEA 10	1,385	0.17%
RI BEA ALL 3	483	0.06%
Eastern Canada	339	0.04%
NY BEA 4	93	0.01%
TOTAL=	***827,310***	***100%***