U.S. Route 1
Corridor Traffic Study

Ogunquit, Maine

Prepared By

Maine Department of Transportation
Bureau of Planning

May 2005

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I. Introduction

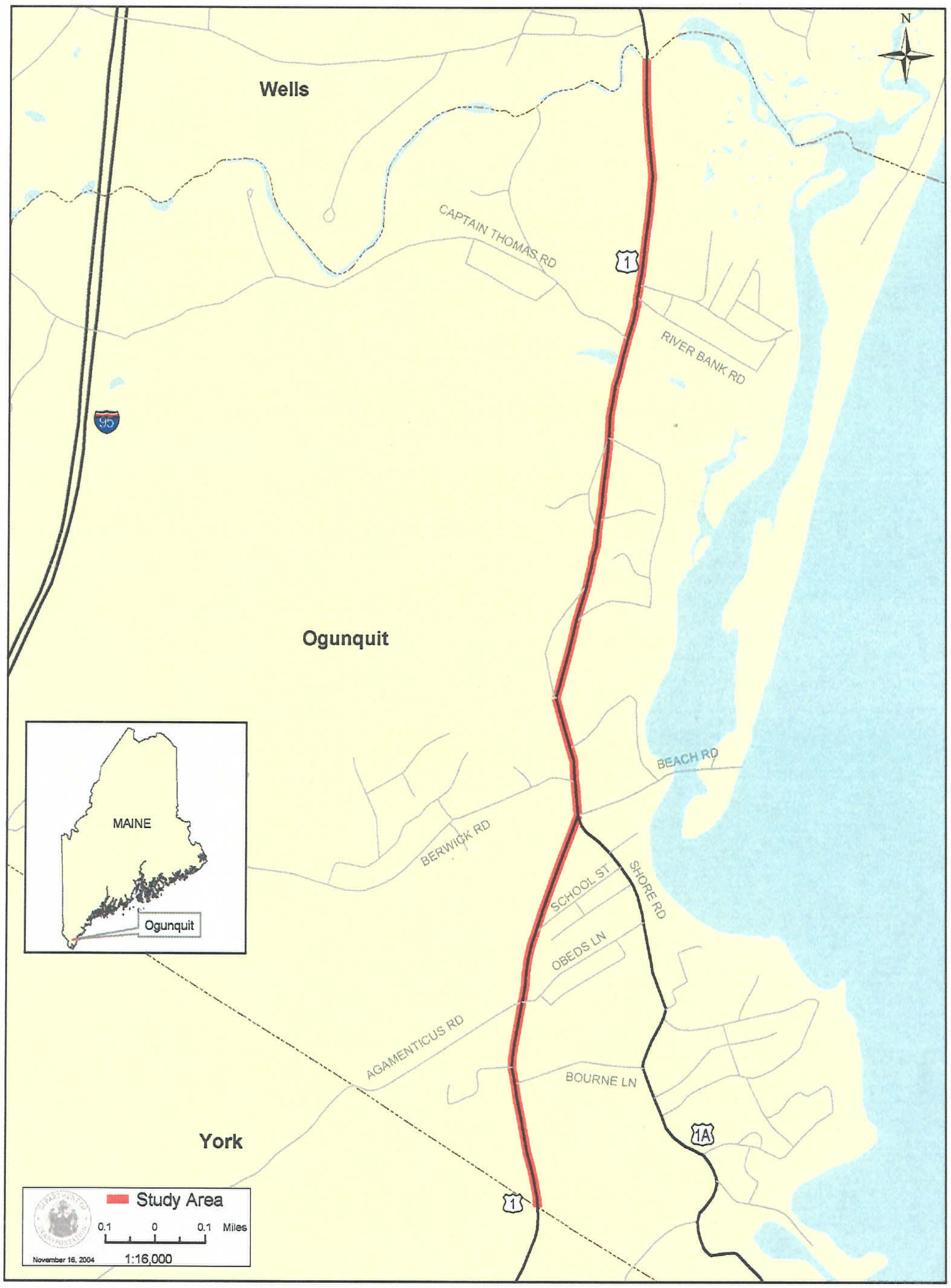
The quality of traffic flow along the U.S Route 1 corridor in southern Maine has, over the years, steadily deteriorated to the point where significant congestion is being experienced during the peak travel periods, especially during the summer months when tourist travel is at its peak. This situation has resulted, in part, from a steady growth in tourism and commercial and residential development.

This study focuses on a 2.3 mile section of U.S. Route 1 in the Town of Ogunquit. The corridor extends from the York/Ogunquit town line north to the Ogunquit/Wells town line. The Study Area is shown in Figure 1.

The primary objective of this Planning Study is to assess existing (base) traffic and roadway conditions along the U.S. Route 1 corridor to identify existing deficiencies relative to mobility, safety, physical conditions and roadway geometrics; to estimate travel demand conditions for the year 2023 based on historical traffic growth trends; to identify potential future roadway deficiencies; and to identify Transportation System Management (TSM) actions to reduce congestion and increase safety on U.S. Route 1 in the Ogunquit Village Center.

Figure 1

Study Area



II. Existing Corridor Conditions

The analysis of existing conditions provides a detailed description of the current physical and operating characteristics of the Route 1 corridor. It also serves as a benchmark for analyzing future conditions and comparing potential improvement alternatives. An important product of the existing conditions analysis is the identification of physical and operational deficiencies in the Route 1 corridor which adversely affect its ability to serve safely and efficiently.

A. Traffic Volumes

1. Seasonal and Daily Variations

Maine Department of Transportation permanent traffic counting station located on Route 1 in Ogunquit north of the Captain Thomas Road provided data for an analysis of Route 1 traffic flow variations. These typical monthly, daily, and hourly variations in traffic flow along the Route 1 corridor are shown in the following figures.

Figure 2, which shows the monthly variation in the average daily traffic for the year 2003, clearly shows the seasonal nature of traffic along the Route 1 corridor. Annual Average Daily Traffic (AADT) at the permanent station is 14,550 vehicles per day. Due primarily to the recreational and tourist activity in the region, traffic volumes peak during the months of July and August at a level equal to 160 percent of the AADT, or a volume of approximately 23,300 vehicles per day. Traffic volumes on Route 1 during the months of May thru October equal or exceed the AADT, while during the "off-season" months of November thru April volumes average less than the AADT. The average daily traffic in January is only 57% of the AADT. Further demonstrating the seasonality of Route 1 is the fact that 38% of the total annual traffic on Route 1 occurs during the months of June, July and August.

Figure 3 shows the daily variation in July and August traffic volumes expressed as a percent of the weekly average daily traffic volume. The data shows that there is slight daily variation in traffic over the course of the week. Saturday volumes are typically the highest of the week, approximately 5 percent greater than the average day.

Figure 2
Monthly Traffic Variation

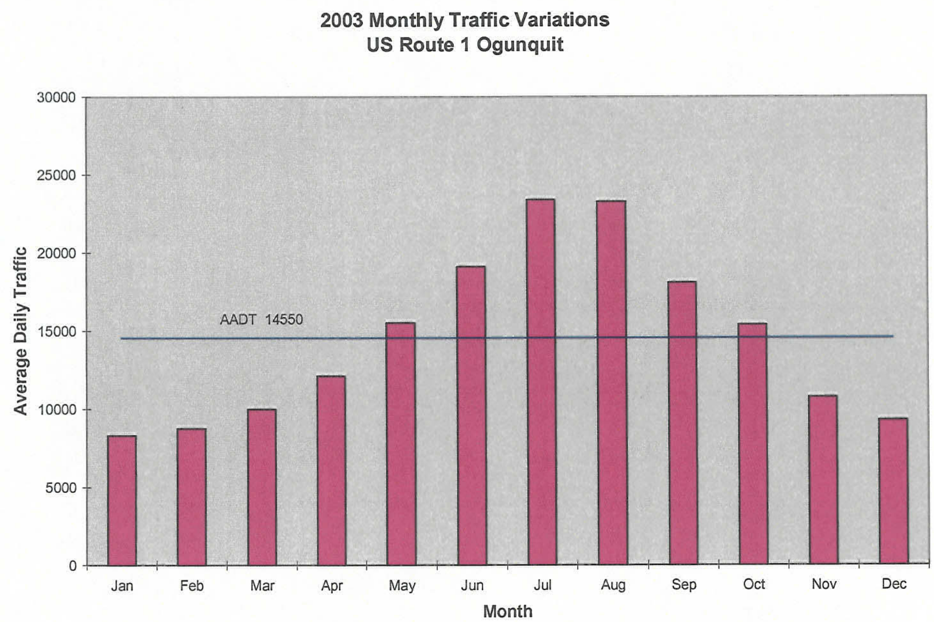


Figure 3
Daily Traffic Variation

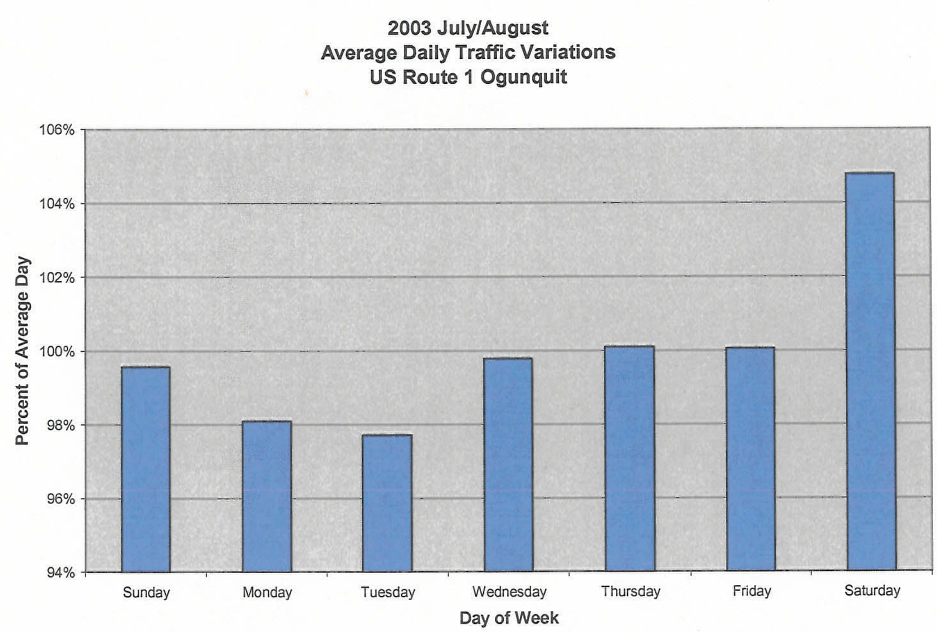
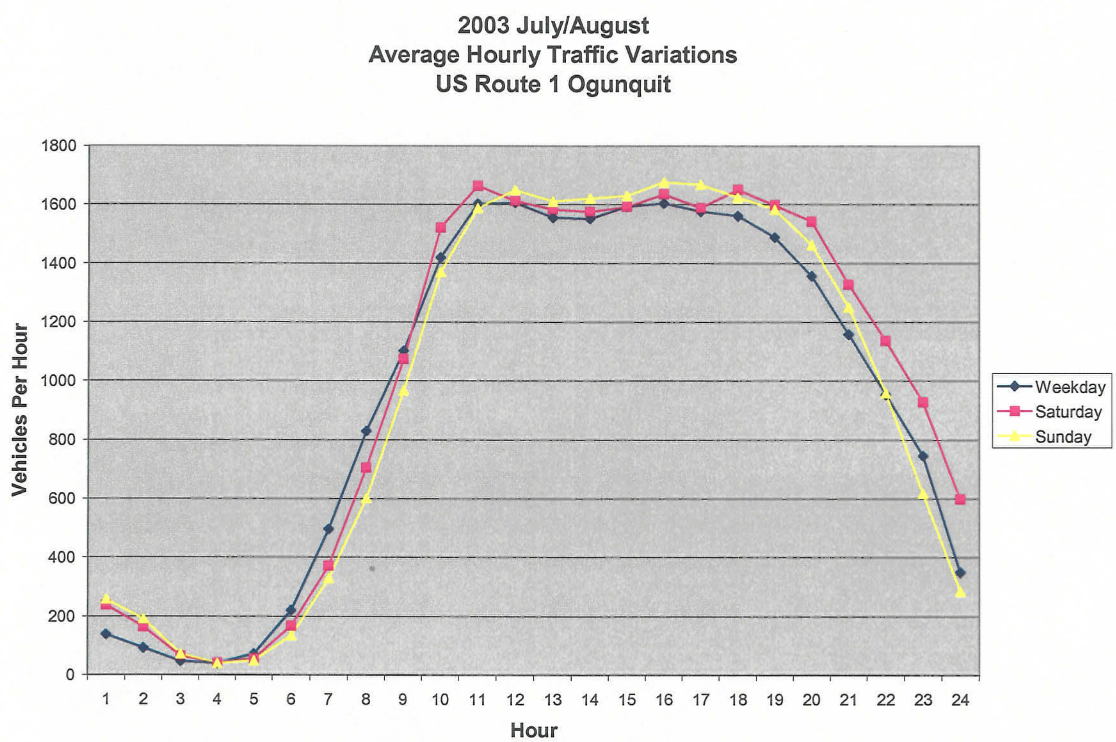


Figure 4 shows the variation of traffic volume by hours of the day during the same peak summer period. In non-recreational areas, hourly traffic volumes would show peak periods of travel during the morning and in the evening when work-related trips generally take place. Hourly traffic volumes along the Route 1 corridor do not exhibit this typical distribution. This is due primarily to the high level of seasonal recreational activities in the late morning and afternoon hours. Volumes tend to steadily increase from 6 am to 10 am when traffic volumes tend to level out at a peak that is spread out over an 8 hour period to about 6 pm. After 6 pm, volumes begin to decrease and reach a low at 4 am.

Figure 4

Hourly Traffic Variation



2. Intersection Turning Movement Volumes

Manual turning movement counts used in the Corridor Study cover seven intersections. Seven-hour (11:00 a.m. to 6:00 p.m.) counts taken in August 2000 at four intersections were supplemented by twelve-hour (6:00 a.m. to 6:00 p.m.) counts taken in August 2003 at three additional intersections. Pedestrian crossing movements were recorded, as well as car and truck turning movements. The seven intersections are listed in Table 1, along with the dates when the counts were taken and the observed peak hour. The wide range of peak hours at these intersections is an indicator of steady volume of traffic during the late morning and afternoon. The peak hour turning volumes for these intersections are shown in Appendix 3.

Table 1

Peak-Hour Traffic Counts at Selected Intersections

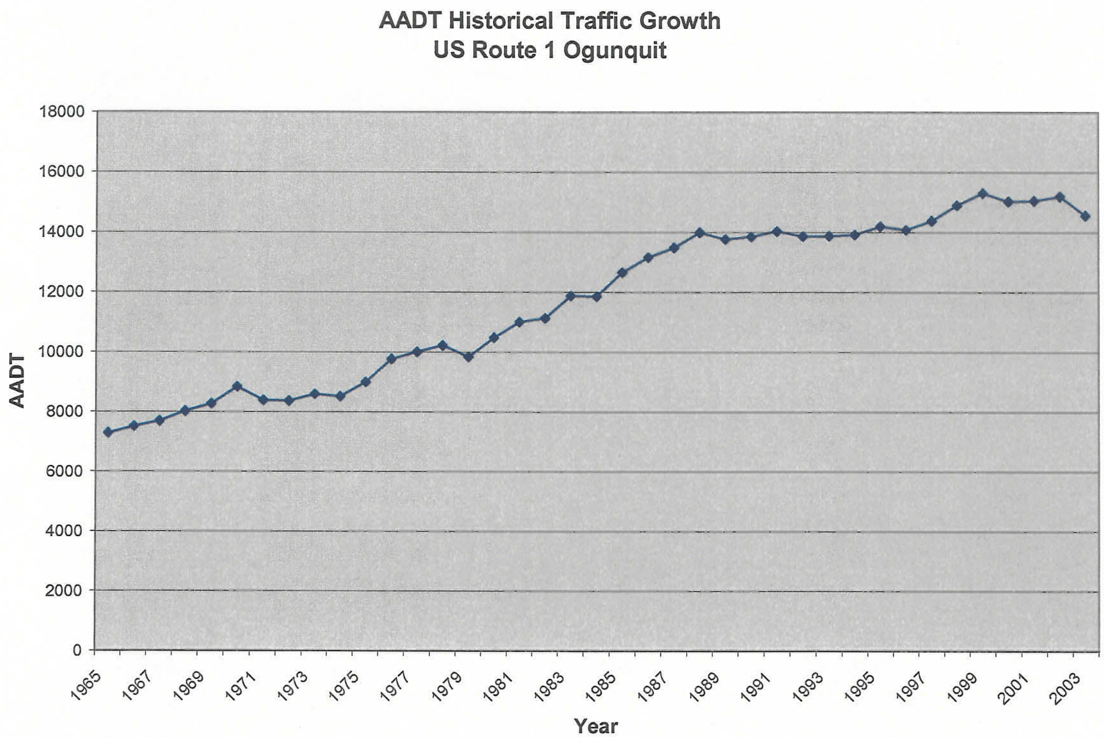
Intersection	Date of Count	Peak Hour
Bourne Lane and Route 1	8-08-00	3:15-4:15
School Street and Route 1	8-15-00	11:15-12:15
Beach Road, Shore Road and Route 1	8-17-00	12:45-1:45
School Street and Shore Road	8-16-00	11:00-12:00
Agamenticus Road, Obeds Road and Route 1	8-01-03	11:00-12:00
Berwick Road and Route 1	8-01-03	10:45-11:45
Captain Thomas Road and Route 1	8-01-03	10:00-11:00

3. Historical Traffic Growth

Figure 5 shows the historical growth in traffic over the past 38 years. For most of this period, the annual growth in the AADT has average about 250 vehicles. In recent years (1999-2002), the AADT has been nearly constant, with a decline in 2003.

Figure 5

Historical Traffic Growth



B. Existing Conditions Inventory

1. Roadway Geometrics

The existing physical characteristics of the corridor help to define the potential and the limitations of the existing roadway. The ability of the corridor to operate as a highway is largely controlled by the physical setting.

Table 2 presents a segment-by-segment inventory of existing roadway geometric conditions for the Route 1 corridor. The following elements are included in the table:

- Begin and end node descriptions
- Begin and end miles along the corridor
- Segment length (miles)
- Posted speed limit
- Shoulder type and width
- Number of lanes and widths
- Center two-way left-turn lanes and widths
- Left and right turn lanes and widths
- Sidewalks
- Parking

- Pavement condition rating (PCR)
- Pavement condition description

In general, the pavement width varies from 28 feet to 30 feet with a 50 foot width in the vicinity of Shore Road and Berwick Road. The shoulders on each side of the traveled way vary in type and with, from 3 feet of gravel to 12 feet of curbed pavement where on-street parking is provided between Shore Road and Berwick Road. Although there are sidewalks on some portions of the corridor, they generally are only on one side of the road and switch back from one side to the other.

For nearly all of the Route 1 corridor in Ogunquit, the available pavement width is marked for three travel lanes: one through lane in each direction and a center two-way left-turn lane. With typical pavement widths of 28 to 30 feet, travel lanes are only 9 or 10 feet in width. Adequate widths for travel lanes in this corridor would be 11 or 12 feet in width.

2. Right-Of-Way

Existing right-of-way width on Route 1 in the Study Area is typically 66 feet with three exceptions. At Bessie's Restaurant just south of Shore Road, the width narrows to 58 feet following the building's face, between the Inside/Out Café just south of Berwick Road and Berwick Road the width is 60 feet, and from Berwick Road to just north of Hoyt's lane the width varies from 68 feet to 87 feet.

3. Pavement Conditions

The Pavement Conditions Rating (PCR) is an evaluation of distresses in the pavement (such as cracking and wheel path rutting). PCR's will always range from 5 for a newly paved roadway to 0 for a road that is completely deteriorated. It is generally most cost-effective to resurface a road before the PCR drops below a rating of 3. PCR's do not account for base material, shoulders, drainage or longitudinal profile (ride).

Listed below are descriptions for different PCR:

- PCR 5.0 – Excellent. New or nearly new pavements. Free of cracks, patches, or rutting.
- PCR 4.0 – Good to Excellent. Pavement exhibiting few, if any, visible signs of surface deterioration.
- PCR 3.3 – Good. Evidence of initial deterioration including hairline cracks and minor rutting.
- PCR 2.4 – Fair to Poor. Visible defects including moderate cracking, distortion, and rutting. Some patching may now be present.
- PCR 1.2 – Poor. Extremely deteriorated pavements. Defects include severe cracking, distortion, and rutting. Very extensive patching.
- PCR 0.8 – Very Poor. Pavement is completely deteriorated. No structural integrity. No salvage value.

Table 2

Route 1 Existing Conditions Inventory

Begin Node Location Description	End Node Location Description	Begin Mile Point	End Mile Point	Segment length (mi)	Speed Limit (mph)	Left Shoulder		Right Shoulder		Number of lanes	Traveled Way Width (ft)	Center Two-way Left-Turn Lane	Center Two-way Left-Turn Lane Width (ft)	Left-Turn Lanes	Left-Turn Lanes Width (ft)	Right Turn lanes	Sidewalks	Parking	Pavement Condition	
						Type	Width (ft)	Type	Width (ft)										Rating (PCR)	Description
TL - Ogunquit, York		14.28	14.29	0.01	35	Gravel	3	Paved	6	2	28	No	0	No	0	No	None	None	4.1	Good to Excellent
		14.29	14.5	0.21	35	Gravel	3	Paved	6	3	28	Yes	9	No	0	No	East Side	None	4.1	Good to Excellent
	Int of BOURNE LN, US 1	14.5	14.52	0.02	35	Gravel	3	Paved	6	3	28	Yes	9	No	0	No	East Side	None	4.1	Good to Excellent
Int of BOURNE LN, US 1	Int of JOSIAS LN, US 1	14.52	14.55	0.03	35	Gravel	3	Paved	6	3	28	Yes	9	No	0	No	East Side	None	4.1	Good to Excellent
Int of JOSIAS LN, US 1	Int of AGAMENTICUS RD, OBEDS LN, US 1	14.55	14.67	0.12	35	Gravel	3	Paved	6	3	28	Yes	9	No	0	No	East Side	None	4.1	Good to Excellent
Int of AGAMENTICUS RD, OBEDS LN, US 1		14.67	14.82	0.15	30	Curbed	0	Gravel	2	3	28	Yes	9	No	0	No	West Side	None	4.1	Good to Excellent
	Int of SCHOOL ST, US 1	14.82	14.83	0.01	30	Curbed	0	Gravel	2	3	28	Yes	9	No	0	No	West Side	None	4.07	Good to Excellent
Int of SCHOOL ST, US 1		14.83	14.93	0.1	30	Curbed	0	Paved	2	3	28	Yes	9	No	0	No	West Side	None	4.07	Good to Excellent
		14.93	15.02	0.09	30	Curbed	0	Paved	6	3	30	Yes	9	No	0	No	Both	None	4.07	Good to Excellent
	Int of BEACH RD, SHORE RD, US 1	15.02	15.07	0.05	30	Curbed	0	Curbed	0	3	46	Yes	9	No	0	No	Both	None	4.07	Good to Excellent
Int of BEACH RD, SHORE RD, US 1	Int of BERWICK RD, US 1	15.07	15.14	0.07	30	Curbed	0	Curbed	0	3	50	No	0	Yes	12	No	East Side	East Side	4.07	Good to Excellent
Int of BERWICK RD, US 1	Int of HOYTS LN, US 1	15.14	15.21	0.07	30	Curbed	0	Curbed	0	2	32	No	0	No	0	No	Both	None	4.07	Good to Excellent
Int of HOYTS LN, US 1		15.21	15.27	0.06	30	Curbed	0	Curbed	0	2	32	No	0	No	0	No	Both	None	4.07	Good to Excellent
	Int of KINGS HWY, US 1	15.27	15.31	0.04	30	Gravel	4	Paved	6	2	28	No	0	No	0	No	Both	None	4.07	Good to Excellent
Int of KINGS HWY, US 1		15.31	15.36	0.05	40	Gravel	4	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	4.07	Good to Excellent
		15.36	15.41	0.05	40	Gravel	4	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	4.09	Good to Excellent
	Int of GRASS HOPPER LN, US 1	15.41	15.48	0.07	40	Gravel	6	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	4.09	Good to Excellent
Int of GRASS HOPPER LN, US 1	Int of KINGS HWY, US 1	15.48	15.54	0.06	40	Gravel	6	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	4.09	Good to Excellent
Int of KINGS HWY, US 1	Int of KINGS HWY, US 1	15.54	15.64	0.1	40	Gravel	4	Paved	6	3	30	Yes	9	No	0	No	East Side	None	4.09	Good to Excellent
Int of KINGS HWY, US 1	Int of KINGFIELD AV, US 1	15.64	15.66	0.02	40	Gravel	4	Paved	6	3	30	Yes	9	No	0	No	East Side	None	4.09	Good to Excellent
Int of KINGFIELD AV, US 1	Int of GRASS HOPPER RD, KINGS HWY, US 1	15.66	15.8	0.14	40	Gravel	4	Paved	6	3	30	Yes	9	No	0	No	East Side	None	4.09	Good to Excellent
Int of GRASS HOPPER RD, KINGS HWY, US 1		15.8	15.91	0.11	40	Gravel	6	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	4.09	Good to Excellent
		15.91	15.98	0.07	40	Gravel	6	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	3.95	Good
	Int of CAPT THOMAS RD, US 1	15.98	16.02	0.04	40	Gravel	6	Gravel	6	3	30	No	0	Yes	9	No	None	None	3.95	Good
Int of CAPT THOMAS RD, US 1	Int of RIVER BANK RD, US 1	16.02	16.1	0.08	40	Gravel	6	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	3.95	Good
Int of RIVER BANK RD, US 1	Int of OCEAN ST, US 1	16.1	16.13	0.03	40	Gravel	6	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	3.95	Good
Int of OCEAN ST, US 1		16.13	16.24	0.11	40	Gravel	6	Gravel	6	3	30	Yes	9	No	0	No	East Side	None	3.95	Good
	TL - Ogunquit, Wells	16.24	16.58	0.34	40	Gravel	6	Gravel	6	3	30	Yes	9	No	0	No	None	None	3.97	Good

The PCR for Route 1 in Ogunquit ranges from 3.95 to 4.1. The corridor falls within the categories of Good and Good to Excellent.

4. Roadway System

Route 1 within the Study Area has a federal functional classification designation of Minor Arterial. Minor Arterials are highways that tend to link Collector Roads to Principal Arterials and typically serve lower traffic volumes and have lower designed travel speeds than Principal Arterials.

5. Intersections

There are six key intersections in the Study Area. They are described in the subsection that follows.

Route 1 at Bourne Lane – South End of Study Area

- This is a three-legged unsignalized intersection.
- Traffic is controlled by a stop sign on the Bourne Lane approach.
- The east approach (Bourne Lane) consists of a single lane approach flared at the intersection to provide a 45 foot left turn-lane and a right turn-lane.
- The north approach (Route 1) consists of a shared through/right-turn lane and a center two-way left-turn lane (CTWLTL).
- The south approach (Route 1) consists of a through lane and a CTWLTL.
- The lane approach widths are 9 feet on Route 1 and 10 feet on Bourne Lane.

Route 1 at Obeds Lane and Agamenticus Road

- This is an offset four-legged unsignalized intersection.
- Traffic is controlled by stop signs on the Obeds Lane and Agamenticus Road approaches.
- The east approach (Obeds Lane) consists of a single shared lane.
- The west approach (Agamenticus Road) intersects Route 1 at a skew angle and consists of a single shared lane.
- The north approach (Route 1) consists of a shared through/right-turn lane and a CTWLTL.
- The south approach (Route 1) consists of a shared through/right-turn lane and a CTWLTL.
- The lane approach widths are 9 feet on Route 1, 9 feet on Obeds Lane, and 10 feet on Agamenticus Road.

Route 1 at School Street

- This is a three-legged unsignalized intersection.
- Traffic is controlled by a stop sign on the School Street approach.
- The east approach (School Street) intersects Route 1 at a skew angle and consists of a single lane approach flared at the intersection to provide a 25 foot left turn-lane and a right turn-lane.

- The north approach (Route 1) consists of a shared through/right-turn lane and a CTWLTL.
- The south approach (Route 1) consists of a through lane and a CTWLTL.
- The lane approach widths are 9 feet on Route 1 and 9 feet on School Street.

Route 1 at Shore Road and Beach Road – Ogunquit Village Area
- This is a K-shaped, four-legged unsignalized intersection.
- Traffic is controlled by stop signs on the Shore Road and Beach Road approaches.
- The east approach (Shore Road) intersects Route 1 at a skew angle and consists of a shared single lane. There is sufficient room to support two approach lanes for approximately 35 feet; one for through vehicles and one for right-turning vehicles.
- Left-turns are prohibited from Shore Road to Route 1 south.
- The other east approach (Beach Road) intersects Route 1 at a skew angle and consists of a right-turn lane, an 80 foot through lane, and a 60 foot left-turn lane.
- The north approach (Route 1) consists of a shared through/right-turn lane and a CTWLTL.
- The south approach (Route 1) consists of a through lane and a left-turn lane.
- Parking is permitted along the south side of Shore Road near the intersection and along the east side of the Route 1 south approach.
- The lane approach widths are 10 feet on Route 1 south approach, 12 feet on Route 1 north approach, 16 feet on Shore Road, and 12 feet on Beach Road.

Route 1 at Berwick Road
- This is a three-legged unsignalized intersection.
- Traffic is controlled by a stop sign on the Berwick Road approach.
- The west approach (Berwick Road) intersects Route 1 on a downgrade and consists of a shared single lane approach.
- The north approach (Route 1) consists of a shared through/right-turn lane and a left-turn lane.
- The south approach (Route 1) consists of a shared through/left-turn lane.
- The lane approach widths are 14 feet on Route 1 south approach, 10 feet on Route 1 north approach, and 12 feet on Berwick Road.

Route 1 at Captain Thomas Road – North End of Study Area
- This is a three-legged unsignalized intersection.
- Traffic is controlled by a stop sign on the Captain Thomas Road approach.
- The west approach (Captain Thomas Road) intersects Route 1 at a skew angle and consists of a shared single lane approach.
- The north approach (Route 1) consists of a shared through/right-turn lane and a CTWLTL.
- The south approach (Route 1) consists of a through lane and a left-turn lane.
- The lane approach widths are 9 feet on Route 1 and 12 feet on Captain Thomas Road.

6. Safety

Crash data for the years 2001 through 2003 were used to identify High Crash Locations (HCLs) in the Study Area. A HCL is a location which has eight (8) or more traffic crashes and a Critical Rate Factor (CRF) greater than 1.00 in a three-year period. A highway location with a CRF greater than 1.00 has a frequency of crashes that is significantly greater than the statewide average for similar locations. Table 3 summarizes the location, the number of crashes and CRF for the Study Area intersections and road segments.

Based on the results of the crash research, two locations within the Study Area meet High Crash Location criteria. Collision diagrams were prepared for these locations to determine if there are any crash patterns or trends evident that may indicate correctable roadway/intersection deficiencies. These diagrams are provided in Appendix 2. The following paragraphs summarize the results of the crash research.

Route 1 at Shore Road and Beach Road

Eight collisions occurred at this intersection between 2001 and 2003: 4 crashes in 2001, 1 in 2002 and 3 in 2003. The CFR is 1.27. According to the injury types there were 0 fatal, 0 incapacitating, 0 non-incapacitating, 2 possible injury and 6 no injuries (property damage) with a 25.0 % injury rate. Five were angle collisions; two as vehicles exited Beach Road turning left and right, one as a vehicle turned left from Shore Road (a prohibited movement), one as a southbound Route 1 vehicle turned left onto Beach Road, and one as a vehicle exited a business on Shore Road. The remaining 3 crashes were rear-end collisions; one on Beach Road, one on southbound Route 1, and one on northbound Route 1. There is no crash pattern at this intersection.

Route 1 at Berwick Road

Nine collisions occurred at this intersection between 2001 and 2003: 3 crashes in 2001, 3 in 2002 and 3 in 2003. The CFR is 1.67. According to the injury types there were 0 fatal, 0 incapacitating, 1 non-incapacitating, 1 possible injury and 7 no injuries (property damage) with a 22.2 % injury rate. There were 4 rear-end collisions; one on Berwick Road, one on southbound Route 1, and two on northbound Route 1. There were three angle collisions: two as a vehicle turned left from Berwick Road and one as a vehicle turned right from Berwick Road. The remaining two were sideswipe collisions; one as a southbound vehicle made an improper left turn and one was a single vehicle that struck an illegally parked vehicle on Berwick Road.

Table 3

Crash Data Summary, 2001-2003

Location on Route 1			
Intersection	**Road Segment**	**Number of Crashes**	**CRF**
York TL		0	0.00
	York Town Line to Bourne Lane	1	0.14
Bourne Lane		2	0.47
	Bourne Lane to Josias Lane	0	0.00
Josias lane		0	0.00
	Josias Lane to Agamenticus Road	2	0.49
Agamenticus Road		3	0.68
	Agamenticus Road to School Street	4	0.73
School Street		1	0.24
	School Street to Shore Road	7	1.05
Shore Road		**8**	**1.27**
	Shore Road to Berwick Road	7	2.22
Berwick Road		**9**	**1.67**
	Berwick Road to Hoyts Lane	4	1.12
Hoyts Lane		0	0.00
	Hoyts Lane to Kings Highway	2	0.37
Kings Highway		0	0.00
	Kings Highway to Grasshopper Lane	0	0.00
Grasshopper Lane		0	0.00
	Grasshopper Lane to Kings Highway	0	0.00
Kings Highway		0	0.00
	Kings Highway to Kings Highway	4	0.79
Kings Highway		0	0.00
	Kings Highway to Kingfield Avenue	2	1.26
Kingfield Avenue		0	0.00
	Kingfield Avenue to Grasshopper Lane	2	0.29
Grasshopper Lane		0	0.00
	Grasshopper Lane to Captain Thomas Road	7	0.75
Captain Thomas Road		1	0.18
	Captain Thomas Road to River Bank Road	2	0.48
River Bank Road		1	0.18
	River Bank Road to Ocean Street	1	0.49
Ocean Street		1	0.18
	Ocean Street to Well Town Line	10	0.61
Wells TL		0	0.00

The crash rate is determined by dividing the crashes by the amount of travel. Crash rates for the period 2001 through 2003 are shown in Table 4 for rural Minor Arterials statewide and for the Study Area. The crash rate for both roadway segments (links) and combined (links and nodes) is above the statewide average for Minor Arterials while the crash rate for the nodes (intersections) is below the statewide average.

Table 4

Crash Rate Comparison

	2001-2003 Statewide Crash Rate	**2001-2003 Study Area Crash Rate**
Links (crashes per 100 million vehicle-miles)	115.8	163.47
Intersections (crashes per million entering vehicles)	0.13	0.10
Links and Nodes (crashes per 100 million vehicle-miles)	157.8	243.72

A comparison between the types of crashes in the last three-year period and the statewide average for the past three years is shown in Table 5. The Study Area had higher percentages of rear-end/sideswipe, pedestrian, and sled/bike crashes than occurred statewide during that period.

Table 5

Crash Type Comparison

Crash Type	**Statewide 2001-2003 Total**	**Statewide Percent of Total %**	**Route 1 2001-2003 Total**	**Route 1 Percent of Total %**
Object in Road	2,306	2.10	1	1.22
Run Off Road	26,544	24.21	7	8.54
Rear End/Sideswipe	**37,874**	**34.54**	**51**	**62.19**
Head On/Sideswipe	3,722	3.39	2	2.44
Intersection Movement	20,768	18.94	15	18.29
Pedestrians	**832**	**0.76**	**2**	**2.44**
Sled/Bike	**535**	**0.49**	**1**	**1.22**
Train	23	0.02	0	0.0
All Other Animals	451	0.41	0	0.0
Deer	11,123	10.14	3	3.66
Moose	2,054	1.87	0	0.0
Bear	77	0.07	0	0.0
Non Collision	1,359	1.24	0	0.0
Other	1,995	1.82	0	0.0
Unknown	0	0.00	0	0.0
Total	**109,663**	**100.00%**	**82**	**100.00%**

A comparison between the time of year crashes in the last three-year period and the statewide average for the past three years is shown in Table 6. Route 1 crashes in the last three years had a higher than statewide average during the months of May through August. This finding is consistent with the seasonal nature of traffic in Ogunquit.

Table 6

Time of Year Comparison

Month	Statewide 2001-2003 Total	Statewide Percent of Total %	Route 1 2001-2003 Total	Route 1 Percent of Total %
January	11,251	10.26	7	8.54
February	9,115	8.31	2	2.44
March	9,842	8.97	1	1.22
April	6,545	5.97	3	3.66
May	**7,440**	**6.78**	**7**	**8.54**
June	**8,621**	**7.86**	**15**	**18.29**
July	**8,935**	**8.15**	**23**	**28.05**
August	**8,565**	**7.81**	**12**	**14.63**
September	7,715	7.04	3	3.66
October	9,041	8.24	4	4.88
November	10,252	9.35	3	3.66
December	12,341	11.25	2	2.44
Total	**109,663**	**100.00%**	**82**	**100.00%**

C. Mobility and Operating Conditions

1. Travel Speeds

A travel time study, using the floating car method, was conducted along Route 1 from Kittery to Wells in July 2000 to measure actual travel speeds and locate areas where significant travel delays are occurring. Six runs were made in both the northbound and southbound directions. The detailed runs are included in Appendix 6. Table 7 shows the average travel speeds for the Ogunquit section of Route 1. According to *2000 Highway Capacity Manual* (HCM2000), the average travel speed is the length of the highway segment divided by the average travel time of all vehicles traversing the segment, including all stopped delay times.

Table 7

Average Travel Speeds along the Corridor

Section End Points		Section Length (miles)	Posted Speed Limit (mph)	NB Direction Average Travel Speed (mph)	SB Direction Average Travel Speed (mph)
Mountain Road	Bourne Road	3.31	50/35	42.0	42.8
Bourne Lane	Agamenticus Road and Obeds Lane	0.15	35	8.9	31.3
Agamenticus Road and Obeds Lane	School Street	0.16	30	3.8	27.6
School Street	Shore Road and Beach Road	0.24	30	3.9	26.4
Shore Road and Beach Road	Berwick Road	0.07	30	7.6	17.4
Berwick Road	Captain Thomas Road	0.88	30/40	26.3	26.3
Captain Thomas Road	Tatnic Road	0.63	40	30.4	30.1

For the northbound direction, slow speeds and delays and substantial delays were found on the approaches to intersections of Agamenticus Road and Obeds Lane, School Street, Shore Road, and Berwick Road due to traffic congestion and pedestrian movements. Overall average travel speeds of approximately 4 to 8 mph were encountered. Delays in through traffic movement, in excess of 5 minutes, were experienced at the Shore Road and Beach Road intersection.

2. Level of Service

A major element of this study is the evaluation of operating conditions along the corridor relative to existing and future traffic mobility. To assess mobility, capacity and level of service (LOS) analyses were conducted for intersections within the Study Area using the Synchro/SimTraffic software package.

Capacity is defined as the "maximum sustainable flow rate at which vehicles or persons reasonably can be expected to traverse a point or uniform segment of a lane or roadway during a specific time period under given roadway, geometric, traffic, environmental, and control conditions". Conditions or factors that affect capacity include the number of travel lanes, lane and shoulder width, lateral clearances, alignment, the characteristics of vehicles in the traffic stream, and traffic control and regulations in existence.

Level of service (LOS) is a qualitative measure describing operational conditions within a traffic stream taking into account a number of variables such as speed and travel time, vehicles maneuverability, traffic interruptions, comfort, and convenience. There are six levels of service from LOS "A" to LOS "F", with LOS "A" representing the best operational condition and LOS "F" representing the worst, often when traffic demands exceed capacity. Each level of service represents a range of operating conditions and the driver's perception of those conditions.

The following table summarizes the relationship between delay and level of service for an unsignalized intersection.

Table 8

Level of Service Criteria for Unsignalized Intersections

Level of Service	Control Delay per Vehicle (sec)
A	Up to 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0

Existing 2003 traffic flow conditions were evaluated using the SimTraffic microscopic vehicle simulation analysis program. This program models all vehicles traveling through a roadway network by simulating individual vehicle traffic flow. Inputs to the model include roadway geometrics, lane use, intersection control operation, intersection turning movements, and system traffic volume. As the model runs, the location of each vehicle in the model network is tracked for each second of time. With this location and time data compiled for each vehicle, the model then computes a variety of measures-of-effectiveness (MOE's) for each intersection approach by lane and traffic movement. This comprehensive list of MOE's includes delay per vehicle, along with, 50^{th} percentile, 95^{th} percentile and maximum queue lengths by lane. The primary benefit of SimTraffic is that it allows the analyst to view traffic simulation flows in real time on the computer screen. This allows the analysis of the effects of different alternatives to be compared and contrasted more easily than with mathematical analysis alone. The model results reported for each alternative are based on an average of results from five random simulations of that alternative. The SimTraffic modeling results for the 2003 traffic volume conditions are presented in Table 9. The detailed results are included in Appendix 5.

As shown in the table, the Route 1 and Shore Road and Beach Road intersection currently operates at a level of service F on the northbound Route 1 approach and the Shore Road approach. The Berwick Road approach at Route 1 currently operates at level of service D. Other intersections show the ability to operate at level of service A or B. However, the SimTraffic runs showed excessive queuing that spilled back into adjacent intersections from the northbound Route 1 approach at Shore Road and Beach Road. These long queues caused a degradation of the level of service for the Route 1 at Bourne Lane, Obeds Lane and Agamenticus Road, and School Street intersections that is not reflected in the table.

Table 9

Existing Conditions – 2003 Volumes

The results presented for each intersection below are the average delay per vehicle (in seconds per vehicle) based on traffic simulations.

Intersection	Minor Street				Major Street				Overall Intersection Delay (sec/veh)
	EB		WB		NB		SB		
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	
Route 1 @ Bourne Lane	-	-	17	C	5	A	2	A	4
Route 1 @ Agamenticus Lane and Obeds Lane	13	B	12	B	3	A	2	A	3
Route 1 @ School Street	-	-	14	B	3	A	1	A	3
Route 1 @ Shore Road and Beach Road	169*	F	25*	C/D	321	F	23	C	133
Route 1 @ Berwick Road	34	D	-	-	4	A	4	A	6
Route 1 @ Captain Thomas Road	11	B	-	-	12	B	2	A	8
Shore Road @ School Street	7**	A	-	-	1**	A	1**	A	1

* EB represents Shore Road and WB represents Beach Road
**NB represents Shore Road northeast bound, SB represents Shore Road southwest bound and EB represents School Street

Note: The above delays do not take into account the vehicle queuing that spills back from the Route 1, Beach Road and Shore Road intersection.

3. Traffic Signal Warrant Analysis

In addition to capacity analyses, a limited signal warrant analysis of the six intersections was performed to determine if traffic signal installation was warranted for further consideration as a possible improvement to these locations. In the analysis, observed four-hour and p.m. peak-hour intersection volumes were compared with the criteria of traffic signal Warrants 2 and 3 respectively of the Manual of Uniform Traffic Control Devices (MUTCD). According to the MUTCD, the satisfaction of a traffic signal warrant or warrants shall not itself require the installation of a traffic control signal. The signal warrants analysis is based on traffic volumes for an average day. The results of this analysis are summarized in the following table.

Table 10

Four-Hour and Peak-Hour Volume Traffic Signal Warrant Analysis

Intersection	Current Control	Satisfaction of Four-Hour Volume Warrant	Satisfaction of Peak-Hour Volume Warrant
Route 1 at Bourne Lane	Stop Sign	No	No
Route 1 at Agamenticus Road and Obeds Lane	Stop Sign	No*	No*
Route 1 at School Street	Stop Sign	No	No
Route 1 at Shore Road and Beach Road	Stop Sign	Yes	Yes
Route 1 at Berwick Road	Stop Sign	No*	No*
Captain Thomas Road	Stop Sign	No*	No*
Shore Road at School Street	Stop Sign	No	No

* Further analysis of the 12-hour turning movement counts at these intersections showed that none of the MUTCD traffic signal Warrants 1 through 8 was satisfied.

The warrant analysis showed that the four-hour volume warrant and the peak-hour volume warrant were only met at the Route 1 intersection with Shore Road and Beach Road.

D. Other Transportation Facilities

1. Pedestrian Facilities

There are sidewalks on some portions of the corridor, they generally are only on one side of the road and switch back from one side to the other. The following is a listing of the sidewalks throughout the study corridor:

- York/Ogunquit town line to Ogunquit Playhouse — None
- Ogunquit Playhouse to Obeds Lane — East Side
- Obeds Lane to Shore Road — West Side
- Shore Road to Berwick Road — East Side
- Berwick Road to Glen Avenue — Both Sides
- Glen Avenue to 0.06 miles north of Ocean Street — East Side
- 0.06 miles north of Ocean Street to Ogunquit/Wells town line — None

From School Street to Shore Road, the 6-foot paved shoulder attracts pedestrian usage on the east side. At other locations where no sidewalks are present, there is evidence of pedestrian usage such as a beaten path beyond the shoulder.

Figure 6 shows the seven-hour (11:00 a.m. to 6:00 p.m.) pedestrian crossing movements, sidewalks, and marked crosswalks along the corridor at seven intersections. As shown in the figure, most of the pedestrian activity along the Route 1 corridor is in the Ogunquit Square area. The intersection with the highest amount of pedestrian activity is Route 1, Shore Road and Beach Road with 1,659 pedestrian crossings; 1,165 crossing Beach Road and 397 crossing Shore Road. The intersection of School Street and Shore Road has 708 pedestrians crossing. The School Street approach with 459 pedestrians crossing has no painted crosswalk. The intersection of Route 1 and Berwick has a total of 642 pedestrians crossing; 214 pedestrians crossing Berwick Road, 239 crossing Route 1 northbound, and 189 crossing Route 1 southbound. A diagram showing the location of sidewalks and marked crosswalks along the corridor is included in Appendix 4.

2. Trolley Service

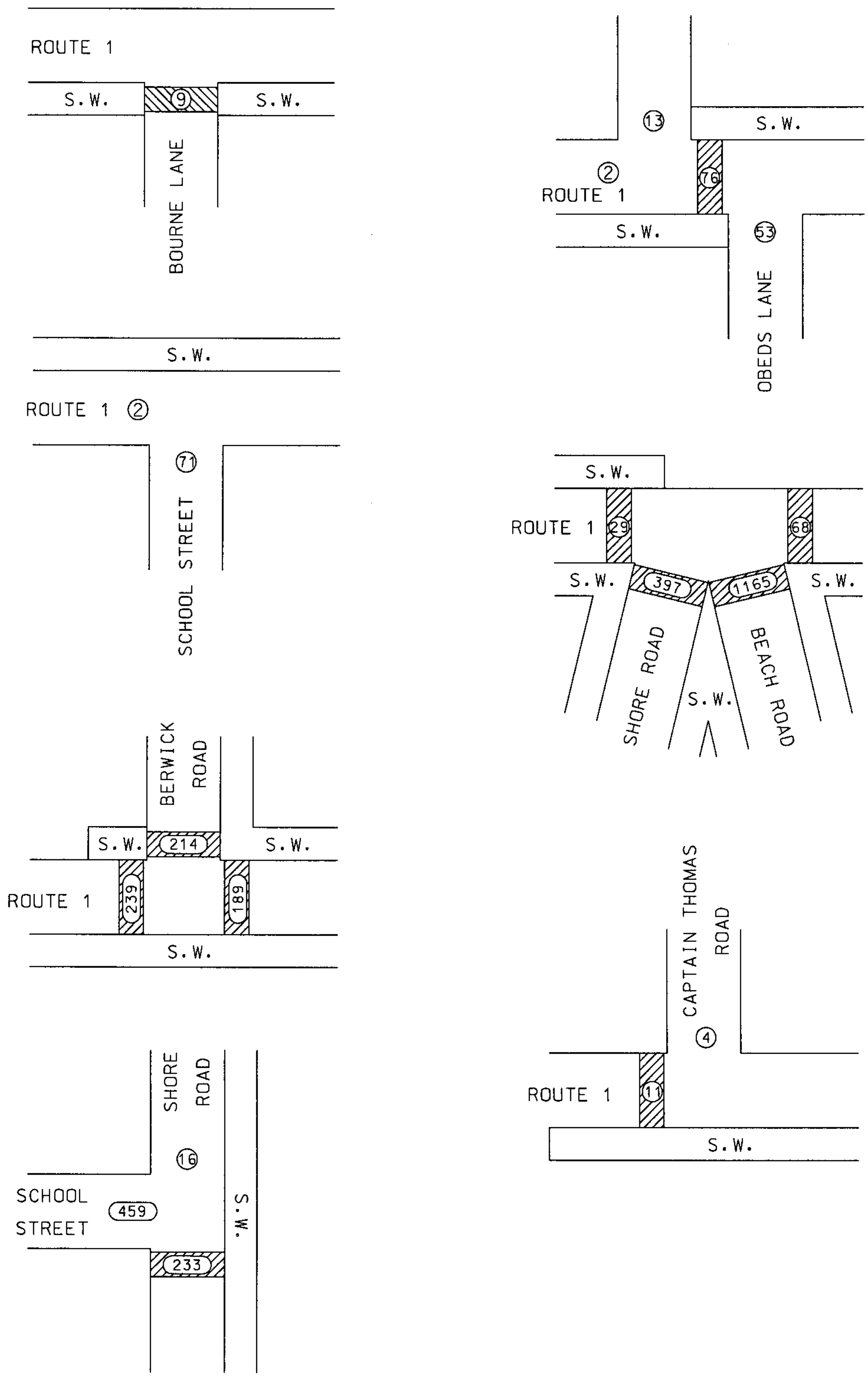
The Ogunquit Trolley Company LLC provides trolley service in the town of Ogunquit. Eight trolleys operate from mid-June to Labor Day and four trolleys operate during the late spring and early fall. The trolleys operate daily starting in mid May until Columbus Day. The hours of operation are 9:00 AM to 9:00 PM from mid May to mid June, 9:00 AM to 11:00 PM from mid June to Labor Day, and 9:00 AM to 8:00 PM from Labor to Columbus Day. Weekend service is also provided from the first Saturday in May to mid May with hours of operation, 9:00 AM to 5:00 PM.

The trolleys run a loop along the corridor from the Ogunquit and Wells town line, proceed to Ogunquit Beach and Perkins Cove, return to Ogunquit Beach and then Ogunquit and Wells town line, with 39 stops along the way. The trolleys run approximately every 5 minutes in July and August and at least every 15 minutes during other months of operation. All trolleys travel the same route. Total ridership is approximately 250,000 per season.

3. Park and Ride

No park and ride facilities are provided on Route 1 in the Study Area.

Figure 6
Pedestrian Volumes



Pedestrian Volumes shown on the figure are for 11:00 - 6:00 PM.

4. Bicycle Facilities

There are no designated bike routes along the Route 1 corridor in the Study Area. However, bicyclists commonly travel on Route 1 during the warmer months. MaineDOT improved the quality of bicycling north of the Study Area by providing 5 foot paved shoulders on Route 1 in Wells from the Ogunquit town line northerly to the southern junction of Route 9 under Project Number STR-6705(00)X. Pave shoulders of adequate width for bicyclists have also been provided on Route 1 in York, south of Ogunquit.

III. Future Conditions

To evaluate the impact of future travel on the existing Study Area corridor, hourly traffic volume conditions were projected to the year 2023. The procedure used was to estimate an annual percentage increase based on historical trends and apply that increase to volumes within the Study Area. Traffic volumes on Route 1 from the York and Ogunquit town line to the Ogunquit and Wells town line are projected to increase by about 1.5 percent per year (30% in 20 years). The baseline analysis of 2023 conditions assumes that no major improvements of any type are implemented within the time period of the study.

The SimTraffic modeling results for the 2023 traffic volume conditions are shown in Table 11. These results are presented in terms of level of service (LOS) and vehicle delay (seconds/vehicle). The detailed analyses are included in Appendix 5. The table shows that 3 of the 7 intersections will have one or more approaches operating at LOS E or F in 2023. At the Route 1 and Bourne Lane intersection, Bourne Lane is forecast to operate at LOS E. At the Route 1, Shore Road and Beach Road intersection, all approaches are forecast to operate at LOS F. At the Route 1 and Berwick Road intersection, Berwick Road is forecast to operate at LOS F. The other intersections can operate through 2023 at LOS C or better.

Based on the analysis of existing and future traffic conditions, the intersection of Route 1, Shore Road and Beach Road is currently the only intersection that operates at level of service F and is forecast to worsen by 2023. This intersection appears to be the capacity constraint along the Route 1 corridor. The following section of this report looks at alternatives to address the deficiencies at this intersection thus improving the Route 1 corridor.

Table 11

Future Conditions – 2023 Volumes

The results presented for each intersection below are the average delay per vehicle (in seconds per vehicle) based on traffic simulations.

Intersection	Minor Street				Major Street				Overall Intersection Delay (sec/veh)
	EB		WB		NB		SB		
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	
Route 1 @ Bourne Lane	-	-	40	E	7	A	3	A	7
Route 1 @ Agamenticus Lane and Obeds Lane	18	C	24	C	3	A	3	A	4
Route 1 @ School Street	-	-	17	C	3	A	2	A	3
Route 1 @ Shore Road and Beach Road	550*	F	855*	F	664	F	58	F	412
Route 1 @ Berwick Road	496	F	-	-	25	C/D	5	A	40
Route 1 @ Captain Thomas Road	22	C	-	-	14	B	3	A	9
Shore Road @ School Street	9**	A	-	-	2**	A	1**	A	2

* EB represents Shore Road and WB represents Beach Road
**NB represents Shore Road northeast bound, SB represents Shore Road southwest bound and EB represents School Street

Note: The above delays do not take into account the vehicle queuing that spills back from the Route 1, Beach Road and Shore Road intersection.

IV. Alternatives Analysis

Based upon observations and evaluations for traffic operations and data, three TSM improvement alternatives and one no-build were considered to reduce the congestion and crash occurrence at the intersection of Route 1, Shore Road and Beach Road. The alternatives are described below. Conceptual sketches of the alternatives are presented in Appendix 1.

No Build

- This alternative is to maintain the existing transportation system without attempting to change either traffic capacity or travel demand in the Study Area. The no-build is the base condition to which all other alternatives are compared.

Signal

- Install a fully actuated traffic signal at the existing intersection.

Roundabout

- Construct a single-lane roundabout 120 feet in diameter.
- This alternative also includes converting the existing southbound Route 1 left-turn lane between Berwick Road and Beach Road to a 100 foot northbound left-turn lane at Berwick Road.

One-way system

- Relocate the northbound approach of Route 1 through Jacob's Drive to Shore Road. The relocated northbound Route 1 approach at Shore Road would be a free movement while the Shore Road westbound approach would be under stop control. The section of Shore Road from Jacob's Drive to Route 1 would become one-way westbound.
- Convert the existing Route 1 section between Beach Road and Jacob's Lot Drive to a southbound through lane and a left-turn lane.
- Install a fully actuated traffic signal on Route 1 at Beach Road.

A. Level of Service

Capacity analyses were performed under 2003 volumes and 2023 future volumes at the Route 1, Shore Road and Beach Road intersection to determine the delay that would be experienced with the intersection alternatives. The performance of each TSM alternative was compared to the baseline no-build condition. The results for 2003 and 2023 are summarized in Table 12 and Table 13 in terms of vehicle delay for each intersection approach; the delay is expressed in seconds/vehicle. For the overall intersections, the delay is expressed in vehicle-hours. The detailed capacity analysis sheets are included in Appendix 5.

The simulation analysis revealed that, under existing traffic volumes, the signal alternative reduces delay at the Route 1, Shore Road and Beach Road intersection and the overall network but the intersection still operates at LOS F. The roundabout and the one-way system alternatives greatly reduce the delays at this intersection and at other Route 1 intersection at Bourne Lane, Obeds Lane and Agamenticus Road, and School Street by reducing the queue lengths on the Route 1 northbound approach. The simulation analysis also revealed that the roundabout alternative provides the greatest operational improvement for the Route 1 at Shore Road and Beach Road intersection and the entire network.

Table 12

Route 1 @ Shore Road and Beach Road - Improvement Alternatives – 2003 Volumes

The results presented for each intersection below are the average delay per vehicle (in seconds per vehicle) based on traffic simulations.

Alternative	Intersection	Minor Street		Major Street		Overall Intersection Delay (sec/veh)	Overall System Delay (veh-hrs)
		EB Delay (sec/veh)	WB Delay (sec/veh)	NB Delay (sec/veh)	SB Delay (sec/veh)		
No Build	Route 1 @ Shore Road and Beach Road	169*	25*	321	23	133	200
Signal	Route 1 @ Shore Road and Beach Road	290*	54*	66	49	93	107
Roundabout	Route 1 @ Shore Road and Beach Road	13*	9*	17	6	12	19
One-Way System	Route 1 @ Shore Road and Beach Road	10*	25*	-	12	12	27
	Route 1 @ Jacob's Drive	-	-	3	2	2	
	Shore Road @ Jacob's Drive	3**	-	48**	-	16	

* EB represents Shore Road and WB represents Beach Road
**NB represents Shore Road and EB represents Jacob's Lot Drive (new Route 1 northbound

Table 13

Route 1 @ Shore Road and Beach Road - Improvement Alternatives – 2023 Volumes

The results presented for each intersection below are the average delay per vehicle (in seconds per vehicle) based on traffic simulations.

Alternative	Intersection	Minor Street		Major Street		Overall Intersection Delay (sec/veh)	Overall System Delay (veh-hrs)
		EB Delay (sec/veh)	WB Delay (sec/veh)	NB Delay (sec/veh)	SB Delay (sec/veh)		
No Build	Route 1 @ Shore Road and Beach Road	550*	855*	664	58	412	863
Signal	Route 1 @ Shore Road and Beach Road	334*	129*	220	65	161	458
Roundabout	Route 1 @ Shore Road and Beach Road	36*	12*	157	9	60	137
One-Way System	Route 1 @ Shore Road and Beach Road	11*	72*	-	22	22	194
	Route 1 @ Jacob's Drive	-	-	10	4	7	
	Shore Road @ Jacob's Drive	8**	-	184**	-	42	

* EB represents Shore Road and WB represents Beach Road

**NB represents Shore Road and EB represents Jacob's Lot Drive (new Route 1 northbound)

B. Cost Estimates

To assist in benefit cost analysis of the alternatives, preliminary costs have been estimated, in current (2004) dollar values. Table 14 summarizes the costs. As the table shows, the total cost for the three improvement alternatives are $160,000 for the traffic signal, $2,100,000 for the roundabout, and $6,150,000 for the one-way system. For the roundabout and one-way system alternatives, right-of-way accounts for most of the total cost.

Table 14

Estimate Costs

Alternative	Construction Cost	Preliminary Engineering Cost	Construction Engineering Cost	Right of Way Cost	Total Cost
No Build	$0	$0	$0	$0	$0
Signal	$100,000	$30,000	$20,000	$10,000	$160,000
Roundabout	$400,000	$60,000	$40,000	$1,600,000	$2,100,000
One-Way System	$1,000,000	$150,000	$100,000	$4,900,000	$6,150,000

Table 15 shows the capital and ten-year capital costs of each alternative over the 20-year period from 2004 to 2024. Ten-year capital costs are those associated with upgrading the traffic signal equipment.

The 20-year analysis period has been selected for comparison of transportation alternatives in recognition of the difficulties in forecasting travel and costs for longer periods of time. While right-of-way has value that lasts beyond 20 years, the utilization of that asset in the very long term is difficult to predict. For this reason, the analysis is confined to a 20-year period for which travel and cost estimates have less uncertainty.

All annual costs and ten-year capital costs are discounted at a rate of 6% per year to take into account that each of the alternatives is a potential investment that competes with other investment opportunities for a reasonable rate of return.

Table 15

Annual Costs of Alternatives

Alternative	Transportation Cost for the 20-Year Period		
	Capital		Total Discounted
	Initial	10-Year	Annual
No Build	$ -	$ -	$ -
Signal	$ 160,000	$ 80,000	$ 17,873
Roundabout	$ 2,100,000	$ -	$ 183,088
One-way system	$ 6,150,000	$ 80,000	$ 540,108

C. Benefit Estimates

Table 16 summarizes the transportation benefits of each alternative. These transportation benefits, expressed in 2004 dollars represent the reductions in congestion (delay) and crashes. For all three alternatives, the reduction in congestion represents the greatest transportation benefit. The roundabout alternative has the greatest reduction in congestion (approximately $820,000).

Table 16

Transportation Benefits of Alternatives

Alternative	Annual Transportation Benefits (in 2004 dollars)		
	Reducing Congestion	Reducing Crashes	Total
No Build	$ -	$ -	$ -
Signal	$ 450,755	$ 6,005	$ 456,761
Roundabout	$ 819,600	$ 9,609	$ 829,209
One-way system	$ 785,347	$ 13,212	$ 798,559

D. Benefit-Cost Analysis

A tool used to compare the alternatives was a benefit-cost evaluation. This was conducted in two parts; an overall benefit-cost evaluation and in incremental benefit-cost assessment. The two parts are described below.

1. Benefit-Cost Evaluation

In this part, each alternative's benefits (measured by the dollar value of annual travel time savings and annual crash savings) were compared with its cost (measured by the annualized cost of construction). If the benefits outweighed the costs, then the alternative was considered cost effective. Table 17 summarizes the results. As the table indicates, all three improvement alternatives are cost effective. Therefore, these three alternatives warrant further analysis in part 2 of the benefit-cost analysis. The signal alternative has the highest B/C ratio, followed by those of the roundabout and the one-way system.

Table 17

Comparison of Benefits and Costs

Alternative	Benefits and Costs (in 2004 dollars per year)			Benefit/Cost
	Benefit	Cost	Net Benefit	B/C Ratio
No Build	$ -	$ -	$ -	
Signal	$ 456,761	$ 17,873	$ 438,888	25.22
Roundabout	$ 829,209	$ 183,088	$ 646,121	4.48
One-Way System	$ 798,559	$ 540,108	$ 258,451	1.45

2. Incremental Benefit-Cost Assessment

This part begins by comparing the two lowest cost alternatives whose B/C ratio is greater than 1.0. An incremental benefit cost calculation is performed, using the following formula:

Incremental B/C ratio = $(B_2 - B_1) / (C_2 - C_1)$

Where,

B_2 = Annual benefits of more expensive alternative
B_1 = Annual benefits of less expensive alternative
C_2 = Annualized costs of more expensive alternative
C_1 = Annualized costs of less expensive alternative

An incremental B/C ratio greater than 1.0 indicates that every additional dollar spent on the more expensive alternative yields more than one dollar in benefits. On the other hand, an incremental B/C ratio less than 1.0 indicates that every additional dollar spent on the more expensive alternative yields less than one dollar in benefits. In that case, the more expensive alternative is not cost effective. Also, a negative incremental B/C ratio indicates that the more expensive alternative yields fewer benefits than the less expensive alternative. Table 18 summarizes the results of the incremental benefit-cost assessment. As the table indicates, the signal and roundabout alternatives have a favorable incremental benefit-cost ratio. The additional cost of the one-way system is a poor investment due to an unfavorable incremental benefit-cost ratio.

Table 18

Incremental Benefit-Cost Assessment

Alternative		**Incremental**			
More Expensive	**Less Expensive**	**Benefit**	**Cost**	**Net Benefit**	**B/C Ratio**
Signal	No build	$ 456,761	$ 17,873	$ 438,888	25.22
Roundabout	Signal	$ 372,448	$ 165,215	$ 207,233	2.25
One-Way System	Roundabout	$ - 30,650	$ 357,020	$ - 387,670	- 0.09

E. Right-Of-Way Impacts

An additional tool to assess the impacts of each alternative is right-of-way impacts. Table 19 summarizes the right-of-way impacts for each alternative. As the table shows, the roundabout and one-way system alternatives cannot be built within the existing right-of-way. Two commercial properties on the west side of Route 1 in Ogunquit Square would need to be displaced for the construction of the roundabout. Two other commercial properties on the west side of Route 1 may be affected by relatively minor right-of-way acquisitions, but would not be displaced. These are due to the size and location of the roundabout. For the construction of the one-way system, two commercial properties in Ogunquit Square on the east side of Route 1 between Shore Road and Jacob's Lot Drive would need to be displaced. Three other commercial properties would have their access reduced to such an extent by the relocation of Route 1 northbound, these properties would need to be displaced as well.

Table 19

Right-of-Way Impacts

	Alternatives		
Right-Of-way Impacts	**Signal**	**Roundabout**	**One-Way System**
Potential Displaced Properties	0	2	5
Other Potential Affected Properties	0	2	0

F. Other Environmental Issues

Because of the urban nature of the Study Area and the limited scope of the alternatives analyzed, few environmental issues, other than right-of-way impacts, are anticipated from implementing any alternative. Ogunquit has properties listed on the National Register of Historic Places, but none are affected by the intersection improvement alternatives. With all improvement projects requiring construction, some temporary delay and inconvenience can be expected. However, the greatest environmental impact may be the positive impact that reduced congestion has on the local economy and quality of life.

V. Conclusions

This report summarizes the results of a comprehensive traffic corridor study for the 2.3 mile segment of Route 1 in Ogunquit. The report examined existing and future traffic conditions on the Route 1 corridor, with a specific focus on the Ogunquit Village area. The reason the focus was on the Ogunquit Village area is that this area has the greatest operational deficiencies and that improvements in this location would have a positive affect on other locations on Route 1 in Ogunquit. This area was evaluated with 2003 volumes, as well as projected 2023 volumes to determine the ability of Route 1 to accommodate future traffic volumes. Three improvement alternatives were examined for the Route 1, Shore Road and Beach Road intersection at the heart of the Ogunquit Village.

Under existing traffic conditions, delays at the Route 1, Shore Road and Beach Road intersection result in long queues on Route 1 northbound and Shore Road. The queues, in turn, extend along Route 1 past unsignalized intersection and driveways, effectively preventing access for vehicles attempting to enter Route 1 traffic. In the summer months, average speeds along Route 1 northbound are reduced significantly, to the extent where Route 1 does not function effectively as an arterial. Assuming a continuation of traffic growth patterns, future operating conditions will continue to deteriorate unless improvements are implemented.

The following conclusions have been drawn from the analysis of these transportation alternatives.

- **Signal.** The low-cost signal alternative provides operational improvement as compared to the current operating conditions but the intersection continues to operate at LOS F.

- **Roundabout.** Of the alternatives analyzed, the roundabout offers the greatest potential for reducing congestion to the Route 1 corridor in Ogunquit for existing and future conditions. The roundabout alternative can reduce the current traffic delay by 91% and the projected 20-year delay by 85%.

- **One way system.** This alternative was the most costly and least cost-effective in the analysis. The one-way system alternative provides major operational improvement as compared to the current operating conditions; however, it involves the partial relocation of Route 1 within the village area and has extensive right-of-way impacts.

The study has also identified several physical deficiencies in the transportation facilities along Route 1 in Ogunquit. Travel lanes, including the center two-way left-turn lane, are too narrow. In many places the shoulders are unpaved and too narrow for use by bicyclists. Sidewalks are either absent or only sporadically available in many places along the corridor, even though clear evidence of pedestrian use of shoulders and grassed areas along the roadside is visible.

Recommendations. The following improvements are recommended to address traffic congestion and safety issues in the Ogunquit Route 1 corridor.

- To address the traffic congestion problems of Ogunquit village, construct a roundabout at the intersection of Route 1, Shore Road, and Beach Road. This recommended improvement can provide long-term relief in traffic congestion and be implemented in a relatively short time. It would also provide safety benefits at the corridor's High Crash Locations.

- To improve bicycle safety, provide paved shoulders of 5 feet or more in width on both sides of Route 1 in Ogunquit. This shoulder improvement would help bicyclists by providing more consistent shoulders throughout Ogunquit and with neighboring York and Wells.

- To improve pedestrian safety and accessibility, provide continuous sidewalks along the east side of Route 1 from the Ogunquit Play House to the Wells town line and along the west side from Agamenticus Road to the Wells town line. This improvement would also provide safer access to crosswalks and to stops along the Ogunquit trolley service. Consider extension of one or more sidewalks into Wells if warranted by roadside pedestrian activity.

- To address the substandard pavement width and provide continuity with the recently completed highway project on Route 1 in Wells, widen Route 1 in Ogunquit within the limits of the existing 66-foot right-of-way. The recommended cross-section is a 12-foot center two-way left-turn lane, two 11-foot through lanes, two 5-foot curbed shoulders, and two 5-foot sidewalks, as shown in Figure 7. This cross-sectional width totals 54 feet and can fit within the available right-of-way without major impacts to densely developed abutting commercial properties. As improvements are made on Route 1 in Ogunquit, it is also recommended to apply access management principles to improve safety by reducing the size and number of curb cuts where feasible.

Figure 7
Recommended Typical Section