11-1962

Interstate Route 95 : Location and Economic Study : Portsmouth, New Hampshire-Kittery, Maine (Summary Report)

Wilbur Smith and Associates

Location and Economic Study

INTERSTATE ROUTE 95

PORTSMOUTH
NEW HAMPSHIRE

KITTERY
MAINE

SUMMARY REPORT

Wilbur Smith and Associates

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Location and Economic Study

INTERSTATE ROUTE 95

PORTSMOUTH
NEW HAMPSHIRE

KITTERY
MAINE

This report summarizes the findings and recommendations of a comprehensive engineering and economic study relating to the proposed Interstate Route 95 bridge over the Piscataqua River. Location, construction, and financial aspects of this crossing are elaborated in the detailed 164-page report.

Prepared For

THE NEW HAMPSHIRE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

and

THE MAINE STATE HIGHWAY COMMISSION

In Cooperation With

THE U. S. DEPARTMENT OF COMMERCE BUREAU OF PUBLIC ROADS

By

Wilbur Smith and Associates

NOVEMBER, 1962

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AND
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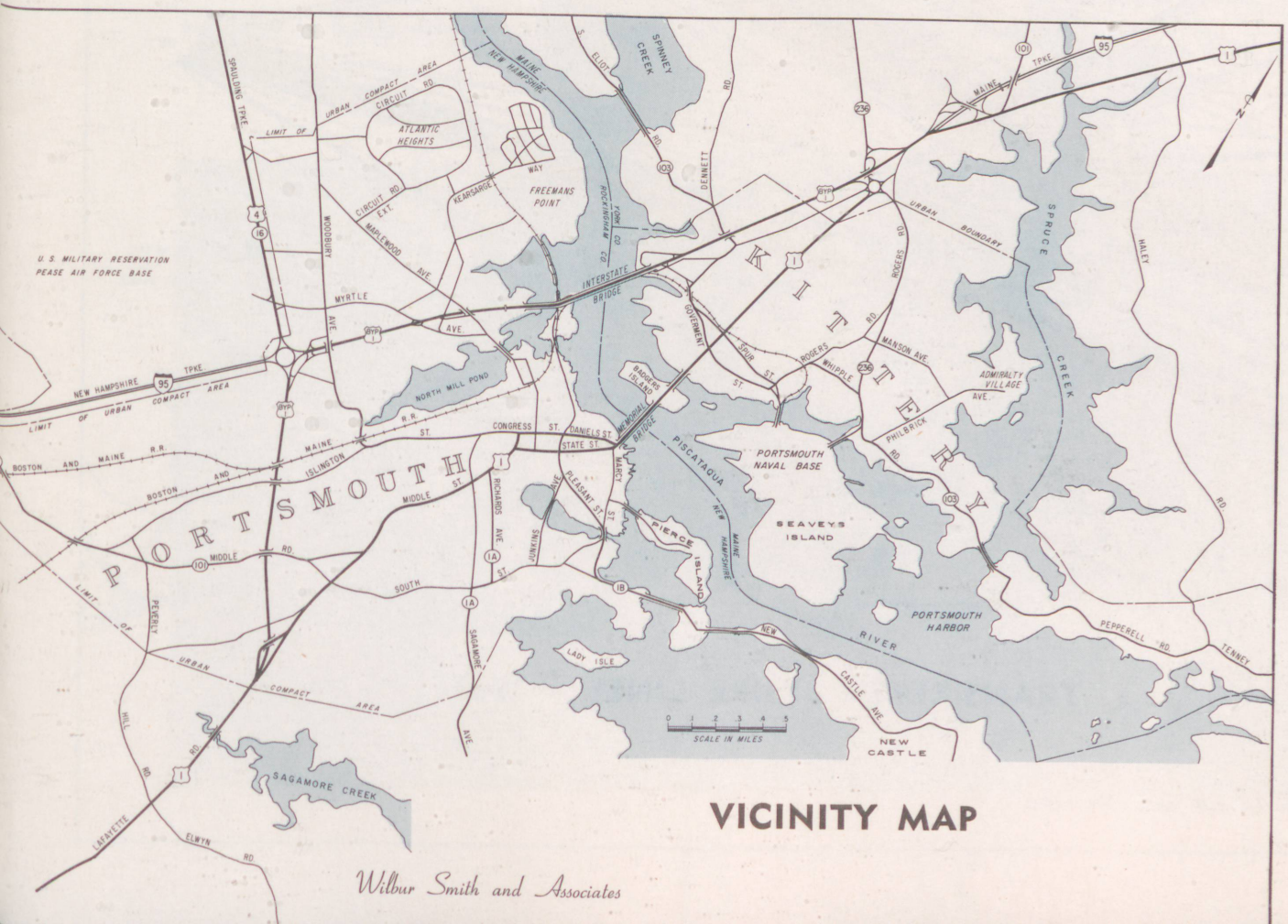
REPORT IN BRIEF...

Improved highways, more leisure time, and a generally higher standard of living have served to enhance the position of upper New England as a major recreational region. The resultant acceleration in tourist activity, coupled with sharp upturns in commercial and industrial development, have produced substantial growth in the area's traffic volumes.



VICINITY MAP

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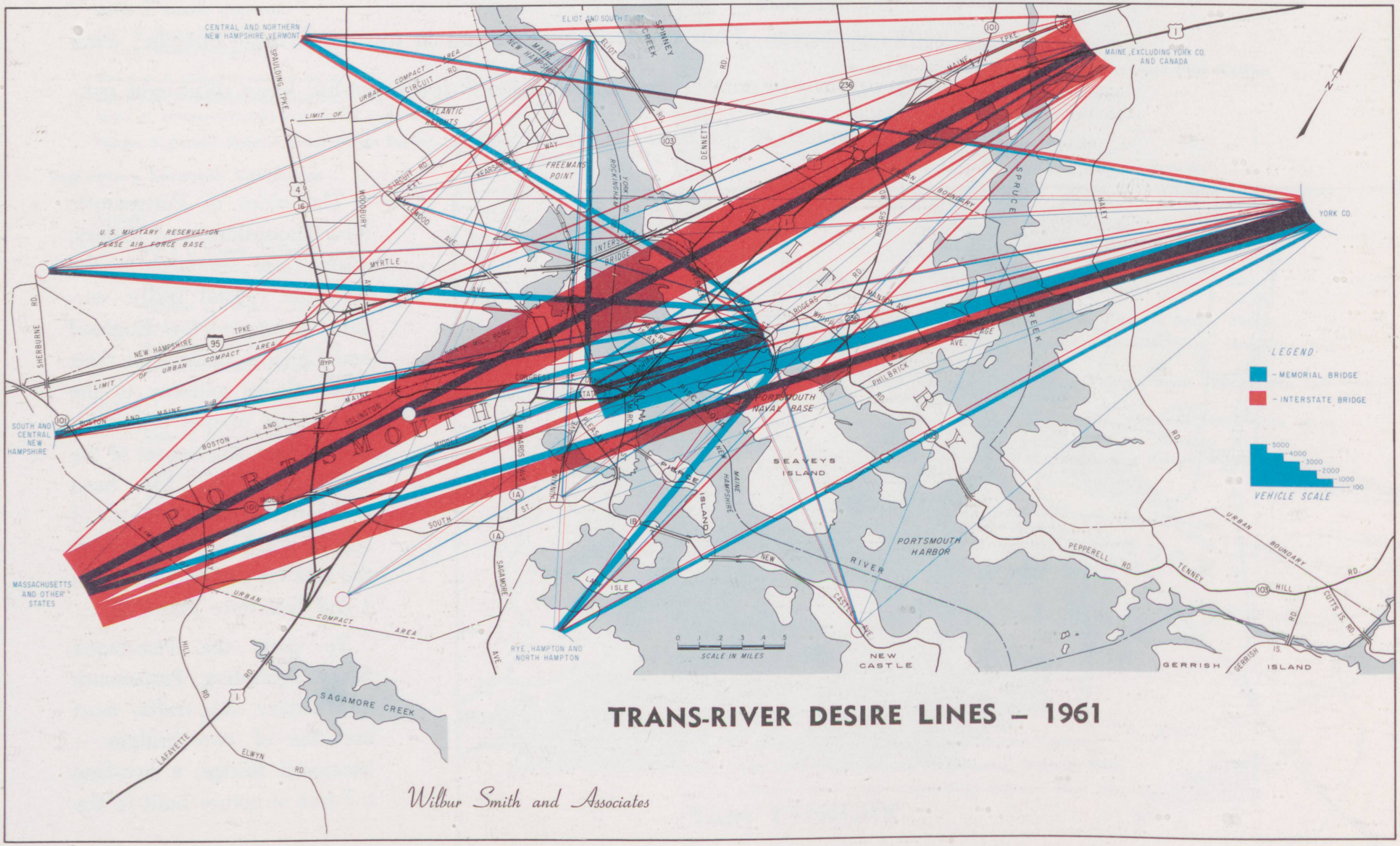
The cities of Portsmouth, New Hampshire, and Kittery, Maine, are centered in the principal coastal traffic corridor to upper New England and Canada. Because of their dual role as gateway to the region and market center for a large area, the impact of the increased travel has been keenly felt. Heavy streams of traffic are funneled through the area via U. S. Routes 1 and 4 and Interstate Route 95.

To cross the Piscataqua River separating Portsmouth and Kittery, this traffic must use one of two bridges — Memorial Bridge, a two-lane toll-free structure built in the

1920's to serve U. S. Route 1, or the Maine-New Hampshire Interstate Toll Bridge built in 1950, connecting the New Hampshire and Main Turnpikes (both now designated as Interstate Route 95).

Traffic over the Interstate bridge has increased markedly in recent years, especially during the summer months. Daily traffic over this facility in July, 1962, averaged 24,000 vehicles; over Memorial Bridge, the



TRANS-RIVER DESIRE LINES – 1961

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total was 19,400. For the entire year, average annual daily traffic on the Interstate Bridge is 14,000 and on the Memorial Bridge, 17,000.

During peak traffic periods, the existing 30-foot wide Interstate bridge is sometimes operated as a three-lane facility. The lift bridge must be opened frequently for passing boats, with the result that vehicles are often backed up for more than a mile in each direction on the bridge approaches. While bridge openings average only three per day, each of about 10 minutes duration, the frequency of openings is greatest in summer and on weekends when highway travel is heaviest. It is estimated that as many as 5,000 vehicles are delayed on a busy summer weekend day — 15 to 20 per cent of the total daily volume.

Although existing traffic conditions are bad, anticipated future movements dwarf present volumes. By 1985, trans-river trips in the area should average 67,500 daily — a 122 per cent increase over the total of 30,400 Trips in 1961.[1]

Problems stemming from the growing traffic volumes and plans to extend Interstate Route 95 through the Portsmouth-Kittery area necessitated a thorough engineering and economic study to determine the best means for locating, constructing, and financing a crossing over the Piscataqua River.

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[1]The future traffic estimates assume a toll-free facility.

Two approaches to the problem were considered:

- **Expanding the capacity of the existing toll bridge, including construction of a parallel span.**
- **Constructing a high-level bridge and approaches on a new location.**

Numerous separate but related investigations and analyses were undertaken during the year-long study. These included:

- Comprehensive origin-destination surveys.
- Analysis of supplemental traffic volume data.
- Field reconnaissance and capacity studies.
- Location studies involving all physical factors affecting the feasibility of eight possible alignments. The three most feasible of these were studied in detail.
- Development of cost estimates for the three selected routes, including costs of right-of-way as estimated by qualified appraisers.
- Detailed economic impact investigations, including economic comparisons, conventional benefit-cost studies, comparative cost estimates, and impacts on land use.
- Comparative analyses of toll financing versus financing with 90 per cent Federal Interstate highway funds.

In addition, noted bridge authorities (Hardesty and Hanover, consulting engineers, New York City) were consulted relative to design of the bridge itself, following criteria prescribed by the U. S. Bureau of Public Roads and the Maine and New Hampshire highway departments.

Three alternate locations for the proposed Interstate Route 95 river crossing and its approaches were developed. Consideration was given to traffic service, topography, culture, land use, and navigational requirements. Design criteria were established and feasible alignments and profiles prepared. Particular attention was given to the bridge location, navigational clearances, comparative bridge costs, functional design and cost of major interchanges, right-of-way acquisition and construction costs.

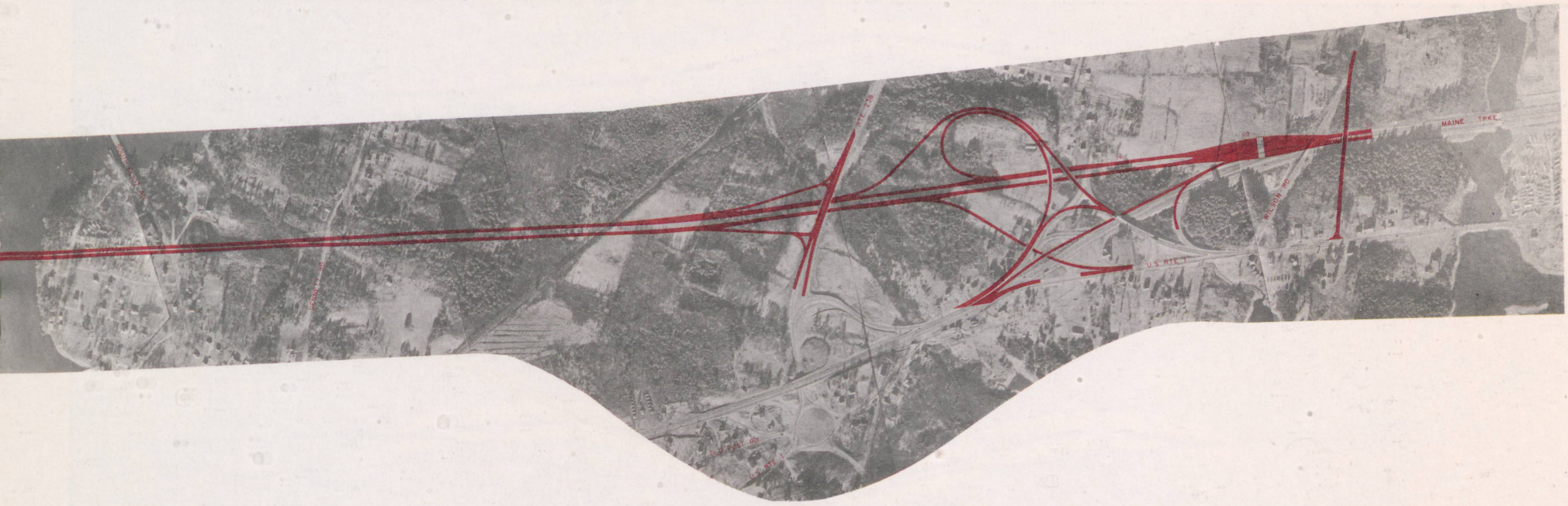
All of the routes studied begin about 3,500 feet south of the traffic circle in New Hampshire and terminate on the north near the toll booth locations on the Maine Turnpike.

- Alternate A, about one half mile upstream from the present route, extends from the New Hampshire Turnpike south of its present terminus in a northerly and northeasterly direction, west of the present Interstate bridge approaches and south of Kearsarge Way to a proposed interchange with the Maine Turnpike and U. S. Route 1 in Kittery. Major interchanges are proposed with U. S. Route 4 (Spaulding Turnpike) and Bypass U. S. Route 1 (present Interstate bridge) in Portsmouth, Maine Route 236, and U. S. Route 1 in Kittery. The crossing of the river will be on a high-level bridge, providing a vertical clearance of 130 feet above mean high level.

- A second location for the Interstate connector, Alternate B, proposes interchanges at the same locations as on Alternate A. The approaches to and the main span over the river would, however, be immediately west of and closely parallel to the present Interstate bridge. A lift bridge will be required.

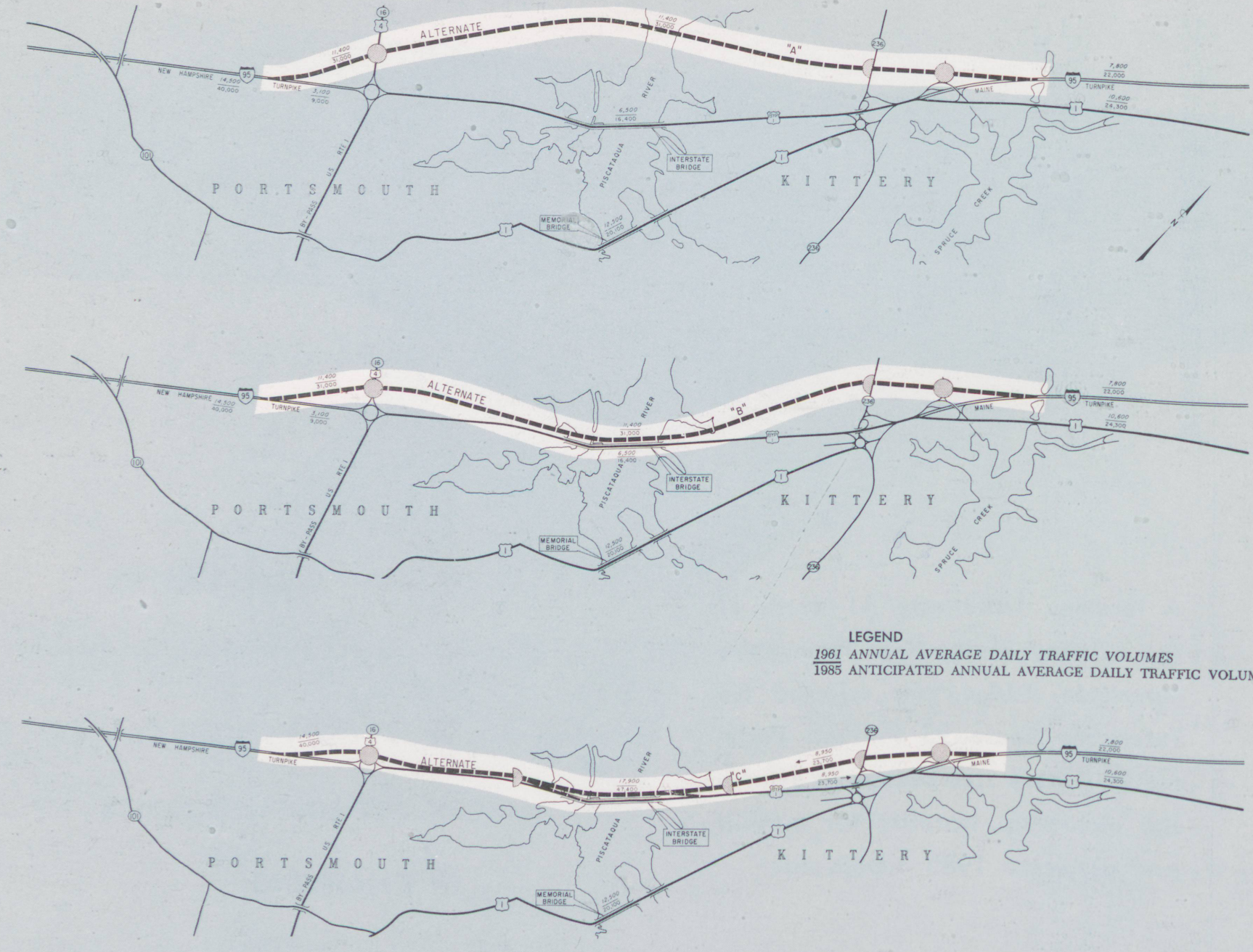
- The third location, Alternate C, utilizes the present Interstate bridge right-of-way in New Hampshire. Northbound traffic would use the existing right-of-way in Maine and southbound traffic would use a separate right-of-way immediately west of the present Interstate bridge alignment. Since this location pre-empts the present location of Bypass U. S. Route 1, additional interchanges with the local street system would be required between the major interchanges near the southern and northern extremities of the route section.

THE RECOMMENDED ROUTE



A location (Alternate A) north of the existing Maine-New Hampshire Interstate Bridge was selected for Interstate Route 95 through Portsmouth-Kittery area because it affords the maximum benefits for current and projected 1985 conditions:

- **TRAFFIC SERVICES**
- **NAVIGATION**
- **ECONOMIC IMPACT**
- **DEVELOPMENT COSTS**
- **FINANCING**



LEGEND

1961 ANNUAL AVERAGE DAILY TRAFFIC VOLUMES

1985 ANTICIPATED ANNUAL AVERAGE DAILY TRAFFIC VOLUMES

ALTERNATE ROUTES

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The relative advantages and disadvantages of the alternate route locations are presented in the summary table. Alternate A, the upstream high-level bridge, excels in just about ALL areas of comparison:

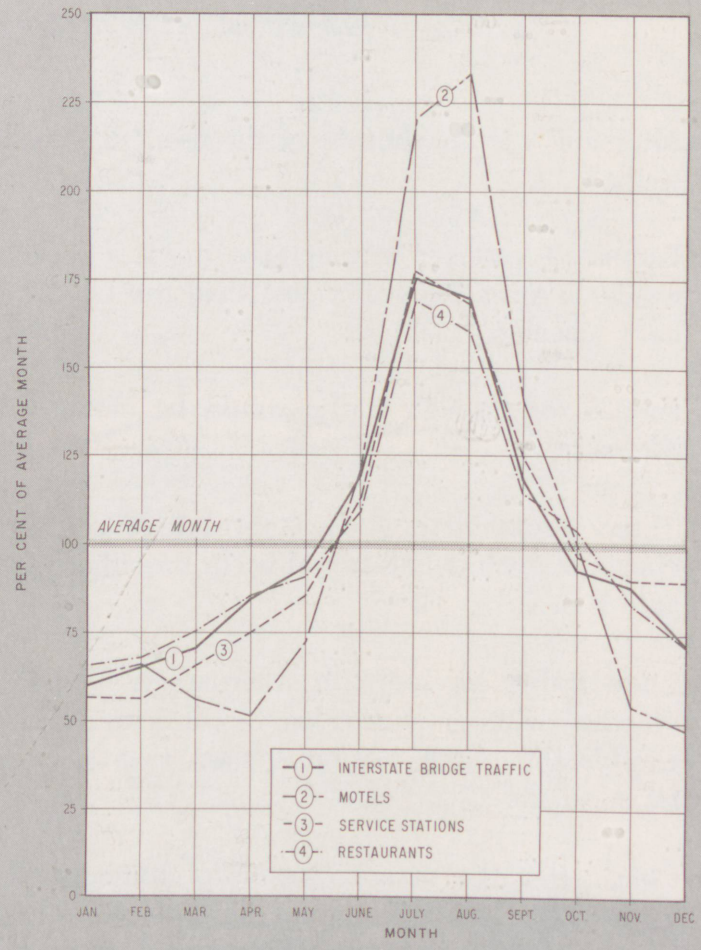
- Alternate A is the shortest of the three alignments studied.
- Estimated cost of development on this location would be over $6,600,000 less than the two alternate schemes.
- Service for through traffic would be better with Alternate A.
- There would be no delays for bridge openings. However, such delays would occur on either Alternate B or C.
- Local traffic service with Alternate A would be identical with that provided by Alternate B, and considerably more favorable than that provided by Alternate C.
- Considering the design controls of route termini, topography, and the present development of the area — a quite moderate displacement of existing dwellings and businesses would be required. While Alternate A would require the taking of more residential dwellings, it would be less disruptive to service stations and other commercial buildings. The public information building in Maine would not be disturbed although the weight station serving southbound traffic in Maine would have to be relocated.
- River navigation and development would be better with development of Alternate A than either of the other alternates.
- Access to key military installations would be improved by development of the Alternate A alignment.
- The impact on restaurant and motel sales would be slight with all alternates. While service station sales would be affected more by Alternate A than Alternate B or C, the volume of sales should be equivalent to present levels within five years after the highway improvement is completed and opened to traffic. In subsequent years, normal traffic growth and new land use developments would result in substantial increases in sales at all business establishments along the Interstate Bridge approaches.
- All alternates were developed for high design standards. Under the recommendations, it would be necessary to relocate the toll plazas on the Maine Turnpike to maintain high standards of design and to provide good traffic services.
- Accessibility to the Portsmouth-Kittery area would be improved with the Alternate A alignment; this should increase the development of customer markets and make the area inviting for commercial-industrial growth.

- Total development cost estimated for Alternate A would be $13,587,000, divided between the two states.

- In Maine, about $975,000 of construction costs would probably be ineligible for Federal participation unless the legislature amends the statutes relating to the Main Turnpike Authority, to provide that the turnpike become toll-free after payment of the turnpike's indebtedness.

- If a toll-free facility is constructed, New Hampshire's share of construction costs would approximate $750,000. Maine's share would vary from $620,000 to about $1,500,000, with the amount contingent upon the extent to which approaches to the Maine Turnpike are eligible for financing under the Interstate highway program.

It is recommended that the route be developed on the Alternate A alignment, with a high-level fixed-bridge over the Piscataqua River. This route provides a higher quality of traffic service for both through and local motorists, could be constructed at considerably less cost, would not have a significant adverse impact upon the roadside businesses presently located along the Interstate Bridge approaches, and would create greater opportunities for new development.



MONTHLY VARIATIONS
GROSS RECEIPTS AND TRAFFIC

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COMPARISON OF ALTERNATE LOCATIONS

Interstate Route 95 — Portsmouth, New Hampshire and Kittery, Maine

Item	Alternate A, Western Location			Alternate B, Central Location			Alternate C, Eastern Location		
	New Hampshire	Maine	Total	New Hampshire	Maine	Total	New Hampshire	Maine	Total
Approximate Length (miles)									
Between common points	2.37	2.09	4.46	2.24	2.25	4.49	2.24	2.24	4.48
Actual construction project	2.34	2.09	4.43	2.08	2.25	4.33	2.12	2.24	4.36
Traffic Usage									
Estimated 1985 Annual Average Daily Traffic									
Highest Volume Section	40,000	31,000	—	40,000	31,000	—	47,500	47,400	—
Piscataqua River Bridge	31,000	31,000	—	31,000	31,000	—	47,400	47,400	—
Lowest Volume Section	24,200	16,600	—	24,200	16,600	—	30,300	22,000	—
Estimated 1985 Directional Design Hour Volumes									
Piscataqua River Bridge	3,690	3,690	—	3,690	3,690	—	5,640	5,640	—
Traffic Service									
Through Traffic	Excellent: No marginal interference from frontage roads or intermediate ramp connections; no delays due to bridge openings.			Very Good: No marginal interference from frontage roads or intermediate ramp connections; some delays due to bridge openings.			Good: Some marginal interference due to extensive frontage roads and some intermediate ramp connections; some delays due to bridge openings.		
Local Traffic	Good: Through traffic diverted to new bridge; Interstate Bridge available for local motorists; no decrease in access points to Interstate Bridge required.			Good: Through traffic diverted to new bridge; Interstate Bridge available for local motorists; no decrease in access points to Interstate Bridge required.			Fair: Local traffic intermixed with through traffic; number of present access points to Interstate Bridge eliminated.		
Effect on River and Harbor Development Channel Clearances	Preferred: High-level fixed bridge design provides liberal horizontal (470 ft. min.) and adequate vertical (130 ft.) clearances.			Adequate: Low-level lift bridge provides adequate horizontal (225 ft. min.) and vertical (135 ft. open; 36 ft. closed) clearances.			Adequate: Low-level lift bridge provides adequate horizontal (225 ft. min.) and vertical (135 ft. open; 36 ft. closed) clearances.		
Navigation	Preferred: Greater distance from Interstate Bridge and wider channel facilitate maneuvering of ships.			Undesirable: Prolongates narrow channel of present Interstate Bridge; close proximity to Interstate Bridge makes navigation difficult.			Undesirable: Prolongates narrow channel of present Interstate Bridge; close proximity to Interstate Bridge makes navigation difficult.		

COMPARISON OF ALTERNATE LOCATIONS (Continued)

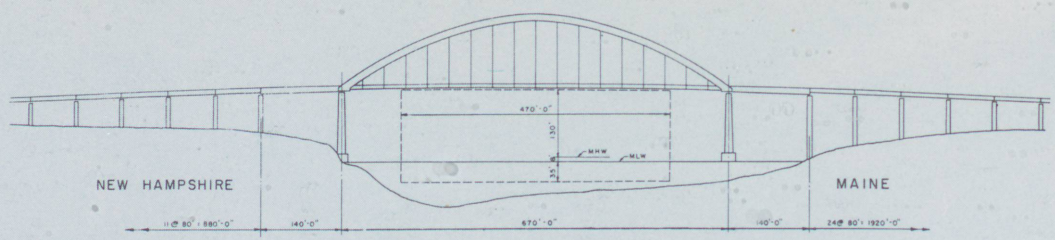
Item	Alternate A, Western Location			Alternate B, Central Location			Alternate C, Eastern Location		
	New Hampshire	Maine	Total	New Hampshire	Maine	Total	New Hampshire	Maine	Total
Functional Design									
Mainline Roadways									
Maximum Curvature	1° –30′	0 –30′	–	2 –30′	1 –15′	–	2 –45′	1 –30′	–
Maximum Grade	4.0%	4.0%	–	3.0%	0.5%	–	3.0%	1.2%	–
Major Interchange									
Maximum Curvature	230′R	230′R	–	250′R	230′R	–	230′R	230′R	–
Maximum Grade	–3.8%	–4.3%	–	+4.2%	–4.3%	–	+4.2%	–4.3%	–
Estimated Costs (Thousands of Dollars)									
Right-of-Way	$ 550	$ 165	$ 715	$ 644	$ 229	$ 873	$ 522	$ 353	$ 875
Construction									
Piscataqua River Bridge	2,117	3,033	5,150	5,900	4,750	10,650	5,900	4,750	10,650
Major Interchanges	1,404	1,313	2,717	1,581	1,314	2,895	2,503	1,627	4,130
Other	3,368	1,637	5,005	3,522	2,295	5,817	3,035	2,130	5,165
Sub-Total	$6,889	$5,983	$12,872	$11,003	$8,359	$19,362	$11,438	$8,507	$19,945
TOTAL	$7,439	$6,148	$13,587	$11,647	$8,588	$20,235	$11,960	$8,860	$20,820
Benefit-Cost Ratio			4.72			3.22			3.96
Economic Factors									
Acquisition of Buildings									
Residential	21	5	26	19	7	26	9	12	21
Commercial, Misc.	2	1	3	3	–	3	–	–	–
Service Stations	2	–	2	2	1	3	8	1	9
TOTAL	25	6	31	24	8	32	17	13	30

COMPARISON OF ALTERNATE LOCATIONS (Continued)

Item	Alternate A, Western Location			Alternate B, Central Location			Alternate C, Eastern Location		
	New Hampshire	Maine	Total	New Hampshire	Maine	Total	New Hampshire	Maine	Total
Impact on Roadside Business (1966 Gross Sales as per cent of present)									
Service Stations	50-80			85-95			90		
Restaurants	106			108			114		
Motels	110			114			120		
Community Impact									
Short-range	Fair			Good			Good		
Long-range	Good			Fair			Fair		
Feasibility of Revenue Bond Financing (with 10 Cent per Axle Toll)[1]									
Estimated Bond Issue for—									
Entire Bond Project	$14,560,000	(15,800,000)		$22,700,000	(24,000,000)			$21,400,000	
States' 10 Per Cent Share of Construction Costs	1,950,000	(3,250,000)		2,800,000	(4,100,000)			2,750,000	
Estimated Coverage By Net Revenues[1, 2]									
First Year Interest		1.84	(1.04)		1.18	(0.69)		1.25	
Second Year Interest		2.07	(1.17)		1.32	(0.77)		1.40	
Level Debt Service		2.52	(1.41)		1.61	(0.93)		1.71	
Number of Years to Pay Out Bond Issue for States' 10 Per Cent Share of Construction Costs		2	(5)		3	(6)		3	

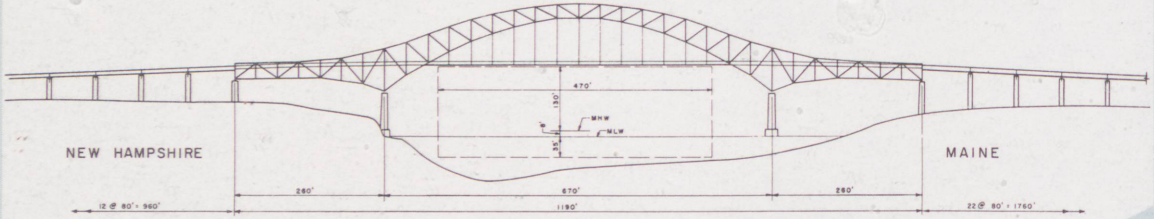
[1](000)—With existing Interstate Bridge toll free
[2]Bond issue for entire project

The feasibility of revenue financing of the different alternates was examined. It appears that such financing could be used IF tolls are retained on the existing Interstate bridge, IF bond obligations are effected for a 40-years period, IF costs of toll collections and operations are added to the usual maintenance and operating costs, IF a 10-cent per axle toll schedule is applied, IF financing costs (including an interest rate of approximately 4.75 per cent) are added to other costs, and IF all motorists using the two bridges are delayed for the collection of tolls.



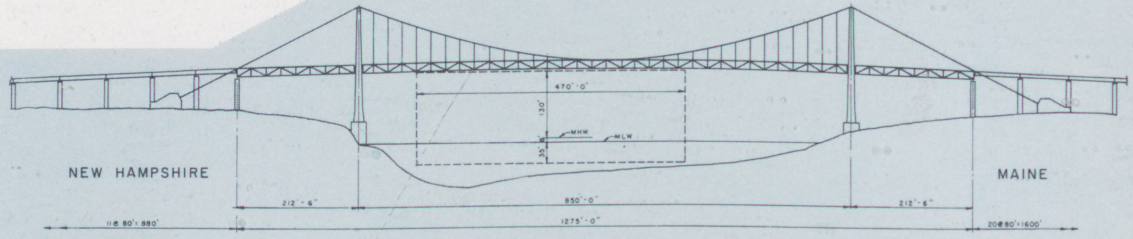
TIED ARCH BRIDGE

PLATE 3



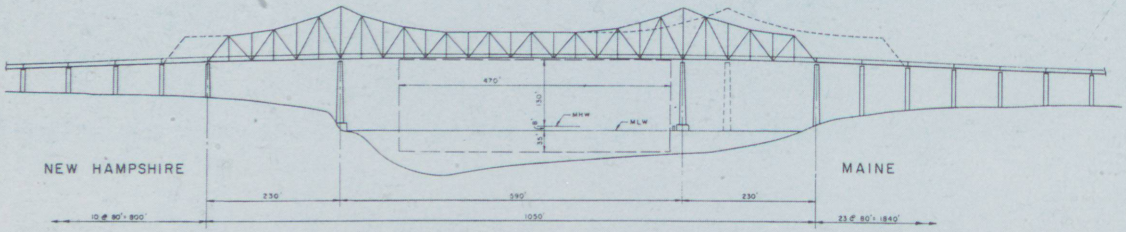
SEMI-THROUGH CANTILEVER TRUSS BRIDGE

PLATE 1



SUSPENSION BRIDGE

PLATE 4



THROUGH CANTILEVER TRUSS BRIDGE

PLATE 2

PISCATAQUA RIVER BRIDGE

ALTERNATE HIGH LEVEL STRUCTURES

HARDESTY AND HANOVER

IT IS RECOMMENDED THAT INTERSTATE ROUTE 95 THROUGH THE PORTSMOUTH-KITTERY AREA BE CONSTRUCTED ON THE ALTERNATE A LOCATION, WITH A HIGH-LEVEL BRIDGE OVER THE PISCATAQUA RIVER, AND THAT CONVENTIONAL FEDERAL INTERSTATE HIGHWAY FUNDS BE USED IN FINANCING.


WILBUR SMITH
AND ASSOCIATES