



Downtown Bristol Traffic Study

Final Report Completed:
February 10, 2003

Prepared for the



Prepared by:



Lamoureux & Dickinson Consulting Engineers, Inc.
14 Morse Drive
Essex Junction, VT 05452
Tel: 802-878-4450 Fax: 802-878-3135
E-mail: mail@ldceinc.com

TABLE OF CONTENTS

INTRODUCTION	1
STUDY AREA	1
AREAS OF CONCERN	1
EXISTING CONDITIONS INVENTORY	5
<i>EXISTING ROADWAY CONDITIONS</i>	<i>5</i>
<i>Functional Classification</i>	<i>5</i>
<i>Horizontal Alignment</i>	<i>5</i>
<i>Terrain & Vertical Alignment</i>	<i>5</i>
<i>Posted Speed Limits</i>	<i>5</i>
<i>Roadway Width</i>	<i>6</i>
<i>Surrounding Land Use</i>	<i>6</i>
<i>Parking Inventory</i>	<i>6</i>
<i>Right of Way Information</i>	<i>8</i>
<i>Utilities</i>	<i>8</i>
<i>Lighting</i>	<i>8</i>
<i>Traffic Control</i>	<i>10</i>
<i>Traffic Volumes</i>	<i>11</i>
<i>Intersection Capacity Analyses</i>	<i>12</i>
<i>Accident Information</i>	<i>12</i>
<i>Sign Inventory</i>	<i>13</i>
<i>Environmental & Cultural Resources</i>	<i>13</i>
<i>EXISTING PEDESTRIAN / BICYCLE FACILITIES</i>	<i>20</i>
<i>EXISTING PARKING ANALYSIS</i>	<i>24</i>
RECOMMENDATIONS	27
<i>PEDESTRIAN FACILITY IMPROVEMENTS</i>	<i>27</i>
<i>BICYCLE FACILITY IMPROVEMENTS</i>	<i>31</i>
<i>DOWNTOWN PARKING IMPROVEMENTS</i>	<i>32</i>
<i>BROOKS / SHAW'S SHOPPING CENTER IMPROVEMENTS</i>	<i>35</i>
<i>WEST STREET / MAPLE STREET INTERSECTION IMPROVEMENTS</i>	<i>38</i>
<i>WEST / NORTH / SOUTH STREET INTERSECTION IMPROVEMENTS</i>	<i>41</i>
<i>Traffic Signal Improvements</i>	<i>41</i>
<i>North Street Improvements</i>	<i>41</i>
<i>South Street Improvements</i>	<i>41</i>
<i>West Street Improvements</i>	<i>42</i>
<i>TRAFFIC CALMING PROJECT</i>	<i>44</i>
IMPLEMENTATION OF RECOMMENDATIONS	45

List of Tables

Table 1	5
Table 2	11
Table 3	12
Table 4	15
Table 5	24
Table 6	45

List of Images

Image 1 : Downtown Streetscape / Lighting.....	8
Image 2 : View of Main Walkway Through the Park.....	9
Image 3 : North / South / West / Main Street Traffic Signal	10
Image 4 : Existing Painted.....	20
Image 5 : Lack of Paved Shoulder at Lord's Prayer Rock	21
Image 6 : Winter Parking Ban Sign.....	26
Image 7 : Textured Crosswalk.....	27
Image 8 : Limited Visibility of Pedestrian Crossing at Western Shopping Center Access	35
Image 9 : Shopping Center Middle Access.....	36
Image 10 : West Street / Maple Street Intersection (Bristol Village Mobil / Village Creemee Stand).....	38
Image 11 : Vehicle Backed into Diagonal Parking on South Street	42

List of Figures

Figure 1: Study Area / Location Plan	2
Figure 2 : Areas of Concern.....	4
Figure 3 : Available Parking Assessment	7
Figure 4 : Accident Locations Within the Study Area.....	14
Figure 5 : Pedestrian Facilities	22
Figure 6 : Bicycle Facilities	23
Figure 7 : Study Recommendations Summary Sheet 1.....	29
Figure 8 : Study Recommendations Summary Sheet 2.....	30
Figure 9 : Additional Parking Park Place / School Street.....	34
Figure 10 : Shopping Plaza Proposed Improvements	37
Figure 11 : West Street / Maple Street Intersection.....	40
Figure 12 : West / North / South / Main Street Intersection	43

INTRODUCTION

The Transportation Advisory Committee (TAC) of the Addison County Regional Planning Commission (ACRPC) initiated this traffic study for the downtown area of the Town of Bristol at the request of Bristol town officials. The purpose of the study was to:

- Evaluate the existing parking facilities, and address the recurring problem with a lack of available parking for downtown merchants and apartment tenants during the winter months when snow removal parking restrictions are enforced,
- Evaluate the current bicycle and pedestrian infrastructure and amenities, and make appropriate recommendations to facilitate and encourage these modes of travel, and
- Evaluate the existing traffic flow patterns and conditions, identify deficiencies, and recommend solutions to improve flow, efficiency, access and safety.

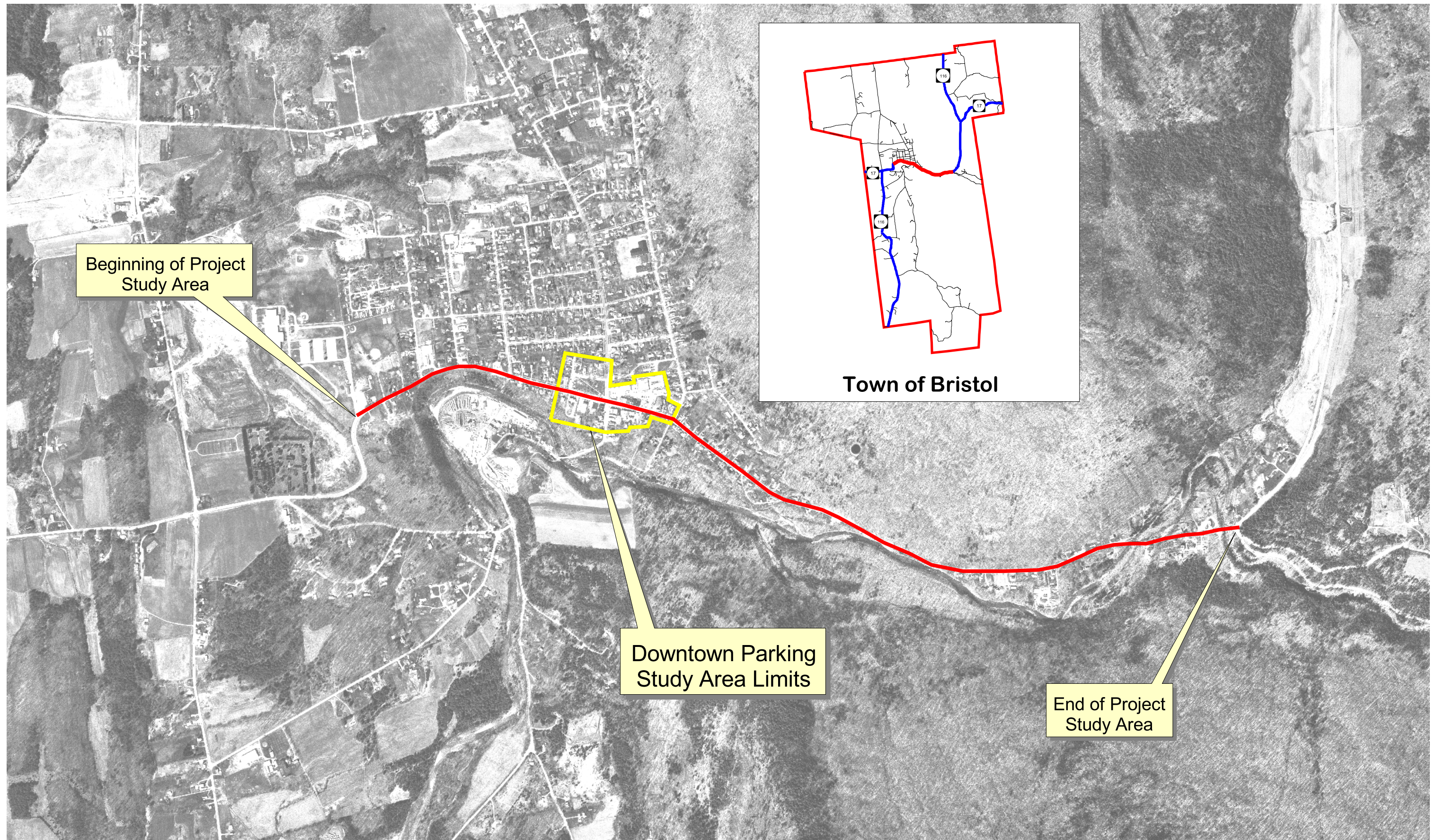
STUDY AREA

The study area consists of VT Route 17 / 116 through the Town of Bristol extending from Airport Drive to Lincoln Road. The focus area for the parking aspect of the study extends from the School Street / West Street intersection east to the Basin Street / Mountain Street intersection, north to Church Street where the Shaw's Shopping Center is located and approximately 200 feet of South Street. Figure 1 shows the location of the study area and the project limits.

AREAS OF CONCERN

Bristol town officials have recognized a need in the downtown area to encourage and facilitate bicycling and walking and to reduce the conflicts with vehicular traffic. There has been a noticeable increase in truck traffic through the town in recent years which is causing concern and the sidewalk network is in need of repair. Specific areas of concern regarding traffic flow and safety in the downtown area include:

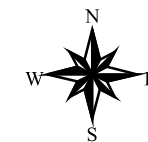
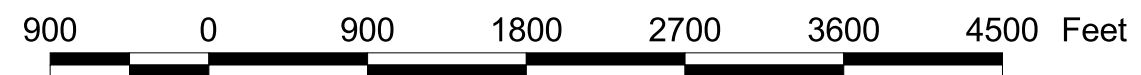
- The Shaw's / Brooks Shopping Plaza parking lot
- The intersection of West Street and Maple Street (Bristol Village Mobil & Village Creemee Stand)
- VT Route 17 / 116 east of the Lords' Prayer Rock to Lincoln Road



Prepared for:



Prepared by:



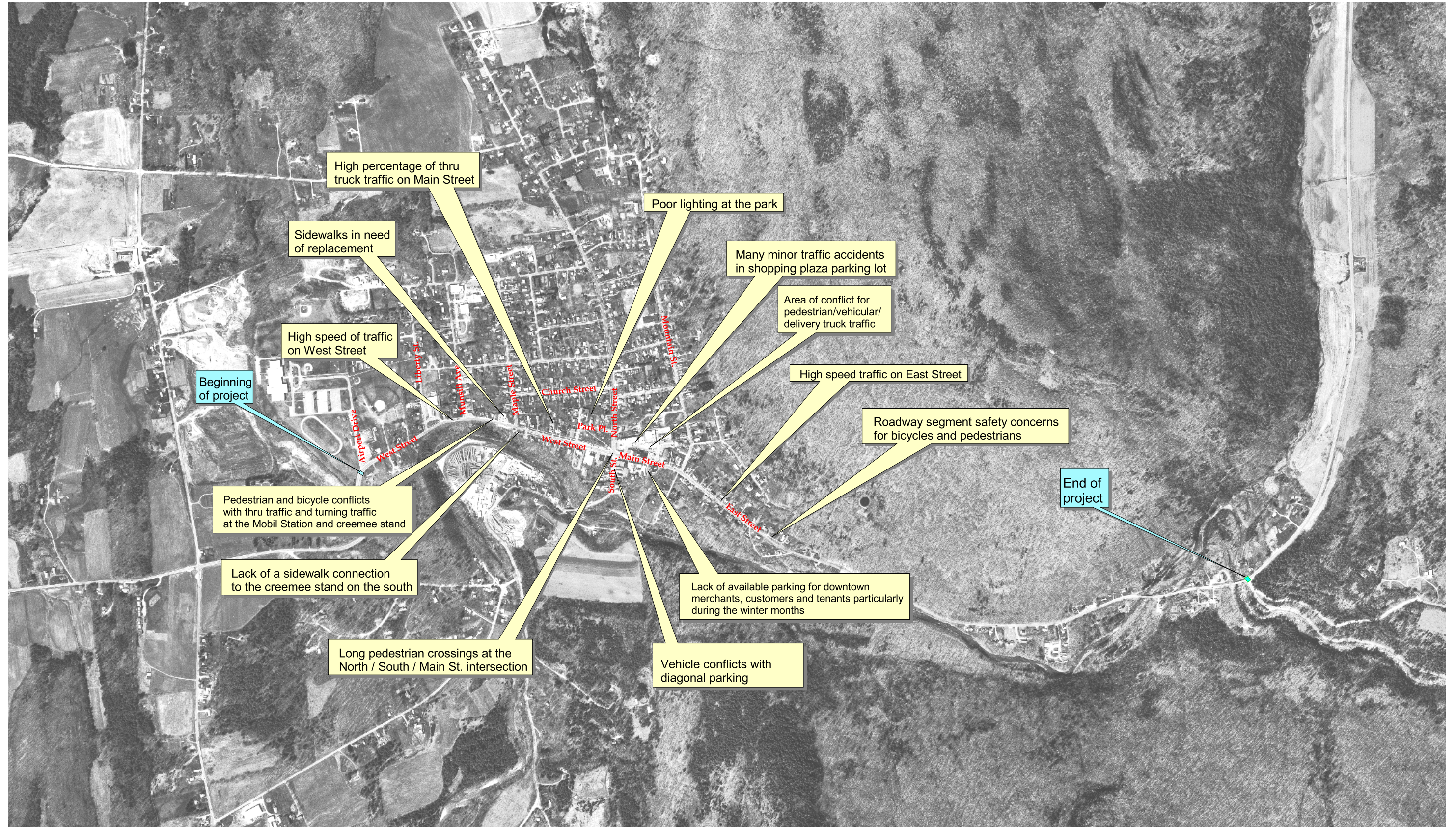
**Downtown Bristol Traffic Study
Study Area / Location Plan
Figure 1**

A public concerns meeting was held on June 24, 2002 to gather input and consensus on the issues and concerns to be addressed in this study. Minutes from this meeting are included in Appendix A. Several residents and business owners attended the meeting and expressed concerns regarding:

- Lack of convenient parking for downtown customers and residents (particularly during winter months)
- Desire to lower speed limit in downtown
- Need to accommodate bicyclists through town and out to Bartlett Falls

Also included in Appendix A is a summary of a meeting which was held with Pomerleau Real Estate Co. (owner of the Shaw's / Brooks shopping center parcel) to obtain their concerns and input for this study.

Figure 2 has been prepared to graphically summarize these areas of concern.



Prepared For:



Prepared By:



500 0 500 1000 1500 2000 2500 3000 3500 Feet



Downtown Bristol Traffic Study
Areas of Concern
Figure 2

EXISTING CONDITIONS INVENTORY

In an effort to verify the concerns expressed by town officials, local merchants and area residents, an extensive inventory was taken of existing roadway, pedestrian / bicycle and parking conditions. The results of this inventory are summarized in the following sections.

EXISTING ROADWAY CONDITIONS

Functional Classification

VT Routes 116 and 17 share a common route through downtown Bristol. The local portion of this roadway is named West Street from Airport Drive to North Street where it becomes Main Street. Main Street extends from North Street to Mountain Street where it becomes East Street. East Street extends from Mountain Street to the Lords Prayer Rock where the State Highway begins again.

West / Main / East Street is a Class 1 town highway classified as a minor arterial. North Street and South Street are Class 2 minor collectors. All other streets in downtown Bristol are Class 3 local streets.

Horizontal Alignment

There are no significant horizontal curves on West / Main / East Street in the project area

Terrain & Vertical Alignment

There are no significant vertical curves on West / Main / East Street in the project area although there is a steep hill just outside the study area to the west.

Posted Speed Limits

The posted speed limit on West / Main / East Street is 30 mph from Liberty Street to the Lords Prayer Rock. For this study, L&D performed two speed surveys on East and West Streets for a five-hour period on Thursday, June 20, 2002. The results of the speed surveys are shown in Table 1. Detailed speed survey results are included in Appendix B.

Table 1
Speed Survey Results

Location	Avg. Speed (mph)	85 th Percentile Speed (mph)	Percent Vehicles > 30 mph
West St. (east of Maple St.)	32	33	35%
East St. (east of Mountain St.)	34	34	55%

The two speed surveys on West and East Streets were performed in close proximity to the downtown area where speeds are constrained by the presence of on-street parking, pedestrians and the traffic signal at the North St. / South St. intersection. Higher speeds are likely as vehicles enter and exit the Village in the area of Prayer Rock and to a lesser extent near Airport Road.

Roadway Width

Pavement widths on VT Route 17 / 116 (West Street / Main Street / East Street) vary from a minimum of 25 feet wide to a maximum of 78 feet wide at the intersection of North / South Streets. The narrowest segment occurs at Lord's Prayer Rock where the lanes are approximately 12 feet wide and the paved shoulders are between 6 inches to 1 foot wide. Paved shoulder widths vary from 6 inches to 12 feet wide while lane widths vary from 12 to 30 feet wide. The wider sections occur where parallel or diagonal on-street parking exists in the downtown area.

Surrounding Land Use

Downtown Bristol provides a wide-range of services to surrounding towns. The core downtown area is densely developed with a mixture of commercial, retail and residential buildings. The commercial sector provides professional services (medical and general offices), several eating establishments, a laundromat and two bank branches. Retail uses include a Shaw's Supermarket, a Brooks drug store, several convenience and beverage stores plus numerous smaller specialty-retail stores. Municipal offices and a Post Office are also located in the downtown area. Existing building footprints in the core downtown study area have been mapped on Figure 3. A table is included on this figure listing the current building use and building footprint size.

Parking Inventory

The focus area for the parking aspect of the study extends from the School Street / West Street intersection east to the Basin Street / Mountain Street intersection, north to Church Street where the Shaw's Shopping Center is located and approximately 200 feet of South Street. All existing parking (public and private) in this study area has been mapped on Figure 3. There are a total of 154 public on-street parking spaces located on West Street, Main Street, South Street, Park Place and School Street. There are approximately 288 private parking spaces (both paved and gravel) including the parking lots at the post office, the Merchants Bank and Brooks / Shaws. In total there are approximately 442 parking spaces in the downtown study area.

In an effort to determine the adequacy of the existing parking in the core downtown area, the amount of parking required for the existing building uses and footprints was calculated using the parking requirements in the town zoning regulations combined with rates recommended by the Urban Land Institute. This evaluation indicates that 476 spaces are required to meet the needs of the existing building uses which indicates a possible shortage of approximately 30 +/- parking spaces.

Public On-Street Parking

Code	Location	# of Spaces	Type of Parking
A	West Street (north side, along park)	40	perpendicular
B	Park Place (south side, along park)	25	angled
C	School Street (east side, along park)	8	angled
D	School Street (west side)	6	parallel
E	Park Place (north side)	2	parallel
F	West Street (south side)	2	parallel
G	South Street (west side)	14	angled
H	Main Street (south side)	25	angled
I	Main Street (north side)	7	angled
J	Main Street (north side)	21	angled
K	Main Street (north side)	2	parallel
L	Main Street (south side)	2	parallel
Total		154	

Private Off-Street Parking

Street #	Street	occupant	Use	1st floor use	2nd floor use	Building Footprint (sq. ft.)	Required Parking	Existing Parking	Parking Surface
1	Main Street	Allied Insurance of Vt.	mixed	commercial	residential	2000	7	0	street
1	South Street	Town Offices	municipal	municipal	offices	3500	18	0	street
2	Park Place	residence	residential	residential	residential	0	1	4	paved
3	West Street	U.S. Post Office	municipal	municipal	offices	4100	20	19	paved
3	Main Street	Sip N Suds	mixed	commercial	residential	3600	18	0	street
4	South Street	Brown-McClay Funeral Home	commercial	commercial	none	4100	21	18	gravel
4	Main Street	Shaw's Supermarket	commercial	commercial	none	16000	64	92	paved
4	North Street	Brook's Pharmacy	commercial	commercial	none	9100	36	59	paved
5	Main Street	Bobcat Cafe & R.J. Turner	commercial	commercial	commercial	1850	9	0	street
6	Park Place	Bristol Dental Group	commercial	commercial	none	900	5	0	street
6	South Street	Dr. Office / residence	mixed	commercial	residential	2500	7	8	gravel
7	Main Street	Pooh's Corner	mixed	commercial	residential	1000	5	0	street
8	Main Street	Cubber's Restaurant	commercial	commercial	commercial	1750	9	0	street
8	Park Place	First Baptist Church	institutional	institutional	none	3200	0	10	gravel
9	Main Street	Vt. Honey Lights	mixed	commercial	residential	1750	13	0	street
10	Main Street	Cheers Flower & Gift Basket	commercial	commercial	commercial	1750	9	0	street
11	West Street	Champlain Farms	commercial	commercial	none	4000	20	8	paved
11	Main Street	Greetings	mixed	commercial	residential	1350	7	0	street
11	School Street	St. Ambrose Parish Hall	institutional	institutional	none	5300	0	0	street
11	School Street	St. Ambrose Rectory	residential	residential	residential	1850	2	2	paved
12	Main Street	Images & Bristol Bak/Cafe	commercial	commercial	commercial	1050	5	0	street
13	West Street	apartments	residential	residential	apartments	2200	5	8	gravel
14	School Street	Bristol Health & Fitness	commercial	commercial	commercial	6500	33	7	paved
15	West Street	Merchant's Bank	commercial	commercial	none	2900	15	15	paved
15	Main Street	Velocity Bus. Publishing	commercial	commercial	none	1050	5	0	street
17	Main Street	Wokky's Chinese Restuaran	commercial	commercial	none	1250	6	0	street
18	Main Street	Folkheart	commercial	commercial	commercial	1050	5	0	street
19	Main Street	Showtime Video	mixed	commercial	residential	2000	13	2	gravel
20	Main Street	Movies Etc.	mixed	commercial	residential	1050	5	0	street
21	Prince Lane	Bristol Redemption Center	commercial	commercial	none	5000	25	15	paved
21	Main Street	Kimball Office Service	mixed	commercial	residential	2000	13	2	gravel
22	Main Street	Reed's Auto Supply	mixed	commercial	residential	1100	6	0	street
23	Main Street	residence	residential	residential	residential	1200	3	3	gravel
23	Main Street	Cyclone Grist Mill	commercial	commercial	none	4100	21	6	gravel
24	Main Street	Bristol Cliffs Cafe	commercial	commercial	commercial	1750	9	0	street
25	Main Street	apartments	residential	residential	residential	1700	5	9	gravel
25	Main Street	Deerleap Books	commercial	commercial	none	1400	7	0	street
26	Main Street	The Village Corner Store	commercial	commercial	none	2800	14	3	paved
27	Main Street	Antiques	commercial	commercial	commercial	2000	10	0	street
Total							476	288	



Right of Way Information

Based on tax maps, it appears that the width of the right-of-way ranges from 66 to 110 feet along West / Main / East Street.

Utilities

Overhead electrical, telephone and cable TV lines pass through the area mainly along the south side of West Street and East Street on utility poles located from 1 to 10 feet from the edge of pavement. The utility poles are located behind the northerly block along Main Street. Underground water, sewer and telephone lines also exist along West / Main / East Street.

Lighting

Existing roadway lighting consists of luminaires on the utility poles along VT 17/116 through the downtown area. There are also historic style pedestal pole lights along Main Street as can be seen in Image 1.

Image 1 : Downtown Streetscape / Lighting



Existing lighting for the park is minimal. There is one luminaire in the center of the park which provides 1.2 foot-candles of light directly under the fixture but drops to 0.5 foot-candles within twenty feet of the pole. This fixture is mounted quite high and is obstructed by tree limbs. There is a luminaire at the northeast corner of the park facing the fountain which provides 0.4 foot-candles of light directly under the fixture. The only other luminaire for the park is on the south side, in the center, facing the gazebo. This luminaire produces 0.1 foot-candles of lighting directly under the fixture. Throughout a majority of the green, light levels are only 0.01 to 0.02 foot-candles. Image 2 shows the main walkway through the park which should be illuminated to a level of at least 0.3 foot-candles and no more than 0.5 foot-candles.

Image 2 : View of Main Walkway Through the Park



Traffic Control

The primary intersection traffic control along West / Main / East Street is a traffic signal which exists at the North / South / Main Street intersection as shown in Image 3. The signal is operating on a fixed timing plan with a 65 second cycle and two phases (one for Main Street and one for North / South Street). There are no vehicle detector loops currently operating at this intersection. The controller for this signal is a Traconix HMP-40 controller which is obsolete and difficult to find replacement parts for. A separate rotary timer sets the signal into flashing operation from 11 p.m. to 6 a.m.

Image 3 : North / South / West / Main Street Traffic Signal



Traffic Volumes

The most recent available traffic counts on VT Route 17 / 116 are automatic traffic recorder (ATR) counts performed by VTrans in 2000. These counts are typically 7-day counts and provide both hourly and daily traffic volumes. Table 2 presents the average annual daily traffic (AADT) in vehicles per day (vpd) and the afternoon peak hour volume in vehicles per hour (vph) from the three counts located within the study area.

Table 2
VT Route 17 / 116 Average Daily Traffic Volumes

Count ID	Location	AADT (vpd)	Peak Hour (vph)
A127	VT 17 W to Bristol Village Line	5,500	617
A162	Bristol Village Line to Mountain Street	6,000	750
A126	Mountain Street to Lincoln Road	4,700	523

These traffic volumes are average compared to other minor arterials in downtown areas in the region which carry anywhere between 2,000 – 9,600 vehicles per day. The following list of minor arterials in the region can be used for comparison purposes:

<u>Route</u>	<u>Town</u>	<u>AADT</u>
VT Route 17	Addison	2,000 – 3,300
VT Route 116	Middlebury	2,200 – 3,100
VT Route 30	Middlebury	4,400 – 6,600
VT Route 22A	Vergennes	4,500 – 9,300
VT Route 116	Hinesburg	3,400 – 9,600

New morning and afternoon peak hour turning movement counts were conducted at the North / South / Main Street intersection in June 2002 as part of this study. The morning peak hour occurs from 8:00 to 9:00 a.m. Afternoon traffic peaks between 4:45 and 5:45 p.m. The results of these new turning movement counts can be found in Appendix B.

Data from the turning movement count conducted at the North / South / Main Street intersection indicates that 12% of the eastbound through traffic and 7% of the westbound through traffic consists of heavy truck traffic during the morning peak hour. During the afternoon peak hour, 4-5% of the through traffic is heavy trucks. Statewide afternoon peak hour truck percents for minor arterials typically range from 3-5% indicating that afternoon truck volumes through Bristol are average for this type of roadway. There is no published statewide data for morning peak hour truck percents,

however, 7-12 % truck percents are very high. VTrans data from 1998 indicated that on an average day approximately 7.22% of the daily traffic stream on VT Route 17 / 116 through Bristol consisted of heavy trucks, which was slightly higher than the statewide average of 6.87% for a minor arterial roadway.

Intersection Capacity Analyses

Using the methodology outlined in the *Highway Capacity Manual 2000*, intersection capacity analyses were performed for the North / South / Main Street signalized intersection. Capacity analysis results are reported as a level of service and average delay (reported in seconds per vehicle) for each approach of the intersection. Levels of service are letter designations ranging from A to F, with level of service (LOS) A representing the best operating conditions and LOS F the worst. It is desirable to maintain LOS C (average delays between 20-35 seconds) or better for all approaches at signalized intersections.

Traffic volumes from the intersection turning movement count were factored to year 2002 design hour volumes, using VTrans traffic data and factors, for use in the capacity analyses. Design hour volumes (DHV's) represent the 30th highest hourly volumes anticipated over a given year. It is standard practice to use design hour volumes to analyze intersection operation and geometry. Pre-timed signal timings from the existing two phase controller were used in the capacity analyses.

Table 3 summarizes the results of the morning and afternoon peak hour analyses which indicate that the signalized intersection is operating at very acceptable levels of service during both peak periods.

Table 3
North / South / West / Main Street Intersection
2002 Capacity Analysis Results

Approach	AM DHV	PM DHV
South Street (NB)	B (16.5)*	B (17.7)
North Street (SB)	B (18.1)	C (20.8)
Main Street (EB)	A (9.0)	B (12.0)
Main Street (WB)	A (8.9)	A (9.5)

* Level of service (average delay in seconds per vehicle)

Accident Information

Accident data was obtained from the Vermont Agency of Transportation for VT Route 17 / 116 through Bristol Village. During the five-year period from 1996-2000, 15 accidents were reported along West / Main / East Street with a total of 9 injuries. A summary of these accidents can be found in Appendix C.

Accident information was also requested from the Bristol Community Police. A search of the Vermont Incidence Based Reporting System (VIBRS) indicated that 115 accidents were investigated in the study area during the time period from January 1, 1999 to September 27, 2002. Figure 4 is a diagram indicating the location of these accidents. Table 4 is the accident listing which accompanies the diagram to describe each of the accidents. Based on this accident data the following locations have been identified as “high accident locations” in town:

1. Brooks / Shaws Parking Lot
2. Section of Main Street with diagonal parking
3. Champlain Farms parcel
4. Section of South Street with diagonal parking
5. Mobil Station parcel

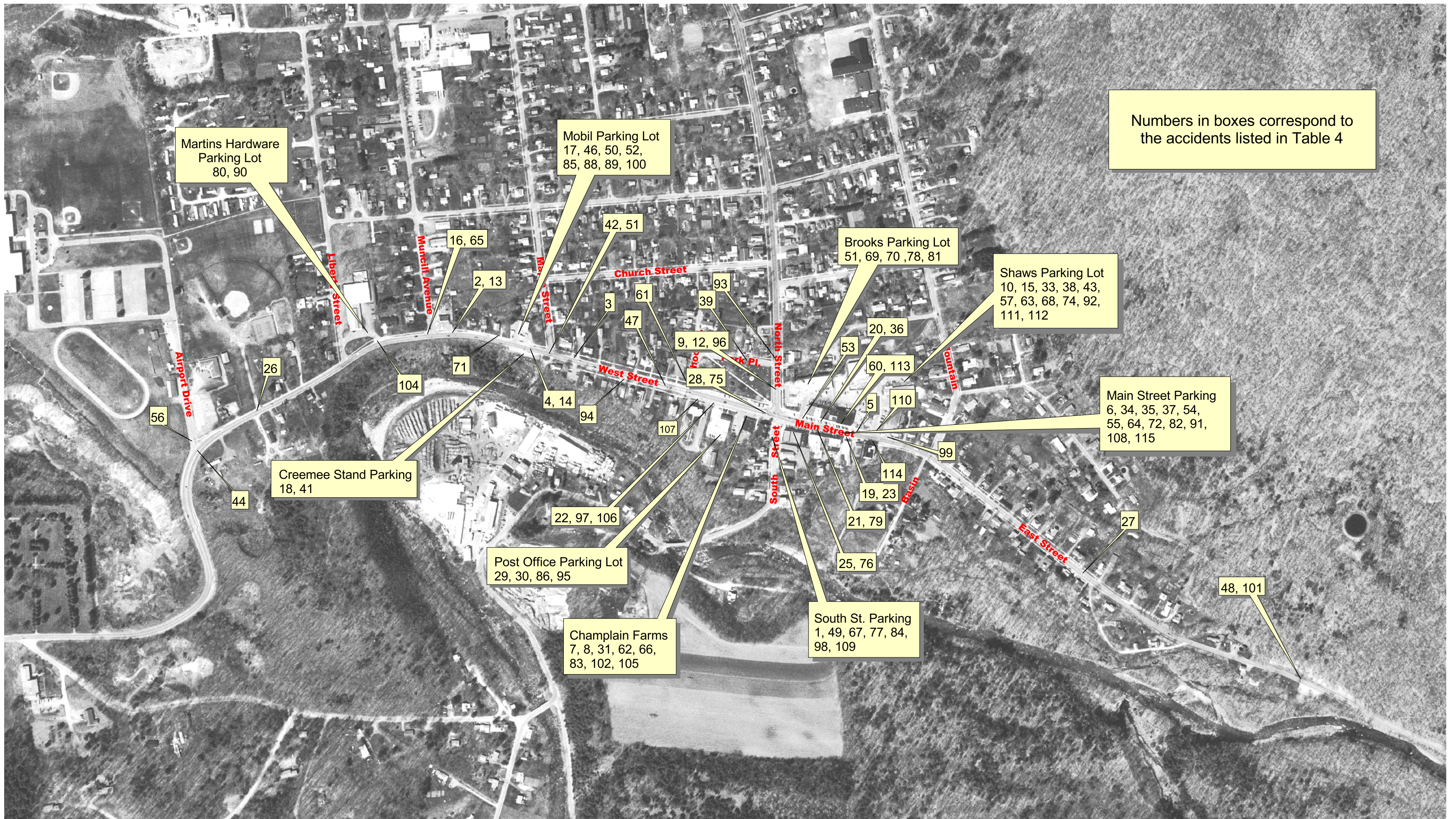
Sign Inventory

Existing signs on West / Main / East Street include the following:

- “Winter Parking Ban” sign located east of Airport Drive for eastbound traffic
- “30 MPH” speed limit signs for both directions located just east of Liberty Street ,
- “Yield to Pedestrian” crossing signs at crosswalk for Mobil / Creemee Stand,
- “School Pedestrian” warning sign for eastbound traffic located west of School Street,
- “Deaf Pedestrian” sign for East Street,
- “Watch for Children Ahead” warning sign for eastbound traffic located east of Mountain Street
- “30 MPH” speed limit signs for both directions at the Lords Prayer Rock.

Environmental & Cultural Resources

There are no significant environmental resources in the project area, however the study area contains the historic downtown district of Bristol.



Prepared for:



Prepared by:



200 0 200 400 600 800 Feet

Data obtained from Bristol Police Department
for the time period from 1/1/99 to 9/27/02



Downtown Bristol Traffic Study
Accident Locations
Within the Study Area
Figure 4

Downtown Bristol Traffic Study

Table 4

Accidents Reported Within the Study Area Between 1/1/99 and 9/27/02

(Data source: Bristol Community Police Department search of VIBRS)

Acc. No.	LOCATION	DESCRIPTION
1	South Street at traffic light	Vehicle exiting parking backed into a northbound vehicle
2	West Street at Munsill Ave. Exxon	Westbound vehicles, rear-end collision
3	West Street, near Maple Street	Vehicle struck backing out of drive
4	West Street by Village Mobil	Eastbound vehicle rear-ended, stopped to turn into Mobil
5	Main Street	Eastbound vehicle rear-ended, waiting for pedestrian to cross
6	Main Street (middle) on South side	One vehicle leaving parking, one going in, collided
7	West Street at Champlain Farms	Vehicle pulling in hit building
8	Parking Lot at Champlain Farms	Crash in the lot
9	North Street at traffic light	2 vehicles in North Street approach, vehicle in left lane decided to turn right, struck vehicle turning
10	Grand Union parking lot	Hit and run
11	Main Street	Backing out accident
12	West/North Streets Intersection	Both vehicles on North Street turning west onto West Street, cars formed separate lanes and collided
13	West Street by Exxon	Eastbound vehicle rear-ended, struck by 2 others while waiting to turn into Exxon
14	West Street at Mobil	Vehicle pulling out to go westbound struck by vehicle backing out of Creemee Stand
15	Grand Union parking lot	Hit and run
16	West Street at Munsill Ave.	Eastbound vehicle on West Street turning onto Munsill Avenue rear-ended
17	Village Mobil Parking lot	Vehicle backed into another
18	Creemee Stand	Vehicle parked in Creemee stand didn't set brake, vehicle rolled over bank
19	Main Street by Dearleap Books	Vehicle rear-ended while waiting for pedestrian to cross
20	Main Street by bakery	Vehicle backing out of parking space struck by westbound vehicle
21	Main Street in front of Mings	Eastbound vehicle hit pedestrian coming out of Mings
22	West Street by Post Office	Vehicle pulling out of Post Office struck by eastbound vehicle on Main Street
23	Main Street by Dearleap Books	Vehicle parked in front of bakery had brake released by dog inside it, vehicle hit building

Downtown Bristol Traffic Study

Acc. No.	LOCATION	DESCRIPTION
24	East Street/Basin Street	Eastbound vehicle collided with pole to avoid a vehicle traveling in the same direction
25	Main Street	Vehicle hit Laundromat building while parking
26	West Street / old entrance to rec field	Westbound vehicle stopped to let vehicle turn left and was rear-ended
27	East Street (73)	2-car crash in front of house, vehicle entering the road was struck by westbound vehicle
28	West Street by Holley Hall	Eastbound vehicle rear-ended waiting for traffic turning onto North Street
29	Post Office parking lot	Vehicle struck by another vehicle backing out of parking spot
30	Post Office parking lot	Vehicle backed into another
31	Champlain Farms	2 vehicles collided in lot
32	West Street (29)	Westbound vehicle turned in front of 2 eastbound vehicles
33	Brooks/Grand Union	Backing out accident
34	Main Street	Vehicle backing out of south side parking lot collided with a vehicle on the north side
35	Main Street	Vehicle parked on south side backed out and hit a vehicle backing out of north side parking lot
36	Main Street at Bakery	Vehicle backed out and struck another parked car (sideswiped)
37	Main Street	Vehicle backed out into a westbound vehicle trying to park next to him (diagonal parking on south side)
38	Grand Union parking lot	Vehicle backed into another moving car
39	Park Place	Vehicle backed into a pedestrian
40	Main Street	Pedestrian ran across street (not in crosswalk) from between 2 cars on north side and was hit by an eastbound car
41	West Street at Creemee Stand	Westbound vehicle hit tent pole in vehicle parked in Creemee stand
42	West Street/Maple Street	Westbound vehicle pulled out of Mobil, stopped to turn onto Maple, rear-ended by motorcycle
43	Grand Union parking lot	Vehicle backed into westbound vehicle traveling through the parking lot
44	West Street at Airport Drive	Westbound vehicle struck eastbound vehicle turning into Airport Drive
45	Main Street (31)	Eastbound vehicle hit 2 parked cars, jumped curb, tried to pass vehicle on right that was turning into Shaws
46	West Street at Village Mobil	Vehicle backed into another in parking lot
47	West Street, west of park	Dog ran into vehicle
48	West of Lords Prayer rock	Vehicles traveling in opposite directions collided, side-swipe

Downtown Bristol Traffic Study

Acc. No.	LOCATION	DESCRIPTION
49	South Street by Town Office	Vehicle backed out, hit a southbound vehicle
50	Village Mobil Parking lot	Vehicle parked between pumps & building struck by vehicle passing through
51	Brooks/Grand Union	Vehicle parked behind Images backed into vehicle parking next to it
52	Village Mobil Parking lot	Vehicle backed into another vehicle in lot
53	Main Street	Eastbound vehicle stopped to make left turn to Brooks changed to park on Main, turned into vehicle passing on the right
54	Main Street	Vehicle backed out of parking space, hit vehicle traveling on Main Street
55	Main Street	Vehicle traveling west on Main went to park on South, 3 vehicles collision occurred
56	Airport Drive	Vehicle stopped at stop sign, was rear-ended
57	Grand Union parking lot	2 vehicle crash
58	Main Street near No-knees	Eastbound tractor trailer damaged light poles trying to make a turn into shopping center
59	West Street at Maple Street	Vehicle struck another vehicle turning into Maple, rear-ended eastbound vehicle
60	Main Street in front of Reeds Auto	Parked vehicle struck by a vehicle parking
61	West Street/School Street	Westbound vehicle struck by vehicle turning off School Street
62	West Street at Champlain Farms	Backing out accident in parking lot
63	Shaws in front of door	Vehicle backed into person and cart
64	Main Street	Eastbound vehicle struck by vehicle backing out of south side
65	West Street at Munsill Avenue	Eastbound vehicle rear-ended while waiting for turning traffic
66	West Street at Champlain Farms	Eastbound vehicle rear-ended vehicle stopped for light
67	South Street	Vehicle backed into vehicle parked across street
68	Shaws parking lot	Vehicle backing out of space hit vehicle heading west
69	Brooks parking lot	Vehicle backed into parked car
70	Brooks parking lot	One vehicle behind bakery, one vehicle in front of Brooks, backed into each other
71	West Street	Westbound vehicle struck concrete block placed on road edge west of Mobil
72	Main Street	Two vehicles backing out of spaces on opposite sides, hit each other
73	Village Mobil Parking lot	Mobile home struck pump driving out

Downtown Bristol Traffic Study

Acc. No.	LOCATION	DESCRIPTION
74	Shaws parking lot	Vehicle backing out of spot struck a vehicle passing through the lot
75	West Street at light	Vehicle rear-ended
76	Main Street at Sip n Suds	Eastbound vehicle collided with vehicle traveling in opposite direction, crossed center line
77	South Street by Town Office	Vehicle backing out hit another parked vehicle
78	Brooks parking lot	Vehicle traveling through parking lot was backed into by another vehicle behind Cubbers
79	Main Street near Showtime Video	Vehicle backing out could not see due to larger vehicle parked beside it, struck westbound vehicle
80	West St., near Martins Hardware	Parked vehicle was struck by a hit and run
81	Brooks parking lot	Vehicle backing out hit a moving vehicle behind Bristol Bakery
82	Main Street	Vehicle backing out struck another vehicle pulling into nearby parking space
83	West St., at Champlain Farms	Eastbound vehicle crossing westbound lane to park on south side of Park Street collided with passing vehicle leaving Park to travel westbound
84	South Street/Main Street Int.	Vehicle backed out of parking space into northbound vehicle stopped at light
85	Village Mobil Parking lot	Rear-end collision
86	Post Office parking lot	Vehicle backed into mail vehicle
87	Main Street/Basin Street	Eastbound vehicle stopped to turn left onto Mountain, rear-ended
88	Village Mobil Parking lot	Vehicle backed into another vehicle in lot
89	Village Mobil Parking lot	Vehicle backed into another vehicle in lot
90	West Street	Vehicle struck a pole in Martin's Hardware lot from Liberty Street, cutting through lot onto West Street
91	Main Street	Vehicle parked on north side backing out and vehicle parked on south side backing out, south side vehicle crossed eastbound lane and they hit each other
92	Shaws parking lot	Tractor trailer ripped off bumper of parked car
93	Park Street/North Street	Southbound vehicle struck by garbage truck that went left of center before turning right
94	West Street (25)	Vehicle parked on road struck by eastbound vehicle
95	Post Office parking lot	Vehicle backed into parked car
96	Main Street Intersection	Southbound vehicle from North Street struck by vehicle driving east on West Street who was distracted - light violation

Downtown Bristol Traffic Study

Acc. No.	LOCATION	DESCRIPTION
97	West Street	Westbound vehicle was rear-ended waiting to turn into Post Office - snowy roads
98	South Street	Vehicle backed into northbound vehicle waiting for light
99	Main Street	Eastbound vehicle rear-ended when stopped to turn into Shaws
100	Village Mobil Parking lot	Vehicle backed into another
101	East Street at Lords Prayer Rock	Child walking stepped in front of car
102	Champlain Farms	Vehicle backing into pump hit another coming in from West St.
103	North Street	Southbound vehicle stopped to turn left by entrance to Brooks, was rear-ended
104	West Street at Martin's Hardware	Westbound vehicles both trying to turn into drive, 1st vehicle stopped in middle of right turn (for pedestrians), 2nd vehicle was side swiped
105	West St. by Champlain Farms	Westbound vehicle on West Street turned into eastbound vehicle
106	West St. by Post Office	Eastbound vehicle stopped to turn into Post Office, struck by another vehicle
107	West Street at Merchants Bank	Westbound vehicle stopped to turn, was rear-ended
108	Main Street	Vehicle backed out of space at 15 Main, another vehicle beside backing up struck each other
109	South Street	Vehicle backed out and hit northbound vehicle
110	Main Street	Parked car backed out of spot near bank, struck vehicle exiting parking lot
111	Shaws parking lot	Vehicle parked in front of store backed into car which had pulled up behind it and was stopped driving through
112	Shaws parking lot	Backing accident
113	Main Street by Reeds Auto	Westbound vehicle towing trailer chipped vehicle backing from north side
114	Main Street	Vehicle parked in parallel space in front of No-Knees, backed into fire hydrant post
115	Main Street	2 vehicles backing out of south side spaces, one vehicle in between, backed into each other

EXISTING PEDESTRIAN / BICYCLE FACILITIES

An inventory was taken of the existing sidewalk network in the study area. Figure 5 provides a graphic summary of the location and condition of the existing sidewalks. The following ranking system was used to describe the condition of the sidewalks:

- Excellent = new sidewalk with no cracks or heaving
- Good = old sidewalk with few if any cracks and no heaving
- Fair = sidewalks with significant cracks but no heaving
- Poor = extremely cracked and heaving sidewalks

Many of the sidewalks on the side streets (Maple, Mountain, North) are only four feet wide which does not meet the current Americans with Disabilities Act (ADA) standards unless there are 5 ft. x 5 ft. passing areas every 150 feet. In some cases there may be paved driveways along the streets which would serve as passing areas. The narrow sidewalks are shown on Figure 5 with an indication that they may not meet ADA standards.

Image 4 : Existing Painted Crosswalk on Main Street

There is a fairly complete network of sidewalks in the project area. Missing sidewalk sections are also shown on Figure 5 and include the following locations:

- on the south side of West Street the sidewalk ends a few hundred feet east of the Village Creemee Stand
- no sidewalks along Munsill Avenue
- no sidewalk across Champlain Farms on the south side of West Street
- no sidewalk in front of the old Bristol Market on the east side of North Street
- there are no sidewalks along Airport Drive from West Street to the school

There are painted crosswalks across all side streets along West / Main / East Street. There are also several crosswalks across West / Main / East Street including the one shown in Image 4 which is one of the longest crossings located at the signalized intersection of North / South Streets. There are no pedestrian signals for this crossing. All existing crosswalk locations are shown on Figure 5.



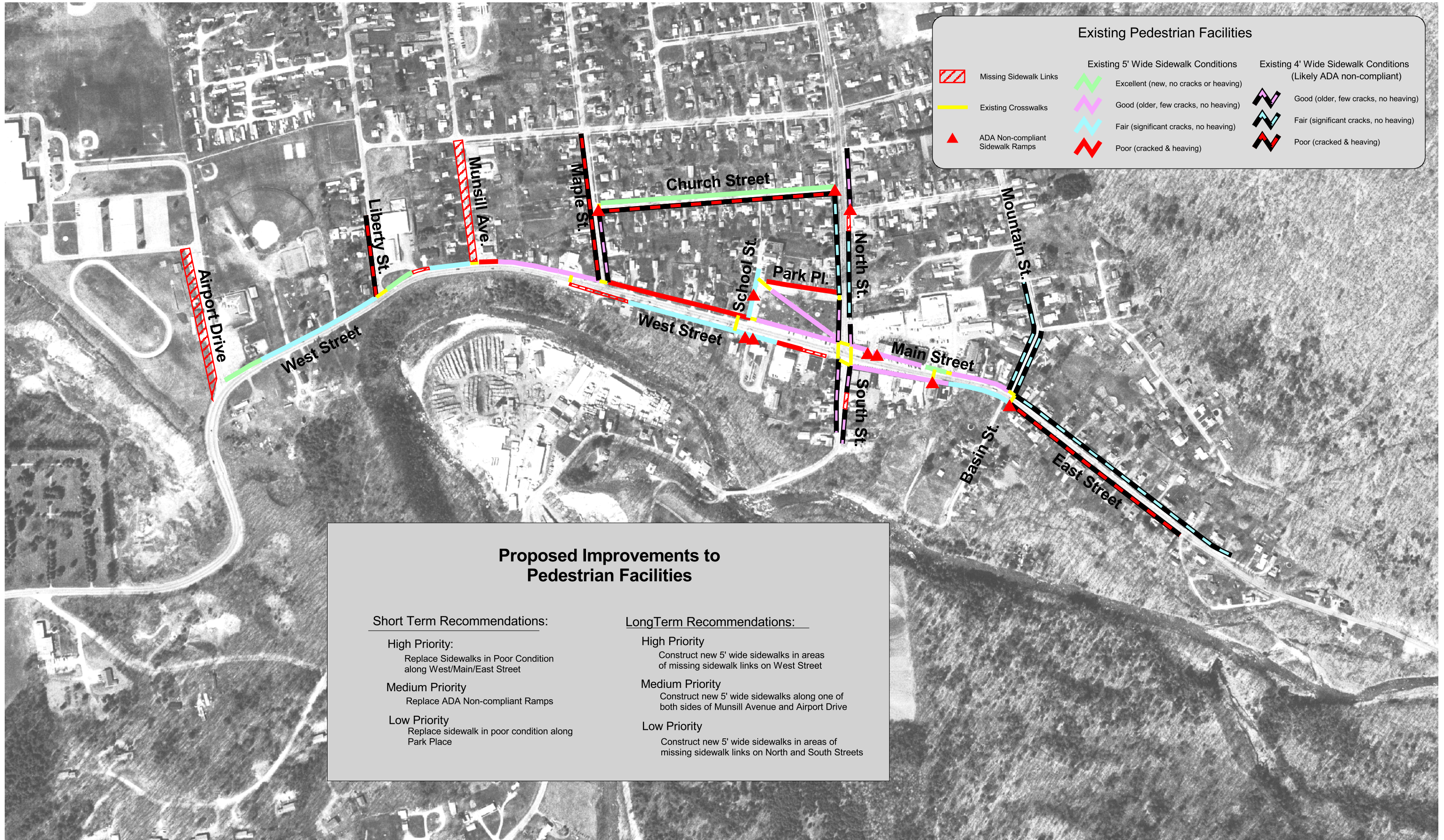
Most sidewalk ramps are in good condition and meet the ADA standards for texture, slope and maximum curb reveal. Ramps which do not meet ADA standards are flagged on Figure 5 and include the following locations:

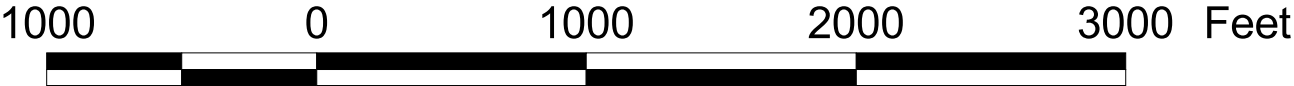
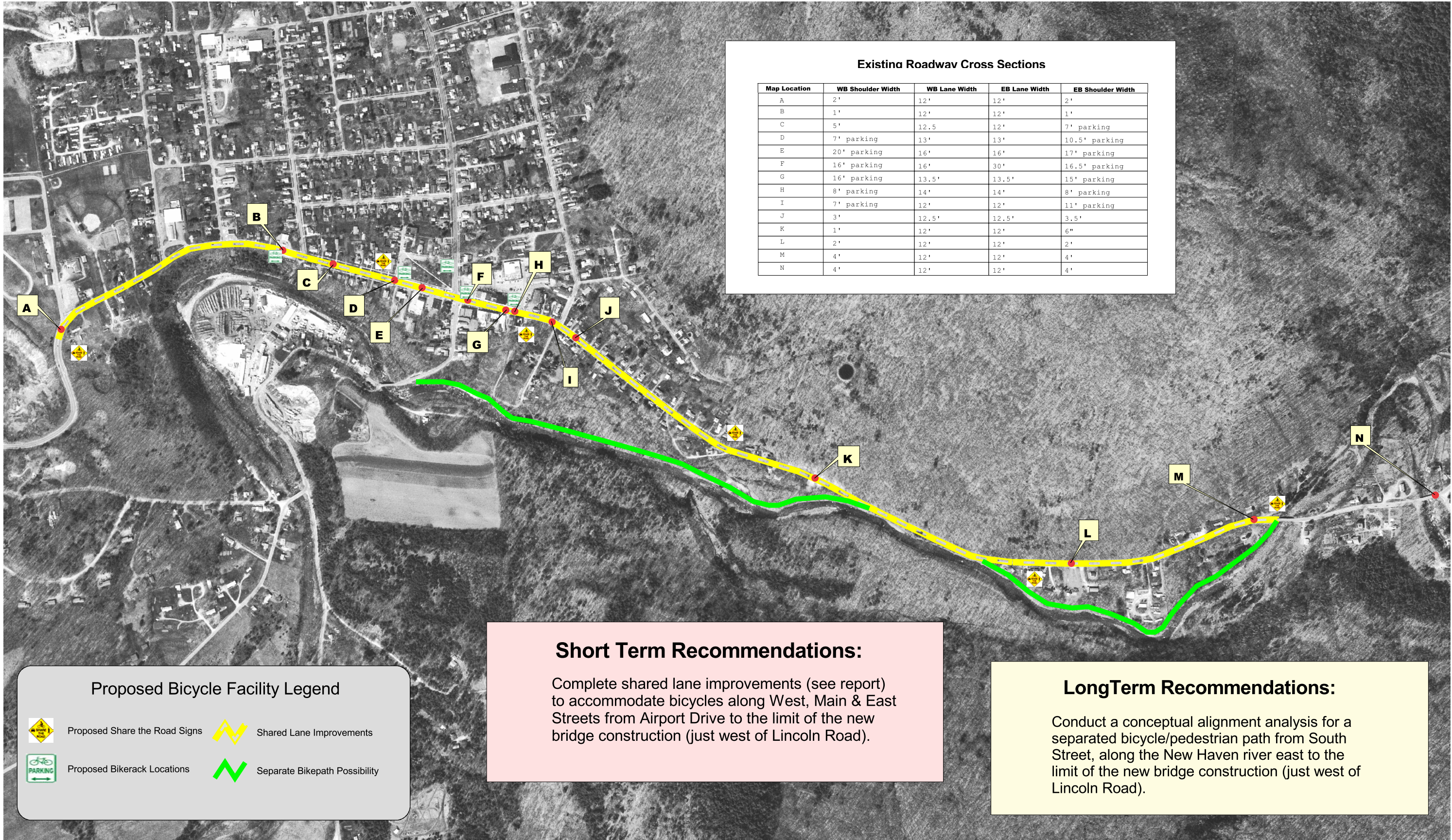
- the ramp at the northeast corner of Church and Maple Street which has too much curb reveal and is not textured
- the ramp at the southwest corner of Church and North Street which has too much curb reveal and is not textured
- the ramp at the northeast corner of North and Garfield Street which has too much curb reveal and is not textured
- the ramp to the handicapped parking space on School Street which is too steep and not textured
- both sidewalk ramps at the bank driveway entrance which are too steep
- both sidewalk ramps at the Main Street entrance to Brooks which are too steep
- the south side of the Main Street mid-block crosswalk which has no sidewalk ramp
- the southeast corner of the East and Basin Street which has too much curb reveal and is not textured

There are no existing bike paths, bike lanes or bike racks in Downtown Bristol and most of the paved shoulder along West / Main / East Street is inadequate for bicycling (see Image 5). Shoulder widths on West / Main / East Street range from 6 inches to 2 feet wide through most of the study area (not including the areas with on-street parking) as shown on Figure 6. To be considered adequate for bicycling, VTrans recommends that the paved shoulder be a minimum of 3 feet wide, increasing to 4 feet wide against guardrail, curb or other roadside barrier. This recommendation is published in the VTrans *Vermont Pedestrian and Bicycle Facility Planning and Design Manual*.



Image 5 : Lack of Paved Shoulder at Lord's Prayer Rock





EXISTING PARKING ANALYSIS

Parking occupancy counts were conducted on a Thursday at noon and 6 p.m. and on a Friday at 5 p.m. during the summer months. Table 5 provides a summary of the marked on-street parking inventory and occupancy counts.

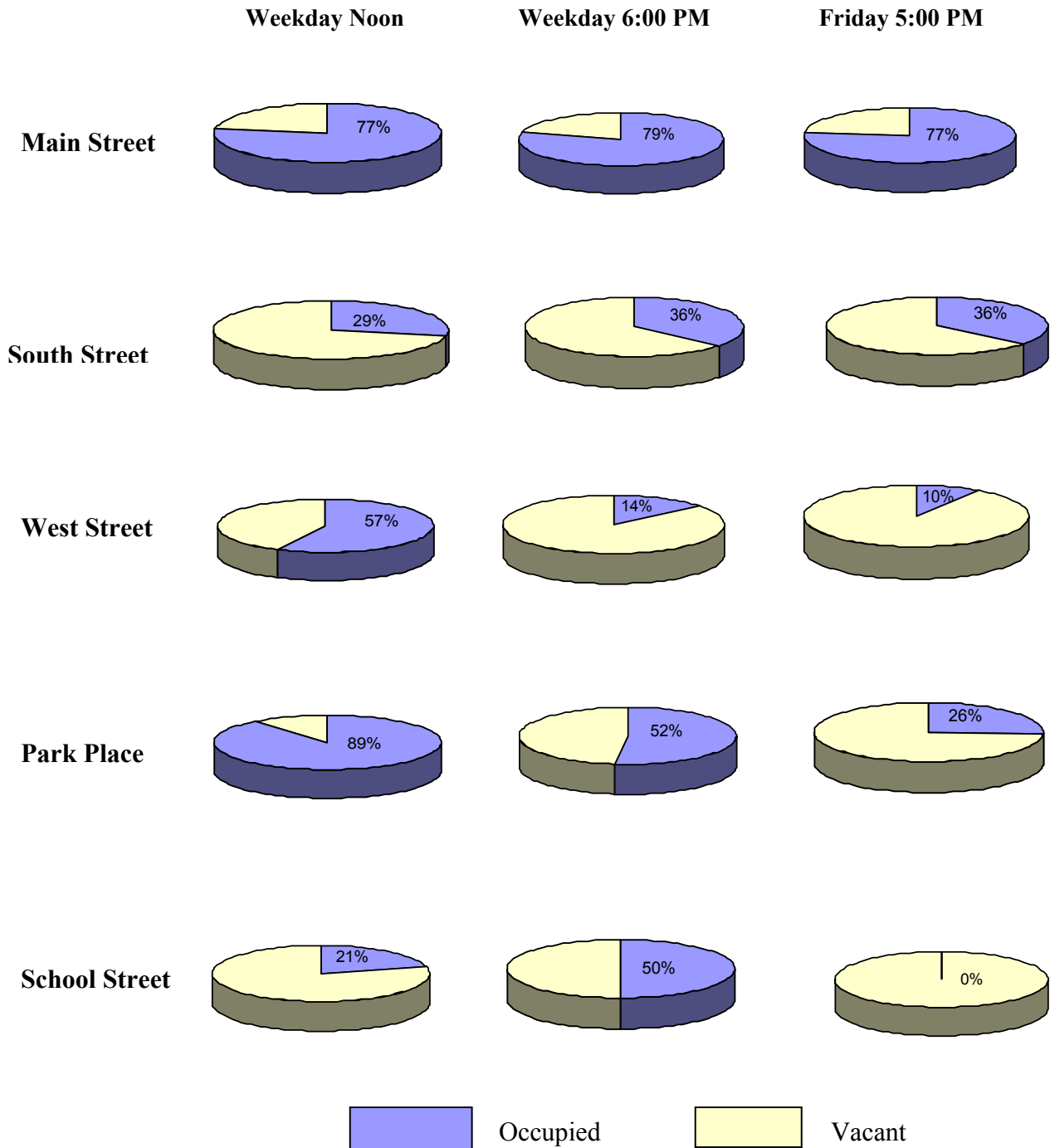
Table 5
On-Street Parking Inventory and Occupancy Counts

Street Name	Existing Designated On-Street Parking	# of Spaces Occupied		
		Thursday Noon	Thursday 6 p.m.	Friday 5 p.m.
South Street - west side	14 diagonal spaces	5	5	8
North Street – both sides	no parking	-	-	-
Park Place – south side	25 diagonal spaces	22	12	6
Park Place – north side	2 parallel spaces	2	2	1
School Street – east side	8 diagonal spaces	3	4	0
School Street – west side	6 parallel spaces	0	3	0
West Street – north side	40 perpendicular spaces (along park)	11	5	4
West Street – south side	2 parallel spaces (in front of Town Offices)	1	1	0
Main Street – north side	23 diagonal spaces	18	15	17
	2 parallel spaces (at bank)	1	1	0
Main Street – south side	25 diagonal spaces	21	23	21
	2 parallel spaces (at Deerleap)	0	2	2

Based on these parking occupancy counts there appears to be adequate on-street parking available in the downtown area on an average weekday during the summer months. The pie charts on the following page summarize the parking utilization observed on each of the streets with on-street parking. The parking spaces on West Street (on the south side of the park) have a very low occupancy rate during the afternoon peak when Main Street parking is reaching full occupancy.

A conflict with current uses has been noted between the restaurant and laundromat which are both located on the south side of Main Street. Customers using the laundromat must compete with restaurant patrons (particularly in the evening) for the parking spaces in front of the laundromat which are the most convenient for loading and unloading laundry.

On-Street Parking Utilization Graphs



During the non-winter months, several tenants and employees of the downtown block park on Main Street or in the shopping center parking lot. There is an overnight winter parking ban on all public right-of-ways (see Image 6) and overnight and long term parking is restricted by the owner of the shopping center lot during the winter months. This creates a lack of available parking during the winter months particularly for tenants of the downtown block.

Image 6 : Winter Parking Ban Sign

A parking permit program was tried for the first time in 2001-2002 to address the winter parking problem for the tenants of Main Street. A parking permit was issued to each of the tenants to allow overnight parking on Park Place. The tenants were required to move their vehicles early in the morning to allow snow removal on Park Place before the employees / business owners arrived who park in this area. During this first year, there were problems with tenants who were not moving their vehicles in the morning and because the program was not officially adopted into the Town parking ordinance, the local police department could not ticket the offending vehicles. By the end of the season, the program appeared to be working better as one of the problem tenants was evicted and a landlord pulled the parking permit from another problem tenant.



This Winter Parking Program has been implemented again this year (2002-2003) with a few minor changes. The program has been officially adopted so vehicles in violation can be towed away. A light in the clock tower at the Town Hall indicates when vehicles must be moved off Main Street for overnight parking. If the light is on, the cars must be relocated to one of 25 spaces on Park Place which are designated for overnight parking during snow storms. These cars must be moved from Park Place by 6:30 a.m. to allow for snow removal. Any cars left on Main Street when the light is on are being towed and vehicles left on Park Place after 6.30 a.m. are either being plowed in or are being towed as well.

RECOMMENDATIONS

Overall concept plans (Figures 7 & 8) have been prepared to summarize the following recommendations which address parking, traffic circulation and pedestrian / bicycle access in downtown Bristol.

PEDESTRIAN FACILITY IMPROVEMENTS

Short Term Recommendations

High Priority

The Town of Bristol should pursue a speed limit reduction from 35 to 25 mph through the village area between Airport Drive and the Lord's Prayer Rock.

All existing sidewalks in poor condition along West / Main / East Street should be replaced with new 5 ft. wide sidewalks meeting ADA standards.

Existing crosswalks on West / Main Street should be replaced with raised / textured crosswalks (as shown in Image 7) to improve the visibility and safety of pedestrians.



Image 7 : Textured Crosswalk

Medium Priority

All ADA non-compliant sidewalk ramps (refer to Figure 5 for locations) should be replaced with ramps that meet the current ADA standards which includes texturing and a maximum of a 1/4" curb reveal.

A signalized pedestrian crossing should be considered for the North / South / Main Street intersection. The crosswalks on Main Street should be shortened if possible (using bulb-outs) to minimize the timings required for a pedestrian phase at this intersection. This should be part of a traffic calming project which should be pursued by the Town.

Lighting in and around the park should be improved by continuing the Main Street lighting theme

into the park. The walkway through the park should be illuminated to a level of at least 0.3 foot-candles and no more than 0.5 foot-candles. Perimeter lighting should also be provided along all four sides of the park, directed toward the sidewalks / roadways around the park. Lighting should also be designed inside the park to highlight the major park features (gazebo, fountain, play area, cannon), minimize dark spots and increase security.

Low Priority

The sidewalk along the north side of Park Place should be replaced.

Long Term Recommendations

High Priority

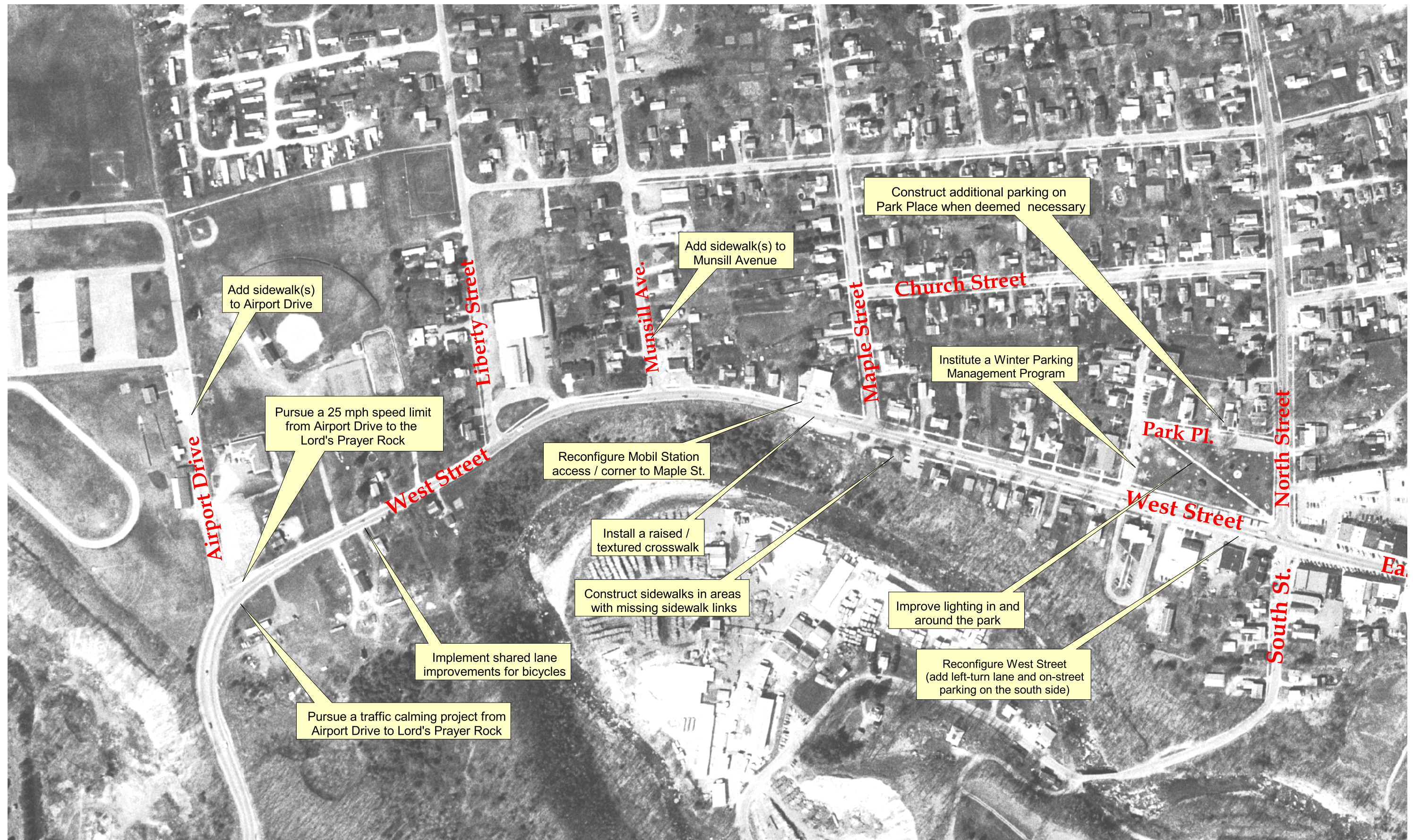
New 5 ft. wide sidewalks should be constructed along West Street in areas of missing sidewalk links (refer to Figure 5 for locations).

Medium Priority

New 5 ft. wide sidewalks should be constructed along one or both sides of Airport Drive and Munsill Avenue.

Low Priority

New 5 ft. wide sidewalks should be constructed in areas of missing sidewalk links on North and South Streets.



Prepared For:



Prepared By:



500

0

500

1000

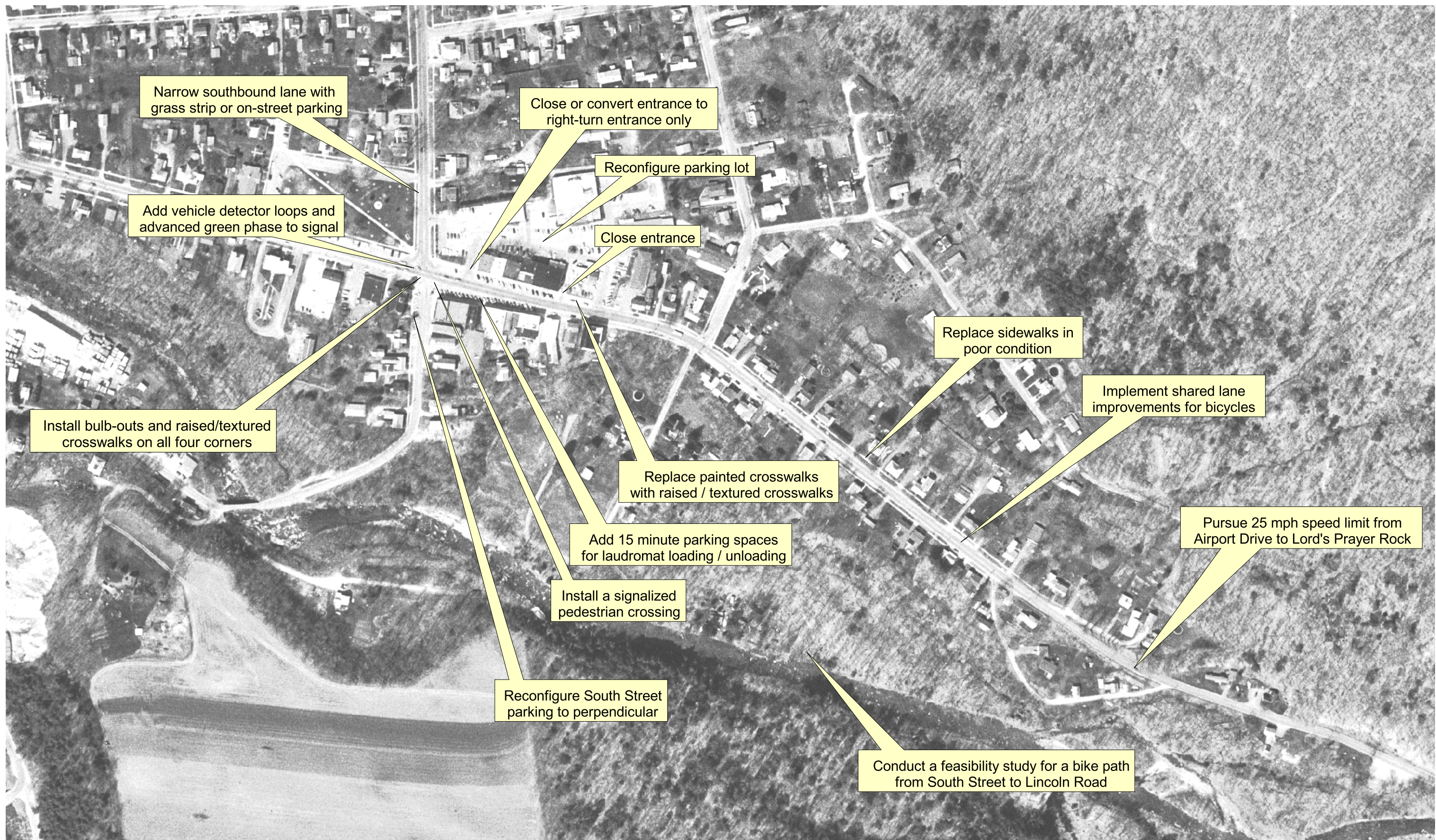


Downtown Bristol Traffic Study

Study Recommendations

Summary Sheet 1

Figure 7



BICYCLE FACILITY IMPROVEMENTS

Short Term Recommendations

Bicycle racks should be provided in the downtown area to encourage bicycle activity. Bicycle parking areas should be clearly visible, close to principal building entrances and separated from vehicle parking areas. Suggested areas for bicycle racks are indicated on Figure 6.

Due to existing on-street parking, steep grades and rock outcrops, shared lanes are the most feasible method to accommodate bicycles in the project area. Several improvements are recommended (in the Draft Vermont Pedestrian and Bicycle Facility Planning and Design Manual published by VTrans April 2002) to improve the bicycling experience in this type of environment including:

- Providing at least a 2 ft paved shoulder wherever possible (refer to Figure 6 for areas to be upgraded)
- Narrowing travel lanes to the minimum 11 ft width
- Implement traffic calming to reduce the speed of motor vehicles
- Install bicycle safe drainage grates
- Be sure pavement surfaces are free of irregularities
- Use a limited number of share the road signs to indicate to motorists that bicycles are present (refer to Figure 6 for placement recommendations)
- Use slip-resistant durable markings
- Reduce and enforce the speed limit
- Regularly removing accumulated dirt, broken glass and other debris

Long Term Recommendations

A feasibility study should be conducted for a separated path along the New Haven River between South Street and Lincoln Road. This type of facility should be feasible for a majority of the distance, however, there is one area between the Lord's Prayer Rock and Lincoln Road where there appears to be insufficient room for a path between the river and the existing roadway. Widening the roadway to provide 5 ft wide bicycle lanes or 3-4 ft wide paved shoulders should be examined as part of the feasibility study.

DOWNTOWN PARKING IMPROVEMENTS

Short Term Recommendations

Based on the parking utilization count and land use parking analysis, it appears that overall, there is adequate parking available in downtown Bristol, however, the location of the available parking is not always convenient for the patrons of the Main Street businesses, particularly those carrying laundry to the laundromat. This problem could be addressed by designating several 15-minute parking spaces (loading / unloading spaces) in front of the laundromat for their patrons. The parking ordinance will need to be revised to allow enforcement of these spaces by the Bristol Police Department.

Improving the lighting around the park, installing a pedestrian activated crossing at the North / South / Main Street signal and instituting traffic calming on Main Street (possibly shortening the crossings with bulb-outs) should make the perpendicular parking on West Street (along the south side of the park) more desirable to patrons of the Main Street businesses.

The current Winter Parking Management Program should be continued to accommodate the tenants of the downtown block. This program involves the sale of parking permits to landlords of the downtown apartments for use by their tenants. These permits allow overnight parking in an area designated by the Town with a requirement that the vehicles be moved by a specified time in the morning to allow for snow removal. When the light in the clock tower is on, all vehicles must be removed from Main Street and parked in the designated area. The parking spaces along the north side of the park are currently being used and are preferred by the Town maintenance crew due to plowing issues, however, the parking spaces along the south side of the park would be more convenient for the tenants and are the least utilized for daytime, on-street parking which would allow tenants to remain in these spaces until later in the morning. Revenue gained from the sale of the parking permits should be used to offset additional snow removal costs created by this program. The parking ordinance and parking ban signs must be revised to include this Winter Parking Management Program so that the Bristol Police Department can enforce the program.

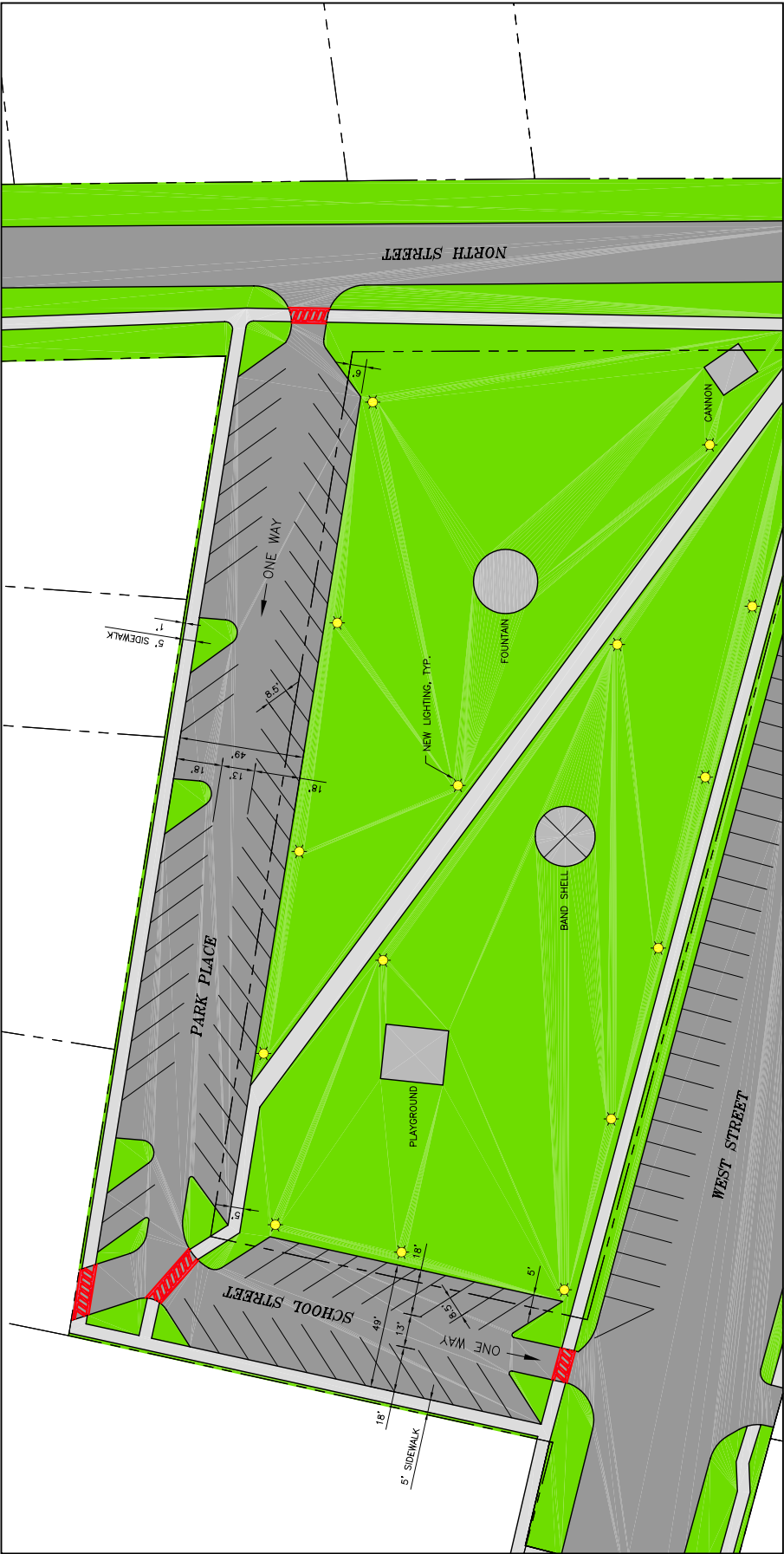
Long Term Recommendations

If additional municipal parking spaces are determined to be necessary in the future, it is recommended that diagonal or parallel parking be added to the north side of Park Place. There appears to be adequate right-of-way to add diagonal parking to Park Place without requiring any property acquisition. The sidewalk on the north side of Park Place (which is currently in poor condition) would have to be replaced in front of the new diagonal parking and the diagonal parking on the south side would have to be shifted approximately 3 feet into the park. Diagonal spaces could also be added to the east side of School Street by again taking approximately 3 feet of the park. Figure 9 illustrates the additional parking which could be created along Park Place and School Street.

This study also examined the core downtown area to identify potential locations for a municipal parking lot. There are no municipally owned lots currently available for parking. The municipal parcel at the end of Basin Street is too far away and separated from Main Street by too steep of a grade to be feasible for such a lot. It appears that the most feasible parcel for such a lot is currently owned by the Brown-McClay funeral home on South Street. The Town might consider purchasing this parcel in order to create a suitable off-street municipal parking lot for the benefit of its downtown business district.



EXISTING CONDITIONS



PROPOSED IMPROVEMENTS

DOWNTOWN BRISTOL TRAFFIC STUDY BRISTOL, VERMONT	FIGURE 9 ADDITIONAL PARKING PARK PLACE/SCHOOL ST.	LAMOUREUX & DICKINSON Consulting Engineers Inc. 100 State Street Essex Junction, VT 05452 (802) 878-4450 Engineers-Planners-Surveyors
---	---	--



BROOKS / SHAWS SHOPPING CENTER IMPROVEMENTS

Short Term Improvements

Current access to the shopping center consists of three access points on Main Street (2 two-way and 1 one-way) and an access on North Street. There is also a private entrance from Mountain Street which leads to the Beverage Center.

It is recommended that the western access on Main Street be converted to a right-turn entrance only or eliminated altogether. Either option will improve traffic circulation on Main Street by prohibiting the left- turn movement from Main Street into the shopping center. This access is located too close to the intersection to allow this movement which can result in queues on Main Street backing up into the intersection. This will also increase pedestrian safety across this access. As can be seen in Image 8, the building makes it impossible to see pedestrians approaching from the left when vehicles are exiting at this access.

Image 8 : Limited Visibility of Pedestrian Crossing at Western Shopping Center Access



The middle access (between the bank and the Village Corner Store, see Image 9) should be closed and converted to a pedestrian walkway / bicycle / green area. Benches and bike racks could be installed in this area to encourage pedestrian and bicycle activity in the downtown area. The 2-3 parking spaces along the Village Corner Store could be converted to diagonal spaces on the roadway once the access is closed.

Long Term Recommendations

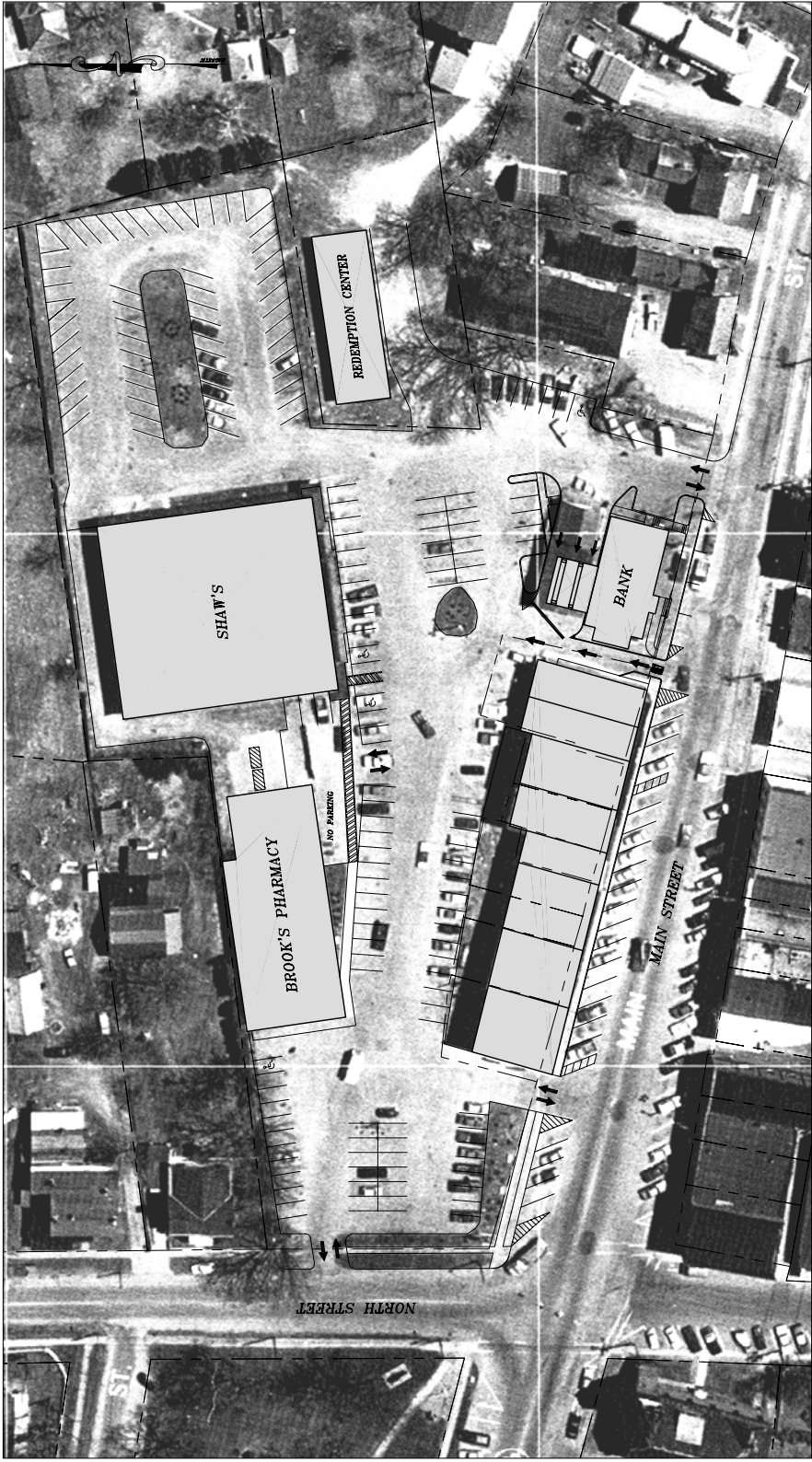
Grassed islands are recommended at the ends of the parking stalls in front of Shaws. These islands will help to define the isles and improve traffic circulation through the parking lot. It is also recommended that curbing, sidewalks and grassed areas be added between the parking and the backs of the Main Street buildings. The parking aisle behind the Main Street buildings should be straightened and narrowed to allow just enough room for two-way traffic between this aisle and the Brooks parking aisle.



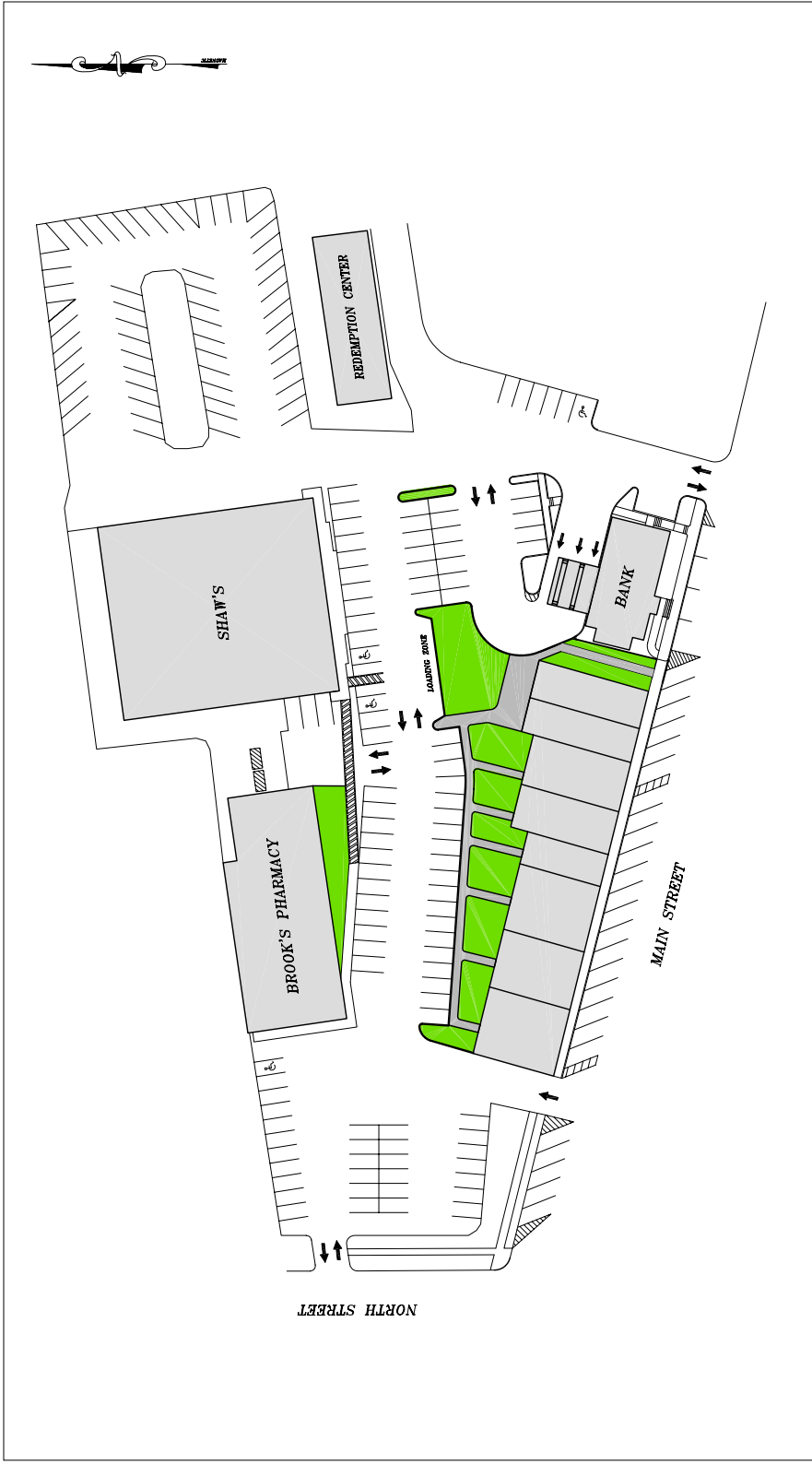
**Image 9 : Shopping Center Middle Access
Being Used as Pedestrian Walkway**

The bank drive-thru traffic can be re-directed between the bank parking and the shopping center parking back to the same access that they entered through. This will keep bank traffic separate from the shopping center traffic, eliminating conflict points and will create an area that can be used as a truck loading / unloading area and additional grassed area in the parking lot.

Figure 10 has been prepared to illustrate these recommendations.



EXISTING CONDITIONS



PROPOSED IMPROVEMENTS

WEST STREET / MAPLE STREET INTERSECTION IMPROVEMENTS

Bristol Police accident records indicate that the area at the West Street / Maple Street intersection is a high accident area. An examination of the existing conditions in this area indicates that the wide gravel shoulders along West Street and Maple Street are being used for parking by Bristol Village Mobil and Village Creemee Stand customers. There is a “no parking” sign on the north side of West Street for this area which is not always being obeyed.

Image 10 : West Street / Maple Street Intersection (Bristol Village Mobil / Village Creemee Stand)

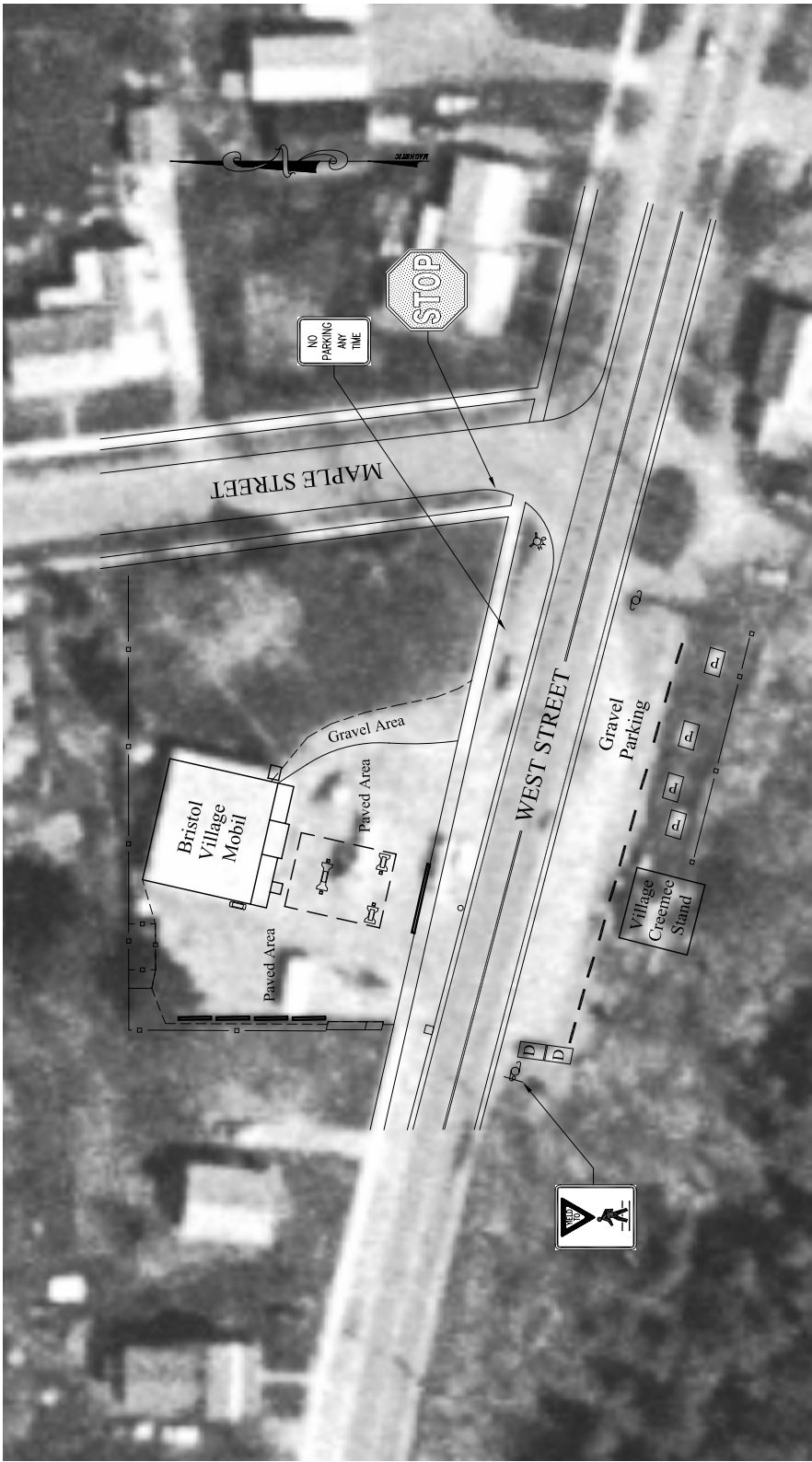


Bristol Village Mobil has two relatively wide, uncontrolled access points which may be contributing to the high incidence of accidents at this location. This is also an area of high pedestrian / bicycle activity in the summer months. Vehicles seldom yield to pedestrians at the mid-block crosswalk between the Bristol Village Mobil and the Village Creemee Stand. This is particularly true of the higher speed vehicles approaching from the west who are not anticipating a crosswalk in this location. Image 10 shows existing conditions in this location.

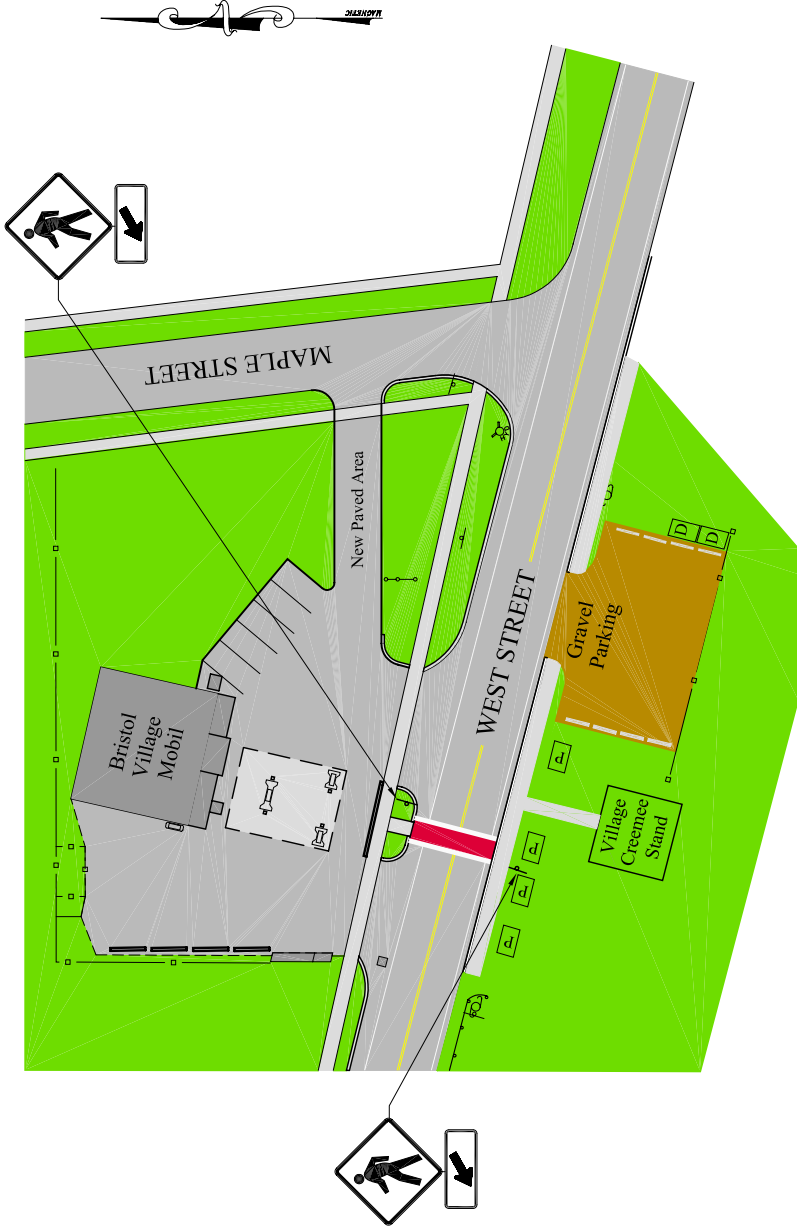
Figure 11 has been prepared to show the existing conditions and recommended improvements for the West Street / Maple Street area. Traffic calming is recommended to slow the traffic on West Street through this area and make the crosswalk more visible. It is also recommended that the West Street / Maple Street corner be reconfigured as shown on the plan to clearly define the two access points to the Bristol Village Mobil and to prevent parking on the streets in this area.

A third access from the parking lot of the Bristol Village Mobil onto Maple Street could also be used to reduce traffic conflicts with the traffic backing out of the Village Creeme Stand and with pedestrians crossing West Street. It should be noted however, that the proposed access onto Maple Street was opposed by neighbors and the Planning Commission during the original permit review of the Bristol Village Mobil project. They required that trees be planted along Maple Street to reduce the impacts of the project on the houses on Maple Street.

A relocation of the parking area at the Village Creemee Stand has also been shown on Figure 11. Currently, uncontrolled perpendicular parking exists along most of the West Street frontage for the Creemee Stand and requires vehicles to back out onto West Street. This perpendicular parking has been replaced by a gravel parking located on the east side of the Creemee Stand. This design implements access management techniques in an effort to define a more precise ingress / egress location and eliminate a wide uncontrolled access. This design will also improve the safety of the crosswalk at this location.



EXISTING CONDITIONS



PROPOSED IMPROVEMENTS

DOWNTOWN BRISTOL TRAFFIC STUDY BRISTOL, VERMONT
FIGURE 11 WEST ST./MAPLE ST. INTERSECTION
LAMOUREUX & DICKINSON Consulting Engineers Inc. 100 West Street Essex Junction, VT 05452 (802) 878-4450 Engineers-Planners-Surveyors

WEST / NORTH / SOUTH STREET INTERSECTION IMPROVEMENTS

Traffic Signal Improvements

Traffic flow in the downtown area could be improved by providing improvements to the traffic signal at the North Street / South Street / Main Street intersection. First, the signal should be converted to semi-actuated operation by installing vehicle detector loops on the side streets. This will allow the signal to dwell on Main Street until there is a call to serve the side streets; which in turn will improve traffic circulation on Main Street during the off-peak hours. This can be accomplished with the existing traffic signal controller.

Second, a pedestrian activated crossing should be installed at this intersection. The pedestrian signals could be designed to allow exclusive pedestrian phasing or concurrent phasing. An exclusive pedestrian phase provides the safest crossing for pedestrians by requiring all traffic to stop during the pedestrian phase.

The third change which should be made at the signal is to provide an advance green for the eastbound traffic on Main Street. This would allow left-turning traffic a chance to turn before westbound through traffic is given a green light.

The second two changes, will require replacing the existing controller with a more modern model. The VTrans District Transportation Administrator has indicated that a spare controller may be available from VTrans for this intersection.

North Street Improvements

The southbound traffic lane on North Street should be reduced to 11 ft wide with 2 ft shoulders by adding on-street parking on the west side of the street or by creating a wider green belt between the road and the sidewalk. This will prevent vehicles from passing on the right which has been a cause for accidents at the intersection.

South Street Improvements

The diagonal parking on South Street has been identified as a problem area based on the review of the accident data. Most drivers using these parking spaces do not back out of the spaces properly and head south down South Street. Most people want to head north so they either back into the parking space so they can drive out (see Image 11) or they back all the way around until they are facing north again which is not safe due to limited visibility in this area. To correct this situation, the diagonal parking should be converted to perpendicular parking. The parking spaces on the east side of South Street were recently eliminated in the parking ordinance, so there is now room for the northbound and southbound travel lanes to be shifted to the east to provide room for the conversion to perpendicular

parking on the west side of South Street. There is also room between the first two telephone poles on South Street to shift the sidewalk closer to the town office building and provide a buffer strip between the parking spaces and the travel lanes on South Street for the first 100 feet.

Image 11 : Vehicle Backed into Diagonal Parking on South Street



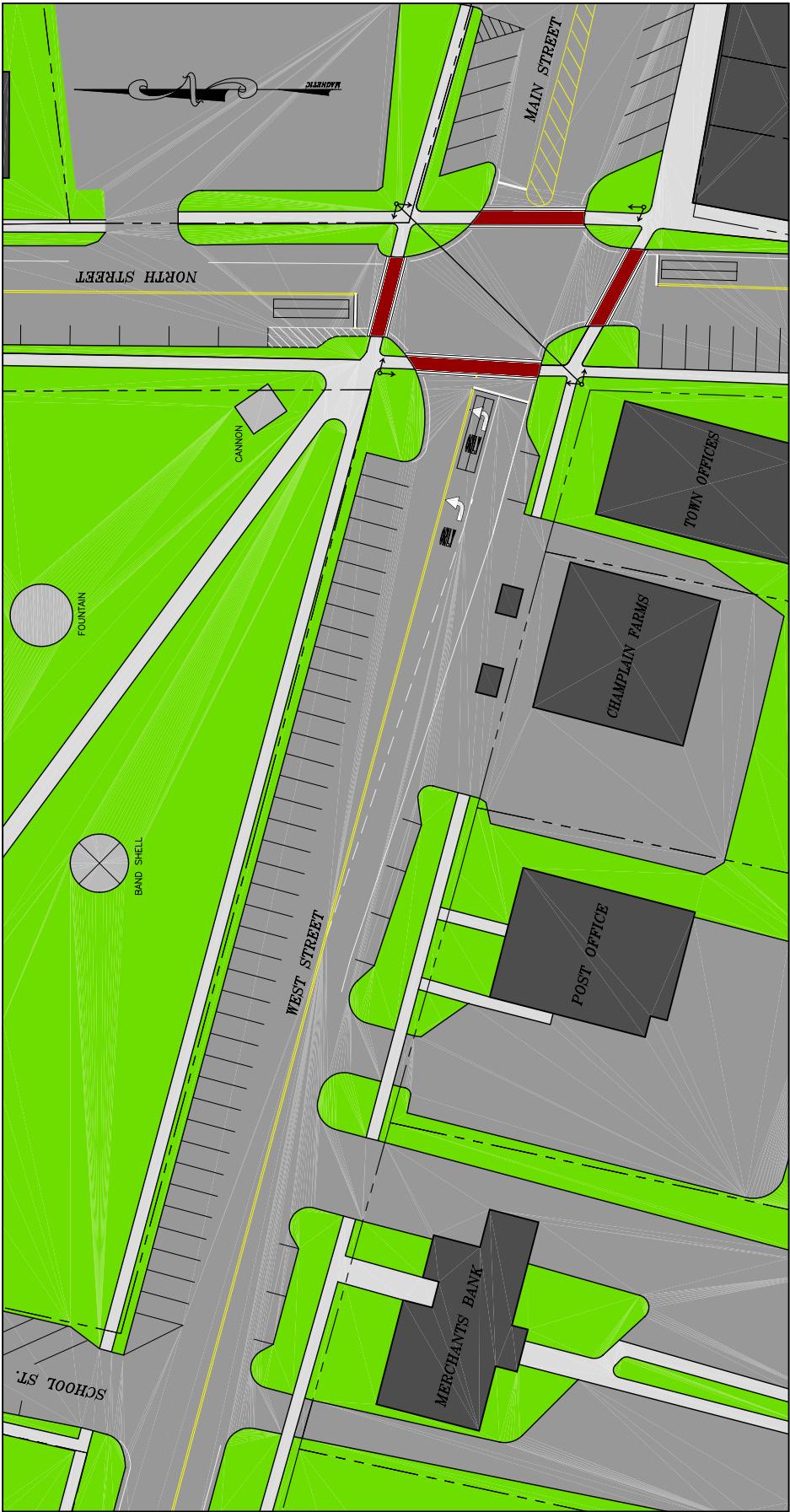
West Street Improvements

The segment of West Street between School Street and North Street should be reconfigured to clearly delineate 11 ft wide through lanes. There is also room to add an eastbound left-turn lane for traffic turning left onto North Street. This will work well with the advanced green phase proposed for the traffic signal at this intersection. Parallel parking spaces should be delineated on West Street in front of the Merchants Bank and the Post Office. Curbing and a grass strip can be installed between the parallel parking spaces and the sidewalk to protect the utility poles and improve the pedestrian safety in this area.

It is also recommended that bulb-outs be installed on all four corners of this intersection to increase pedestrian safety by shortening the distance that pedestrians must cross and placing them out where they are more visible. The crosswalks at this intersection should be replaced with raised, textured crosswalks to increase their visibility. Figure 12 has been prepared to illustrate all of the above recommendations for this intersection and the West Street approach.



EXISTING CONDITIONS



PROPOSED IMPROVEMENTS

TRAFFIC CALMING PROJECT

Traffic calming is defined by ITE (the Institute of Transportation Engineers) as “the use of education, enforcement and / or engineering to reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized users.” ITE describes the meaning of the phrases in the definition as follows:

- 1) *Reduce negative effect of motor vehicle use* means changing the design and the role of the street to reduce the negative social and environmental effects of motor vehicles on individuals (e.g. speed, intrusion, etc.), and on society in general (e.g. pollution, urban sprawl, etc.).
- 2) *Altering driver behavior* addresses the self-enforcement aspect of traffic calming: the lowering of speeds, the reduction of aggressive driving, and the increase in respect for non-motorized street users.
- 3) *Improve conditions for non-motorized street users* means to promote walking and cycling, increase safety, create a feeling of safety and improve aesthetics, etc.

The Vermont Agency of Transportation (VTrans) has developed a *Traffic Calming Study and Approval Process for State Highways*. Based on the May 2002 Final Draft of this document, the implementation of traffic calming devices on a state highway will require a multi-step process involving a variety of stakeholders. The first two steps of the planning process have been completed for the Town of Bristol and are included as a separate document in Appendix D.

In summary, it is recommended that the remaining steps of the VTrans *Traffic Calming Study and Approval Process* be completed to define a traffic calming project for VT Route 116 from Airport Drive to Lincoln Road.

IMPLEMENTATION OF RECOMMENDATIONS

Table 6 presents a summary of the recommendations presented in the previous section. A conceptual cost estimate is included for each of the recommendations where appropriate.

Table 6

Recommendation / Cost Estimate Summary

Problem Area	Recommendation	Cost Estimate
Pedestrian Facilities	<ul style="list-style-type: none"> ▪ Pursue speed limit reduction to 25 mph ▪ Replace sidewalks in poor condition ▪ Replace crosswalks on West / Main Street with raised / textured crosswalks ▪ Replace ADA non-compliant ramps ▪ Install a signalized pedestrian crossing at West / North / South / Main Street intersection ▪ Improve lighting in and around the park ▪ Construct sidewalks in areas with missing sidewalk links 	<ul style="list-style-type: none"> ▪ no cost ▪ \$10-15 / lf ▪ \$500 each ▪ \$75-\$100 each ▪ \$15,000 (not including a new controller) ▪ \$10,000 - \$15,000 ▪ \$15-20 / lf
Bicycle Facilities	<ul style="list-style-type: none"> ▪ Install bike racks in the downtown area ▪ Implement shared lane improvements ▪ Conduct a feasibility study for a separated bike path between South Street and Lincoln Road 	<ul style="list-style-type: none"> ▪ \$300 per rack ▪ \$100,000-200,000 ▪ \$10,000 - \$15,000
Downtown Parking	<ul style="list-style-type: none"> ▪ Designate 15 minute parking for laundromat ▪ Institute a Winter Parking Management Program ▪ Add diagonal or parallel parking to Park Place when future demand warrants additional parking 	<ul style="list-style-type: none"> ▪ \$50 / sign ▪ Management Costs ▪ \$20,000 - \$30,000 depending on design
Brooks / Shaws Shopping Center	<ul style="list-style-type: none"> ▪ Close or convert western Main Street access to right-turn entrance only ▪ Close middle Main Street access and convert to a pedestrian walkway / bicycle / green area ▪ Install grassed islands in parking lot, add curbing, sidewalks and green area behind Main Street buildings, re-direct bank parking to create truck loading / unloading area 	<ul style="list-style-type: none"> ▪ \$300 (convert) - \$1,000 (close) ▪ \$1,000 - \$3,000 ▪ \$8,000 – \$12,000

Downtown Bristol Traffic Study

Problem Area	Recommendation	Cost Estimate
West Street / Maple Street Intersection	<ul style="list-style-type: none"> ▪ Install curbing and grassed islands to clearly delineate two access points to the Mobil Station ▪ Reconfigure the site to define parking spaces ▪ Install an access onto Maple Street ▪ Creemee Stand access / parking reconfiguration 	<ul style="list-style-type: none"> ▪ \$1,000 ▪ \$2,000 ▪ \$2,000 ▪ \$3,000 - \$5,000
West St. / North St. / South St.	<ul style="list-style-type: none"> ▪ Convert the signal to semi-actuated operation ▪ Install a new controller, replace signal heads, add an eastbound left-turn lane on West Street and program an advanced green phase for eastbound traffic on Main Street ▪ Convert diagonal parking on South Street to perpendicular parking (including an overlay of 300 lf of South Street) ▪ Make southbound lane on North Street narrower by creating on-street parking or a wider green strip ▪ Install bulb-outs and raised textured crosswalks on all four corners of the intersection ▪ Create parallel parking spaces in front of the Merchants Bank and the Post Office 	<ul style="list-style-type: none"> ▪ \$1,000 - \$2,000 ▪ \$40,000 - \$50,000 ▪ \$8,000 - \$12,000 ▪ \$2,000 - \$3,000 ▪ \$5,000 - \$8,000 ▪ \$2,000 - \$3,000
Traffic Calming Project	<ul style="list-style-type: none"> ▪ Complete the Traffic Calming Study and Approval Process for a traffic calming project on VT Route 116 from Airport Drive to Lincoln Road 	<ul style="list-style-type: none"> ▪ \$15,000 - \$20,000

P:\2001\01_109\report.wpd

APPENDIX A

Meeting Minutes

Meeting Minutes

September 16, 2002

As part of the Downtown Bristol Traffic Study, Roger Dickinson and Jody Carriere met with Ernie Pomerleau and Steve Ploesser of the Pomerleau Real Estate Co. to obtain their concerns and input concerning parking and circulation on the Shaws / Brooks / Middlebury Bank shopping center parcel. Pomerleau Real Estate developed this shopping center approximately 25 years ago by consolidating five small parcels into one. Even by the standards in use at that time, the number of parking spaces provided on the consolidated parcel was marginal.

Pomerleau Real Estate owns exclusive rights to the parking and circulation on this parcel; the adjoining parcels reportedly do not have any legal access or parking easements. This has apparently been a source of conflict with several of the adjoining parcels, as Pomerleau essentially receives no compensation for the use and maintenance of their parking by others. Historically, they have tolerated public use of their parking by others to the extent that it does not interfere with or restrict the parking available to their tenants. Although they have observed downtown shoppers, apartment residents and others using the parking on the shopping center parcel for long-term parking, they feel that it would be counter-productive to strictly enforce a ban on such parking. This works for most of the year. During the winter, however, it is their absolute policy that no overnight parking is allowed on their property. They have found this to be necessary in order to remove snow and prepare the parking areas for day-time use; and every fall, notices are distributed to this effect. Vehicles found parked overnight during the winter months are then towed as necessary.

Their opinion is that Bristol needs to have an ongoing parking management program for the winter months, similar to what was first tried last winter. They point out that putting the time and effort into such a program is generally less expensive than constructing additional parking lots.

APPENDIX B

Traffic Counts

APPENDIX C

Accident Data

APPENDIX D

Traffic Calming

Step 1: Problem Identification by Local Government or Community Group

At the June 24, 2002 public meeting which was held to obtain input from the Bristol community for the Downtown Bristol Traffic Study, several attendees expressed their view that traffic was traveling at excessive speeds through the Village. Concerns were also expressed relative to traffic safety, given the number of large trucks traveling VT 116 combined with the presence of on-street parking and pedestrians in the downtown area. Attendees at this meeting included representatives of the Town of Bristol, its Selectboard and Planning Commission and representatives of the Addison County Regional Planning Commission.

Step 2: Problem Review: Identify Study Area, Problematic Route Sections and Supporting Justification

Study Area / Problematic Route Sections

Several areas along VT Route 17 / 116 extending from Airport Drive to Lincoln Road have been identified in the Downtown Bristol Traffic Study as problem areas for pedestrians and bicyclists. The problematic sections along this route include the following:

- Mid-block crosswalk between the Mobil Station and Village Creeme Stand
- Long crosswalks at the North / South / Main Street intersection
- Mid-block crosswalk at the bank on Main Street
- Roadway segment from Lord's Prayer Rock east to Lincoln Road problematic for bicyclists

Traffic Conditions

VT Route 116 through the Village of Bristol is a Class 1 town highway with a posted speed limit of 30 mph. Functionally, this portion of Route 116 is classified as a rural minor arterial. There are no parallel routes in the immediate vicinity, although the Monkton Rd. / Burpee Rd. corridor located approximately one mile west of the Village is a well-known short-cut between Hinesburg and East Middlebury. That corridor is posted to prohibit through truck traffic.

The most recent available traffic counts are ATR (automatic traffic recorder) counts performed by VTrans in 2000. These counts are typically 7-day counts and provide both hourly and daily traffic volumes. The following table shows the results of those counts:

Count ID	Cross-Street	AADT (vpd)	Peak Hour (vph)
A127	Stony Hill Rd.	5,500	617
A162	School St.	6,000	750
A126	Rockydale Rd.	4,700	523

For the Downtown Bristol Traffic Study, Lamoureux & Dickinson performed two speed surveys on East and West Streets for a five-hour period on Thursday, June 20, 2002. The results are shown in the following table:

Location	Avg. Speed (mph)	85 th Percentile Speed (mph)	Percent Vehicles > 30 mph
West St. (east of Maple St.)	32	33	35%
East St. (east of Mountain St.)	34	34	55%

The two speed surveys on West and East Streets were performed in close proximity to the downtown area where speeds are constrained by the presence of on-street parking, pedestrians and the traffic signal at the North St. / South St. intersection. Higher speeds are likely as vehicles enter and exit the Village in the area of Prayer Rock and to a lesser extent near Airport Road.

A pedestrian and traffic count was also performed on June 20th from 3-6 p.m. at the North/South/East/West Street intersection. Hourly pedestrian volumes in the 20-30 pedestrians per hour range crossing North St., and 10-20 pedestrians per hour crossing each of the remaining three approaches were observed.

Local accident data obtained from the Bristol Police Department indicates that 115 accidents have occurred in the project area (from Airport Drive to Lincoln Road) during the January 1, 1999 to present time period.

Land-Use

Bristol Village provides a wide-range of services to surrounding towns. The core downtown area is densely developed with a mixture of commercial, retail and residential buildings. The commercial sector provides professional services (medical and general offices), several eating establishments, a laundromat and two bank branches. Retail uses include a Shaw's Supermarket, a Brooks drug store, several convenience and beverage stores plus numerous smaller specialty-retail stores. Municipal offices and a Post Office are also located in the downtown area.

The Village downtown area makes extensive use of on-street parking in a mix of diagonal, perpendicular and parallel parking. With a generally high-turnover rate, numerous traffic conflicts are created by vehicles entering and exiting parking spaces throughout the day.

Immediately to the west and an integral part of Bristol's downtown area is the Town Green. Located on the north side of Route 116, the Green serves as a focal point of the Village. With benches, a small playground, a gazebo and a fountain, adjacent churches and offices, the Green is actively used. The entire Village is served by an extensive sidewalk network which links the downtown to surrounding residential areas and schools. Mount Abraham Union High School is located on the westerly edge of the Village at the intersection of West Street and Airport Road. The local elementary school is located some distance north of the Village off from Mountain Street. School

children living in the Village walk to school.

VTrans Input

Dick Hosking, the District Transportation Administrator (DTA) for this region, was contacted to obtain his input on a traffic calming project for this section of VT Route 116. Because a majority of the roadway (from Airport Drive to the Lord's Prayer Rock) is a Class 1 Town Highway the only requirement VTrans has is that any traffic calming devices which are installed must not restrict the use of this roadway as a through route for heavy trucks.

Greg Riley, the VTrans Planning Coordinator for this region, has reviewed the Step 1 and Step 2 information and had no additional input.

Traffic Calming Project Justification

With the problem area identified and the existing conditions documented the following questions have been asked to determine if a traffic calming project is justified:

Is there a conflict between traffic speeds and the built environment along the road?

Prevailing traffic speeds of 33-34 mph are inappropriate for the built environment within the study area which is densely developed. In particular, the Bristol downtown has all of the characteristics of a central business district of a larger community, with on-street parking and high numbers of pedestrians. This creates numerous points of conflicts with traffic traveling on VT 116. Additionally, vehicles traveling East Street beyond the Prayer Rock often increase their speeds, although the posted speed limit remains at 30 mph. Although VT 116 has very narrow shoulders and no sidewalks along most of this route, numerous bicyclists and pedestrians travel along this roadway to and from Bartlett Falls, a popular swimming hole.

Would traffic-calming devices reduce traffic speeds without affecting the general mobility and character of the region?

Traffic calming devices will not adversely affect general mobility of the region. Because of the high volume of heavy truck traffic, the use of speed humps or other similar devices which would create high noise levels and vibrations as trucks travel over them is not recommended. In general, however, it is believed that traffic calming devices will enhance the character of the downtown Village area as a people-friendly commercial center and community focal point.

Is the problem occurring in a village setting?

Yes, downtown Bristol meets all five criteria used to determine a Village setting as summarized in the following table.

Village Criteria	Downtown Bristol Conditions
Speed limit of 40 mph or less	Yes – speed limit = 30 mph
There are sidewalks in the area	Yes – there are sidewalks along VT Route 17/116 from Airport Drive to the street east of Basin Street
Residences, commercial and civic buildings such as town halls, post offices, churches, etc. are so located that walking and bicycling are convenient modes of travel within the area.	Yes – all of the listed uses are located within walking / bicycling distance in the downtown area
The density of houses gives the area the appearance of a connected settlement	Yes – the buildings along the downtown block are physically connected or separated by narrow alleys
The area is designated as a village in the Town or Regional plan	Yes – Main Street is designated as a Village in downtown Bristol

With positive responses to all three of the above questions, we conclude that the traffic calming study and approval process should be completed for a traffic calming project along VT Route 17 / 116 in downtown Bristol from Airport Drive to Lincoln Road.