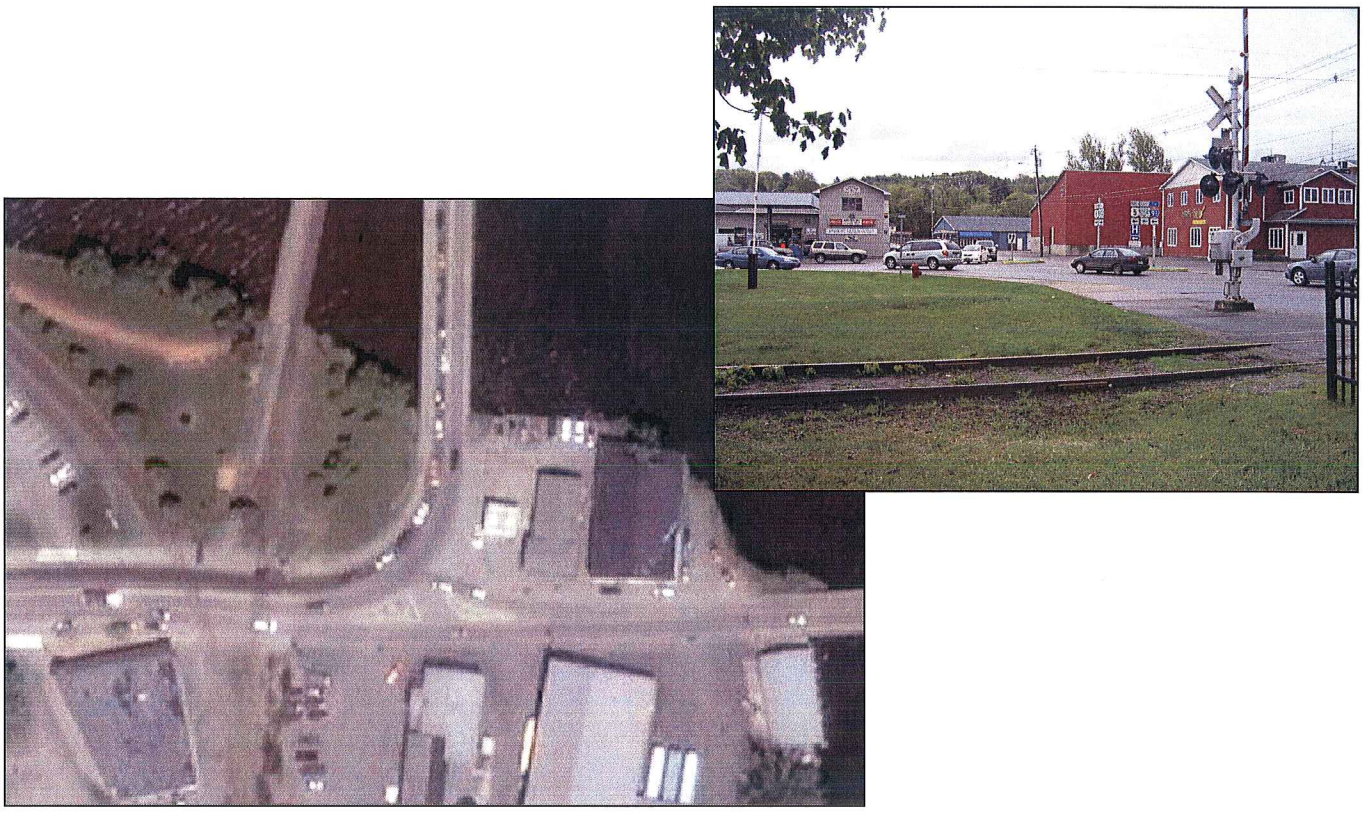
Draft

INTERSECTION STUDY

at

Main Street, Causeway & Railroad Square



August 2008

LAMOUREUX & DICKINSON
Consulting Engineers, Inc.
Essex, VT 05452
www.LDengineering.com

1.0 Introduction

1.1 Project Background

The purpose of this intersection study is to develop and evaluate potential alternative improvements at the Main Street / Causeway / Railroad Square intersection. This is a T-intersection with Main Street to the west, the Causeway to the north, and Railroad Square to the east. The Main Street, Causeway, East Main Street corridor also carries US Route 5/VT Route 105 through Newport City. This route makes a sweeping 90 degree bend at this intersection. Long Bridge links Railroad Square on its west end with Mount Vernon Street on its east end; thus the east leg of this intersection is sometimes also referred to as Mount Vernon Street.

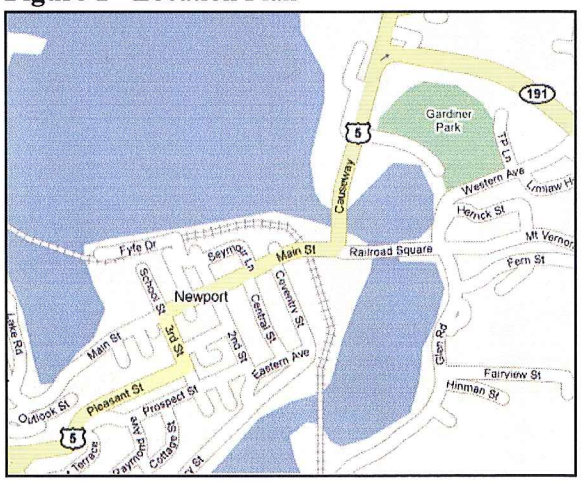
The Route 5 corridor, including both Main Street and the Causeway, serves as the primary truck route through Newport City. This intersection was also identified in the 1997 US Route 5 Corridor Access Management Plan as experiencing long delays (traffic congestion) and having wide open curb cuts that contribute to driver confusion and safety problems.

1.2 Project Area - Location and Description

Figure 1 shows the location of this intersection and its relation to the surrounding City and its road network. The project area is defined by the shores of Lake Memphremagog, the two Main Street railroad crossings located immediately to the west on Main Street, the Causeway Bridge located to the north and the Long Bridge located to the east. Existing adjacent land-uses include a waterfront park to the northwest, Azur's Convenience Store and Bond Auto Parts in the northeast corner, and Poulin Grain along the southerly side. Also on the south side, immediately to the west of the railroad crossings, is the One Main Street commercial building.

The geographical constraints created by Lake Memphremagog and South Bay make this intersection a major pinch point in the regional transportation network; forcing all traffic traveling between Derby / I-91 and Newport City through this one intersection.

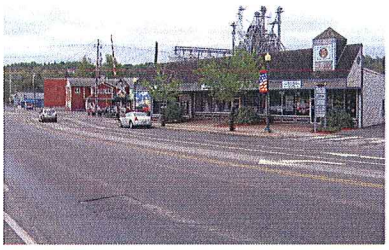
Figure 1 - Location Plan



2.0 Existing Conditions

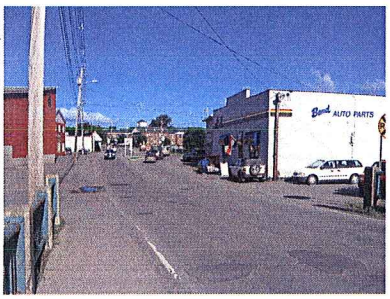
2.1 Approach Geometry

Figure 2 illustrates existing conditions at this intersection.



The west approach, Main Street, operates as a three-lane roadway (two approach lanes plus one departure lane) with 50+ feet of pavement width. Although there are no marked parking spaces, on-street parallel parking occurs on the south side in front of the One Main Street building. The two eastbound approach lines provide separate lanes for traffic turning left towards the Causeway (Route 5/105 through traffic) or straight towards Railroad Square and Mt. Vernon St. There are sidewalks on both sides of the Main Street approach west of the railroad crossings, but only on the northerly side east of the crossings. At the railroad crossings, pedestrians utilize unmarked extensions of the roadway pavement.

The north approach, the Causeway, operates as a 30 feet wide two-lane roadway with a sidewalk on the west side. The east side of this approach is a continuous open curb cut in front of Azur's Convenience Store.

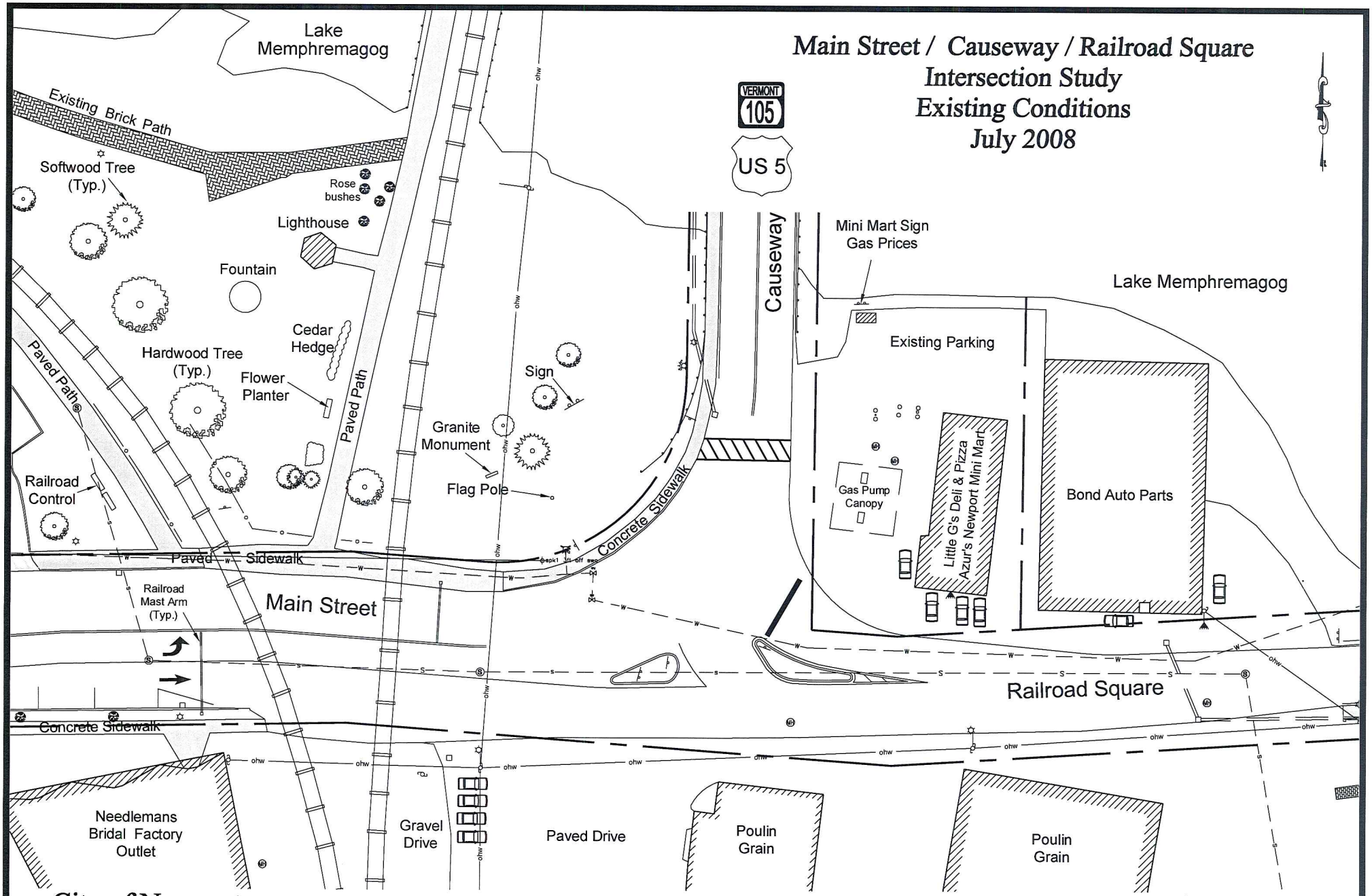


The east approach, Railroad Square, is the stop-controlled approach. Two small curbed islands channelize turning movements to and from Railroad Square. This approach has two lanes (one approach lane plus one departure lane) with 40+ feet of roadway width at the intersection; narrowing down to 24 feet at the Long Bridge. There are no sidewalks along either side of Railroad Square until the Long Bridge, which has a sidewalk on the south side. Both sides of Railroad Square are continuous open curb cuts for Poulin Grain (south side), Azur's and Bond Auto Parts (north side).

The posted speed limit on all approaches to this intersection is 25 mph. Available sight distances from the Railroad Square approach are excellent in both directions (north and west). Looking to the north over the Causeway, vehicles are required to see over a slight crest in the bridge itself. Available sight distances exceed 500 feet; whereas 335-390 feet is recommended for prevailing speeds of 30-35 mph.

The two small curbed islands also contain both directional (route) and regulatory (stop) signs to direct traffic through this intersection. In addition, many of the pavement markings shown on Figure 2, including the stop bar, crosswalk markings and edge lines, are considerably worn and barely visible.

Main Street / Causeway / Railroad Square
Intersection Study
Existing Conditions
July 2008



City of Newport

GRAPHIC SCALE

50 0 25 50 100

(IN FEET)

1 inch = 50 ft.

Figure 2

NVDA Northeastern Vermont Development Association

LAMOUREUX & DICKINSON
Consulting Engineers, Inc.
14 Morse Drive
Essex Junction, VT 05452
(802) 878-4450

2.2 Traffic Conditions / Analysis

Traffic Volumes

Existing traffic volumes were determined from recent counts performed by the Vermont Agency of Transportation (VTrans). Included were the following automatic traffic recorder counts[1]:

P179, US 5 between RR Crossing & Coventry Road (Main Street), August 2006,
P222, US 5 between Railroad Square & Gardner Park Rd (Causeway), August 2006,
P180, Mount Vernon Street at Long Bridge, June 2006;

and the following turning movement counts[2]:

US 5 & Railroad Square, September 26, 2006,
US 5 & Coventry Street, August 9, 2006,
Western Ave., Mt. Vernon St. & Glen Rd., March 24-25, 2005.

Copies of the above counts are included in Appendix A.

Table 1 illustrates the daily and hourly traffic volumes on each approach to this intersection. In addition, the two turning movement counts listed above are particularly interesting as they permit a comparison of school day vs. non-school day traffic patterns.

Table 1 - Intersection Approach Traffic Volumes

	Main Street	**Causeway**	**Railroad Square**
Annual Average Daily Traffic (vpd)	16,000	11,400	5,900
Weekday Hourly Volumes (vph) 7:00 am - 6:00 pm	1,100 - 1,600	700 - 1,130	400 - 530

Totaling Main Street traffic volumes over the railroad crossing from these two counts results in the hourly patterns shown in Figure 3. Additionally, Figure 4 presents weekday morning and afternoon peak hour turning movement volumes, as observed during the September 2006 turning movement count at this intersection.

---

1 Automatic traffic recorder counts are typically 7-day counts performed using a mechanical counter and rubber road tubes. The data (total vehicles) is collected in hourly intervals.

2 Turning movement counts are typically a 12-hour (6:00 am - 6:00 pm) count performed over a 1-2 day time period. The data is collected in 15-minute intervals. Pedestrian, car and truck volumes are tabulated separately by direction and turning movement.

Figure 3 - August vs. September Weekday Hourly Volumes
Main Street at RR Crossing

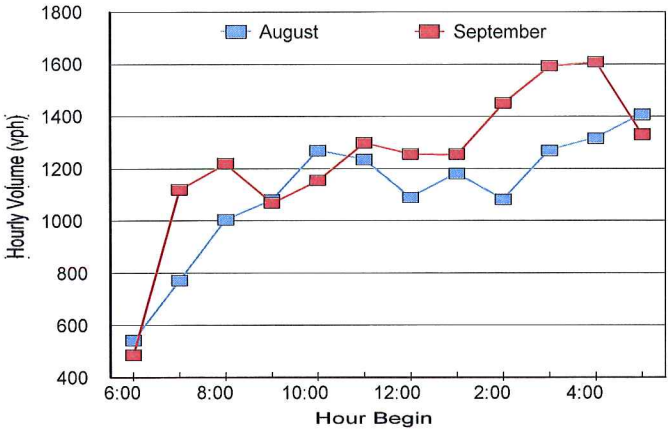
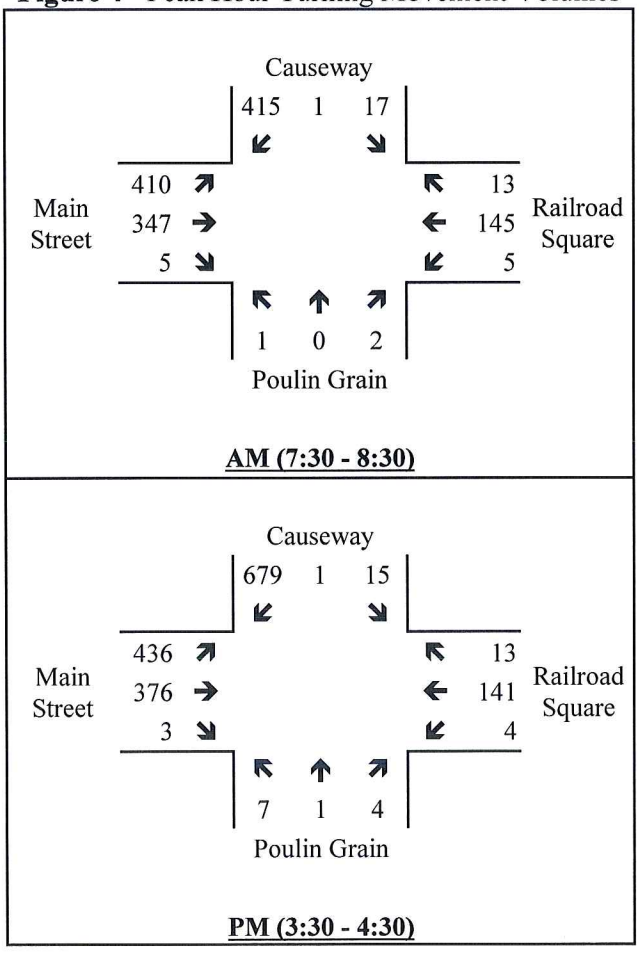


Figure 4 - Peak Hour Turning Movement Volumes



Several observations concerning the turning movement patterns shown in Figure 4. First, the turning movements shown do not include vehicles entering or exiting Azur's Convenience Store in the northeast quadrant of this intersection. Secondly, we observed numerous trucks

and other vehicles proceeding straight from Main Street onto Railroad Square and then turning left onto Western Avenue instead of turning left over the Causeway to the I-91 Access Road and beyond. The high number of vehicles proceeding straight from Main Street onto Railroad Square during the PM peak hour is indicative of this alternate route.

Signal Warrant Analysis

An analysis of the signal warrants was performed using the September 2006 weekday volumes. The results indicate that Warrant 1, Eight-Hour Volume, and Warrant 2, Four-Hour Volume, were both satisfied. Warrant 7, Crash Experience, was not satisfied (see Crash History below), as there have not been more than five crashes per year that could have been prevented with signalization.

Capacity Analysis

VTrans' level of service policy is to maintain level of service (LOS) D or better on the stop-sign controlled approaches of unsignalized intersections. Levels of service range from A to F; with A representing free-flowing traffic experiencing minimal delays and F representing congested traffic flow with very long delays.

Capacity analyses were also performed using the observed weekday peak hour volumes shown in Figure 4. The results indicate that vehicles turning left from Railroad Square onto Main Street experience significant delays and congestion. During the morning peak hour, this movement's average delay equals 26 seconds per vehicle (LOS D). During the afternoon peak hour, that increases to 59 sec/veh (LOS F). By the year 2030, using projected traffic volumes (see Chapter 4 below), delays on the Railroad Street approach will increase to 37 sec/veh (LOS E) and 178 sec/veh (LOS F) during the morning and afternoon peak hours, respectively.

These results indicate that this intersection does not have sufficient capacity to service existing or future traffic volumes, and thus experiences high levels of traffic congestion during peak periods.

2.3 Pedestrian / Bicycle Facilities

This intersection is also an important crossroads for pedestrians and bicyclists. Immediately to the west is the City's downtown business district and waterfront. To the north are located the hospital, elementary, middle and high schools, local parks and recreational facilities. Major city residential neighborhoods are also located on all three sides.

From the September 2006 VTrans turning movement count, an average hourly volume of 18 pedestrians were observed; with a maximum of 33 pedestrians per hour during the noon hour. These volumes are consistent with our late May 2008 morning and afternoon peak hour observations.

This intersection presently has a sidewalk only along its northwest corner; linking existing sidewalks on the north side of Main Street and the west side of the Causeway. This sidewalk is also the terminus of the City's waterfront bikepath and the existing railroad bridge path. The City's proposed bike path to the north along the east side of Lake Memphremagog will

also terminate at the railroad bridge, which will be upgraded. Existing sidewalks along the south side of Main Street and the Long Bridge terminate prior to the intersection; leaving a 400 ft long gap in front of Poulin Grain. There is no marked pedestrian crossing linking the north and south sides of this intersection.

Similarly, existing shoulder widths are insufficient to provide for use by bicyclists as a bike lane. Bicyclists therefore must travel through this intersection sharing the roadway with vehicular traffic.

The one crosswalk located north of the intersection links Azur's on the east side with the existing sidewalk on the west side. The markings for this sidewalk are presently worn to almost nothing. Along Azur's in the northeast corner of this intersection is a wide open curb cut into their parking lot without any established pedestrian facility. Vehicles were also observed routinely parallel parking along the roadway, making pedestrian circulation that much more difficult and dangerous in this immediate area.

2.4 Crash History

The crash experience of this intersection was obtained from both VTrans and the City of Newport Police Dept. The VTrans crash records span a five-year time period from 2002 to 2006, inclusive. Those records indicate 3 reported crashes in 2004, 4 in 2005 and 5 in 2006. The majority of the crashes in each year were rear-end and same direction sideswipe type accidents, which are not types typically correctable by the installation of traffic signal control.

The City Police Dept. records show 12 crashes on Main Street, 5 on the Causeway and no crashes on Railroad Square during 2007. Unfortunately, their records do not give the exact locations or crash types. It is also not known if all of these were "reported" crashes where there was personal injury and/or damage that exceeded $1,000.

This intersection is also located within an identified high crash location - section that extends between mile markers 1.101 and 1.701 on US 5(Main Street) in Newport City. For reference purposes the Main Street / Second Street intersection is located at mile marker 1.397, the Main Street / Coventry Street intersection at mile marker 1.512, and this intersection at mile marker 1.627. The VTrans 2001-2005 High Crash Location Report identifies this 0.60 mile section as experiencing 50 crashes in that five-year period, 44 of which involved property damage only. This high crash section essentially encompasses the entire downtown area, and it is likely that many of the crashes were related to the on-street parking that exists along much of that section.

2.5 Railroad Crossing

On Main Street immediately to the west of this intersection are located two railroad crossings of the Montreal, Maine & Atlantic Railroad. The first crossing is the Richford to Newport mainline. The second crossing is a spur serving local industries on the north side of Newport City. Both crossings are sufficiently close to be protected by one set of crossing signals and gates.

One of the major impacts of these crossings is the requirement that buses and trucks carrying flammable liquids come to a complete stop before proceeding over the crossing. With Main Street between this intersection and Coventry Street (US Route 5A) being the major truck route through the City and also the major route to and from the local schools, stopping buses and trucks are a common occurrence; creating traffic congestion and delays.

2.6 Right-of-Way

Information concerning existing street right-of-ways was researched at the City Clerk's office. A review of land records and plats indicates that the much of the property surrounding this intersection was once owned by the Canadian Pacific Railroad. We were able to locate three railroad property plats. The first shows Main Street as a four-rod (66 ft) wide right-of-way. This plat also shows existing property lines in the northwest corner of the intersection.

The second and third railroad property plats show portions of parcels now owned by Poulin Grain along south the side of Railroad Square in the vicinity of the Long Bridge. One of them refers to several other railroad property plats in this immediate area that do not appear to have been recorded. The other shows that the City acquired an irregular parcel on the south side of Railroad Square to accommodate the new Long Bridge which is located southerly of the original bridge. This plat also shows the original right-of-way on the north side which, like the original bridge, curved to the north[3]. It is not known if that portion of the original right-of-way was ever officially relinquished.

Copies of plans for the 1945 construction of the new Long Bridge and the 1981 reconstruction of the Causeway Bridge were also obtained from VTrans District office.

The lack of visible property corners and/or monuments hindered a precise identification of the existing right-of-way, particularly along the Azur and Bond Auto parcels. Overall, the right-of-way shown on Figure 2 was based on the Causeway and Railroad Square both having a three-rod right-of-way and Main Street having a four-rod right-of-way. These right-of-ways are generally centered upon the existing roadway center lines, except that the Causeway bridge plans do show that bridge to be several feet off-center. We did not find any information indicating that additional right-of-way exists on Azur's corner to accommodate the existing intersection.

2.7 Utilities

Major city-owned water and sewer mains pass through this intersection and its approaches. Utility plans were obtained from the City to help locate those utilities. Additionally, electrical (Vermont Electric Cooperative), telephone (Fairpoint) and CATV (Comcast) lines run overhead in the east-west direction along the south side (Main Street - Railroad Square) of this intersection. Overhead electrical lines also run in the north-south direction along the west side of the Causeway.

---

[3] City utility plans also show old water and sewer mains (now abandoned) curving north at this same location.

2.8 Natural Resources

The only critical natural resource in the project area is Lake Memphremagog and its shoreline. Providing a buffer area along shorelines helps to remove pollutants from surrounding developed land. At this intersection and along its immediate approaches, all roadway, parking lot and roof runoff presently drains overland directly to the lake without the benefit of any treatment or traversing a buffer area to remove pollutants.

Other natural resources that are not present within the project area include rare, threatened and endangered species, wetlands, streams, wildlife and wildlife habitat and agricultural land.

2.9 Hazardous Material Sites

One site, the Newport Mini-Mart (now Azur's Convenience Store) is listed on the Vermont Agency of Natural Resources hazardous materials site list. The gas pumps and underground storage tanks at this location are owned by D&C Transportation.

2.10 Historic/Archeological Sites and Historic Structures

The University of Maine at Farmington Archeology Research Center was engaged to perform an archeological resource assessment for this Study. They found that almost all of the areas surrounding this intersection have been previously disturbed to the extent that little, if any, archeological value remains. The only area that they found to be sufficiently undisturbed to warrant further investigation is the portion of the waterfront park on the northwest corner. A report detailing their findings is enclosed in Appendix B.

Additionally, although this intersection is located at the easterly edge of the City's downtown historic district, the existing buildings located immediately adjacent to this intersection are either of recent construction or have been extensively modified over the years such that they have little remaining historical significance.

2.11 Land and Conservation Fund (LWCF) Sites

The closest LWCF sites listed by the Vermont Agency of Natural Resources are Prouty Beach and Gardner Park. Both are well outside the project area.

3.0 Project Purpose and Need

3.1 Issues and Concerns

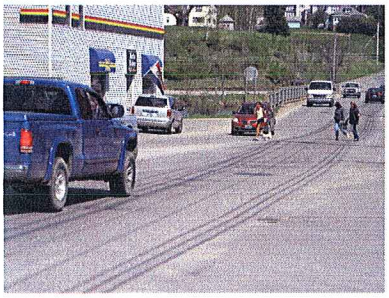
Issues and concerns noted at the project kick-off meeting, included:

- Many motorists only come to a "rolling stop" exiting Railroad Square.
- Azur's convenience store parking causes sight distance issues.
- End of school day at 2:30 pm is typically a problem time.
- Poulin's Grain generates many trucks.
- Numerous seasonal residents and tourists in the area during the summer.

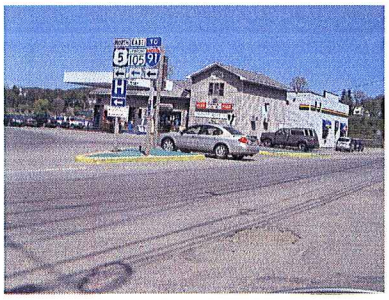
- Traffic backs up to Derby Road during peak summer afternoons causing motorists to have extreme difficulty exiting Railroad Square.
- Large tractor trailers have difficulty negotiating the intersection (which is located on the state designated truck route system).

Other observations made during site visits and traffic observations include:

- Many of the pavement markings including the stop bar, crosswalk markings and edge lines, are considerably worn and barely visible.
- There is no edge line delineation at the present along Railroad Square or the east side of the Causeway across Poulin Grain's, Bond Auto's or Azur's long open curb cuts.



- Numerous pedestrians were observed crossing between the Causeway and the Long Bridge at various locations. Their paths often took them through Azur's parking lot.
- Several vehicles were observed traveling the wrong way through the islands at the intersection.
- Although generally conforming to current MUTCD standards, the existing signs and pavement markings provide insufficient guidance to motorists, particularly those that might be unfamiliar with the area.



- Vehicles were observed parallel parking in front of the One Main Street building located just west of Poulin's Grain. Remnants of several on-street parallel parking space markings are barely visible. The eastbound through lane from Main Street to Railroad Square is presently marked as 17 ft wide (to the curb). Deducting 8 ft for parallel parking at this location leaves only 9 ft remaining for a lane width; considerably narrower than normal.

- We also observed several instances where vehicles would make a left-turn exiting Railroad Square and travel alongside other through Causeway to Main Street vehicles as if there were two lanes departing the intersection westbound towards Main Street.

3.2 Project Purpose

The purpose of this Project is to provide safe and efficient traffic and pedestrian flow at this intersection.

3.3 Project Needs

- Additional intersection capacity to safely accommodate existing and future vehicular, bicycle and pedestrian volumes.
- Access management of driveways and parking areas serving adjacent parcels in the immediate vicinity of the intersection.
- Improved signage and pavement markings to properly guide motorists, bicyclists and pedestrians.