

## SENATE....No. 65.

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### Commonwealth of Massachusetts.

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IN SENATE, March 11, 1858.

The Committee on Mercantile Affairs and Insurance, to whom was referred the "Report of the Committee on Cape Cod Harbor," beg leave to submit the following

#### REPORT:

The preservation of Cape Cod Harbor is eminently of national importance in its relations to commerce. It has been so regarded by congress, in numerous appropriations that have been made, directed to the object of preserving the shifting sand soil, which in many places has formed the only barrier against the encroachments of the sea, by the planting of beach grass. Permanent benefits have been secured by these appropriations, but it has now become apparent that the imminent danger to the harbor lies in the threatened breach, liable to be made in high gales of wind, through the continually narrowing strip of beach sand between the ocean and the head of East Harbor.

To ascertain, with precision, the extent of this danger and the remedy required, the legislature of 1857 authorized the governor of the Commonwealth to appoint a committee and

select a competent engineer "to examine Cape Cod Harbor, particularly the eastern portion thereof, with reference to the plan of constructing, by means of an appropriation by congress, a pier or solid wall from Beach Point, in Truro, to the opposite beach at the mouth of East Harbor."

During the last year, a careful examination was made by that committee, and a highly competent engineer, William P. Parrott, Esq., whose experience has made him especially familiar with such investigations; and the result of this examination and the report of the engineer in detail, accompanied with sketches and estimates, confirm the opinion long entertained by those best acquainted with the harbor and its exposures, that the only permanent security will be the construction of the pier or solid wall recommended by the engineer.

Referring to the reports of the committee and engineer as presenting a specific and practical basis for the action of congress which it is proposed to invoke for a national work so essential to the protection of commerce, your Committee recommend the adoption of the following Resolution.

MATTHIAS ELLIS.  
WILLIAM FABENS.  
GEO. H. CHASE.  
GEO. F. WILLIAMS.  
ALBERT L. BENCHLEY.  
JAMES GUILD.  
CHARLES B. ALLEN.

## Commonwealth of Massachusetts.

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In the Year One Thousand Eight Hundred and Fifty-Eight.

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### RESOLVE

In relation to Cape Cod Harbor.

*Resolved*, That the senators of the Commonwealth of Massachusetts in congress, are instructed, and the representatives requested, to use their endeavors to obtain an appropriation by congress, for the purpose of preventing the threatened destruction of Provincetown Harbor, by the construction of a pier or solid wall from Beach Point, in Truro, to the opposite beach at the mouth of East Harbor.

## Commonwealth of Massachusetts.

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*To His Excellency, the Governor, and the Honorable Council:*

The Committee appointed, under a Resolve passed by the last legislature, "To examine Cape Cod Harbor, particularly the eastern portion thereof, with reference to the plan of constructing, by means of an appropriation by Congress, a pier or solid wall from Beach Point in Truro, to the opposite beach at the mouth of East Harbor, so called;" submit the following

### REPORT:

From the south-eastern extremity of Massachusetts, there reaches forth into mid ocean a point of land some seventy miles in length, which has been not unaptly termed the "right arm of the Commonwealth," from its striking resemblance in its shape, to the human arm.

The first section of the Cape, from the shoulder to the elbow, extends nearly a due east course, some thirty-five miles into the Atlantic, then at the elbow, forming nearly a right angle to the northward, and as it extends itself, gently curving to the westward, until near the wrist, where it forms from that point to the fingers' end, a little more than a half circle, which curve forms one of the finest and most important harbors in the United States.

In more senses than one, perhaps, has this neck of land received this cognomen. From its barren soil has gone forth a race of enterprising, efficient and intelligent shipmasters and seamen, not equalled from any other spot on the globe, while it

has furnished, also, its full quota for the mercantile and other business pursuits. And yet, in another and more terrible sense has it proved a "right arm" of destruction to life and property. Not a year fulfils its cycle but many a gallant sailor finds his voyage of life at an end upon its treacherous sands, and large amounts of property are irrecoverably lost.

A paternal government, with commendable liberality, has established at various points along its dangerous coasts, light-houses, as beacons to warn the mariner of his dangers, and to aid him in escaping them; but a more paternal Providence placed at this point of extreme peril a harbor easy of access, of sufficient depth of water, and capacious enough for the wants both of the naval and merchant service.

This harbor is of priceless value to the commercial world. Situated as it is, at this point of extreme danger, and in such close proximity to Boston, the commercial metropolis of New England, (it being but forty miles from Boston light, at the mouth of Boston Harbor, and which harbor is probably one of the most dangerous to approach in our whole country,) its importance can be somewhat appreciated since it is the only approachable resort for vessels bound into Boston and adjacent ports, when, through stress of weather, they are unable to reach their place of destination.

Here the exposed and tempest-tossed mariner often finds a safe retreat from the furies of wind and storm, and since the day the *May Flower* cast anchor within this haven, vessels of every size and class have sought its bosom in the storm, and nestled in safety upon its waters.

It is not the government which needs this harbor for the ships of its navy,—it is not the sailor,—it is not those who inhabit this arm of the sea,—it is not those whose friends and property are exposed to the perils of old ocean,—it is not any one of these alone, nor all combined, who are the recipients of such a boon,—it is a common blessing, a gift to humanity, and is to be prized and treasured as such.

It cannot then be a matter of surprise to any one, that the citizens of Cape Cod and the citizens of Massachusetts, so many of whom are engaged in commercial business, and all of whom have a direct or indirect interest here, should have a watchful and paternal regard for such an all-important, and to them, to

our government, and to the commercial world, invaluable spot as is Cape Cod Harbor.

In token of this, the people, and through them the legislature of Massachusetts and our national congress, have manifested their regard for its safety by repeated action. Five times since 1825, has the legislature of our State sent a board of commissioners to examine this harbor and its environs, and report upon the dangers to which it might be exposed, with a view to its preservation; and it is a remarkable fact, that it is the unanimous and concurrent testimony of every board, and of every individual composing the several boards, that the harbor was in danger from causes operating at the time of their several visits; and although the four preceding reports have very faithfully portrayed the situation of things as they found them, and each proposed a course of remedial action, yet we deem it proper to retrace somewhat their ground, making such additional suggestions as we are warranted to do by the changes which are constantly going on, and the dangers which have since arisen, and to propose such remedies as to us seem most likely to place the harbor in safety.

It was the good fortune of your Committee, that according to the provisions of the Resolve creating the Commission, we were accompanied in our investigations by a competent and efficient engineer, in the person of William P. Parrott, Esq., of Boston, who, with them, visited Provincetown on the 14th day of September last, and during our stay there we twice visited the points of danger, and on the 16th and 17th held public hearings; and a synopsis of the testimony then taken will be found appended to this Report, and is document marked B.

It is a well known fact, that this portion of Cape Cod is mainly destitute of any portion of virgin soil; nearly the whole land (if land it may be called) being one vast body of loose, and when not secured by some growth of shrubbery or beach grass, drifting sand.

In the early settlement of the Province Lands, (now Provincetown,) these lands were covered with a tolerable growth of pine wood, shrubbery and beach grass, which gave the sand a stable character; but, without a knowledge of the consequences, or with indifference to them, these pines were cut off to a large extent for fuel, and cattle were allowed to run at large, feeding

upon the grasses and browse, until some considerable portion of the territory was shorn of its covering.

There were those, however, who very soon foresaw the evils liable to arise as the results of these acts, and the attention of the provincial legislature was called to it, and as early as 1714, "An Act for preserving the Harbor of Cape Cod, and regulating the inhabitants and sojourners there," was passed with the following preamble: "Whereas the Harbor of Cape Cod being very useful and commodious for fishing, and the safety of shipping both inward and outward bound, is in danger of being damnified, if not made wholly unserviceable, by destroying the trees standing on said Cape, (if not timely prevented,) the trees and bushes being of great service to keep the sand from being blown into the Harbor by the wind;" "Be it enacted," &c.

Then, in 1740, another Act was passed, entitled, "An Act to prevent damage being done to the Harbor of Cape Cod, by Cattle and Horse-Kind feeding on Provincetown land," with the following preamble: "Whereas many persons, *not Inhabitants in Province Town*, frequently drive down great numbers of Neat Cattle and Horse-Kind to feed thereon, whereby the Beaches there are much broken and damnified, which occasions the sands blowing into Cape Cod Harbor, to the great damage thereof," "Be it therefore enacted," &c.

These Acts were passed for the purposes indicated in their preambles: the first to prevent the destruction of the pine trees, not the cutting them down, however, for the Act simply provides, that "No person or person may presume to bark or box any pine tree or trees \* \* \* for the drawing of turpentine, on pain of forfeiting and paying ten shillings," &c. The second Act provided, that "no person or persons, *not being Inhabitants of Provincetown*, shall presume to turn, or drive any Neat Cattle or Horse-Kind, to or upon the lands of Provincetown, so called, to feed thereon, upon the penalty of forty shillings a head," &c.

These Acts, it will be seen, but partially prohibited the evils spoken of, and had they been obeyed to the letter, could have been of little benefit; consequently, five years later, we find the legislative authorities passing another Act, with the following preamble: "Whereas the provisions made in and by an Act

entitled an Act to prevent damage being done to the harbor of Cape Cod \* \* \* has been found ineffectual for that end," "Be it therefore enacted," &c.

Here follows another Act, the provisions of which were entirely futile, or nearly so, as to any thing its execution might do to prevent the destruction of the trees, shrubbery or grass on this territory. The same is true of an Act passed in 1805.

The liberties which these several Acts granted to the people, were sufficient in themselves—if availed of—to effect the evils they proposed to abate, and hence, as has been suggested, they were nearly or quite useless enactments; the work of destruction still went on.

No prohibitory Act was passed until 1826. In 1825 the legislature, upon the petition of the selectmen of Truro, authorized the appointment of a board of commissioners, "to examine Cape Cod Harbor, and ascertain and estimate the danger of damage to the same, by the drifting sand or otherwise," &c.

The commissioners, Messrs. Zabdiel Sampson and Nymphas Marston, Esqrs., in their report make this declaration. "The space where a few years since were some of the highest lands on the Cape, covered with trees and bushes, now presents an extensive waste of undulating sand."

Thus it will be seen, that by inefficient laws, and those but very partially observed, the natural protection to Cape Cod Harbor has been recklessly and unjustifiably destroyed.

At the suggestion of these gentlemen the legislature of 1826 enacted that "it shall not be lawful for any person or persons to suffer any neat cattle, horses or sheep, to go at large on the province lands and beach in the county of Barnstable, or to cut any beach grass, bush or wood thereon, or to pull up any roots or shrubs, trees or beach grass therefrom."

This Act, with others in aid of its provisions, which have been passed subsequently, have been effective in entirely putting a stop to cattle, &c., going at large, and the cutting of the wood, and destroying the shrubbery and grasses now growing upon these lands; but these remedies have come too late; the damage has been done, and their effectiveness now, cannot remedy the evils which past neglect and misconduct has engendered.

The first board of commissioners who examined this territory

recommended as a substitute for these natural protections which had been destroyed, "the cultivation of beach grass, and the setting out of such grass on the Cape and on Long Beach."

In accordance with this suggestion, the legislature at the session of 1826 passed a Resolve instructing the senators and requesting the representatives of this Commonwealth in the congress of the United States, "to use their endeavors to procure an appropriation by congress for the purpose of preventing the destruction of Provincetown Harbor in this Commonwealth."

As the result of this application, congress appropriated in May, 1826, \$3,500 for that purpose; and at different periods, down to July, 1838, appropriations were made amounting in the aggregate to the sum of \$28,850.

This amount has mainly been spent in setting out beach grass upon these "waste and undulating sands."

That portion of these uncovered sands lying in the rear of, and north-westerly of the village of Provincetown, and towards Race Point, has been to a great extent covered in this way, and has proved, as is believed, a sure protection—or such as it bids fair to be—against the blowing of the sand.

The same may be said of all that portion lying southward from Race Point, and on to Long Point. At the terminus of this point—which is the fingers' end of this long "arm"—and near the light-house standing here, has been built a bulkhead or breakwater, in accordance with the recommendation of the commissioners who viewed this harbor and territory in 1853.

These protections—that is, the setting of the beach grass, and the building of the bulkhead at Long Point—seem to have had their desired effect here, and no dangers to the harbor seem to be apparent at this time from this quarter.

We now pass to the eastern side of Cape Cod Harbor, contiguous to which, and connecting therewith, lies East Harbor.

This is an inlet extending some three miles in a south-easterly direction, terminating at a point a little north of what is termed the "Highlands of the Cape."

Lying adjacent to this inlet, and mainly upon its southerly side, is a large tract of salt marshes.

For many years subsequent to the settlement of Provincetown, this inlet or harbor was the winter quarters of a large fleet of fishermen and coasters; and vessels have not unfre-

quently gone up into this harbor to receive the cargoes of vessels wrecked upon the back side, which have been carted across the Cape, and shipped to Boston.

The main beach lying northward and eastward of East Harbor, and between it and the Atlantic, is at its widest point—which is near the mouth of the East Harbor inlet—about one-half of a mile wide; thence it stretches itself south-easterly to the head of East Harbor, where its width, at the ordinary high tide, is but about five rods. A little south of this narrowest point it connects with the “Highlands.”

All this tract of about three miles in length, is mainly unprotected, and during a high north or north-westerly wind, the blowing of the sand resembles a driving snow storm; and by these winds the sand is carried directly into East Harbor.

High hills and bluffs of sand have thus been driven into the channel of this harbor, and from this cause it has become shallow and useless; no vessels having passed into it for the last ten or twelve years; and notwithstanding this harbor has become nearly filled from this source, yet there has been carried out by the ebb tide, immense quantities of sand into the easterly part of Cape Cod Harbor.

On the westerly side, and directly at the mouth of East Harbor, and between that and Cape Cod Harbor, lies Beach Point. This beach commences at the main land in the north-west part of the town of Truro, and extends in a north-westerly direction, and at this time is about one and three-fourths of a mile in length, and from three to six rods in breadth, and divides East Harbor from Cape Cod Harbor. This point has projected itself forward at the rate of about twenty feet per year for the last twenty years, and the effect has been to crowd the channel running into East Harbor one hundred or more feet upon the opposite (Provincetown) shore.

Formerly,—until two years since, when a bridge was built from this point over the channel to Provincetown,—all the travel to and from Provincetown passed along this beach on the easterly shore of East Harbor.

At a place called “Deep Hole,” a little inside of the East Harbor inlet, the road, or where the travel was,—for a road or track would be wiped out by every passing breeze or flowing tide,—was overhung by a high hill, and where the highest point

of that hill was, twenty or twenty-five years ago, and where people travelled eight years ago with their carriages, now lies the bed of the channel, and the remaining portion of the hill is not so high as then by twenty feet; and it is with difficulty that a person can now pass on foot below the hill, at low-water.

The locality of this vast body of sand has been changed, by the winds having blown it from the top of the hills into the water below, and by having been "eat out" by the force of the ebb tide from the bottom, and thus chiefly carried out into Cape Cod Harbor.

From these causes mainly, if not entirely, has risen that large extent of flats lying at the mouth of East Harbor, and which have for many years, been gradually rising and extending themselves into Cape Cod Harbor.

It was in evidence before your Committee that "where fish were caught ten or twelve years ago, in Cape Cod Harbor, at the mouth of East Harbor, in ten feet of water at low-water, now at that time of tide, dry flats may be seen."

These injuries, though slow in their progress, are undoubtedly each year augmenting, and would, in process of time, prove a serious, if not fatal injury to the harbor.

But your Committee are of opinion that a more imminent and impending danger to the safety of the harbor is to be found at the head of East Harbor. Here, as has been observed, the main beach is but about five rods wide, and from evidence before us we learn that this already narrow place is gradually, yet surely growing more narrow, by the washing away of the beach upon the back side, and lessening in its height by the sand being blown away, until now the sand, at one point certain,—and that its very narrowest,—is but a few inches above the ordinary high-water mark.

During the gale when the "Minot's Ledge" light-house was destroyed, a breach was cut through here, and a stick of timber lying upon the back side was carried through by the force of the water into East Harbor. The volume of water which passed through at this time was not large, but should there, during one of those heavy gales and high tides, which not unfrequently visit our coast, be a breach made here, and a free passage to the water ensue, so loose and unstable is the sand, and with such force would the water be impelled through, that

in one single tide it is not improbable that Cape Cod Harbor would be very seriously injured, and the foundation laid for its entire ruin.

During the gale alluded to, a cut was made through the beach at Chatham, some twenty miles above this point, into "Pleasant Bay," the outlet of which was at "Old Harbor," in Chatham, which was as powerful, and as wonderful in its results as would be, what we here now only fear.

It was the concurrent testimony of every individual before your Committee, that the slight obstruction existing here to the overflowing of the waters from the Atlantic side into East Harbor, hourly imperilled the safety of Cape Cod Harbor.

The ordinary rise of the tide upon the back side is probably not less than eight feet, which would be an average rise of one foot and four inches per hour. The difference in time of the tide between the back side, and the inside, at the head of East Harbor—at the point of danger—was stated to be, by the gentlemen before us at the public hearing, from three-fourths of an hour, to one hour and a half. Assuming it to be one hour, then the water upon the outside would be one foot and four inches higher at the same time, than it would be some five rods distant in East Harbor. With such a fall as this, in so short a distance, in ordinary circumstances, the water would flow through a breach here with great rapidity and power; then add to this the additional force which an extraordinary high tide would give it, and then the still augmented force the wind would give—for it is the high easterly gales which cause the extra tides, lashing the waters as they do into fury, causing the waves to rise like mountains, and dashing them with a power upon this beach, which beggars all description—and some idea may be formed of the exposures to which this frail beach is here subjected and the injuries which would be likely to ensue to Cape Cod Harbor by its overflow.

We have thus glanced at the more apparent dangers which threaten the safety of the harbor, and it now remains to suggest such remedies as were indicated to us by our own observation, and particularly to report upon the feasibility of the plan indicated in our commission, "of constructing, by means of an appropriation by congress, a pier or solid wall from Beach

Point, in Truro, to the opposite beach at the mouth of East Harbor.”

We propose to speak first of this last proposition. As has been fully shown,—and from the fact that a bridge has been built across the channel, without a draw,—there has ceased to be any value to East Harbor for navigable purposes, and we know of no other uses to which it could possibly be applied; so that should it be entirely closed, no loss can be sustained from this quarter.

No more sand would be carried out into the harbor, by the ebb of the tide which flows into East Harbor.

The main beach, which for the last few years has been materially cut away by the force of the tide, at “Deep Hole,” just above the mouth of East Harbor, would remain unharmed in the future.

Should a breach be made at the main beach, at the head of East Harbor, “a pier or solid wall” thrown across at the point proposed, would prove a certain security, and probably the only certain security to the safety of the Harbor; for placed at this point, whatever power might be brought to bear upon the main beach in high gales of wind, by the action of the water, this “pier or wall” would be screened from its force by the main beach lying in its rear; so that if a breach occurs, this would prove a barrier to its further progress.

Another benefit we think would be gained, that the flats now extending into Cape Cod Harbor, at the mouth of East Harbor, would, by the action of the tide and waves, be washed up upon the eastern side of the harbor, and against the “pier,” thereby strengthening and fortifying the one and materially benefiting the other.

A further benefit would be, that it would prove a protection to the bridge already built, from Beach Point, across the channel, to Provincetown. This bridge was built two years ago, and portions of it have been carried away each winter since by the ice. Should Provincetown be dismembered by a breach through the Cape, at the head of East Harbor, the communication with that place would be cut off, or very liable so to be; for should a free channel be cut through, and flow into Cape Cod Harbor, it would be quite improbable that a bridge could ever be built here which could repel the power of the winds

and waves, and tide, and the shifting sand, and more than all these, the drifting ice; and though the argument in favor of a "pier," for the protection of the bridge, may seem to be more of local than public importance, yet it will, we think, on a little reflection be seen, that so important has this harbor become to the public, and so important is it to have speedy and frequent communication with wrecked vessels all along on these coasts, that the cutting off of this communication by the loss of the bridge, would be a public as well as a private calamity.

These are some of the benefits to be derived from the execution of this plan, and your Committee are of the unanimous opinion, that it is entirely feasible, and seems to be the only permanent and efficient work which can be performed for the ultimate and entire safety of the harbor against the dangers which here threaten it; we, therefore, recommend "the plan of constructing, by means of an appropriation by congress, a pier or solid wall from Beach Point, in Truro, to the opposite beach at the mouth of East Harbor." And to this Report will be found appended the able report of William P. Parrott, Esq., engineer, with his plans, recommendations, estimates, &c., and which is document marked A.

As an additional security, we recommend the erection of some barrier at the narrow points of the main beach, at the head of East Harbor, which would tend to lessen the danger of a breach through here, and also to raise the beach by the accumulation of the drifting sand around it.

And furthermore, we recommend that the transplanting of beach grass be continued, and that all that territory lying north of East Harbor, and now unprotected, should as speedily as possible be covered. The principal causes which have heretofore disturbed and prevented its growth here, (aside from the drifting sand,) are now removed, that of cattle having been allowed, in years past, to run at large, and that of its having heretofore been used as a public highway, as nothing, perhaps, has been more effectual in destroying the grass, than the pasturing of cattle, and the travel over it with carriages, thus cutting up the grass and loosening the sand.

In conclusion, your Committee cannot with too much earnestness commend this harbor to the fostering care of our State and National Governments. No outlay of expense could give

us what a kind Providence has here beneficently bestowed, and now a comparatively trifling outlay may preserve it for generations to come, a God-given and government-protected boon.

JOHN KENRICK,  
M. S. UNDERWOOD,  
DAVID BURSLEY,

*Committee.*

October 14, 1857.

## A P P E N D I X .

## DOCUMENT A.

September 7, 1857.

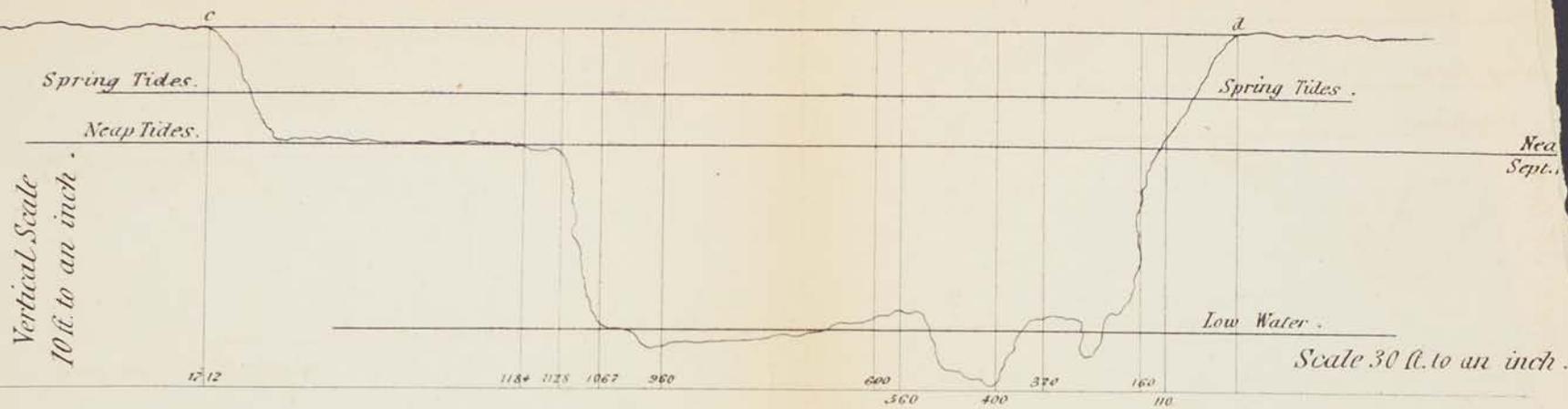
DEAR SIR:—Having received official notice of your appointment, under a Resolve of the last legislature, “Concerning the preservation of Cape Cod Harbor,” as Engineer, as provided by said Resolve, we desire you to meet us at Provincetown, on Tuesday, the 15th inst., for the purpose of aiding the Committee in their examinations, and with particular reference to making a survey and estimate of the cost of “a pier or solid wall,” proposed to be built from “Beach Point,” in Truro, to the opposite beach, at the mouth of “East Harbor,” and its probable effects as a protection to “Cape Cod Harbor.” And also, to aid the Committee in making further examinations touching any liabilities of danger to said harbor, by a break through the main beach at the head of “East Harbor,” and from any changes which have taken place, or are liable to take place upon or near “Beach Point,” at the mouth of “East Harbor,” or at “Long Point,” at the western part of “Cape Cod Harbor;” and to make such suggestions touching any or all of these points, as you may deem important, and to propose any remedies for existing or prospective dangers, with an estimate of their cost of construction. You will please report the result of your examinations and conclusions, to the Committee, at your earliest convenience.

In behalf of Committee on Cape Cod Harbor,

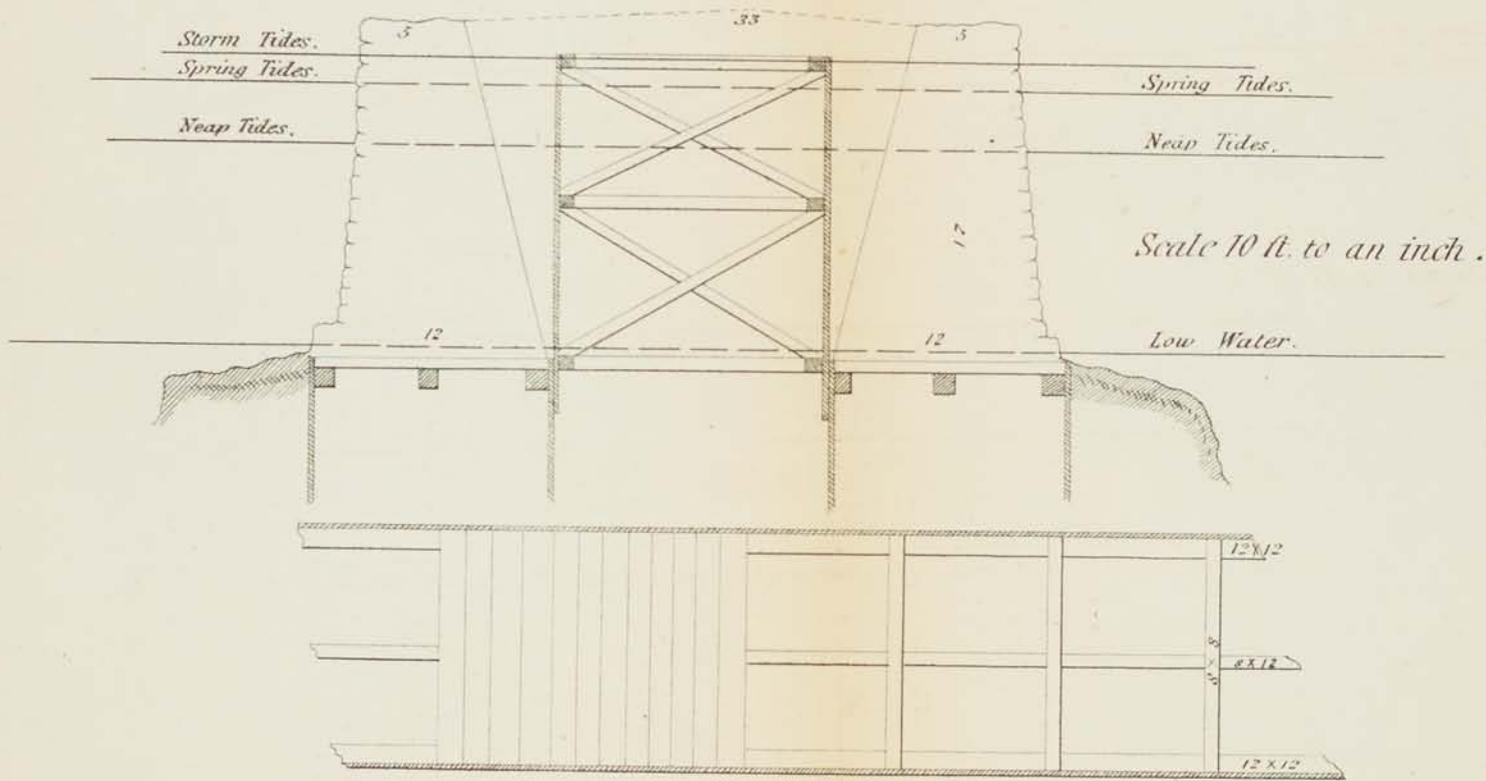
JOHN KENRICK, *Chairman.*

To W. P. PARROTT, Engineer.

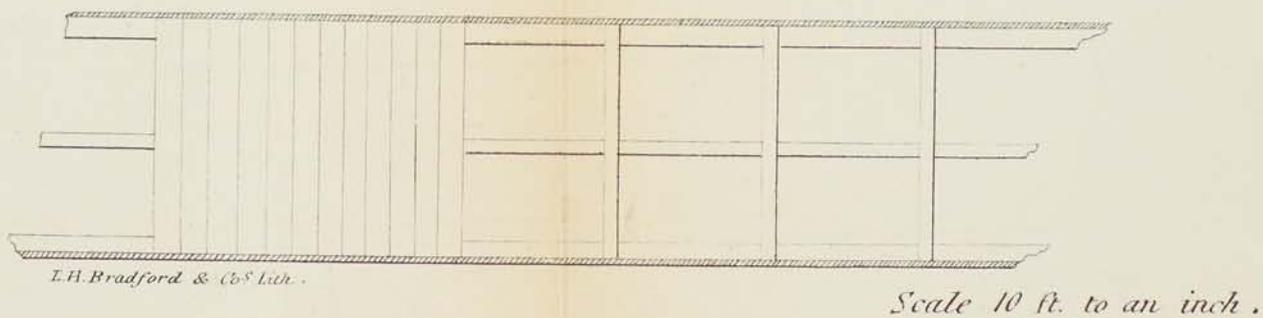
N<sup>o</sup> 1



N<sup>o</sup> 2



N<sup>o</sup> 3





To the Hon. JOHN KENRICK, Chairman of the Committee under the Resolve of the Legislature of Massachusetts, "Concerning the Preservation of Cape Cod Harbor," passed May 29, 1857:—

SIR,—The undersigned, in accordance with the annexed instructions, respectfully submits the following Report:—

In compliance with your request, I attended the public hearing at Provincetown, in September last, and also made an examination of the localities specified in your order. An extended survey in detail, was not, in my judgment, necessary, as the very full survey made under the direction of Major Graham, in the years 1833, 4 and 5, and the subsequent coast survey, afford all the information in detail, that can be required, consequently the expense which would necessarily be incurred to make another survey, would have been, in my opinion, unwarrantable. The measurements were, therefore, confined to such as were required to make an approximate estimate of the cost of the pier or solid wall, at "Beach Point."

The information derived from the examination of the gentlemen who appeared before you, the general examination of the harbor, including also East Harbor, and the examination of the back of the Cape, with the measurements above stated, are the data upon which this Report is based.

It is quite evident that Provincetown Harbor is filling up with sand, in that part, near "East Harbor," marked upon the plan (B) in red ink. Also, that the sand comes from "East Harbor," and more especially, from that part marked (A) in red, which locality was termed by the witnesses "Deep Hole," and that it is carried out by the action of the ebb tide, and deposited in the harbor, and that, unless a remedy is soon provided, that the injury to this most important harbor will be great, and also irreparable. The most obvious remedy is the construction of the pier or solid wall, specified in the Resolve.

The length of this wall will depend upon its final location, but will not vary in its extreme length much over seventeen hundred feet. Its height will be seventeen feet in the channel, for a distance of about one thousand feet; the remainder will average about nine feet in height. In making the estimates, the profile annexed to this Report, with the sections sketched below it, have been taken as the basis. Any variation in location will not probably change the dimensions in any great degree.

The foundation of this structure requires great care, and in its construction will be involved a large contingent expense, as the bot-

tom of the channel is loose sand, which is liable to be changed in position, by every change in the direction or velocity of the water. For this reason, even an approximate estimate for the cost of this item, is difficult. It can be covered only by a liberal allowance for contingent expense.

The cost of the whole structure will also depend, of course, upon the quality of the work and the materials of which it is constructed. The estimates submitted are based upon the cost of the kind of work commonly used in this section of the country for works of this class.

Expensive masonry does not seem to be required in this case, as it is probable that in a few years the whole structure will be entirely covered with sand.

Several plans present themselves, all involving the same general principle, viz.: the retaining the sand which is to form the foundation of the wall in place, until the dam is completed.

But one is now submitted, as it appears to me, to be the best, and to embrace all the general items of expense for works of this kind. The contingent expense being allowed for in a separate item.

The plan proposed is:—First to construct frames of timber for each wall, as shown in sketches Nos. 2 and 3. The outside timbers to be 12×12 inches, the intermediates 8×12, tied across by ties 8×8 inches, the whole to be covered with three inch plank. Upon both sides of this frame it is proposed to drive sheet piling to the proper depth, (estimated to be 12 feet,) where, if our information is correct, it will meet clay or mud bottom. This would effectually prevent the water from running under the foundation. Upon these platforms the double wall would be built, with a coffer dam between them, to prevent the passage of the water through the walls. The whole space being filled in with earth, from the marshes in "East Harbor," would form a perfect dam to the water now flowing into East Harbor.

The dimensions of the walls and the other details of the proposed structure, will be seen on reference to the sketches annexed, which make part of the Report.

The estimated cost, based upon the above data, is as follows:—

Materials for foundation, . . . . .	\$7,274 00	
Labor, . . . . .	2,094 00	
Driving piles, . . . . .	6,800 00	
	<hr/>	\$16,168 00
Masonry, 12,800 perches at \$2.50, . . . . .	\$32,000 00	
Earth Work, . . . . .	3,000 00	
	<hr/>	\$35,000 00

## CONTINGENT EXPENSES.

Foundation, . . . . .	\$8,804 00	
Masonry, . . . . .	7,280 00	\$16,084 00
	<hr/>	<hr/>
Total for the dam, . . . . .		\$67,252 00

In addition to this, there will be required to protect "Beach Point," at several points where it is narrow, a further expenditure of \$3,600.

A further expenditure of about \$10,000 is required to make the back of the Cape secure, at the point marked (C) in red upon the plan.

The total amount will then be as follows:—

For the dam, . . . . .	\$67,252 00
Beach Point, . . . . .	3,600 00
back side, . . . . .	10,000 00
	<hr/>
	\$80,852 00

The probable effect of these structures upon Provincetown Harbor will be, first, to stop the flow of sand into the main harbor, which is now endangering its safety; next, the accumulation of sand and shingle upon Beach Point, which is now prevented by the current out of East Harbor, and the consequent result will be, that the whole shore on this side of the harbor will be improved. There is danger that the sand now turned back by the current out of East Harbor, may be washed along shore, and fill up the docks at Provincetown. Should this be the case, it can be easily remedied if timely care is taken, and turned to good account. I do not consider it possible that the erection of this dam can injure the harbor under any combination of circumstances; on the contrary, it is absolutely and immediately required for its preservation.

Another probable effect, arising from the erection of this work, will be the filling up of East Harbor.

Upon comparison of the present beach line, on the back of the Cape, with Major Graham's Map, it appears, that the ocean is gradually encroaching upon the land, and as the strip of sand now forming the barrier to the ocean outside, is quite narrow, and composed of sand easily worn away by either wind or water, there is danger that the tide may soon break through at this point. Should this ever take place, the harbor would be greatly endangered, and the remedy

would cost far more than the present work. By building this dam, and the consequent filling of East Harbor, an effectual barrier would be formed against danger from this quarter.

From a like comparison with the map, as to Beach Point, I am of opinion that it is steadily increasing in length, as East Harbor fills up, and upon this opinion I base the conclusion, that in case the dam is built, the beach will soon accumulate, cover up the stone wall, and make a continuous beach to Provincetown, and it is quite possible that the sand bars now in the harbor, opposite to the mouth of "East Harbor," may be in part added to the beach by the action of the sea, and the original depth of water be again restored.

Long Point was not examined, as there was no evidence that further information was required beyond that in your possession.

In conclusion, in answer to your general requisition for my opinion upon all other points important for the preservation of this important harbor, I would say, that, generally, there are two sources of danger to this harbor. First from the blowing sand. This has been remedied in part by the action of government, but another appropriation is more evidently required to perfect the system which ought not to be left to time and natural causes alone. Secondly, from a breach of the sea, from the back of the Cape, through East Harbor, into Provincetown Harbor.

This will be most effectually remedied by the structure which is the immediate subject under consideration.

In view of all the matters above stated, it is my opinion that there should be an appropriation of \$100,000. To cover both the items last stated, and with this amount properly expended, the immediate dangers to which this harbor is now exposed may be prevented.

All of which is respectfully submitted by

Your obedient servant,

WM. P. PARROTT.

## DOCUMENT B.

MINUTES OF TESTIMONY TAKEN BEFORE COMMITTEE  
APPOINTED TO EXAMINE CAPE COD HARBOR, SEP-  
TEMBER 16 AND 17, 1857.

Hearing before Committee on Cape Cod Harbor, at Provincetown,  
September 16, 1857:—

*Statement of Nathaniel E. Atwood, of Provincetown.*

Am fifty years of age ; engaged in maritime occupations ; acquainted with Cape Cod Harbor from youth to the present time.

Changes are going on near East Harbor, but of extent am ignorant. Have no direct interest at East Harbor, but have at Long Point.

Cause of changes is, sand is blown into East Harbor, and from thence is carried, by current, into Cape Cod Harbor. Think if a dyke was built, from Beach Point to opposite shore, in Provincetown, the East Harbor would speedily fill up.

In case dyke is made across mouth of East Harbor, think the waves would drive the present sand bars and pile them against the dyke, and finally make a smooth curve through the whole shore of Cape Cod Harbor.

Have made special examinations of East Harbor, and the beach separating the same from the Atlantic—one last autumn, and two the past summer.

Think great danger of waves breaking through beach from the Atlantic, at head of East Harbor.

In case breach be made at this place, a strong current would set through into Cape Cod Harbor, and seriously impair if not destroy it.

Have no doubt there is an essential difference between time of high-water at head of East Harbor and in Atlantic immediately opposite. Think one and one-half hours. Should breach be made at this place, current setting out would be liable to create a spit or bar, which would endanger the navigation on the outside, and prevent vessels following close along the beach during thick weather.

In middle portions of harbor, no material changes are going on.

No serious changes have taken place at Long Point, since piling and planking by General Government, a few years since.

Beach Point has gradually extended towards Provincetown, since I have known it.

*Eben S. Smith.*—Am fifty-one years of age; resided in Provincetown twenty-four years.

Have generally observed the harbor and changes going on. The sand accumulating on bars at entrance of East Harbor, is brought from East Harbor by current. Am positive that, since I have lived in Provincetown, the current at Deep Hole has cut the sand away, on Provincetown side, an hundred feet; faster for last fifteen years than prior.

Am well acquainted with back side. The sand hills flatten. During the gale when Minot's Ledge Light was destroyed, the sea broke through the beach at the head of East Harbor. It washed away very fast. Consider this a dangerous place. If a thorough breach should be made here, it would destroy Cape Cod Harbor.

There is a marked difference in time of high-water, between inside and outside; think three-fourths to an hour, in time.

There has been no attempt to protect the shore at Deep Hole. Beach grass has been set out on the beach, to the north and north-west of East Harbor, but it has not been effectual to prevent the sand blowing.

Think a dam is the only effectual remedy to prevent the sand being washed into Cape Cod Harbor at this place. Have no personal interest in East Harbor or meadows.

Believe sand on bars, at entrance of East Harbor, is moved by waves around the shore in front of town. At Union Wharf, most western in town, the sand has raised about a foot within eight years. Think a portion of sand may come from west. Have but little personal knowledge as regards Long Point.

The bridge, from Beach Point to Provincetown, was constructed two years ago the first of November next. The bridge has had the effect to increase the strength of the current, by obstructing it in part, and has changed the main channel further towards the Provincetown side.

Am Agent for Insurance offices in Boston. Know that they consider Cape Cod Harbor of great importance as a harbor of refuge during the inclement seasons.

The Insurance Companies of Boston are now preparing to make a depot here, and intend to keep a steam tow-boat here, during the winter and early spring, to assist vessels.

*Nathaniel Lewis.*—Am sixty-two years of age; resided in the easterly part of Provincetown forty years. Have followed the fishing business up to the last two or three years. Have been about the harbor much during that time, boat-fishing. Changes are going on in east part of Cape Cod Harbor. The bars are constantly making off. Where I caught fish twelve years ago, in ten feet of water at low-water, it is now dry at same time of tide. This I determine by positive ranges. Am intimately acquainted with East Harbor. Deep Hole has changed in on to Provincetown side, one hundred feet or more; this sand is carried into Cape Cod Harbor. Ebb tide runs strongest. The action of the sea-wash in the harbor, has been to carry this sand to the westward rather than to the east. Formerly it was the practice of the people of Provincetown to wheel sand into the harbor; this practice has been discontinued within last five years.

Beach Point has extended towards Provincetown four hundred feet, within last twenty years.

The channel under the bridge has moved the whole width since the erection of the bridge.

September 17, 1857.

*John Nickerson's Statement.*

Am sixty-two years of age; resided in Provincetown all my days; maritime occupations.

I think the present danger to Cape Cod Harbor is from the beach at the head of East Harbor, and from the current sweeping the sand—which is blown into East Harbor at the Deep Hole—into Cape Cod Harbor. I know that the flats at the east part of Cape Cod Harbor, are gradually rising and extending. Strong W.N.W. winds move large quantities of sand into east Harbor, which are carried into Cape Cod Harbor by the current. Deep Hole has cut away very much, and has moved in to the Provincetown side. East Harbor has not been used by vessels for ten or fifteen years; before that it was used.

The flats in western part of Cape Cod Harbor, and in front of the town, are gradually rising, and in my opinion the sand is moved from the bars in the east part of the harbor, around the shores below the town.

Think there is no danger at present, from the sand at the west part of Cape Cod Harbor; the grass set by government, has stopped the sand at this place from blowing.

Know that Beach Point is gradually extending towards Province-

town, and the current is constantly cutting in on the Provincetown side, and carrying the sand into Cape Cod Harbor.

When the Massachusetts Commissioners were here in 1853, I went with them and sounded across from Long Point to the entrance of East Harbor; found the soundings the same as laid down on Major Graham's chart, until we came into two fathoms of water, when we found it shoaled somewhat. Did not sound the flats at the mouth of East Harbor any nearer the shore than the two fathom curve.

*Statement of Solomon Davis.*

Fifty-eight years of age; resided in Truro all my days. Cape Cod Harbor is of first importance in every point of view. Think there is reason to apprehend danger to it from certain causes. Know that there has been much change at Deep Hole, in East Harbor. Shore was formerly straight in this place, where is now a deep curve. Twenty-five years since was a high hill where Deep Hole now is. Carriages used to pass between hill and harbor, at this place, at high-water—now cannot pass there at any time of tide, hill is so abrupt. Have no doubt that the sand washed from this locality has been carried by the current, and deposited in Cape Cod Harbor. Truro seamen often remark, that the easterly side of Cape Cod Harbor is growing shallow. Know that great quantities of sand are blown into East Harbor, and find a resting place somewhere,—believe in Cape Cod Harbor. Think the bridge has had the effect to force the channel towards Provincetown; was often at this place during the past summer, and was surprised at strength of current, and its effect on the sand.

Think that the proper remedy is the erection of dyke from Beach Point to the opposite shore, in Provincetown. Am satisfied that this would protect the harbor at this place. Think that the bars at the mouth of East Harbor, would be carried by the action of the waves, up against the dyke, and eventually form a beach.

Know of no changes on Beach Point; was not acquainted with it prior to the erection of the bridge. Am not familiar with the beach at the Head of East Harbor meadow. Have no personal interest at East Harbor. Know of no objection to the construction of a dyke, unless from owners of the East Harbor marshes.

*Hiram J. Snow's Statement.*

Forty-nine years of age; resided in Provincetown eight years. Am keeper of Long Point Light; been keeper nine months. Run an accommodation stage from Provincetown to wellfleet, formerly.

Intimately acquainted with roads to Truro ; where Deep Hole road *was* eight years ago, the channel now *is*. Was a high hill at this place, which has reduced twenty feet by being blown into Deep Hole. This sand has all been carried into Cape Cod Harbor. Know that bars at east part of Cape Cod Harbor, are rising and extending into harbor. Know this to be the fact from personal observation. Tried to drive my horse across the flats, to Beach Point, a few years since, and failed ; more recently drove across easily. Was on beach at head of East Harbor, during gale when Minot's Ledge Light was destroyed ; water ran through into East Harbor for two hours. At this time, the tide did not overflow Beach Point ; could see whole length of it ; examined point carefully ; tide went across only at extreme point, next where bridge now is. Tendency of sand from East Harbor is outward into Cape Cod Harbor.

