

Chapter 1:

Purpose and Need

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This chapter describes the purpose and need for the Sakonnet River Bridge Project, the project study area, the public safety concerns regarding the bridge structure, the importance of the Sakonnet River Bridge in the Rhode Island and Massachusetts transportation systems, and the project objectives.

1.1 PROJECT OVERVIEW AND BACKGROUND

This Draft Environmental Impact Statement (DEIS) was prepared jointly by the Federal Highway Administration (FHWA) and the Rhode Island Department of Transportation (RIDOT). This DEIS presents evaluations of the reasonable and prudent alternatives for RIDOT to rehabilitate or replace the Sakonnet River Bridge. The regional location of the bridge is shown in Figure 1-1.

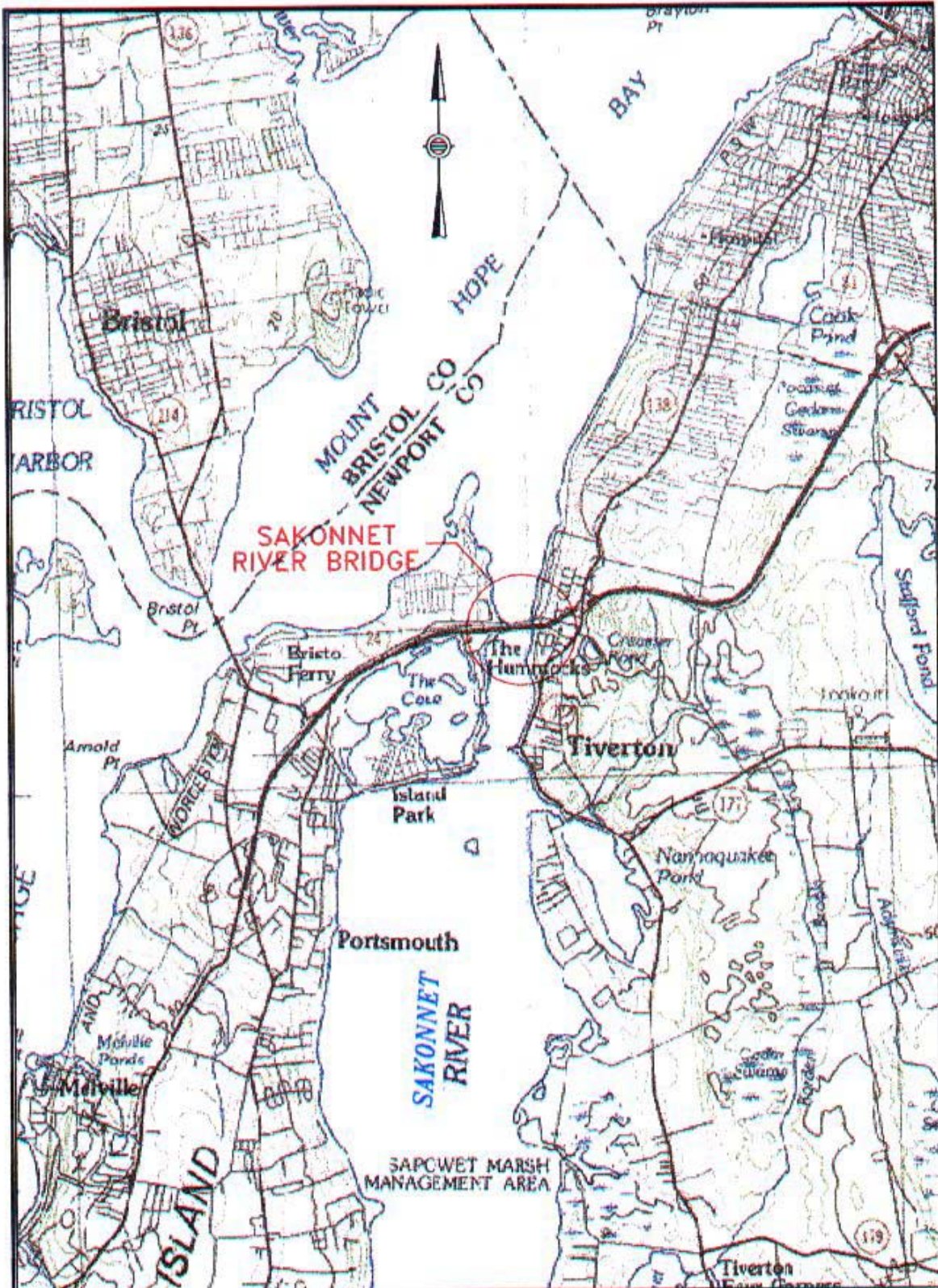
The project study area centers on the Sakonnet River Bridge and the Rhode Island State Route 24 (RI 24) approaches. The potential traffic impacts of the alternatives have been studied on the State Routes within the following traffic analysis area, as shown in Figure 1-2:

- North:* The intersection of RI 24 and Interstate Route 195 (I-195) in Fall River, Massachusetts
- Northwest:* RI 114 across the Mt. Hope Bridge to Bristol continuing through Warren, and along RI 136 to I-195
- South:* RI 114 and RI 138 through Portsmouth and Middletown to Newport to the Claiborne Pell Bridge.

The Sakonnet River Bridge (RI Bridge Number 250) was originally constructed between 1954-1956. The bridge carries RI 24 over the Sakonnet River, a tidal passage separating the Town of Portsmouth on Aquidneck Island to the west and the Town of Tiverton on the mainland to the east. The bridge is located where the Sakonnet River opens into Mount Hope Bay to the north, in a setting with neighborhoods of 19th and early 20th century homes, pleasure boat marinas, and commercial fishing wharves.

The main bridge structure is comprised of 27 spans with a total length of approximately 2,983 feet (910 meters(m)), as shown in Figure 1-3. The structure was designed in accordance with the 1944 American Association of State Highway Officials Specifications (AASHO). The predominant feature of the bridge is a three-span continuous truss main section. The center section is a 375-foot (114.3 m) long through arch truss span with 65-feet (19.8 m) of vertical clearance over the navigation channel. The truss spans and girder spans on the bridge are defined as “non-redundant fracture critical,” which means that structural failure of the fracture critical members could result in collapse of the bridge.

The bridge is oriented in an east-west alignment across the Sakonnet River; however, RI 24 is designated as north-south in this location. RI 24 is a key link in the transportation system connecting Massachusetts to Rhode Island and the Aquidneck Island communities.



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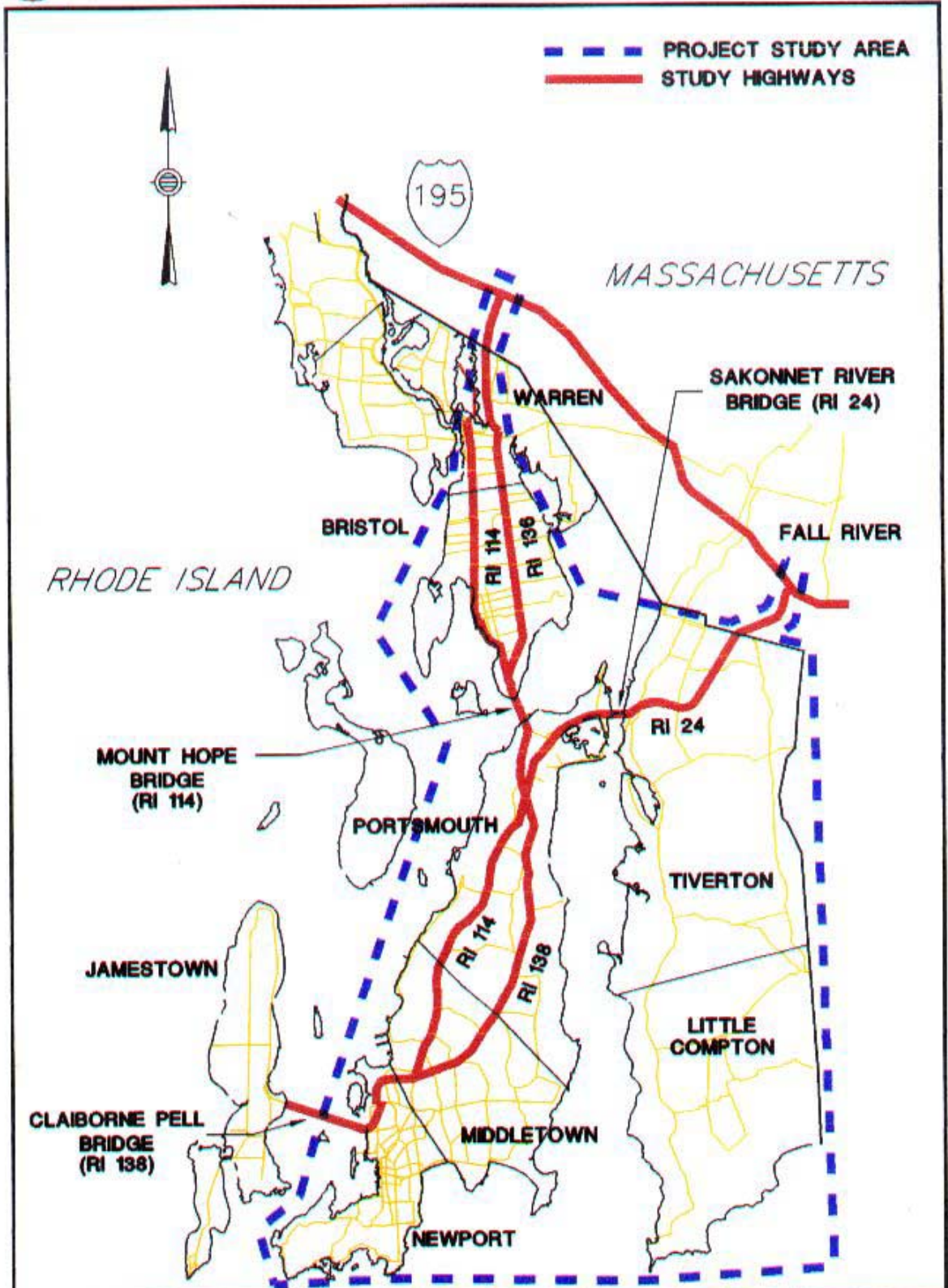
Federal Highway Administration

PROJECT REGION MAP
SAKONNET RIVER BRIDGE PROJECT

Source: USGS QUADRANGLE Scale = 1:63,360

Figure No.
1-1

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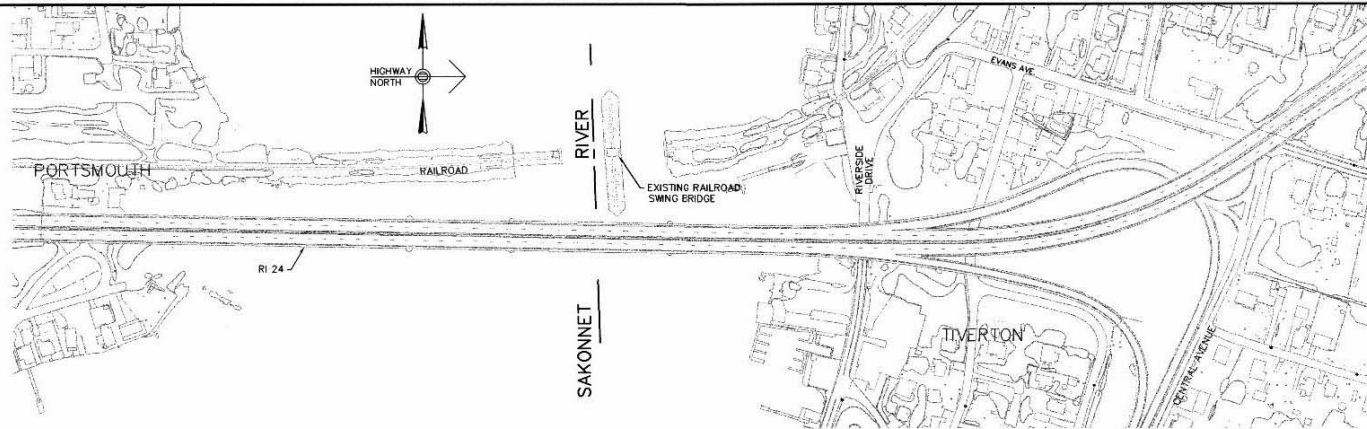


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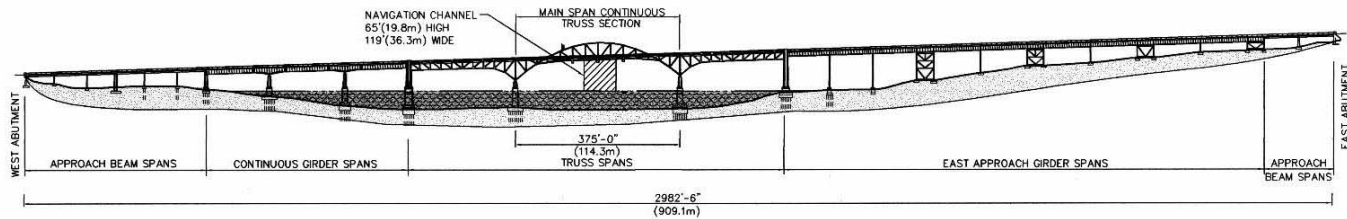
TRAFFIC IMPACTS STUDY AREA
SAKONNET RIVER BRIDGE PROJECT

Figure
1-2

Page 1-3



PLAN
NOT TO SCALE



SOUTH ELEVATION
NOT TO SCALE

Source: COMMONWEALTH ENGINEERS & CONSULTANTS, INC.

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EXISTING SAKONNET RIVER BRIDGE

SAKONNET RIVER BRIDGE PROJECT

Figure No.
1-3

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1.2 PROJECT PURPOSE AND OBJECTIVES

The proposed action is to either rehabilitate or replace the Sakonnet River Bridge (RI Bridge No. 250) that carries Rhode Island State Route 24 (RI 24) over the Sakonnet River between Portsmouth and Tiverton in Newport County, Rhode Island (Figure 1-1). The extensive rehabilitation work required to address the existing deteriorated condition of the bridge structure would result in high costs and adverse traffic impacts during construction. Federal Highway Administration (FHWA) guidelines encourage that if it is determined that the cost to fully rehabilitate an existing bridge would exceed 50% of the cost of a new bridge, then bridge replacement alternatives should be investigated. Accordingly, the Rhode Island Department of Transportation (RIDOT), the project proponent, is considering alternatives to replace the bridge.

This Draft Environmental Impact Statement (DEIS) has been prepared by RIDOT to meet Federal Highway Administration (FHWA) environmental regulations implementing the National Environmental Policy Act (NEPA.) The objective of this environmental review process for the Sakonnet River Bridge Rehabilitation or Replacement Project (the Project) is to evaluate the environmental impacts of alternatives and to identify a preferred alternative that would maintain this essential river-crossing component of the regional transportation network. The preferred alternative identified in this DEIS satisfies the following project needs:

- Improve or replace the existing bridge that is structurally deficient, fracture critical, as well as substandard. The bridge does not meet current highway design standards for shoulder widths and structural capacity.
- Maintain the critical north/south transportation system link between Massachusetts and Rhode Island that the existing bridge provides.
- Provide adequate seismic protection for the vital transportation link that the bridge provides for Aquidneck Island.
- Support existing and future traffic volumes, with the least disruption during construction.
- Improve public safety.

1.3 PROJECT NEEDS

RIDOT is considering alternatives for the Sakonnet River Bridge to address the need to maintain a structurally sound bridge to carry RI 24 and to continue to provide for marine navigation in this location. The project needs are discussed in the following categories: safety; system linkage; transportation demand and capacity; intermodal relationships; and social demands and economic development.

1.3.1 Safety

Subsequent to its dedication on September 26, 1956, the bridge has undergone several upgrades and rehabilitation projects including guardrail improvements, resurfacing, and lighting upgrades. Normal maintenance and repairs such as minor painting, deck patching and joint repair have been performed by RIDOT periodically since the bridge was constructed. Emergency repairs have also been performed in the past on the bridge to address extensive deterioration found on structural members.

RIDOT conducted a comprehensive field inspection of the bridge during September and October 1997, and March and April 1998. These inspections found significant deficiencies in the concrete support piers and abutment walls, the steel superstructure and substructure, and the bridge deck. The significant problems found on the bridge include the following:

- Several of the concrete piers exhibit areas of heavy surface deterioration and cracking. Major elements of the pier supporting the west approach beams will need to be completely replaced. Abutments exhibit cracking, delamination, and deterioration at the backwalls and beam seats.
- Structural steel components across the bridge (primarily floor beams, stringers and crossbeams) are in need of repair, supplementing, or replacement.
- Deterioration of the bridge deck has occurred to the extent that total replacement is required.
- Many of the utility conduits, expansion fittings, couplings, and junction boxes are deteriorated and require replacement.
- A non-functional drainage system and a multitude of failed deck joints have allowed road salt and debris to collect on the structural members located below. The drainage troughs are clogged with debris to the extent that they have buckled under their own weight. As a result, the majority of the crossbeams exhibit severe deterioration requiring either extensive supplementing or complete replacement.
- The paint system is at the end of its useful life. Additional deterioration of the bridge could result if comprehensive repainting is not performed.
- The bridge railing is substandard

In order to maintain the safety of the bridge during the EIS process, as well as during the design and construction period for the selected alternative, RIDOT is currently performing Interim Repairs (which began in 2000 and will be completed in the fall of 2001) to address deterioration of structural elements.

In addition, the on-ramp from Central Avenue (part of the bridge structure) has little acceleration lane length and minimal sight distance for motorists attempting to merge with the high speed RI 24 traffic. The off-ramp to Central Avenue (also part of the bridge structure) has insufficient deceleration lane length and terminates at the Central Avenue Interchange, which has a confusing alignment and a complicated traffic pattern.

An additional problem not addressed by any of the previous repairs is that the Sakonnet River Bridge does not meet current seismic standards. Therefore, an essential project need is to make certain that any new construction implementing the project purpose complies with relevant seismic standards. The Sakonnet River Bridge is considered a “critical” structure since it is a vital transportation link for Aquidneck Island. Critical bridges should be designed and constructed to withstand maximum credible events, or earthquakes corresponding to the 500-year event (10 percent probability of exceedence in 50 years) and the 2,500-year event (two percent probability of exceedence in 50 years). The 500-year seismic design should have minimal damage from a seismic event, and the 2,500-year design no loss of life from an event. In response to national policy initiated by the US Department of Transportation (USDOT),² the New England states are taking steps to address seismic related issues for new bridges as well as those existing bridges that are seismically deficient. Rhode Island has implemented the latest federal design guidelines requiring critical highway structures to continue to function and remain open to emergency vehicles immediately following a large earthquake. FHWA policy also recommends development of site specific seismic criteria.

The existing Sakonnet River Bridge is a non-redundant fracture critical structure, which by definition means that an entire portion of the bridge could collapse if any one of the fracture critical members fail.

A substantial project need is to maintain traffic flow during construction. This essential need for all of the project alternatives is addressed in the DEIS.

1.3.2 System Linkage

RI 24 is an important link in the transportation network providing a north-south connection between Massachusetts and Rhode Island, particularly to Aquidneck Island which includes the City of Newport resort area. RI 24 as it crosses the Sakonnet River Bridge carries the highest traffic volume of the three bridges connecting to Aquidneck Island. RI 24 is functionally classified by RIDOT as an Urban Principal Arterial - Other Freeway and Expressway (Urban).³ Due to the constraining RI 24 highway geometry on the Tiverton side, the bridge and approaches are signed for a 50 miles per hour (mph) speed limit. The traffic study in the DEIS demonstrates these linkages.

1.3.3 Transportation Demand and Capacity

The Sakonnet River Bridge project is not expected to have a significant effect on capacity, traffic flow, level of service or vehicular mode share in the transportation corridor. This is because the proposed action is largely to improve bridge safety, and not necessarily to increase traffic capacity. RI 24 in the location of the Sakonnet River Bridge will have sufficient capacity during the study period; therefore, additional lanes for highway capacity is not a need of the project.

The existing traffic volumes and types of vehicles using RI 24 in the project area were quantified during several periods in 1998 and 1999. The traffic data are summarized in Table 1-1.

TABLE 1-1 1998/1999 TRAFFIC DATA SUMMARY

FACTOR	NORTH-BOUND	SOUTH-BOUND	TOTAL
Average Daily Traffic	20,000	20,700	40,700
Design Hour Volumes	1,800	1,900	3,700
Percent Commercial Vehicles	2.5	2.5	2.5

Sources: Commonwealth Engineers & Consultants, Inc. 1998 and 1999 traffic counts.
RIDOT 1999 Automatic Vehicle Classification/Weigh-in-Motion (AVC/WIM) data.

A potential detour route option during construction for traffic currently using the Sakonnet River Bridge would be the Mt. Hope Bridge, carrying RI 114 over Mt. Hope Bay to the west of the Sakonnet River. The Mt. Hope Bridge has one lane in each direction, and currently carries an average daily traffic volume of 14,300 vehicles.⁴ Traffic detoured to the Mt. Hope Bridge would affect RI 114 and RI 136 to the north of the bridge, and RI 114 and RI 138 to the south. Further detour impacts may also occur at the southern end of Aquidneck Island on the Claiborne Pell Bridge, which carries RI 138 over the East Passage of the Narragansett Bay from the City of Newport. The Pell Bridge currently carries an average daily traffic volume of 23,000 vehicles. The predicted effects of traffic detours in the project area are addressed in the DEIS.

1.3.4 Intermodal Relationships

Rail

The existing Sakonnet River Railroad Bridge (RI Bridge No. 450) is located to the north, and adjacent to, the highway bridge. The railroad bridge is a center-pivot swing type built in 1899, and is not currently in use due to damage caused by a marine vessel collision. RIDOT is proceeding with a separate project to evaluate alternatives and prepare conceptual designs for reactivation of the existing rail corridor to provide commuter service. Should such a commuter rail service be activated along the existing railroad corridor, a Tiverton train station near the Sakonnet River Bridge could be accessed via RI 24 and RI 138, making for a potential intermodal connection. A new railroad bridge would be required to carry rail traffic across the Sakonnet River.

Moreover, RIDOT is considering a new highway bridge alternative in this DEIS which would be aligned along the railroad right-of-way to the north of the Sakonnet River Bridge, and would combine to the extent feasible the structures required for both the highway and railroad bridges. None of the project alternatives considered would preclude future use of the rail line.

Water Transportation

While no intermodal connection to water transportation is envisioned at this time, the project alternatives would maintain reasonable needs of navigation after full consideration of the environment. The navigation clearance currently provided on the Sakonnet River in the center channel is 65-feet (19.8 m) high and 119-feet (36.3 m) wide at mean high water. The US Coast Guard (USCG) bridge regulations are intended to prevent any interference with navigable waters of the United States.⁵ The USCG must approve the location and plans for the construction or modification of any bridge over waters subject to the ebb and flow of the tide, which applies to the Sakonnet River.

The project may include temporary impacts to water transportation during construction by closure or restriction of the navigation channel.

Pedestrian and Bicycle

The Sakonnet River Bridge has a three-ft. (1 m)-wide walkway on both the northbound and southbound sides. However, this walkway, which is for emergency use only, is not adequately separated from the traffic lanes by a barrier system. Pedestrian and bicycle access is currently prohibited on the bridge. The New Bridge Alternatives discussed in this DEIS include provisions for pedestrian and bicycle access on the bridge, linking the Tiverton and Portsmouth bikeways, and would provide wider shoulders to improve overall vehicular and pedestrian safety

1.3.5 Social Demands and Economic Development

The existing Sakonnet River Bridge is the most heavily used of the three bridges (Sakonnet River Bridge, Mount Hope Bridge, Claiborne Pell (Newport) Bridge) connecting the mainland to Aquidneck Island. Therefore, a long-term safe connection between the island and the mainland is required to meet the daily travel demands of Aquidneck Island residents and businesses, as well as to foster further economic and tourism development in the area. Furthermore, public services are provided between Tiverton and Aquidneck Island including secondary schools and public transit, requiring daily use of the Sakonnet River Bridge.

REFERENCES

1. American Association of State Highway and Transportation Officials, *Standard Specifications For Highway Bridges*, Sixteenth Edition, 1996 (1998 Interim Revisions).
2. U.S. Department of Transportation, Federal Highway Administration, *Seismic Retrofitting Manual for Highway Bridges*, Publication No. FHWA-RD-94-052, May 1995.
3. Rhode Island Department of Transportation, *Technical Paper No. 130, Highway Functional Classification System for the State of Rhode Island, 1995-2005, and Functional Classification of Roads Update*, October 1988.
4. Rhode Island Department of Transportation, *Traffic Flow Map, showing 1998 annual 24 hour average daily traffic*, 1999.
5. Code of Federal Regulations, *Title 33, Navigation and Navigable Waters, Chapter I, Coast Guard, Department of Transportation, Part 114, General*, revised as of July 1, 1999.