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Maine State Highway Commission

AUGUSTA, MAINE 04330



BRIDGE STUDY

FOR

WINNEGANCE BRIDGE

BETWEEN

**BATH & PHIPPSBURG
SAGADAHOC COUNTY**

AUGUSTA , MAINE

DECEMBER 1968

COMMISSIONERS

DAVID H. STEVENS
CHAIRMAN
BERTRAND A. LACHARITE
STEVEN D. SHAW

SYLVESTER L. POOR
CHIEF ENGINEER



Maine State Highway Commission

AUGUSTA, MAINE 04330

January 8, 1969

To the Honorable Senate and
House of Representatives of the
One Hundred and Fourth Legislature

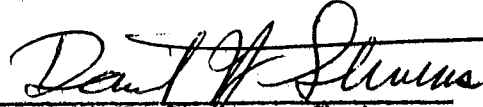
Transmitted herewith is a report entitled "Bridge Study for
Winnegance Bridge".


This report is being submitted in accordance with the provisions
of the Private and Special Laws of the One Hundred and Third
Legislature, Chapter 144, a copy of which is included and made
a part of this report.


The report was prepared by the Maine State Highway Commission,
Bridge Division.

Respectfully,

MAINE STATE HIGHWAY COMMISSION


David H. Stevens, Chairman


Bertrand A. Lacharite, Member


Steven D. Shaw, Member

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SUMMARY

In compliance with an act passed by the 103rd Legislature, the Maine State Highway Commission has prepared this report based on the engineering aspects of a highway bridge across Winnegance Stream to remedy conditions of pollution and traffic hazards.

The existing bridge is a small reinforced concrete span and spillway built into a stone and earth fill causeway serving as a dam to impound a portion of Winnegance Stream.

The stream flow in Winnegance Stream is very small in relation to the volume of impounded water and as a consequence the area above the dam remains in a stagnant condition at all times.

The approaches to the bridge and causeway are very hazardous due to sharp curves, excessive grades, poor visibility and a high volume of traffic.

Highway traffic at this location at the present time and traffic projected for a twenty year period is as follows:

Year 1968 - Estimated Average Daily Traffic in 24 hour period - 1635 vehicles
Year 1988 - Estimated Average Daily Traffic in 24 hour period - 2615 vehicles

Traffic volume during the summer months would be much higher than the above averages as this is the only route leading to the Popham Beach area and several extensive summer colonies.

The Bridge Division of the Maine State Highway Commission has prepared an estimate of cost for bridge structures and approaches at three locations as follows:

Estimate No. 1	-	3-Span Bridge on Same Location	\$ 230,000.
Estimate No. 2	-	3-Span Bridge on New Location	351,000.
Estimate No. 3	-	1-Span Bridge on New Location	291,000.

It should be noted that upon petition by the Town of Phippsburg and the City of Bath, reconstruction of the bridge could be considered under provisions of the Bridge Act.

With the present state's valuation of Phippsburg and Bath, the division of cost of a bridge estimated at \$250,000 would be:

State of Maine	\$ 91,000.00
County of Sagadahoc	75,000.00
City of Bath	75,586.21
Town of Phippsburg	<u>8,413.79</u>
	\$250,000.00

Each municipality would be responsible for acquiring any necessary right of way within its own borders. As the valuation of the City of Bath is about 54% of the valuation of the entire County, Bath would indirectly pay a large share of the county's portion also.

It should also be noted that this bridge is on a route of the Federal Aid Secondary System. As such it could be eligible for Federal Aid for rebuilding in some future construction program.

WINNEGANCE STREAM - BRIDGE STUDY

INTRODUCTION

The State of Maine Legislature, meeting in 103rd regular session, enacted an act authorizing and directing the State Highway Commission to study the desirability of rebuilding the existing bridge and causeway across Winnegance Stream between the city of Bath and the town of Phippsburg and to report the results of the study to the next regular session of the Legislature. A full copy of the act follows:

- - - - -

Chapter 114 - Private and Special Laws, 1967

AN ACT Authorizing State Highway Commission to Study Desirability of Bridge Between Bath and Phippsburg.

Be it enacted by the People of the State of Maine, as follows:

Study desirability of bridge between Bath and Phippsburg. The State Highway Commission is authorized and directed to make a study of the need and cost of a high-level bridge across a portion of Winnegance Lake between the municipalities of Bath and Phippsburg to replace the present causeway, with necessary highway approaches thereto.

The commission shall report the results of its study to the next regular session of the Legislature.

- - - - -

In response to the above Act, the State Highway Commission has conducted a study based on need, traffic service and other engineering aspects of a bridge across Winnegance Stream.

ENGINEERING CONSIDERATIONS

Figure 1, Page 9 is a location map of the general vicinity showing the site of the proposed bridge.

Existing Structure.

The existing structure was built across a tidal estuary and consists of an earth and rock fill causeway and a reinforced concrete bridge structure, of 18 ft. clear span, with a spillway incorporated into the substructure. The original construction was done in 1932, and in 1954 the bridge structure and causeway were widened to provide a 28 ft. clear roadway on the bridge with a narrow sidewalk. The structure, as a dam, impounds an area of approximately one-fourth square mile at high tide elevation.

Project Aspects.

Three separate aspects appear to have a bearing on any improvement at this location; namely, Pollution, Traffic and Safety and Navigation, each of which is discussed below.

Pollution.

The spillway under the structure was built to near high tide elevation with the intention of creating an impounded area of mostly fresh water. Extremely high tides overflow some outside water into the area above the bridge. As this occurs but a small portion of the time, little exchange of the ponded water is accomplished. The drainage area above the bridge is very limited and as a consequence the supply of fresh water is inadequate to properly flush the ponded area and so it has become stagnant and polluted. A gate was provided in the spillway for the purpose of draining the pond in stages by manipulation of the gate at proper intervals. Draining the pond in this manner appears to offer little improvement in the water condition due to the polluted condition of the Kennebec River into which the estuary drains, from which some water enters at extra high tides.

The spillway section could be removed at small cost; however, the resulting opening would provide for only two or three feet fluctuation in the water level above, remaining close to half tide level at all times. Again the polluted condition of the Kennebec River would prevent improvement of conditions to any great extent.

Estimates have been prepared to provide a channel through the existing causeway sufficient to allow full tidal flow without excessive velocity at any time.

Attention is called to the fact that major areas of mud flats would be exposed at low tide and it appears that the primary reason for originally building the dam was to keep these mud flats covered. Since there has

been little if any improvement in the condition of the Kennebec River since the dam was built, the improvement in odors and appearance is questionable. Furthermore, there does not appear to be any major improvement likely in the condition of the Kennebec River in the immediate future.

Traffic and Safety.

The approaches to this causeway and bridge contain very hazardous curves and grades. The curve at the Phippsburg end, though not excessively short radius, is such that it is considered hazardous for modern traffic. The approach at the northerly or Bath end is on a very sharp curve with an intersection at the end of the curve. The visibility is extremely limited due to buildings close to the roadway on the inside of the curve and to a grade of about 8% beginning in the curve and ending near the end of the causeway where there is deep water close to the northerly shore.

Estimate No. 1, improvement on existing location, would reduce the grade to about 2.5% but with no change in the curves on either end.

Estimate No. 2, bridge and approaches on new location downstream, would eliminate the curve on the Phippsburg end, reduce the grade to under 1.5% and provide a curve and chanelized intersection on the Bath end safe for traffic under any normal conditions.

Estimate No. 3 is at the same location as that for Estimate No. 2 but with a maximum grade of about 2 1/2%. Curvature and the intersection would be the same as contemplated for Estimate No. 2.

Navigation.

The structure at present provides for no passage of boats at any time. With the existing spillway removed, clearances thus provided would allow passage of small boats at slack water, that is, when the water level is the same on both sides of the causeway. The slack water period would be extremely short and during the remaining time the velocity would be extremely high. Estimates No. 1 and No. 2 provide for a channel sufficient in size to allow navigation at any time without excessive velocity in the channel. Underclearance would be about 8 feet at mean high water and the minimum depth at mean low water would be about 4 feet.

At the time the original causeway and bridge were built, in 1932, the U. S. Corps of Engineers did not consider the stream navigable above the remains of the old dam 700' down stream. However, this does not appear to be any serious obstacle to small boats in its present condition.

The channel as provided in these estimates may be of dubious value to navigation as the stream above the bridge is quite narrow at low tide and a great deal of the area is bordered by soft mud flats.

In Estimate No. 3, the existing dam and bridge structure would remain in place. No provision is made for a navigable channel. The existing spillway could remain in place, or be removed, without material change in cost.

Conclusions.

1. With any changes in drainage at this location that could be made, it appears that little benefit would be derived in the immediate future regarding pollution, due to the condition of the Kennebec River into which the estuary connects.
2. Navigation aspects would be of minor value, considering the limited area made accessible, type of shoreline in the estuary and the cost of such improvement.
- 3.- The major improvement in this location would be that contemplated in Estimate No. 2 or No. 3 which would eliminate the hazardous curves, reduce the grades on approach roadways and provide a safe intersection with adequate visibility for all traffic movements.

The details of an actual design of any type improvement selected would be subject to some adjustment of roadway widths, grades and structure dimensions, from those assumed in these proposals, when location surveys and foundation data are available.

Estimate No. 1

Estimate No. 1 is for a three span continuous rolled beam type bridge having span lengths of 43'-0", 54'-0", 43'-0". The deck would be reinforced concrete and would have a 37' clear roadway width with a 4' wide sidewalk, bituminous concrete wearing surface and metal bridge rail.

The bridge would be located on the alignment of the existing causeway, at the deep water channel near the north bank. The roadway would be raised a maximum of about 8', reducing the approach grade from about 8% at the north bank to about 2.5%. No improvement in the curve and hazardous intersection on the north approach is provided at this location.

A channel would be cut in the existing causeway to 4' minimum below mean low tide. The underclearance above mean high tide would be about 8 feet.

The approaches would consist of a 22' wide bituminous concrete pavement with a bituminous concrete sidewalk provided on the downstream side.

The existing structure would remain in use without any change in grade.

The raised approaches to the new structure would extend about 300' on the south end and 350' on the north end, making a total length of

bridge and approach of approximately 800 feet.

Figure 2, Page 10, shows a Plan sketch of the Proposed Bridge and Approaches. Figure 4, Page 12, shows a sketch of the Plan and Elevation of the proposed bridge; and Figure 7, Page 15, shows Transverse Sections of the bridge and approaches.

The estimated cost of the project as outlined in Estimate No. 1 is as follows:

Bridge Structure	\$ 170,000.
Approaches	52,000.
Channel Through Existing Causeway	<u>8,000.</u>
	\$ 230,000.

Estimate No. 2

Estimate No. 2 is for a structure similar to that for Estimate No. 1, located on new location downstream from the existing causeway. The curve at the Phippsburg end would be eliminated and the approach roadway would join the existing road on the Bath end about 1000 ft. northerly from the present intersection. Traffic would be channelized at the new intersection and the present very hazardous curve and intersection would be eliminated.

Grades would be reduced to less than 1.5%. The channel and clearances would be approximately the same as in Estimate No. 1. A channel would be cut in the existing causeway providing approximately the same opening as that under the new structure.

The same type approach roadway as in Estimate No. 1 would be provided. The length of approach on the Phippsburg end would be about 850' and on the Bath end about 1200', making a total length of bridge and approach roadway about 2200'.

The existing structure would be discontinued but could remain in place.

Figure 3, Page 11, shows a Plan sketch of the Proposed Bridge and Approaches. Figure 4, Page 12, shows a sketch of the Plan and Elevation of the proposed bridge; and Figure 7, Page 15, shows Transverse Sections of the bridge and approaches.

The estimated cost of the project as outlined in Estimate No. 2 is as follows:

Bridge Structure	\$ 105,000.
Approaches	227,000.
Channel Through Existing Causeway	<u>8,000.</u>
Right of Way	<u>11,000.</u>
	\$ 351,000.

Estimate No. 3

Estimate No. 3 is for a structure and embankment on new location downstream from the existing causeway, on the same alignment as that in Estimate No. 2. No structure is provided for full tidal flow and for navigation.

A smaller structure is provided downstream from the existing opening to accommodate drainage that now passes through the dam. The bridge structure would be a 65' steel stringer span supported on shallow concrete abutments with steel piles driven to ledge foundation.

The curve at the Phippsburg end would be eliminated and the roadway would join the existing road on the Bath end about 1000 ft. northerly from the present intersection as in Estimate No. 2. Traffic would be channelized at the new intersection.

The maximum grade on the approach roadway would be about 2 1/2%, slightly more than that used for Estimate No. 2. However, the visibility would be nearly as great as with the lesser grade and in all respects satisfactory.

The same type approach roadway as in Estimates No. 1 & No. 2 would be provided. The improvement would extend between the same points as in Estimate No. 2, for a total length of bridge and approach of about 2200 ft.

The existing bridge and causeway would remain in place to continue to serve as a dam but would be closed to traffic.

Figure 5, Page 13, shows a Plan sketch of the Proposed Bridge and Approaches. Figure 6, Page 14, shows a sketch of the Plan and Elevation of the proposed bridge; and Figure 7, Page 15, shows Transverse Sections of the bridge and approaches.

The estimated cost of the project as outlined in Estimate No. 3 is as follows:

Bridge Structure	\$ 61,000.
Approaches	219,000.
Right of Way	<u>11,000.</u>
	\$ 291,000.

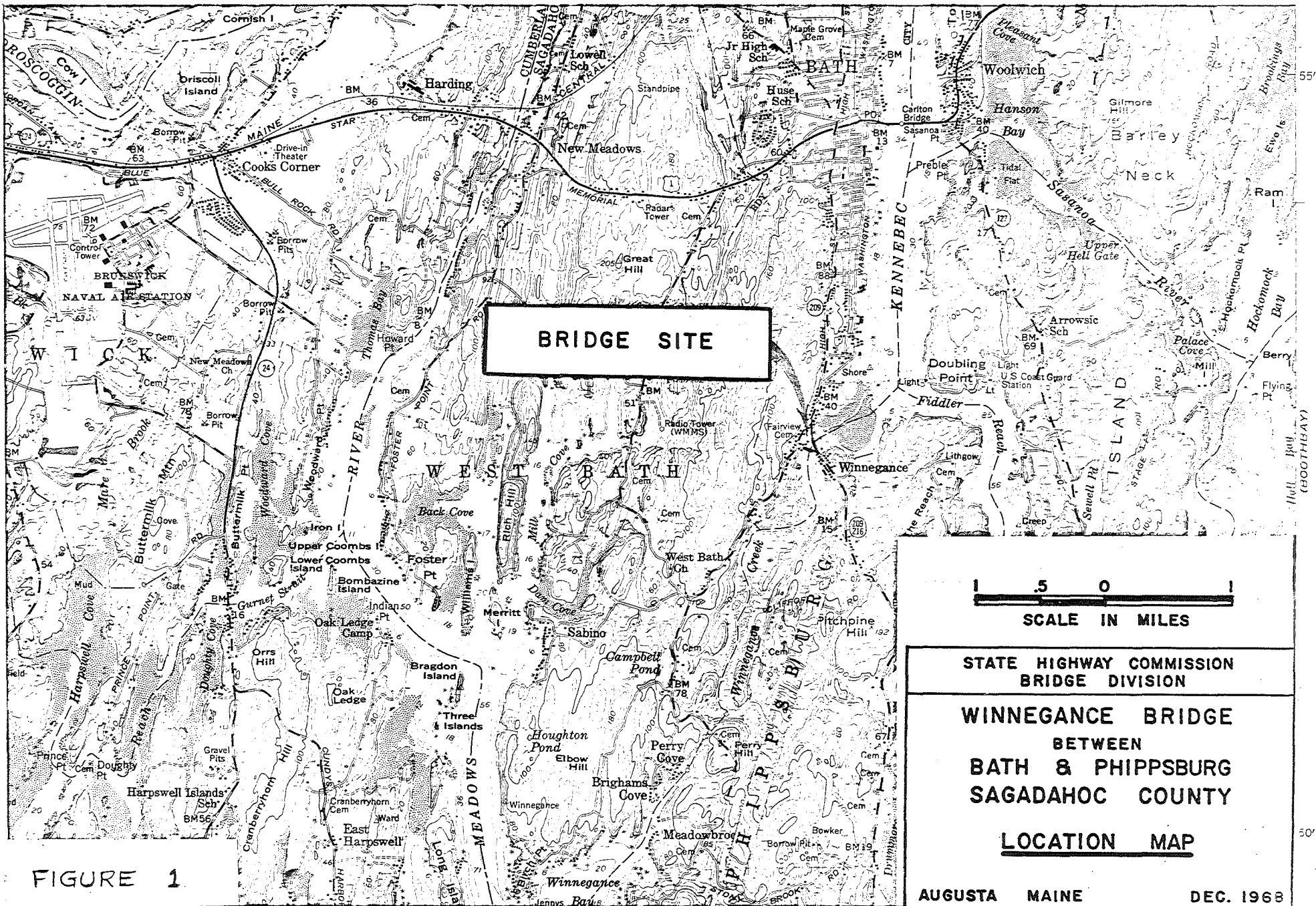


FIGURE 1

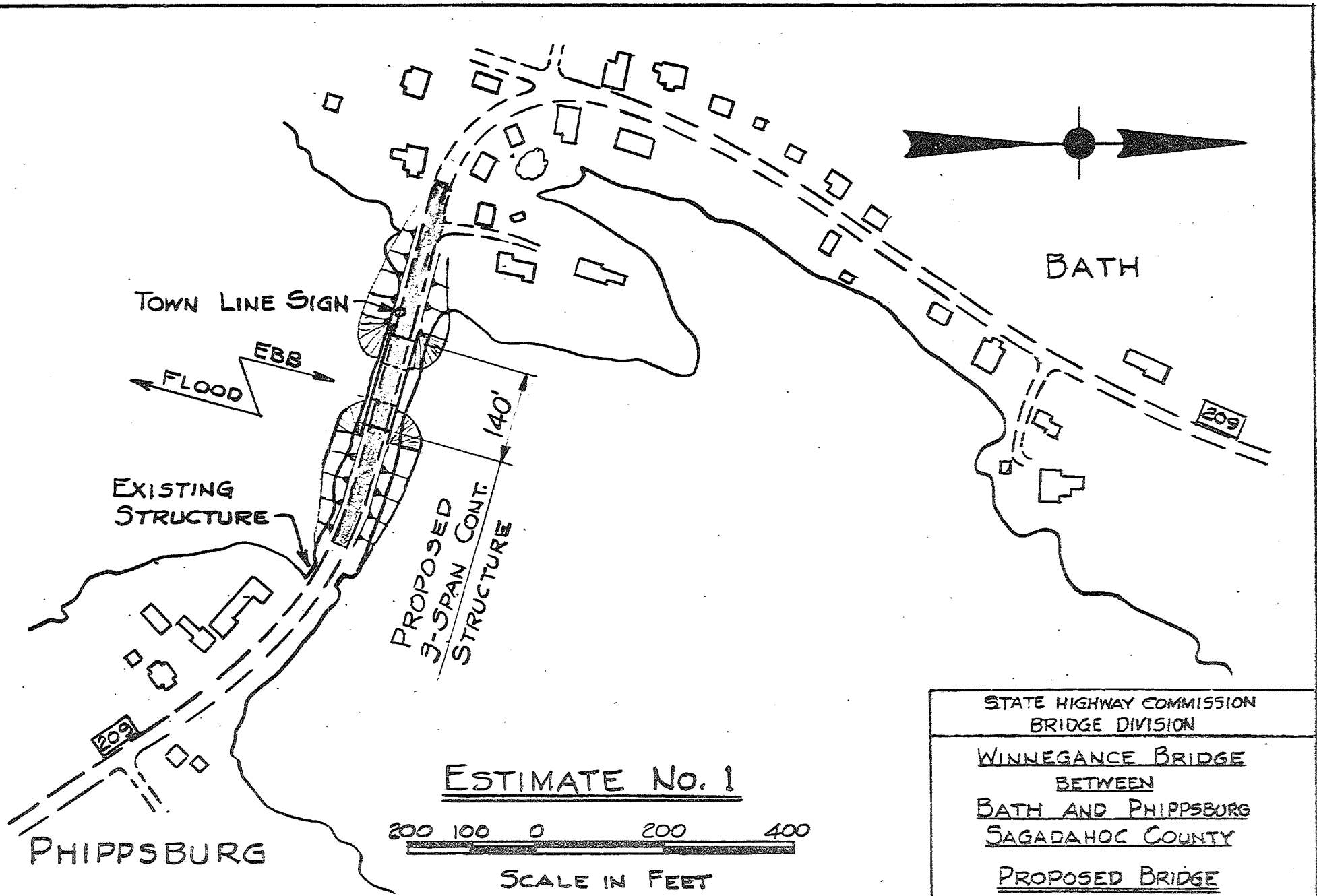


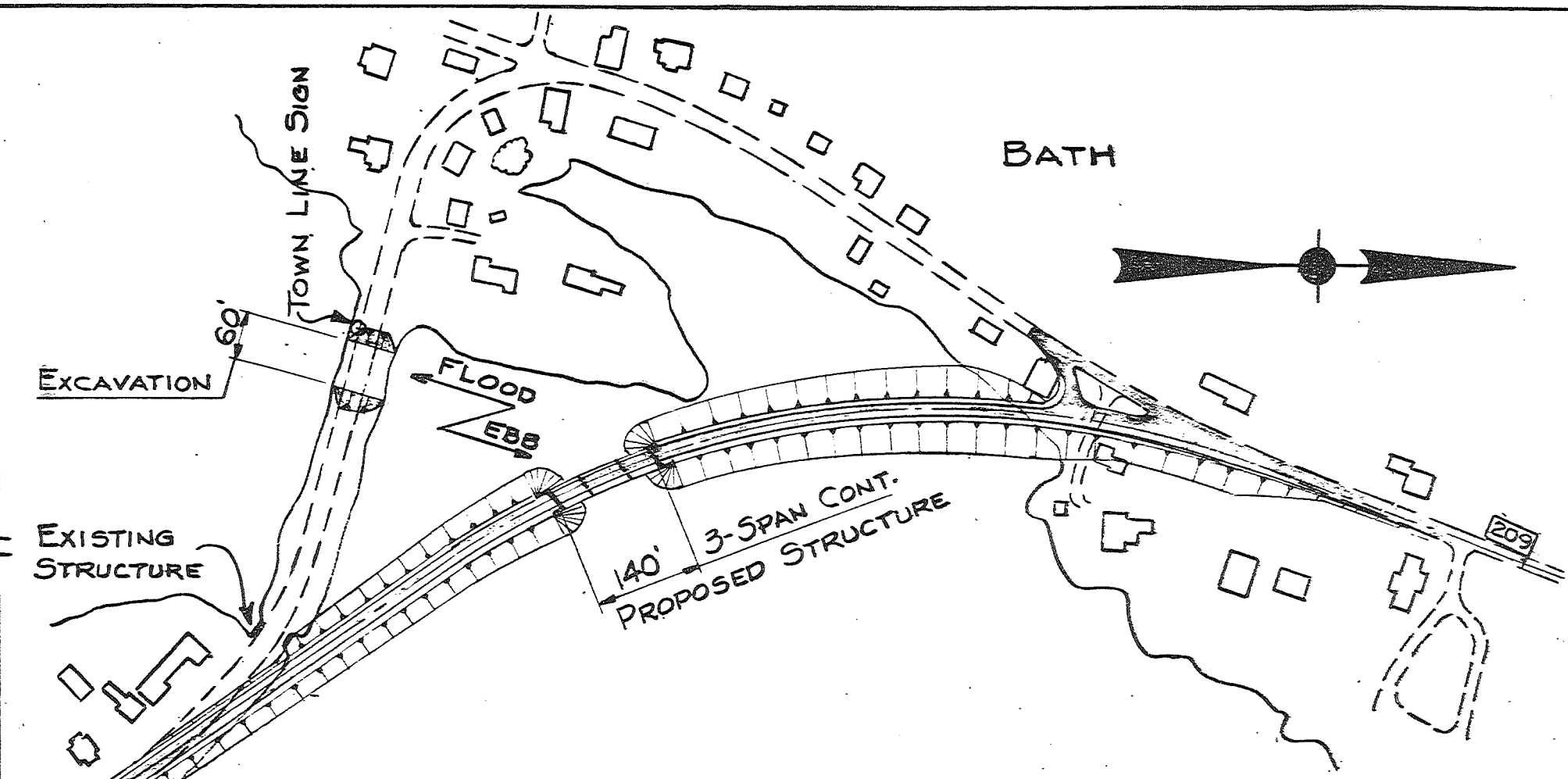
FIGURE 2

STATE HIGHWAY COMMISSION
 BRIDGE DIVISION

WINNEGANCE BRIDGE
 BETWEEN
BATH AND PHIPPSBURG
SAGADAHOC COUNTY

PROPOSED BRIDGE
ESTIMATE NO. 1

AUGUSTA MAINE DEC. 1963



ESTIMATE No. 2



SCALE IN FEET

STATE HIGHWAY COMMISSION BRIDGE DIVISION
<u>WINNEGANCE BRIDGE</u> BETWEEN <u>BATH AND PHIPPSBURG</u> <u>SAGADAHOOC COUNTY</u> <u>PROPOSED BRIDGE</u> <u>ESTIMATE NO. 2</u> AUGUSTA MAINE DEC. 1968

FIGURE 3

PHIPPSBURG

BATH

TOWN LINE SIGN

EXCAVATION

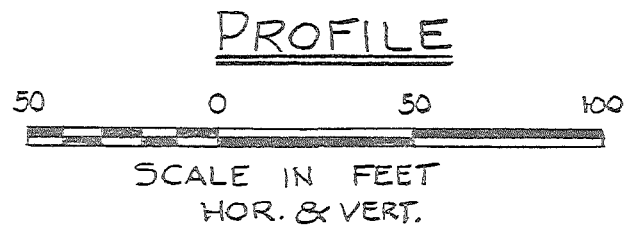
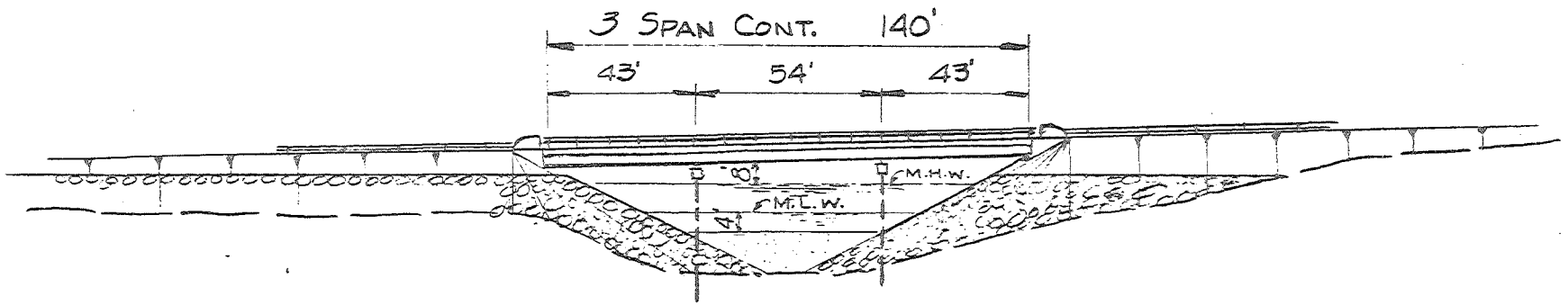
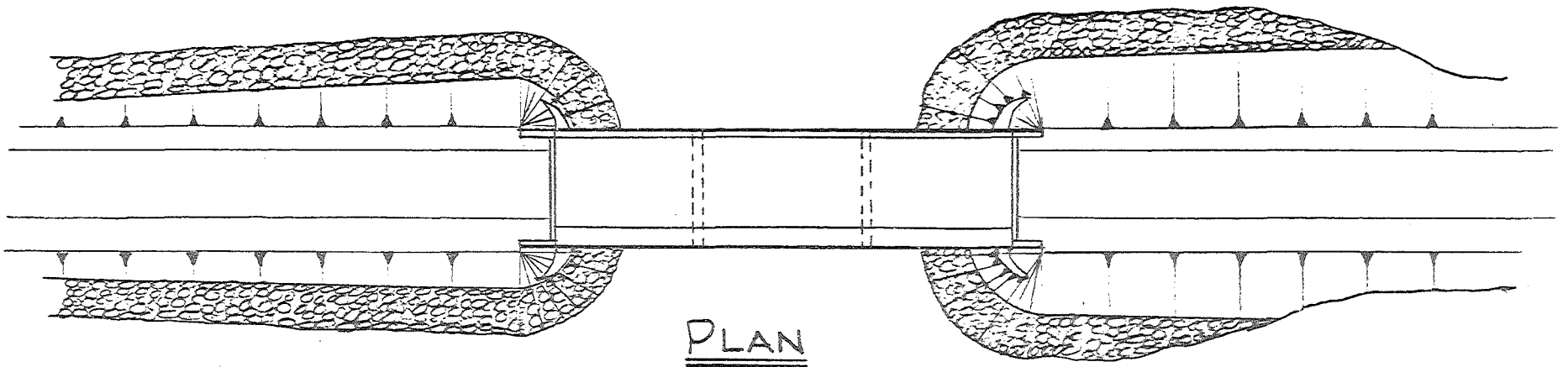
FLOOD
EBB

EXISTING
STRUCTURE

140' 3-SPAN CONT.
PROPOSED STRUCTURE

209

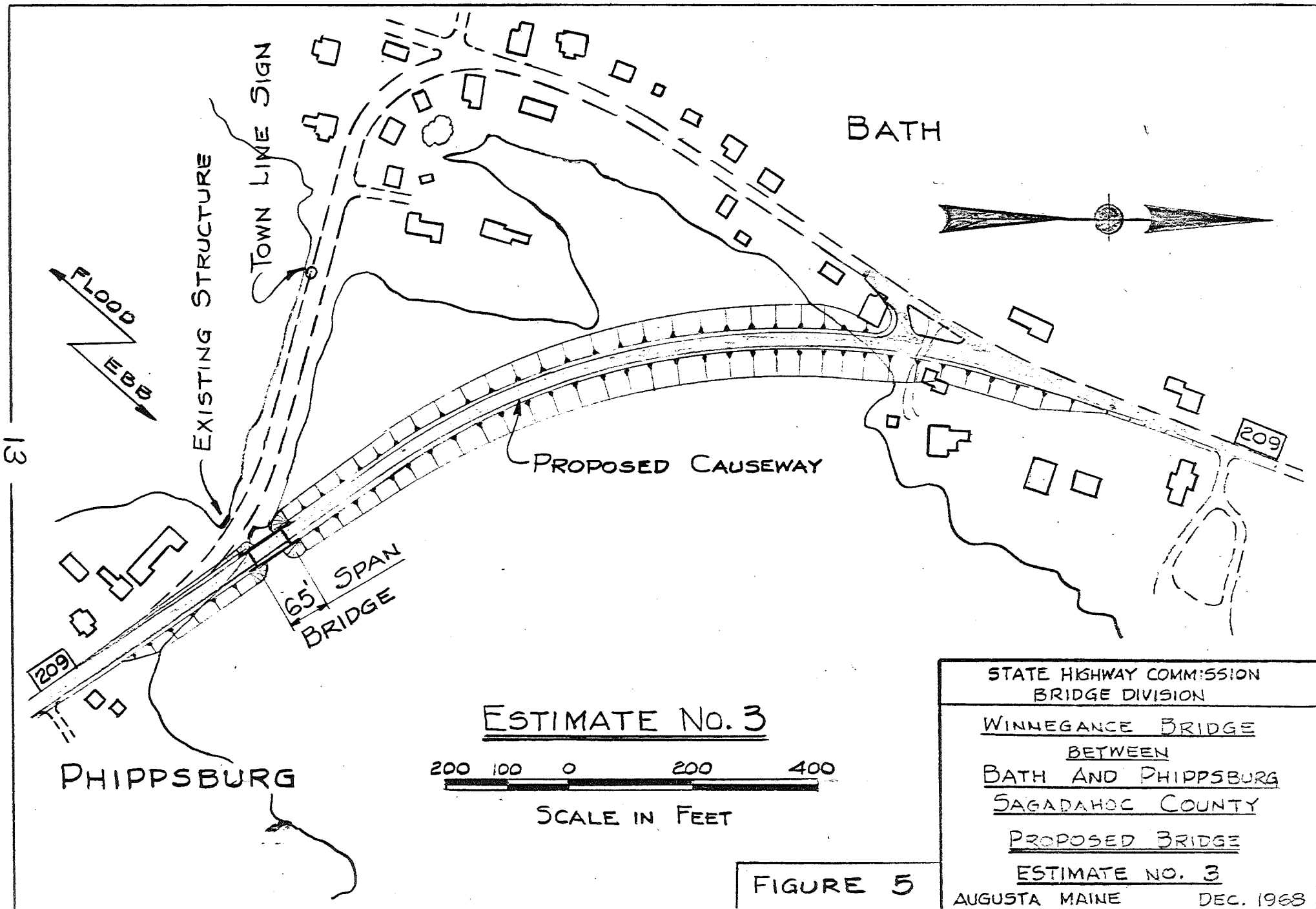
209



ESTIMATE No. 1 & No. 2
(No. 2 SKewed 15°±)

FIGURE 4

STATE HIGHWAY COMMISSION
BRIDGE DIVISION
WINNEGANCE BRIDGE
BETWEEN
BATH AND PHIPPSBURG
SAGadahoc COUNTY
PROPOSED BRIDGE
PLAN & PROFILE
AUGUSTA MAINE DEC. 1968



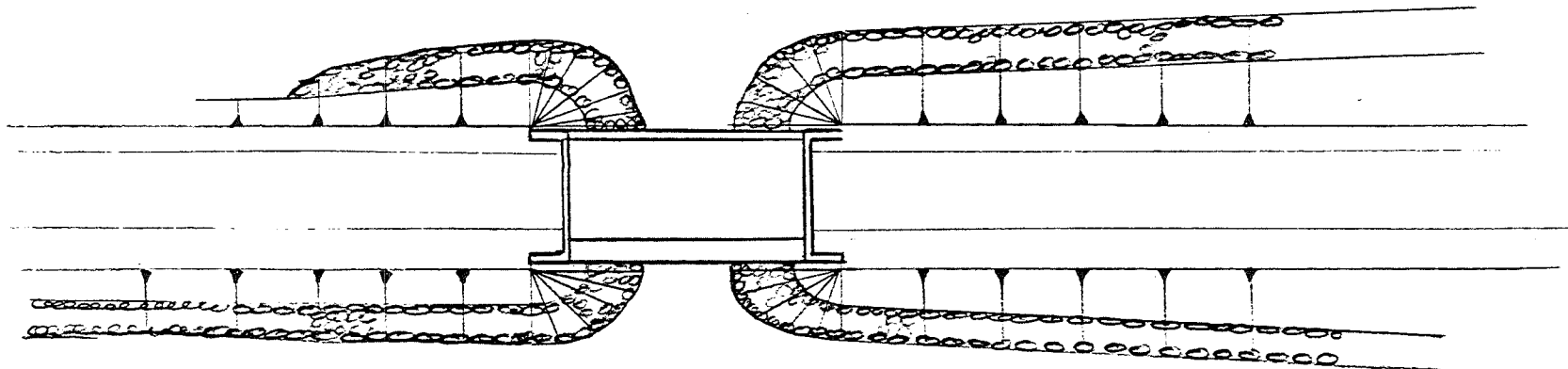
ESTIMATE NO. 3



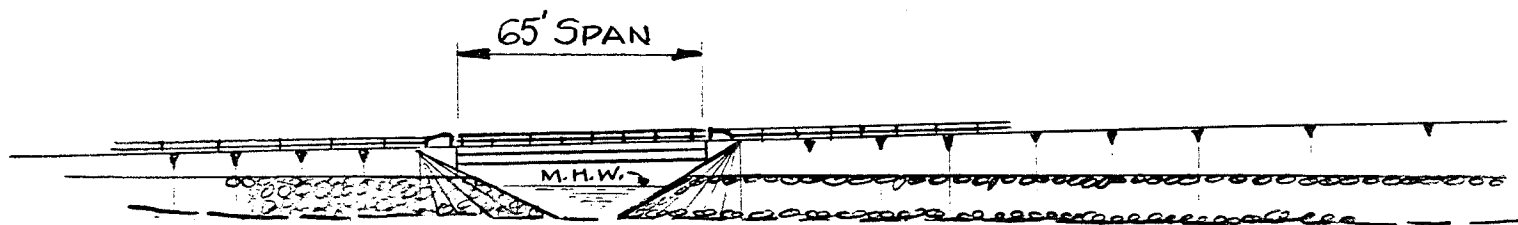
SCALE IN FEET

FIGURE 5

STATE HIGHWAY COMMISSION BRIDGE DIVISION
<u>WINNEGANCE BRIDGE</u> BETWEEN <u>BATH AND PHIPPSBURG</u> <u>SAGadahoc COUNTY</u> <u>PROPOSED BRIDGE</u> <u>ESTIMATE NO. 3</u> AUGUSTA MAINE DEC. 1968



PLAN



PROFILE

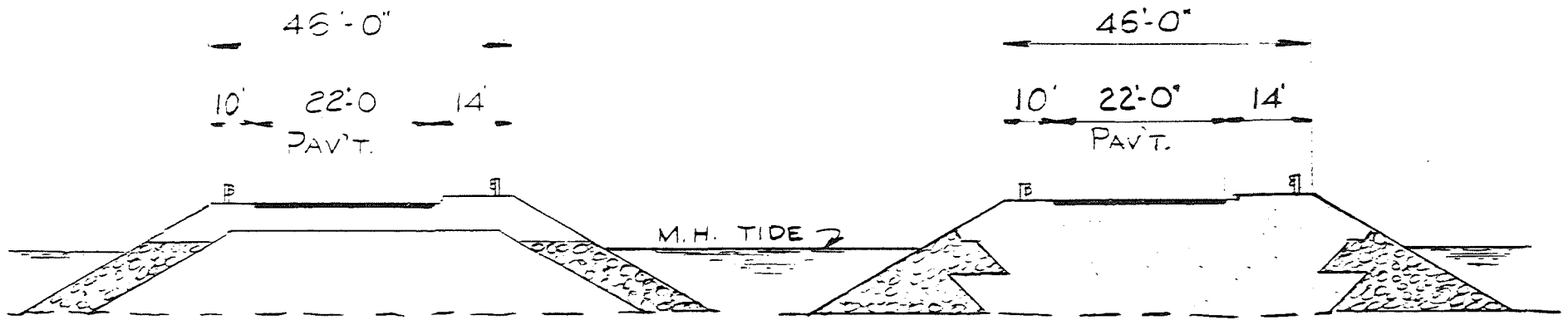


SCALE IN FEET
HOR. & VERT.

ESTIMATE NO. 3

FIGURE 6

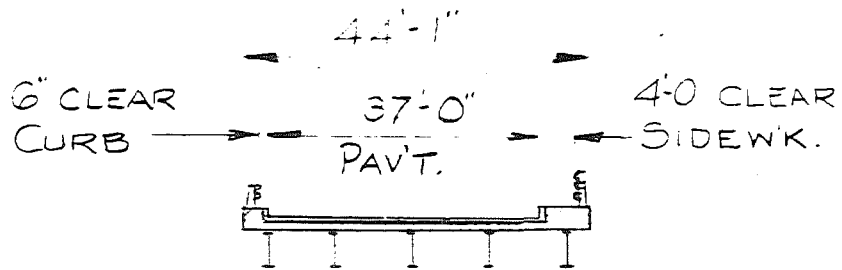
STATE HIGHWAY COMMISSION BRIDGE DIVISION
<u>WINNEGANACE BRIDGE</u> BETWEEN <u>BATH AND PHIPPSBURG</u> <u>SAGADAHOE COUNTY</u>
<u>PROPOSED BRIDGE</u> <u>PLAN & PROFILE</u>
AUGUSTA MAINE DEC 1968



ESTIMATE No. 1

ESTIMATE No. 2 & No 3

APPROACH SECTIONS



ESTIMATE No. 1, No. 2, & No. 3

BRIDGE SECTION

STATE HIGHWAY COMMISSION BRIDGE DIVISION
<u>WINNEGANCE BRIDGE</u> BETWEEN <u>BATH AND PHIPPSBURG</u> <u>SAGadahoc COUNTY</u>
<u>TYPICAL SECTIONS</u>
FIGURE 7
AUGUSTA MAINE DEC. 1968