

**WEST CHARLOTTE VILLAGE TRAFFIC STUDY**

Draft

November 29, 1995

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Chittenden County Regional Planning Commission

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## **Executive Summary**

This report has been prepared by the Chittenden County Regional Planning Commission staff at the request of the Town of Charlotte Planning Commission. Its purpose is to analyze the roads and intersections in the Town of Charlotte's West Village. The intersection of US 7, Ferry Road and Church Hill Road and the intersection of Ferry Road and Greenbush Road are analyzed under 1995 and 2000 AM and PM Peak hour volumes. In addition, the Town of Charlotte provided a list of expected development in the area between US 7 and Lake Champlain. The traffic generated by this development was applied to the intersection in 1995 and 2000 and the subsequent impact analyzed.

The report concludes that both intersections and roadways in the study area will operate satisfactorily in 1995 and 2000 with and without the development. All scenarios included growth in the Charlotte to Essex, NY ferry ridership based on historical trends provided by the Lake Champlain Transportation Company. Beyond the ferry's impact, assumptions were made regarding the size and nature of the new development. Thus, the ultimate impact of any new development must be reevaluated when more detailed information becomes available.

The report recommends that pavement markings be applied to Ferry Road's east approach to Greenbush Road. The pavement marking will help distinguish the roadway from the shoulder/sidewalk area adjacent to the store on the northeast corner of the intersection.

The report also recommends that transportation issues be addressed as the Town develops a long term master plan for the West Village.

## **I. Study Area and Purpose**

The study provides an analysis of how the West Charlotte village highway system operates in 1995 and how well it will perform in 2000, assuming historical growth trends continue. Additionally, the study quantifies the impact of expected development in the area of Charlotte between US 7 and Lake Champlain. With the exception of the Charlotte to Essex Ferry, this study makes assumptions regarding the size and nature of development which has yet to be formally submitted for approval.

The purpose of analyzing the new development is not to approve or reject expected projects. Rather, the report is a planning tool that provides a benchmark for the Town as well as a comfort level on the system's ability to handle some growth above and beyond historical annual increases.

The study area, shown on the map in Appendix A, focuses on the core village area and contains two key intersections. The intersection of US 7, Ferry Road and Church Hill Road is controlled by a traffic signal while the intersection of Ferry Road and Greenbush Road is controlled by stop signs on all approaches supplemented by a stop sign beacon suspended over its center. In 1992, the traffic signal and turning lanes were added to the US 7, Ferry Road and Church Hill Road intersection to address safety and operational deficiencies. US 7 is a principal statewide arterial primarily serving through traffic. Ferry Road, a town highway, is classified as a minor collector and serves as the link to the Charlotte to Essex, New York ferry. Greenbush is also a town highway and serves as a local collector.

The study area contains a mix of land uses including town offices, a post office, a fire station, a general store, light industrial uses, a campground and several single family homes. In accordance with the Town Plan vision calling for growth to be focused in village centers, the land in the study area is zoned commercial, village and industrial (Refer to the 1995 Zoning Ordinance Map in Appendix A). All these zoning categories will allow for continued mixed use development in the village and will produce and attract vehicle trips.

## **II. Methodology**

A list of potential and approved residential and commercial projects was provided by the Town of Charlotte Planning and Zoning office. In general, these projects are located between Lake Champlain and US 7. The AM and PM peak hour traffic generation was estimated for these projects, distributed along the highway network and added into the intersections. The operation of the intersections was then analyzed in accordance with the procedures of the 1995 Highway Capacity Manual with and without the new projects for the years 1995 and 2000. These scenarios are described below in Table 1 on the following page.

Scenario	Year	Description	Condition
1	1995	No Build	Existing traffic.
2	1995	Build	Existing traffic plus traffic generated from new development.
3	2000	No Build	Background growth.
4	2000	Build	Background growth plus traffic generated from new development.

Table 1. Scenarios

### III. Base Conditions

#### 1995 AM and PM peak hour volumes

1995 AM and PM peak hour volumes are based on intersection turning movement counts and week long automatic traffic recorder counts taken by Chittenden County Regional Planning Commission (CCRPC) staff in early November 1995. CCRPC counts were supplemented by Vermont Agency of Transportation (VAOT) count stations on US 7, Greenbush and Ferry roads. These counts were adjusted for seasonal variations based on the year long continuous VAOT count station located on US 7 south of Ferry Road. In locations where a 1995 count was not available, the AADTs were grown from the last date available to 1995.

#### Year 2000 No Build Condition

Year 2000 No Build traffic numbers were projected from 1995 counts based on the average annual growth in average annual daily traffic (AADT) for the roads in the study area as presented in Table 2.

Station	Road	Location	Average Annual Growth	Years
D293	Ferry Road	Greenbush to Lake Rd	5.3%	1980 to 1991
D371	Greenbush	South of Ferry Road	6.8%	1983 to 1991
D368	Greenbush	North of Lake Road	8.4%	1983 to 1987
D386	Church Hill	Just east of US 7	4.3%	1977 to 1991
D132	US 7	Thompson's Pt, Rd to Ferry Rod	2.3%	1977 to 1994
D131	US 7	Ferry Road to Lake Rd	2.3%	1977 to 1992

Table 2. Average Annual Traffic Growth around West Charlotte Village

Figure 1 on the following page shows 1995 and 2000 AADTs for the roads in the study area.

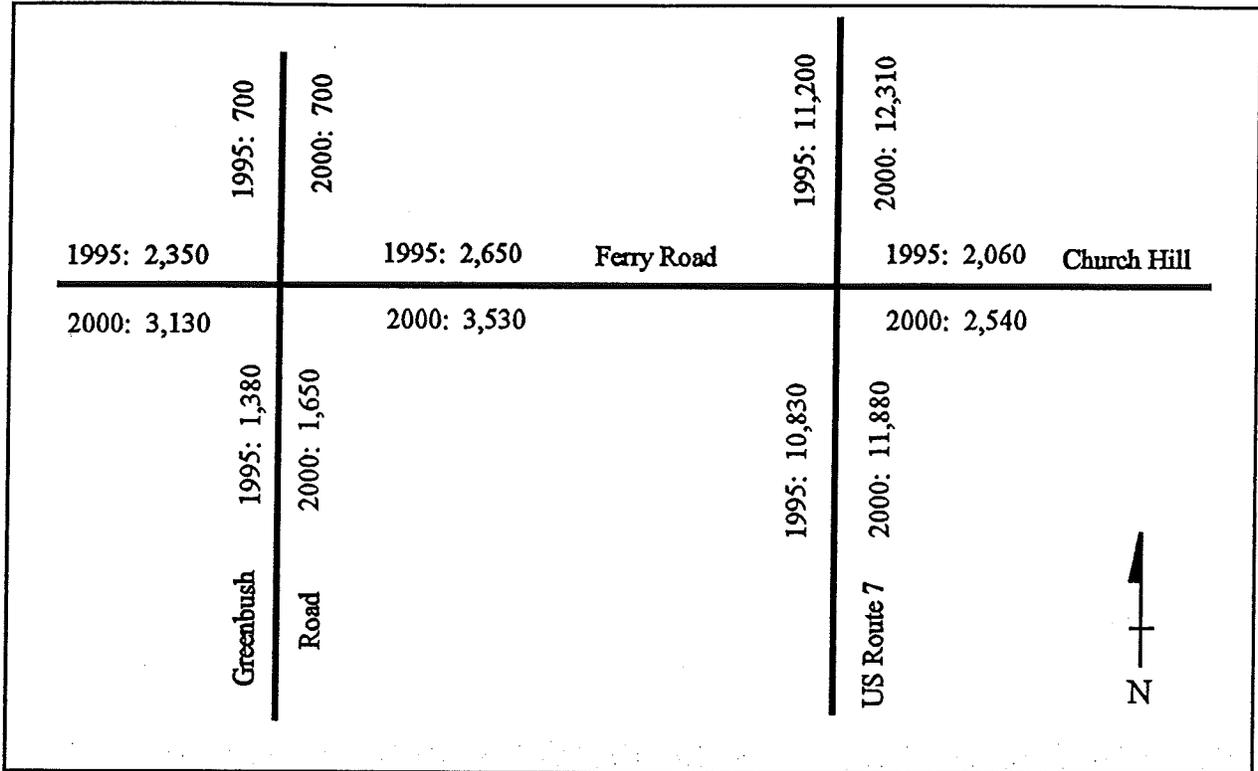


Figure 1  
1995 and 2000 Average Annual Daily Traffic

These AADT were then converted to AM and PM peak hour turning movement volumes based on the relationship between 1995 AADT and actual AM and PM peak hour volumes. This relationship was determined using CCRPC's November turning movement counts adjusted for seasonal variations. The turning movements for all scenarios are presented in Appendix B.

#### IV. Impact of New Development

##### Trip Generation from Expected Development

The number of vehicle trips generated by proposed development is generally estimated by multiplying a trip generation rate by some measure (square feet, employment, acreage) of the development size. The Town of Charlotte Planning and Zoning department prepared the following list of expected and pending development proposals. The location of these proposals is identified on the map in Appendix C. Because all proposals have not been formally submitted, assumptions have been made. In particular, Table 3 assumes that the bank, convenience market and health center will have 2,000 square feet of leasable area each. This number was chosen because it appears consistent with the

scale of existing development. In most cases below, the trip generation rates were taken from the Institute of Transportation Engineer's (ITE) *Trip Generation, 5th. Edition. Trip Generation, 5th. Edition* does not contain rates for train stations. Thus a rate of one vehicle trips per boarding was assumed. Refer to Appendix C for a detailed list of the trip generation rates used.

Map Reference Number *	Description	Quantity	AM Peak Hour Trips	PM Peak Hour Trips
1	Library	2700 sf	3	13
2	Elderly Housing (Attached)	100 units	8	6
2	Health Center	10 employees	5	11
2	Convenience Market	2000 sf	11	24
2	Drive in Bank	2000 sf	21	87
3	Train Station	38 boardings	38	38
6	3 Lot Subdivision	3 single family units	4	5
7	14 Lot Subdivision	14 single family units	15	18
8	16 Lot Subdivision	16 single family units	16	21
9	Carpenter Farm	4 single family units	5	6
10	Fischer Subdivision	8 single family units	9	11
Totals			135	240

Table 3. Trip Generation

\* See Appendix C

Not included in Table 3 are the vehicle trips generated by the Charlotte\Essex Ferry. For 1995 scenarios it is not necessary to perform a trip generation calculation for the ferry because its vehicle trips are already included in the ground counts. Ferry Road is the only access to the Charlotte\Essex Ferry. Traffic on Ferry Road has grown an average of 5.3% per year between 1980 and 1991. Not surprisingly, the number of annual riders on the Charlotte\Essex Ferry has grown 5.2% per year between 1982 and 1994. Year 2000 background growth for Ferry Road was computed by growing the numbers 5.3% per year (See Appendix D for the Charlotte\Essex Ferry Ridership). Since traffic volumes on Ferry Road depend so heavily on the ferry traffic, it is reasonable to assume the 5.3% per year growth includes increasing ferry use.

In addition to trips generated by new development, the Town of Charlotte was also concerned with the impact of seasonal homes and businesses. An estimate of the trip generation of these seasonal locations was made and is contained in Appendix C for information. These land uses generate approximately 78 AM peak hour trips and 71 PM peak hour trips. Because these are existing establishments and homes, and the 1995 AM and PM peak hour no build volumes have been adjusted for seasonal variations, these trips are already accounted for.

Distribute new trips on road and at intersections

The trips generated in the AM and PM peak hour were distributed along the highway network and converted to turning movements at the two study intersections. Trips were distributed in proportion to the directional split at the AM and PM peak periods of the exiting highway system. Table 4 shows that approximately 47 to 60% of these new trips pass through the two study intersections. Figure 2 shows how the trips generated have been distributed at the two study intersections.

Intersection	AM Peak Total Trips = 135		PM Peak Total Trips = 240	
	Passing Thru Intersection	% of Total At Intersection	Passing Thru Intersection	% of Total At Intersection
Ferry Road\Greenbush Road	80	60%	135	56%
US 7 & Ferry Road	64	47%	141	59%

Table 4. Allocation of new Trips

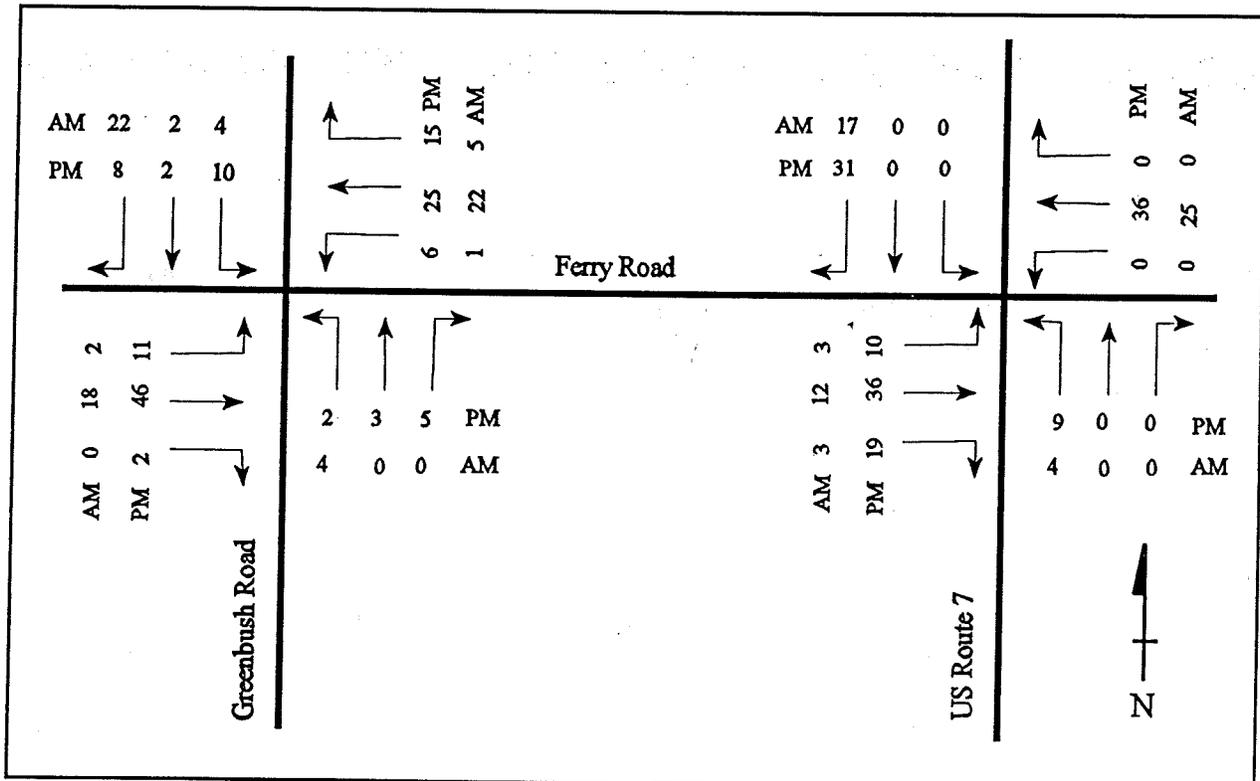


Figure 2  
Distribution of Development Trips at Intersections

The following tables summarize the increase in AM and PM peak hour traffic volume due to the expected development. Because the Ferry Road & Greenbush Road intersection serves a smaller volume of traffic, the percent increase is fairly large as indicated below. The relative increase in peak hour traffic volume at the US 7 & Ferry Road intersection, on the other hand, never exceeds 10%. Table 5 also indicates that for the Ferry and Greenbush roads intersection, the AM peak has a higher volume than the PM peak. Appendix E shows how traffic on Ferry Road varies throughout the day.

Year	AM Peak Hour			PM Peak Hour		
	No Build	Build	% Inc.	No Build	Build	% Inc.
1995	408	488	20.0%	375	510	36.0%
2000	541	621	15.0%	484	619	28.0%

Table 5  
Traffic Volumes at the Ferry Road & Greenbush Road Intersection

Year	AM Peak Hour			PM Peak Hour		
	No Build	Build	% Inc.	No Build	Build	% Inc.
1995	998	1062	6.4%	1426	1567	10.0%
2000	1149	1213	6.0%	1609	1750	9.0%

Table 6  
Traffic Volumes at the US 7 & Ferry Road Intersection

### V. Intersection Operational Analysis

Level of Service (LOS) is the standard measure used to quantify the operational performance of highway facilities. The letters A, B, C, D, E and F are the five possible LOS ratings. Similar to school report cards, an LOS of "A" indicates that the facility is operating exceptionally well, while an LOS of F indicates that the facility is failing. There is almost universal agreement that the levels of service A, B and C are acceptable and that an LOS of F is not. Because Level of Service ratings attempt to measure how well a facility is operating as *perceived by the driver*, there is considerable debate about the acceptability of LOS D. On rural highway facilities, where speeds are often higher and drivers expect a higher level of mobility, LOS D may not be acceptable. In urban areas, on the other hand, where drivers expect and are accustomed to greater delays, an LOS of D is often considered acceptable and often widespread. In some instances, levels of service of E may be acceptable in urban areas.

Level of Service for both signalized and unsignalized intersections is measured in terms of average stop delay per vehicle. Table 7 below presents the relationship between LOS and average stopped delay. As indicated below, the Highway Capacity Manual (HCM) has lower delay thresholds for unsignalized intersections. The HCM rationalizes this difference by pointing out that drivers at signalized intersections are able to relax during red cycles while at unsignalized intersections, drivers must stay alert and be ready to move when gaps in opposing traffic are large enough. Furthermore, unsignalized intersections are smaller volume facilities and drivers therefor expect less delay. And finally, there is greater variability in delay encountered at unsignalized intersections compared to pre-timed signals.

Unsignalized	LOS	Signalized
<5.0	A	≤ 5.0
> 5.0 and ≤ 10.0	B	> 5.0 and ≤ 5.0
> 10.0 and ≤ 20.0	C	> 15.0 and ≤ 25.0
> 20.0 and ≤ 30.0	D	> 25.0 and ≤ 40.0
> 30.0 and ≤ 45.0	E	> 40.0 and ≤ 60.0
> 45.0	F	> 60.0

Table 7  
LOS Criteria for Intersections  
Average Stopped Delay\Vehicle (seconds)<sup>1</sup>

The following tables summarize the results of the operational analysis on the US 7 & Ferry Road and Ferry Road & Greenbush Road intersections. The tables include level of service rating, the average stop delay and the volume to capacity ratings for the entire intersection and for each approach. It is necessary to review each approach as well as the average intersection. In some cases, the average may mask failures at individual approaches. The volume to capacity ratio, although not directly related to level of service, also provides additional insight into the ability of a particular approach to handle the volume.

The tables show that for all scenarios, the average level of service for each of the study intersections is A or B. Most of the individual approaches operate at A or B as well with an occasional LOS C. As described above, LOS A, B and C is considered acceptable.

<sup>1</sup>Tables 9-1 and 10-3. *Highway Capacity Manual, Special Report 209, Third Edition.* Transportation Research Board; National Research Council; Washington D.C.; 1994.

Tables 10 and 11 also present estimated maximum queue length for the west approach to the Ferry Road and US 7 intersection. The Town was concerned that vehicles backing up at the intersection would block a planned exit for the proposed library located approximately 550 feet west of US 7. The maximum estimated queue length for any of the scenarios is 156 feet and will therefore not block the library's proposed exit.

Scenario PM Peak	Average Intersection	Approaches			
		North	East	South	West
1995 No Build	A	A	A	A	A
	2.6	1.4	2.1	4.2	2.7
	0.22	0.09	0.2	0.38	0.26
1995 Build	A	A	A	B	A
	3.6	1.8	2.9	5.2	4.1
	0.31	0.16	0.28	0.43	0.37
2000 No Build	A	A	A	B	A
	3.3	1.5	2.6	5.1	3.5
	0.27	0.11	0.25	0.43	0.33
2000 Build	A	A	A	B	A
	4.5	2.0	3.5	6.4	5.2
	0.36	0.18	0.33	0.49	0.44

LOS  
Delay  
VC

Table 8. PM Peak Hour Level of Service  
Ferry Road and Greenbush Road Intersection

Scenario AM Peak	Average Intersection	Approaches			
		North	East	South	West
1995 No Build	A	A	A	A	A
	2.2	1.6	1.7	2.1	2.6
	0.24	0.16	0.18	0.25	0.32
1995 Build	A	A	A	A	A
	2.5	2.2	1.9	2.2	3
	0.22	0.21	0.18	0.2	0.29
2000 No Build	B	A	A	C	A
	6.0	0.8	2.2	14.7	4.7
	0.31	0.15	0.21	0.71	0.40
2000 Build	A	A	A	A	A
	4.4	2.4	2.6	2.4	2.6
	0.34	0.23	0.25	0.23	0.25

LOS  
Delay  
VC

Table 9. PM Peak Hour Level of Service  
Ferry Road and Greenbush Road Intersection

Scenario PM Peak	Average Intersection	Approaches				LOS Delay VC Queue (ft)
		North	East	South	West	
1995 No Build	B 8.2 0.53	B 7.2 0.63	B 14.8 0.58	A 4.7 0.35	B 13.6 0.47 97	
1995 Build	B 9.7 0.58	B 9.2 0.67	B 13.5 0.59	B 6.1 0.41	B 14 0.6 135	
2000 No Build	B 9.7 0.60	B 8.3 0.68	C 16.4 0.67	B 5.2 0.41	C 16.4 0.64 126	
2000 Build	B 12 0.66	B 12.8 0.75	B 13.3 0.64	B 7.3 0.49	C 16.1 0.71 156	

Table 10 PM Peak Hour Level of Service  
US 7 and Ferry Road

Scenario AM Peak	Average Intersection	Approaches				LOS Delay VC Queue
		North	East	South	West	
1995 No Build	B 8 0.34	B 7.7 0.40	B 9.6 0.39	B 6.7 0.22	B 9.3 0.35 114	
1995 Build	B 8.4 0.36	B 8.5 0.41	B 9.1 0.42	B 7.5 0.25	B 8.7 0.37 119	
2000 No Build	B 8.7 0.4	B 9.2 0.46	B 9 0.46	B 8 0.27	B 8.8 0.43 114	
2000 Build	B 9 0.42	B 9.9 0.47	B 8.7 0.48	B 8.6 0.31	B 8.4 0.45 143	

Table 11 AM Peak Hour Level of Service  
US 7 and Ferry Road

## VI. Roadway Segment Analysis

The HCM determines level of service for different types of road segments based on design speed, actual speed, peak hour volume and road capacity in vehicles per hour. As an approximation to these procedures, this report has computed volume to capacity ratios at the peak hour based on a road capacity calculated at LOS C. These capacities are contained in the Chittenden County Transportation Model. The HCM has more rigorous methods for determining capacity based on road geometry, grade, shoulder width and other site specific factors. The method here tends to underestimate the actual capacity of the road segments and is therefore a conservative estimate to actual operating conditions.

The following Table summarizes 1995 and 2000 volume to capacity ratios for the road segments in the study area. For US 7, a principal arterial, the capacity at level of service of C is 1,000 vehicles per hour per lane. For Greenbush and Ferry Roads, classified as local roads, the capacity at level of service C is 500 vehicles per hour per lane. With capacity computed at level of service C, a volume to capacity ratio equal to 1.00 indicates that the road segment is operating at LOS C. The table below shows that the volume to capacity ratios are all significantly less than 1.00. Thus, the road segments in the study area are operating at acceptable level of service.

Road	Location	1995			2000		
		AADT	Peak Hour	% LOS C Capacity	AADT	Peak Hour	% LOS C Capacity
Ferry Road	US 7 to Greenbush	2,650	281	28%	3,530	374	37%
Ferry Road	Greenbush to Lake	2,350	249	25%	3,130	332	33%
Greenbush	Thompson's Point to Ferry Road	1,380	146	15%	1,650	175	17%
Greenbush	Ferry to CVRR	1,790	190	19%	2,050	217	22%
Church Hill	East of US 7	2,060	218	22%	2,540	269	27%
US 7	South of Ferry Road	10,830	1,148	57%	11,880	1,259	63%
US 7	North of Ferry Road	11,200	1,187	40%	12,310	1,305	43%

Table 12  
Roadway Capacity Analysis

## VII. Safety

The Vermont Agency of Transportation maintains a list of crashes that occur on federal, state and local roads. There have been a total of 6 crashes in 1992, 1993 and 1994 at the intersection of US 7 and Ferry Road since the intersection was reconstructed in 1992. There have been no reported crashes at the intersection of Ferry and Greenbush Roads. VAOT ranks intersections and road segments by calculating the ratio of the actual accident rate to a critical accident rate for a particular road segment or intersection. The actual accident rate is based on the number of crashes per year

divided by the amount of daily traffic using the facility. The critical rate is the average accident rate for a specific category of highway in the state. Intersections and road segments are identified as high accident locations (HALs) when the actual to critical rate exceeds 1.0 for intersections and 2.0 for road segments. Based on the number of crashes since 1992, there are no high accident locations in the study area.

Despite the fact that no crashes have been reported at the intersection of Ferry and Greenbush road, there is potential for a conflict between pedestrians and vehicles. The store on the northeast corner of the intersection has a porch and steps that appear to drop customers into the roadway. There does appear to be enough room for a shoulder or sidewalk and an 11 foot wide road. A quick review of this location suggests that pavement markings would help delineate the line between the travel way and the shoulder/sidewalk. This marking would help keep pedestrians and motorists aware.

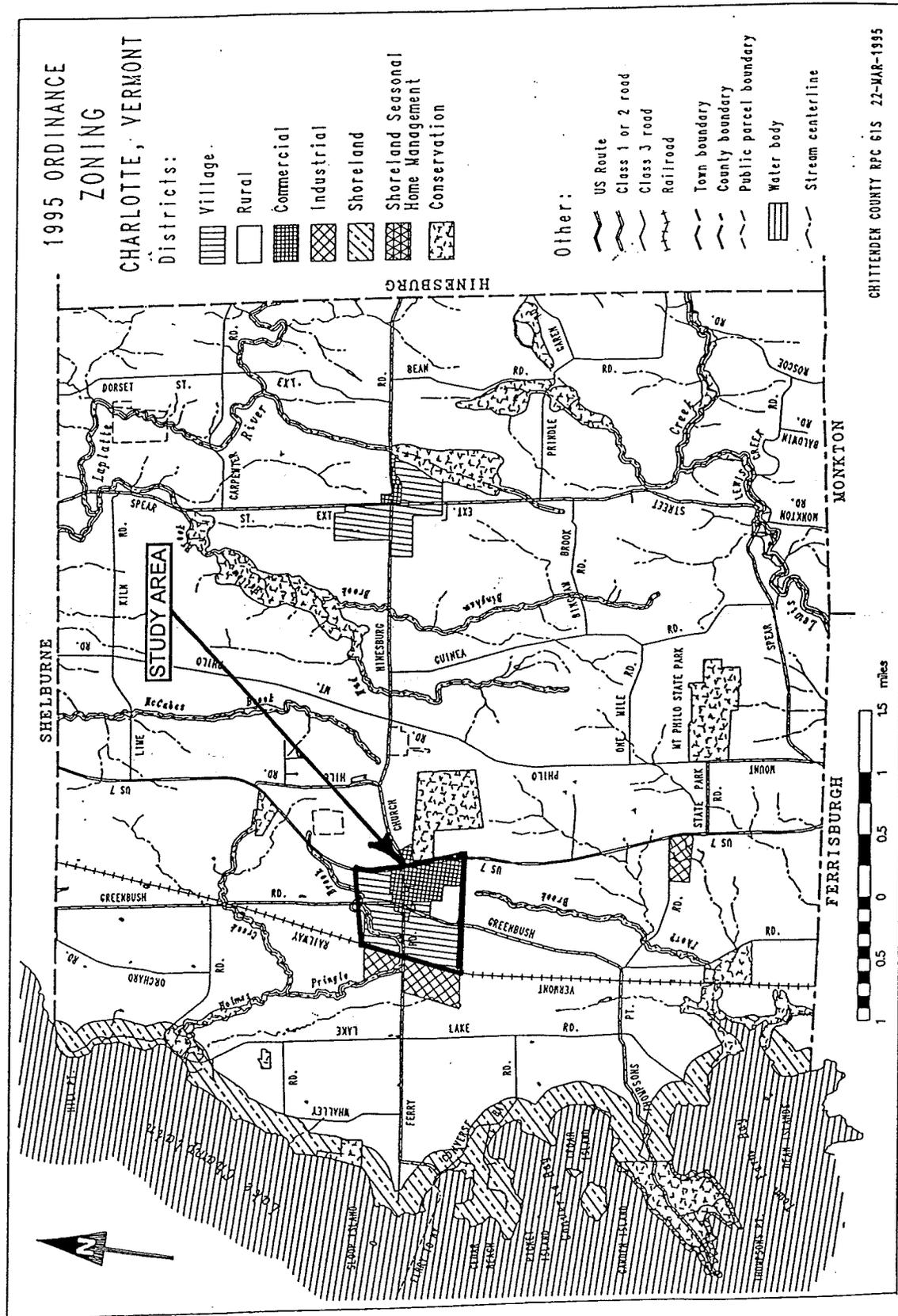
### **VIII. Recommendations and Conclusion**

Based on the operational and safety analysis above, the two intersections and roadways in the study area will operate satisfactorily in 1995 and 2000 under historical growth trends which include growth in the Charlotte to Essex, NY ferry. The roads and intersections are operating at high levels of service (LOS of A, B and C) and are thus able to absorb the impact of additional development without significant decreases in performance. Since this report depends on assumptions made regarding the size and nature of the new development, the ultimate impact, however, should be analyzed on a case by case basis as more detailed information becomes available.

The only recommended action at this time is pavement markings at the east Ferry Road approach to Greenbush Road. These pavement markings will help to distinguish the roadway from the shoulder and sidewalk adjacent to the store.

Because the Town of Charlotte has designated the study area as a growth center, a longer term transportation system analysis should be undertaken. The Town is currently starting the development of a master plan for the West Village. Transportation issues related to pedestrian and bicycle facilities, parking, public transit and truck routes should be addressed as part of the master plan. A transportation strategy should be developed that supports the master plan.

APPENDIX A



CHITTENDEN COUNTY RPC 61S 22-MAR-1995

### APPENDIX B

PM PEAK HOUR TURNING MOVEMENTS

Ferry Road & Grenbush

	North	East	South	West
L	13	25	5	23
T	14	106	14	76
R	3	8	48	40
	375	30	139	67

1995 PM Peak

Ferry Road & Grenbush

	North	East	South	West
L	14	30	6	27
T	15	141	12	107
R	6	13	62	51
	484	35	184	80

2000 PM Peak

Ferry Road & Grenbush

	North	East	South	West
L	10	6	2	11
T	2	25	3	46
R	8	15	5	2
	135	20	46	10

PM Peak Hour Impact of Proposed Development

Ferry Road & Grenbush

	North	East	South	West
L	23	31	7	34
T	16	131	17	122
R	11	23	53	42
	510	50	185	77

1995 with New Development

Ferry Road & Grenbush

	North	East	South	West
L	24	36	8	38
T	17	166	15	153
R	14	28	67	53
	619	55	230	90

2000 PM Peak with New Development

US 7 & Ferry Road

	North	East	South	West
L	5	27	72	110
T	644	17	276	1
R	64	126	60	24
	1426	713	170	408

1995 PM Peak

US 7 & Ferry Road

	North	East	South	West
L	5	37	94	138
T	689	28	282	2
R	82	142	71	39
	1609	776	207	447

2000 PM Peak

US 7 & Ferry Road

	North	East	South	West
L	0	0	9	10
T	0	36	0	36
R	31	0	0	19
	141	31	36	9

PM Peak Hour Impact of Proposed Development

US 7 & Ferry Road

	North	East	South	West
L	5	27	81	120
T	644	53	276	37
R	95	126	60	43
	1567	744	206	417

1995 PM Peak with New Development

US 7 & Ferry Road

	North	East	South	West
L	5	37	103	148
T	689	64	282	38
R	113	142	71	58
	1750	807	243	456

2000 PM Peak with New Development

AM PEAK HOUR TURNING MOVEMENTS

Ferry Road & Grenbush

	North	East	South	West
L	2	7	10	20
T	7	95	9	114
R	34	1	64	45
	408	43	103	83

1995 November AM Peak

Ferry Road & Grenbush

	North	East	South	West
L	39	11	12	23
T	9	126	12	154
R	3	1	90	61
	541	51	138	114

2000 AM Peak

Ferry Road & Grenbush

	North	East	South	West
L	4	1	4	2
T	2	22	0	18
R	22	5	0	0
	80	28	28	4

AM Peak Impact of Proposed Development

Ferry Road & Grenbush

	North	East	South	West
L	6	8	14	22
T	9	117	9	132
R	56	6	64	45
	488	71	131	87

1995 AM with New Development

Ferry Road & Grenbush

	North	East	South	West
L	43	12	16	25
T	11	148	12	172
R	25	6	90	61
	621	79	166	118

2000 AM with New Development

US 7 & Ferry Road

	North	East	South	West
L	1	88	7	54
T	251	60	337	82
R	48	16	4	50
	998	300	164	348

1995 November AM Peak

US 7 & Ferry Road

	North	East	South	West
L	1	100	10	75
T	265	84	362	105
R	62	18	4	63
	1149	328	202	376

2000 AM Peak

US 7 & Ferry Road

	North	East	South	West
L	0	0	4	3
T	0	25	0	12
R	17	0	0	3
	64	17	25	4

AM Peak Impact of Proposed Development

US 7 & Ferry Road

	North	East	South	West
L	1	88	11	57
T	251	85	337	94
R	65	16	4	53
	1062	317	189	352

1995 AM with New Development

US 7 & Ferry Road

	North	East	South	West
L	1	100	14	78
T	265	109	362	117
R	79	18	4	66
	1213	345	227	380

2000 AM with New Development

APPENDIX C

Trip Generation Estimates for Expected Development

* Ref #	ITE LU Code	Description	Quantity	Units	AM			AM Trips			PM			PM Trips			Remarks
					Trip Gen	% In	%out	IN	Out	Trip Gen	% In	%out	IN	Out			
1	590	Library	2.7	1000 sf	0.99	83%	17%	2	1	4.74	48%	52%	6	7			
2	253	Eldery Housing (Attached)	100	dus	0.08	62%	38%	5	3	0.06	50%	50%	3	3	Based on small sample only		
2	720	Health Center	10	employee	0.54	77%	23%	4	1	1.14	35%	65%	4	7	10 employees = approx 2000 sf		
2	852	Convenience Market	2	1000 sf	formula	50%	50%	5	5	formula	49%	51%	12	12	Assumed 2000 sf store		
2	912	Drive In Bank	2	1000 sf	formula	56%	44%	12	9	43.63	48%	52%	42	45	Assumed 2000 sf drive up		
3	na	Train Station	38		1	90%	10%	34	4	1	10%	90%	4	34	Per RSG ridership estimates		
6	210	3 Lot Subdivision	3	sfd	formula	26%	74%	1	3	formula	65%	35%	3	2			
7	210	14 Lot Subdivision	14	sfd	formula	26%	74%	4	11	formula	65%	35%	12	6			
8	210	16 Lot Subdivision	16	sfd	formula	26%	74%	4	12	formula	65%	35%	13	7			
9	210	Carpenter Farm	4	sfd	formula	26%	74%	1	4	formula	65%	35%	4	2			
10	210	Fischer Subdivision	8	sfd	formula	26%	74%	2	7	formula	65%	35%	7	4			
					Total AM Trip Generation				135	Total AM Trip Generation			240				

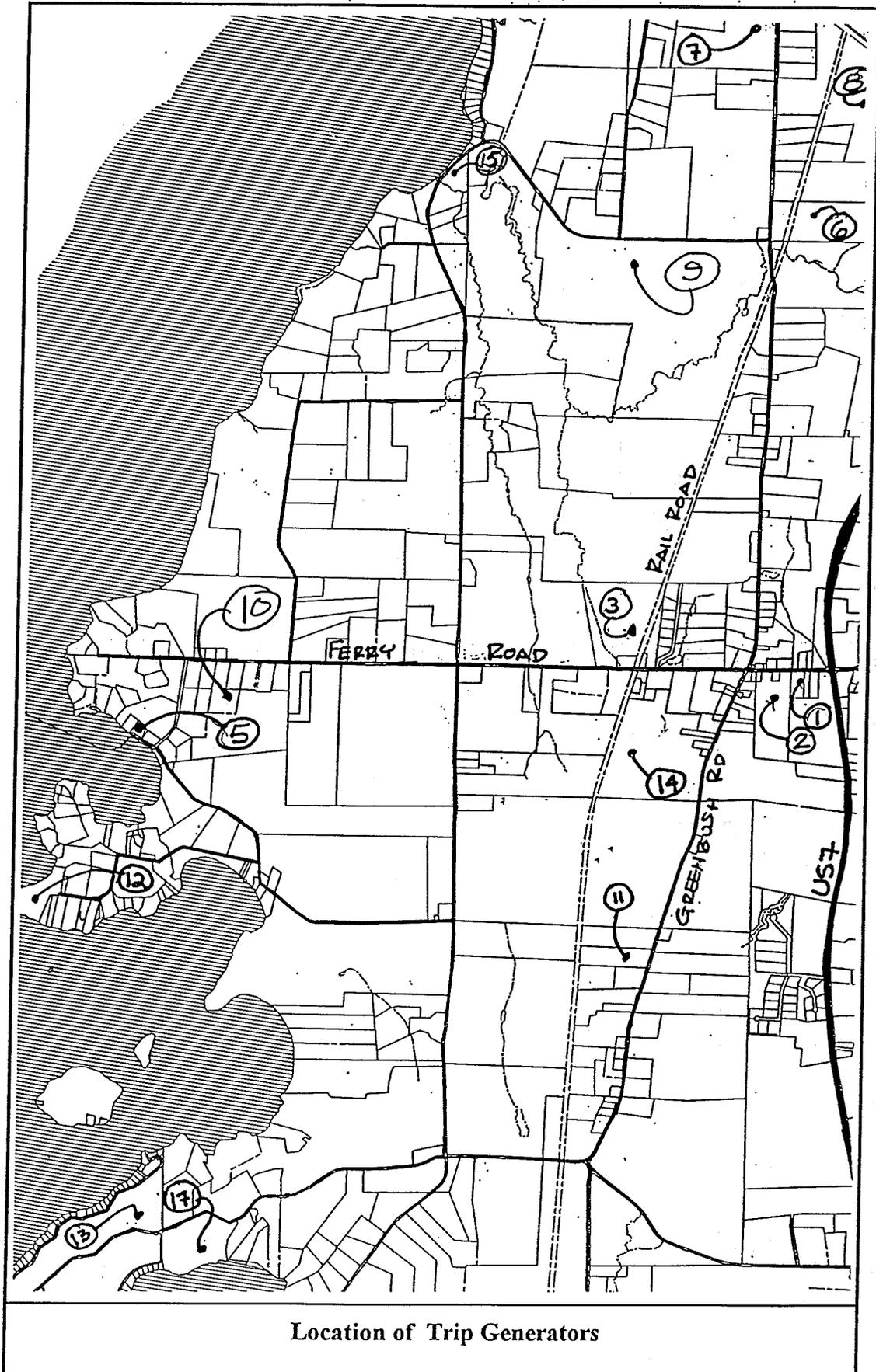
Note: Ferry Trip Generation Estimates included in growth factors for Ferry Road

Seasonal Trip Generators

* Ref #	ITE LU Code	Description	Quantity	Units	AM			AM Trips			PM			PM Trips			Remarks
					Trip Gen	% In	%out	IN	Out	Trip Gen	% In	%out	IN	Out			
11		Peikley's Blueberries	10	parking s				5	5				5	5	Assumed		
12		Cedar Beach Summer Cam	20	sfdus	0.16	67%	33%	2	1	0.26	41%	59%	2	3			
13	260	Thompson's Point Seasonal	116	sfd	0.16	67%	33%	12	6	0.26	41%	59%	12	18			
14	416	Old Lantern Campground	50	acres	0			5	5				5	5	Assumed		
15	415	Town Beach and Recreation	20	acres	0.12	59%	41%	1	1	0.19	34%	66%	1	3			
16		Apple Orchards	10	parking s				5	5				5	5	Assumed		
17	420	Point Bay Marina	299	berths	0.08	33%	67%	8	16	0.19	60%	40%	1	1			
					Total AM Trip Generation				78	Total PM Trip Generation			71				

\* See Map on Next Page for Locations

APPENDIX C



Location of Trip Generators

**APPENDIX D**

Charlotte to Essex NY Ferry Vehicle Count

Year	Vehicles / Year
1982	56,181
1983	66,939
1984	68,219
1985	72,571
1986	82,924
1987	92,947
1988	99,454
1989	106,347
1990	107,800
1991	111,159
1992	111,312
1993	101,750
1994	103,043

Average Annual Growth 5.2%  
1982 to 1994

Source: Lake Champlain Transportation Company

### APPENDIX E Hourly Variations Along Ferry Road November 1995

