



**R | S | G** INC.  
RESOURCE SYSTEMS GROUP, INC.

- Technical Report and Plans for:

## **MIDDLESEX VILLAGE FEASIBILITY STUDY & CONCEPTUAL DESIGN**

Middlesex, VT

- Prepared for the:

## **Town of Middlesex & Central Vermont Regional Planning Commission**

5 May 2006

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## 1.0 INTRODUCTION

Middlesex Village lies in close proximity to the adjacent employment and retail centers in Montpelier, Berlin, and Waterbury, and is also within reasonable commuting distance to Burlington. Many of the commuting and shopping trips to these destinations from residents of Middlesex and Moretown and the greater Mad River Valley pass through the US 2/VT 100B intersection and Middlesex Village. Additionally, the Mad River Valley and ski destinations attract significant tourist traffic throughout the year – most of which accesses the Valley through the Middlesex village area.

While it is clear that a relatively high level of commuting and tourist traffic pass through the US 2/VT 100B intersection and village area (over 5,000 cars per day during the ski season), it is also critical to ensure that visitors and residents of Middlesex Village can walk and bicycle safely through the village.

In November 2003, the Town of Middlesex staged a one-day session of intense brainstorming about a number of issues throughout the village including pedestrian access and safety, infill development, and connectivity. This design charrette produced a number of valuable recommendations focused in the village core, at the gateways to the village, and adjacent to the I-89 interchange area. The comments and thoughts expressed during the charrette served as a starting point for this design project.

The purpose of this planning and feasibility study is to develop a set of comprehensive strategies that both improve traffic flow through the village area and also enhance the accessibility of amenities for residents on foot or on bicycle.

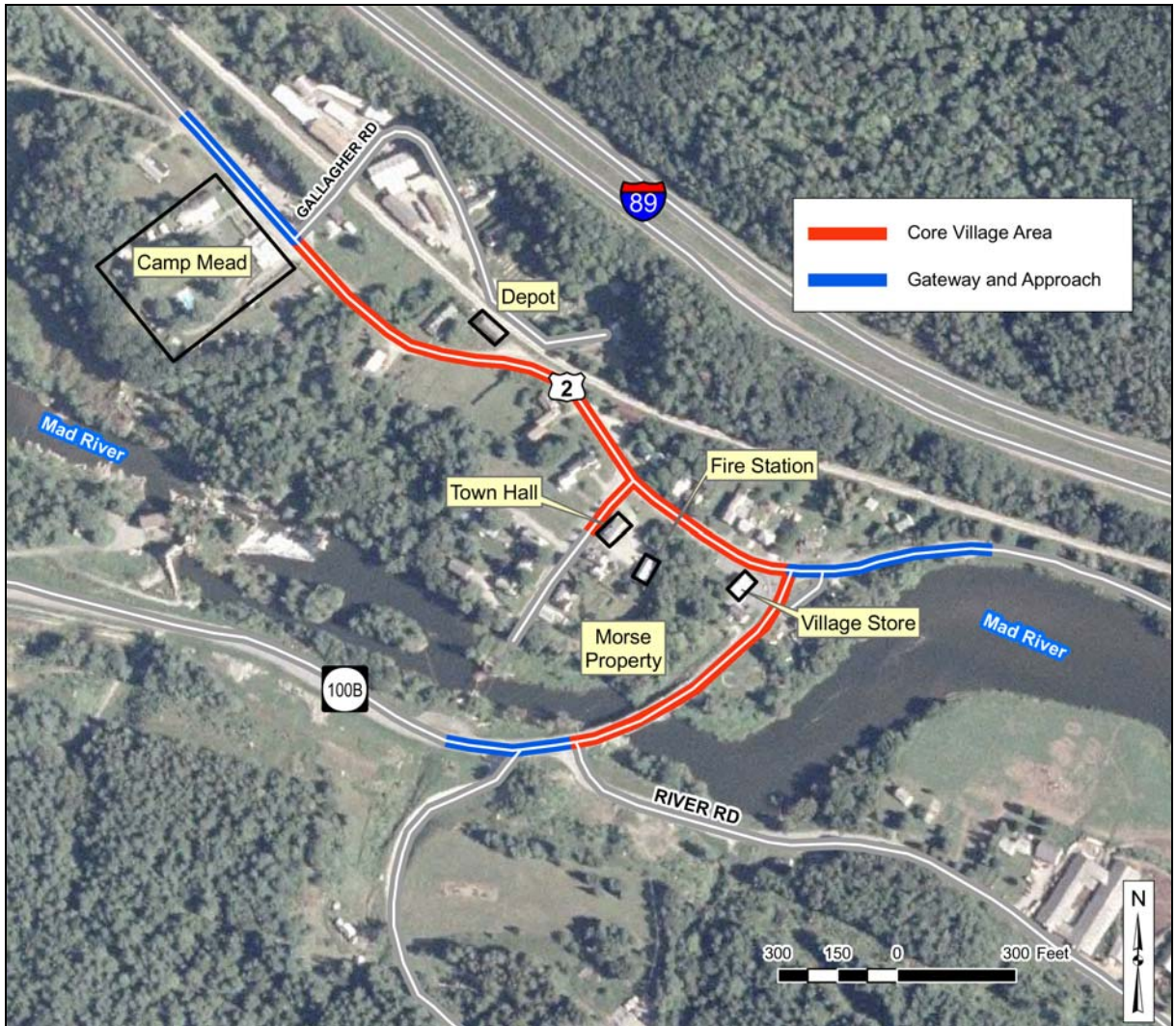
This report, which accompanies the conceptual design plans for the village, includes the following sections:

- Section 2.0 – Existing Conditions
- Section 3.0 – Environmental and Cultural Resources
- Section 4.0 – Cost Estimates
- Section 5.0 – Alternatives Evaluation
- Section 6.0 – Recommendations and Timeline

Figure 1 on the following page shows the approximate limits of the study area.



Figure 1: Study Area

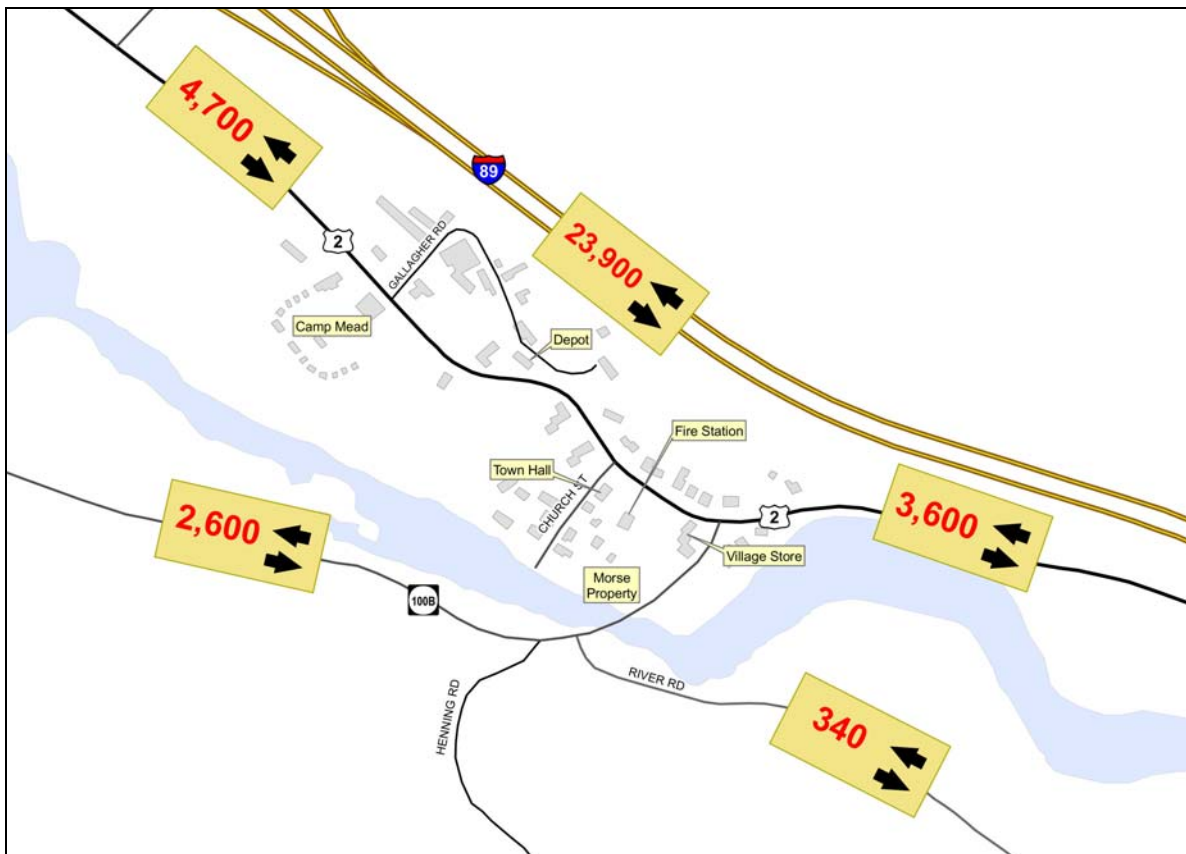


## 2.0 SUMMARY OF EXISTING CONDITIONS

### 2.1 AVERAGE ANNUAL DAILY TRAFFIC VOLUMES

Figure 2 below shows 2005 average annual daily traffic (AADT) volumes on routes through and around Middlesex Village. The highest volumes in the village are found along US 2 west of VT 100B where nearly 5,000 vehicles pass on an average day. Based on a traffic count on VT 100B south of US 2, trucks make up approximately 6% of the vehicle mix on this section of VT 100B.

Figure 2: 2005 Average Annual Daily Traffic Volumes at Selected Locations

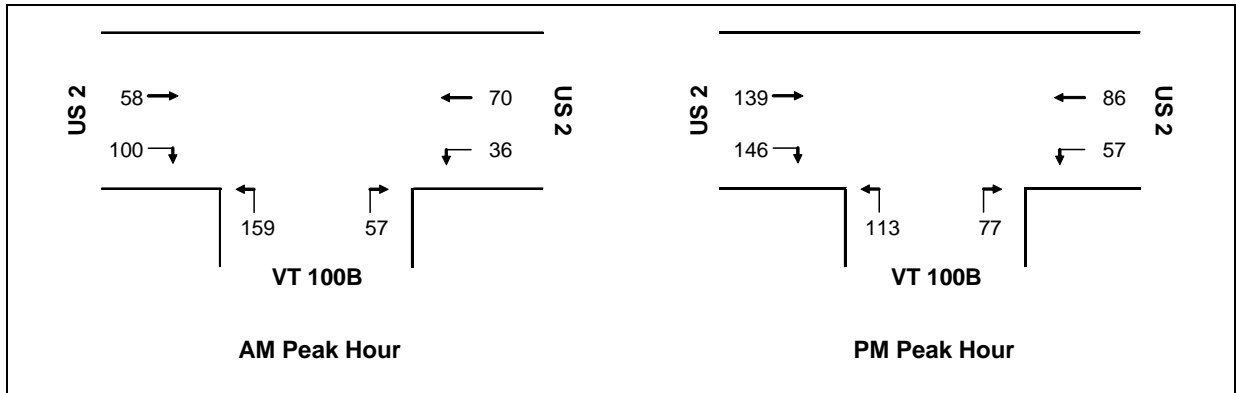


### 2.2 INTERSECTION TRAFFIC VOLUMES

Figure 3 below shows 2004 AM and PM peak hour traffic volumes at the US 2/VT100B intersection in the center of the village. The peak hour volumes are approximately 30% higher during the evening peak hour than during the morning peak.



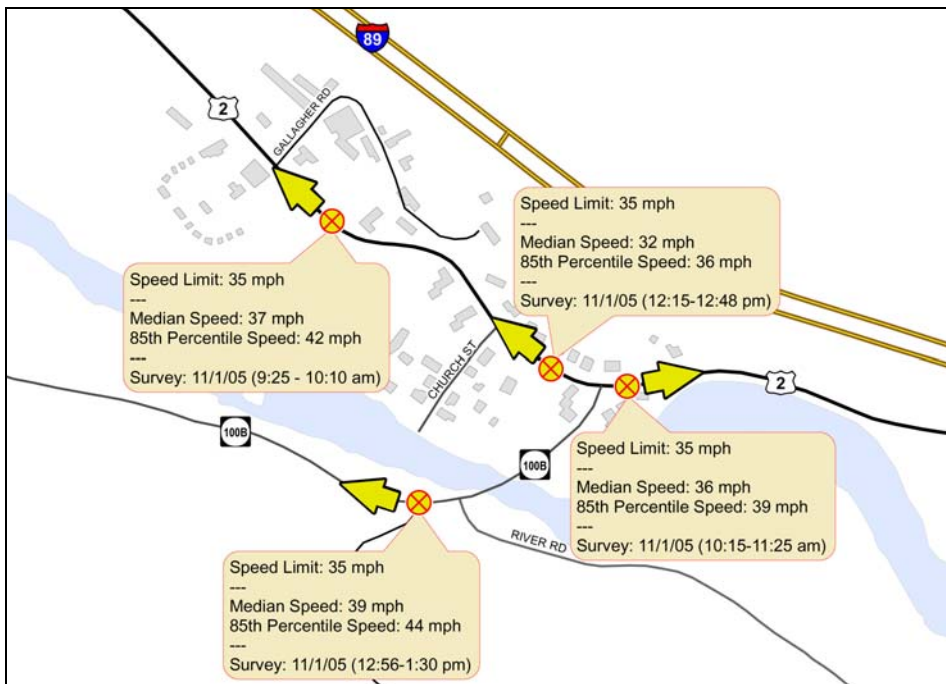
Figure 3: AM & PM Peak Hour Turning Movement Counts: US 2-VT 100B Intersection



2.3 VEHICLE SPEEDS

VTrans conducted a spot speed study at the four locations shown in Figure 4 on 1 November 2005. The study compared the posted speed with the median (or 50<sup>th</sup> percentile) speed and the 85<sup>th</sup> percentile speed. The 85<sup>th</sup> percentile speed is often used as a benchmark for setting speed limits. The two stations closest to the US 2-VT 100B intersection showed 85<sup>th</sup> percentile speeds within 5 miles per hour of the posted speed limit. Speeds at the other two locations were greater than 5 miles per hour over the posted speed. This implies that either a change in posted speed should be considered, or that traffic calming treatments should be used to slow traffic to the posted speed.

Figure 4: Posted and Observed Speeds (based on VTrans Speed Survey)



## 2.4 VEHICLE CRASHES

VTtrans maintains a statewide database of reportable vehicle crashes. A reportable crash is a crash involving \$1,000 or more in property damage, an injury, or a fatality. Between 1998 and 2003 there were *no* reported vehicle crashes within the Middlesex Village study area.

## 2.5 ROADWAY FUNCTIONAL CLASSIFICATION

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

The following lists road functional classification in the study area:

- Rural Major Collector: US 2, VT 100B
- Rural Minor Collector: River Road
- Rural Local Road: Church Street, Gallagher Road

## 2.6 UTILITIES

The following utilities were identified within the study area:

- Overhead power, telephone and cable
- Underground storm drainage with drop inlets and catch basins
- Shared residential sewage disposal system for two homes on north side of US 2-VT 100B intersection to access leach field at southeast corner of intersection.

## 2.7 DRAINAGE

There is a closed drainage system which begins at two catch basins located on both sides of US 2 immediately north of Church Street. The system collects stormwater via drop inlets along US 2 and drains down US 2 past VT 100B to an outflow at the Winooski River approximately 300 feet east of the US 2-VT 100B intersection.

The conceptual designs proposed include additional curbing along US 2 and VT 100B to accommodate the new sidewalks. The new curbing would necessitate extension of the existing stormwater drainage system north along US 2 to the crest of the hill south of the Depot. A new closed system with catch basins would be needed from this crest north along US 2 to drain into the intermittent stream located to the south of Camp Meade. A second closed system with catch basins would be required to run from Camp Meade south along US 2 to drain into the same stream. A third



closed system with catch basins would be needed along VT 100B to run from the Country Store south to drain into the Winooski River.

## 2.8 RIGHT OF WAY

Based on 2000 VTTrans plans for the re-alignment of VT 100B and new Winooski River bridge, the state right-of-way width along US 2 is 3 rods or 49.5 feet. The state right-of-way width along VT 100B is nearly 190 feet wide at US 2, then tapers back to approximately 60 feet at the northern Winooski River bridge abutment, then widens again to approximately 120 feet across the bridge.

Although the conceptual design recommendations remain within the state right-of-way, it is recommended that a temporary construction easement of 5-20 feet on parcels fronting on the proposed sidewalk is pursued to minimize potential construction-related conflicts.

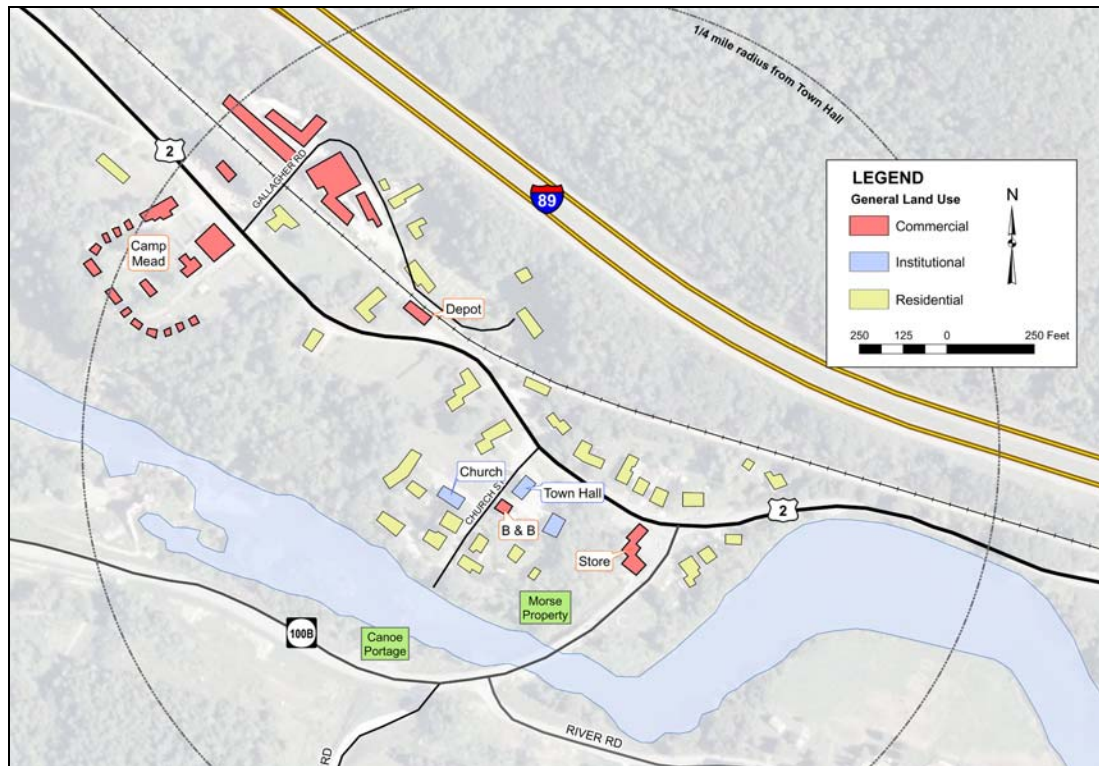
## 2.9 GENERALIZED VILLAGE LAND USES AND PEDESTRIAN TRIP DESTINATIONS

Figure 5 below shows a map of generalized land uses and major pedestrian trip destinations within the study area. Land uses were generalized as either commercial, institutional, or residential. The pedestrian trip destinations are labeled on the map. The circle surrounding the village shows that a number of homes and destinations are located within a ¼ mile radius (approximately 5 minute walk) of Town Hall. Pedestrian destinations within the identified radius include the Camp Meade Diner, the Church and Bed and Breakfast on Church Street, Town Hall, and the Country Store.





Figure 5: Generalized Village Land Uses and Pedestrian Trip Destinations



### 3.0 ENVIRONMENTAL AND CULTURAL RESOURCES

The study area was examined for potential environmental, natural, and cultural resource impacts based on site assessments and existing GIS resource coverages. This preliminary resource assessment should be revisited once preliminary and final designs are developed.

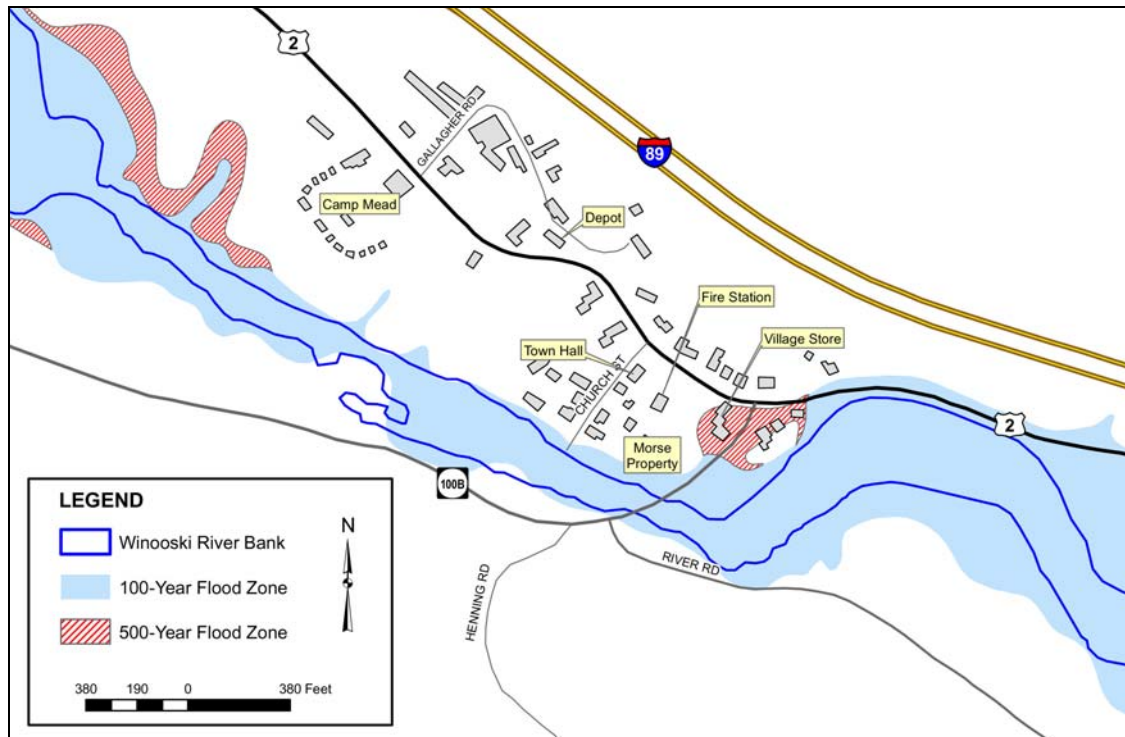
#### 3.1 FLOOD ZONES

Figure 6 below shows areas of the study area identified by the Federal Emergency Management Agency (FEMA) as 100-year and 500-year flood zones. The 100-Year Flood Zone is an area inundated by a 100-year flood event. Similarly, the 500-Year Flood Zone is an area inundated by a 500-year flood event or an area inundated by a 100-year flood event with average depths of less than 1 foot or with drainage areas less than 1 square mile. The land adjacent to the US 2-VT 100B intersection is located in the 500-year flood zone. The land to the east of this intersection is identified as part of the 100-year flood zone.

As the flood zone delineations are dated 1996, it is unclear whether the boundaries account for the new terrain resulting from the re-alignment of VT 100B and the new bridge over the Winooski River.



Figure 6: FEMA-Designated Flood Zones Adjacent to Study Area



### 3.2 ARCHEOLOGICAL RESOURCES

An Archeological Resources Assessment (ARA) conducted by the University of Vermont Consulting Archaeology Program in the Fall of 2005 determined that the potential impacts from this project will have *no effect on significant cultural resources*. The project area received a score of -32 based on the variables in the “Environmental Predictive Model for Locating Precontact Archaeological Sites” methodology. A score of +32 or higher typically indicates an archaeologically sensitive area. Disturbances caused by the 1927 flood, the construction of US 2, and the construction of the new VT 100B bridge have likely removed any remnants of archaeologically significant artifacts from within the study area.

### 3.3 HISTORIC RESOURCES

The VTans historic preservation specialist identified potential impacts on historic resources within the project’s area of potential effect. The project area travels through the Middlesex Historic District which is included in the State of Vermont Historic Sites and Structures Survey. To avoid adverse impacts on historic resources, work should attempt to remain within the state Right-of-Way. Detailed project plans showing existing Right-of-Way lines will be needed for final Section 106 review and Section 4(f) evaluation.



### 3.4 HAZARDOUS WASTE SITES

The Vermont Agency of Natural Resource's hazardous waste site inventory includes two locations within the study area as shown in the table below. As both locations fall within the area impacted by the relocation of the US 2-VT 100B intersection, it is likely that any necessary site remediation was taken care of at that time.

**Table 1: Identified Hazardous Waste Sites in the Study Area**

Site Name	Status
Middlesex Country Store	Low Priority: Contamination to soils or groundwater but no effect on receptors
Middlesex Service Center	Site Management Activity Completed 1998

### 3.5 OTHER ENVIRONMENTAL CONDITIONS

- Deer Wintering Areas: None identified in study area
- Rare, Threatened or Endangered Species: None identified in study area
- Wetlands: No wetlands were identified within or adjacent to the study area. Based on the Vermont Significant Wetlands Inventory, the closest identified wetlands are located ½ mile southeast of the US 2/VT 100B intersection.
- Prime Agricultural Soils: Nearly the entire study area has been classified as being of Statewide importance for the production of food, feed, fiber, forage, and oilseed crops, according to the Natural Resources Conservation Service database.

### 4.0 COST ESTIMATES

Order of magnitude cost estimates were developed for each of the alignments. It is important to note that these cost estimates are preliminary and should be used for planning purposes only. Once a final design is developed, the cost estimates should be revisited and revised based on a more precise understanding of quantities and materials.

Costs for sidewalk and curbing are based on the 2006 *VTrans Report on Shared Use Path and Sidewalk Unit Costs*. Unit costs for other elements (signage, striping, landscaping, drainage, etc.) are based on a manual survey of recent contractor bid prices received by VTrans.

The preliminary cost estimates for each section are presented in the next section.

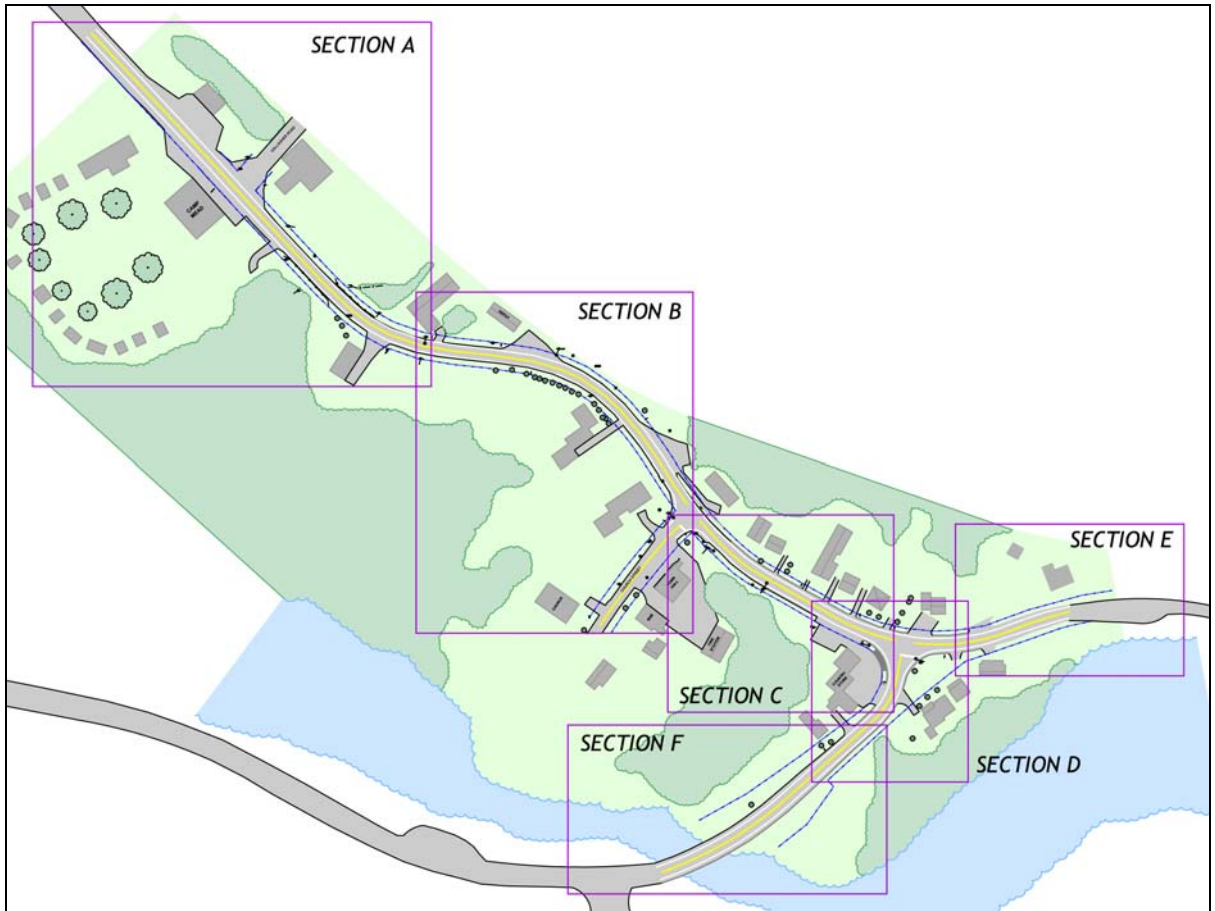
### 5.0 ALTERNATIVES EVALUATION

This section provides a comprehensive evaluation of the various alternatives proposed for each of the six sections shown below in Figure 7. The alternatives evaluation includes an overview of the



proposed section elements, potential impacts, cost estimates, potential permitting issues, and advantages/disadvantages for each section.

**Figure 7: Sections Used for Evaluation**



**5.1 SECTION A**

Section A encompasses the segment of US 2 from north of Camp Meade to north of the Depot. The conceptual designs include a defined gateway with a splitter island, narrowed shoulders, and a gateway sign located outside the state right-of-way, narrowed and defined access points at Camp Meade, the old gas station, and Gallagher Road, concrete sidewalks and granite curbing from Camp Meade to the Depot, and new drop inlets and storm drains on either side of the stream. Once the traffic calming elements are in place, a new VTtrans speed study should be conducted to determine whether re-posting the speed limit at 30 miles per hour through the village is appropriate.

The major difference between the alternatives is how the sidewalks cross the stream and ravine south of Camp Meade. Alternative 1 includes an expansion of the box culvert and filling north of US 2 for the sidewalk crossing. Approximately 530 cubic yards of fill would be needed to provide sufficient width for the sidewalk and a 2:1 slope down to the stream. Alternative 2 includes a new pedestrian footbridge (approximately 100 foot span) across the ravine south of US 2.

Public comment received at the Alternatives Public Meeting indicated that since the sidewalk extension through this segment is a long-term plan, they would like to keep both options open and make a final decision once the implementation of the sidewalks becomes feasible.

In the short term, the residents and Selectboard would like to investigate the possibility of replacing the guardrails over the stream with a lower profile guardrail to provide additional shoulder width for pedestrians and bicyclists.

**5.1.1 Preliminary Cost Estimates**

The preliminary cost estimates below include costs associated with final design, construction, construction inspection, municipal project management, and a 10% contingency.

**Alternative 1: Culvert Extension**

Element	Quantity	Units	Cost/Unit	Subtotal
Concrete Sidewalk & Granite Curb	610	I.f.	\$140	\$85,400
Crosswalk Striping	2	each	\$200	\$400
Sign and Pole	8	each	\$200	\$1,600
Lengthen Box Culvert	8	ft.	\$500	\$4,000
Fill	533	cu. yd.	\$15	\$8,000
Granite Curb for Islands	450	I.f.	\$53	\$23,850
Gateway Sign	1	each	\$1,500	\$1,500
Excavation	1615	cubic yard	\$20	\$32,304
Underdrain	890	lf	\$30	\$26,700
Drop inlet	8	each	\$1,000	\$8,000
				Construction: \$191,754
				Engineering: \$38,351
				Inspection: \$19,175
				Municipal Project Management: \$23,010
				Contingency: \$19,175
				<b>TOTAL: \$291,466</b>

**Alternative 2: Pedestrian Bridge**

Element	Quantity	Units	Cost/Unit	Subtotal
Concrete Sidewalk & Granite Curb	580	I.f.	\$140	\$81,200
Crosswalk Striping	2	each	\$200	\$400
Sign and Pole	8	each	\$200	\$1,600
Pedestrian Bridge (100' span)	1	each	\$100,000	\$100,000
Granite Curb for Islands	450	I.f.	\$53	\$23,850
Gateway Sign	1	each	\$1,500	\$1,500
Excavation	1615	cubic yard	\$20	\$32,304
Underdrain	890	lf	\$30	\$26,700
Drop inlet	8	each	\$1,000	\$8,000
				Construction: \$275,554
				Engineering: \$55,111
				Inspection: \$27,555
				Municipal Project Management: \$33,066
				Contingency: \$27,555
				<b>TOTAL: \$418,842</b>



**5.1.2 Evaluation Matrix**

The evaluation matrix below details costs, potential impacts, local and regional issues, and potential permits required for the “Do Nothing” alternative and the two identified Build alternatives.

		Do Nothing	Alternative 1 Culvert Extension	Alternative 2 Pedestrian Bridge
COST (order of magnitude)	Cost Estimate <small>(final design, construction, inspection, contingency)</small>	\$0	\$290,000	\$420,000
	Annual Town Maintenance Costs <small>(surface repair, plow, striping, signs, sweeping, etc.)</small>	\$0	\$9,000	\$13,000
ENGINEERING	Traffic Safety	No Change	Improve	Improve
	Alignment Change	No	No	No
	Bicycle/Pedestrian Access	No Change	Improve	Improve
	Hydraulic Performance	No Change	Additional impervious surface	Additional impervious surface
IMPACTS	Agricultural Lands	No	Possible	Possible
	Archaeological	No	No	No
	Historic Structures/Sites	No	No	No
	Floodplain	No	No	No
	Fish and Wildlife	No	No	No
	Rare, Threatened & Endangered Species	No	No	No
	Public Lands	No	No	No
	Noise	No	No	No
LOCAL & REGIONAL ISSUES	Wetlands	No	No	No
	Community Character	No Change	Improve	Improve
	Economic Impacts	No Change	Improve	Improve
	Conformance to Regional Transportation Plan	No	Yes	Yes
PERMITS	Act 250	No	No	No
	401 Water Quality	No	No	No
	404 Corps of Engineers Permit	No	No	No
	Stream Alteration	No	Possible	Possible
	Conditional Use Determination	No	No	No
	Storm Water Discharge	No	No	No
	Shoreland Encroachment	No	No	No
	Endangered & Threatened Species	No	No	No
	State Historic Preservation Office Clearance	No	No	No
	NEPA Category	N/A	Categorical Exclusion	Categorical Exclusion

**5.1.3 Advantages & Disadvantages**

	Alternative 1	Alternative 2
Advantages	Traffic Calming	Traffic Calming
	Enhanced Pedestrian Mobility	Enhanced Pedestrian Mobility
	Enhanced Village Character	Enhanced Village Character
Disadvantages	Cost for Culvert Extension	Cost for Pedestrian Bridge
	Maintenance Costs	Maintenance Costs



## 5.2 SECTION B

Section B encompasses the segment of US 2 from north of the Depot to Church Street. Only one alternative has been developed for this segment which includes a concrete sidewalk with granite curbing along the south side of US 2 between the Depot and Town Hall, crosswalks at the Depot (if necessary) and at Church Street, parking stall striping at Town Hall, a reduced curve radius on the north side of Church Street at US 2, and an expansion of the existing storm drainage system up to the hill crest at the Depot. The Depot enhancements shown in the plans are conceptual and should be refined once the use of the building becomes clear.

Along the south side of US 2 from the Depot south approximately 250 feet is a relatively steep berm with white pine trees set approximately 10-15 feet off of the edge of pavement. Based on public input, the conceptual design brings the sidewalk down along the edge of pavement with a retaining wall cut into the berm to avoid cutting any of the trees. The preliminary cost estimate below includes replacement costs for 14 trees, should the trees be damaged during construction or by the retaining wall.

### 5.2.1 Preliminary Cost Estimate

The preliminary cost estimates below include costs associated with final design, construction, construction inspection, municipal project management, and a 10% contingency. The cost estimate does not include any costs associated with the Depot enhancements shown in the plans.

Element	Quantity	Units	Cost/Unit	Subtotal
Concrete Sidewalk & Granite Curb	770	l.f.	\$140	\$107,800
Crosswalk Striping	4	each	\$200	\$800
Sign & pole	2	each	\$200	\$400
Retaining Wall	250	l.f.	\$80	\$20,000
Maple/Oak Tree (6" or larger)	14	each	\$500	\$7,000
Excavation	544	cubic yard	\$20	\$10,889
Underdrain	300	lf	\$30	\$9,000
Drop inlet	2	each	\$1,000	\$2,000
			Construction:	\$157,889
			Engineering:	\$31,578
			Inspection:	\$15,789
			Municipal Project Management:	\$18,947
			Contingency:	\$15,789
			<b>TOTAL:</b>	<b>\$239,991</b>



**5.2.2 Evaluation Matrix**

The evaluation matrix below details costs, potential impacts, local and regional issues, and potential permits required for the “Do Nothing” alternative and the identified Build alternative.

	Do Nothing	Alternative 1	
<b>COST</b> (order of magnitude)	Cost Estimate* <small>(final design, construction, inspection, contingency)</small>	\$0	\$240,000
	Annual Town Maintenance Costs <small>(surface repair, plow, striping, signs, sweeping, etc.)</small>	\$0	\$7,000
<b>ENGINEERING</b>	Traffic Safety	No Change	Improve
	Alignment Change	No	No
	Bicycle/Pedestrian Access	No Change	Improve
	Hydraulic Performance	No Change	Additional impervious surface
<b>IMPACTS</b>	Agricultural Lands	No	Possible
	Archaeological	No	No
	Historic Structures/Sites	No	No
	Floodplain	No	No
	Fish and Wildlife	No	No
	Rare, Threatened & Endangered Species	No	No
	Public Lands	No	No
	Noise	No	No
<b>LOCAL &amp; REGIONAL ISSUES</b>	Wetlands	No	No
	Community Character	No Change	Improve
<b>PERMITS</b>	Economic Impacts	No Change	Improve
	Conformance to Regional Transportation Plan	No	Yes
	Act 250	No	No
<b>PERMITS</b>	401 Water Quality	No	No
	404 Corps of Engineers Permit	No	No
	Stream Alteration	No	No
	Conditional Use Determination	No	No
	Storm Water Discharge	No	No
	Shoreland Encroachment	No	No
	Endangered & Threatened Species	No	No
	State Historic Preservation Office Clearance	No	No
	NEPA Category	N/A	Categorical Exclusion

\* Does not include cost for Depot enhancements

**5.2.3 Advantages & Disadvantages**

	Alternative 1
Advantages	Traffic Calming Improvements to Depot Defined Town Hall Parking Enhanced Pedestrian Mobility Enhanced Village Character
Disadvantages	Construction Costs Maintenance Costs





### 5.3 SECTION C

Section C encompasses the segment of US 2 Church Street to VT 100B and includes the Country Store. The conceptual design includes a new concrete sidewalk with granite curbing along the south side of US 2 between Town Hall and the Country Store, a narrowed access off of US 2 to the Country Store, a bus pull-off and shelter, a raised and textured speed table in the Country Store access drive to discourage cut-through traffic, and new pedestal lights along the length of the section.

The conceptual design shows a new tourist information center located on the Town-owned parcel between the Country Store and Town Hall. The idea for this facility grew out of planning efforts for the VT 100B scenic byway corridor which identified this as a good location. However, the Town of Middlesex is currently conducting a municipal facilities assessment to identify potential locations for a new fire station and Town Hall. As this assessment may identify the same parcel for these facilities, the design shown on the conceptual plans should be revisited once the municipal facilities assessment has been completed.

The sidewalk segment between the Country Store and the Town Hall has been identified by the Steering Committee and the residents as the highest priority recommendation. The residents would like to see the sidewalk move forward, even though the plans for the town parcel between the Country Store and Town Hall have not been finalized.

#### 5.3.1 Preliminary Cost Estimate

The preliminary cost estimates below include costs associated with final design, construction, construction inspection, municipal project management, and a 10% contingency. The cost estimate does not include any costs associated with the tourist information center shown in the plans.

Element	Quantity	Units	Cost/Unit	Subtotal
Concrete Sidewalk & Granite Curb	830	l.f.	\$140	\$116,200
Crosswalk Striping	2	each	\$200	\$400
Sign and Pole	2	each	\$200	\$400
Bus Shelter	2	each	\$1,000	\$2,000
Pedestal Lights	10	each	\$2,300	\$23,000
Speed Table	1	each	\$2,000	\$2,000
Expanded Store Parking	1	each	\$10,000	\$10,000
Granite Curbing to Define Parking	135	l.f.	\$53	\$7,155
Relocate Drop Inlet	1	each	\$2,000	\$2,000
			Construction:	\$163,155
			Engineering:	\$32,631
			Inspection:	\$16,316
			Municipal Project Management:	\$19,579
			Contingency:	\$16,316
			<b>TOTAL:</b>	<b>\$247,996</b>



**5.3.2 Evaluation Matrix**

The evaluation matrix below details costs, potential impacts, local and regional issues, and potential permits required for the “Do Nothing” alternative and the identified Build alternative.

	Do Nothing	Alternative 1	
<b>COST</b> (order of magnitude)	Cost Estimate* <small>(final design, construction, inspection, contingency)</small>	\$0	\$250,000
	Annual Town Maintenance Costs <small>(surface repair, plow, striping, signs, sweeping, etc.)</small>	\$0	\$8,000
<b>ENGINEERING</b>	Traffic Safety	No Change	Improve
	Alignment Change	No	No
	Bicycle/Pedestrian Access	No Change	Improve
	Hydraulic Performance	No Change	Additional impervious surface
<b>IMPACTS</b>	Agricultural Lands	No	Possible
	Archaeological	No	No
	Historic Structures/Sites	No	No
	Floodplain	No	500-Year Zone
	Fish and Wildlife	No	No
	Rare, Threatened & Endangered Species	No	No
	Public Lands	No	No
	Noise	No	No
<b>LOCAL &amp; REGIONAL ISSUES</b>	Wetlands	No	No
	Community Character	No Change	Improve
	Economic Impacts	No Change	Improve
<b>PERMITS</b>	Conformance to Regional Transportation Plan	No	Yes
	Act 250	No	No
	401 Water Quality	No	No
	404 Corps of Engineers Permit	No	No
	Stream Alteration	No	No
	Conditional Use Determination	No	No
	Storm Water Discharge	No	No
	Shoreland Encroachment	No	No
	Endangered & Threatened Species	No	No
	State Historic Preservation Office Clearance	No	No
NEPA Category	N/A	Categorical Exclusion	

\* Does not include cost for Tourist Information Center enhancements

**5.3.3 Advantages & Disadvantages**

Advantages	Improve Country Store access & parking Enhanced pedestrian mobility Enhanced village character Enhanced transit access New tourist center
Disadvantages	Additional curb cut for tourist center Construction costs Maintenance costs



**5.4 SECTION D**

Section D focuses on the US 2-VT 100B intersection. Alternative 1 keeps the existing traffic control (stop on VT 100B approach) with a raised median at the VT 100B approach and new signs to warn northbound drivers of the approaching stop-controlled intersection. Alternative 2 reconfigures the intersection as a roundabout with 1 105 foot inscribed diameter, a one-lane 20 foot circulating roadway, 5 foot truck apron, and 27.5 foot radius raised center island. Alternative 3 replaces the existing control with an all-way stop control. Based on the most recent VTrans traffic count (2004), the volumes at the intersection do not meet the MUTCD warrants for an all-way stop. However, this count data is based on May volumes. It is conceivable that volumes during the busier fall tourist and winter ski seasons may meet the warrants.

Public input at the Alternative Public Meeting indicated that the all-way stop control was the preferred alternative as it would also serve to slow traffic through the village. Some meeting participants thought that the roundabout will create a definitive gateway in the village and will help to slow traffic. Others felt it was too large for the location and the village would be giving up important green space for a larger transportation facility.

**5.4.1 Preliminary Cost Estimates**

The preliminary cost estimates below include costs associated with final design, construction, construction inspection, municipal project management, and a 10% contingency for the roundabout alternative. The cost estimates for the two stop-controlled alternatives show only construction costs, since they are relatively minor improvements and may be able to be implemented by VTrans District maintenance crews.

**ALTERNATIVE 1: Existing Control**

Element	Quantity	Units	Cost/Unit	Subtotal
Granite Curb for Islands	90	l.f.	\$53	\$4,770
Sign & Pole	3	each	\$200	\$600
			<b>TOTAL:</b>	<b>\$5,370</b>

**ALTERNATIVE 2: Roundabout**

Element	Quantity	Units	Cost/Unit	Subtotal
105' Roundabout	1	each	\$150,000	\$150,000
			Construction:	\$150,000
			Engineering:	\$30,000
			Inspection:	\$15,000
			Municipal Project Management:	\$18,000
			Contingency:	\$15,000
			<b>TOTAL:</b>	<b>\$228,000</b>

**ALTERNATIVE 3: All-Way Stop**

Element	Quantity	Units	Cost/Unit	Subtotal
Granite Curb for Islands	90	l.f.	\$53	\$4,770
Stop Bar Striping	2	each	\$500	1000
Sign & Pole	3	each	\$200	\$600
			<b>TOTAL:</b>	<b>\$6,370</b>



**5.4.2 Evaluation Matrix**

The evaluation matrix below details costs, potential impacts, local and regional issues, and potential permits required for the “Do Nothing” alternative and the identified Build alternative.

	Do Nothing	Alternative 1 Existing Control	Alternative 2 Roundabout	Alternative 3 All-Way Stop	
<b>COST</b> (order of magnitude)	Cost Estimate (final design, construction, inspection, contingency)	\$0	\$5,000	\$228,000	\$6,000
	Annual Town Maintenance Costs (surface repair, plow, striping, signs, sweeping, etc.)	\$0	\$200	\$6,800	\$200
<b>ENGINEERING</b>	Traffic Safety	No Change	Improve	Improve	Improve
	Alignment Change	No	No	No	No
	Bicycle/Pedestrian Access	No Change	No Change	No Change	Improve
	Hydraulic Performance	No Change	No Change	No Change	No Change
<b>IMPACTS</b>	Agricultural Lands	No	Possible	Possible	Possible
	Archaeological	No	No	No	No
	Historic Structures/Sites	No	No	No	No
	Floodplain	No	500-Year Zone	500-Year Zone	500-Year Zone
	Fish and Wildlife	No	No	No	No
	Rare, Threatened & Endangered Species	No	No	No	No
	Public Lands	No	No	No	No
	Noise	No	No	No	No
<b>LOCAL &amp; REGIONAL ISSUES</b>	Wetlands	No	No	No	No
	Community Character	No Change	Improve	Improve	Improve
	Economic Impacts	No Change	Improve	Improve	Improve
	Conformance to Regional Transportation Plan	No	Yes	Yes	Yes
<b>PERMITS</b>	Act 250	No	No	No	No
	401 Water Quality	No	No	No	No
	404 Corps of Engineers Permit	No	No	No	No
	Stream Alteration	No	No	No	No
	Conditional Use Determination	No	No	No	No
	Storm Water Discharge	No	No	No	No
	Shoreland Encroachment	No	No	No	No
	Endangered & Threatened Species	No	No	No	No
	State Historic Preservation Office Clearance	No	No	No	No
	NEPA Category	N/A	Categorical Exclusion	Categorical Exclusion	Categorical Exclusion

**5.4.3 Level of Service**

Table 2 below shows the Level of Service (LOS) and average delay for each approach under 2025 design hour conditions. The Vermont State Design Standards call for intersections designed in villages to operate at LOS C or better. The northbound movement with existing traffic control and the eastbound movement with all-way stop control operate under this threshold under 2025 design hour conditions.

**Table 2: 2025 Design Hour Level of Service and Average Delay**

	Existing Traffic Control		Roundabout		All-Way Stop	
	LOS	Avg. Delay	LOS	Avg. Delay	LOS	Avg. Delay
Northbound VT 100B	<b>F</b>	<b>76 seconds</b>	B	12 seconds	C	20 seconds
Eastbound US 2	A	0 seconds	A	8 seconds	<b>D</b>	<b>32 seconds</b>
Westbound US 2	A	4 seconds	B	11 seconds	C	15 seconds



**5.5 SECTION E**

Section E encompasses the eastern gateway to the Village along US 2. The recommendations developed for this section include a defined gateway with a splitter island, narrowed shoulders, and a gateway sign located outside the state right-of-way. Once the traffic calming elements are in place, a new VTrans speed study should be conducted to determine whether re-posting the speed limit at 30 miles per hour through the village is appropriate.

**5.5.1 Preliminary Cost Estimate**

The preliminary cost estimates below show only construction costs, since they are relatively minor improvements and may be able to be implemented by VTrans District maintenance crews.

Element	Quantity	Units	Cost/Unit	Subtotal
Gateway Sign	1	each	\$1,500	\$1,500
Granite Curb for Island	75	l.f.	\$53	\$3,975
Sign and Pole	2	each	\$200	\$400
Striping	1	each	\$500	\$500
				<b>\$6,375</b>

**5.5.2 Evaluation Matrix**

The evaluation matrix below details costs, potential impacts, local and regional issues, and potential permits required for the “Do Nothing” alternative and the identified Build alternative.

	Do Nothing	Alternative 1	
COST (order of magnitude)	Cost Estimate <small>(final design, construction, inspection, contingency)</small>	\$0	\$6,000
	Annual Town Maintenance Costs <small>(surface repair, plow, striping, signs, sweeping, etc.)</small>	\$0	\$200
ENGINEERING	Traffic Safety	No Change	Improve
	Alignment Change	No	No
	Bicycle/Pedestrian Access	No Change	No Change
	Hydraulic Performance	No Change	No Change
IMPACTS	Agricultural Lands	No	Possible
	Archaeological	No	No
	Historic Structures/Sites	No	No
	Floodplain	No	Yes
	Fish and Wildlife	No	No
	Rare, Threatened & Endangered Species	No	No
	Public Lands	No	No
	Noise	No	No
	Wetlands	No	No
LOCAL & REGIONAL ISSUES	Community Character	No Change	Improve
	Economic Impacts	No Change	Improve
	Conformance to Regional Transportation Plan	No	Yes
PERMITS	Act 250	No	No
	401 Water Quality	No	No
	404 Corps of Engineers Permit	No	No
	Stream Alteration	No	No
	Conditional Use Determination	No	No
	Storm Water Discharge	No	No
	Shoreland Encroachment	No	No
	Endangered & Threatened Species	No	No
	State Historic Preservation Office Clearance	No	No
	NEPA Category	N/A	Categorical Exclusion



## 5.6 SECTION F

Section F encompasses the southern gateway to the Village along VT 100B from River Road to US 2. The recommendations developed for this section include a defined gateway with a splitter island, narrowed shoulders, and a gateway sign located outside the state right-of-way, a concrete sidewalk and granite curb along the western side of VT 100B from the Country Store across the bridge to the canoe portage, and new pedestal lights along the sidewalk and across the Winooski River bridge.

Once the traffic calming elements are in place, a new VTtrans speed study should be conducted to determine whether re-posting the speed limit at 30 miles per hour through the village is appropriate.

### 5.6.1 Preliminary Cost Estimate

The preliminary cost estimates below include costs associated with final design, construction, construction inspection, municipal project management, and a 10% contingency.

Element	Quantity	Units	Cost/Unit	Subtotal
Concrete Sidewalk & Granite Curb	850	l.f.	\$140	\$119,000
Sign and Pole	2	each	\$200	\$400
Pedestal Lights	12	each	\$2,300	\$27,600
Granite Curb for Island	100	l.f.	\$53	\$5,300
Gateway Sign	1	each	\$1,500	\$1,500
Excavation	544	cubic yard	\$20	\$10,880
Underdrain	300	lf	\$30	\$9,000
Drop inlet	4	each	\$1,000	\$4,000
			Construction:	\$177,680
			Engineering:	\$35,536
			Inspection:	\$17,768
			Municipal Project Management:	\$21,322
			Contingency:	\$17,768
			<b>TOTAL:</b>	<b>\$270,074</b>



**5.6.2 Evaluation Matrix**

The evaluation matrix below details costs, potential impacts, local and regional issues, and potential permits required for the “Do Nothing” alternative and the identified Build alternative.

	Do Nothing	Alternative 1	
<b>COST</b> (order of magnitude)	Cost Estimate <small>(final design, construction, inspection, contingency)</small>	\$0	\$270,000
	Annual Town Maintenance Costs <small>(surface repair, plow, striping, signs, sweeping, etc.)</small>	\$0	\$8,000
<b>ENGINEERING</b>	Traffic Safety	No Change	Improve
	Alignment Change	No	No
	Bicycle/Pedestrian Access	No Change	Improve
	Hydraulic Performance	No Change	Additional impervious surface
<b>IMPACTS</b>	Agricultural Lands	No	Possible
	Archaeological	No	No
	Historic Structures/Sites	No	No
	Floodplain	No	Possible
	Fish and Wildlife	No	No
	Rare, Threatened & Endangered Species	No	No
	Public Lands	No	No
	Noise	No	No
	Wetlands	No	No
<b>LOCAL &amp; REGIONAL ISSUES</b>	Community Character	No Change	Improve
	Economic Impacts	No Change	Improve
	Conformance to Regional Transportation Plan	No	Yes
<b>PERMITS</b>	Act 250	No	No
	401 Water Quality	No	No
	404 Corps of Engineers Permit	No	No
	Stream Alteration	No	No
	Conditional Use Determination	No	No
	Storm Water Discharge	No	No
	Shoreland Encroachment	No	No
	Endangered & Threatened Species	No	No
	State Historic Preservation Office Clearance	No	No
	NEPA Category	N/A	Categorical Exclusion

**5.6.3 Advantages & Disadvantages**

	Alternative 1
Advantages	Traffic Calming Enhanced Village Character Enhanced Pedestrian Mobility Defined Village Gateway
Disadvantages	Construction Cost Maintenance Costs



## 6.0 RECOMMENDATIONS & IMPLEMENTATION

Based on input received from the project Steering Committee, VTrans, the Central Vermont Regional Planning Commission, and from village residents and business owners at two public meetings, the identified improvements have been prioritized into short-term (0-3 years), mid-term (3-5 years), and long-term (5+ years) groups. This section summarizes the elements in each phase and discusses timelines and opportunities for implementation. Each of the elements recommended below is identified on the conceptual design plan included with this report.

### 6.1 SHORT-TERM RECOMMENDATIONS

The identified short-term improvements include the following:

- Construct a new 5-foot concrete sidewalk with granite curbing along south side of US 2 from VT 100B Country Store Entrance to Town Hall with all related drainage, minor landscaping, and signs. (500 linear feet)
- Install ten new pedestal lights adjacent to the new sidewalk.
- Construct gateway enhancements at the three main village entrances to include splitter islands, new advanced speed warning signs, gateway signs, and narrowed shoulders. The VTrans District Transportation Coordinator has reviewed and approved the splitter island plans and is willing to see how they function with maintenance operations.
- Stripe seven parking spaces in front of Town Hall in coordination with the new sidewalk.
- Construct a new northbound splitter island and new safety signage at VT 100B-US 2 intersection
- Construct a raised, textured speed table and parking capacity enhancements at the Country Store. Town officials, VTrans officials, and store owner should work closely on the implementation of these recommendations as the results will benefit both village residents and store patrons.
- Replace the existing south-side guardrail with box beam guardrail across the box culvert south of Camp Meade to widen the shoulder and create safer conditions for pedestrians and cyclists.

Once the traffic calming elements are in place, a new VTrans speed study should be conducted to determine whether traffic speeds have reduced to warrant a re-posting of the speed limit to 30 miles per hour through the village.

Table 3 below shows preliminary cost estimates for the identified short term recommendations. The unit costs are based on the VTrans Bicycle and Pedestrian Program Unit Cost Database and the





VTrans Average Bid Price Listing. Estimates are also shown for final design (engineering), municipal project management, construction inspection, contingencies, and right-of-way easements.

**Table 3: Short Term Recommendations - Preliminary Cost Estimate**

Element	Quantity	Units	Cost/Unit	Subtotal
<b>Sidewalk from Country Store to Town Hall with Pedestrian Amenities</b>				
Concrete Sidewalk & Granite Curb	500	l.f.	\$140	\$70,000
Crosswalk Striping	75	ft	\$20	\$1,500
Pedestal Lights	10	each	\$2,300	\$23,000
Bus Shelter	2	each	\$1,000	\$2,000
Relocate Drop Inlet	1	each	\$2,000	\$2,000
<b>Gateway Enhancements at Three Village Entrances</b>				
Granite Curbing for Splitter Island	225	l.f.	\$25	\$5,625
Concrete for Splitter Island	18	s.y.	\$45	\$800
Re-Stripe Lanes	1500	l.f.	\$0.2	\$300
Signs & Posts	12	each	\$200	\$2,400
Gateway Sign	3	each	\$3,000	\$9,000
<b>Stripe Town Hall Parking</b>				
Stripe 7 parking spaces (10' x 20')	223	l.f.	\$0.2	\$45
<b>VT 100B-US2 Enhancements</b>				
Granite Curbing for Splitter Island	100	l.f.	\$25	\$2,500
Concrete for Splitter Island	6	s.y.	\$45	\$267
Signs & Posts	3	each	\$200	\$600
Restriping	250	l.f.	\$0.2	\$50
<b>Raised &amp; Textured Speed Table &amp; Parking Enhancements at Country Store</b>				
Speed Table	1	each	\$2,000	\$2,000
Sub Base Gravel	14	c.y.	\$28	\$392
Bituminous Concrete	350	s.y.	\$15	\$5,250
Granite Curbing to Define Parking	135	l.f.	\$53	\$7,155
<b>Replace Southern Guardrail over Box Culvert South of Camp Meade</b>				
Box Beam Guardrail	130	lf	\$72	\$9,316
			Construction:	\$144,199
			Engineering:	\$28,840
			Municipal Project Management:	\$14,420
			Construction Inspection:	\$21,630
			Contingencies:	\$14,420
			Right-of-Way:	\$10,000
			<b>TOTAL:</b>	<b>\$234,000</b>

The new sidewalk and certain elements of the gateway improvements are eligible for funding under the Transportation Enhancements (TE) program. We recommend that the Town submit a letter of intent to VTrans in May 2006 and a full TE application by August 2006 to pursue funding for final design and construction of these facilities. Assuming the proposal is approved for funding in January 2007, construction could be scheduled for as early as late summer 2007 or spring 2008. The Transportation Enhancements program requires a 20% local match which would need to be approved at Town Meeting in March 2007.



A number of the other short-term recommendations which involve maintenance on state facilities (restriping, new/relocated signs, guardrail replacement) can be funded directly through the VTrans Maintenance District force accounts.

## 6.2 MID-TERM RECOMMENDATIONS

The identified mid-term improvements include the following:

- Construct new 5 foot concrete sidewalk with granite curbing from Town Hall to Camp Meade with all related drainage improvements, new crosswalks, utility relocations, stream crossing elements, and new signs. The exact alignment of this sidewalk will be determined once additional infill development is identified for the Depot and old gas station (Gallagher Road) site. A conceptual sidewalk alignment as well as conceptual layouts for the Depot and gas station parcels are included in the enclosed plans.
- Construct a new 5 foot concrete sidewalk with granite curbing along the west side of VT 100B from the Country Store to the canoe portage with all related drainage improvements, utility relocations, and new signs. A conceptual sidewalk alignment is shown in the enclosed plans.
- Install new pedestal lights adjacent to the new sidewalks.

Due to the variability of the mid-term recommendations (timeframe for infill development, exact sidewalk alignments, public support), a more detailed cost estimate or implementation plan was not developed. A more comprehensive study of the mid-term elements should be conducted as warranted.

## 6.3 LONG-TERM RECOMMENDATIONS

The identified long-term recommendations include the following:

- Construct a tourist information center and related parking and sidewalk features adjacent to the Country Store. The Town of Middlesex is currently examining municipal facilities needs and the parcel identified on the conceptual plans for the tourist information center is also under consideration for a relocated town hall. Pending the outcome of these needs analysis, the town should pursue funding for a tourist information center to service the large percentage of tourist traffic heading towards attractions in the Mad River Valley. This tourist information center also has the potential to provide additional downtown parking (if needed), serve as a transit depot, and provide increased parking capacity for the Country Store. Preliminary estimates for construction of the tourist center are about \$10,000.

