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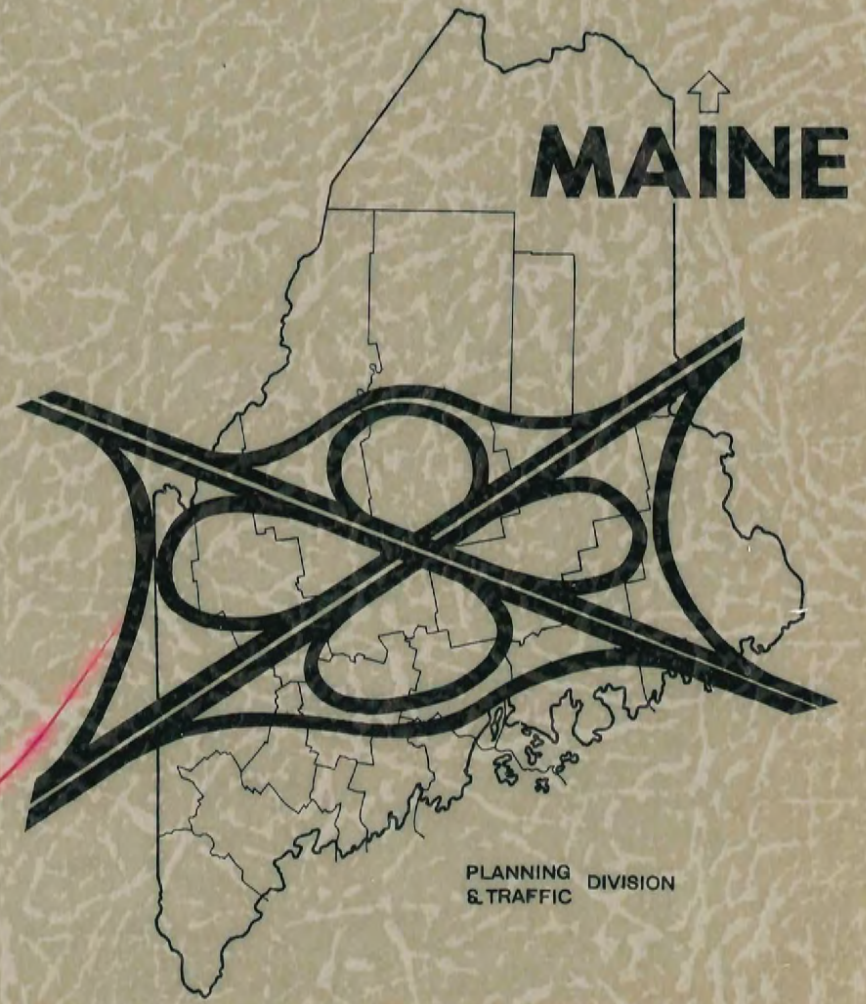
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BIDDEFORD-SACO BRIDGE STUDY



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PLANNING & TRAFFIC DIVISION

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SYLVESTER L. POOR
CHIEF ENGINEER

Maine State Highway Commission

AUGUSTA, MAINE 04330

January 11, 1967

To the Honorable Senate and
House of Representatives of the
One Hundred and Third Legislature -

Transmitted herewith is a report entitled
"Biddeford-Saco Bridge Study".

This report is being submitted in accordance with
the provisions of the Resolves of the One Hundred and Second
Legislature, Chapter 36, a copy of which is included and made
a part of this report. The report was prepared in cooperation
with the United States Department of Commerce, Bureau of
Public Roads.

Respectfully,

MAINE STATE HIGHWAY COMMISSION

Handwritten signature of David H. Stevens in cursive.

David H. Stevens, Chairman

Handwritten signature of Bertrand A. Lacharite in cursive.

Bertrand A. Lacharite

Handwritten signature of Steven D. Shaw in cursive.

Steven D. Shaw

Prepared by
MAINE STATE HIGHWAY COMMISSION

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PREPARED AND PUBLISHED
IN COOPERATION WITH
THE UNITED STATES DEPARTMENT OF COMMERCE, BUREAU OF PUBLIC ROADS
PUBLISHED UNDER APPROPRIATION
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SUMMARY

In compliance with a resolve passed by the 102nd Legislature, the Maine State Highway Commission, in cooperation with the U. S. Bureau of Public Roads, has conducted a feasibility study of a highway bridge across the Saco River based on traffic service, engineering, and economic aspects.

The purpose of the bridge, as stated in the Resolve, is to provide a continuous coastal route. The coastal route referred to in the Resolve is assumed to be a portion of State Route 9 which begins at the junction of U. S. Route 1 in the Town of Wells and extends for approximately 33 miles, rejoining U. S. Route 1 in the Town of Scarborough. Some 23 miles of the route described is designated State Aid - Federal Aid Secondary while the system designation for the remaining 10 miles is State Highway - Federal Aid Secondary.

The analysis of the traffic survey which was conducted at three locations in the towns of Biddeford and Saco during the period of June 27, to July 1, 1966, showed that a bridge would provide traffic service to only 42 vehicles at the 1966 Annual Average Daily Traffic level for continuous coastal route travel. However, since the bridge would serve local traffic, some 1430 vehicles would use the bridge facility, again at the 1966 Average Annual Daily Traffic level.

The Bridge Division of the Maine State Highway Commission has determined that a bridge spanning the Saco River between the coastal communities of Hills Beach and Camp Ellis would cost an estimated \$960,500.

A Benefit-Cost Analysis of the proposed facility yielded a Benefit-Cost Ratio of 1.96, indicating the Annual Highway User Savings being greater than the Annual Costs associated with the construction and maintenance of a bridge and approaches. This method of analysis is used to merely show the relation of highway user benefits to capital costs and cannot be used to determine the priority of a proposed project. The priority of the proposed project should be determined by comparing its necessity with other highway needs throughout the State, and funds available for such work.

BIDDEFORD-SACO BRIDGE STUDY

INTRODUCTION

The State of Maine Legislature, meeting in 102nd regular session, enacted a resolve authorizing the State Highway Commission to study the desirability of a bridge across the Saco River with the results of the study to be reported to the next regular session of the Legislature. A full copy of the Resolve follows:

- - - - -

Chapter 36 - Resolves, 1965

RESOLVE, Authorizing State Highway Commission to Study
Desirability of Bridge Across Saco River

Bridge Across Saco River: Study Authorized. Resolved: That the State Highway Commission be, and is, authorized and directed to make a study of the need and cost of a highway bridge across the Saco River between the Cities of Saco and Biddeford in the County of York, to provide a continuous coastal route, with necessary highway approaches thereto; and be it further

RESOLVED: That the Commission shall report the results of its study at the next regular session of the Legislature.

- - - - -

In response to the above Resolve, the State Highway Commission, in cooperation with the U. S. Bureau of Public Roads, has conducted a feasibility study based on traffic service, engineering, and economic aspects of a bridge across the Saco River.

Coastal Route Description

The coastal route referred to in the Resolve is assumed to be that portion of State Route 9 which begins at the junction of U. S. Route 1 in the Town of Wells (Cozy Corners), extends northeasterly for

approximately 15.8 miles serving the coastal resort communities of Kennebunk Beach, Kennebunkport Village, Cape Porpoise, Goose Rocks Beach, Fortunes Rocks, Biddeford Pool and Hills Beach; then loses its coastal identity and extends inland in a westerly direction following the south side of the Saco River, crossing the Saco River within the urban areas of the Cities of Biddeford and Saco and, following the north side of the river, continues easterly to Camp Ellis where Route 9 again follows the coastline. The so-called inland portion of this route is about 7.8 miles in length. The remaining portion of the coastal route, an additional 9.7 miles, extends through the coastal resort communities of Ferry Beach, Bay View, Old Orchard Beach and Pine Point and rejoins U. S. Route 1 in the Town of Scarborough.

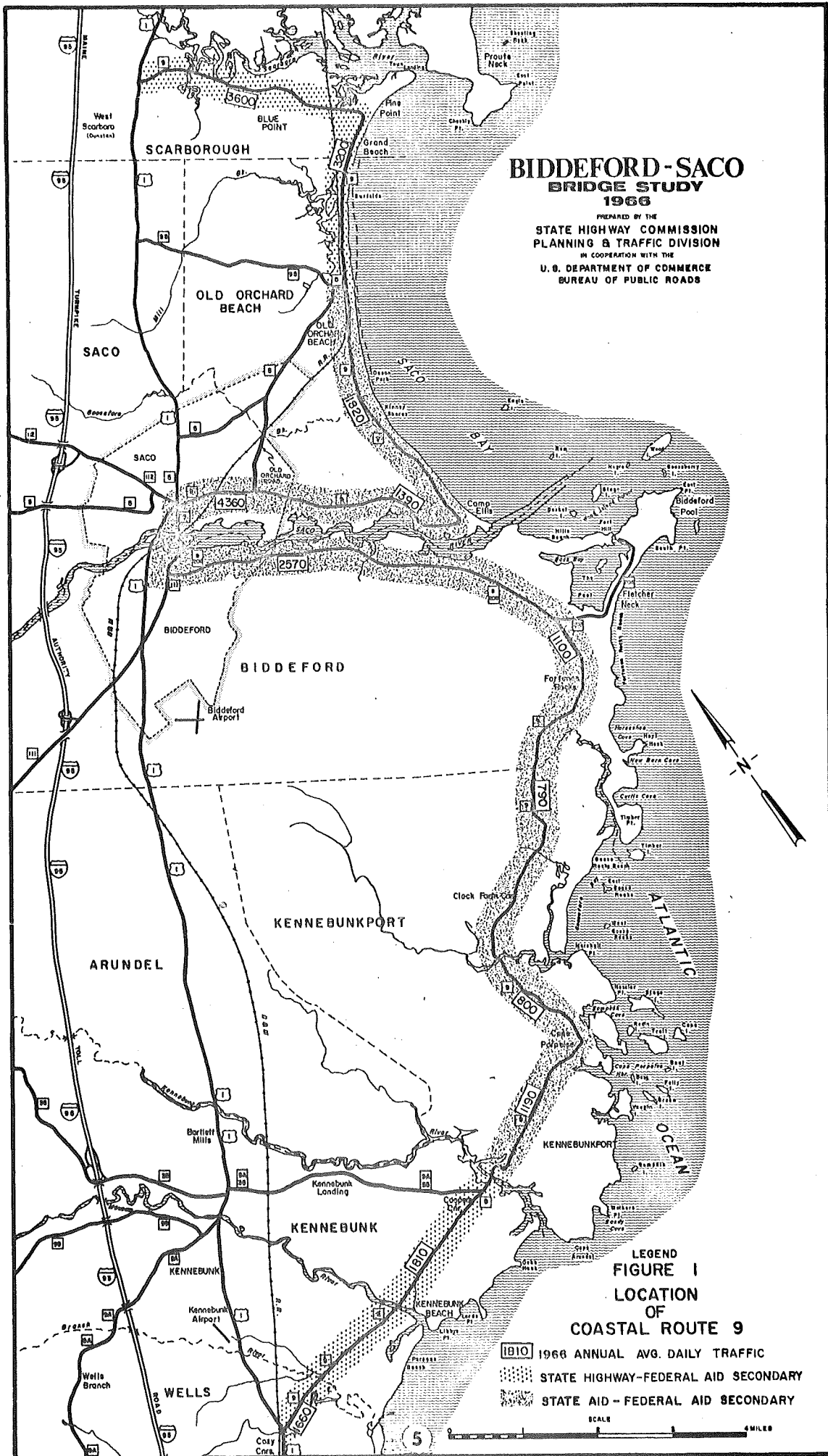
The route described, which totals 33.3 miles in length, has the following highway system designations:

<u>Description</u>	<u>Miles</u>	<u>System Designation</u>
U. S. Route 1, Wells to Kennebunkport Village	4.5	State Highway - Federal Aid Secondary
Kennebunkport Village to Jct. S.R. 5, Old Orchard Beach	23.4	State Aid - Federal Aid Secondary
S.R. 5, Old Orchard Beach to Jct. U. S. Rte. 1, West Scarboro	5.4	State Highway - Federal Aid Secondary
	<hr/>	
Total Length	33.3	

Figure 1, Page 5 shows the location of the coastal route with the highway system and Annual Average Daily Traffic volumes indicated.

BIDDEFORD - SACO BRIDGE STUDY 1966

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LEGEND
FIGURE 1
LOCATION
OF
COASTAL ROUTE 9

- 1010 1966 ANNUAL AVG. DAILY TRAFFIC
- STATE HIGHWAY-FEDERAL AID SECONDARY
- STATE AID - FEDERAL AID SECONDARY

SCALE 4 MILES

TRAFFIC SERVICE

Introduction

In order to fulfill the request of the 102nd Legislature, traffic studies were undertaken by the State Highway Commission to ascertain the present demand for a continuous coastal route and to determine the feasibility of a new bridge over the Saco River.

If a continuous coastal route were to be provided, a bridge would have to be constructed to span the Saco River generally between the Route 9 coastal communities of Hills Beach and Camp Ellis. It was assumed for the purpose of the traffic analysis that the proposed bridge would be located in the vicinity of Ferry Lanes in both Biddeford and Saco. The location of the proposed bridge studied is shown in Figure 2, Page 7.

Origin and Destination Survey

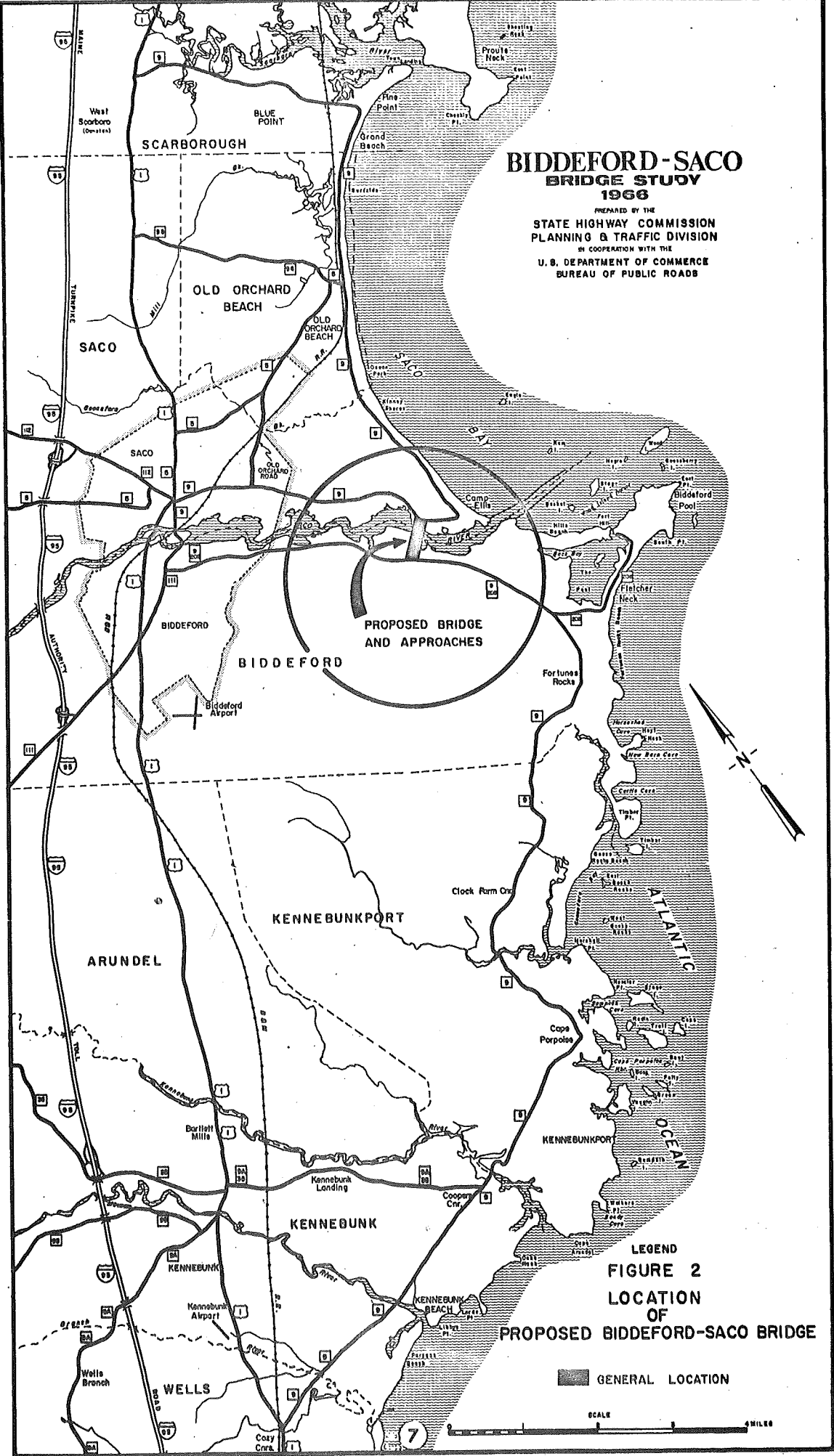
Motorists were interviewed at three roadside interview stations in order to determine the traffic which could be assigned to a proposed bridge. The stations were located as follows: (See Figure 3, Page 9)

<u>Station No.</u>	<u>Town</u>	<u>Location Description</u>
9-S	Saco	Route 9 (Beach Street) Northwest of the Old Orchard Road
9-B	Biddeford	Route 9 near the westerly entrance to Notre Dame Hospital
5-S	Saco	Route 5 (Ocean Park Avenue) West of the Saco-Old Orchard Town Line

The above station locations were selected to provide a sample of all traffic presently potential to a proposed bridge.

BIDDEFORD-SACO BRIDGE STUDY 1966

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LEGEND
FIGURE 2
 LOCATION
 OF
 PROPOSED BIDDEFORD-SACO BRIDGE

■ GENERAL LOCATION

SCALE 0 1 2 3 4 MILES

Motorists at each station were interviewed in both directions of travel during the survey period from June 27, to July 1, 1966. The Biddeford Station was operated for 16 hours, while in the Saco area interviewing was conducted for 13 and 8 hours at the Route 9 and Route 5 Stations respectively. Motorists interviewed were asked questions relating to the Origin and Destination of their trip, the trip purpose, and the location and purpose of any intermediate stops made within the study area.

At the roadside stations some 10,089 interviews were collected representing 50.8 percent of the total volume of 19,860, the average number of vehicles passing through the roadside stations during the period of study.

TABLE 1

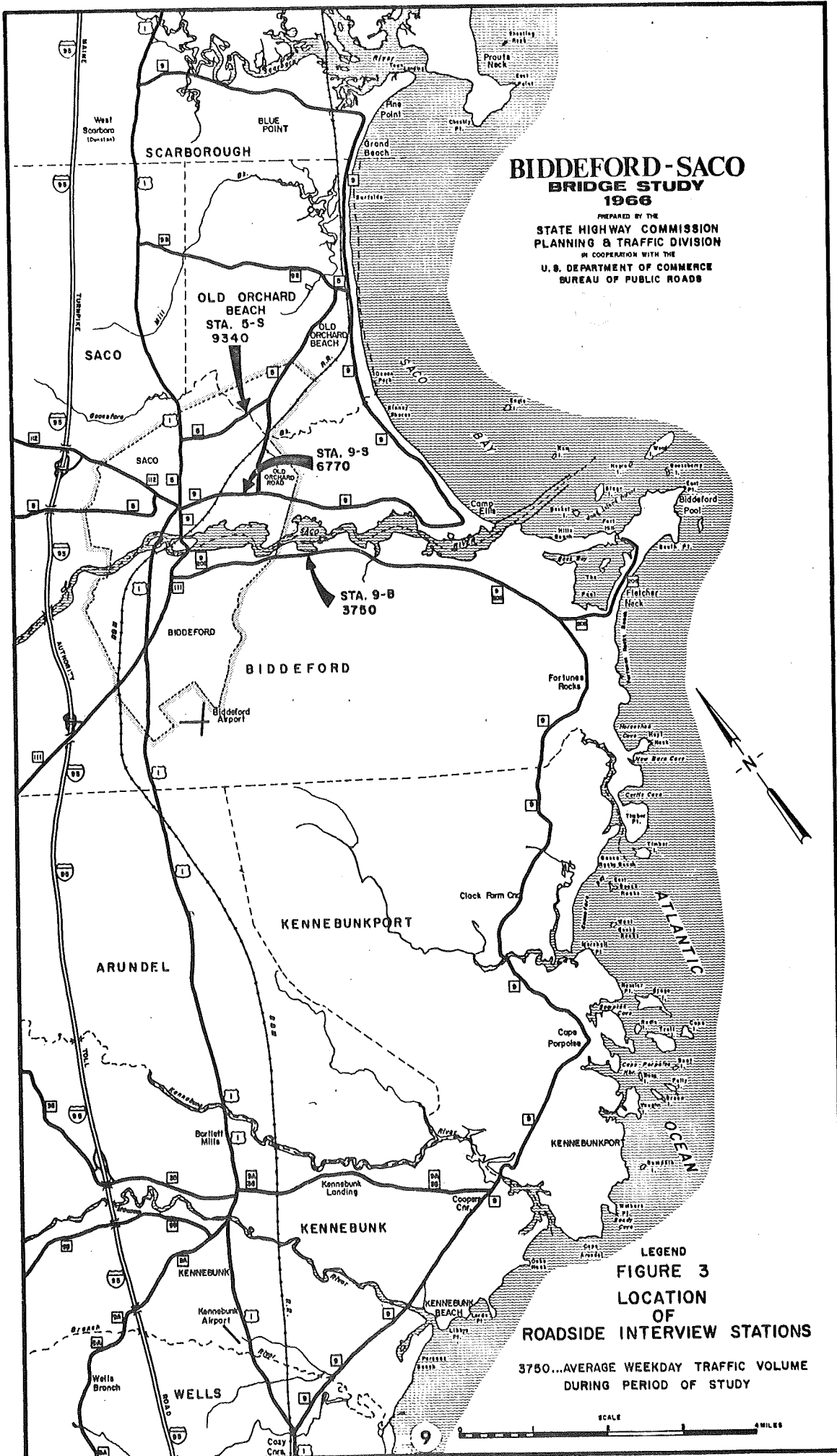
SUMMARY OF MOTORISTS INTERVIEWED

Sta. No.	<u>Passenger Vehicles</u>		<u>Trucks</u>		<u>All Vehicles Period of Study Average Weekday June 27 - July 1</u>	
	<u>Volume</u>	<u>Percent Sample</u>	<u>Volume</u>	<u>Percent Sample</u>	<u>Volume</u>	<u>Percent Sample</u>
9-S	6520	59.5	250	34.4	6770	58.6
9-B	3650	93.5	100	61.0	3750	92.6
5-S	9060	28.6	280	22.1	9340	28.4
Totals	19230	51.4	630	33.2	19860	50.8

Roadside interviews were expanded and adjusted to represent Average Weekday Traffic during the period of study. As a basis for the expansion and adjustment of the interview data, automatic traffic volume counts and manual vehicle classification counts were taken at each roadside interviewing station during the course of the study.

BIDDEFORD-SACO BRIDGE STUDY 1966

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LEGEND
FIGURE 3
LOCATION
OF
ROADSIDE INTERVIEW STATIONS

3750...AVERAGE WEEKDAY TRAFFIC VOLUME
DURING PERIOD OF STUDY

SCALE 0 1 2 MILES

Study Area

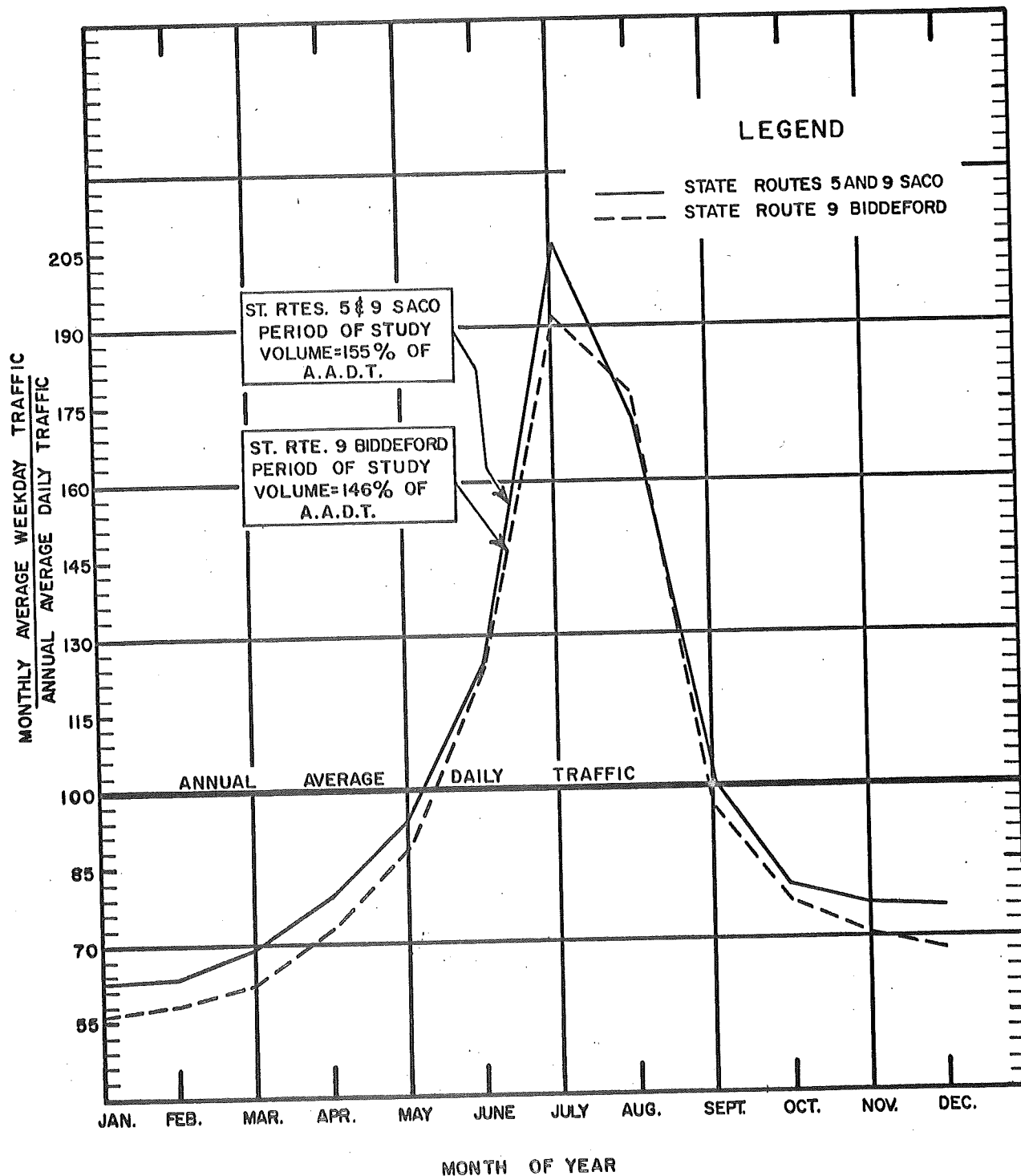
The study area (consisting of six towns, namely: Biddeford, Saco, Old Orchard Beach, Kennebunk, Kennebunkport, and Arundel) was divided into 74 traffic zones. These zones were established for the analysis of the origin and destination data. The delineation of zone boundaries was based on criteria such as: land use, traffic generators (communities), compact urban lines, and town boundaries. Street and roadway patterns and natural barriers which restrict the free movement of vehicles were also considered in the zonal breakdown.

Traffic Characteristics

Traffic volume variations and the trip purpose analysis at the three roadside interview stations indicate, as expected, that all of the stations display recreational characteristics. In the peak months of July and August, traffic is approximately 87 percent greater than the Annual Average Daily Traffic. Traffic volume counts recorded during the study period (June 27, to July 1, 1966) are 55 percent greater than the Annual Average Daily Traffic (A.A.D.T.) at the Saco Stations, while at the Biddeford Station a corresponding Annual Average Daily Traffic adjustment factor of 46 percent is applicable. Figure 4, Page 11 shows the monthly traffic variations at the three station locations.

An analysis of passenger vehicles by trip purpose (Figure 5, Page 12) shows a relatively high percentage of social and recreational trips - again denoting a recreational route. At Roadside Interview Station No. 5-S - Route 5, Saco, social and recreational trips account for 47 percent of the total passenger vehicles; while at the other two stations, 41 percent of the passenger vehicles had social and recreation

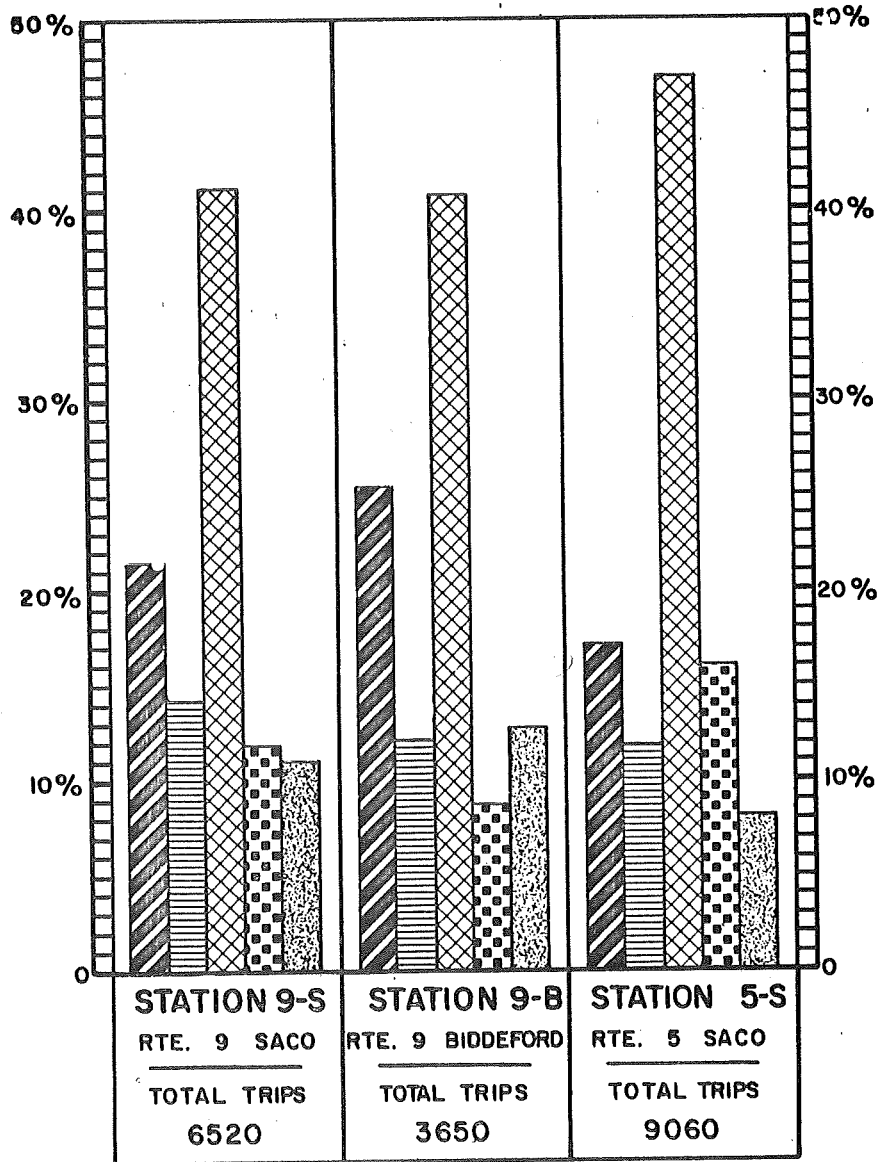
MONTHLY TRAFFIC VARIATIONS



BIDDEFORD—SACO
BRIDGE STUDY
1966

FIGURE 4

DISTRIBUTION OF TRAFFIC AT ROADSIDE INTERVIEW STATIONS BY TRIP PURPOSE
PASSENGER VEHICLES—PERIOD OF STUDY (June 27, to July 1, 1966)
 (Combined Trips At Each Station Total 100%)



LEGEND
TRIP PURPOSE

- Work
- Business
- Social & Recreation
- Shopping
- Other

BIDDEFORD—SACO
BRIDGE STUDY
1966

as the trip purpose. A further analysis showing vehicle occupancy by trip purpose for each roadside station is shown in Figure 6, Page 14. This figure gives an indication of the number of persons traveling in the area for the various trip purposes.

Traffic Growth Factors

Relatively high traffic growth rates can be expected on all of the routes studied. This is not unlike other recreational routes in the State. For purposes of this study, traffic has been projected for 20 years hence. The traffic growth at each roadside interview station (Table 2) has been projected based on historical trends.

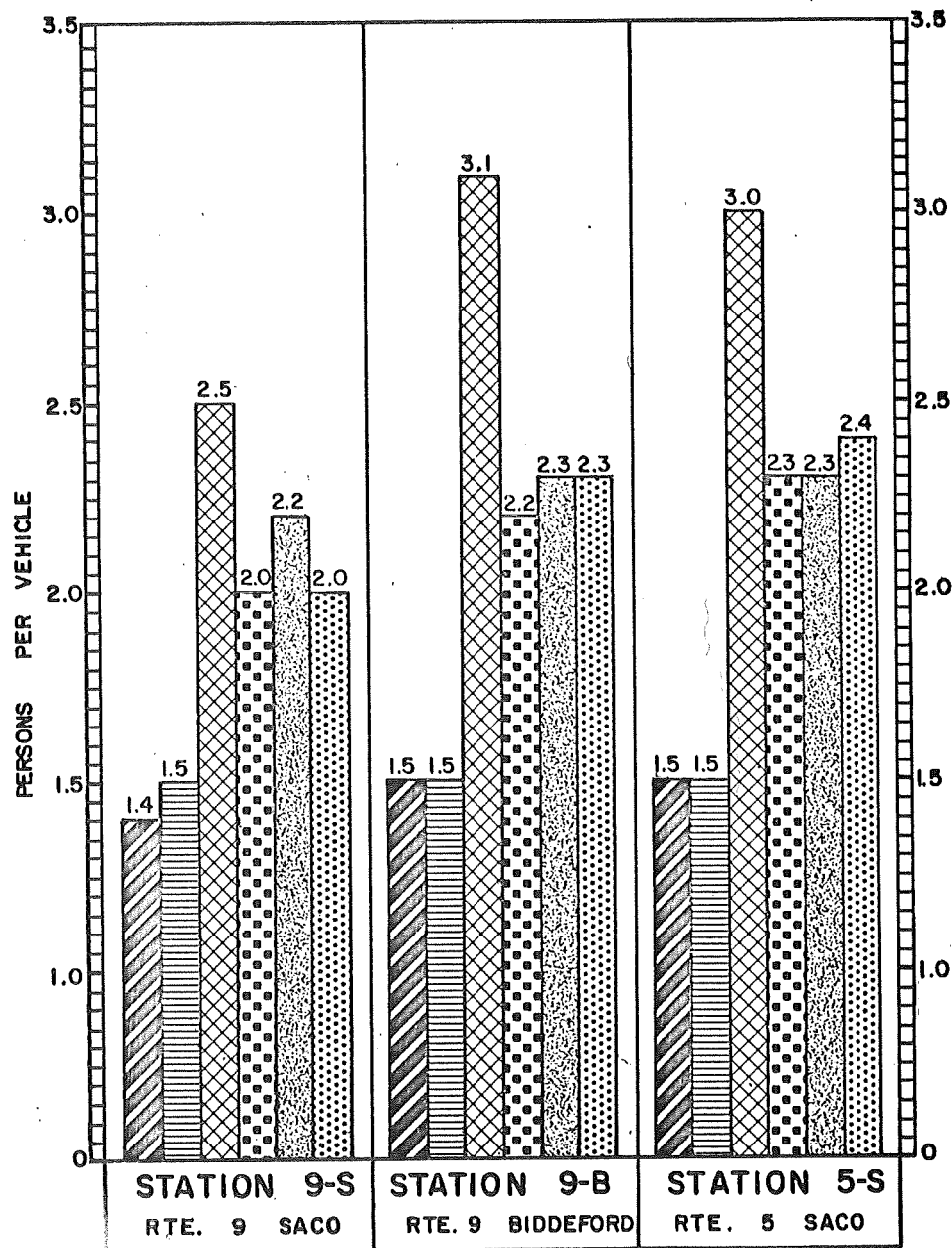
TABLE 2
TRAFFIC GROWTH FACTORS
1966-1986

<u>Roadside Interview Stations</u>	<u>Traffic Growth Factors</u>
No. 9-S - Route 9, Saco	1.86
No. 9-B - Route 9, Biddeford	2.26
No. 5-S - Route 5, Saco	2.18







Estimated Traffic Usage - Proposed Biddeford-Saco Bridge

The results of the analysis of the origin and destination information collected at the three study locations served as the basis for the assignment of traffic to the proposed bridge. The method employed for the assignment of traffic to the proposed bridge location is based on a time diversion formula where the travel time for a trip between an origin and destination using existing facilities is compared to the travel time for a trip between the same origin and destination over a new facility,

VEHICLE OCCUPANCY AT ROADSIDE INTERVIEW STATIONS BY TRIP PURPOSE
 PASSENGER VEHICLES—PERIOD OF STUDY (June 27, to July 1, 1966)



LEGEND
 TRIP PURPOSE

- Work..... 
- Business..... 
- Social & Recreation.... 
- Shopping..... 
- Other..... 
- All Trip Purposes 

BIDDEFORD - SACO
 BRIDGE STUDY
 1966

FIGURE 6.

in this case, the proposed Biddeford-Saco Bridge. This is a generally accepted traffic assignment procedure and is recommended by the U. S. Bureau of Public Roads. The results of this technique were used in the study to determine the potential traffic assignable to the proposed bridge location.

Applying the traffic assignment procedures to the origin and destination trip information obtained at the three roadside interview stations results in some 1885 vehicles being assigned to the proposed bridge location (Table 3) at the study period traffic level, average weekday June 27, to July 1, 1966. Of the 1885 vehicles assigned, only 775 vehicles, 41 percent of the total volume, were trips obtained from Roadside Interview Station No. 9-B, vehicles presently using Route 9 on the Biddeford side of the Saco River. An estimated 898 vehicles, 48 percent of the volume, were assigned from Route 9 in Saco, while a lesser number, 212 vehicles or 11 percent of the total volume, was assigned from Route 5 in Saco. Heavy trucks, 61 in number, amount to 3.2 percent of the total vehicles assigned.

The traffic assigned to the proposed bridge from the roadside interview stations at the study period traffic level averages approximately 51 percent greater than the Annual Average Daily Traffic (the common denominator for traffic volume statistics). The 1885 vehicles assigned to the proposed Biddeford-Saco Bridge at the study period level is adjusted to an assigned traffic volume of 1245 vehicles, 1966 Annual Average Daily Traffic level. Table 3 shows traffic at both period of study and adjusted Annual Average Daily Traffic levels.

TABLE 3

TRAFFIC ASSIGNED TO PROPOSED BIDDEFORD-SACO BRIDGE

Sta. No.	Location	Period of Study Average Weekday (June 27, to July 1, 1966)		Adjusted 1966 Annual Average Daily Traffic		
		Volume	Percent	Pass. Vehicles	Trucks	Total Volumes
9-S	Route 9 - Saco	898	47.6	556	22	578
9-B	Route 9 - Biddeford	775	41.1	517	14	531
5-S	Route 5 - Saco	212	11.3	131	5	136
Total Vehicles Assigned		1885	100.0	1204	41	1245

The traffic assignments show that the present demand for a continuous coastal route is extremely small. Trips which are considered Route 9 through trips, that is, trips from south of the study area (Wells and south) to north of the study area (Scarborough and north) account for only 42 trips or slightly more than three percent of the 1245 trips assigned to the proposed bridge at the Annual Average Daily Traffic level. On the other hand, local trips, trips between study area communities, total 930 trips or approximately three-fourths of the total trips assigned. The remaining 273 trips, approximately 22 percent of the total assignment are external trips, trips between study area communities and places outside the study area.

GENERATED TRAFFIC - It is conceivable that some additional traffic will use the proposed bridge over and above the existing diverted traffic. This so-called "generated traffic" could result from new developments which might take place along the roadway at or near the bridge location, or perhaps from some trips being made more frequently because of a shorter or more attractive route. Based on experience at other facilities, it is

estimated that generated traffic would amount to 15 percent of that traffic assigned from diversion. Therefore, it is estimated that a proposed bridge located in the vicinity of Ferry Lanes in both Biddeford and Saco, providing a continuous coastal route, would serve at the 1966 Annual Average Daily Traffic level, 1430 vehicles. This volume represents the 1245 vehicles assigned from the origin and destination study with an additional 185 vehicles estimated to be generated by the new facility.

A trip table showing the origins and destinations of vehicles assigned to the proposed Biddeford-Saco Bridge, 1966 Annual Average Daily Traffic, is included as Table 4, Page 18. For presentation purposes, the 74 traffic zones used in the analysis of the origin and destination information have been grouped into larger traffic generation areas.

Figure 7, Page 19, displays the traffic desire lines of trips assigned to the proposed bridge at the Annual Average Daily Traffic level. This figure illustrates pictorially the straight line travel desires of trips between origins and destinations, disregarding the physical layout of existing streets and roads.

FUTURE TRAFFIC - Traffic growth trends of routes analyzed during the course of this study would indicate that traffic usage of the proposed Biddeford-Saco Bridge could slightly more than double during a 20-year period. Therefore, the estimated 1986 Annual Average Daily Traffic is 2950 vehicles.

T A B L E 4

TRAFFIC ASSIGNED TO PROPOSED BIDDEFORD-SACO BRIDGE
ALL VEHICLES - 1966 ANNUAL AVERAGE DAILY TRAFFIC

<u>TRIPS BETWEEN</u>	<u>AREAS IN SACO</u>						<u>OLD ORCHARD BEACH AREAS</u>		<u>ROUTE NO. 5 & ROUTE NO. 112 TOWNS</u>	<u>TOWNS NORTH OF STUDY AREA</u>	<u>TOTAL TRIPS</u>
	<u>URBAN</u>	<u>OLD ORCHARD ROAD</u>	<u>CAMP ELLIS & FERRY BEACH</u>	<u>BAYVIEW</u>	<u>ROUTE NO. 9 FERRY RD.</u>	<u>ROUTE U.S.1</u>	<u>URBAN & RURAL</u>	<u>PINE PARK</u>			
<u>AREAS IN BIDDEFORD</u>											
CENTRAL			120	47	29		70				266
BUSINESS DISTRICT			99	35	50		102				287
URBAN		1									
NOTRE DAME HOSPITAL		2	2	3	7	1	11	3		3	32
FERRY LANE	23	2	4	5	4	1	11		2	21	73
HILLS' BEACH AND											
BIDDEFORD POOL	100	6	9	1	10	5	63	5	7	90	296
GUINEA CORNER	6		1		4		12	1		3	27
OTHER RURAL			6	2	1						9
<u>KENNEBUNKPORT</u>	8	1	9	6	7	1	8	1	1	35	77
<u>KENNEBUNK</u>	2		11	3	6		1			4	27
<u>ARUNDEL</u>					1		1			1	3
<u>TOWNS SOUTH OF STUDY AREA</u>	2	1	45	9	7	1	12			42	119
<u>ROUTE NO. 111 TOWNS</u>			13	4	2		10				29
TOTAL TRIPS	141	13	319	115	128	9	301	10	10	199	1245

BRIDGE LOCATION AND ENGINEERING ASPECTS

The site of the proposed bridge was determined after studying the traffic desires, existing maps of the area, and undertaking ground reconnaissance. From this analysis it again appeared feasible to locate the crossing in the approximate vicinity of Ferry Lane, this being the narrowest point of the river and shortest distance between Route 9, Biddeford, and Route 9, Saco.

The approximate site having been determined, a survey party then made a topographical survey of the area. The survey was plotted and the most economical and advantageous line was determined from the conditions indicated. In order to keep property damage to a minimum on the Biddeford side of the river, the project was started at the intersection of old Route 9 and Ferry Lane. The alignment is such that it may be extended to connect with new Route 9. The termination of the proposed alignment on the Saco end is at an intersection with Route 9.

Since the Saco River is navigable at this point a comparatively high level structure is required. The necessary underclearance for the bridge has been tentatively established at 36' above mean sea level, but any such clearance must be approved by the U. S. Army Corps of Engineers. The grades of the approaches were then determined by connecting the finished grade of the structure and the beginning and end of the proposed project with suitable grades fitting the existing conditions and deemed most economical.

A three-span, continuous, composite, welded plate girder, having a 280' center span has been selected as best fitting the existing conditions. The survey indicated ledge outcroppings on both banks at about low tide and in an area acceptable for pier locations thus making it possible to construct piers without costly cofferdams in deep water. It would be necessary to face and protect that portion of the concrete piers within the tide range with a facing of granite.

The abutments would be of the shallow-depth type on fill and would be supported by steel piling. The fill in front of the abutments would be protected by a riprap or concrete facing.

The superstructure of the proposed bridge would consist of a three span continuous plate girder having span lengths of 210' - 280' - 210'. A reinforced concrete deck having 30' clear roadway width, 1'-6" clear curb widths, bituminous concrete wearing surface, and a two-bar metal bridge rail would appear to be adequate.

The approaches would consist of a 24' pavement and 10' shoulders, with guard rail where required. The pavement would be surfaced with bituminous concrete. The west approach will be about 1970 feet long and the east approach about 430 feet, the total length of the entire proposal being 3100 feet.

Figure 8, Page 23 shows a Plan and Profile sketch of the bridge and approaches while Elevation and Transverse Section of the bridge structure is shown in Figure 9, Page 24.

The estimated cost of the proposed project is \$960,500. The breakdown of this cost is as follows:

Bridge Structure	\$843,000
Approaches	97,000
Right-of-Way	20,500
	<hr/>
	\$960,500

Any increase in the amount of underclearance which might be required by the U. S. Army Corps of Engineers would have to be reflected in an increase in the estimated cost of the proposal.

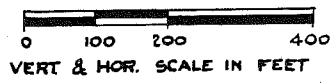
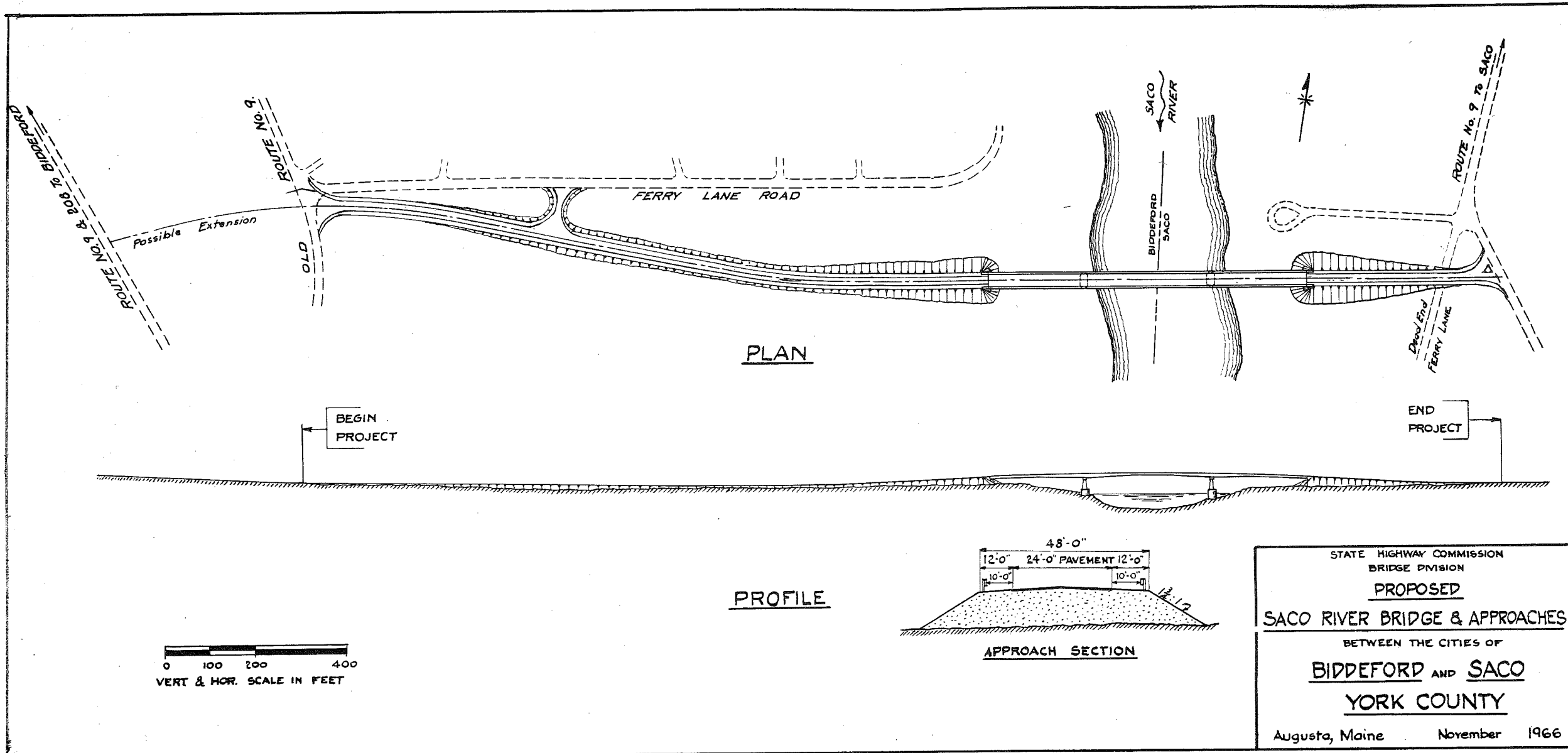
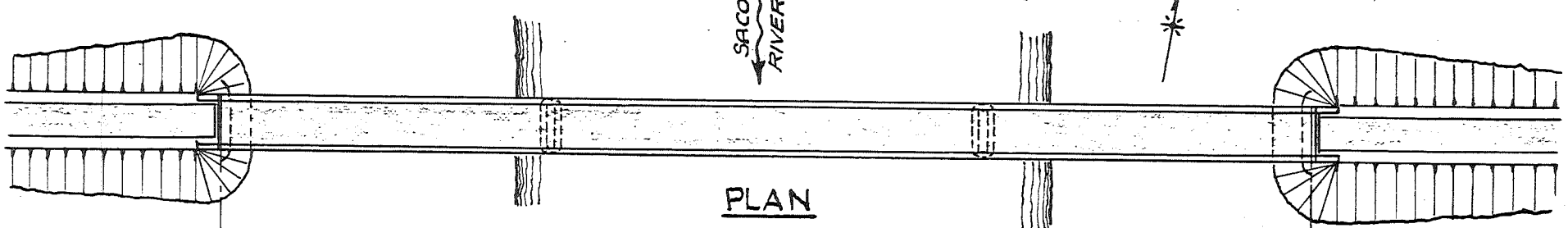


FIGURE 8

SACO RIVER



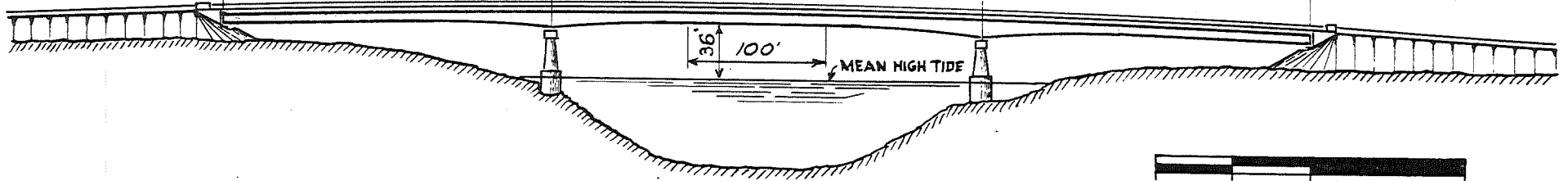
PLAN

3-SPAN CONTINUOUS COMPOSITE 700'-0" C-C ABUTMENT BEARINGS

210'-0"

280'-0"

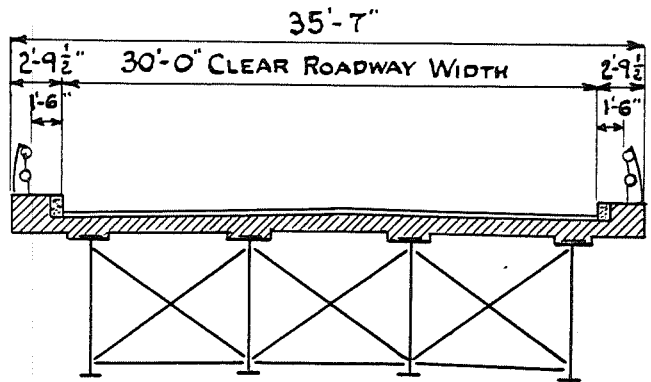
210'-0"



ELEVATION



VERT. & HOR. SCALE IN FEET



TRANSVERSE SECTION

35'-7"

30'-0" CLEAR ROADWAY WIDTH

2'-9 1/2"

1'-6"

2'-9 1/2"

1'-6"

FIGURE 9

STATE HIGHWAY COMMISSION
 BRIDGE DIVISION
PROPOSED
SACO RIVER BRIDGE
 BETWEEN THE CITIES OF
BIDDEFORD AND SACO
YORK COUNTY
 Augusta, Maine November 1966

BENEFIT-COST ANALYSIS

Introduction

A Benefit-Cost Analysis is undertaken to determine if the construction of a new facility will provide annual savings to the highway user which are great enough to off-set the annual construction and maintenance costs. This analysis involves computing the differences in annual costs to the highway users in terms of vehicle operating costs (fuel, tires, oil, maintenance and repairs, depreciation, comfort-convenience, and time), when vehicles use existing highways in one case and a new improvement in another. The total difference is then compared with the annual cost of making the improvement (construction and maintenance costs).

For the Biddeford-Saco Bridge Study this analysis involves a comparison of the differences in annual costs for motorists traveling between their origin and destination on existing roads and streets in one instance, and making the same trip utilizing the proposed facility (Biddeford-Saco Bridge) in another, and then relating any saving in travel costs to the annual costs associated with the construction of a new bridge and approaches.

A 20-year study period is generally used for highway user cost computations with appropriate estimated average traffic for the study period. The methods used for all phases of this analysis are based on "Road User Benefit Analyses for Highway Improvements", American Association of State Highway Officials (1960). Construction and maintenance costs for the proposed bridge and approaches thereto have been computed by the Bridge Division of the Maine State Highway Commission.

The following table summarizes the procedures involved in the Benefit-Cost Analysis.

Results of Benefit-Cost Analysis

Annual Highway User Costs

	<u>Annual Vehicle Miles</u>	<u>Annual Avg.* Highway User Costs</u>
Existing Roads and Streets	3,789,395	\$539,718
New Improvement	<u>3,549,407</u>	<u>445,230</u>
Difference:		
Highway User Savings, New Improvement	239,988	\$ 94,488

* Includes cost of stops at traffic signals, stop signs, and railroad crossing..

Annual Improvement Costs

<u>Item</u>	<u>Estimated Life (Yrs.)</u>	<u>Estimated Cost</u>	<u>Annual Capital Costs *</u>
Bridge Structure	50	\$843,000	\$39,200
Approaches:			
Grading and Base	40	83,400	4,212
Pavement	20	13,600	1,001
Right-of-Way	100	20,500	836
Total Costs		<u>\$960,500</u>	<u>\$45,249</u>
Annual Maintenance Cost			<u>3,000</u>
Annual Construction and Maintenance Costs			\$48,249

* Annual amount required to amortize the total highway improvement cost with interest computed at 4 percent for the life of each construction item.

Benefit Cost Ratio

$$\text{Benefit-Cost Ratio} = \frac{\$94,488 \text{ (Highway User Savings)}}{\$48,249 \text{ (Annual Improvement Costs)}} = 1.96$$

The Benefit-Cost Analysis shows the annual highway user savings to be greater than the annual costs associated with the construction and maintenance of a bridge and approaches by a ratio of approximately two to one. This analysis would indicate that the bridge proposal in and of itself is economically feasible. Such a proposal must, however, be measured against other highway improvement needs and the availability of funds before the priority of a project can be determined.

Recent studies indicate statewide highway needs on existing facilities which far outstrip available funds. At the present time, some 1158 miles of roadway on the rural Federal-aid Secondary System, of which the route in question is a part, is in need of reconstruction. Average annual needs on the rural Federal-aid Secondary System have been determined to amount to some fifteen million dollars (\$15,000,000). In contrast to these known needs, only approximately five million dollars (\$5,000,000) are available annually. The needs indicated are based on pavement width and condition, safety, and other similar features and the severity of these needs has established project priority.