REPORT OF CHESAPEAKE BAY BRIDGE COMMISSION

January 5, 1931

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Honorable Albert C. Ritchie,

Governor of Maryland,

Annapolis, Md.

Sir:

The Chesapeake Bay Bridge Commission was appointed by you to study and report on the project of a bridge across the Chesapeake Bay as a State undertaking in the event that private capital does not proceed with such a project.

We have assumed that you desire our report before the meeting of the coming Legislature in order that necessary legislation may be considered and passed in the event that such legislation is deemed desirable.

Although the Commission has had no funds available for engineering studies, legal advice and other expenses. We have had the benefit of the best possible engineering advice through the courtesy of the Engineers Club of Baltimore, which appointed a Committee composed of Messrs. Bancroft Hill (Chairman), W. Watters Pagon, Steuart Purcell, and G. J. Requardt. Mr. Hill in particular, and his associates, have devoted much time and study to preparing estimates and in assembling the record of experience in bridge and tunnel building in other states.

Intensive studies, including in particular expensive soundings to determine accurately depths and character of bottom, drafting of plans for structure, etc., are necessary for an accurate estimate of the cost of a bridge or tunnel. Cost of material and labor must inevitably rest on such a base. Without funds available, such studies could not of course be made by the present Commission.

The engineers, however, have advised us what crossings in their judgment were available from an engineering point of view and have given us rough estimates based on experience elsewhere, not in any sense as final estimates,

but in order to enable the Commission to determine what projects were at least worthy of further consideration and study.

The Lawyers' Committee was composed of Messrs. W. Lee Rawls (Chairman), Randolph Barton, Jr., S. Scott Beck, Walter J. Mitchell and W. Preston Lane. Mr. Rawls in particular, has given much study and thought to the recommendation of the Committee embodied in the attached report, and has declared them, in his opinion, free of constitutional and other legal difficulties.

We have not been unmindful of the desirability of private capital undertaking the building of such a structure. As no action involving State co-operation could be taken before the meeting of the Legislature, and as this period of time was required for our own studies necessary to a report of any value, those interested in building a structure from Millers Island to Tolchester, have been afforded an opportunity to complete their financial plans.

The existing financial depression has militated against the projectors. At the date of writing this report, there is apparently no immediate prospect of such financing.

We therefore, in accordance with the duty assigned to us, are submitting herewith our recommendations.

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Wm. G. Baker, Jr.
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REPORT OF
CHESAPEAKE BAY BRIDGE COMMISSION

To Hon. Albert C. Ritchie,

Governor of Maryland.

The Chesapeake Bay Bridge Commission was appointed by you to study and report on the project of the proposed Chesapeake Bay Bridge "as a State undertaking" in the event that private capital did not proceed with it. In your opening address to the Commission you requested us to consider the whole problem of crossing the Chesapeake, whether by bridge or tunnel, with recommendations as to sites, and plans for financing.

Your Commission has held a number of meetings, and its sub-committee on Plan and Procedure, on Engineering, and on Law, have devoted much time and study to the subject. The Commission has been hampered by the fact that no appropriation for expenses was available. Although we have had available the best engineering and legal advice free of compensation, it is proper to state that lack of funds has made it impossible for the engineers to do more than gather the results of experience elsewhere and to submit to us only such general estimates of costs as could be determined without the intensive studies and expense incidental to accurate estimates.

Your request for a report on the project "as a State undertaking," leads us to the following inquiries:

1. In view of the fact that so costly a project could not be constructed from the State's current receipts, has the State power to sell its bonds, the proceeds of which could be used by the State to erect a bridge or other structure across the Chesapeake?

2. Can the State use its money or credit to assist private capital in providing the cost of erecting a bridge?

Reference to the Constitution of the State shows two provisions directly bearing upon the above questions:

Art. 3, Section 34 provides in part:

"No debt shall be hereafter contracted by the General Assembly unless such debt shall be authorized by a law providing for the collection of an annual tax or taxes sufficient to pay the interest on such debt as it falls due, and also to discharge the principal thereof within fifteen years from the time of contracting the same."

Art. 3, Section 34 further provides:

"The credit of the State shall not in any manner be given, or loaned to, or in aid of any individual, association or corporation."

These articles were inserted in the Constitution of our State following heavy losses sustained by the State in earlier days, resulting from contributions of State funds to the development of privately owned transportation and other projects which it was believed at the time would be successful and would contribute to the welfare of the State.

Considering these provisions in inverse order we find the answer to our inquiries:

(a) The second provision plainly prohibits the use of the credit of the State to aid a private corporation to erect a bridge across the Chesapeake.

(b) The answer to the question as to whether or not the State can sell its bonds, and use the proceeds to erect a bridge is "Yes"; but the provision of our Constitution cited above contains qualifications which make it inadvisable in our judgment to use State bond proceeds for the construction of so costly a project as a bridge or tunnel across the Chesapeake.

Bonds issued by the State must be paid off in 15 years, and a bridge costing say $10,000,000 would require under our Constitution an annual levy upon the taxpayers of the State of not less than $400,000 for interest for the first year (decreasing as the principal sum was paid off); and in addition thereto, an average annual levy of $666,000 per annum for 15 years; or by way of illustration, say $1,066,000 the first year and not less than $666,000 a year.

When we note that the total net debt (after deduction of sinking fund) of the State at present is $29,000,000 and that this represents expenditures for school houses, public buildings, and many hundreds of miles of roadway, it would seem that the taxpayers of the State might well hesitate to increase

the debt of the State $10,000,000 for a single project of six miles of roadway, however beneficial such a project might at present appear.

Further, there are obvious financial disadvantages in levying a tax sufficient to pay in fifteen years for the cost of a structure which may last for 75 years or more. The cost should be spread over a longer period and shared by future taxpayers, but this the Constitution of the State does not permit.

A homely though not exact analogy of the fallacy of such financing may be found in the case of an individual who buys land and erects a house thereon. He desires to pay for it out of income, but instead of placing a long term mortgage on the property for 10 or 15 years, and giving himself a reasonable time to pay the principal of the debt, he borrows for the short term of say three years and assumes the obligation of paying off the purchase price in that time.

Nor could the State issue its bonds payable out of tolls. The provision of the Constitution quoted above requires an annual levy on the taxpayers sufficient to pay interest and principal on every bond issued by the State. Some method of levying less than is customary—say for the schools of the State, and assigning to the schools the tolls from the bridge might be devised, but such a device does not appeal to your Commission, and for the above reasons, your Commission cannot recommend financing a costly bridge by the issuance of State bonds.

THE PROBLEM

Your Commission therefore devoted further study to the situation to determine whether a different form of financing the bridge as a "State undertaking" could be devised which met the difficulties of the situation, would not involve the State credit, and was essentially sound in its financial structure.

During the course of our studies, it became evident that the Chesapeake Bay project was but one of many which the State will be called upon to consider in the future.

Bridge building is costly. The State now spends some $14,000,000 annually for the construction and maintenance of roadways and bridges, and with the increasing demands of modern traffic, the State Roads Commission,

out of its annual appropriations, may have available only such funds as are required for roads and bridges that are already a part of the State Roads system, or are essential as extensions of, or connections with, present roadways.

If then the State Roads Commission has not the funds available, and if private capital is unwilling to erect toll bridges, such projects as the Chesapeake Bay bridge must be postponed for many years to come, unless the State is willing to go heavily into debt, or unless some sound financial plan can be devised which does not involve the use of taxpayers' money but under State direction and control sets up a system under which the bridge can be erected and paid for by the users.

WATER AREAS AS BARRIERS TO MODERN TRAFFIC

Such a plan is most desirable, for, as we have said, the Chesapeake Bay crossing is but one of many projects, provision for the construction of which at the proper time should now be made by the State.

An examination of the map of Maryland will confirm this need.

Maryland has relatively more water area (excluding the Great Lake States) than any State in the Union. Its land area is 9,941 square miles; its water area 2,386 square miles. Approximately one-fifth of the State therefore is water area.

In the early days when roadways were few and bad, the State which possessed facilities for water transportation, possessed a great economic advantage. Towns and cities were built along the water-ways, and transportation of freight and passengers by water was speedy and economical, while by land it was slow and costly.

In those days, Maryland's extensive water area was an unmixed blessing.

Today this valuable water area still offers vast food supplies, gives occupation to many thousands of its citizens, and health-giving pleasure to many thousands more.

Yet from a traffic point of view the situation has changed greatly. With

the development of the automobile, freight and passengers now pass rapidly over well-constructed roads, and roadways tap nearly every section.

Waterways, which served as broad, self-maintaining highways, have now become, from the standpoint of speed, barriers instead of aids to traffic.

Maryland, with its large expanse of water area, must recognize this economic change, if it is to keep abreast of the times.

What was a 20% blessing threatens to become a 20% handicap, and *will* become so unless a far sighted policy is adopted which places the State on at least an equal footing with other States in the matter of speedy and convenient land transportation.

Let us look more closely into this phase of the matter:

To the east of the western counties, and to the west of the eastern counties, lies the broad Chesapeake Bay—a greater barrier to modern methods of transportation than a mountain range. Over its 130 miles of length in Maryland there is not a single bridge.

But this is not all: Along practically the whole southern boundary of the State of Maryland lies the Potomac River uncrossed by any bridge from the river's mouth up to the City of Washington—a distance of 94 miles over water.

Above Washington, the next nearest bridge-crossing lies at Point-of-Rocks, 43 miles above the City—a toll bridge. As we proceed still further up the river, we find spaces of five, ten or fifteen miles between bridges. All are toll bridges until we reach Hancock, where with the narrowing of the river we find more frequent county bridges, toll free.

There has been a demand, of course, for bridge crossings over the Potomac both north and south of Washington, but a demand often ceases when the project appears hopeless. Traffic adjusts itself to inconvenient delays and increased costs, the public becomes quiescent and an enterprise which might mean quick and rapid development of land values as well as traffic convenience to the public is lost because of failure to devise ways and means.

To illustrate: One can readily imagine the economic handicap to the

northern portion of our State if the Potomac River were substituted for the Mason & Dixon Line as to the northern boundary of our State and we found the first bridge crossing over the boundary was 94 miles from the mouth of the River, and the next bridge crossing was 43 miles away.

It might be said that this rich northern portion of our State would long since have overcome such a handicap, but in a way this begs the question. Does development precede or follow adequate traffic arteries?

In addition to these barriers to the east and south of a large portion of our State, the map shows many interior barriers, to which we may have become accustomed, but which are none the less economic barriers.

Following the western shore of the Chesapeake and traveling north, we find that the Patuxent River cuts northwest from the Bay. It is about 30 miles from the mouth to Lower Marlboro. Traffic near the mouth of the river, in order to reach the opposite bank a mile or more away, must either find a ferry crossing, or travel at least 60 miles by roadway to its destination. There is a small ferry but not a single bridge across the Patuxent south of Hillsbridge near the headwaters.

As we trace the map north on the Western Shore we find that there is already a demand for another bridge across the Severn River.

Deep indentations are cut by many other rivers as we continue north: The Magothy, Rock Creek, the Patapsco (which has invited much discussion as to a suitable crossing from south to east Baltimore), the Gunpowder and many other rivers northeast of Baltimore.

Continuing our tracing, we reach the Susquehanna and here we find within the State two bridges only, one at Havre de Grace, and one at Conowingo—nine miles apart. Reaching the head of the Bay and turning southward down the Eastern Shore, we find such rivers as the Northeast, Elk, Sassafras, and Chester—in some instances crossed by bridges along main thoroughfares, but in the main we note that the roadways run around the headwaters and dip into the peninsulas. They are dead end roadways.

Further south the Choptank separates two important county seats, Easton

and Cambridge. To pass by motor from one to the other, traffic must cover 30 miles. A bridge across the Choptank would shorten this distance perhaps 16 miles.

Still further south lies the Nanticoke over which a bridge near headwaters is planned by the State Roads Commission.

We pass south by Deal Island to Crisfield, and here we see again the picture of roads circling headwaters and dipping into peninsulas.

It would take a staff of capable statisticians a protracted period of time to calculate the number of lost business hours and the added cost to automobilists in Maryland resulting from absence of convenient bridges, and the necessity of running around the headwaters of bays, rivers and inlets. The cost of roads alone for this purpose, is doubtless no small item in the present debt of the State, and in the future may well require heavy additional expenditures of taxpayers' money.

The above description is not given for the purpose of indicating that bridges are needed at each, or even at many, of these points. In a number of instances bridges would not at present, and might not for many years, justify the cost.

The description is given for two reasons:

(1) In order to bring home to Marylanders a true picture of our State and its traffic handicaps in competition with States where a straight line is the shortest traffic distance between two points.

(2) To indicate the state-wide necessity of setting up now by legislation adequate state machinery whereby costly but needed bridges, which cannot be built out of State funds, can be built when and as the traffic justifies.

If the State pursues a haphazard policy of waiting for local leadership to create or express a demand, we may yet see the day when the State Treasury is raided through political influence for less pressing needs, while the more important projects are delayed many years until some casual Commission, such as our own, is appointed to report upon it, with the final decision resting not upon sound economic advantage or relative necessity but upon the vociferance with which claims are asserted.

The economic welfare of the whole State, we believe, may be greatly stimulated, and at a much earlier date, by setting up the proper State machinery at once. Such a policy may well result in the increased value of lands in developed territories; it may open up undeveloped territories, while the receipts from the gasoline tax may add substantially to the income available for other roadways throughout the State.

The present generation then has its choice of adopting a sound farsighted policy which may set the State ahead many years, or of pursuing the present policy of haphazard development that may postpone progress for many years to come.

WHAT HAS BEEN DONE IN OTHER STATES

Realizing this situation, as we have said above, the Commission set itself the task of developing a plan by which these advantages may be secured. Fortunately we were not without valuable precedent.

New York Plan Some years ago it was recognized by far-seeing business men and bankers in New York and New Jersey that with the increasing traffic across the Hudson River, improved facilities should be provided. A number of conferences were held. The New York State Chamber of Commerce took an active part.

As a result of these conferences the Port of New York Authority, a commission on which were representatives from both New York and New Jersey, was created and was authorized to issue bonds to pay for the construction of such bridges or tunnels as the Commission determined were needed, and which it has estimated would pay for themselves in a reasonable period through traffic tolls. The bonds were not issued by the state nor was the state responsible for their payment.

Principal and interest on the bonds were to be paid primarily from tolls and revenues received from traffic passing over or through such structures as might be constructed under the Commission's authority.

In this instance, the States, by inter-state contract, agreed to pay a certain proportion of the cost of its structure with the state funds provided by the taxpayers.

The financial structure was wisely constructed, the confidence of investors obtained and the bonds have found a ready market, having sold at one time at a price requiring as low an interest payment as 3.92%.

The Commission has constructed and completed to date two bridges connecting Staten Island with New Jersey, and there is in course of construction a very large Hudson River bridge to connect Manhattan Island with New Jersey.

The respective States, the carriers of traffic by motor and the business and pleasure vehicles all have the advantage today of convenient facilities, whereas in the absence of such a plan, they might have waited many years until future

State governments and taxpayers would be willing to construct these structures at a heavy cost to the States.

In some respects the New York problem was simpler than that of the State of Maryland, as the two States by contract assisted directly in the appropriation of state funds, while in Maryland we desire to avoid this if possible, and are confronted with a dual problem—the erection of bridges within the State of Maryland as well as the erection of bridges across the Potomac which should be arranged by contract between the States of Maryland and Virginia.

Kentucky Plan In this State we find laws which have dealt with problems more closely akin to our own.

The Kentucky law authorizes the State Highways Commission to build, acquire and own bridges and gives the Commission power of condemnation. The Commission also has power to contract with other states for the erection of inter-state bridges and tunnels.

The Commission is authorized to issue bonds for such purposes for any period over one year, at a rate of interest not exceeding 6%, and to fix tolls sufficient to pay interest and principal on cost over a reasonable period. These tolls cannot be lowered during the life of the bonds without consent of bondholders. The bonds are to be a first lien on the tolls and bridges.

It is expressly declared that the bonds shall not be a State obligation, nor involve the credit of the State, although the State's "moral" obligation is pledged—whatever that may mean.

Upon the payment of the bonds representing the cost of a structure, it becomes the unpledged property of the State, and tolls cease.

Contracts must be awarded as other state contracts, to the lowest bidder, and the bonds are to be sold to the highest bidder.

Monies received from tolls are to be deposited in the State Treasury to the credit of the "Highway-Bridge Fund" in trust for the payment first of interest, the balance to be used for payment of principal of the bonds issued to pay for the structure.

The bonds (and this we shall enlarge upon later) are free of taxation.

They have a redemption price and the State may at any time pay off the remaining outstanding bonds and make the bridge free of toll.

Each structure—bridge or tunnel—must stand on its own footing, except that in certain instances a single bond issue may cover other structures.

The State Highways Commission agrees to maintain and operate the bridge, thus setting free the gross tolls to be used for payment of the cost of the bridge and interest thereon. This provision is designed to give necessary strength to the security and assurance to investors who are asked to purchase the bond issue.

Recently the first issue of bonds was offered for sale. While dependent upon tolls alone and while the State (and incidentally its Highway Commission) assumed no financial obligation with relation thereto—the bonds were sold to a well-known investment house which had evidently satisfied itself that the estimates of traffic tolls were correct.

Sale of bonds was aided by the tax exemption provision. The bond issue bore interest at 4½% and was offered to the public at 97½ and accrued interest.

The West Virginia Laws West Virginia has created a "West Virginia Bridge Commission". The Commission may acquire or build bridges, issue "toll revenue bonds", which are not binding upon the State. The bonds are to be tax exempt.

In most respects the law is quite similar to that of Kentucky.

THE COMMISSION'S RECOMMENDATION

From a study of the respective advantages of the laws cited, and as a result of inquiry from those familiar with the operation of laws in the several states, your Commission is led to make the following recommendation:

PERMANENT COMMISSION

That the Legislature authorize the Governor of the State to appoint an *unpaid* Commission to be known as the Maryland Bridge Commission, similar in composition to the Port of New York Authority—i. e., composed of leading citizens of Maryland whose judgment and advice will command the confidence and respect of all Marylanders, and of investors in this and other States.

The Commission to have authority to employ one of the best bridge engineers available, and to have an efficient secretary and such other office force as may be necessary. The duties of the Commission and the further equipment of office force will be discussed at some later date. The expenses of the Commission so far as they are not payable and paid out of bond proceeds, to be paid from the gasoline tax.

The proceeds of this tax have increased materially in recent years (partly due to increase in rate of tax) as indicated by the following figures:

1925	$2,022,985.86
1926	2,255,578.84
1927	4,314,296.53
1928	5,607,565.88
1929	6,473,536.35
1930*	7,466,539.41

*Estimated to include November and December receipts.

Functions The Maryland Bridge Commission to have supervision in co-operation with the State Roads Commission of the development of a state-wide policy for the construction of toll bridges or tunnels crossing the Chesapeake Bay, Potomac River and such other waterways as careful estimates of costs and traffic will justify.

May Issue Bonds Either the Maryland Bridge Commission or the State Roads Commission (to be determined later) will be given authority to issue and sell bonds to provide costs of construction of a bridge. Length of life of bonds not to exceed 40 years; the bonds to be exempt from Federal, State or local taxation. The bonds *are in no way to involve the credit of the State or of either Commission,* but to be payable solely out of the gross tolls and revenues received from the operation of the bridge.

The Commissions are to fix the tolls to be charged. These tolls cannot be lowered during the lifetime of the outstanding bonds without the consent of the investors who have supplied the funds. Moneys received from tolls are to be sent to the State Treasury to be held in trust and applied to the payment of interest and retirement of the bond issue.

Before bonds may be issued on any structure, a joint certificate of the two Commissions (the Maryland Bridge Commission and the State Roads Commission) should be required to the effect that after a careful study (by experts and approved by the Commissions), it was estimated that the gross tolls during the first five full years of operation will be at least twice the amount of the interest to be paid on total bonded debt.

Maintenance and Operation The State Roads Commission to pay for the operation and maintenance of these as well as other state bridges.

To Become State Property Each bridge to become the sole and unpledged property of the State when the cost thereof, represented by outstanding bonds, shall have been paid for from tolls and the bonds retired.

The State is to have the right to make any bridge toll free at any time by retiring the bonds then outstanding in advance of maturity.

All tolls and revenues to be deposited in State Treasury in a fund to be known as the "Maryland State Bridge Fund," the tolls from each bridge to be kept separate and in trust to pay the principal and interest on bonds of that particular bridge.

It may be well to add a provision that whenever, in any one year the tolls of a bridge or bridges covered by one bond issue exceed twice the original interest charges thereon, the surplus therefrom, with the authority of the Maryland Bridge Commission, may be used to pay interest on or to retire bonds on some other bridge to be specified by the Commission.

The term "bridge" as used above to include tunnels or structures, which are part bridge and part tunnel.

If the estimates are carefully and correctly made and prove reliable, our figures show that the State may well become the absolute owner of any bridge within about 10 to 15 years after its construction, and the bridge thereafter can be made toll free.

In other respects the law of Maryland may well follow the law of Kentucky with its various provisions as to rates of interest, freedom from State obligation, open bidding for contracts, open bidding for bond issues, together with the provision that upon payment of bonds, a bridge or tunnel wholly within the State of Maryland shall become the unpledged property of the State, or in the case of the Potomac bridge the joint property of the States of Maryland and Virginia.

The law should contain protective provisions so that the machinery set up might not be used as a substitute to pay for bridges that should ordinarily be erected by the State as toll-free bridges. The new machinery is solely for the purpose of securing the erection of toll bridges—the construction should be used only to enable the State to pay for the more costly structures (say $500,000 *or more) the erection of which might be delayed for many years before the State with its own funds could construct them as toll-free.*

Further, the Maryland Bridge Commission should be equipped with such office force and engineering advice as to enable it, with sound information but the least duplication of cost, to supervise all estimates of cost, the awarding of contracts, the sale of bonds, etc., etc.

This recommendation in no way reflects upon the present State Roads

Commission. Composition of State Commmissions vary from year to year. Investors who are asked to purchase a bond with a 20 or 30 year due date, know this and desire some check upon future changes which might result in the creation of an inefficient and politically minded Roads Commission.

Further, the present State Roads Commission has many duties to perform. It is not the intention of this Commission to cause it to "bog down" with too many duties, but to provide through the proposed Maryland Bridge Commission such aid and supervision over toll bridges as may be adequate to obtain the best results and to give and maintain confidence in the reliability and accuracy of the State's estimates at all times.

The State cannot lose by this added credit; it will gain by the lower interest rates and higher prices at which bond issues may be sold.

ADVANTAGES

The advantages of the above plan are obvious. They may be summed up as follows:

(1) The State does not issue a single bond; nor is the credit of the State or any sub-division thereof involved in any way for the cost of construction of the bridges. No taxpayer as such will contribute a dollar to such cost of construction.

(2) Only such bridges as traffic justifies will be built now, and the State and automobile users will have the use of them available at once instead of waiting possibly many years before State funds are available for their construction.

The building of toll bridges will not supersede the present duties and functions of the State through the State Roads Commission to build and maintain toll-free roads and bridges.

The plan simply adds a method by which needed toll bridges can be built.

(3) The resultant development of large areas of the State may well result in the increased value of properties. The increased gasoline sales, due to

the attraction to Maryland of a large volume of outside traffic, as well as increased local traffic, may result in a substantial net increase in the gasoline tax.

(4) The bridges eventually become the unrestricted property of the State, although the cost of the bridges is paid for by the users and not by the taxpayers. The State will have the power at any time to take over any bridge and make it toll free by paying off whatever amount of bonds remains then outstanding. In taking over a bridge no complex question of valuation is involved. The price is fixed by the cost of retirement of the bonds then outstanding.

(5) Bonds can be issued for 20, 25 or 30 years and the cost spread over that period. If the State were to construct bridges out of its own bond issues, the cost of the structures must be paid for in 15 years.

(6) Tax exemption of bonds is a factor. Kentucky Highway bonds bore interest at the rate of 4½% substantially aided by tax exemption. It is possible that if constructed by private capital, the cost of money would be as high as 6½%.

Few people realize the difference in a 2% per annum interest charge over a period of say 30 years. If a commission is able to sell $10,000,000 bonds at a rate of interest of 2% per annum less than private capital over a period of 30 years (assuming the bond issue remained outstanding that long) the saving in interest would amount to $200,000 a year, which over a period of 30 years (without allowance of interest on interest) would be $6,000,000—or more than half the cost of the bridge.

DISADVANTAGES

The disadvantages from the standpoint of the public are more superficial than real. Two may be urged. Public construction, ownership and operation have proven very costly in many instances. It is argued that on the whole it is better from the standpoint of the public for private capital to take the risks. But economic history has shown that where private capital has been unwilling to take the risk, and there was a public need, the State has of necessity met the need.

Thus in the domain of bridge building it may well be argued that private capital is invading the field of public functions rather than that the State is invading the field of private capital.

State roads and bridges have become a public function today. The whole free road system of Maryland, with the necessary bridges incidental thereto, is owned and operated by the State.

Toll bridges logically may be added as a State function, and as an added service to the public.

The State is not invited, under the plan suggested, to step far afield into the logical domain of private capital. It simply extends its own field of operation from publicly owned toll free bridges to publicly maintained and operated toll bridges, which when paid for through tolls, become the unpledged property of the State.

Your Commission believes that a plan which eventuates in complete state ownership of a bridge without cost to the State for its construction, with lower interest rates on cost to be paid by users of the bridge, and at the same time gives the public an immediate traffic benefit, is a plan well worthy of State consideration.

Many members of the Commission and a substantial portion of the public might well feel that as closely as toll bridges are allied to toll free roads as a public function, there are public reasons why private capital should be first given an opportunity.

There is nothing in this report to conflict with such views.

Our duty is to suggest a plan sound and beneficial to the public, which provides at least an alternative to construction by private capital.

(2) The second disadvantage that may be urged is the use of State funds but as has been pointed out the only use of State funds contemplated above is for the purpose of paying the expenses of the Maryland Bridge Commission and for the purpose of maintaining the bridges. The first is proportionately of little importance to the ensuing advantages and the second practically answers itself, for the State now pays the cost of maintenance not only of

bridges but roadways throughout the whole of the State, which pass by or near the homes of all the taxpayers.

This use of State funds for maintenance is not a sound objection to the plan. Further dedication of gross receipts from tolls to the payment of interest and principal on cost gives the necessary credit to the bond issues and enables the State to obtain the benefit of lower interest charges. The State does not lose this cost of management; it gets full value, for the application of gross tolls to the retirement of bonds means that the State will acquire the bridge free of cost and therefore free of toll at a proportionately earlier date.

No taxpayer in any part of the State can justly complain of such a program.

TOLL BRIDGES

There is nothing new or original in our suggestion of the advisability of toll bridges. Although there have always existed toll bridges in the United States, this form of public utility has achieved a very great growth during the past few years owing to the expansion of motor vehicle transportation. It was estimated over three years ago that there was invested in public and private toll bridges well over one-half billion dollars. Since that estimate was made, many more millions have been added.

SALEABILITY OF BONDS

The problem of saleability and prices to be obtained for the bonds would be greatly simplified by giving assurance to the investor through some State guarantee fund, such as the pledge of ½c on the gasoline tax, that any deficiency in tolls will be made up.

If this could be done, we believe the benefits of the above plan would be certain in every respect.

The bonds would have a surer market, would bring high prices with low interest rates, and would enable the State to lower the requirement that before construction, estimated tolls on a bridge must be at least twice the in-

terest requirements. This would result in a number of bridges being built at an earlier date, but still on a conservative basis.

At the same time the gasoline tax fund would operate as a guarantee fund only, and might never be used.

We understand that New York has worked out a system of guarantee funds which is operating very satisfactorily. We are not yet in a position to recommend such a plan in Maryland, but may do so later.

Or we may later suggest an additional provision to the proposed law, authorizing the State of Maryland to do what was done by the State of New York in several instances, namely to contribute to the specified cost under certain specified conditions, where necessary to secure the saleability of bonds at a proper price.

This, however, might well be supplementary authority to be exercised only under proper protection.

It would alter somewhat the advantages of the plan to taxpayers as above stated, but the fundamental principles of the plan would be maintained intact.

It is our belief, however, that under normal bond market conditions, the form of bond here suggested even without the above additions, would be attractive to investors,—certainly more marketable than bonds put out by private capital under similar conditions.

The Port of New York Authority bond issues were sold to yield as low an interest rate as 3.92% in a favorable bond market and no higher than 4.93% in un unfavorable market. These bonds were payable from tolls and revenues only, but the Port Authority used part of the tolls for the maintenance cost of bridges. The credit was further strengthened by a State contribution to cost of structure.

It may be urged that bonds issued and dependent upon traffic near New York City would be more attractive to investors and this is true, but it is also true that even in a most unfavorable bond market, the Kentucky Highway Commission was able to sell a 4½% bond at a discount under a law similar to that proposed herein.

Much of the above statement goes into detail for the purpose of conveying a picture to the minds of those not familiar with practical operation of similar laws in other States. At the appropriate time and in discussions before the Legislature, if desired, we can bring out the practice in other States more fully. We may well hold back, until that time, our final recommendations on such questions as

(1) Whether or not the Maryland Bridge Commission and the State Roads Commission should operate jointly, or whether there should be but one Commission to be known as the Maryland Bridge Commsision on which members of the State Roads Commission should serve.

(2) Which Commission should issue bonds.

(3) Whether the tolls should be deposited directly in the State Treasury in trust for bond holders, or as in New York, be deposited in a special trust fund by the Commission itself.

(4) Whether or not it might be advisable for the State be authorized to continue toll charges on toll bridges for a while after bonds are paid off, in order to hasten the date of full payment for other toll bridges.

It is not our intention to fix in terms an inflexible plan, but to give definite outlines of a plan, the details to be agreed upon later.

CHESAPEAKE BAY BRIDGE

To return now to the Chesapeake Bay Bridge:

One of the first, if not the first, projects to be considered by the Maryland Bridge and State Roads Commissions, will obviously be a structure across the Chesapeake Bay.

The Commissions will have available what your Commission has not had—namely adequate funds for drafting plans and for accurate engineering and traffic estimates, with reliable data based on soundings to determine with precision, depths and character of bottom.

With such information before them, the Commissions can then determine wisely at what point and with what character of structure the Chesapeake Bay should be crossed.

Our own engineers report only two possible crossings available at anything like a reasonable cost. They are:

(1) *Millers Island-Tolchester Bridge.*

At the time of the appointment of this Commission, there was already in existence a well developed plan to provide a crossing by bridge from Millers Island (lying about 8 miles east of the southeast corner of Baltimore City) to Tolchester on the Eastern Shore.

The sponsors of this plan had already obtained the necessary franchises and permits, had made soundings and borings, and designed the tentative plans for the bridge. Traffic studies had been made which in the opinion of the sponsors indicated that the venture would be profitable.

The proposed Millers Island-Tolchester bridge would cross about six miles of water. Most of the water on this proposed route, would be rather shallow and the foundation conditions apparently good. Your Commission feels that this bridge, if completed, would be a valuable addition to the transportation system of the State, and it has endeavored to encourage the carrying to completion of this project by private capital.

There is, at present, no certainty that this bridge will be built by private capital in the near future. Those interested in the project have assured us,

however, that responsible banking houses are prepared to finance this structure when financial conditions are favorable.

We have been charged with the duty of suggesting an alternative plan, and have done so with two purposes:

First—in order to have the present Legislature pass the necessary legislation and avoid the delay of another two years in launching an accurate and intelligent study of the projects, in the event that private capital does not carry out the present project.

Second—in order that proper legal machinery may now be set up by the State to provide for the construction of such other toll bridges as traffic may justify, and which private capital is unwilling to construct.

(2) *Sandy Point-Kent Island Route*

If the needs of the State, as a whole, be considered, the desirability of a connecting link placed at a more central point between the Eastern and Western shores of Maryland, than the Millers Island-Tolchester bridge becomes apparent.

A careful survey of the Bay shows only one central point that is at all practical. Between Sandy Point on the Western, and Kent Island near the Eastern Shore, there lies a route which is the shortest of any route south of the extreme upper part of the Bay. A crossing at this point would bring about great savings in travel between large portions of the eastern and western shores.

Thus mileage via such a bridge as compared with mileage passing around the headwaters of the Chesapeake through Elkton would show a saving from Crisfield to Baltimore 40.8 miles; from Pocomoke 40.8 miles; from Oxford 65.8 miles; from Easton 65.8 miles; from Cambridge 51.8 miles; from Salisbury 40.8 miles and from Ocean City 16.8 miles.

There is a similar saving in mileage from these points to Frederick, Hagerstown and Cumberland, and a much greater saving to Annapolis and points south of Annapolis.

Mileage over the Millers Island-Tolchester bridge would show a saving from Crisfield to Baltimore of 34.7 miles; from Pocomoke 34.7 miles; from Oxford 58 miles; from Easton 58 miles; from Cambridge 40.7 miles; from Salisbury 34.7 miles, and from Ocean City 20.7 miles.

The Sandy Point-Kent Island route would be very close to and would parallel the line of ferries now operated by the Claiborne-Annapolis Ferry Company.

Our preliminary but by no means accurate estimates indicate that traffic over this route by bridge or tunnel would substantially exceed traffic via the Millers Island-Tolchester route.

An examination of the road-map of Maryland seems to justify this conclusion.

We believe that substantially greater traffic from the central and southern portions of the Eastern Shore would be drawn to the western and southern portion of the state and to Baltimore City over this route than over the Millers Island-Tolchester route, and vice versa.

It was reported at one time that the United States Government, through the Engineering Division of the War Department, would oppose a crossing from Sandy Point to Kent Island. We have reason to believe that this is not now true. A bridge with a proper span we believe would be approved, and a tunnel under the Bay at a proper depth would meet with encouragement rather than objection.

When it comes to the consideration of the practical questions involved in constructing such a crossing, we are confronted with several difficulties.

First, on the route of about 21,000 feet, or say four miles, there are two miles of deep water.

Second, this route lies across the approach to the Port of Baltimore, which approach must be safeguarded in any plans which are considered. There is imposed upon this route, therefore, the necessity of either a long tunnel or a bridge with one of the longest single spans which has ever been built.

If a bridge were chosen, it would be necessary to have in its central portion one long clear span of at least 2,000 feet. Two spans of greater length (Fort Lee of New York and Golden Gate of California) are under construction. A bridge from Sandy point to Kent Island would be further complicated by the fact that the location of the anchorages for the suspension

cables would be in deep water, which is a type of construction that, as far as we know, has not yet been attempted on any bridge having a very long span.

Our preliminary estimates indicate that the cost of a bridge at this point is prohibitive, but our estimates may be readily checked should the State enact the legislation recommended.

Another suggestion has been a structure—part bridge and part tunnel. This is probably impractical owing to the fact that the tidal flow is very strong between Kent Island and the Western Shore, especially at ebb tide during the floods from the Susquehanna. If the tunnel is to be under only a portion of the deep water it must have at least one of its ends rising on a long gentle slope in that deep water, and this would provide an obstruction, which would probably increase by 50 percent the speed of the tidal flow.

This leaves for consideration the construction of a tunnel from shore to shore or at least under the whole of the deep water.

We repeat that no reliable estimate of the cost of a bridge or of a tunnel, or of a combination of the two can be made without thorough engineering studies.

We have before us, however, two letters of Mr. H. Kent McCay, former City Engineer and Harbor Engineer of Baltimore, stating in substance that he and his associates, have consulted with one of the most responsible contractors in Baltimore and one in New York, also with Francis Betts Smith, the engineer and builder of the Oakland-Alameda tunnel, and he is willing to guarantee the completion of a tunnel such as our engineers specify, for $14,750,000. This price to include tunnel and causeway — a distance of 3-9/10th miles—ventilators, lighting and all machinery necessary for operation included.

He has also consulted, he informs us, a leading Bonding Company, who were bondsmen for the Alameda Tunnel Contractors and the Bonding Company has agreed to give a performance bond for $7,000,000 to guarantee the satisfactory performance of the proposed contract.

The Maryland Bridge Commission if created doubtless will take this

estimate and proposition under consideration, and through its own experts, make the necessary checks on estimated costs.

If the Chesapeake Bay Bridge Company should finance itself and construct the Millers Island-Tolchester bridge we would strongly advise against the consideration of a bridge or tunnel across the Chesapeake at any other point. Traffic would not support both bridges and both the state and private capital would lose thereby, and a useless menace to private capital may well tend to impede the development of state traffic arteries, which this report seeks to promote.

We recommend, however, that this site, as well as the Chesapeake Bay Bridge Company's site be taken under consideration by the proposed Maryland Bridge Commission.

APPLICATION OF PLAN SUGGESTED IN THIS REPORT TO THE CHESAPEAKE PROJECTS

We understand that the Chesapeake Bay Bridge Company employed the best cost and traffic experts available. The resulting estimates evidently rested on a sufficiently sound basis to convince investment bankers that the project was financially feasible. If the estimates are accurate and a structure can with profit to private capital be erected at this point, then it is obvious such a bridge can be financed even more readily under the plan proposed by us, because of the additional advantages offered of (a) a lower interest rate on cost of structure, and (b) the fact that the State Roads Commission will agree to maintain and operate the structure, thus releasing the whole amount of tolls received to be applied to payment of interest and principal on cost of construction.

We have no official figures on the Chesapeake Bay Bridge Company's estimated cost of this structure, nor have we at present its traffic experts' reports. Current rumor as to the estimated cost of this bridge is $10,000,000 or $11,000,000. Private capital apparently believes it can at this price, erect and operate a bridge with profit. To do this it is clear that its estimated tolls must be from $1,000,000 to $1,200,000 at the outset and in later years, $1,500,000 per annum.

If these estimates of cost and traffic are accurate and the State Commission should authorize and construct this bridge, then it is calculated that with a 4½% bond issue the cost of the bridge would be paid in 10 or 12 years and the bridge become the unrestricted property of the State.

Assuming the cost of $11,500,000 and two-thirds of the estimated traffic the bridge would become the unrestricted property of the State in 17 to 18 years.

The Maryland Bridge Commission, however, would not be obliged to rely entirely on estimates. It would doubtless proceed more conservatively. Thus a bridge with estimated tolls sufficient to retire the bond issue in 15 years, would be bonded for a longer period, say 25 years, to provide allowance for inaccuracies in estimates. More adequate protection would thus be afforded to investors, while the State would obtain the benefit of earlier acquirement of the bridge toll-free, if the estimates should prove to be accurate or over conservative, by having funds available to retire bond issues.

Similar reasoning may well be applicable to the Sandy Point-Kent Island project, but such deductions should not be drawn until reliable estimates of cost and traffic are available.

ESTIMATING TRAFFIC

In many instances in recent years, bridges have been substituted for ferries. As to the greatly increased volume of traffic via bridge or tunnel as compared with ferry service, there can be no question.

Where ferry service was frequent, and a large constant volume of traffic was carried (such as across the Hudson at New York and between Philadelphia and Camden) there was some basis upon which a prediction of future traffic might be made. In these cases the actual traffic has exceeded that which was predicted, although of course this may, to some extent, reflect the conservatism of the engineers who made the prediction. A very substantial percentage of earlier traffic estimates in recent years, however, has not been justified by later experience. We are informed that there has been a decided improvement in accuracy of traffic estimates in recent years, owing to improved methods.

The fact that the existing ferry traffic at a given point would not be sufficient to pay interest and principal on the cost of a bridge or tunnel has little bearing. Infrequently operated ferries cannot offer the service afforded by a bridge or tunnel. There is the necessity of the user adjusting his business or pleasure to the hour of ferry service; an allowance of time must be be made to be certain to arrive before the ferry leaves. Bridge or tunnel service is available every minute of the day or night. Further, in the case of the ferry, there is an occasional uncertainty as to adequate capacity due to unusual traffic demand; and there is the further, but not so serious difficulty in this case, resulting from uncertainty of service due to fog, ice and weather conditions. Above all there is the time lost in crossing.

Thus, if the same speed should be maintained on a bridge or tunnel from Sandy Point to Kent Island, as is maintained in the Holland Tunnel in New York, that is, 30 to 35 miles an hour, the time of crossing would be less than 10 minutes, as against say 45 minutes by ferry. No ferry, no matter how well equipped or operated, could compete with such service.

We think it proper to state that if such legislation as we recommend is enacted, and it should be determined to construct a bridge from Millers Island to Tolchester, it is our opinion that good faith would require the Commission to negotiate with the Chesapeake Bay Bridge Company for the acquisition of its property and rights, and should pay the Company not only its expenses to date of acquisition, but fair compensation for engineering and other services rendered.

Nor do we believe that the State as a practical matter, could adopt any other course. The Bridge Company has acquired valuable properties rights and licenses; a vast amount of engineering and legal work has been done. All of this would doubtless be available to the State if private capital should not be able to carry out its plans. While all costs and estimates would doubtless be checked by the State bodies, it would be a senseless waste to duplicate in full the work already done.

We have already stated in general terms that the purpose of this report is to secure the erection of needed toll bridges within the State, and that

there was nothing in this report that is intended to discourage private capital.

This statement is especially applicable to the Chesapeake Bay Bridge Company, whose officers have devoted a number of years to the project and have spent large sums of money for engineering and other costs. The Company has been particularly unfortunate in having its project ready for investment when the investment bond market was at a low ebb.

It is our belief that the Bridge Company is entitled to special consideration for the reasons stated. It is therefore our judgment that while the State should promptly set up its own machinery to provide for the crossing of the Chesapeake, in the event that the Chesapeake Bay Bridge Company is not successful in financing its project, yet a reasonable time should be given to the Company for this purpose, the State granting such reasonable extensions of time for the beginning and completion of the bridge as may meet with the approval of the Legislature and yourself as Governor.

If the Bridge Company is financially able to act within the time limit—well and good. If not, the State will be ready to proceed. Nor will a reasonable extension of time interfere with the State plans, for the State need not lose by the delay if the proper machinery is set up and can begin at once an intensive study of the Chesapeake Bay, Potomac River and other projects.

If the Sandy Point-Kent Island crossing is adopted, good faith as well as practical necessity require that the Claiborne-Annapolis Ferry Company be acquired at a fair consideration. The company has rendered a notable service to the public. It embarked on an undertaking which at the time was highly speculative. It was threatened with bankruptcy at one time. It has given good service and now promises to be profitable. The stockholders have received but one dividend, namely 25c a share. The Company was encouraged by the State to undertake to supply this service.

Good faith now requires the State to act fairly and liberally. Practical necessity points in the same direction. Experience indicates that bonds for the cost of a tunnel would not be purchased by the public if a competing ferry were operated nearby. No reliable estimate of revenues could be made under such circumstances, and investors would fear to purchase the bonds if private capital controlled a competitive operation.

The practice in Kentucky is to acquire any competing ferry before a toll bridge or toll tunnel is erected by the State Highways Commission.

In conclusion we desire to emphasize what we have repeatedly stated in this report: That it seems to us that the time has come for the State to determine whether or not it will provide the necessary machinery whereby toll bridges and tunnels may be constructed when and as traffic justifies where private capital fails to act.

The choice lies between (a) a State-wide plan for the erection of toll-bridges (or tunnels) to be paid for by tolls, the structure when the cost is paid for from tolls to become the unrestricted property of the State—a policy which will benefit present as well as future generations—will add value to land in developed areas and open up less valuable areas to development; and (b) a haphazard policy which may well result in sporadic raids on the State treasury and postpone for many years to come the economic progress of the State.

We attach hereto the report of our Engineering Committee.

Respectfully submitted,

B. HOWELL GRISWOLD, JR., *Chairman* *

WM. G. BAKER, JR.
CLEVELAND R. BEALMEAR
FREDERICK A. DOLFIELD
EDGAR ALLAN POE
JAMES H. PRESTON
WM. LEE RAWLS
DONALD SYMINGTON
Baltimore

S. SCOTT BECK
W. B. COPPER
Chestertown, Kent County

JAMES M. CROCKETT, *Pocomoke City, Worcester County*
W. W. GOLDSBOROUGH, *Greensboro, Caroline County*
J. FRANK HARPER, *Centreville, Queen Anne's County*
L. M. MILBOURNE, *Kingston, Somerset County*
HOOPER S. MILES, *Salisbury, Wicomico County*
WALTER J. MITCHELL, *La Plata, Charles County*

REPORT OF ENGINEERS' COMMITTEE

ENGINEERS' CLUB

CHESAPEAKE BAY BRIDGE COMMITTEE

Baltimore, Maryland

November 19, 1930

Mr. B. Howell Griswold, Jr., Chairman,

The Chesapeake Bay Bridge Commission,

Baltimore and Calvert Streets,

Baltimore, Md.

Dear Mr. Griswold:

Your Commission was appointed to consider the feasibility of the various methods of providing a crossing for the Chesapeake Bay, to the end that while the bay shall still serve as the best highway system for water borne transportation enjoyed by any people in the world, it shall cease to be an almost unpierced barrier to our ever growing highway system for transport by motor, and that social and commercial intercourse between Marylanders of the Eastern and of the Western Shore may be carried on with convenience which at least approximates that which they now enjoy in traffic with the people of adjoining parts of neighboring states.

A crossing of this kind would, of course, be a monumental structure. It would be one of the great bridges or tunnels of the world. Its cost would be large but its effect on the growth of our state should also be far reaching. It would, of course, be partially or entirely self-supporting through tolls and it is possible that it might pay for itself and be entirely free. This depends, of course, on the traffic and the growth of the state.

Before attempting to discuss our problem, it may be well to outline some of the methods by which crossings of large bodies of water are being provided in other communities at the cost of many million dollars.

Although there have always existed toll bridges in the United States, this form of public utility has achieved a tremendous growth during the past few years owing to the expansion of motor vehicle transportation. It was estimated over three years ago that there was invested in public and private toll bridges well over one-half billion dollars. Since that estimate many more millions have been added.

There are various methods of financing these utilities. Some, like other public utilities, have perpetual franchises and operate under the principle of private ownership, indefinite as to extent of time. The bridges of this class are largely of the older and smaller type, or replacements of it, such as, Clark's Ferry across the Susquehanna River above Harrisburg, where the first bridge was built in 1828, although the present bridge is a modern structure. The franchise is perpetual. Few, if any, of the more recent large structures fall into this class.

Many large modern toll bridges are built by private capital, but with the right of the state to purchase them under some definite schedule of payments, if it shall so desire. The Vicksburg Bridge over the Mississippi, built at a cost of about $7,000,000, is of this type. It may be purchased by the states of Mississippi and Louisiana, or either of them, at any time, at the cost of construction less depreciation plus cost of financing. The Tacony-Palmyra Bridge across the Delaware above Philadelphia, built at a cost of about $4,000,000, may be acquired, by either Pennsylvania or New Jersey, or their political sub-divisions, at cost less depreciation.

Bridges are also built by private capital, where the terms of the franchise provide that the bridges will become the property of the state without cost at a certain definite date. The Bear Mountain Bridge across the Hudson River, cost $5,000,000, will revert to the state of New York free at the end of thirty years from its opening. The Mount Hope Bridge in Rhode Island, one of the large modern suspension type bridges, reverts to the state of Rhode Island free in 1970.

In the field of public initiative there are several different methods by which toll bridges are financed and erected.

The state may build the bridge as one of its direct activities, in the same manner as that in which it builds an ordinary free bridge. The Mid-Hudson

Bridge at Poughkeepsie, built by the state of New York through its department of Public Works at an estimated cost of $6,000,000, is an example. The situation was not greatly different from those existing in the building of the Hanover Street and Severn River Bridges.

The state may build a bridge without pledging the state's credit in any way, the project being self-sustaining. In this case a state commission or other agency raises the necessary money by selling its bonds and pledging the prospective revenue of the bridge to meet the interest and retire the principal. The state may even agree to furnish the money necessary for maintenance and operation from other sources, leaving the entire tolls for the debt requirements. The state of Kentucky is at present carrying on a toll bridge building program in which the bonds are issued through the State Highway Commission and are in no way a charge against the general credit of the state. The project is, of course, expected to be self-supporting. All tolls will be used for the requirements of the principal of, and interest on the debt. The state pledges itself to provide for maintenance and operation.

Where it is desired to provide a crossing for a body of water which separates two states, many bridges have been built by joint state commissions. The Philadelphia-Camden Bridge across the Delaware was built by a joint state commission of Pennsylvania and New Jersey, at a cost of $36,000,000, with part of the money required furnished by the city of Philadelphia and the balance by the two states. In this case the principal and interest are direct state and city obligations and are not affected by the tolls. These tolls, by the way, are coming in much faster than was estimated and the bridge will be made free at a considerably earlier date than was predicted.

Bridges have also been financed by bonds issued by joint commissions, the interest and principal of which are entirely dependent on the revenues from the bridges. The Fort Lee Bridge across the Hudson River in New York city, by far the largest bridge in the world, now being built at an estimated cost of $75,000,000, is financed by the Port of New York Authority, a joint commision of New York and New Jersey. The Champlain Bridge was financed by the bonds of a joint commission of New York and Vermont.

Municipalities also have built bridges to be paid for out of earnings.

The City of Louisville built a bridge over the Ohio at a cost of about $5,000,000. The bonds were issued by the city to cover the whole cost, to be retired through tolls, after which, bridge will be free.

It is proposed to build a bridge with a longer single span than the world has ever seen over the Golden Gate at San Francisco, by a district composed of six California counties. It is expected that the cost and interest will be met by tolls.

What has been said about bridges applies equally well to under water highway tunnels. There are only three in use in the country.

The Holland Tunnel under the Hudson River at New York city was built by the New York City Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission. It is a toll crossing consisting of two tubes with a twenty-foot roadway in each, which permits of two lines, a fast and slow, in each direction. Speed on the fast line is as high as the rate of thirty-five miles an hour. It cost, without interest on construction, $48,000,000.

The Detroit-Canada Tunnel is a single tube with a twenty-two foot roadway under the Detroit River. Its cost was estimated at $25,000,000. It was built by private capital.

The George A. Posey Tube at Oakland, California, is a single tube with a twenty-four foot roadway and two three-foot sidewalks. It was built by Alameda County at a cost of $5,000,000 and is free.

It must, of course, be realized that before any of these large structures were financed or built, it was necessary to make elaborate surveys of traffic upon which to base a forecast of the probable traffic by the proposed crossing, to examine various sites and make soundings and borings to determine the most economical location, and to complete the design of the structure so that a reasonably accurate estimate of the cost might be made. This same procedure will be necessary in our own case if it shall be decided that the state shall build this crossing. Below are cited a few examples of this necessary preliminary work.

In the case of the major crossings built by the states of Pennsylvania, New Jersey and New York, such as, the Philadelphia-Camden Bridge and the Hol-

land Tunnel, the first action of the states was to appropriate several hundred thousand dollars, in each case, for the necessary investigations. In the report of the Board of Transportation, of the City of New York, on the Brooklyn-Richmond Tunnel, their statement was that $2,000,000 was appropriated "for the preparation of plans and construction."

In the Alameda Tunnel, "A large force of engineers, carefully selected for their experience in unusual problems of design in reinforced concrete, underwater construction and ventilation, worked on the plans for this project".

For the Lake Champlain Bridge Commission, $120,000 was provided by New York and $80,000 by Vermont, although the bridge was to be finally financed by bonds of the commission.

For the Kill Van Kull Bridge, "The acts carried an appropriation of fifty thousand dollars from each state for the preliminary studies and surveys".

It will be noted that this work did not give the final figure as the report says: "While it is not possible at present to report definite cost figures, it is estimated that a bridge of the aforementioned capacity can be built at a cost within $16,000,000 inclusive of approaches, real estate and interest during construction".

In this situation you requested the Engineers' Club of Baltimore to appoint a Committee to help you in this work. The President of the Club appointed such a Committee and this Committee has endeavored to co-operate with you in examining this problem, to advise you as to the engineering problems involved, and to tabulate for you data as to how large crossing problems were being handled elsewhere.

At the appointment of your Commission, there was already in existence a well developed plan to provide a crossing by bridge from Miller's Island to Tolchester. The sponsors of this plan had already obtained the necessary franchises and permits, had made soundings and borings and designed the tentative plans for the bridge. Traffic studies had been made that indicated a reasonable chance that the venture would be profitable.

The structure proposed at this point would cross about six miles of water. Most of the water, on this proposed route, would be rather shallow

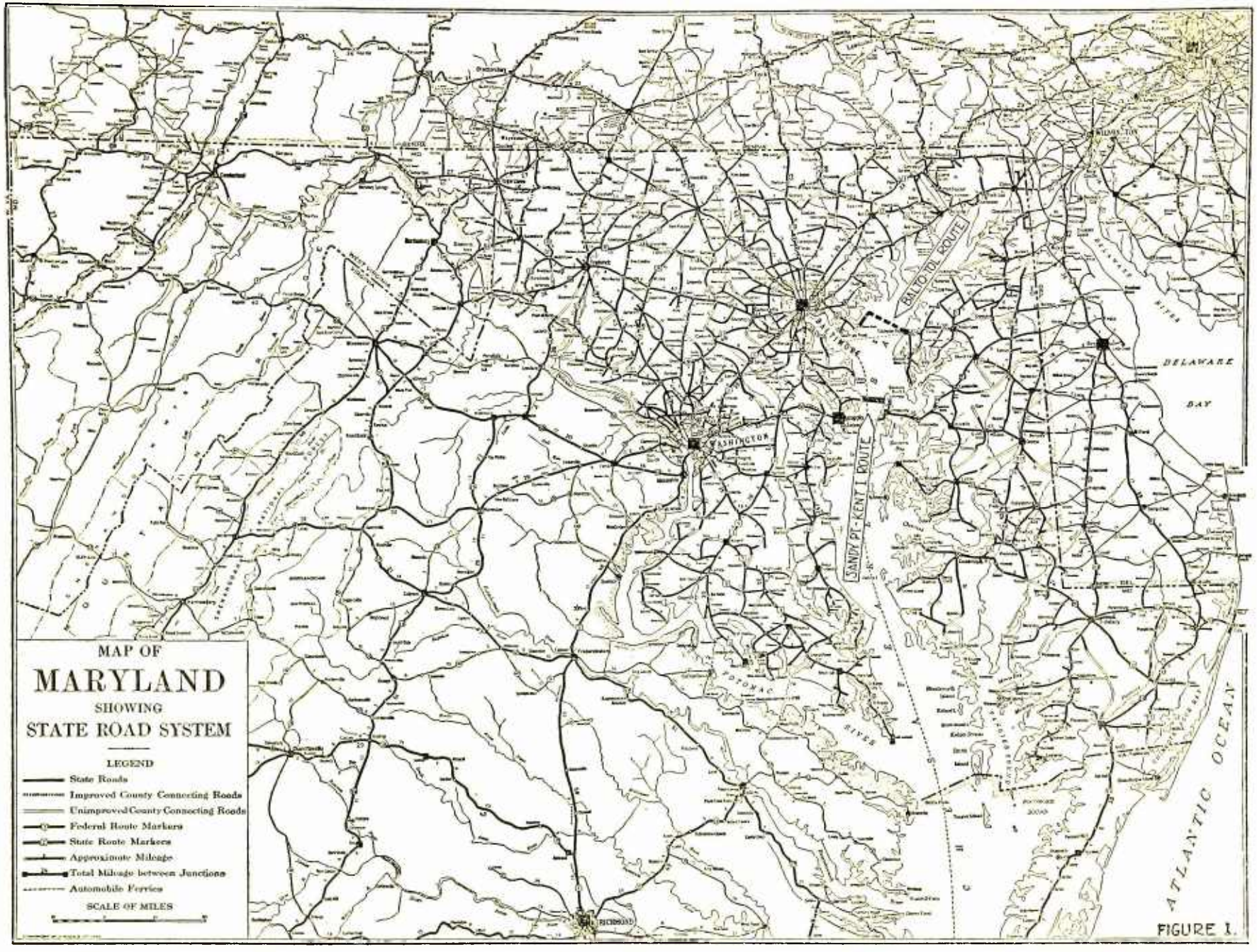

MAP OF
MARYLAND
SHOWING
STATE ROAD SYSTEM
LEGEND
State Roads
Improved County Connecting Roads
Unimproved County Connecting Roads
Federal Route Markers
State Route Markers
Approximate Mileage
Total Mileage between Junctions
Automobile Ferries
SCALE OF MILES
BALTIMORE
WASHINGTON
ANNAPOLIS
BALTIMORE ROUTE
SANDY PT.-KENT I. ROUTE
POTOMAC RIVER
DELAWARE RIVER
DELAWARE BAY
ATLANTIC OCEAN

FIGURE 1.

and the foundation conditions apparently good. This bridge, if completed, would be a valuable addition to the transportation system of the state. There is, at present, no assurance that this bridge will be built at any time in the near future, if at all, and your Commission has, therefore, followed the instruction to examine the entire question of providing a crossing over the Chesapeake Bay, which will bring into communication the Eastern and Western Shores of the state.

If the needs of the state, as a whole, be considered, the desirability of a connecting link placed at about the central point of the Eastern and Western Shores of Maryland, becomes immediately apparent. This situation is shown graphically in figure 1.

A careful survey of the Bay shows only one central point that is at all practical. Between Sandy Point on the Western and Kent Island on the Eastern Shore, there lies a route which is the shortest of any south of the extreme upper part of the Bay. A crossing at this point would bring about great savings in distance in travel between large parts of the eastern and western shores, as shown by the following table:

	OCEAN CITY	SALISBURY	CAMBRIDGE	EASTON	OXFORD	POCOMOKE	CRISFIELD
MILEAGES VIA SANDY POINT							
BALTIMORE	141.2	109.2	93.2	63.2	74.2	139.2	150.2
ANNAPOLIS	120.5	88.5	72.5	42.5	53.5	118.5	129.5
WASHINGTON	153.5	121.5	105.5	75.5	86.5	151.5	162.5
FREDERICK	188.2	156.2	140.2	110.2	121.2	186.2	197.2
MILEAGES VIA ELKTON							
BALTIMORE	158	150	145	129	140	180	191
ANNAPOLIS	185	177	172	156	167	207	218
WASHINGTON	197	189	184	168	179	219	230
FREDERICK	205	197	192	176	187	227	238
SAVING IN DISTANCE IF BRIDGE ROUTE IS USED							
BALTIMORE	16.8	40.8	51.8	65.8	65.8	40.8	40.8
ANNAPOLIS	64.5	88.5	99.5	113.5	113.5	88.5	88.5
WASHINGTON	43.5	67.5	78.5	92.5	92.5	67.5	67.5
FREDERICK, HAGERSTOWN and CUMBERLAND	16.8	40.8	51.8	65.8	65.8	40.8	40.8

It is impossible to believe that the bringing in to closer positions by the amounts indicated above when applied to a well developed populous state, such as ours, can fail to be of great benefit. A monetary value cannot be placed on this intangible gain but the amount must be large.

Such a crossing would provide a route, by which, the wealth of the national capital, gathered from the whole country, could flow to the Eastern Shore with its enormous water-front for hunting, fishing and other forms of recreation. Not only would this benefit the Eastern Shore, but the rise in property value would be a gain for the whole state.

The rich markets in Washington would also be opened to the truck gardens of the Eastern Shore.

It is probable that this route would act as a by-pass for the ever increasing traffic between the northern and southern states and between Washington and such resorts as Atlantic City, thus relieving the congestion along the present routes, and that this traffic added to that between Washington and Western Maryland on the one side, and the Eastern Shore on the other, would place Annapolis and a considerable section of the Western Shore on a through traffic route and aid in their development.

Baltimore City and the surrounding counties, the growth of which is largely bound up with that of the City, would gain ready access to the Eastern part of the state. Western Maryland would get the advantages of closer position to a large and growing part of its state and also the benefits of the increased wealth and development of its own state.

Finally, as has been already noted, the bringing in a closer position to large groups of people by the amounts indicated cannot fail to be a benefit.

When it comes to the consideration of the practical questions involved in constructing such a crossing, we are confronted with several difficulties.

First, on the route of about 21,000 feet, or four miles, two miles will be in deep water.

Second, this route lies across the approach to the Port of Baltimore, which approach must be absolutely safeguarded in any plans which are considered. There is imposed upon this route, therefore, the necessity of either

a long tunnel or a bridge with one of the longest single-spans which has ever been built.

If a bridge is chosen, it must have, in its central portion, one long clear span of at least 2,000 feet. Although by the time this span was built there would undoubtedly be one and perhaps two spans of greater length (Fort Lee of New York and Golden Gate of California), our bridge would be complicated by the fact that the location of the anchorages for the suspension cables would be in deep water, which is a type of construction that, as far as we know, has not yet been attempted on any bridge having a very long span.

It has been suggested that part of the deep water crossing be by tunnel, but this is probably impractical owing to the fact that at this point is what is known as the most restricted section of the Bay and the tidal flow is very strong, especially at ebb tide during the floods from the Susquehanna. If the tunnel is to be only under a portion of the deep water, it must have at least one of its ends rising on a long gentle slope in that deep water and this would provide an obstruction, which would probably increase by fifty per cent. the speed of the tidal flow. It would appear, therefore, that if a tunnel is resorted to it must extend under the whole of the deep water.

The present state of our knowledge of this location and the foundation conditions existing shows nothing impossible about building either a bridge or a tunnel, but there exists at the present time in the world no structure similar to either of these proposed crossings and any estimate of cost can only be made after a careful examination of the location and after the design of the structure, and even after such an estimate is made, often owing to changes in conditions, which occur during the period which must elapse between the estimate and the carrying out of the work, the actual cost may be quite different from the estimate. It is thus impossible to make even an approximate estimate of the cost without some investigation.

This Committee has received, however, the following letter from Mr. H. Kent McCay, former Harbor Engineer and City Engineer of Baltimore.

H. KENT McCAY
Consulting Engineer

Formerly
City Engineer, Baltimore
Harbor Engineer, Baltimore
Construction Corps, U. S. Navy

Telephone Plaza 1389

23 W. Mt. Royal Ave.

Baltimore, Md.,

December 12, 1930.

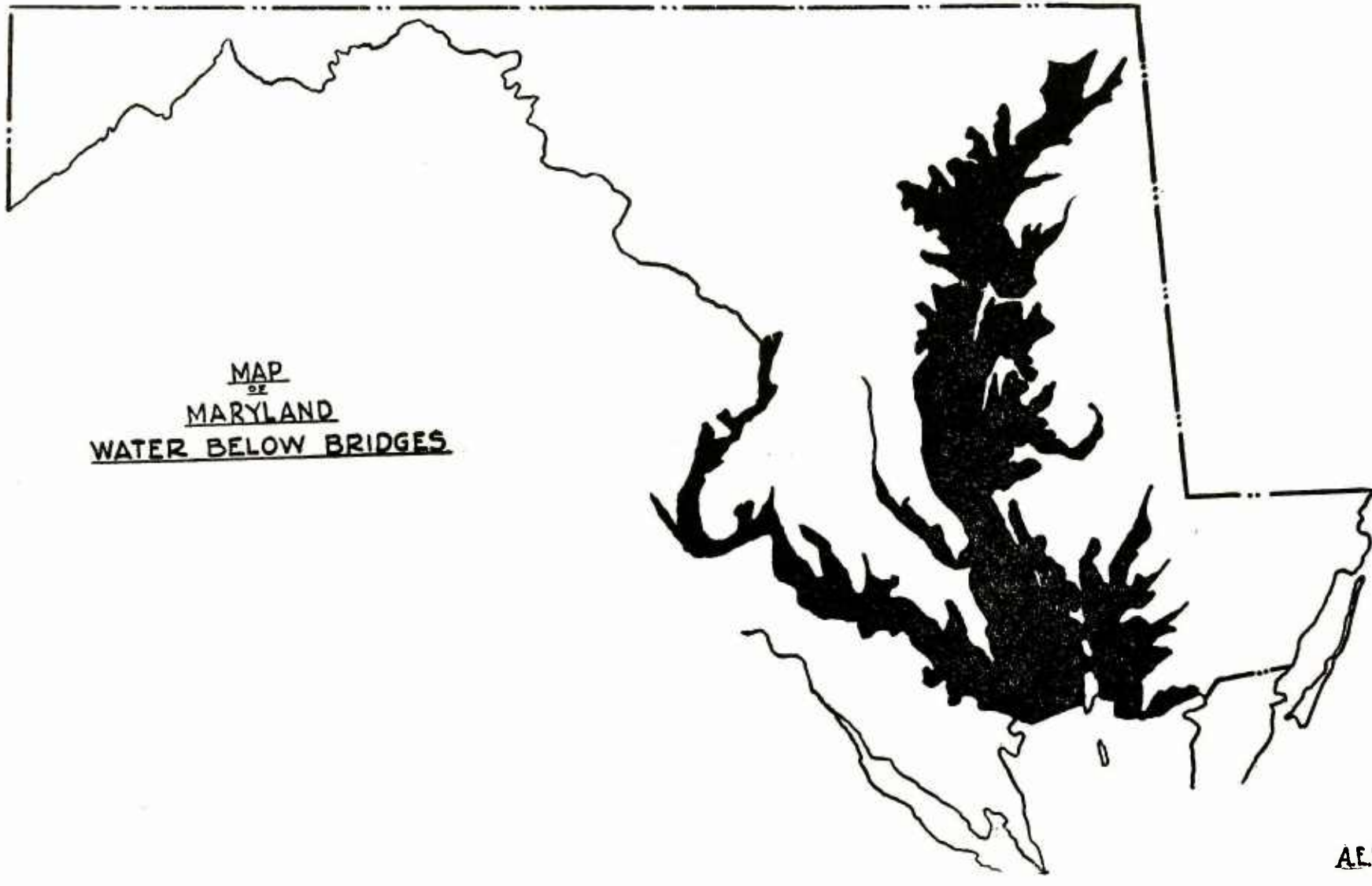
Mr. Bancroft Hill,
Chairman of Engineering Club,
Chesapeake Bay Bridge Committee,
Court Square Building,
Baltimore, Md.

Sir:

My self and associates have communicated with one of the most responsible Contractors in Baltimore, and also with a well known and responsible Contractor in New York, and we desire to confirm our estimate for the construction of the Tunnel from Sandy Point to Kent Island, in accordance with the profile filed in your Office, for the sum of fourteen million seven hundred fifty thousand dollars ($14,750,000). This amount has been confirmed by Francis Betts Smith, of San Francisco, the builder of the Oakland-Alameda Tunnel.

The above mentioned price will complete the tunnel, including ventilating and lighting equipment and will turn the same over to your principals in complete operating order.

My self and associates have consulted one of the most responsible Bonding Companies in this City who were bondmen on the Oakland-Alameda Tunnel, and they have agreed to furnish a performance bond, for seven million dollars ($7,000,000), to guarantee the satisfactory completion of this contract.


MAP
OF
MARYLAND
WATER BELOW BRIDGES
A.E.C.

We are prepared to give you the name of the Contractor, and also the name of the Bonding Company at your request.

Yours very truly,

(Signed)

HKM/AKH H. KENT MCCAY.

Although, as previously stated, it is impossible to form an approximate estimate of the cost of a bridge in the absence of any design or knowledge as to foundation conditions, this Committee believes that a bridge would undoubtedly cost more than this estimate for a tunnel .

When we consider the question of probable traffic on a crossing at this point, we are again confronted by the same lack of data as we were in considering the probable cost. Along with the engineering estimates as to probable cost which were made before the great bridges and tunnels, previously mentioned, were built, there were exhaustive traffic surveys and estimates made from data gathered from all possible sources. In some of these cases the actual results have greatly exceeded the estimates, although this may reflect to some extent the conservatism of the engineers making these estimates.

As a broad general statement, an inspection of the Map of Maryland, Water Below Bridges, shown herewith, would seem to indicate that the crossing of as great a natural barrier as that shown must, from the very nature of the case, generate considerable traffic.

The fact that no great amount of ferry traffic now exists would not appear to affect this conclusion, as no ferry service operating under the conditions existing at this point can even approximate a bridge or tunnel because of the time that must be taken for such a trip and the uncertainty as to adequate capacity at times of unusual demand.

If the same speed should be maintained on a bridge or tunnel at this point as is maintained in the Holland Tunnel in New York, that is thirty to thirty-five miles an hour, the time of crossing would be less than ten minutes. No ferry, no matter how well equipped or operated, could compete

with such service, and especially if this service is available day or night, at any time, entirely independent of ferry schedule.

As between a tunnel and a bridge, there are various advantages and disadvantages on the side of each. In times of good weather, there is little doubt that a bridge would be more attractive. In times of thick fog or violent storms, a tunnel would probably be much more useable. These questions would have to be analyzed by a competent engineering force. It is probable that the question of cost would finally govern.

Although under the original method for building subaqueous railroad and highway tunnels, they were very expensive, it has been claimed that with new methods the cost can be greatly reduced and it may be that a tunnel can compete in price with a bridge and even be built for much less, but once again, this is a question which cannot be answered until some designs for both a bridge and a tunnel have been made.

We wish to acknowledge the assistance of the State Roads Commission in furnishing data on road mileages.

We hope that the information presented has been of some help to you in your work and if there should arise any other questions of a general engineering character, we shall be glad to assist you in answering them, as far as it is possible, in the absence of a design or investigation of the site.

Respectfully submitted,

CHESAPEAKE BAY BRIDGE COMMITTEE

of

ENGINEERS' CLUB

W. Watters Pagon
G. J. Requardt
Steuart Purcell
Bancroft Hill
Chairman.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