MESSAGE

FROM

THE PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A report from the Secretary of War, in compliance with a resolution of the Senate, in relation to the military and naval defences of the country.

APRIL 27, 1840.

Read, and referred to the Committee on Military Affairs.

MAY 8, 1840.

Ordered to be printed, and the committee discharged.

To the Senate of the United States:

I transmit, herewith, a report and accompanying documents from the Secretary of War, which furnish the information, in relation to that portion of the defences of the country intrusted to the charge and direction of the Department of War, called for by the resolution of the Senate of the 2d of March, 1839.

M. VAN BUREN.

WASHINGTON CITY, *April* 24, 1840.

WAR DEPARTMENT, *April* 24, 1840.

SIR: On the 2d of March, 1839, the Senate "*Resolved*, That the President of the United States be requested to cause to be laid before the Senate, at the commencement of the next session of Congress, reports upon the military and naval defences of the country; showing—

"1st. The fortifications, or other permanent defences, commenced, completed, projected, or deemed necessary: 1. For the northern frontier, from Lake Superior to Passamaquoddy bay. 2. For the maritime frontier, from Passamaquoddy bay to Cape Florida. 3. The Gulf frontier, from Cape Florida to the Sabine bay. 4. The western frontier, from the Sabine bay to Lake Superior; with a conjectural estimate of the probable expense of constructing or completing such works as may not yet have been completed or commenced.

"2d. The state of the armament of the fortifications, so far as the same may be completed or commenced, with a conjectural estimate of the expense of completing the armament of all the forts which may be commenced, or deemed necessary to be constructed.

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"3d. The armories, arsenals, magazines, and foundries, either constructed or deemed necessary; with a conjectural estimate of the expense of constructing such of said establishments as may not yet be completed or commenced, but which may be deemed necessary.

"4th. The floating or steam batteries, or vessels which have been constructed in aid of fortifications, or may be deemed necessary to be constructed in aid of such works, with a conjectural estimate of the expense which the same may require.

"5th. The ships of war built, or under construction, or deemed necessary to be built, with a conjectural estimate of the expense of building and arming the vessels not yet completed or commenced, or which may be deemed necessary within a reasonable time.

"6th. The navy yards, docks, and naval establishments of every kind, either constructed or commenced, or deemed necessary, with the probable expense of completing the same.

"With any other information or suggestions which the President may deem necessary to be communicated to Congress, in order to exhibit a full view of what is necessary to be done, and the probable cost thereof, to place the United States in a proper state of defence by land and water, and on each of the four great lines of defence which her frontiers present."

This resolution having been referred by you to this department, with instructions to furnish the information required in relation to the matters under its jurisdiction and control, a board of able and experienced officers was appointed to take the whole subject into consideration, and to make a full and detailed report on the various points of inquiry involved. The report of that board I have now the honor to submit. The great inconvenience to the service which would have resulted from assembling, at an earlier period, the officers who composed the board, and the important interests embraced in the subjects submitted to them, have occasioned the delay which has occurred in furnishing the information called for by the resolution.

In presenting this report, I beg leave to state that I fully concur with the board, both as to the manner it is proposed to defend our maritime and inland frontiers, and in the selection of sites for the works of defence.

Very respectfully, your most obedient servant,

J. R. POINSETT.

To the PRESIDENT *of the United States.*

WASHINGTON, *April* 23, 1840.

SIR: The board of officers, to whom so much of the resolution of the Senate of the United States of the 2d of March, 1839, as relates to the military defences of the country, was committed, have the honor to submit the following reports, namely:

1st. *Report on the defence of the Atlantic frontier, from Passamaquoddy to the Sabine.*

This is divided into two distinct portions, viz: the coast from Passamaquoddy to Cape Florida; and the coast from Cape Florida to the Sabine bay.

2d. *Report on the defence of the northern frontier, from Lake Superior to Passamaquoddy bay.*

3d. *Report on the western frontier, from the Sabine bay to Lake Superior.*

Connected with these reports are tabular statements showing the "permanent defences commenced, completed, projected, or deemed necessary;" "with conjectural estimates of the probable expense of constructing or completing such works as may not yet have been completed or commenced."

4th. *Report on "the armories, arsenals, magazines, and foundries, either constructed or deemed necessary, with a conjectural estimate of the expense of constructing such of said establishments as may not yet be completed or commenced, but which may be deemed necessary."*

Hon. J. R. POINSETT,
Secretary of War.

REPORT

ON

THE DEFENCE OF THE ATLANTIC FRONTIER, FROM PASSAMAQUODDY TO THE SABINE.

So entirely does this board concur in the views presented on several occasions, within the last twenty years, by joint commissions of naval and military officers, by the board of engineers for fortifications, and by individual officers, who have at various times been called on to treat the same subject, that, in quoting their opinions, we should, for the greater part, express our own. But though these reports are, some of them, comprehensive and elaborate, we suppose that an explicit statement of our views, at least as to the great principles on which the system of defence should be erected, is expected from us; especially as the system now in progress has been the subject of a criticism which, considering the high official source whence it emanated, may be supposed to have disturbed the confidence of the public therein.

The nature and source of that criticism, attacking as it does fundamental principles, and inculcating doctrines which we believe to be highly dangerous, will lead us at times into amplifications that we fear may prove tedious; this, however, we must risk, trusting to the importance of the subject for excuse, if not for justification.

The principal errors, as we conceive, in the document * referred to, are—

1. That, for the defence of the coast, the chief reliance should be on the navy.

2. That, in preference to fortifications, floating batteries should be introduced wherever they can be used.

3. That we are not in danger from large expeditions; and, consequently,

4. That the system of the board of engineers comprises works which are unnecessarily large for the purposes they have to fulfil.

On these topics, together with other errors of the same nature, we shall feel constrained to enlarge.

The first question that presents itself is this: *What, in general terms, shall be the means of defence?*

We have a seacoast line of more than three thousand miles in extent, along which lie scattered all the great cities; all the depots of commerce; all the establishments of naval construction, outfit, and repair; and towns, villages, and establishments of private enterprise, without number. From this line of seacoast, navigable bays, estuaries, and rivers, the shores of which are similarly occupied, penetrate deep into the heart of the country.

How are the important points along this extended line to be secured from hostile expeditions, especially since one of the prominent causes of the prosperity of these various establishments, namely, facility of access from the ocean, is, as regards danger from an enemy, the chief cause of weakness?

Shall the defence be by a navy exclusively?

* See Senate document No. 293, p. 1, 24th Congress 1st session—vol. 4.

The opinion *that the navy is the true defence of the country* is so acceptable and popular, and is sustained by such high authority, that it demands a careful examination.

Before going into this examination, we will premise, that by the term "navy" is here meant, we suppose, line-of-battle ships, frigates, smaller sailing vessels, and armed steam-ships; omitting vessels constructed for local uses merely, such as floating batteries.

For the purpose of first considering this proposition in its simplest terms, we will begin by supposing the nation to possess but a single seaport, and that this is to be defended by a fleet alone.

By remaining constantly within this port, our fleet would be certain of meeting the enemy, should he assail it. But if inferior to the enemy, there would be no reason to look for a successful defence; and as there could be no escape for the defeated vessels, the presence of the fleet, instead of averting the issue, would only render it the more calamitous.

Should our fleet be equal to the enemy's, the defence might be complete, and it probably would be so. Still, hazard—some of the many mishaps liable to attend contests of this nature—might decide against us; and, in that event, the consequences would be even more disastrous than on the preceding supposition. In this case, the chances of victory to the two parties would be equal, but the consequences very unequal. It might be the enemy's fate to lose his whole fleet, but he could lose nothing more; while we, in a similar event, would lose, not only the whole fleet, but also the object that the fleet was designed to protect.

If superior to the enemy, the defence of the port would, in all respects, be complete. But, instead of making an attack, the enemy would, in such case, employ himself in cutting up our commerce on the ocean; and nothing could be done to protect this commerce, without leaving the port in a condition to be successfully assailed.

In either of the above cases, the fleet might await the enemy in front of the harbor, instead of lying within it. But no advantage is apparent from such an arrangement; and there would be superadded the risk of being injured by tempests, and thereby disqualified for the duty of defence, or of being driven off the coast by gales of wind; thus, for a time, removing all opposition.

In the same cases, also, especially when equal or superior to the enemy, our fleet, depending on having correct and timely notice as to the position and state of preparation of the enemy's forces, might think proper to meet him at the outlet of his own port, or intercept him on the way, instead of awaiting him within or off our own harbor. Here it must be noticed that the enemy, like ourselves, is supposed to possess a single harbor only; but, having protected it by other means, that his navy is disposable for offensive operations. If it were attempted thus to shut him within his own port, he, in any case but that of decided inferiority, would not hesitate to come out and risk a battle; because, if defeated, he could retire, under shelter of his defences, to refit; and, if successful, he could proceed with a small portion of his force—even a single vessel would suffice—to the capture of our port, now defenceless; while, with the remainder, he would follow up his advantage over our defeated vessels, not failing to pursue them into their harbor, should they return thither.

Actual superiority on our part would keep the enemy from volunteering a battle; but it would be indispensable that the superiority be steadily main-

tained, and that the superior fleet be constantly present. If driven off by tempests, or absent from any other cause, the blockaded fleet would escape, when it would be necessary for our fleet to fly back to the defence of its own port. Experience abundantly proves, moreover, that it is in vain to attempt to shut a hostile squadron in port, for any length of time. It seems, then, that whether we defend by remaining at home, or by shutting the enemy's fleet within his own harbor, actual superiority in vessels is indispensable to the security of our port.

With this superiority the defence will be complete, provided our fleet remain within its harbor. But then all the commerce of the country upon the ocean must be left to its fate; and no attempt can be made to react offensively upon the foe, unless we can control the chances of finding the enemy's fleet within his port, and the still more uncertain chance of keeping him there; the escape of a single vessel being sufficient to cause the loss of our harbor.

Let us next see what will be the state of the question on the supposition of numerous important ports on either side, instead of a single one; relying, on our part, still, exclusively on a navy.

In order to examine this question, we will suppose our adversary to b fortified in all his harbors, and possessed of available naval means equal to our own. This is certainly a fair supposition; because, what is assumed as regards his harbors, is true of all maritime nations, except the United States; and as regards naval means, it is elevating our own strength considerably above its present measure, and above that it is likely to attain for years.

Being thus relatively situated, the first difference that strikes us, is, that the enemy, believing all his ports to be safe, without the presence of his vessels, sets at once about making our seas and shores the theatre of operations, while we are left without choice in the matter; for, if he think proper to come, and we are not present, he attains his object without resistance.

The next difference is, that while the enemy (saving only the opposition of Providence) is certain to fall upon the single point, or the many points, he may have selected, there will exist no previous indications of his particular choice, and, consequently, no reason for preparing our defence on one point rather than another; so that the chances of not being present and ready on his arrival are directly in proportion to the number of our ports: that is to say, the greater the number of ports, the greater the chances that he will meet no opposition whatever.

Another difference is, that the enemy can choose the mode of warfare, as well as the plan of operations, leaving as little option to us in the one case as in the other. It will be necessary for us to act, in the first instance, on the supposition that an assault will be made with his entire fleet; because, should we act otherwise, his coming in that array would involve both fleet and coast in inevitable defeat and ruin. Being in this state of concentration, then, should the enemy have any apprehensions as to the result of a general engagement; should he be unwilling to put any thing at hazard; or should he, for any other reason, prefer acting by detachments, he can, on approaching the coast, disperse his force into small squadrons, and single ships, and make simultaneous attacks on numerous points. These enterprises would be speedily consummated; because, as the single point occupied by our fleet would be avoided, all the detachments would be unop-

posed; and, after a few hours devoted to burning shipping, or public establishments, and taking in spoil, the several expeditions would leave the coast for some convenient rendezvous, whence they might return, either in fleet or in detachments, to visit other portions with the scourge.

Is it insisted that our fleet might, notwithstanding, be so arranged as to meet these enterprises?

As it cannot be denied that the enemy may select his point of attack out of the whole extent of coast, where is the prescience that can indicate the spot? And if it cannot be foretold, how is that ubiquity to be imparted that shall always place our fleet in the path of the advancing foe? Suppose we attempt to cover the coast, by cruising in front of it; shall we sweep its whole length?—a distance scarcely less than that which the enemy must traverse in passing from his coast to ours. Must the Gulf of Mexico be swept, as well as the Atlantic? or shall we give up the Gulf to the enemy? Shall we cover the southern cities, or give them up also? We must, unquestionably, do one of two things: either relinquish a great extent of coast, confining our cruisers to a small portion only, or include so much, that the chances of intercepting an enemy would seem to be out of the question.

On the practicability of covering even a small extent of coast by cruising in front of it—or, in other words, the possibility of anticipating an enemy's operations; discovering the object of movements of which we get no glimpse, and hear no tidings; and seeing the impress of his footsteps on the surface of the ocean—it may be well to consult experience.

The Toulon fleet, in 1798, consisting of about twenty sail of line-of-battle ships and frigates, about twenty smaller vessels of war, and nearly two hundred transports, conveying the army of Egypt, slipped out of port and surprised Malta. It was followed by Nelson, who, thinking correctly that they were bound for Egypt, shaped his course direct for Alexandria.

The French, steering towards Candia, took the more circuitous passage, so that Nelson arrived at Alexandria before them; and, not finding them there, returned, by the way of Caramania and Candia, to Sicily, missing his adversary in both passages. Sailing again for Alexandria, he found the French fleet at anchor in Aboukir bay; and, attacking them, achieved the memorable victory of the Nile.

When we consider the narrowness of this sea; the very numerous vessels in the French fleet; the actual crossing of the two fleets on a certain night; and that Nelson, notwithstanding, could see nothing of the enemy himself, and hear nothing of them from merchant vessels, we may judge of the probability of waylaying our adversary on the broad Atlantic.

The escape of another Toulon fleet in 1805; the long search for them in the Mediterranean by the same able officer; the pursuit in the West Indies; their evasion of him amongst the islands; the return to Europe; his vain efforts, subsequently, along the coast of Portugal, in the Bay of Biscay, and off the English channel; and the meeting at last at Trafalgar—brought about only because the combined fleets, trusting to the superiority that the accession of several reinforcements had given, were willing to try the issue of battle: these are instances, of many that might be cited, to show how small is the probability of encountering, on the ocean, an enemy who desires to avoid a meeting; and how little the most untiring zeal, the most restless activity, the most exalted professional skill and judgment, can do to lessen the adverse chances. For more than a year Nelson most closely watched

his enemy, who seems to have got out of port as soon as he was fully prepared to do so, and without attracting the notice of any of the blockading squadron. When out, Nelson, perfectly in the dark as to the course Villeneuve had taken, sought for him in vain on the coast of Egypt. Scattered by tempests, the French fleet again took refuge in Toulon; whence it again put to sea, when refitted and ready, joining the Spanish fleet at Cadiz.

On the courage, skill, vigilance, and judgment, acceded on all hands to belong, in a pre eminent degree, to the naval profession in this country, this system of defence relies to accomplish, against a string of chances, objects of importance so great that not a doubt or misgiving as to the result is admissible. It demands of the navy to do perfectly, and without fail, that which to do at all seems impossible. The navy is required to know the secret purposes of the enemy, in spite of distance and the broken intercourse of a state of war, even before these purposes are known to the leader who is to execute them; nay, more, before the purpose itself is formed. On an element where man is but the sport of storms, the navy is required to lie in wait for the foe at the exact spot and moment, in spite of weather and seasons; to see him, in spite of fogs and darkness. Finally, after all the devices and reliances of the system are satisfactorily accomplished, and all difficulties subdued, it submits to the issue of a single battle, on equal terms, the fate of the war; having no resource or hope beyond.

It may here be alleged that the term *navy*, as applied to the defence of the country, means more than the sea-going vessels we have enumerated; that it means, also, gun-boats, floating batteries, and steam batteries; and that the true system of defence for the coast requires us to provide all our harbors with some or all of these vessels, according to local circumstances; leaving to the sea-going vessels the duty of destroying the enemy's commerce, carrying the war into the enemy's seas, and contending for the mastery of the ocean.

But such a proposition is totally distinct from that we have been considering. This is one that we regard as, in part, perfectly sound; as containing, though not true throughout, the great principle on which the present glory of the navy proper has been built, and its future glory will depend.

We are aware that some of our ships have been blockaded within our harbors, but we are not aware that any of the high distinction achieved by that service has been gained in these blockaded ships.

On the other hand, we know that, instead of lying in harbor and contenting themselves with keeping a few more of the enemy's vessels in watch over them than their own number—instead of leaving the enemy's commerce in undisturbed enjoyment of the sea, and our own commerce without countenance or aid—they scattered themselves over the wide surface of the ocean, penetrated to the most remote seas, everywhere acting with the most brilliant success against the enemy's navigation. And we believe, moreover, that in the amount of enemy's property thus destroyed, of American property protected or recovered, and in the number of hostile ships kept in pursuit of our scattered vessels—ships, evaded if superior, and beaten if equal—they rendered benefits a thousand fold greater, to say nothing of the glory they acquired for the nation, and the character they imparted to it, than any that would have resulted from a state of passiveness within the harbors.

Confident that this is the true policy as regards the employment of the navy proper, we doubt not that it will, in the future, be acted on as it has been in the past; and that the results, as regards both honor and advantage, will be expanded commensurately with its own enlargement.

In order, however, that the navy may always assume and maintain that active and energetic deportment in offensive operations, which is at the same time so consistent with its functions and so consonant with its spirit, we have shown that it must not be occupied with mere coast defence.

But if the navy is to be relieved from this home duty, some other reliance must be substituted; the navy itself requiring, for its own establishments, not less than the towns and harbors, that the defence be complete. And this brings us to consider whether the floating defences mentioned above, namely, gun-boats, floating batteries, and steam batteries, constitute the best reliance.

After considering these defensive means, we will examine the properties of forts and land batteries, these being the only other well-tried resort; and, that a comparison may be instituted, we will confine ourselves to cases where the latter are properly applicable.

There are, doubtless, situations where it may be necessary for us to present a defensive array, at the same time that to do so by fortifications alone would be impracticable; and it is not, therefore, prejudging the question we are about to examine: it is neither underrating fortifications, nor overrating these floating defences, to say that these last are, some or all of them, indispensable in such positions.

Any very broad water, where deep soundings may be carried at a distance from the shores greater than effective gun-range, and where no insular spot, natural or artificial, can be found or formed nearer the track of ships, will present such a situation; and we may take some of our great bays as examples.

Broad sounds, and wide roadsteads, affording secure anchorage beyond good gun-range from the shores, will afford examples of another sort; and harbors with very wide entrances, and large surface, exhibit examples of still another kind.

As, in all such cases, fortifications alone will be ineffectual, and, nevertheless, recourse to defences of some sort may be unavoidable, it has not failed to be a recommendation in the several reports on the defence of the coast, since 1818, that there should be a suitable and timely provision of appropriate floating defences. And until the invention of man shall have caused an entire revolution in the nature of maritime attack and defence, these or kindred means must be resorted to; not, however, because they are means intrinsically good, or suitable under other circumstances, but because they are the only means applicable.

In the circumstances just referred to, there is no alternative, and therefore no point to be discussed. The remaining question is, whether these floating defences are to be relied on in cases that admit of defence by fortifications.

And, first, as to gun-boats. Although of undoubted use in peculiar circumstances, it will hardly contended that gun-boats afford a safe reliance in harbors that can be entered by vessels of magnitude. Ships becalmed, or aground, might be sorely harassed, if not destroyed, by a spirited attack from this force; and there are other situations wherein it would be very effective. But harbors defended by gun-boats will not be attacked in calms,

nor with adverse winds; and it is not easy to believe that any probable array of these craft would impede or hinder for a moment the advance of a hostile fleet. Nelson, at Trafalgar, bore down in two divisions upon the combined fleet, each division being exposed to a raking fire; and, although suffering considerably from that fire, he was able, notwithstanding, to break the hostile line and defeat his superior adversary. What, comparatively with the raking fire of the combined fleet, would be the fire of a fleet of gun-boats? Opposing no effectual obstacle to approach or entrance, these small vessels, scattered and driven upon the shoals, would be kept, by the broad-sides of a few active vessels, at too great a distance to produce any serious effect upon the main attack, by their desultory fire.

Although they might afford useful means of annoyance during a protracted occupation by the enemy of harbors that contained extensive shoal grounds and shallow bays and inlets, they would be nearly useless in resisting the first assault, and in preventing the brief operation of levying contributions, or burning or spoiling national establishments.

The true reason of this feeble defence must not, however, be misunderstood. It is not that the boats do not carry guns enough, or men enough, for the object; but it is because, from the comparative weakness of the vessels, the guns and the men cannot be kept in an effective position.

There are, moreover, many harbors requiring defence, in which there are no shoals whereon these boats could take refuge; and in such, their capture or destruction would be inevitable, should there be, at the same time, no river up which they might fly, or lateral issue through which they could escape, to a safe distance.

Floating batteries, of which good use might be sometimes made in peculiar situations, would, we suppose, differ from gun boats, in being larger; containing many guns; and in being stronger—that is to say, having thicker sides or bulwarks; and it has sometimes even been proposed to construct them with ball proof parapets, and with platforms open above; like, in these respects, batteries upon the shore. But, in whatever way formed, it is necessarily a part of the idea that they be strong and massive; and, consequently, that they be unwieldy, incapable of sudden change of place, and incapacitated either to advance upon a defeated foe, or to evade a victorious one. We are not, of course, now speaking of batteries moved by steam.

Being denied the power of locomotion, at least for any purpose of manœuvering in face of the enemy, we are to consider these batteries as moored in position, and awaiting his advance. Should the batteries be large, requiring deep water to float them; or should they be placed across or near the channel, for the sake of proximity to the track of ships; the enemy would engage them at close quarters. All advantages of mobility—of concentrating his whole fleet upon one or two points, to which, under these circumstances, no relief can be sent—of greater elevation and command, would be on the side of the assailant; with no countervailing advantage to the batteries, but greater thickness of bulwarks. Whether this excess of thickness should be considered a material advantage, since the introduction of large bomb cannon into the armament of ships, is a doubtful matter. The batteries, if anchored across the channel, would have the further advantage of a raking fire; but we have seen that the raking fire of one squadron of ships upon another advancing is by no means decisive. The power of throwing the whole assailing force upon one or two points,

of pouring upon the decks of the batteries a greatly superior force of boarders, would, of themselves, seem to leave little room to doubt as to the issue.

If, now, we suppose these floating batteries to be smaller, so that, having a lighter draught, they might be placed near the shores, or upon the shoals, they might certainly be thereby saved from the kind of attack which would prove so fatal if anchored more boldly in deep water; but they would, at the same time, lose much of their efficiency, from their remoteness; and positions, wherein they would be secure from being laid alongside, while they would be in a proper attitude to contribute materially to the defence of the harbor, are afforded but rarely. It is doubtful whether, as a general rule, these smaller floating batteries, notwithstanding their greater capability of endurance, would afford a better defence, gun for gun, than gun-boats; or, in other words, whether this capability of endurance in the one, would be more than a compensation for the power of locomotion in the other.

But, whether near the shore or in the channel, whether large or small, this description of defence, owing to its fixedness, connected with the destructibility of the material of which it must be made, will be exposed to attacks analogous to those made by gun-boats on ships aground. The enemy, knowing of what the defensive arrangements consist, will come provided with the requisite number of sailing or steam vessels, armed with bomb-cannon, against which the thicker bulwarks of the floating batteries would avail nothing. He would, besides, hardly fail to provide himself with bomb-ketches armed with heavy sea-mortars; and, as there could be no guarding against the effects of the long ranges of these, a few such vessels would, with great certainty, constrain the floating batteries to quit their position, abandoning every disposition approaching to a concentrated array. Not to mention other modes of attack, which would seem to leave the chances of success with the enemy, it will be noticed that this kind of defence, whether by gun-boats or floating batteries, has the same intrinsic fault that an inactive defence by the navy proper has; that is to say, the enemy has it in his power to bring to the attack a force of the same nature, and at least as efficacious, as that relied on for defence: hence the necessity not of mere equality, but of *superiority*, on the part of the defence, at every point liable to be attacked; and hence, also, the necessity of having an aggregate force as many times larger than that disposable by the enemy as we have important places to guard. Should we, for example, have ten such places, and the enemy threaten us with twenty ships of the line, we must have, in all these places, an aggregate of gun-boats and floating batteries more than equivalent to two hundred ships of the line; for, it will hardly be contended that these defences can be transported from one place to another, as they may be respectively in danger.

But what will be the relative state of the parties, if, instead of gun-boats or floating batteries, we resort to steam batteries? Although much has been said, of late, of the great advantage that defence is to derive from this description of force, we have not been able to discover the advantages; nor do we see that seacoast defence has been benefited, in any particular, by the recent improvement in steam-vessels, except that, in the case before adverted to, where, from the breadth of the waters, defence from the shore would be unavailing, a more active and formidable floating defence than by gun-boats and floating batteries is provided. It must be remembered that by far the greatest improvement in steam-vessels consists in having adapted them to ocean navigation; and one inevitable consequence of this

improvement will be, that, if the defence of harbors by steam batteries be regarded as securing them from the attacks of ships of the line and frigates, or, at least, of placing the defence quite above that kind of attack, they will no longer be attacked by sailing vessels, but by steam vessels, similar, in all warlike properties, to those relied on for defence.

Not only is there no impediment to transferring these vessels across the ocean, but the rapidity and certainty of these transfers are such as to enjoin a state of the most perfect readiness everywhere and at all times; and, also, a complete independence of arrangement at each particular point—both the state of preparation, and the independence of arrangement, being much more important than when the enemy's motions were governed by the uncertain favor of winds and weather.

It is not easy to conceive of any important properties belonging to steam batteries acting defensively, that the attacking steam-vessels may not bring with them, or, at least, may not have imparted to them on their arrival upon the coast; unless it should be thought proper to give to the former a greater thickness of bulwark than would be admissible in sea going vessels.

But the peculiar advantage conferred by steam lies in the facility of moving with promptitude and rapidity; and any attempts to strengthen the harbor vessels, by thickening their bulwarks considerably, would unavoidably lessen their mobility, thereby partially neutralizing the advantage sought. At the same time, it is extremely doubtful whether any benefit would be derived from the thicker sides. It is probable that the best kind of bulwark for these vessels, and all others, is that which will be just proof against grape and canister shot fired from moderate distances; because, with such bulwarks, a shell fired from a bomb cannon within a reasonable distance would pierce both sides; that is to say, would go in on one side of the ship and out at the opposite, producing no greater effect than a solid shot of the same calibre; while, with thickened sides, every shell would lodge in the timbers, and produce terrible ravages by bursting.

In the practice with these missiles in this country, it has been found difficult to lodge a shell in thin targets, even when the load of the gun was so reduced as to increase materially the uncertainty of aim. As it is probable, therefore, that the protection from solid shot afforded by massive bulwarks would be more than counterbalanced by the greater injury horizontal shells would inflict by means of these bulwarks, we may conclude that the harbor steam-battery will not differ, in this respect, materially, from the attacking steamships; and, if they do differ in having more solid and impervious bulwarks, that no advantage over the enemy will result therefrom. We come, therefore, to the same result as when considering the application of the other kinds of floating force to the defence of harbors; and this result is, that there is no way of placing the coast in a condition of reasonable security but by having, at any point the enemy may happen to select, a force in perfect readiness which shall be superior to that brought to the attack.

The reason of this coincidence of result is, that no peculiarity in form or details can disguise the difficulties, or essentially modify the conditions, inseparable from the nature of a floating force.

Buoyancy is a condition necessary to every variety of the force; and, to observe this condition, a common material must be used in each—a material that is combustible, weak, and penetrable to missiles. If the weakness and penetrability be, in part, remedied by an increase of the quantity of the material, it must be at the sacrifice of buoyancy, activity, and speed—proper-

ties of great value. If a small draught of water be desired, it can only be obtained at the expense of that concentration of power which is a great and almost characteristic quality of naval armament.

It might not be strictly true to say that as much would be lost in one respect as would be gained in another; but, though modifications of this floating force, made with a view to adapt it to peculiar services, will somewhat disturb the equilibrium of the several kinds, there will still be no great disparity when acting in their appropriate way; and a little superadded force to the weaker party will restore the balance. None of these modifications, it should be observed, touch, on the one hand, the means whereby injury is inflicted; nor, on the other, the susceptibility to injury: all are still timber structures, carrying a common armament.

The necessity of having at each point a force at least equal to the attacking force, will require large preparations, on any supposition. With the navy proper, however, with gun-boats and floating batteries, something has already been done: the existing navy will be an important contribution. Small vessels supplied by commerce would afford tolerable substitutes for gun-boats; and from the class of merchant ships many vessels might be drawn for service as floating batteries: still there will remain great efforts to be made, and great amounts to be expended, to complete the defensive array. But a reliance on steam batteries would lead to expenditure vastly greater, because, with them, all has yet to be provided. Having at present no force of this kind on hand, (or next to none,) the preparation by the enemy of (say) twenty steam frigates would require the construction of two hundred, of equal force, on our part, supposing that we design to cover but ten of our principal harbors, leaving all others at his mercy.

Having shown that steam batteries cannot be substituted for shore defences, we will here add that they will, on the other hand, in certain cases, necessarily increase the number of these defences, and, in other cases, augment their force. Channels which admitted only small vessels of war, would, in peculiar positions, need no defence; in other positions, their defence might be safely trusted to works of moderate force. The introduction of these vessels of small draught and great power requires, however, that these passages should be defended, and defended adequately.

We should not have gone so much at length into a branch of our subject, wherein the general conclusions appear to be so obvious and incontrovertible, but for the prevalence of opinions which we consider, not erroneous merely, but highly dangerous, and which, we think, must give way before a full exhibition of the truth. We do not anticipate any formidable objections to the positions assumed, nor to the illustrations; but, even should all these, in the form we have presented them, be objected to, we may still challenge opposition to the following broad propositions, namely:

1st. If the seacoast is to be defended by naval means exclusively, the defensive force at each point deemed worthy of protection must be, at least, equal *in power* to the attacking force.

2d. As, from the nature of the case, there can be no reason for expecting an attack on one of these points rather than on another, and no time for transferring our state of preparation from one to another, after an attack has been declared, each of them must have assigned to it the requisite means; and,

3d. Consequently, this system demands a power in the defence as many times greater than that in the attack as there are points to be covered.

Believing that a well-digested system of fortifications will save the country from the danger attending every form of defence by naval means, and the intolerable expense of a full provision of those means, we will now endeavor to show that such a system is worthy of all reliance.

There has been but one practice among nations, as to the defence of ports and harbors; and that has been a resort to fortifications. All the experience that history exhibits is on one side only: it is the opposition of forts, or other works comprehended by the term *fortification*, to attacks by vessels; and, although history affords some instances wherein this defence has not availed, we see that the resort is still the same. No nation omits covering the exposed points upon her seaboard with fortifications, nor hesitates in confiding in them.

In opposition to this mode of defence, much stress is laid on certain successful attacks that have been made by ships on works deemed strong. We have no doubt that all such results might be accounted for by circumstances independent of the naked question of relative strength; but, at any rate, when carefully considered, how little do these results prove, in comparison with numerous other instances, in which there was an immense disparity of force in favor of vessels that have been signally defeated. These latter instances are those that should be received as a test of the actual relation between the two kinds of force; not, certainly, because they were successful, but because the smaller the work, its armament, its garrison, the less the probability that any extraneous influence has been in operation. A single gun behind a parapet, provided its position be a fair one, and the parapet be proof, need, as regards its contest with ships, owe nothing else to the art of fortification; and its effect will be the same whether the battery were fresh from the hands of the ablest engineer of the age, or were erected at the dawn of the art. The gun is in a position to be used with effect; the men are as fully protected by the parapet as the service of the gun will allow; they are brave and skilful, and there is nothing to prevent their doing their duty to the utmost. These are all conditions easily fulfilled, and, therefore, likely to be so. The state of things is not less just and fair toward the vessel: she chooses her time and opportunity; the battery goes not to the ship, but the ship to the battery; taking the wind, the tide, the sea—all, as she would have them; her condition and discipline are perfect, and her crew courageous and adroit. Nothing, under such circumstances, can prevent the just issue of battle, but some extraordinary accident—possible, indeed, to either party, but easily recognised when occurring.

The contest between larger works and heavy squadrons may be much more complicated affairs; the cause of disaster to the former being often traceable to potent, though not always obvious, influences. The fortifications may have been absurdly planned originally, or badly executed; for there has at all times been in this profession, as in others, much scope given to quackery—they may have been erected at a time when the ships of war, against which they were provided, were very different things from the lofty line-of-battle ships of modern times—a long peace, or long impunity, may have left them in a state wholly unprepared for the sudden use of their strength—the command may have been intrusted to persons ignorant alike of the amount of power in their hands, and of the mode of exercising it—the garrison may have been undisciplined or mutinous—the populace discontented or disloyal—the clamor of frightened citizens may have caused a premature surrender: all these, or any of them, may have produced the issue, leaving the question of relative power untouched.

While there can be no doubt that these and other deteriorating influences may have occasionally operated to the prejudice of fortifications, and that these were likely to be more numerous and more controlling as the works were more extensive, it is certain that there can be no influence acting in a reverse direction upon them; that is to say, none making them stronger and more efficient than they ought to be. There can be no favorable influence of such a nature, for example, as to make the simple one-gun battery before mentioned equivalent to a battery (say) ten times as large.

It must not be supposed, from what we have said in relation to larger fortifications, that their magnitude necessarily involves imperfection or weakness; nor, because we have considered small and simple works as affording the best solution to the question of relative force, must it be inferred that small works are suited to all circumstances. We speak here in reference merely to the judgment we are entitled to form of the relative power of these antagonist forces, from their contests, as exhibited in history. In instances of the latter sort, there cannot, from the nature of the case, be any important influence operating, of which we are ignorant, or for which we cannot make due allowances; while, in examples of the former kind, we may be in the dark as to many vital matters.

These observations have been deemed necessary, because, in judging of this matter, it might not be so obvious that certain brilliant and striking results should not be adopted as affording the true test of relative power. It would be more natural to turn to Copenhagen and Algiers, as indicating where the power lies, than to Charleston and Stonington; and yet these latter, as indices, would be true, and the former false.

We will now turn to certain examples:

"The name of Martello tower was adopted in consequence of the good defence made by a small round tower in the Bay of Martello, in Corsica, in the year 1794, which, although armed with one heavy gun only, beat off one or two British ships of war, without sustaining any material injury from their fire. But this circumstance ought merely to have proved the superiority which guns on shore must always, in certain situations, possess over those of shipping, no matter whether the former are mounted on a tower or not. That this is a just decision, will perhaps be readily allowed by all who are acquainted with the following equally remarkable, but less generally known fact, which occurred about twelve years afterwards, in the same part of the world." *

"Sir Sidney Smith, in the Pompée, an eighty gun ship, the Hydra, of thirty-eight guns, Captain Manby, and another frigate, anchored about eight hundred yards from a battery of two guns, situated on the extremity of Cape Licosa, and protected from assault by a tower in which were five-and twenty French soldiers, commanded by a lieutenant.

"The line of battle ship and the frigates fired successive broadsides till their ammunition was nearly expended; the battery continually replying with a slow but destructive effect. The Pompée, at which ship alone it directed its fire, had forty shot in her hull; her mizen topmast carried away; a lieutenant, midshipman, and five men killed, and thirty men wounded. At length, force proving ineffectual, negotiation was resorted to, and, after some hours parley, the officer, a Corsican, and relative of Napoleon, capitulated. It then appeared that the carriage of one of the two guns had failed

* Pasley's Course, vol. iii.

on the second shot, and the gun had subsequently been fired lying on the sill of the embrasure: so that, in fact, the attack of an eighty-gun ship and two frigates had been resisted by a single piece of ordnance." (Journal of Sieges, by Col. John T. Jones.)

"The Corsican tower above mentioned, which had, in like manner, completely baffled a naval cannonade, was very soon found to surrender when attacked by land; not, however, before a small battery had been made [erected] to reduce it." (*Pasley's Course*, vol. iii.)

Here are two examples:

1st. A single heavy gun, mounted on a tower, beat off one or two British ships.

2d. A barbette battery, containing two guns, beat off a British eighty-gun ship, supported by two frigates.

It would seem that no exception can possibly be taken to either instance, as trials of relative power. There is no complication of circumstances on one side or the other; nothing to confuse or mislead; all is perfectly simple and plain. A small body of artillery, judiciously posted on the shore, is attacked by armed vessels bearing forty or fifty times as many guns; and the ships, unable to produce any effect of consequence, are beaten off with loss.

The cases present no peculiar advantage on the side of the batteries, either as regards position or quality; for both works were immediately reduced by a land attack; that which the eighty-gun ship and two frigates were unable to effect, being immediately accomplished by landing two field-pieces, with a very small portion of the crew of one of the vessels.

On the other hand, there was no peculiar disadvantage on the part of the ships, as the time and mode of attack were of their own choice.

In order that there might be no unjust disparagement of the vessels, in the manner of representing the affairs, the language of British military writers (the ships being British) has been exactly quoted. (See Pasley's Course of Elementary Fortifications, vol. iii; and Journal of Sieges, by Colonel John T. Jones.)

Had the representation of these actions been taken from the victorious party, the result would have appeared still more to the disadvantage of the ships.

The circumstances attending the attack and defence of Copenhagen, in April, 1801, seem to have been the following:

On the northeast side of the city, (the only side exposed to attack from heavy ships,) there lies a shoal spreading outward from the walls, about three-quarters of a mile in the narrowest part. Through this shoal there runs, in a northeast-and-by-north direction, a narrow channel, connecting the basin, in the heart of the city, with deep water. Were it not for this shoal, vessels might approach even to the walls of the city, on a length of about one and a half mile; as it is, they can get no nearer, in any place, than about three-quarters of a mile, without following the channel just mentioned. As the edge of the shoal lies nearly north and south, and the channel passes through it in a northeast-by-north direction, the great mass of the shoal is to the southward, or on the right-hand side of the channel. We will call this the southern shoal. The "Three-crown battery" is situated upon this southern shoal, and near the channel.

The Danish defences consisted—

1st. Of the fortifications on this side of the city, including the Three-crown battery, Nelson estimated the batteries supporting the Danish vessels at about ninety guns.

2d. Of four sail of the line, mounting 282 guns, and one frigate and two sloops, mounting 76 guns; making 358 guns. All these vessels lying in the channel before mentioned, and some of them near its mouth; they constituted the left of the Danish floating defences, and were thus posted to defend the entrance to the inner harbor or basin.

3d. Of a line of floating defences, of various kinds, moored near the edge of the southern shoal. They were eighteen in number, as follows, counting from the right or southern extremity: 1st, a block ship of 56 guns; 2d, a block-ship of 48 guns; 3d, a praam of 20 guns; 4th, a praam of 20 guns; 5th, a block-ship of 48 guns; 6th, a raft of 20 guns; 7th, a block-ship of 22 guns; 8th, a raft of 20 guns; 9th, a block-ship of 62 guns; 10th, a small vessel of 6 guns; 11th, a raft of 24 guns; 12th, a praam of 20 guns; 13th, a ship of the line of 74 guns; 14th, a block-ship of 26 guns; 15th, a raft of 18 guns; 16th, a ship of the line of 60 guns; 17th, a block-ship of 64 guns; 18th, a "frigate" of 20 guns: total in this line 628 guns. These vessels were moored in a line extending south from a point outside and a little to the southward of the Three-crown battery; and the part of the line nearest the walls was not less than three quarters of a mile distant.

Lord Nelson carried to the attack the Elephant, 74 guns; Defiance, 74; Monarch, 74; Bellona, 74; Edgar, 74; Russell, 74; Ganges, 74; Glutton, 54; Isis, 50; Agamemnon, 64; Polyphemus, 74; Ardent, 64; Amazon, 38; Desirée, 38; Blanche, 36; Alcmene, 32; Dart, 30; Arrow, 18; Cruiser, 18; Harpy, 18; Zephyr, 14; Otter, 14; Discovery, 16; Sulphur, 10; Hecla, 10; Explosion, 8; Zebra, 16; Terror, 10; Volcano, 8: making a total of 1,074 guns, besides a few in gun-boats. The Agamemnon did not get into action; which reduces the force employed to 1,010 guns. The Bellona and Russell grounded; but Lord Nelson says, "although not in the situation assigned them, yet they were so placed as to be of good service."

With this force Lord Nelson engaged the line of floating defences that was moored near the edge of the southern shoal. He approached from the south, with a fair wind; and as his leading vessel got abreast of the most southern of the Danish line, she anchored by the stern. The second English vessel passed on until she had reached the next position, when she anchored, also, in the same way; and thus, inverting his line as he extended it, he brought his whole force against the outer and southern part of the Danish force. His line did not reach as far northward as the Three-crown battery, and mouth of the channel; for he says, in speaking of the grounding of the Bellona, Russell, and Agamemnon: "These accidents prevented the extension of our line by the three ships before mentioned, who would, I am confident, have silenced the Crown islands, (Three-crown battery,) the outer ships in the harbor's mouth, and prevented the heavy loss in the Defiance and Monarch."

Concentrating, as he did, the force of 1,010 guns upon a portion of the Danish array, not only inferior to him by 382 guns, but so situated as to be beyond the scope of succor, and without a chance of escape, Lord Nelson had no reason to doubt that signal success would crown his able arrangement. Every vessel in this outer Danish line was taken or destroyed,

except one or two smaller vessels, which cut and ran in under shelter of the fortifications.

The vessels lying in the narrow channel could participate in no material degree, in the action, because the British line did not reach abreast of them; and because, not being advanced beyond the general direction of the Danish line, but, on the contrary, retired behind it, they could not act upon any of the British vessels—except, perhaps, obliquely upon two or three of the most northern ships. But, had all the Danish vessels that were lying in the narrow channel been mingled, from the first, with the line that was destroyed, the result would probably have been still more to the advantage of the assailants: that is to say, these vessels, also, would have been captured or destroyed; because, not only would the aggregate Danish force of 986 guns have been inferior to the 1,010 guns of the British, but it would, also, have been without the ability to counteract the power of concentration possessed by the latter, whereby the whole force would have acted on parts of the Danish line in succession.

For the same reason that the squadron which lay in the narrow channel could not materially aid in resisting the attack made on the line of floating defences anchored along the edge of the shoal, the action of the Three-crown battery, and the guns on the shore, must have been greatly restricted. Situated *upon the shoal*, the Three crown battery was *behind* the Danish line, which consequently masked it, and also the shore batteries, from a view of the English line. Under such circumstances, it is not conceivable that the batteries could be used with effect; and the commander of the Danish forces says, expressly, that the Three-crown battery "*did not come at all into action;*" and a chronicler of the times states that the fortifications of the town "*were of no service while the action lasted; they began to fire when the enemy took possession of the abandoned ships, but it was at the same time that the parley appeared.*" In proportion as the Danish vessels passed into the hands of the English, as some were burnt, and others blown up, the scope of the batteries would enlarge, and their power be felt; but, just as all impediment of this sort had been removed, Lord Nelson himself proposed the cessation of hostilities, and the action ceased. It might be profitable to discuss the probable consequences of a continuance of the action; to inquire why it was that Lord Nelson, after he had conquered two-thirds of the 986 floating guns opposed to him, did not pursue his advantage, and concentrate his 1,010 guns upon the 358 guns, which were all that remained of the floating defences of the Danes, especially as the wind was in favor of such a manœuvre. But having already devoted too much space to this particular contest, we will suppose some dictate of policy, perhaps of humanity, induced him to close the contest, relying on the severe blow he had already inflicted, and the commanding tone it enabled him to assume, for such a termination of the pending negotiation as the interest or policy of Great Britain demanded.

It is important, however, yet to notice, that, as soon as the negotiation opened, Lord Nelson's vessels passed out of the reach of the Three-crown battery, as fast as they could be withdrawn. Lord Nelson himself states that this battery was not silenced.

A British writer, speaking of this crisis, says: "It must not, however, be concealed that Lord Nelson, at the time he dictated this note to the Dane, was placed in rather awkward and difficult circumstances: the principal batteries, as well as the ships which were stationed at the mouth of the har-

bor, were still unconquered ; two of his own vessels were aground, and exposed to a heavy fire ; others, if the battle continued, might be exposed to a similar fate ; while he found it would be scarcely practicable to bring off the prizes under the fire of the batteries. These considerations, undoubtedly, influenced him in resolving to endeavor to put a stop to hostilities, in addition to the instructions he had to spare the Danes, and the respect he might have felt for their brave defence." (Campbell's Naval History, vol. vii, p. 203.)

The circumstances above detailed show, clearly—

1st. That the battle of Copenhagen was fought between an English fleet, mounting 1,010 guns, and a Danish line of floating defences, mounting 628 guns ; and that all the latter were conquered.

2d. That the Danish line was attacked in such a manner, that none of the fixed batteries in the system of defence could participate in the contest, which was carried on up to the surrender of the Danish line, almost exclusively between vessels. It appears that a few of the smaller vessels, under Captain Riou, occupying the northern extremity of the English line, were under the fire of the Three-crown battery. The loss being very severe, he was obliged to retreat.

3d. That, as soon as the batteries were unmasked and began to act, the battle was closed, by Lord Nelson opening a parley.

4th. That, consequently, it was in no sense a contest between ships and batteries, or a triumph of ships over batteries, and affords no ground for judging of their relative power.

5th. That it illustrates, strikingly, the advantage that a fleet possesses over a stationary line of floating defences. Lord Nelson was superior to the whole of his adversary's floating force ; but not being disposed to run any unnecessary hazard, he directed all his force upon a part of the Danish line, which was, of course, defeated ; and had there been no other than a floating force present, so, of course, would have been the remainder, had it been of twice the strength it was. This example fully confirms what we have before urged on this topic.

In estimating the respective forces above, we have set down the vessels of both parties at their rate : that is to say, a ship called a seventy-four, we have reckoned at 74 guns.

We now proceed to examine a great instance of naval success, in which there is no room to doubt the extent to which fortifications were engaged ; this instance is the attack on Algiers in 1816.

The attack was made by the combined English and Dutch fleets, mounting about one thousand guns, under the command of Lord Exmouth.

In the fortifications that looked towards the water, there are enumerated in a plan supposed to be authentic, 320 guns ; but not more than 200 of these could act upon the fleet as it lay. The ratio of the forces engaged, therefore, as expressed by the number of guns, (saying nothing of the calibres, of which we know nothing,) was about as 5 to 2. The action continued from a quarter before three until nine, without intermission, and did not cease altogether until half-past eleven.

It is very certain that the effects of the fire upon the Algerine shipping and town were very severe, because we know that all the shipping was destroyed, excepting some small vessels ; and we know, also, that Lord Exmouth dictated the terms of the treaty that followed.

Honorable as this result was to the combined fleets, and happy as it was for the cause of humanity, there are, nevertheless, technical circumstances connected with it, that excite doubts as to how much of the final result was due to physical chastisement, to moral effect, to inherent defects in the defences, and to ignorance in the use of these defences, such as they were. That the loss in killed and wounded in the city and works was great, is probable, because we are informed that a very great addition had been made to the garrison, in preparation for the attack, under some impression, no doubt, that a landing would be attempted. For the service of the guns there were needed but 3,000 or 4,000 men, at the utmost. An accumulation beyond that number would add nothing to the vigor of defence, while, by causing an increase of the casualties, it would heighten the terrors of the combat. The depressing effect of this loss of life in the batteries, and of the burning of buildings within the town, and about the mole, was of course increased by the entire destruction of the Algerine fleet, anchored within the mole.

We have no means of judging of the actual condition of the works; nor of their fitness for the task of contending with the heavy ships of modern times.

The forts and batteries on the shore were probably too elevated to be commanded even by the largest of the assailing ships; and, provided these guns were covered with a proof parapet, they may be regarded as being well situated.

But more than half of the guns engaged were in the Mole-head battery; and the mode of attack adopted, especially by the Queen Charlotte, of 110 guns, was calculated to test, in the severest manner, the principles on which this work had been planned. She so placed herself within "fifty yards" of the extremity of this battery, that she could either rake, or take in reverse, every part of it. If she, at the same time, commanded the battery—that is to say, if, from her spar-deck, she could look down upon its platform—then she must, at once, with her grape and canister, have driven the garrison from that platform, leaving only the lower and covered tier of guns, if there were such a tier, for service. With our imperfect knowledge of the fortifications, all this must, however, be left to conjecture.

But there are matters connected with the service of the batteries, which are not conjecture. Not a shot was fired until the Queen Charlotte had anchored.

What a different vessel, when she anchored, might not this ship have been, if the Mole-head battery had employed its fire of more than 100 guns in raking her, from the time she arrived within a mile and a half until she had anchored within fifty yards? How different might have been the condition of the fleet, generally, if they had been subjected, during the approach, and while assuming their stations, to the raking fire of all the 200 guns?

It does not appear that a single hot shot was fired from the batteries.

We might almost rest on this fact; and assert that a defence which had failed to provide itself with this auxiliary means, must have been carried on in disregard, if not in violation, of all rules, all knowledge, and all experience; that it was probably without plan or combination, and, not less probable, without preparation in other particulars of importance scarcely inferior.

Before leaving this example, it may be well to inquire what, after all, was the effect of these batteries upon the ships, compared with the effect of ships upon ships.

In the battle of the Nile, the French fleet, rated at 1,190 guns, caused a loss in Nelson's fleet of 895 killed and wounded; which is in the proportion of ten French guns to less than eight Englishmen killed and wounded. In the battle of Trafalgar the French fleet carried not less than 3,000 guns, and they caused a loss to the English of 1,587 killed and wounded; which is in the proportion of ten guns to less than six killed and wounded. In this affair of Algiers, with a force not exceeding 200 guns, the batteries caused a loss of 883 killed and wounded, being in the proportion of 10 guns to 44 men; and, if we take into account every gun that was pointed upon the bay, (say 350 guns,) the proportion will be 10 guns to 25 men; being an effect more than three times as great as that produced by the French ships at the battle of the Nile, and more than four times as great as that produced by the ships of the same nation at Trafalgar.

While reflecting on the circumstances of this battle, the mind is not satisfied with any reasons that present themselves for the withdrawal of Lord Exmouth, the moment the land wind enabled him to do so. On the supposition of entire success on his part, it is not understood why he should feel the great anxiety he states himself to have been under, that this wind should spring up. "Providence at this interval," (between 10 and 11 at night,) "gave to my anxious wishes the usual land wind, common in this bay; and my expections were completed. We were all hands employed warping and towing off, and, by the help of the light air, the whole were under sail, and came to anchor out of the reach of shells, about two in the morning, after twelve hours of incessant labor."

Now, if any thing had been decided by the action, it must have been one of two things: either the ships were victorious, or the batteries were so. If the ships were completely victorious, it would seem to have been judicious for them to remain where they were, in order, if there was to be any more fighting, to be ready to press their advantage; and, especially, in order to maintain the ascendency, by preventing the remounting of guns, repairing of batteries, and resupplying them with munitions, &c.

Had the people possessed the inflexibility report ascribed to the Dey, and had they set zealously about the work of preparation for a new contest, it might not have been easy for Lord Exmouth, in the condition to which his ships are acknowledged, by authentic accounts, to have been reduced, to enforce his demands. It is not understood, therefore, why, if he had been so successful as to be certain that his end was attained, he should be so anxious to get out of gunshot, when, by so doing, he involved the issue in more or less doubt and hazard.

He relied on the effects produced on the people by his dreadful cannonade, and the result proves that he was right; but his anxiety to clear the vessels from the contest shows that there was a power still unconquered, which he thought it better to leave to be restrained by the suffering population of the city, than keep in a state of exasperation and activity by his presence. What was this power, but an unsubdued energy in the batteries?

The true solution of the question is, then, not so much the amount of injury done on the one side or the other—particularly as there was, on the one side, a city to suffer, as well as the batteries—as the relative efficiency of the parties when the battle closed at about eleven o'clock. All political

agitation and popular clamor aside, what would have been the result had the fight been continued, or even had Lord Exmouth renewed it next morning?

These are questions that can be answered only on conjecture; but the manner the battle ended certainly leaves room for many doubts whether, had the subsequent demands of Lord Exmouth been rejected, he had it in his power to enforce them by his ships: whether, indeed, if he had renewed the fight, he would not have been signally defeated.

On the whole, we do not think that this battle, although it stands pre-eminent as an example of naval success over batteries, presents any arguments to shake the confidence which fortifications, well situated, well planned, and well fought, deserve, as the defences of a seaboard.

Gibraltar.

The attack on the water batteries of Gibraltar in September, 1782, by the French and Spanish floating batteries, is a well-known instance of the power of guns on shore.

These floating batteries had been rendered, as was supposed, shot-proof and shell-proof, by several additional thicknesses of timber to the sides, and by covering the decks with a roof of sloping timbers.

They mounted 142 guns on the engaged side, with 70 in reserve to replace any that might be dismounted. They were anchored at the distance of about 1,000 yards from the walls, and were opposed by about 85 guns.

After a protracted cannonade, nine of the floating batteries were burnt by hot shot from the shore; and the tenth, having been taken possession of by the victors, was set on fire by them.

No material injury was done to the works of the town by their fire; and only eighty-five men and officers were killed and wounded by the fire from these vessels, together with a very violent cannonade and bombardment from the siege batteries.

Battle of Algesiras.

On the 6th July, 1801, the French Admiral Lenois was lying at anchor off the town of Algesiras with two ships of 80 guns, one of 74 guns, and one frigate. To the south of him, on a small island, was a battery, called the Green-island battery, mounting seven 18 and 24-pounders; and, to the north of him, on the main, another battery, called St. Jaques's battery, mounting five 18-pounders. There were, besides, fourteen Spanish gun-boats anchored near: making a total of 306 guns afloat and 12 guns in battery—altogether, 318 guns.

Sir James Saumarez, hearing that Lenois was in this position, advanced against him from Cadiz with two ships of 80 guns, four of 74 guns, one frigate, and a lugger: in all, 502 guns. On his approach, Lenois, who was anchored in a line nearly north and south, at some distance from the shore, cut his cables and ran into shoal water, to prevent being doubled upon by the British line: this manœuvre, at the same time, entirely unmasked the fire of the batteries.

The Hannibal, one of the British 74's, in attempting to close with the French admiral, touched the ground, and could not be floated off. She, however, continued the fight with great obstinacy, even for a considerable time

after she was deserted by her consorts. Not being able to double upon the French line, an attempt was made to assault the Green-isle battery, which, being badly served by the Spaniards, had nearly ceased firing. But this attempt was anticipated by the arrival at the island of a party sent from the French frigate lying near; and the assault was defeated, with the loss to the English of one boat sunk and another taken: the Frenchmen renewing with vigor the fire of the battery. At the north end of the line, the French admiral was aided by seven gun-boats, which took so active a part in the fight that five of them were sunk or rendered unserviceable. The St. Jaques battery being, however, served sluggishly by the Spaniards, the French sent a party from the Dessaix to impart greater activity and effect.

After the combat had continued about six hours, the British squadron drew off, greatly damaged, leaving the Hannibal 74 alone and aground; and she, after suffering great loss, was obliged to strike. The French insist that the Pompée, an English ship of 80 guns, had struck her colors; but, as they could not take possession, she drifted off and was then towed away: it is believed she was entirely dismasted.

We do not know the loss in the French squadron, but the killed, wounded, and missing, in the English fleet, amounted to 375 men; being more than twelve men for every ten guns against them, and being twice as great, in proportion, as the English loss in the battle of Trafalgar.

In this battle of Algesiras, there were 502 English guns afloat, acting against 306 French guns afloat. As the English chose their own time for the attack, and had the wind, it is only reasonable to suppose that 306 of the English guns were a match for the 306 guns in the French vessels. This will leave 196 English guns afloat, opposed to the 12 guns in the batteries; or, reckoning one side only of each ship, it shows 98 guns in the British fleet to have been overmatched by the twelve guns in the batteries.

There never was a more signal and complete discomfiture; and it will admit of no other explanation than that just given, namely, that the two small batteries, one of 5 and the other of 7 guns, partly 18 and partly 24-pounders, more than compensated for the difference in favor of the British fleet of 196 guns.

The Hannibal got aground, it is true; but she continued to use her guns, with the best effect, until she surrendered; and, even on the supposition that this ship was useless after she grounded, the British had still an excess of 122 guns over the French fleet and batteries.

These batteries were well placed, and probably well planned and constructed, but there was nothing extraordinary about them; their condition before the fight was complained of by Admiral Lenois; and they were badly fought in the early part of the action: still the 12 guns on shore were found to be more than equivalent for two seventy-fours and one frigate.

Battle of Fuenterabia.

This recent affair introduces steam batteries to our notice.

On the 11th July, 1836, six armed steamers, together with two British and several Spanish gun-boats, attacked the little town of Fuenterabia. The place is surrounded only by an old wall; and two guns of small calibre, to which, on the evening of the attack, a third gun of larger calibre was added, formed the entire of its artillery. The squadron cannonaded this place

during a whole day, and effected absolutely nothing beyond unroofing and demolishing a few poor and paltry houses, not worth, perhaps, the ammunition wasted in the attack. What may have been the number of guns and weight of metal which the assailants brought, is unknown; though the superiority, independent of the superior weight of metal, must have been at least ten to one: but not the slightest military result was obtained. (See United Service Journal, August, 1836, page 531.)

We will now turn to affairs of a similar character on our own coast.

In June, 1776, Sir Peter Parker, commanding a squadron of two ships of 50 guns, four of 28 guns, two of 20 guns, and a bomb-ketch—in all (according to their rate) 252 guns—attacked Fort Moultrie, in Charleston harbor, South Carolina.

It is stated that the fort mounted "about thirty pieces of heavy artillery." Three of the smaller vessels were aground for a time during the action; and one of them could not be floated off, and was in consequence burnt by the English. Deducting this vessel as not contributing to the attack, and supposing that the other two were engaged but half the time, the English force may be estimated at 200 guns; or, reckoning one broadside only, at 100 guns against 30 guns.

The English were defeated with great loss of life, and injury to the vessels; while the fort suffered in no material degree, and lost but 30 men. The killed and wounded in the squadron were reported by the commodore to be 205; being for every 10 guns employed against them more than 68 men killed and wounded—a loss more than eleven times as great, in proportion to the opposing force, as the loss at the battle of Trafalgar.

In September, 1814, a squadron of small vessels, consisting of two ships and two brigs, mounting about 90 guns, attacked Fort Boyer, at the mouth of Mobile bay. A false attack was at the same time made by a party of marines, artillery, and Indians, on the land side. The fort was very small, and could not have mounted more than 20 guns on all sides, nor more than 15 guns on the water fronts. The action continued between two and three hours, when one of the ships, being so injured as to be unmanageable, drifted ashore under the guns, and was abandoned and burnt by the English; the other vessels retreated, after suffering severely. There were ten men killed and wounded in the fort; the loss on the other part is not known.

The affair of Stonington, during the last war, affords another instance of successful defence by a battery. In this case there were only two guns, (18-pounders,) in a battery which was only three feet high, and without embrasures. The battery, being manned exclusively by citizen volunteers from the town, repelled a persevering attack of a sloop of war, causing serious loss and damage, but suffering none.

The only other instance we will adduce is that of the late attack on the castle of St. Juan de Ulloa. Having before us a plan of this work, made on the spot, after the surrender, by a French engineer officer who was one of the expedition; having, also, his official account of the affair, as well as narratives by several eye-witnesses, we can fully understand the circumstances attending the operations, and are liable to no material errors.

On the 27th of November, 1838, Admiral Baudin anchored at the distance of about seven-eighths of a mile in a northeast direction from the castle, with the frigates La Néréide, of 52 guns, La Gloire, of 52 guns, and L'Iphigénie, of 60 guns; and, after being a short time in action, he was joined by La Créole, of 24 guns: in all 188 guns, according to the rate of

the ships. In a position nearly north from the castle, and at a distance of more than a mile, two bomb-ketches, carrying each two large mortars, were anchored. The wind being adverse, all the vessels were towed into position by two armed steamboats belonging to the squadron. "It was lucky for us," says the reporter, "that the Mexicans did not disturb this operation, which lasted near two hours, and that they permitted us to commence the fire." He further says: "We were exposed to the fire of one 24 pounder, five 16-pounders, seven 12-pounders, one 8-pounder, and five 18-pounder carronades: in all, 19 pieces *only*." In order the better to judge of these batteries, we will convert them, in proportion to the weight of balls, into 24-pounders; and we find these 19 guns equivalent to less than 12 guns of that calibre. But we must remark, that, although this simplifies the expression of force, it presents it greatly exaggerated; it represents, for example, three 8-pounders as equivalent to one 24-pounder; whereas, at the distance the parties were engaged (an efficient distance for a 24-pounder) the 8-pounders would be nearly harmless. It represents also the 18-pounder carronades as possessing each three-fourths the power of a long 24-pounder; whereas, at that distance, they would not be better than the 8-pounders, if so good. Although the above estimate of the force of the batteries is too great by full one-third, we will, nevertheless, let it stand as representing that force.

There were, then, twelve 24-pounders engaged against 94 guns (estimating for one broadside only of each ship) and 4 sea-mortars. During the action, a shell caused the magazine in the cavalier to explode, whereby three of the nineteen guns were destroyed, reducing the force to about ten 24 pounders.

Considering the manner in which this work was defended, it would not have been surprising if the ships had prevailed by mere dint of their guns; but our author states, expressly, that though the accident just mentioned completely extinguished the fire of the cavalier, still "the greater part of the other pieces which could see the ships, to the number of sixteen, continued to fire till the end of the action." They were not dismounted, therefore, and the loss of life at them could not have been great. What, then, was the cause of the surrender of the castle?

Much has been said of the great use, made by the ships, of horizontal shells, or shells fired at low angles, from large guns; and it is a prevailing idea that the work was torn to pieces, or greatly dilapidated, by these missiles. This engineer officer states that, on visiting the castle after the cannonade, he found "it had been more injured by the French balls and shells than he had expected; still the casemates in the curtains, serving as barracks for the troops, were intact." "Of 187 guns found in the fort, 102 were still serviceable; 29 only had been dismounted by the French fire. The heaviest injury was sustained by the cavalier" (where a magazine exploded) "in bastion No. 2; in battery No. 5," (where another magazine was blown up,) "and the officers' quarters." They found in the castle 25 men whose wounds were too severe to permit their removal with the rest of the garrison.

Of the 29 guns dismounted, 5 were thrown down with the cavalier; the remaining 24 guns were no doubt situated in parts of the work opposite to the attack, being pointed in other directions; and were struck by shots or shells that had passed over the walls facing the ships. There is reason to suppose that, of the remaining 16 guns pointed at the French, none were dismounted; and we know that most of them continued to fire till the end of the action.

The two explosions *may*, certainly, have been caused by shells fired at low angles from Paixhan guns. But it is much more likely they were caused by shells from the sea-mortars, because these last were much larger, and therefore more likely to break through the masonry; because, being fired at high angles, they would fall vertically upon the magazines, which were less protected on the top than on the sides; and because there were more of these large shells fired, than of the small ones, in the ratio of 302 to 117.

But, considering that the cannonade and bombardment lasted about six hours, and that 8,250 shot and shells were fired by the French, it is extraordinary that there were no more than two explosions of magazines, and that no greater injury was done the fort; since it is certain that there were no less than six other similar magazines situated on the rampart, in different parts of the work, not one of which was shell-proof. The surrender, after these explosions, was a very natural event, with a governor and garrison who seem to have known as little about the proper preparation for such contests as about the mode of conducting them. The second explosion must have satisfied them, if the first did not, that they had introduced within their own precincts much more formidable means of destruction than any it was in the power of the French to send from gun or mortar.

The important points to be noticed in this contest are these:

1st. The French took such a position that their 94 guns were opposed by the equivalent of 10 or 12 guns only.

2d. In proof of the inefficiency of the Mexican guns generally, it may be stated, that, although the three French frigates were struck in their hulls about three hundred times, they lost but thirty three men in killed and wounded. The Iphigénie was hulled 160 times, and yet had but thirteen men hurt; very few, therefore, of these 160 balls could have passed through her sides.

3d. It appears that very few, if any, of the guns exposed to the direct action of the French broadsides were dismounted or silenced by their fire.

4th. The narratives of the day contain exaggerated statements of injury inflicted on the walls by shells fired from guns; the professional report above quoted, of the chief engineer of the expedition, neither speaks of, nor alludes to, any such injury. After deducting from the parts of the work said to be most injured—the cavalier, and also battery No. 5, in each of which a magazine exploded—there remain, as having suffered most, the quarters of the officers and bastion No. 2. As to the first, if it was elevated above the walls, (as is probable) it would of course suffer severely; because the walls of mere barracks, or quarters, are never made of a thickness to resist shot or shells of any kind; and if not elevated above the walls, but covered by them, the injury resulted most probably from shells fired at high angles from the sea-mortars, and not from shells fired nearly horizontally from the Paixhan guns. Whether the injury sustained by bastion No. 2 was the effect of shot and shells upon the face of the walls, or of shells falling vertically within the bastion, is not stated; it was probably due in part to both. If there had been any extraordinary damage done by the horizontal shells, we may reasonably suppose special mention would have been made of it, because it was the first time that this missile had been tried, in a large way, in actual warfare. That any thing like a breach could have been effected with solid shot, at that distance, and in that time, we know to be impossible; but it is neither unreasonable to suppose, nor unlikely, that many of the heavy vertical shells may have fallen in the bastion and caused much injury. Whatever may

have been the cause of the damage, or its amount, it did not, we have reason to believe, extinguish the fire of any of the five 16-pounders that were pointed from the bastion against the ships.

5th. So far as effects were produced by the direct action of the French armament, whether guns, bomb-cannon, or sea-mortars, it does not appear that there was the slightest reason for the submission of the fort. There is little doubt that the 8,250 shot and shells fired at the castle must have greatly marred the surface of the walls; and it is not unlikely that three or four striking near each other may have made deep indentations—especially as the stone is soft, beyond any material applied to building in any part of the United States; but these are not injuries of material consequence, however they may appear to the inexperienced eye; and we should risk little in asserting, that, abstracting the effects of the explosion, the castle was as inaccessible to assault, after the cannonade, as before it; that, so far as regards the levelling of obstacles lying in the way of a sword in-hand attack, the 8,250 shot and shells might as well have been fired in the opposite direction.

6th. The explosion, however, of two deposites of powder in the castle, (one of which is reported to have buried sixty men in its ruins,) showed the defenders that, although they might evade the vertical fire, and their works might cover them from the horizontal fire, of the French, there was no protection against, no evasion of, the dreadful ravages of exploding magazines. With this ruin around them, and a six-fold greater ruin likely, at every moment, to burst upon their heads, it is not surprising that a garrison, found in circumstances so unmilitary, doubted their power of protracted resistance.

7th. It must be borne in mind that these explosions have nothing to do either with the question of relative strength, or with the peculiarities of the French attack. No defences, with such management, can be effective; and no attack can fail. The French, not dreaming of such culpable, such inconceivable negligence, on a point always receiving the most careful attention, entered upon the cannonade with no other purpose, as is avowed, than that of somewhat weakening the defences, and dispiriting and fatiguing the garrison, before proceeding to an assault which was to have followed at night, and for which all preparations had been made. Had the Mexicans thrown all the powder of these eight magazines into the sea, or had they transported it to their barracks, and every man, making a pillow of a keg, slept through the whole cannonade (as might have been done safely) in their quarters in the curtain casemates, the castle of St. Juan de Ulloa would, we doubt not, have been as competent to resist the projected assault, as it was when the French first arrived before it.

8th. The number of killed and wounded in the French vessels, in proportion to the guns acting against them, was, for ten guns, more than twenty-seven men—being upwards of four times as great as the loss sustained by the English at the battle of Trafalgar.

In concluding this reference to facts in military history, we will add, that we do not see how it is possible to avoid making the following deduction, namely: that fixed batteries upon the shore are capable of resisting the attacks of ships, even when the armament of the latter is by far the most numerous and heavy.

There are several reasons for this capacity in batteries, of which the principal may be thus stated; and these reasons apply to vessels of every

size and every sort—to small or large—to vessels moved by wind or steam: The ship is everywhere equally vulnerable; and, large as is her hull, the men and the guns are very much concentrated within her: on the other hand, in the properly constructed battery, it is only the gun itself, a small part of the carriage, and now and then a head or an arm raised above the parapet, that can be hurt: the ratio of the exposed surfaces being not less than fifteen or twenty to one. Next, there is always more or less motion in the water, so that the ship gun, although it may have been pointed accurately at one moment, at the next will be thrown entirely away from the object, even when the motion in the vessel is too small to be otherwise noticed; whereas, in the battery, the gun will be fired just as it is pointed, and the motion of the ship will merely vary to the extent of a few inches, or at most two or three feet, the spot in which the shot is to be received. In the ship, there are, besides, many points exposed, that may be called vital points. By losing her rudder, or portions of her rigging or of her spars, she may become unmanageable, and unable to use her strength; she may receive shots under water, and be liable to sink; she may receive hot shot, and be set on fire; and these damages are in addition to those of having her guns dismounted, and her people killed, by the shot which pierce her sides and scatter splinters from her timbers; while the risks of the battery are confined to those mentioned above, namely, the risk that the gun, the carriage, or the men, may be struck. That the magazines should be exposed, as were those of the castle St. Juan de Ulloa, must never be anticipated as possible.

While on this part of our subject, it is proper to advert to the use of horizontal shells, or hollow shot, or Paixhan's shells, (as they are variously called;) it having been argued that the introduction of these missiles is seriously to impair the utility of fortifications as a defence of the seacoast.

We fully believe that the free use of these shells will have an influence of some importance on the relative force of ship and battery; but that influence must be the very reverse of such predictions. How are the batteries to be affected by them? It can be but in two ways: first, the ship gun having been pointed so as to strike a vital point—that is to say, a gun or a carriage—the shell may explode at the instant of contact. This explosion may possibly happen thus opportunely, but it would happen against all chances; and if happening, would probably do no more than add a few men to the list of killed and wounded. For reasons that will soon appear, it is to be doubted whether the probability of dismounting the gun would be so great as if the missile were a solid 32-pounder shot. Secondly, if it be not by dismounting the guns, or killing the garrison, the effects anticipated from these missiles must result from the injury they do the battery itself. Now we are perfectly informed, by military experience, as to the effects of these shells upon forts and batteries; for the shells are not new, although the guns may be so—the 8-inch and the 10 inch shells having always been supplied in abundance to every siege-train, and being perfectly understood, both as to their effects and the mode of using them.

Were it a thing easily done, the blowing away of the parapets of a work (a very desirable result to the attacking party) would be a common incident in the attacks of fortifications; but the history of attacks by land or water affords no such instance. The only practicable way yet discovered of demolishing a fortification, being by attaching a miner to the foot of the wall; or by dint of solid shot and heavy charges, fired unremittingly, during a long succession of hours upon the same part of the wall, in order not

only to break through it, but to break through it in such a manner that the weight and pressure of the incumbent mass may throw large portions of the wall prostrate. This, the shortest and best way of breaching a wall, requires, in the first place, perfect accuracy of direction; because the same number of shots, that, being distributed over the expanse of a wall, would merely peel off the face, would, if concentrated in a single deep cut, cause the wall to fall; and it requires, moreover, great power of penetration in the missile—the charge of a breaching gun being, for that reason, one-third greater than the common service charges. Now, the requisite precision of firing for this effect is wholly unattainable in vessels, whether the shot be solid or hollow; and if it were attainable, hollow shot would be entirely useless for the purpose, because *every one of them would break to pieces against the wall*, even when fired with a charge much less than the common service charge. This is no newly discovered fact; it is neither new nor doubtful. Every hollow shot thrown against the wall of fort or battery, if fired with a velocity affording any penetration, will unquestionably be broken into fragments by the shock.

After so much had been said about the effect of these shells upon the castle of St. Juan de Ulloa, it was deemed advisable, although the result of European experiments were perfectly well known, to repeat, in our own service, some trials touching this point. A target was therefore constructed, having one-third part of the length formed of granite, one-third of bricks, and the remaining third of free-stone. This was fired at by a Paixhan gun, and by a 32-pounder, from the distance of half a mile; and the anticipated results were obtained, namely:

1st. Whether it was the granite, the brick, or the free-stone, that was struck, the solid 32-pounder shot penetrated much deeper into the wall, and did much more damage, than the 8-inch hollow shot; and,

2d. These last broke against the wall in every instance that the charge of the gun was sufficient to give them any penetration.

The rupture of the shell may often cause the explosion of the powder it contains, because the shell, the burning fuse, and the powder, are all crushed up together; but the shell having no penetration, no greater injury will be done to the wall by the explosion than would be caused by the bursting of a shell that had been placed against it.

From all this, it appears, incontrovertibly, that, as regards the effects to be produced upon batteries by ships, solid shot are decidedly preferable to hollow shot; and the ship that, contemplating the destruction of batteries, should change any of her long 24 or 32-pounder guns for Paixhan guns, would certainly weaken her armament. Her best missiles, at ordinary distances, are solid shot; and, if she can get near, grape shot to fire into the embrasures and over the walls. The best shells against batteries are the sea-mortar shells, fired at high elevations; which, being of great weight, and falling from a great height, penetrate deeply, and, containing a considerable quantity of powder, cause material ravage by their explosion. Such shells, however, can only be fired by vessels appropriately fitted.

The use of these same hollow shot by batteries against vessels, is, however, an affair of different character. The shells do not break against timber; but, penetrating the bulwarks, they, in the first place, would do greater damage than hollow shot, by making a larger hole, and dispersing more splinters; and having, as shot, effected all this injury, they would then augment it, many fold, by exploding.

In all cases of close action between ship and battery, the shells will pass through the nearer side, and, if not arrested by some object on the deck, will probably lodge and explode in the farther side; causing, by the explosion, a much greater loss among the crew, and greater injury to the vessel, than by their mere transit across the vessel. As before suggested, the vessel would suffer less injury, were her sides made so thin as not to retain the shell, permitting it to pass through both sides, unless fired with a small velocity. It is not impossible that an extensive use of these horizontal shells may lead to a reduction in the thickness of ships' bulwarks.

In the facts quoted above, there is no illustration of the effects of hot shot, except in the case of Gibraltar. In that attack, the floating batteries were made proof against cold shot, and, as was thought by the constructor, proof against hot shot also: and so, indeed, for a time, it seemed. It was conceived that the hot shot, when buried deep in the closely jointed timbers, would scarcely communicate flame; and that it would not be difficult, by the use of the fire engines provided, to subdue so stifled a combustion.

By making these floating batteries impenetrable to shot, it was supposed they had been rendered equal, in perfectly smooth water, to land batteries, gun for gun; and so they might then have been, nearly, had the incombustibility of the latter been imparted to them. But, now, resistance to fire would not suffice; these floating batteries must either repel these horizontal shells from their bulwarks, or, if that be impossible, permit them to pass through both sides. Nothing can be better calculated to exhibit the tremendous effects of these shells, than a vessel so thick-sided as to stop every shell, allowing it to burst when surrounded by several feet of timber; and there can be no greater mistake than supposing that, by thickening the bulwarks of vessels of war, or fitting up steam batteries with shot-proof sides, the effects of land batteries are to be annulled, or in any material degree modified.

We will sum up this branch of our subject, with the remark, that the facts of history, and the practice of all warlike nations, are in perfect accordance with the conclusions of theory. The results that reason anticipated have occurred again and again. And so long as, on the one side, batteries are formed of earth and stone; and, on the other, ships are liable to be swallowed up by the element on which they float, or to be deprived of the means by which they move; so long as they can be penetrated by solid shot, set on fire or blown up by hot shot, or torn piecemeal by shells, the same results must, inevitably, be repeated at each succeeding trial.

But, after all, it may be urged that the general principle herein contended for, namely, the superiority of batteries in a contest with ships, might be admitted; and still it would remain to show that batteries constitute the kind of defence best adapted to our peculiar wants. This is true; and we will now proceed to consider, severally, the cases to which defence must be applied.

It may be well, however, first, to recall the general scope of the preceding argument. It has been contended that floating defences should not be relied on—not because they are actually incompetent to the duty, but because they cannot fulfil this duty unless provided in inordinate numbers, and at a boundless expense; and we have endeavored to show that this remark is generally true, whether the defensive fleet be made up of sea-going vessels, of floating batteries, or of steam batteries. We have next urged the point that properly planned and constructed batteries are an overmatch for ves-

sels of war, even when greatly inferior to them in armament—sustaining our opinion by many striking examples, and explaining satisfactorily the only instances that have cast any doubt on such contests. If the facts and reasonings we have presented do not convey the same strong convictions that sway our own minds, it must be because we have obscured rather than illustrated them; for it would seem to be impossible that facts could be more unexceptionable, or reasons more beyond the reach of cavil. However that may be, we now leave them to candid and dispassionate revisal, and proceed to examine the mode of applying these defences to our own coast.

It may be well to divide these into several distinct classes:

1. There will be all the smaller towns upon the coast, constituting a very numerous class.

At the same time that no one of these, of itself, would provoke an enterprise of magnitude, it is still necessary to guard each and all against the lesser attacks. A small vessel might suffice to guard against single vessels that would otherwise be tempted by facility to burn the shipping and exact a contribution; but something more than this is necessary, since the amount of temptation held out by a number of these towns would be apt to induce operations on a larger scale. It might often happen, moreover, that our own vessels of war would be constrained to take refuge in these harbors, and they should find cover from the pursuer.

Although the harbors of which we now speak afford every variety of form and dimension, there are few, or none, wherein one or two small forts and batteries cannot be so placed as to command all the water that a ship of war can lie in, as well as the channel by which she must enter. While the circumstances of no two of them are so nearly alike as not to modify the defences to be applied to them severally, all should fulfil certain common conditions, namely: the passage into the harbors should be strongly commanded; the enemy should find no place, after passing, wherein he would be safe from shot and shells; and the works should be inaccessible to sudden escalade—that is to say, a small garrison should be able to repel such an assault. With works answering to these conditions, and of degrees of strength in accordance with the value of their respective trusts, this class of harbors may be regarded as secure. We cannot, however, here avoid asking what would be the mode of defence, if purely naval, of these harbors? Suppose the circumstances are deemed to require the presence of a frigate, or a steam-frigate, or an equivalent in gun-boats; would not *two* hostile frigates, or two steam-frigates, infallibly arrive in quest? Could there be devised a system more certain to result in the capture of our vessels, and the submission of our towns?

2. Another class will consist of great establishments, such as large cities, naval depots, &c., situated in harbors not of too great extent to admit of good defence at the entrance, and also at every successive point; so that an enemy could find no spot within, in which he could safely prepare for operations ulterior to the mere forcing an entrance.

In this class are to be found objects that are, in every sense, of the highest value. On the one hand, accumulations of military and naval material, and structures for naval accommodation, that could not be replaced during a war, which are of indispensable necessity, and of great cost; and, on the other hand, the untold wealth of great cities. As these objects must be great in the eyes of the enemy—great for him to gain, and for us to lose—corresponding efforts on his part must be looked for, and guarded against. If

he come at all, it will be in power; and the preparations on our part must be commensurate.

The entrance to the harbor, and all the narrow passes within it, must be occupied with heavy batteries; and if nature does not afford all the positions deemed requisite, some must, if practicable, be formed artificially. Batteries should succeed each other along the channel, so that the enemy may nowhere find shelter from effective range of shot and shells while within the harbor, even should he succeed in passing the first batteries.

Provided the shores admit this disposition, and the defences be supplied with an armament, numerous, heavy, and selected with reference to the effects on shipping, the facts we have quoted from history show that these defences may be relied on.

If the mere passing under sail, with a leading wind and tide, one, or even two sets of batteries, and then carrying on operations out of the reach of these, or any other, were all, the enemy might perhaps accomplish it; but our present supposition is, that with this class his ulterior proceedings, and finally his return, are to be subject to the incessant action of the defences.

3. This brings us to consider a third class, consisting of establishments of importance situated at a distance up some river or bay, there being intermediate space too wide to be commanded from the shores. In such cases the defence must be concentrated upon the narrow passes, and must, of course, be apportioned in armament to the value of the objects covered. When the value is not very great, a stout array of batteries at the best positions would deter an enemy from an attempt to force the passage, since his advantage, in case of success, would not be commensurate with any imminent risk. But with the more valuable establishments it might be otherwise; the consequence of success might justify all the risk to be encountered in rapidly passing in face of batteries, however powerful. This condition of things requires peculiar precautions, under any system of defence. If, after having occupied the shores, in the narrow places, in the best manner, with batteries, we are of opinion that the temptation may induce the enemy, notwithstanding, to run the gauntlet, the obstruction of the passage must be resorted to. By this is not meant the permanent obstruction of the passage; such a resort, besides the great expense, might entail the ruin of the channel. The obstruction is meant to be the temporary closing by heavy floating masses.

There is no doubt that a double line of rafts, each raft being of large size, and anchored with strong chains, would make it impossible to pass without first removing some of the obstructions, and it might clearly be made impossible to effect this removal under the fire of the batteries. Such obstructions need not be resorted to until the breaking out of a war, as they could then be speedily formed, should the preparation of the enemy be of a threatening nature.

There would be nothing in these obstructions inconsistent with our use of part of the channel, since two or three of the rafts might be kept out of line, ready to move into their places at an hour's notice.

The greatest danger to which these obstructions would be exposed would be from explosion vessels; and from these they might be protected by a boom, or a line of smaller rafts in front.

From what has just been said, it will be perceived that, when the inducements are such as to bring the enemy forward in great power, and efficient batteries can be established only at certain points, we are not then to rely

on them exclusively. In such a case, the enemy should be stopped by some physical impediments; and the batteries must be strong enough to prevent his removing these impediments, and also to prevail in a cannonade, should the enemy undertake to silence the works.

The conditions these obstructions have to fulfil are these:

1st. They must be of a nature to be fixed readily, and to be speedily removed when there is no longer occasion for them; and, to this end, they must be afloat.

2d. They must have adequate inertia to resist, or rather not to be destroyed or displaced by, the shock of the heaviest ship; and, in order to this, they must be held by the heaviest and strongest cables and anchors.

3d. They must be secure from the effects of explosive vessels; and, if in danger from this source, must be covered as above mentioned.

We do not say what are the exact circumstances in which all these conditions will be fulfilled, though we think the idea long ago presented by the board of engineers will, with modifications, embrace them all.

The idea is this: Suppose a line (extending across the channel) of rafts, separated from each other by a space less than the breadth of a ship of war, each raft being about 90 feet long, 30 feet wide, and 6 feet deep, formed of strong timbers, crossed and braced in all directions, and fastened together in the strongest manner. A long-scope chain cable is to proceed from each of the four corners, two obliquely up stream, and two obliquely down stream, to very heavy anchors; and there should also be a very strong chain cable passing from one raft to another. Suppose a ship, striking one of the rafts, to break the chains leading down the stream: in doing this, she must lose much of her momentum. She has, then, "under her fore foot," the raft connected by a strong chain with the rafts to the right and left; on being tightened, this chain will throw the strain upon the down-stream cable of that adjoining raft towards which the ship happens to tend. If we suppose it possible for these chains also to be parted, by the power still remaining in the ship, or by impulses received from succeeding vessels, there will be other chains still to break in the same way. After the down-stream chains are all parted, the rafts will "bring up" in a new position, (higher up the channel,) by the anchors that, in the first instance, were pointed up stream. Here a resistance, precisely like that first overcome, is to be encountered by vessels that have lost most of their force in breaking the successive chains, and in pushing these great masses of timber before them through the water. Should there exist a doubt as to the sufficiency of these remaining anchors and chains, or should it be deemed most prudent to leave nothing uncertain, a second similar line may be placed a short distance above the first.

The best proportions and dimensions of the rafts remain to be determined; but as there is scarcely a limit to the strength that may be given to the rafts themselves, and to the means by which they are to be held to their positions and to each other, the success of a well-arranged obstruction of this sort can hardly be doubted.

The expense would not be great in the first instance, and all the materials would be available for other purposes, when no longer needed for this.

It may be repeated here, that such expedients need not be resorted to, except to cover objects of the highest importance and value, such as would induce an enemy to risk a large expedition. For objects of less importance, batteries would afford ample protection. It will be remembered that this last power is, when once established in any position, a constant quantity; and, although

it should be incompetent to effect decisive results when diffused over a large fleet, may be an overmatch for any small force upon which it should be concentrated. At the same time, therefore, that there is the less liability to heavy attacks, there will be, in the batteries, the greater capacity of resistance to others.

It must not be urged, as a reproach to fortifications, that, in the case we are considering, they are obliged to call in aid from other sources, so long as these aids are cheap, efficient, and of easy resort. By the mode we have suggested, the defence will undoubtedly be complete, every chance of success being on the side of the defence; that is to say, if any confidence is to be placed in the lessons of experience. How, on the other hand, will the same security be attained by naval means? Only, as before shown, by keeping within the harbor a fleet, or squadron, or whatever it may be, which shall be at all times *superior* to the enemy.

In a naval defence, there will be no advantage in obstructions of any sort, for there can be no lessening of the array of guns, in consequence of such obstructions; because, if these obstructions are under the fire of the floating defences, the enemy will first subdue that fire, and then remove the obstructions at his leisure. If this fire prove too powerful for the enemy, the obstructions will have been unnecessary, and will serve only to shut up our own fleet, preventing the prompt pursuit of a beaten foe.

4. There is a fourth class; consisting of harbors, or rather bays or estuaries, of such expanse that batteries cannot be made to control the passage. These have been before spoken of. If the occupation of, or passage through, these must be defended, it must be by other means than batteries upon the shore. The reliance must, from the nature of the case, be a floating defence, of magnitude at least equal to the force the enemy may bring. The complete defence of each of these bays would, therefore, involve very great expense; certainly, in most cases, greater than the advantages gained. The Chesapeake bay cannot, for instance, be shut against a fleet by fortifications; and if the entrance of the enemy is to be interdicted, it must be by the presence of a not inferior fleet of our own. Instead of such a system, it will be better to give up the bay to the enemy, confining our defences to the more important harbors and rivers that discharge into the bay. By this system, not only will these harbors be secure, but the defences will react upon the bay itself, and, at any rate, secure it from predatory incursions; because, while Hampton roads and the navy-yard at Norfolk are well protected, no enemy would proceed up the bay with any less force than that which could be sent out from the navy yard.

In certain cases of broad waters, wherein an enemy's cruisers might desire to rendezvous in order to prosecute a blockade, or as a shelter in tempestuous weather, there may be positions from which sea-mortars can reach the whole anchorage, although nothing could be done with guns. A battery of sea-mortars, well secured from escalade, would, in such a case, afford a good defence; because no fleet will lie at anchor within the range of shells.

In thus distributing the various exposed points of the seacoast into general classes, according to the most appropriate modes of defence, we do not find that any thing can be substituted for fortifications, where fortifications are applicable; and we find them applicable in all the classes but the last; and in the last we shall find them indispensable as auxiliaries. In this last class, there are, no doubt, some cases where naval means must constitute the active and operative force; and it is probable that steam batteries may, of all floating defences, be the most suitable.

It must not be forgotten, however, that the very qualities which recommend this particular kind of force will equally characterize the steam-vessels of the enemy; nor must it be forgotten that, whether steam-vessels, or sailing vessels, or both, are relied on, unless there are well secured points on the shore, under which they can take refuge, they will themselves constitute an object inviting the superior force of an enemy.

If, for example, we were to deem one of the open harbors of such importance as to assign eight or ten steam batteries for its protection, we should thereby place within reach of the enemy an object worthy of the efforts of a squadron, or twelve or fifteen vessels of the same description. Even, therefore, in the cases where naval means must be resorted to for defence upon the water, there should be works upon the shore, behind which, if overpowered, they can retire.

It has been before remarked, that the steam batteries are in no way more formidable to shore batteries than sailing vessels are: armed with Paixhan guns, they would be less so. And they would be less formidable, also, on account of their comparatively small number of guns; for there is no reason why the firing should be more accurate than from ships; and the chances of inflicting injury would be in proportion to the number of missiles.

The only material effect the introduction of this description of vessel can have upon a system of defence by fortifications, is, that, owing to their less draught of water, it will be necessary to secure channels that, not being navigable by vessels of the line and frigates, might otherwise be left unguarded. Some of these channels may have the draught of water lessened by an artificial ridge of stones, so as to be impracticable even to steam-vessels; and this may often be done at small expense, and without detriment to the harbors; others will need additional fortifications. But the instances are not numerous where any such shallow channels exist.

In opposition to an opinion not uncommon, that modern improvements in steam-vessels will tend to lessen the necessity for fortifications, we here see that the tendency is rather to increase their number.

Throughout this whole discussion, the argument has turned on the relative efficiency of fixed and floating defences. The great relative economy of the former, we suppose, will be conceded. If not, we would ask, as conclusive, or at least as leading to calculation entirely satisfactory, that the following information be obtained from authentic sources, namely: the first cost, when complete in all respects, of the frigates United States, Constitution, and Congress, and also the entire expense of each of said vessels up to this time; specifying, as to each, the year of the several expenditures and the amounts thereof, under the heads, as far as practicable, of *first cost, repairs or rebuilding*, and *improvements and alterations;* and distinguishing—1st. The expense bestowed upon the hull. 2d. The expense bestowed upon the masts, spars, sails, anchors, cables, and rigging. 3d. The expense bestowed upon the armament; and 4th. The expense bestowed upon all other matters, (as boats, ballast, tanks, paint, &c.) necessarily connected with the preservation, or the ordinary service of the vessel.

Before we proceed to describe the several positions on the coast requiring fortifications, we have something still to say on the general subject, though on another branch. We now refer to the kind of fortifications, or rather to their magnitude and strength. That this particular topic should be embraced by our remarks, is the more necessary, since views hostile to the system of works now in progress have been urged from a high source.

The present system is founded on this principle, to wit: that the fortifications should be strong, in proportion to the value of the objects to be secured. The principle will not, we suppose, be controverted, but only the mode of applying it.

There will hardly be a difference of opinion as to the mode of guarding the less important points. There being no great attraction to an enemy, works simple in their features, requiring small garrisons only, containing a moderate armament, but at the same time inaccessible to the dashing enterprises that ships can so easily land, and which can be persevered in for a few hours with much vigor, will suffice. Circumstances must, however, materially modify the properties of these works, even when the points to be guarded are of equal value. In one, the disadvantage of position must be compensated by greater power; in another, natural strength may need little aid from art; in another, greater width in the guarded channel may demand a larger armament; and in a fourth, peculiar exposure to land attack may exact more than usual inaccessibility. But all these varieties lie within limits that will probably be conceded.

As to the larger objects, it has been contended that there has been exaggeration in devising works to cover these—the works having been calculated for more formidable attacks than they will be exposed to. It is easy to utter vague criticisms of this nature; and it is not easy to rebut them, without going into an examination as minute as if the criticism were ever so precise and pertinent.

But let us look a little at the material facts. What is the object of an enemy? What are his means? What should be the nature of our defences?

The object may be to lay a great city under contribution, or to destroy one of our naval depots, or to take possession of one of our great harbors, &c. It was estimated that in the great fire in the city of New York, in the year 1835, the property destroyed within a few hours was worth upwards of $17,000,000, although the fire was confined to a very small part of the city, and did not touch the shipping. Is it easy, then, to estimate the loss that would accrue from the fires that a victorious enemy could kindle upon the circuit of that great city, when no friendly hand could be raised to extinguish them? or is it easy to overrate the tribute such a city would pay for exemption from that calamity? Can we value too highly the pecuniary losses that the destruction of one of the great navy-yards would involve? and the loss, beyond all pecuniary value, of stores and accommodations indispensable in a state of war, and that a state of war can hardly replace?

But what are the enemy's means? They consist of his whole sea-going force, which he concentrates for the sake of inflicting the blow. In the language of the critic: "From the nature of maritime operations, such a fleet could bring its whole strength to bear upon any particular position, and, by threatening or assailing various portions of the coast, either anticipate the tardy movements of troops upon land, and effect the object before their concentration, or render it necessary to keep in service a force far superior to that of the enemy, but so divided as to be inferior to it on any one point."

We have, then, objects of sufficient magnitude; and the means of the enemy consist in the concentration of his whole force upon one of these objects.

With the highest notion of the efficiency of fortifications against shipping, these are not cases where any stint in the defensive means are ad-

missible. Having, therefore, under a full sense of the imminent danger to which the great objects upon the coast are exposed, applied to the approaches by water an array of obstacles worthy of confidence, we must carefully explore all the avenues by land, in order to guard against approaches that might be made on that side, in order to evade or to capture the works guarding the channels. But, before deciding on the defences necessary to resist these land attacks, it will be proper to estimate, more particularly, the means that an enemy may be expected to bring forward, with a view to such land operations.

History furnishes many examples; and the expedition to Flushing, commonly called the Walcheren expedition, may be cited as peculiarly instructive.

From an early day, Napoleon had applied himself to the creation of a maritime force in the Scheldt; and, in 1809, he had provided extensive dock-yards and naval arsenals at Flushing and at Antwerp. On his invasion of Austria this year, he had drawn off the mass of his troops that had before kept jealous watch over these naval preparations; relying now on forts and batteries, and on the fortifications of Flushing and Antwerp, for the protection of the naval establishments, and of a fleet containing several line-of-battle ships and frigates, and a numerous flotilla of smaller vessels.

The great naval establishment at Flushing, near the mouth of the Scheldt, and of Antwerp, some sixty or seventy miles up the river, with the vessels afloat on the river, or in progress in the yards, presented an object to England worthy of one of her great efforts.

The troops embarked on this expedition consisted of upwards of 33,000 infantry, 3,000 cavalry, more than 3,000 artillery, and some hundreds of sappers and miners; constituting an army of about 40,000 men. The naval portion consisted of 35 sail of the line, 23 frigates, 33 sloops of war, 28 gun, mortar, and bomb vessels, 36 smaller vessels, and 82 gun-boats: making a total of 155 ships and other armed vessels, and 82 gun-boats. The guns, mortars, &c., provided for such bombardments and sieges as the troops might have to conduct, amounted to 158 pieces, with the suitable supplies of ammunition and stores of every kind.

The idea of sailing right up to their object, in spite of the forts and batteries, seems not to have found favor, notwithstanding the power of the fleet. The plan of operations, therefore, contemplated the landing a portion of the army on the island of Walcheren, to carry on the siege of Flushing; while another portion proceeded up the Scheldt as high as Fort Bartz, which was to be taken; after which, the army would push on by land, about twenty miles farther, and lay siege to Antwerp: all which, it was thought, might be accomplished in eighteen or twenty days from the first landing.

The execution did not accord with the design. Flushing, it is true, was reduced within fifteen days; and in less than a week from the debarcation, (which was on the 31st of July,) Fort Bartz was in possession of the English, having been abandoned by the garrison. But it was twenty five days before the main body, with all necessary supplies for a siege, were assembled at this point, and ready to take up the line of march against Antwerp. Since the first descent of the British, matters had, however, greatly changed. The French were now in force; they had put their remaining defences in good condition; they had spread inundations over the face of the coun-

try; and not only would there be little chance of further success, but the safety of the expedition, formidable as it was, might have been compromised by a farther advance: it was, therefore, decided in council to abandon the movement against Antwerp. The troops accordingly returned to the island of Walcheren, which they did not finally leave till the end of December.

The failure in the ultimate object of the expedition is to be ascribed to the omission to seize, in the first instance, the south shore of the river, and capture the batteries there, as was originally designed, and which was prevented by the difficulty of landing enough troops, at any one debarcation, in the bad weather then prevailing. The capture of these batteries would have enabled the expedition to have reached Fort Bartz during the first week; and, in the then unprepared state of the French, the issue of a dash upon Antwerp can hardly be doubted.

The dreadful mortality that assailed the British army is wholly unconnected with the plans, conduct, or issue of the enterprise, as a military movement; unless, indeed, it may have frustrated a scheme for occupying the island of Walcheren as a position during the war.

Possession was held of the island for five months; and it was finally abandoned from no pressure upon it by the French; although, after the first six weeks, the British force consisted, in the aggregate, of less than 17,000 men; of which, for the greater part of the time, more than half were sick—effectives being often reduced below 5,000 men.

We see, therefore, that an effective force of less than 10,000 men maintained possession of the island, in the face of, and in close proximity to, the most formidable military power in Europe, for more than three months; and no reason can be perceived why it might not have remained an indefinite period, while possessed of naval superiority.

The proximity of England undoubtedly lessened the expense of the expedition; but it influenced the result in no other way material to the argument.

We will allude to no other instances of large expeditions sent by the English to distant countries, than the two expeditions, each of about 10,000 men, sent in the year 1814 against this country: one by the way of Canada, the other to the Gulf of Mexico. United in a single force of 20,000 men against our seacoast, the expense would have been less, and the results more certain.

The French, notwithstanding their constant naval inferiority, have found opportunities to embark in great undertakings of the same nature. In 1802, Leclerc proceeded to St. Domingo with 34 line of-battle ships and large frigates, more than 20 small frigates and sloops, and upwards of 20,000 men.

We learn from these points in history what constitutes an object worthy of vast preparations; and it is impossible to resist the fact, that our own coast, and rivers, and bays, possess many establishments not less inviting to an enemy than Flushing and Antwerp.

We are taught, moreover, what constitutes a great expedition; in other words, what is the amount of force we must prepare to meet; and, more than all, we are taught that such an expedition, seizing a favorable moment, when the military arrangements of a country are incomplete—when the armies are absent, or imperfect in their organization or discipline—does not hesitate to land in the face of the most populous districts, and, availing of the local peculiarities, and covered and supplied by a fleet, to under[illegible]te

operations which penetrate deep into the country, and consume considerable time.

It seems, therefore, that, whenever the object we are to cover possesses a value likely to provoke the cupidity of an enemy, or to stimulate his desire to inflict a serious blow, it is not enough that the approaches by water are guarded against his ships; it will be indispensable to place safeguards against attacks by land also. A force considerable enough for very vigorous attacks against the land side of the fortifications may be thrown upon the shore; and, if these yield, a way is opened for the ships, and the enemy carries his object.

In certain positions, the local circumstances would favor the land operations of an enemy; permitting him, while operating against the fortifications, to be aided by the fleet, and covered from the reaction of the general force of the country. In other positions, the extreme thinness of the population in the neighborhood would require the forts to rely, for a considerable time, on their own strength. In all such cases, a much greater power of resistance would be requisite than in circumstances of an opposite nature. In all such circumstances, the works should be of a strength adequate to resist an attack, although persevered in vigorously for several days. But when these land operations lead away from the shipping, or when the surrounding population is considerable, or the enemy is unable to shelter his movements by local peculiarities, then it will suffice if the works be competent to resist attacks, vigorous also, of a few hours only.

The magnitude and strength of the works will depend, therefore, on the joint influence of the value of the object covered, the natural strength of the position, and the succor to be drawn from the neighborhood. We may introduce, as instances, New York and Pensacola. The former is as attackable as the latter: that is to say, it equally requires artificial defences; and, owing to its capacious harbor and easy entrance, it is not easy to place it in a satisfactory condition as to the approaches by water. But while an enemy, in approaching any of the principal works by land, could not well cover himself from the attacks of the concentrated population of the vicinity, the rapid means of communication from the interior would daily bring great accessions to the defence. A land attack against the city must, consequently, be restricted to a few days; and the works will fulfil their object, if impregnable to a *coup de main.*

Pensacola, an object, in many respects, of the highest importance, and growing in consequence every day, is capable of being defended as perfectly as the city just mentioned. The principal defences lie on a long sandy island, which closes in the harbor from the sea. An enemy landed on this island (Santa Rosa) would be in uninterrupted communication with his fleet; could, owing to the sparseness of the population, have nothing to apprehend, for some time, from any reinforcements arriving at the place; and would be well protected, by position, from the effects of this succor, when it should arrive. While in possession of naval superiority, he might, therefore, not unreasonably calculate on being able to press a siege of many days of the work which occupies the extremity of the island, and guards the entrance to the harbor. And even before coming into possession of this work, his gun and mortar batteries, on the same island, would destroy every thing not bomb-proof and incombustible at the navy yard. An attack not less persevering, and with equal chances of success, might be made from the other side of the harbor also.

If, therefore, the power to resist a *coup de main* be all that is conferred on the works at Pensacola, their object will be obtained only through the forbearance of the enemy; it being obviously indispensable that the principal of these works be competent to resist a short siege. If this liability resulted from the thinness of the neighboring population, it would still be many years before this state of things would be materially altered. But it does not depend on this alone; the peculiar topographical features will continue this liability, in spite of increasing numbers, and ever so easy and rapid communication with the interior; it having been proved that a fleet may lie broad off this shore, and hold daily communication therewith, during the most tempestuous season. The English fleet of men-of-war and transports lay, during the last war, from the 7th of February to the 15th March, 1814, anchored abreast of Dauphin island and Mobile point, where the exposure is the same as that off Pensacola.

Between the cases cited, which may be regarded as of the class of extreme cases, (a class comprising, however, many important positions,) almost every conceivable modification of the defence will be called for, to suit the various conditions of the several points.

The fortifications of the coast must, therefore, be competent to the double task of interdicting the passage of ships and resisting land attacks—two distinct and independent qualities. The first demands merely an array, in suitable numbers, and in proper proportions, of heavy guns, covered by parapets proof against shot and shells; the second demands inaccessibility. As there is nothing in the first quality necessarily involving the last, it has often happened, either from the little value of the position, or from the supposed improbability of a land attack, or from the want of time to construct proper works, that this property of inaccessibility has been neglected.

Whenever we have an object of sufficient value to be covered by a battery, we should bear in mind that the enemy will know the value of the object as well as ourselves. That it is a very easy thing for him to land a party of men for an expedition of an hour or two; and, unless we take the necessary preventive measures, his party will be sure to take the battery first; after which, nothing will prevent his vessels consummating the design it was the purpose of the battery to prevent.

In general, the same fortifications that guard the water approaches, will protect the avenues by land also; but, in certain cases, a force may be so landed as to evade the channel defences, reaching the object by a route entirely inland. Of course, this danger must be guarded against by suitable works.

After the preceding exposition of our views on the general subject of the defences of the coast, it may not be out of place here to indicate the mode by which the system of fortifications on which we would rely can be manned and served, without an augmentation, for that particular purpose, of the regular army.

The force that should be employed for this service, in time of war, is the militia, (using the term in a comprehensive sense;) the probability being, that, in most of the defended points on the seaboard, the uniformed and volunteer companies will supply the garrisons needed. And it may be shown that it is a service to which militia are better adapted than to any other.

The prominent defect of a militia force results from the impossibility of so training the men to field movements in the brief period of their service as to give them any confidence in themselves as manœuvrers in the face of regular

troops; the little they learn merely suffices to show them that it is but little; every attempt of the kind proving, by the disorder that they know not how to avoid, how much greater would be the disorder if in face of an enemy and under fire.

Without the knowledge to be obtained only by long and laborious practice, the militiaman knows that he is no match, in the field, for the regular soldier; and it is not surprising that he should desire to avoid an encounter. But there is no such difficulty in the service of fixed batteries. The militiaman has to be taught merely the service of a single gun, than which nothing can be more simple. He must learn to use the rammer and the sponge, the handspike and the linstock, to load, and to run to battery, to trail and to fire: these are all. Each of these operations is of the utmost simplicity, depending on individual action, and not on concert; and they may all be taught in a very short time. There is no manœuvring, no marching, no wheeling. The squad of one gun may be marched to another; but the service of both is the same. Even the art of pointing cannon is, to an American militiaman, an art of easy attainment, from the skill that all our countrymen acquire in the use of fire-arms—"drawing sight, or "aiming," being the same art, modified only by the difference in the gun.

The mode of applying this force may be illustrated by the case of any of our cities on the seaboard. The forts and batteries, being put in perfect condition, should be garrisoned (at least the more important ones) by a small body of regular artillery, such as our present military force could supply, and sufficient for the preservation of the public property, and to afford indispensable daily guards: to these should be added two or three men of the Ordnance Department, especially charged with the condition of the armament and ammunition, and two or three engineer soldiers, whose sole duty it would be to attend to the condition of the fortifications; keeping every part in a state of perfect repair. In certain important works, however, that would be exposed to siege, or to analogous operations, it would be prudent, especially in the beginning of a war, to keep up a more considerable body of regular troops.

The volunteer force of the city should then be divided into detachments, without disturbing their company organization; and should be assigned to the several works, according to the war garrisons required at each; from four to six men, according to circumstances, being allowed to each gun.

The larger works might require ten, fifteen, or even twenty companies; the smaller, one, two, three, or more companies; and, in some cases, even a platoon might suffice. Being thus assigned, each portion of the city force would have its definite alarm-post; and should be often taken to it, and there exercised in all the duties of its garrison, and more especially in the service of its batteries, and in its defence against assault. The multiplicity of steamboats in all the cities would enable the volunteers to reach even the most distant alarm-posts in a short time.

In order that all these troops may become expert in their duty, one of the works most convenient to the city, besides being the alarm-post of some particular portion of the volunteers, should, during peace, be the ordinary school of drill for all: and in this the detachments should, in turn, assemble and exercise.

Besides the mere manual of the gun and battery, there should be frequent target practice, as being not only necessary to the proper use of the battery, but as imparting interest and excitement to the service.

It might be necessary for a time to submit the volunteers to the drill of a competent officer or non-commissioned officer of the regular artillery; and, in particular, to conduct the practice with shot and shells under such instruction.

The portion of the military force of the city not stationed in the fixed batteries would constitute, under an impending attack, a reserve, posted either in one or several bodies, according to circumstances, ready to cover exposed points, to co-operate in offensive movements, or to relieve exhausted garrisons: this portion having connected with it the mounted force, the field artillery, and the heavy moveable guns.

This appropriation of the volunteer force to the immediate defence of the city would operate in the most favorable way upon that force, superadding to the impulses of patriotism every feeling connected with family, property, and social and civil relations, and, while making military service the first of duties, relieving it of hardship and privation. It would be a peculiar feature in this kind of service that the governing motive in the choice of officers would be favorable to the condition of the troops, every man feeling that the safety of his dearest concerns depended on the efficiency and courage of his officers. The same motive would prompt him, moreover, to desire, and contribute to, the highest state of efficiency in the corps.

The organization of volunteer force here contemplated may comprehend the whole maritime frontier; and be applicable, also, at the more populous points upon the inland borders.

This arrangement, while it might be an enduring one, would be the least expensive, by far, of any that would be efficient.

The days of exercise, drill, and encampment should be fixed and invariable, in order that they may the less interfere with the private occupations of the volunteers. During an impending attack, greater or less portions should be constantly at these posts; but still the service would comprise but a very small portion of the year.

According to the value of the interest to be defended, and the extent of the works to be occupied, would be the rank of the chief command; which should be intrusted to an officer of the regular army, whose control might often be extended, advantageously, over a certain extent of seaboard to the right and left, constituting a maritime department.

In the tables to be presented at the end of this report, we shall give the whole number of men required for the complete defence of each of the works.

We now proceed to examine the coast in detail; and, in order to conform to the Senate's resolution, we shall divide the whole seacoast of the United States into two great portions: the first portion extending from *Passamaquoddy bay to Cape Florida;* the second from *Cape Florida to the mouth of the Sabine.* In our description, we shall, without any other than this general acknowledgment, quote largely from a report presented to Congress in April, 1836, and to be found in the Senate documents of the 1st session 24th Congress, No. 293, vol. 4. This report contains an argument on the general subject, embodying many important considerations, which we have thought best not to repeat in this lengthened report, but to refer to as worthy of perusal.

We will conduct the examination geographically, beginning at the north-eastern extremity; and referring, in every case, to accompanying tables, which exhibit the several works in the order of relative importance as to time.

COAST FROM PASSAMAQUODDY BAY TO CAPE FLORIDA.

The extreme northeastern section of this coast, extending from Quoddy Head to Cape Cod, is characterized by its serrated outline and its numerous harbors, and, at certain seasons, by its foggy atmosphere. The extent of this section, measuring from point to point, wherever the breaks of the coast are abrupt, is about 500 miles; while a straight line from one of the abovementioned capes to the other is hardly half that distance. The eastern half is singularly indented by deep bays; the coast being universally rocky, and possessing numerous islands surrounded by deep water; which islands not only increase the number of harbors, but cover, besides, an interior navigation well understood by the hardy coasters, and measurably secured by its intricacies, and the other dangers of this boisterous and foggy region, from interruption by an enemy. The western half is much less broken; it is covered by few islands in comparison, but contains several excellent harbors.

The eastern harbors of Maine are exposed in a peculiar manner. They are not only on the flank of our line, but they are also quite near the public establishments of the greatest maritime Power. They are, moreover, as yet, backed by only a thin population; and are, consequently, weak as well as exposed. The time may not, however, be very distant, when, becoming wealthy and populous, they will be objects of a full portion of the national solicitude. Works designed for these harbors must, therefore, be calculated for the future; must be founded on the principle that they must defend places much more important than any now existing there; that, being near the possessions of a foreign Power, they will be, in a particular manner, liable to sudden and repeated attacks; and that, lying at the extremity of the coast, they are liable to be tardily succored. The works must, consequently, be competent to resist escalade, and to hold out for a few days. Feebler works might be more injurious than beneficial: their weakness would, in the first place, invite attack; and, it being often a great advantage to occupy fortified places in an adversary's territory, the enemy could prepare himself to remedy the deficiencies of the forts, after they should fall into his hands, by adding temporary works, by providing strong garrisons, and by aiding the defence with his vessels.

No surveys have been made of these harbors, and no plans formed for their defence. It may be well to observe here, once for all, that much confidence is not asked for the mere conjectures presented below, as to the number and cost of the works assigned for the protection of the harbors which have not yet been surveyed: in some cases, there may be mistakes as to the number of forts and batteries needed; in others, errors will exist in the estimated cost.

Eastport and *Machias* may be mentioned as places that will unquestionably be thought to need defensive works by the time, in the order of relative importance, the execution of them can be undertaken by the Government. There are several small towns eastward of Mount Desert island, that may, at that period, deserve equal attention: at present, however, the places mentioned will be the only ones estimated for; and $100,000 will be assumed as the cost at each. (Statement 1, table F.)

Mount Desert island, situated a little east of Penobscot bay, having a capacious and close harbor, affording anchorage for the highest class of vessels, and easily accessible from sea, offers a station for the navy of an enemy superior to any other on this part of the coast. From this point, his

cruisers might act with great effect against the navigation of the eastern coast, especially that of Maine; and his enterprises could be conducted with great rapidity against any points he might select. These considerations, added to the very great advantage, in certain political events, of our occupying a naval station thus advanced, whence we might act offensively, together with the expediency of providing places of succor on a part of the coast where vessels are so frequently perplexed in their navigation by the prevailing fogs, lead to the conclusion, that the fortification, in a strong manner, of this roadstead, may, before long, be necessary. A survey of this island was begun many years ago; but the party being called off to other duties, it was never completed. The project of defensive works has not been made. The entire cost may be, as assumed by the Engineer Department some years ago, $500,000. (Statement 1, table F.)

Castine.—It would seem to be impossible, on this coast, to deprive an enemy enjoying naval superiority of harbors, or prevent his using them as stations during a war—insular situations, which his vessels would render unapproachable, being so numerous; but it seems proper that such of these positions as are the sites of towns should be secured. During the last war, the English held the position of Castine for some time, and left it at their pleasure. It is probable a work costing about $50,000 would deter an enemy from again making choice of this position. (Statement 1, table F.)

Penobscot bay.—Upon this bay, and upon the river of the same name flowing into it, are several flourishing towns and villages. Of the many bays which intersect the coast, the Penobscot is the one which presents the greatest number of safe and capacious anchorages. As before observed, a large portion of these harbors must, for the present, be left without defences, but the valuable commerce of the bay and river must be covered; and to afford a secure retreat for such vessels as may be unable to place themselves under the protection of the works to the east or west of the bay, the passage of the river must be defended. The lowest point at which this can be done, without great expense, is opposite Bucksport, at the "narrows." A project has been given in for a fort at that position, estimated at $150,000. (Statement 1, table D.)

St. George's bay, *Broad bay*, *Damariscotta*, and *Sheepscut.*—West of the Penobscot occur the abovementioned bays, all being deep indentations leading to towns, villages, and various establishments of industry and enterprise. The bays have not been surveyed, and, of course, no plans have been formed for their defence. $400,000 are assigned to the defence of these waters. The Sheepscut is an excellent harbor of refuge for vessels of every size. (Statement 1, table F.)

Kennebeck river.—This river (one of the largest in the eastern States) enters the sea nearly midway between Cape Cod and the mouth of the St. Croix. It rises near the source of the Chaudière, which is a tributary of the St. Lawrence, and has once served as a line of operations against Quebec. The situation and extent of this river, the value of its products, and the active commerce of several very flourishing towns upon its banks, together with the excellence of the harbor within its mouth, will not permit its defence to be neglected. The surveys begun many years ago were never finished. The estimated cost of defences, as formerly reported by the Engineer Department, was $300,000. Positions near the mouth will permit a secure defence. (Statement 1, table D.)

Portland harbor.—The protection of the town, of the merchantmen belonging to it, and of the ships of war that may be stationed in this harbor to watch over this part of the coast, or that may enter for shelter, (all of them important objects,) may be secured, as an inspection of the map of the harbor will show, by occupying Fort Preble point, House island, Hog Island ledge, and Fish point.

If the two channels to the west and east of Hog island can be obstructed at small expense, (to decide which, some surveys are yet necessary,) there will be no necessity for a battery on the ledge; and Fish point need be occupied only by such works as may be thrown up in time of war. The expense, as now estimated, of the works planned for this defence, will be $155,000 for Fort Preble, and $48,000 for House island; for Hog Island channel, say $135,000. (Statement 1, tables A, D, E, and F.) In addition, there must be repairs immediately applied to the old works, at an expense of $6,600.

Saco, Kennebunk, and *York.*—Small works, comparatively, will cover these places; $75,000 is assumed as the aggregate cost (Statement 1, table F.)

Portsmouth harbor and navy-yard.—The only good roadstead, or harbor, between Cape Elizabeth and Cape Ann, is Portsmouth harbor, within the mouth of Piscataqua river. Line-of-battle ships can ascend as high as Fox point, seven miles above the town. This situation, sufficiently commodious for a secondary naval depot, designed to repair vessels of war, should be maintained; but it is to be regretted that the bay to the south of Fox point was not chosen as the site of the navy yard, instead of Fernald's island. Being where it is, it will be necessary, in time of war, to make some particular dispositions for the protection of the navy yard from an attack from the north shore of the river.

The position of Fort Constitution will certainly, and that of Fort McCleary will probably, be occupied by the defences; though the works themselves should give place to those that will better fulfil the object. The other positions for forts, or batteries, are, Gerrishe's point, Fishing island, and Clark's island: some, if not all, of which must be occupied. Surveys are required before the projects can be formed, or before estimates can be made; but there is reason for believing that the entire cost of fortifying this harbor will not fall short of $300,000. (Statement 1, table D.)

Newburyport harbor.—The points forming the mouth of the harbor are continually changing; and it seems necessary, therefore, to rely, for the defence of the harbor, on works to be thrown up during a war. There is only a shoal draught of water. It is thought $100,000 will defend this harbor adequately. (Statement 1, table F.)

Gloucester harbor.—The position of this harbor, near the extremity of Cape Ann, places it in close relation with the navigation of all Massachusetts bay, and imparts to it considerable importance. No surveys have yet been made, but it is believed that sufficient defence may be provided for $200,000. (Statement 1, table E.) Should there be any occasion for defensive works before the proposed new works can be commenced, an expenditure of $10,000, in repairs of the old fort, will be required. (Table A.)

Beverly harbor.—This harbor will be defended chiefly by a portion of the works designed for Salem. $50,000, in addition, will secure it. (Statement 1, table F.)

Salem harbor.—The port of Salem is distant from Marblehead two miles, and separated therefrom by a peninsula. The occupation of the extremity of Winter island (where are the ruins of Fort Pickering) on one side, and Nangus Head on the other, will effectually secure this harbor. Projects have been presented for this defence, estimated to cost $225,000. (Statement 1, tables D and F.) On a sudden emergency, old Fort Lee may be put in an effective state for $2,000. (Table A.)

Marblehead harbor.—Besides covering, in some measure, the harbor of Boston, Salem and Marblehead harbors possess an important commerce of their own, and also afford shelter for vessels prevented, by certain winds, from entering Boston or pursuing their course eastward. The proposed mode of defending Marblehead harbor consists in occupying, on the north side, the hillock which commands the present Fort Sewall, (which will be superseded by the new work,) and, on the south, the position of Jack's point. The two works will cost $318,000. (Statement 1; tables D and F.)

To repair old Fort Sewall, which may be necessary if the new works are not soon begun, will require $10,000. (Table A.)

Boston harbor.—We come now to the most important harbor in the eastern section of the coast; and, considering the relation to general commerce, and the interests of the navy, one of the most important in the whole Union.

After a careful examination of all the necessary conditions of such a problem, the board of naval officers and engineers, in their joint report of 1820, gave this harbor a preference over all other positions to the east, and inclusive, of New York bay and the Hudson, as the seat of the great northern naval depot; and the Government, by the great additions and improvements that have from year to year been since made to the navy-yard on the Charlestown side, have virtually sanctioned the recommendation of the board. But, independent of the navy-yard, Boston is a city of great wealth, and possesses an extensive and active commerce.

The old works defended merely the interior basin from attacks by water; but, as it often happens that vessels enter Nantasket roads with a wind too scant to take them to the city, or are detained in President roads by light winds or an adverse tide; as the former, especially, is a very convenient anchorage whence to proceed to sea; and, above all, as Nantasket roads affords the best possible station for a blockading squadron, it was deemed indispensable to place permanent defences at the mouth of the harbor. The project of defence regards the existing works, with the necessary repairs and modifications, as constituting a second barrier.

Besides a permanent work, now well advanced, on George's island, it contemplates permanent works on Nantasket Head; filling up the Broad Sound channel, so as to leave no passage in that direction for ships of war.

Until the best draught for steam-vessels of war shall be well ascertained, it will not be safe to say to what depth the Broad Sound channel should be restricted; nor, indeed, can it be positively asserted that this description of vessel can be conveniently excluded by such means. Other vessels *can*, however, be thus excluded; and steam-vessels passing this channel would still have to pass the inner barrier. The estimated cost of the works for this harbor is $2,040,000.

Besides the works of a permanent character, it will be necessary, in the beginning of a war, to erect several temporary works on certain positions in the harbor, and on the lateral approaches to the navy yard. (Statement 1, tables A, E, and F.

Plymouth and Provincetown harbors.—These harbors have a commerce of some consequence of their own, but they are particularly interesting in reference to the port of Boston. While these are undefended, an enemy's squadron blockading Massachusetts bay will have ports of refuge under his lee, which would enable him to maintain his blockade, even throughout the most stormy seasons—knowing that the winds which would force him to seek shelter would be adverse to outward-bound, and fatal to such inward vessels as should venture near the Cape. Were the enemy deprived of these harbors, he would be unable to enforce a rigorous investment, as he would be constrained to take an offing on every approach of foul weather. Our own vessels coming in from sea, and finding an enemy interposed between them and Boston, or being turned from their course by adverse winds, would, in case of the defence of these ports, find to the south of Boston shelters equivalent to those provided in the east, at Marblehead, Salem, Gloucester, and Portsmouth. Plymouth harbor has not been fully surveyed. Provincetown harbor has been surveyed, but the projects of defence have not been formed. The former, it is thought, may be suitably covered by a work of no great cost on Garnett point; while, to fortify Provincetown harbor in such a way as to cover vessels taking shelter therein, and at the same time to deprive an enemy of safe anchorages, will involve considerable expense. Probably no nearer estimate can be formed at present, than that offered by the Engineer Department some years ago, which gave $100,000 for Plymouth, and $600,000 for Provincetown. (Statement 1, tables D and E.)

The coast between Cape Cod and Cape Hatteras differs from the north-eastern section in possessing fewer harbors, in having but little rocky and a great portion of sandy shore, in its milder climate and clearer atmosphere; and it differs from all the other portions in the depth and magnitude of its interior seas and sounds, and in the distance to which deep tide navigation extends up its numerous large rivers. The circuit of the coast, not including the shores of the great bays, measures 650 miles; while a straight line from one of the abovenamed capes to the other measures about 520 miles.

Martha's Vineyard sound.—To the south of Cape Cod lie the islands of Nantucket and Martha's Vineyard, which, with several smaller islands on the south, and the projection of Cape Malabar on the east, enclose the abovenamed sound. The channels through this sound, being sufficient for merchant vessels, and one of the channels permitting the passage even of small frigates, are not only the constant track of coasting vessels, but also of large numbers of vessels arriving in the tempestuous months from foreign voyages. There are within the sound the harbors of *Tarpaulin cove*, *Holmes's Hole*, *Edgartown*, *Falmouth*, *Hyannis*, and *Nantucket*, besides small anchorages.

In addition to the many thousand vessels passing this water annually, (of which there are sometimes forty or fifty,) a portion, containing very valuable cargoes, to be seen in the harbors awaiting a change of wind, there is supposed to be at least 40,000 tons of whaling vessels owned in the towns of this sound.

If the harbors just named are to be defended at all, it must be by fortifications. There is little or no population except in the towns, and even this is believed to be entirely without military organization. A privateer might run into either of these harbors, and capture, destroy, or levy contributions

at pleasure. The use of the sound itself, as an anchorage for vessels of war, cannot be prevented by fortifications alone. $250,000 may, perhaps, suffice for the defence of all the harbors against the kind of enterprise to which they are exposed. (Statement 1, table F.)

New Bedford and Fairhaven harbor.—No survey has been made of this harbor, on which lie two of the most flourishing towns. It is easily defensible, and the amount formerly assumed by the Engineer Department will probably suffice, namely, $300,000. (Statement 1, table D.)

Buzzard's bay.—Interposed between the main and the island of Martha's Vineyard, are the Elizabeth islands, which bound Buzzard's bay on the south. This bay covers the harbor of New Bedford, and might be used as an anchorage by an enemy's fleet; but it is too wide to be defended by fortifications.

Narraganset bay.—The properties of this great roadstead will be here briefly adverted to. More minute information may be obtained by reference to reports of 1820 and 1821.

As a harbor, this is acknowledged by all to be the best on the whole coast of the United States; and it is the only close man-of-war harbor that is accessible with a northwest wind, the prevailing and most violent wind of the inclement season. Numerous boards and commissions, sometimes composed of naval officers, sometimes of army officers, sometimes of officers of both services, have, at different times, had the subject of this roadstead under consideration; and all have concurred in recommending, in strong terms, that it be made a place of naval rendezvous and repair, if not a great naval depot; one or more of these commissions preferring it, for the latter purpose, to all other positions. These recommendations have not been acted on; but it is next to certain that a war would force their adoption upon the Government.

With the opening of this anchorage properly defended, hardly a vessel of war would come, either singly or in small squadrons, upon the coast, in the boisterous season, without aiming at this port, on account of the comparative certainty of an immediate entrance. And this would be particularly the case with vessels injured by heavy weather, or in conflict with an enemy; with vessels bringing in prizes, or pursued by a superior force.

This use of the port would almost necessarily bring with it the demand for the means of repairing and refitting; and the concentration of these upon some suitable spot would be the beginning of a permanent dock yard.

For the same reason that ships of war would collect here, it would be a favorite point of rendezvous for privateers and their prizes, and a common place of refuge for merchantmen.

From this, as a naval station, the navigation of Long Island sound, and the communication between this and Martha's Vineyard sound, or Buzzard's bay, might be well protected; New London harbor would be covered; the navy-yard would command southwardly, as from Hampton roads northwardly, the great inward curve of the coast between Cape Cod and Cape Hatteras; the influence of which command over the blockading operations of an enemy will be apparent, when it is considered that the only harbors of refuge left to him will be the Delaware, Gardiner's and Buzzard's bays, and Martha's Vineyard sound.

The bays first mentioned belong to the class before alluded to, which, being too wide for complete defence by batteries, must call in such auxiliary defences as the navy may supply; and, in reference to their defence by

these means, nothing can be more important than the fortification of Narraganset roads, because all but the first of the bays just named (including an anchorage for ships of war under Block island) would be commanded by a single squadron of those floating defences lying in these roads. To a squadron of steam batteries, for instance, lying under the fortifications, it would be a matter of little consequence into which of the above anchorages an enemy should go—all being within reach in three or four hours, and some within sight. We will here observe, by the way, that this use of floating defences is in accordance with the principle before insisted on: they are not expected to close the entrance into these several bays—that would require a squadron for each, at least equal to the enemy's; but as the enemy goes in merely for rest or shelter, and there is no object that he can injure, he may be permitted to enter; and our squadron will assail him only when the circumstances of wind, weather, &c. give all the advantages to the attack. The fortification of Narraganset roads is therefore, in effect, a most important contribution toward the defence of all the neighboring anchorages.

But the same properties that make Narraganset roads so precious to us, would recommend them to the enemy also; and their natural advantages will be enhanced in his eyes by the value of all the objects these advantages may have accumulated therein.

If this roadstead were without defence, an enemy could occupy it without opposition, and, by the aid of naval superiority, form a lodgment on the island of Rhode Island for the war. Occupying this island with his troops, and with his fleets the channels on either side, he might defy all the forces of the eastern States; and while, from this position, his troops would keep in alarm and motion the population of the east, feigned expeditions against New York, or against more southern cities, would equally alarm the country in that direction: and thus, though he might do no more than menace, it is difficult to estimate the embarrassment and expense into which he would drive the Government.

It has been alleged that similar consequences would flow from the occupation of other positions; (such, for instance, as are afforded in the bays just mentioned;) and that, therefore, the defence, in a strong manner, of Narraganset roads is useless.

Even allowing that there are other advantageous and inaccessible positions, whereon an enemy might place himself; is it a reason, because the foe can, in spite of us, possess himself of comparatively unsafe and open harbors, that we should not apply to our own uses, but yield up to him, the very best harbor on the coast? that we should submit to capture and destruction the valuable objects that accumulate in consequence of the properties of the harbor?

But it is believed that none of the outer and wider harbors will answer for such an establishment as we have supposed, nor for any other purpose than an occasional anchorage of ships of war; and for these reasons, amongst others: that, although ships of war might possibly ride in these broad waters at all seasons, it would seem to be a measure of great temerity for transports to attempt it, except in the mildest seasons; and there can be little doubt that a hostile expedition would resort to no harbor as a place of rendezvous, unless it afforded sure protection to its transports; these being the only means by which ulterior purposes could be executed, or final retreat from the country effected.

If, moreover, Narraganset roads be fortified and become a naval station, or at least the station of a floating force designed to act against these outer waters, such an establishment by any enemy would at once be put upon the defensive, and require the constant presence of a superior fleet; thus measurably losing the object of the establishment.

Independent of the qualities of the harbor, however, none of these bays would answer our purposes: 1st. Because they cannot be securely defended; and, 2d. Because they are difficult of access from the main—the communication with them being liable to interruption by bad weather, and liable to be cut off by the enemy.

The defence adopted for Narraganset roads must be formidable on the important points, because they will be exposed to powerful expeditions. Although the possession of this harbor, the destruction of the naval establishment, the capture of the floating defences, and the possession of the island as a place of debarcation and refreshment, should not be considered as constituting, of themselves, objects worthy a great expedition, they might very well be the preliminary steps of such expedition; and defences weak in their character might tempt, rather than deter it; for although unable to resist his enterprise, they might be fully competent, after being captured and strengthened by such means as he would have at hand, to protect him from offensive demonstrations on our part.

There are, besides, in the local circumstances, some reasons why the works should be strong. The channel on the eastern side of the island, being permanently closed by a solid bridge, requires no defensive works; but this bridge being at the upper end of the island, the channel is open to an enemy all along the eastern shore of the island. Works erected for the defence of the channel on the west side of the island cannot, therefore, prevent, nor even oppose, a landing on the eastern side. The enemy, consequently, may take possession, and bend his whole force to the reduction of the forts on the island, which cannot be relieved until a force has been organized, brought from a distance, conveyed by water to the points attacked, and landed in the face of his batteries: all this obviously requiring several days, during which the forts should be capable of holding out. To do this against an expedition of 10,000 or 20,000 men, demands something more than the strength to resist a single assault.

Unless the main works be competent to withstand a siege of a few days, they will not, therefore, fulfil their trust, and will be worse than useless.

It must here be noticed, that, although the works do not prevent the landing of an enemy on Rhode Island, they will, if capable of resisting his efforts for a few days, make his residence on the island for any length of time impossible, since forces in any number may be brought from the main, and landed under the cover of the fire of the works.

To come now to the particular defences proposed for this roadstead. It must be stated that there are three entrances into Narraganset roads:

1st. The eastern channel, which passes up on the east side of the island of Rhode Island. This, as before stated, being shut by a solid bridge, needs no defence by fortifications, other than a field-work or two, which may be thrown up at the opening of a war.

2d. The central channel, which enters from sea by passing between Rhode Island and Canonicut island. This is by far the best entrance, and leads to the best anchorage; and this it is proposed to defend by a fort on the east side of the entrance, designed to be the principal work in the sys-

tem. This work, called Fort Adams, is nearly completed. On the west side of the entrance it is proposed to place another work; and on an island, called Rose island, facing the entrance, a third work. It is also proposed to repair the old fort on Goat island, just within the mouth; and also old Fort Green, which is a little higher up, and on the island of Rhode Island.

3d. As to the western passage, three modes present themselves: first, by reducing the depth of water by an artificial ledge, so as while the passage shall be as free as it is now for the coasting trade, it shall be shut as to the vessels of war, including steam-vessels; second, by relying on fortifications alone to close the channel; or, third, by resorting in part to one and in part to the other mode just mentioned. Either is practicable; but, being the least expensive and most certain, the estimates are founded on the first.

The total cost of the Narraganset defences is estimated at $1,817,482. (Statement 1, tables A, B, D, E, and F.)

Gardiner's bay.—It is uncertain whether this harbor, which would be a very valuable one to an enemy investing this part of the coast, is defensible by fortifications alone. After it shall have been surveyed, it may appear that, from one or more positions, the whole anchorage may be controlled by heavy sea-mortars. In such a case, the defensive works would not be costly. If it be found expedient to fortify some particular portion of the bay, as an anchorage for steam batteries, (which, however, is not anticipated,) the expense would probably be as great as was anticipated some years since by the Engineer Department, viz: $400,000. (Statement 1, table F.)

Sag Harbor, New York, and Stonington, Connecticut.—Neither of these harbors has been surveyed with reference to defence. The first is possessed of considerable tonnage; and the second, besides being engaged in commerce, is the terminus of a railroad from Boston. $100,000 may be assigned to the first, and $200,000 to the other. (Statement 1, tables E and F.)

New London harbor is very important to the commerce of Long Island sound; and, as a port of easy access, having great depth of water, rarely freezing, and being easily defended, it is an excellent station for the navy. It is also valuable as a shelter for vessels bound out or home, and desirous of avoiding a blockading squadron off Sandy Hook.

In the plan of defence, the present forts (Trumbull and Griswold) give place to more efficient works, whereof the expense is estimated at $441,000. (Statement 1, tables C and F.)

Mouth of Connecticut river.—This river has been shown to be subject to the expeditions of an enemy. No survey has been made with a view to its defences; $100,000 is introduced here as the conjectural cost. (Statement 1, table F.)

New Haven harbor.—It is proposed to defend this harbor by improving and enlarging Fort Hale, and substituting a new work for the slight redoubt erected during the last war, called Fort Wooster. The expense of both may be set down at $90,000, exclusive of $5,000 for immediate repairs of old Fort Hale. (Statement 1, table F.)

There are several towns between New Haven and New York, on both sides of the sound; none of them are very large as yet, still, most, if not all, are prosperous and increasing. Although, in their present condition, it might not be deemed necessary to apply any money to permanent defences, yet, as part of the present object is to ascertain, as near as may be, the ultimate cost of completely fortifying the coast, it seems proper to look forward

to the time when some of these towns may become objects of predatory enterprises of some magnitude. Bearing in mind the probable increase of population in the mean time, and the situation of the places generally, it is thought that $200,000 will be enough to provide defences for all. (Statement 1, table F.)

New York harbor.—The objects of the projected works for the security of New York are, to cover the city from an attack by land or sea; to protect its numerous shipping; to prevent, as far as possible, the blockade of this great port; and to cover the interior communication uniting this harbor with the Delaware. In the present condition of the defences, an enemy would encounter no great opposition, whether his attack were made by land or water.

There are two avenues to the city, namely: one by the main channel, direct from sea, and one by the sound. If an enemy come by the way of the sound, he may, now, land his forces on the New York side, at Hellgate, within less than ten miles of New York, and the next day, at the latest, be in the city; or, he may land on the Long Island side, at the same distance, and in the same time be master of the navy-yard and of Brooklyn heights, whence the city of New York is perfectly commanded; or, he may divide his forces, and reach both objects at the same moment.

The projected system of defence closes this avenue at the greatest distance possible from the city, namely, at Throg's point. The occupation of this point will force the enemy to land more than twenty miles from the city on one side, and still farther from the navy-yard on the other.

A work now in progress at Throg's point will probably prevent any attempt to force this passage. It will, as we have seen, oblige an enemy to land at a considerable distance from the object; and as he will then be unable to turn the strong position afforded by Harlem river, the cover on the New York side will be sufficient.

But should he land on the Long Island side, he might, by leaving parties on suitable positions, with a view to prevent our crossing the river and falling on his rear, make a dash at the navy-yard, having no obstacle in his front. To prevent this, effectually, and also to accomplish other objects, a work should be erected on Wilkins's point, opposite Throg's point. This work, besides completing the defence of the channel, would involve a march against the navy-yard from this quarter in great danger; since all the forces that could be collected on the New York shore might, under cover of this work, be crossed over to Long Island, and fall on the rear of the enemy, cutting off his communication with the fleet. The two works on Throg's and Wilkins's points may, therefore, be regarded as perfectly protecting, on that side, the city and navy-yard.

Against an attack by the main channel, there are—

1st. The works in the vicinity of the city, which would act upon an enemy's squadron only after its arrival before the place. They consist of Fort Columbus, Castle Williams, and South Battery, on Governor's island; Fort Wood, on Bedlow's island; and Fort Gibson, on Ellis's island.

It is necessary that these works be maintained, because, in the event of the lower barrier being forced, these would still afford a resource. It is a disadvantage of their positions, however, that the destruction of the city might be going on simultaneously with the contest between these forts and the fleet. They cannot, however, be dispensed with, until the outer barriers are entirely completed, if even then.

2d. At the narrows, about seven miles below the city, the passage becomes so contracted as to permit good disposition to be made for defence. On the Long Island side of the narrows is Fort Lafayette, which is a strong water-battery standing on a reef at some distance from the shore; and immediately behind it, on the top of the bank, is a small but strong work, called Fort Hamilton. Some repairs being applied to these works, this position may be regarded as well occupied.

On the west side, or Staten Island side of the narrows, are the following works belonging to the State of New York, viz: *Fort Richmond*, which is a water-battery; *Battery Hudson*, which is at some height above the water; *Battery Morton*, which is a small battery on the top of the hill; and *Fort Tomkins*, which is also on the top of the hill, and is the principal work. All these need great repairs; but, being once in proper order, would afford a very important contribution to the defence of the passage; nothing further, indeed, being contemplated for this position, except the construction of a small redoubt on a commanding hill, a little to the southwest. The repairs of these works cannot too soon be taken in hand; and it is hoped some arrangement may soon be made with the State authorities to that end.

With the narrows thus defended, and the works near the city in perfect order, New York might be regarded as pretty well protected against an attack by water through this passage.

But there lies below the narrows a capacious bay, affording good anchorage for any number of vessels of war and transports. An enemy's squadron being in that bay, into which entrance is very easy, would set a seal upon this outlet of the harbor. Not a vessel could enter or depart at any season of the year. And it would also intercept the water communication, by the way of the Raritan, between New York and Philadelphia.

The same squadron could land a force on the beach of Gravesend bay, (the place of the landing of the British, which brought on the battle of Long Island in the revolutionary war,) within seven miles of the city of Brooklyn, of its commanding height, and of the navy yard; with no intervening obstacle of any sort.

This danger is imminent, and it would not fail, in the event of war, to be as fully realized as it was during the last war, when, on the rumor of an expedition being in preparation in England, 27,000 militia were assembled to cover the city from an attack of this sort. It is apparent that the defences near the city, and those at the narrows, indispensable as they are for other purposes, cannot be made to prevent this enterprise; which can be thoroughly guarded against only by—

3d. An outer barrier at the very mouth of the harbor. This would accomplish two objects of great consequence, namely, rendering a close blockade of the harbor impossible; and obliging an enemy, who should design to move troops against the navy yard, to land at a distance of more than twenty miles from his object, upon a dangerous beach; leaving, during the absence of the troops, the transports at anchor in the ocean, and entirely without shelter. The hazards of such a land expedition would, moreover, be greatly enhanced by the fact that our own troops, by passing over to Long Island under cover of the fort at Wilkins's point, could cut off the return of the enemy to his fleet, which must lie at or somewhere near Rockaway: time, distance, and the direction of the respective marches, would make, very naturally, such a manœuvre a part of the plan of defence. Against an enemy landing in Gravesend bay, no such manœuvre could be effectual, on account of the shortness of his line of march, as well as of its direction.

In view of these considerations, the board of engineers projected additional works—one for the *east bank*, and another for the *middle ground*; these positions being on shoals on either hand of the bar, outside of Sandy Hook. Before determining on the works last mentioned, the board went into much research in order to ascertain whether these shoals were unchangeable; and it was thought to have been fully proved that there had been no material alteration in more than sixty years. This apparent stability of the shoals encouraged the board to devise the project referred to.

Recent surveys have, however, discovered a new, or rather another channel. If it be indeed a *new* channel, it shows a want of stability in the shoals, that forbids any such structures as the contemplated batteries; and it may be necessary to resort to other means. Suitable means exist, unquestionably, though it may not be best to decide on them until all doubt as to the fixed or changing nature of the channel shall be removed; especially as it must necessarily be some time before the completion of more indispensable works will allow the commencement of these. This may, however, be said with certainty, namely: that, all other means failing, works may be erected on Sandy Hook, which will have a good action upon the channel, and under cover of which bomb-ketches or steam batteries, or both, may lie. With such an arrangement, there would be little probability of the lower bay being occupied as a blockading station.

To recapitulate: The security of the city of New York and the navy-yard requires, first, defences on the passage from the sound; namely, the completion of Fort Schuyler on Throg's point, and the erection of a fort on Wilkins's point—cost of both $976,000: second, the repair of works on Governor's island, on Bedlow's island, and on Ellis's island—estimated cost $170,897: third, the repair of the works at the narrows, including the works belonging to the State—cost $475,000; and, fourth, the erection of outer defences on or near Sandy Hook, estimated by the board of engineers to cost $3,362,824.

The total cost, exclusive of these last, will therefore be $1,621,897; or, including these, $4,984,721. (Statement 1, tables A, C, and F.)

Delaware bay, Fort Delaware, Fort Mifflin, Delaware breakwater.—The coast from the mouth of the Hudson to the Chesapeake, as well as that on the south side of Long Island, is low and sandy, and is penetrated by several inlets; but not one, besides the Delaware, is navigable by sea-going vessels. The Delaware bay itself being wide, and full of shoals, having an intricate channel, and being much obstructed by ice in the winter, affords no very good natural harbor within a reasonable distance of the sea.

The artificial harbor now in course of construction near Cape Henlopen will, it is hoped, fully supply this need; in which event, it must be securely fortified. No plans have, however, as yet been made with that object; and as to the probable cost, nothing better can now be done than to assume the conjectural estimate made some years since in the Engineer Department, namely, $600,000. (Statement 1, table F.)

The lowest point at which the bay is defensible is at Pea-patch island, about forty-five miles below the city of Philadelphia. A fort on that island, to replace the one destroyed by fire; a fort opposite the Pea-patch, on the Delaware shore, to assist in commanding the Delaware channel, and at the same time protect the mouth of the Delaware and Chesapeake canal; a temporary work on the Jersey shore, to be thrown up at the commence-

ment of a war, to assist in closing the channel on that side; together with floating obstructions, to be put down in moments of peril, will effectually cover all above this position—including Philadelphia, and its navy-yard, Wilmington, New Castle, the canal before mentioned, and the Philadelphia and Baltimore railroad.

The commencement of the rebuilding of Fort Delaware being delayed by difficulties attending the settlement of new claims to the island on which it is to stand, Fort Mifflin, which is an old work, about seven miles below the city of Philadelphia, has been put in good order. This work is ready to receive its armament and its garrison.

The expense of the work on Fort Delaware may be estimated at $491,000, and of the fort opposite $521,000. (Statement 1, tables C and F.)

Chesapeake bay.—The board of naval officers and engineers intrusted with the selection of sites for a great northern and a great southern naval depot, recommended, in their joint reports of 1819 and 1820, Burwell's bay, on James river, for the one; and Charlestown, in Boston harbor, for the other. They also recommended Boston harbor and Narraganset bay, at the north, and Hampton roads, at the south, as chief naval rendezvous. In those reports the commissioners entered at large into the consideration of all the matters relating to these important objects, and reference is now made to those reports for many interesting details.

Hampton roads, James river, Norfolk, and the navy-yard.—The works projected for the defence of these are, 1st, a fort at Old Point Comfort—this is called Fort Monroe; 2d, a casemated battery, called Fort Calhoun, on the Rip Rap shoals, opposite Old Point Comfort; and 3d, a line of floating obstructions extending across the channel from one of these works to the other. It was the opinion of the commission above mentioned, that, in the event of a great naval depot being fixed on James river, it might ultimately be proper to provide additional strength by placing works on the positions of Newport news, Wassaw shoals, and Craney Island flats. Such an expansion has, however, since then, been given to the present navy-yard at Gosport, (opposite Norfolk,) that there is little probability of any other position on these waters being occupied for such purposes.

The great importance of retaining Hampton roads during a war, and of covering the navy-yard, is conceded on all hands. The bearing of this harbor upon the general defence of the Chesapeake bay is, perhaps, equally well understood; it being very evident that a small hostile force would reluctantly venture up the bay, or into York river, or the Rappahannock, or any of the upper harbors, leaving behind them a great naval station, and the common rendezvous of the southern coast—a station seldom, in time of war, without the presence of a number of vessels just ready for, or just returned from, sea.

A very important bearing upon the security of Norfolk and the navy-yard, independent of the closing the channel to those places, is, however, not generally understood; and has been entirely overlooked in the official animadversions (before mentioned) on the system of defence of the board of engineers.

If we suppose no defences at the mouth of the roadstead, or only such as can be disregarded, or easily silenced, an enemy might debark his troops in Lynnhaven bay, and despatch them against Norfolk, while his fleet would pass up the harbor to the vicinity of the town, not only covering the flank of his troops, but landing parties to turn any position that might be taken by

the army attempting to defend the place; or, instead of landing in the bay, he might, at his option, land the main body quite near to Norfolk; and having possession of James river, he would prevent the arrival of any succor in steamboats, or otherwise, by that channel.

There are two or three defiles on the route from Lynnhaven bay to Norfolk, caused by the interlocking of streams, that, with the aid of field-works, would possess great strength; and, being occupied in succession, would undoubtedly delay, if not repulse, an enemy assailing them in front. Since the naval depôt seems fixed at Gosport, these must, indeed, be chiefly relied on for its security from land attacks; and timely attention must be given, on the breaking out of a war, to the occupying of these defiles with appropriate defences. These positions possess no value whatever, if they can be turned; and, without adequate fortifications at the outlet of Hampton roads, there would seem to be no security for Norfolk or the navy-yard, except in the presence of a large military force.

On the completion of the projected defences, the circumstances will be very different. Then, those defiles must be attacked in front, because no part of the enemy's force can be landed above the mouth of the roads. But this is not all. The moment an enemy advances toward Norfolk from this point of debarcation, his communication with his fleet will be jeoparded; because, as the defiles do not require a large body to defend them against an attack in front, the greater part of the reinforcements arriving from above, by way of the river, may be landed upon his flanks, or in his rear. An offensive land movement by the enemy, under such circumstances, could be justified only in the case of his finding an entire want of preparation, caused by the unexpected commencement of hostilities. In connexion with this disposition for defence, it may be expedient, on the opening of a war, to throw up a field-work on the shore opposite the position of Fort Calhoun; which would, besides, contribute to the exclusion from the roadstead of vessels of small draught.

The above remarks show that the fortifications in progress are not less necessary to the security of the navy-yard and the city of Norfolk from a land attack, than from an attack by water; and that both these important functions are superadded to the task of defending the only good roadstead of the southern coast, and of contributing, in a very important degree, towards the defence of the Chesapeake bay.

As in the case of Narraganset roads, it has been objected to this system of defence, that, although it may shut up this anchorage, it leaves others in this region open. May we suppose, then, that if there were no other than this harbor, its defence would be justifiable? If so, it would seem that the objection rests on the principle, that, in proportion as nature has been bountiful to us, we must be niggard to ourselves; that, having little, we may cherish it; but, having much, we must throw all away.

The same criticism complains of the unreasonable magnitude of one of these works, (Fort Monroe;) and we concede that there is justice in the criticism. But it has long been too late to remedy the evil. It may not, however, be improper to avail of this opportunity to remove from the country the professional reproach attached to this error. When the system of coast defence was about to be taken up, it was thought best, by the Government and Congress, to call from abroad a portion of that skill and science which a long course of active warfare was supposed to have supplied. Fort Monroe is one of the results of that determination. It was

not easy, probably, to come down from the exaggerated scale of warfare to which Europe was then accustomed; nor, for those who had been brought up where wars were often produced, and always magnified, by juxtaposition or proximity, to realize to what degree remoteness from belligerant nations would diminish military means and qualify military objects. Certain it is, that this experiment, costly as it was in the case of Fort Monroe, would have been much more so but for the opposition of some whose more moderate opinions had been moulded by no other circumstances than those peculiar to our own country.

The mistake is one relating to magnitude, however; not to strength. Magnitude, in fortification, is often a measure of strength; but not always, nor in this instance. Fort Monroe might have been as strong as it is now, against a water attack, or an assault, or a siege, with one-third its present capacity, and perhaps at not more than half its cost. We do not think this work too strong for its position, nor too heavily armed; and as the force of the garrison will depend mainly on the extent of the armament, the error has caused an excess in the first outlay chiefly, but will not involve much useless expense after completion.

Although there is much important work to be done to complete the fort, it is even now in a state to contribute largely to the defence of the roadstead; and there is no doubt that in a very short time all the casemated parts may be perfectly ready to receive the armament.

This work will be found in statement 1, table C; $223,367 being required to complete it.

Fort Calhoun cannot yet be carried forward, for want of stability in the foundation. The artificial mass on which it is to stand having been raised out of the water, the walls of the battery were begun some years since; but it was soon found that their weight caused considerable subsidence. On an inspection by engineer officers, it was then decided to keep the foundations loaded with more than the whole weight of the finished work, until all subsidence has ceased. The load had hardly been put on, however, before it was injudiciously determined to take it off, and begin to build, although the settling was still going on. Happily a better policy prevailed before the construction was resumed; but not before the very considerable expense of removing the load had been incurred, and the further expense of replacing it rendered necessary. It is hoped the whole load will be replaced early the present year. (Statement 1, table C.) Required to complete the work $416,000.

It may be expedient, in time of war, by way of providing interior barriers, to erect batteries on Craney island, at the mouth of Elizabeth river; and to put in condition and arm old Fort Norfolk, which is just below the city.

Harbor of St. Mary's.—The central situation (as regards the Chesapeake) of this fine basin, its relation to the Potomac, its depth of water, and the facility with which it may be defended, indicate its fitness as a harbor of refuge for the commerce of the Chesapeake bay, and as an occasional, if not constant, station during war of a portion of the naval force. A survey has been made, but no project has been formed. The Engineer Department, some years ago, conjectured that the cost of defences in this harbor might amount to $300,000. (Statement 1, table F.)

Annapolis harbor.—No surveys or plans of defence have been made. The existing works are inefficient and quite out of repair. A former esti-

mate, made by the Engineer Department, amounting to $250,000, is adopted here. (Statement 1, table F.)

Harbor of Baltimore.—The proximity of the city to Chesapeake bay greatly endangers the city of Baltimore. In the present state of things, an enemy in a few hours' march, after an easy landing, and without having his communication with his fleet seriously endangered, can make himself master of that great emporium of commerce. There are required for its security two forts on the Patapsco—one at Hawkins point, and the other opposite that point, at the extreme end of the flat that runs off from Sollers point; these being the lowest positions at which the passage of the Patapsco can be defended. Besides the advantages that will result, of obliging the enemy to land at a greater distance—thereby gaining time, by delaying his march, for the arrival of succor, and preventing his turning the defensive positions which our troops might occupy—it will be impossible for him to endanger the city by a direct attack by water.

The present Fort McHenry, redoubt Wood, and Covington battery, should be retained as a second barrier. The first-mentioned is now in good condition, and the repairs required for the others may be applied at the beginning of a war.

The fort on Sollers point flats, which should be first commenced, is estimated to cost $1,000,000. (Statement 1, table D.)

The fort on Hawkins point (to be found in statement 1, table F) will cost, it is supposed, $376,000.

Mouth of Elk river.—The completion of the line of water communication from the Delaware to the waters of the Chesapeake makes it proper to place a fort somewhere near the mouth of Elk river, in order to prevent an enemy from destroying, by a sudden enterprise, the works forming this outlet of the canal. There have been no surveys made with a view to establish such protection, which are estimated at $50,000. (Statement 1, table F.)

Cities of Washington, Georgetown, and Alexandria.—Fort Washington covers these cities from any attack by water, and will oblige an enemy to land at some eight or ten miles below Alexandria, should that city be his object, and about twice as far below Washington. It will also serve the very important purpose of covering troops crossing from Virginia with a view to fall on the flanks of an enemy moving against the capital from the Patuxent or the Chesapeake. To put the necessary repairs on Fort Washington will cost about $20,000. (See statement 1, table A.)

Cedar point, Potomac river.—But all these objects would have been better fulfilled had the work been placed at Lower Cedar point. As it is, however, the contemplated works being constructed in the Patuxent, and the militia of the surrounding country in a due state of preparation, an enterprise against Washington would be a hazardous one.

As giving complete security to the towns in the District, covering more than sixty miles in length of the Potomac, and a large tract of country lying between the Potomac and the Patuxent, the work on Cedar point should not be omitted. There have been no surveys made of the ground, nor projects of the fort, which, in a conjectural estimate of the Engineer Department, was set down at $300,000. (Statement 1, table E.)

Patuxent river.—The more effectually to protect the city of Washington from a sudden attack by troops landed at the head of navigation in the Patuxent, and to provide additional shelter for vessels in the Chesapeake, a fort has been planned to occupy Point Patience, and another to occupy

Thomas's point, both a short distance up the river. The work on Thomas's point is (in statement 1, table D) estimated $250,000; and the work on Point Patience, (in statement 1, table F,) estimated to cost $246,000.

It will be perceived that the system of defence for Washington contemplates, first, defending the Potomac on Cedar point, and maintaining a second barrier at Fort Washington; second, defending the mouth of the Patuxent. This system is criticised, in the document before referred to, in a way to induce the suspicion that it was not understood.

During the last war, there was no fort in the Patuxent; and the consequence was, that the British approached by that avenue, and occupied the whole river as high as Pig point—nearly fifty miles from its mouth, and less than twenty miles from the capital; while, in consequence of there being no forts in the Potomac, they occupied that river as high as Alexandria, inclusive; by this latter occupation, perfectly protecting the left flank of the movement, during its whole advance and retreat. Both flanks being safe, the British had nothing to fear except from a force in front; and that this risk was not great, in the short march of less than twenty miles from his boats, was proved by the issue.

On the ninth day from that on which the fleet entered the Chesapeake, the English army was in possession of the capital, having penetrated near fifty miles beyond the point of debarcation. On the twelfth day from the time of landing, the troops were again on ship-board, near the mouth of the river. This attack, exceedingly well conceived, and very gallantly executed, owed its success entirely to the want of defences, such as are now proposed.

Let us suppose both rivers fortified as recommended, and an enemy landed at the mouth of the Patuxent. If now he attempt this enterprise, his march will be prolonged by at least four days; that is to say, it will require more than sixteen days, during which time he will be out of communication with his fleet, as regards supplies and assistance.

The opposition to his invasion will begin at the landing, because our troops having now nothing to fear as to their flanks, either from the Potomac or Patuxent, will dispute every foot of territory; and although he should continue to advance, it must be at a slower rate.

While he is thus pursuing his route towards Washington, the forces of Virginia will be crossing the Potomac, and concentrating at Port Tobacco, or some position between that place and Fort Washington, preparatory to falling on his flank and rear. This would seem to be conclusive; for it is difficult to conceive of troops persevering in an expedition, when every moment will not only place them farther from succor, but greatly increase their need of it. Railroads reach from near the crossing-places of the Potomac to the very heart of the country south; and a very few days would bring forward a large force, all of which would arrive upon the rear of the enemy.

It is said, in the criticism, that, if shut out of the Patuxent, the enemy might land between the mouth of that river and Annapolis, and thence proceed against Washington. But the same difficulties belong to this project, and a new difficulty is added. The Virginia forces arrive, as before, and assail his flank, either between the Potomac and Patuxent, or between the Patuxent and the Chesapeake; and there is, besides, the Patuxent for the enemy to cross, both in going and returning—itself a formidable military obstacle.

It is said, also, that the landing may be made in the Potomac; but this only proves that the system animadverted on had not been studied, it being a fundamental principle of the system that such landing must be prevented by fortifying the rivers as low down as possible.

The southern coast, stretching from Cape Hatteras to the southern point of Florida, is invariably low, and, for the greater part, sandy; much resembling the coast from the abovementioned cape to Montauk point, on the east end of Long Island.

A ridge of sand, here and there interrupted by the alluvion of the rivers, extends through its whole length. This ridge, in certain portions, lies on the main land; while, in others, it is divided therefrom by basins or "sounds" of various width and depth; and is cut up into islands by numerous channels which connect these interior waters with the sea. Wherever this sand ridge is interrupted, its place is occupied by low and marshy grounds, bordering the principal and the many lesser outlets of the rivers.

Ocracock inlet, N. C.—The shallowness of the water on the bars at this inlet effectually excludes all vessels of war—at least, all moved by sails. But as this is an outlet of an extensive commerce, and as, through this opening, attempts might be made in small vessels, barges, or the smaller class of steam-vessels, to destroy this commerce, or to interrupt the line of interior water communication, timely preparation must be made of temporary works equal to defence against all such minor enterprises.

Beaufort harbor, N. C.—A work called Fort Macon has been erected for the defence of this harbor, which will require some repairs. Some operations are also called for to protect the site from the wearing action of the sea. (Statement 1, table A.) Estimate $10,000.

Mouths of Cape Fear river, N. C.—The defence of the main channel of Cape Fear requires, in addition to Fort Caswell, (now nearly completed,) on Oak island, another fort on Bald Head. And the defence of the smaller channel will require a redoubt on Federal point. The battery-magazine, block-house, &c., at Smithville, should remain as accessories. *Fort Caswell*, Oak island, (statement 1, table C,) requires $6,000 to complete it; the *fort on Bald Head* (statement 1, table F) will require $180,000; the *redoubt on Federal point* (statement 1, table F) will require $18,000; and the battery, &c., called *Fort Johnston*, at Smithville, (statement 1, table A,) $5,000.

Georgetown harbor, S. C.—The first inlet of any consequence south of Cape Fear river is at the united mouths of the Waccamaw, Pedee, and Black rivers, forming Georgetown harbor; which is a commodious and capacious bay, having sufficient water within, and also upon the bar near the mouth, for merchant vessels and small vessels of war. A survey of this harbor was begun many years ago, but never completed; and no projects for defence have been made. It is probable that a work placed near Moscheto creek, or on Winyaw Point, would give adequate strength at the cost of about $250,000, (statement 1, table E.)

Santee river and Bull's bay.—About ten miles south from Georgetown are the mouths of the Santee, the largest river in South Carolina. It is not known whether the bars at the mouths of this river have sufficient water for sea-going vessels. The same uncertainty exists as to the depth into Bull's bay. It may be sufficient to consider these, and the other inlets between Georgetown and Charleston, as calling for small works, capable of resisting boat enterprises, and to assign as the cost $100,000. Should they prove to be navigable for privateers, they will require a larger expenditure. (Statement 1, table F.)

Charleston, S. C.—This city, situated at the junction of Ashley and Cooper rivers, is about five miles, in a direct line, from the sea. Between it and the ocean there is a wide and safe roadstead for vessels of any draught. Upon the bar, lying three or four miles outside of the harbor, there is, however, only water enough for smaller frigates and sloops of war. On the southwest side of the harbor is James's island, in which are several serpentine passages, more or less navigable for boats, barges, and small steam-vessels: some of them communicate directly with the sea and Stono river. Whappoo cut, the most northerly passage from the Stono to Charleston harbor, enters Ashley river opposite the middle of the city.

Interior natural water communications exist, also, to the southwest of Stono river, connecting this with North Edisto river; the latter with South Edisto and St. Helena's sound; this, again, with Broad river; and, finally, this last with Savannah river.

On the north side of the harbor of Charleston lies Sullivan's island, separated from the main by a channel navigable only by small craft. On the northwest side of this island is an interior water communication, which extends to Bull's bay, and even beyond, to the harbor of Georgetown.

From this sketch it is apparent that it will not do to restrict the defences to the principal entrance of the harbor. The lateral avenues must also be shut. And it is probable that accurate surveys of all these avenues will show that the best mode of defending them will be by works at or near the mouths of the inlets, as the enemy will be kept thereby at a greater distance from the city; the lesser harbors formed by these inlets will be protected; and the line of interior water communication will be inaccessible from the sea.

No position for the defence of the principal entrance to Charleston harbor can be found nearer to the ocean than the western extremity of Sullivan's island. This is, at present, occupied by Fort Moultrie—a work of some strength, but by no means adequate to its object; its battery being weak, and the scarp so low as to oppose no serious obstacle to escalade. How far this work, by a modification of its plan and relief, may be made to contribute to a full defence of the harbor, has not yet been determined. But so long as it is the only work at this, the principal point of defence, it must be kept in good condition for service; and no alterations that will disturb this efficiency should be undertaken. The repairs now indispensable will cost $10,000. (Statement 1, table A.)

On a shoal nearly opposite to Fort Moultrie, the foundation of a fort has been begun, which will have a powerful cross-fire with Fort Moultrie. This is called Fort Sumter. (Statement 1, table C.) To complete this work will require, it is estimated, $286,000.

In the upper part of the harbor is Castle Pinckney, on Shuter's Folly island. This requires some repairs, estimated at $7,000. (Statement 1, table A.)

Stono, North Edisto, and South Edisto.—All these must be fortified, at least in such a manner as to protect these inlets from enterprises in boats or small vessels. To that end, $50,000 may be assigned to each. (Statement 1, table F.)

St. Helena sound.—The proper defences cannot be pointed out till the sound shall have been surveyed. Although there is supposed to be no great depth of water on the bar, it is known to be navigable for the smaller class of merchantmen, and for steamboats, and to have a navigable commu-

nication with the head of Broad river, or Port Royal: intersecting the interior navigation between Charleston and Savannah. The estimate is $150,000. (Statement 1, table F.)

Broad river, or Port Royal roads.—The value of this capacious roadstead, as a harbor of refuge, depends on the depth that can be carried over the bar; on the distance of this bar beyond the line of coast; and on the means that may be applicable of lessening the danger of crossing it. This is supposed to be the deepest bar on the southern coast. Should there prove to be water enough for frigates, and should it be practicable to make the passage over the bar safe and easy, by the erection of light houses on the shore, and lights, or other distinct guides, on the bar, this harbor, situated within 60 miles of the city of Charleston, and 20 of Savannah river, intersecting the interior water-communication between these cities, thereby securing the arrival of supplies of every kind, would possess a high degree of importance, not only as a harbor of refuge, but also as a naval station.

The survey of the exterior shoals, constituting the bar, should be made with the greatest care and all possible minuteness. Only when this shall have been done, can the true relation of this inlet to the rest of the coast be known; and on this relation the position and magnitude of the required defences will depend. For the present, the estimate made some years ago by the Engineer Department is adopted, namely, $300,000. (Statement 1, table E.)

Savannah, and mouth of Savannah river, Georgia.—Mention has been made of the natural interior water-communication along the coast of South Carolina. A similar communication extends, south from the Savannah river, as far as the St. John's, in Florida. Owing to these passages, the city of Savannah, like Charleston, is liable to be approached by other avenues than the harbor or river; and, accordingly, its defences must have relation to these lesser, as well as great, channels.

The distance from the mouth of Wassaw sound, or even Ossabaw sound, (both to the southward of Savannah river,) to the city, is not much greater than from the mouth of the river; and an enterprise may proceed the whole distance by water, or part of the way by water and part by land, from either inlet, or from both. As in the case of like channels in the neighborhood of Charleston, it cannot now be determined where they can be defended most advantageously. It is hoped, however, that the localities will permit the defences to be placed near the inlets; because, thus placed, they will serve the double purpose of guarding the city of Savannah and covering these harbors, which, in time of war, cannot but be very useful.

The defence of Savannah river is not difficult. A fort on Cockspur island, lying just within the mouth, and, perhaps, for additional security, another on Tybee island, which forms the southern cape at the mouth of the river, would prevent the passage of vessels up the channel, and cover the anchorage between Tybee and Cockspur.

Old Fort Jackson, standing about four miles below the city, should be maintained as a second barrier, both as respects the main channel and the passages which come into the river from the south; which last would not be at all controlled by works on Cockspur or Tybee. Fort Pulaski, on Cockspur island, is well advanced; and, to a certain extent, is even now efficient, measures being now in hand for mounting the lower tier of guns. $215,000 are required to complete the works, and the out-works and appendages. (Statement 1, table C.) To fortify Tybee island may require

$120,000. (Statement 1, table E.) And to repair Fort Jackson, $50,000. (Statement 1, table A.)

Wassaw sound, Ossabaw sound, St. Catharine's sound, at the mouth of Medway river; Sapelo sound, Doby inlet, Altamaha sound, at the mouth of Altamaha river; St. Simon's sound, at the mouth of Buffalo creek; St. Andrew's sound, at the united mouths of the Scilla and Santilla rivers; and Cumberland sound, at the mouth of St. Mary's river.—All these communications with the ocean are highly important, as regards the line of interior navigation, and several of them as affording access to excellent harbors. The last, and one or two others, are known to be navigable to the largest sloops of war and merchantmen; and some of the others are but little inferior, as regards depth of entrance or safety of anchorage.

All these openings have yet to be surveyed. Some of them are probably easily defensible by forts and batteries, while others may require the aid of floating defences.

It is an important principle, bearing peculiarly on the defence of the whole southern coast, that, on a shore possessing few harbors, it is at the same time more necessary to preserve them all for our own use, and more easy to deprive an enemy of that shelter, without which a close blockade cannot be maintained. This principle is enforced, in the instance of our southern coast, by the two following weighty considerations, namely: first, its remoteness from the nearest naval rendezvous, the Chesapeake, which is, on a mean, 600 miles distant, and to leeward both as to wind and current; and, second, its being close upon the larboard hand, as they enter the Atlantic, of the great concourse of vessels passing, at all seasons, through the Florida channel. While, therefore, this part of the coast, from the concentration of vessels here, is in great need of protection of some sort, naval aid can be extended to it only with difficulty, and at the risk of being cut off from all retreat by a superior enemy.

Accurate and minute surveys, which will enable our vessels, whether pursued by an enemy or suffering by stress of weather, to shun the dangers which beset the navigation of these harbors, and properly arranged defences to cover them when arrived, seem to be indispensable.

When these harbors shall be fortified, the operation of investing the coast, and watching the great outlet of commerce through the Florida passage, will be a difficult and hazardous one to an enemy, to whom no perseverance or skill can avail to maintain a continuous blockade; while, on the part of our small vessels of war, steam-frigates, and privateers, the same sort of supervision will be at all times easy and safe.

Nothing better can now be done, than to assume $200,000 as the average cost of defending each of the nine entrances; giving a total of $1,800,000. (Statement 1, tables E and F.)

St. Augustine, Florida.—This, the most southern of the harbors on the Atlantic, and the key to the eastern portion of Florida, is accessible to the smaller class of merchantmen, to privateers, and to steam-vessels; and requires a certain amount of protection from attacks by water. It is, therefore, proposed to put that part of the old Spanish fort (Fort Marion) that commands the harbor in a serviceable state, which will require $50,000. (Statement 1, table A.)

Having now passed along the whole Atlantic coast, from Passamaquoddy to Cape Florida, pointed out every harbor of any consequence, and specified every work that a thorough system of defence will require, we will, in

order to give a comprehensive view of the number, cost, armament, and garrisons of the works, refer to statement 1, accompanying this report. In that statement the works are divided into tables, showing, separately, 1st, (table A,) the old works already repaired, and those proposed to be repaired and retained in the system of defence; 2d, (table B,) new works completed; 3d, (table C,) works under construction; 4th, (table D,) works to be first commenced; 5th, (table E,) works to be commenced next after those in table D; 6th, (table F,) works to be last commenced.

The most essential works on the Atlantic coast are included in the first five tables; and it appears from the recapitulation, that for these there will be required, for garrisons in time of war, 28,720 men; for the armament, 5,748 pieces of ordnance of every kind; and for the expense yet to be incurred, $9,476,767.

We consider it to be our duty to estimate for the last class of works also, (table F,) although it must be a long time before permanent works for these positions can be commenced. For these there will be required, in addition, for war garrisons, 25,545 men; for armament, 4,790 pieces of ordnance; and for the expense of erection, $14,241,824.

It must be here stated, that, as to a few of the works in table F, fuller information may require them to be elevated into some of the earlier classes.

SEACOAST FROM CAPE FLORIDA TO THE MOUTH OF THE SABINE.

The first positions that present themselves, on doubling around Cape Florida into the Gulf of Mexico, are *Key West* and *the Dry Tortugas.*

This board concur in the opinions heretofore expressed in favor of these fine harbors; and they beg leave to refer for very interesting statements, in relation to the latter harbor especially, to a letter from Commodore Rodgers to the Secretary of the Navy, July 3, 1829, (Senate documents, 1st session 21st Congress, vol. 1, No. 1, page 236;) and letter from the Secretary of the Navy, March 25, 1830, (Senate documents, 1st session 21st Congress, vol. 2, No. 111, page 1.)

A naval force, designed to control the navigation of the Gulf could desire no better position than Key West or the Tortugas. Upon the very wayside of the only path through the Gulf, it is, at the same time, well situated as to all the great points therein. It overlooks Havana, Pensacola, Mobile, the mouths of the Mississippi, and both the inlet and the outlet of the Gulf.

The Tortugas harbors, in particular, are said to afford perfect shelter for vessels of every class, with the greatest facility of ingress and egress. And there can be no doubt that an adversary in possession of large naval means would, with great advantage, make these harbors his habitual resort, and his point of general rendezvous and concentration for all operations on this sea. With an enemy thus posted, the navigation of the Gulf, by us, would be imminently hazardous, if not impossible; and nothing but absolute naval superiority would avail any thing against him. Mere military means could approach no nearer than the nearest shore of the continent.

It is believed that there are no harbors in the Gulf at all comparable with these, that an enemy could resort to with his larger vessels. To deprive him of these, would, therefore, be interfering materially with any organized system of naval operations in this sea. The defence of these harbors would, however, do much more than this. It would transfer to our

own squadron, even should it be inferior, these most valuable positions: and it would afford a point of refuge to our navy and our commerce, at the very spot where it would be most necessary and useful.

In this report, already too much extended, we forbear to enlarge on this topic, merely adding that the complete and certain defence will not be difficult. By occupying two, or at most three, small islands, the harbors of the Dry Tortugas (there being an inner and an outer harbor) may be thoroughly protected. The works must be adequate to resist escalade, bombardment, and cannonade from vessels, and to sustain a protracted investment; but as they will not be exposed to any operation resembling a siege, there can be no difficulty in fulfilling the conditions. They must have capacious store-rooms, be thoroughly bomb-proof, and be heavily armed.

The fortification of Key West should be of a similar character.

No details can be given until all these positions have been minutely surveyed with reference to defence.

The sum of $3,000,000 was, some years ago, assumed by the Engineer Department as necessary to provide defences for the Tortugas and for Key West: and this estimate may now be taken as ample. (Statement 2, table F.)

Turning now to the shore of the Gulf, we find a portion, namely, from Cape Florida to Pensacola, that has never been examined with particular reference to the defence of the harbors. Within this space there are *Charlotte harbor*, *Espiritu Santo bay*, *Appalachicola bay*, *Appalachie bay*, *St. Joseph's bay*, and *Santa Rosa bay*. Nothing better can now be done than to assume for these the estimate formerly presented by the Engineer Department, viz: $1,000,000 for all. (Statement 2, table F.)

It may be remarked, as applying to the whole Gulf coast, that, from the relative geographical position of this part of the seaboard, and the country interested in its safety, from the unhealthiness of the climate, nature of the adjacent country, and mixed character of the inhabitants, it will be some time before that portion within supporting distance, whose welfare may be endangered by an enemy, will be competent, of itself, to sustain a serious attack from without. Upon the Atlantic seaboard, the Alleganies crowd the people down upon the shore; every important point on the coast being surrounded by a population dense now, and every day rapidly increasing in numbers; while the ocean and the interior parallel communications transmit rapid aid to the right and left. The coast of the Gulf, however, is thinly peopled in itself, is remote from succor from behind, and is almost inaccessible to lateral assistance. Those reasons, therefore, which tend to establish the necessity of an organized, permanent, and timely system of defence for the whole seaboard of the United States, apply to this part of it with peculiar force.

We now pass on to the remaining points of defence on the Gulf.

Pensacola bay.—The upper arms of this considerable bay receive the Yellow-water or Pea river, Middle river, and Escambia river. The tributaries of the last, interlocking with the Alabama and the Chattahoochie, seem to mark the routes whereby, at some future day, canals will convey a part of the products of these rivers to Pensacola; while the qualities and position of the harbor, and the favorable nature of the country, have already marked out lines of railroad communication with a vast interior region.

Santa Rosa sound extends eastward, from the lower part of the bay, into Santa Rosa bay. On the west, the lagoons of Pensacola, Perdido, and Mobile bays, respectively, interlock in such a manner as to require but a few

miles of cutting to complete a navigable channel from the first to the last named bay, and thence, through an existing interior water communication, to the city of New Orleans.

Pensacola bay has rare properties as a harbor. It is now accessible to frigates, and there is reason to hope that the bar may be permanently deepened.

The bar is near the coast, and the channel across it straight and easily hit. The harbor is perfectly land-locked, and the roadstead very capacious. There are excellent positions within, for repairing, building, and launching vessels, and for docks and dock-yards, in healthy situations. The supply of good water is abundant. The harbor is perfectly defensible. These properties, in connexion with the position of the harbor, as regards the coast, have induced the Government to select it as a naval station and place of rendezvous and repair.

An excellent survey has been made of the bay of Pensacola, sufficing to form the scheme of defence for the town and harbor. Regarded, however, as an important naval station, and place of rendezvous and repair, which it now is, further surveys, extending a greater distance back from the shores, delineating accurately the face of the country, and showing the several avenues by land and water, are found to be necessary.

The defences of the water passage, as projected, are nearly complete, $22,000 being asked to finish them. A work is just begun at the position of the Barrancas. It is indispensable, in connexion with one or two other small works designed to cover the navy-yard from a lateral attack through the western bays. The Barrancas work may require $100,000, and the others $200,000; making a total for Pensacola of $322,000. (Statement 2, tables A, C, and F.)

Perdido bay.—This bay is intimately related to Pensacola and Mobile bays, both as regards security and intercommunication, and should be carefully surveyed with a view to these objects. It must be fortified, and the cost may be $200,000. (Statement 2, table F.)

Mobile bay.—The plan of defence for this bay comprises a fort, now needing some repairs, for Mobile point. Another fort is projected for Dauphin island, and a tower for the defence of Pass-au-Heron. The estimates for all require $915,000. (Statement 2, tables A, E, and F.)

New Orleans and the delta of the Mississippi.—The most northern water communication between the Mississippi and the Gulf is by the passage called the Rigolets, connecting Lake Borgne and Lake Pontchartrain. The next is the pass of Chef Menteur, also connecting these lakes. Through these passages, an enemy, entering Lake Pontchartrain, would, at the same time that he intercepted all water communication with Mobile and Pensacola, be able to reach New Orleans from the southern shore of the lake; or he might continue onward, through Lake Maurepas, Amité river, and Iberville river, thereby reaching the Mississippi at the very head of the delta: or, landing within the mouths of the Chef Menteur, he might move against the city along the ridge of the Gentilly road.

To the southwest of Chef Menteur, and at the head of Lake Borgne, is Bayou Bienvenue, a navigable channel, (the one followed by the English army in the last war,) not running quite to the Mississippi, but bounded by shores of such a nature as to enable troops to march from the point of debarcation to the city.

These avenues are defended by Fort Pike, at the Rigolets; by Fort Wood, at Chef Menteur; by a small fort at Bayou Bienvenue; and by a tower at Bayou Dupré.

The defences of the Mississippi are placed at the Plaquemine turn, about seventy miles below New Orleans—the lowest position that can be occupied. Fort Jackson is on the right bank, and Fort St. Philip, a little lower down, on the left.

All these forts have been abandoned for several years; and, having received no attention in the way of timely repairs, now require repairs somewhat extensive—especially Forts Jackson and St. Philip, on the Mississippi. The following sums, it is believed, will be required to place all these works in perfect order, viz: Fort Pike, $5,000; Fort Wood, $3,580; fort on Bayou Bienvenue, $2,500; Tower Dupré, $400; Fort Jackson, $20,000; and Fort St. Philip, $3,300. (Statement 2, table A.)

The most western avenue by which New Orleans is approachable from the sea, passes on the west side of the island of Grande Terre into Barrataria bay, which is an excellent harbor for a floating force, guarding the coasting trade on that side of the Mississippi. From this bay there are several passages leading to New Orleans. The estimate for a work which is now about to be begun on Grande Terre island is $325,000. (Statement 2, table C.)

Several times in this report we have alluded to circumstances which would demand the employment of floating defences, in addition to fixed defences upon the shore. We have here an instance in which that kind of defence would be very useful. Fortifications will enable us to protect New Orleans even from the most serious and determined efforts of an enemy; but, owing to the great width of some of the exterior passages, we cannot, by fortification alone, deprive an enemy of anchorages, (especially that of Chandeleur island,) nor cover entirely the exterior water communication between the Rigolets and Mobile. We must, therefore, either quietly submit to the annoyance and injury that an enemy in possession of these passages may inflict, or avert them by a timely preparation of a floating force adapted to their peculiar navigation, and capable, under the shelter of the forts, of being always on the alert, and of assuming an offensive or defensive attitude, according to the designs, conduct, or situation of the enemy.

Our examination of the coast, from Cape Florida to the Sabine, having now been completed, we will, as in the case of the Atlantic coast, refer, for a comprehensive view of the number, cost, armament, and garrison of the works, to statement 2, wherein the works are divided into tables similar to those of statement 1.

The more essential works on the Gulf coast, included in the first five tables, will require for garrison, in time of war, 4,420 men; for the armament, 794 pieces of ordnance of every kind; and for the expense yet to be incurred, $516,780.

The works comprised in the last table (F) are generally such as may be postponed to a late day. But among them have been placed some (as, for example, those for Tortugas and Key West) as to which the examination has not been sufficiently minute to decide to what class they really appertain.

In this age of great improvements in the means of locomotion, it would be unwise to decide, without pressing need, on the details of the floating force required at certain points on the Atlantic and Gulf of Mexico coasts—

perhaps even on the nature of the moving power. Although the probability undoubtedly is, that the power will be steam, genius may, in the interim, devise something still better than steam.

And we may here remark, in relation to the preparation of steam-vessels for warlike purposes generally, that wisdom would seem to direct a very cautious and deliberate progress. Every new vessel may be expected to surpass, in important particulars, all that had preceded; and, to surpass the more, as each succeeding vessel should be the result of careful study and trial of the preceding.

It may be considered unreasonable to expect that steam itself will give way to some agent still more potent, and at the same time not less safe and manageable. But it certainly is no more than probable that steam-vessels now under construction may be regarded almost as incumbrances within ten years.

A *deliberate* advance in this branch of naval construction is recommended the more, by our ability to construct these vessels in large numbers when needed, the timber being collected in the mean time.

Referring now to the tables which accompany this report:

Statement 1 includes all works from Passamaquoddy to Cape Florida; statement 2, all works from Cape Florida to the mouth of the Sabine; each statement comprising six tables, as before mentioned.

In relation to every work executed, in progress, or merely projected, the tables show the garrison, the ordnance of every description, the sums already expended, and the final cost.

As to works not yet planned, a portion of the same particulars are exhibited, founded on conjecture merely; of course, without laying claim to accuracy, but still as approximations, affording some indication of the final result.

It may be well to give here a summary of all these tables.

The works which are likely to be erected on the Atlantic, within a reasonable time, and which are regarded as necessary to a good system of defence, will require war garrisons, amounting to 28,720 men; and they will require a further expenditure of $9,176,767. Works called for in like manner upon the Gulf of Mexico coast, will need 4,420 men to garrison them, and a further expenditure of $516,780. Of the *whole coast*, therefore, the garrisons will amount to 33,140 men, and the expenditures to $9,993,547.

The remaining works comprised in table F, of both statements, will require 30,695 men, and cost $19,521,824.

Making the grand total for the whole seacoast of the United States, in garrisons for the works 63,835 men, and in cost $29,515,371.

In addition to these statements as to the fortifications, there are two corresponding statements of the cost of the ordnance, of the carriages, and of a certain supply of powder and shot, or shells, for each piece—one statement relating to the Atlantic coast, and the other to the Gulf of Mexico coast. From these it appears, that for the works likely to be erected on the Atlantic coast, within a reasonable time, (that is to say, for the works comprised in the first five tables, A, B, C, D, and E,) there will be needed 2,483 pieces of ordnance, and 4,511 carriages, which will cost $2,252,290.

For similar works on the Gulf of Mexico coast, there will be needed 296 pieces of ordnance, and 495 carriages, at a cost of $240,720.

The remaining works named in tables F, of both statements, will require, in addition, 5,447 guns and 5,554 carriages, which will cost $3,735,330.

Making the grand total required for the whole seacoast 8,226 guns and 10,560 carriages, at a cost of $6,228,340.

The time required to construct and put in order the whole system must depend on the amount of the annual appropriation. All that need now be said on the subject is, that in an undertaking necessarily involving so much time, and of such vital importance, there should be no relaxation of diligence. With all diligence, many years must necessarily be consumed. But the work may be too much hurried, as well as too much delayed. There is a rate of progress at which it will be executed in the best manner, and at the minimum cost. If more hurried, it will be defective in quality, and more costly if delayed.

France was at least fifty years completing her maritime and interior defences.

In the report presented by the Engineer Department, in March, 1836, (Senate document, 1st session 24th Congress, vol. 4, No. 293,) there is a demonstration of the actual economy that will result from an efficient system of seacoast defence; which is to the following effect, referring to the document itself for details.

There is first supposed to be an expedition of 20,000 men at Bermuda, or Halifax, ready to fall upon the coast. This will make it necessary, if there be no fortifications, to have ready a force at least equal, at each of the following points, namely: 1st. Portsmouth and navy-yard. 2d. Boston and navy-yard. 3d. Narraganset roads. 4th. New York and navy-yard. 5th. Philadelphia and navy-yard. 6th. Baltimore. 7th. Norfolk and navy-yard. 8th. Charleston, S. C. 9th. Savannah; and 10th. New Orleans; to say nothing of other important places.

At each of these places, except the last, 10,000 men drawn from the interior, and kept under pay, will suffice; the vicinity being relied on to supply the remainder. At New Orleans, 17,000 men must be drawn from a distance. In a campaign of six months, the whole force will cost at least $26,750,000.

The garrisons necessary to be kept under pay for the fortifications in these places will cost for the same time $8,430,500. The difference ($18,319,500) will then be only $3,448,156 less than the whole expense of building these defences, viz: $21,767,656. Whence it follows, that the expense of these erections would be nearly compensated by the saving they would cause in a single campaign.

All which is respectfully submitted.

JOS. G. TOTTEN,
Colonel Engineers.
S. THAYER,
Lieut. Colonel Engineers, Brev. Colonel.
T. CROSS,
Colonel, Assistant Quartermaster General.
G. TALCOTT,
Lieutenant Colonel Ordnance.

STATEMENT 1.

Of the fortifications constructed, constructing, or repairing, and of those from Passamaquoddy

Classification.	Designation of the works.	Garrison in war.	42-pounders.	32-pounders.	24-pounders.	18-pounders.	12-pounders.	Field-pieces.
	A.—*Old works repaired, and those proposed to be repaired, with the amounts expended, and the amounts required to put them in a serviceable condition.*							
1	Fort Sullivan, Eastport, Maine	180	–	5	21	–	–	3
2	Fort Edgecomb, Wiscasset, Maine	60	–	–	12	–	–	–
3	Fort Preble, Portland harbor, Maine	100	–	8	–	–	3	3
4	Fort Scammel, House island, Portland, Me.	80	–	–	8	–	–	3
5	Fort McCleary, Portsmouth, N. H.	80	–	5	–	–	–	6
6	Fort Constitution, N. H.	250	–	21	12	–	–	6
7	Fort at Gloucester, Mass.	80	–	8	–	–	–	3
8	Fort Pickering, Salem, Mass.	60	–	–	6	–	–	3
9	Fort Lee, Mass.	40	–	8	–	–	–	–
10	Fort Sewall, Marblehead, Mass.	125	–	–	18	–	–	3
11	Fort Independence, Boston, Mass.	500	6	49	25	–	–	–
12	Fort Winthrop, Governor's island, Boston, Mass.	–	–	–	16	–	–	–
13	West-head battery, Governor's island, Boston, Mass.	150	–	7	–	–	–	–
14	Southeast battery, Governor's island, Boston, Mass.	–	7	–	–	–	–	–
15	Fort at New Bedford, Mass.	60	–	–	9	–	–	–
16	Fort Wolcott, Newport, R. I.	200	–	–	34	–	–	–
17	Fort Green, Newport, R. I.	40	–	–	8	–	–	–
18	Fort Hale, New Haven, Conn.	30	–	–	6	–	–	–
19	Fort Columbus, Governor's island, N. Y.	–	–	53	26	–	–	–
20	Castle Williams, Governor's island, N. Y.	800	26	26	18	–	–	–
21	South Battery, Governor's island, N. Y.	–	–	5	5	–	–	–
22	Fort Gibson, Ellis's island, N. Y.	80	10	–	–	–	–	–
23	Fort Wood, Bedlow's island, N. Y.	300	16	26	–	2	–	6
24	Fort Richmond, Staten island, N. Y.	–	27	–	–	–	–	–
25	Fort Tompkins, Staten island, N. Y.	–	–	–	32	–	2	–
26	Battery Hudson, Staten island, N. Y.	1,000	40	–	–	–	–	–
27	Battery Morton, Staten island, N. Y.	–	9	–	–	–	–	–
28	Fort Mifflin, Delaware river, Penn.	200	–	–	28	–	–	–
29	Fort McHenry, Baltimore, Md.	350	19	11	20	–	–	6
30	Fort Madison, Annapolis, Md.	80	–	6	–	–	–	3
31	Fort Severn, Annapolis, Md.	60	–	–	7	–	–	3
32	Fort Johnston, Cape Fear river, N. C.	60	–	–	10	–	–	–
33	Castle Pinckney, Charleston, S. C.	50	8	–	–	–	–	–
34	Fort Moultrie, Charleston, S. C.	300	–	30	–	3	9	6
35	Beaufort battery, S. C.	30	–	–	6	–	–	–
36	Fort Jackson, Savannah river, Georgia	70	–	–	10	–	–	3
37	Fort Marion, St. Augustine, Florida	30	–	–	6	–	–	–
38	Fort Hamilton, New York harbor, N. Y.	–	–	–	–	–	–	–
39	Fort Lafayette, New York harbor, N. Y.	–	–	–	–	–	–	–
40	Fort Washington, Potomac river, Md.	–	–	–	–	–	–	–
41	Fort Macon, Beaufort, N. C.	–	–	–	–	–	–	–
		5,445	168	268	343	5	14	57

* Garrison and armament will contribute to those of new fort. ‡ Belongs

STATEMENT 1.

proposed to be constructed or repaired for the defence of the seacoast, bay to Cape Florida.

Armament.										Expended.	Required to complete.	Total cost of repairs or construction.
Carronades.	8-inch howitzers, heavy.	8-inch howitzers, light.	13-inch mortars.	10-inch mortars, heavy.	10-inch mortars, light.	8-inch mortars, light.	16-inch stone mortars.	Cohorns.	Total.			
-	4	-	1	2	-	-	-	-	36	-	$10,000	$10,000
-	5	-	2	2	-	-	-	-	12	-	5,000	5,000
-	3	-	1	2	-	-	-	-	23	$5,086	3,200	8,286*
-	4	-	-	-	-	-	-	-	17	440	3,400	3,840*
-	7	-	2	4	-	-	-	-	15	1,990	750	2,740*
-	2	-	-	2	-	-	-	-	52	2,590	3,671	6,261*
-	1	-	1	-	-	-	-	-	15	-	10,000	10,000*
-	-	-	-	-	-	-	-	-	11	-	5,000	5,000*
-	2	-	-	2	-	-	-	-	8	-	2,000	2,000*
20	15	-	2	4	-	-	-	-	25	-	10,000	10,000*
-	-	-	-	2	-	-	-	-	18	-	100,000	100,000
-	-	-	-	-	-	-	-	-	7	-	5,000	5,000
-	-	-	-	-	-	-	-	-	7	-	5,000	5,000
-	-	-	1	2	-	-	-	-	12	-	5,000	5,000*
-	7	-	-	2	-	-	-	-	43	-	10,000	10,000
-	-	-	-	-	-	-	-	-	8	-	2,000	2,000
-	-	-	-	-	-	-	-	-	6	-	5,000	5,000*
4	8	-	2	12	-	-	-	-	105	-	1,662	
-	8	-	-	-	-	-	-	-	78	205,722	5,735	216,619
-	4	-	-	-	-	-	-	-	14		3,500	
-	2	-	1	2	-	-	-	-	15	-	10,000	10,000
-	8	-	2	-	-	-	-	-	60	-	150,000	150,000
-	-	-	-	-	-	-	-	-	27			
10	7	-	4	8	-	-	-	1	64		450,000	450,000†
-	-	-	-	-	-	-	-	-	40	-		
-	-	-	-	-	-	-	-	-	9			
-	8	-	4	4	-	-	-	-	44	76,783	-	76,783‡
-	7	-	2	7	-	-	-	2	74	140,000	-	140,000‡
-	4	-	1	4	-	-	-	-	18	-	5,000	5,000
-	2	-	-	2	-	-	-	-	14	-	5,000	5,000
-	-	-	-	-	-	-	-	-	10	-	5,000	5,000
-	-	-	-	1	-	-	-	-	9	37,114	7,000	44,114
-	5	-	1	-	-	-	-	-	54	-	10,000	10,000
-	-	-	-	-	-	-	-	-	6	-	5,000	5,000
-	1	-	-	-	-	-	-	-	14	-	50,000	50,000
-	-	-	-	-	-	-	-	-	6	-	50,000	50,000
-	-	-	-	-	-	-	-	-	-	-	20,000	20,000‖
-	-	-	-	-	-	-	-	-	-	-	5,000	5,000‖
-	-	-	-	-	-	-	-	-	-	-	20,000	20,000‖
-	-	-	-	-	-	-	-	-	-	-	10,000	10,000‖
34	114		27	64				3	1,097	699,319	1,227,918	1,927,237

to the State of New York. ‡ Repairs completed. ‖ Included in table B.

STATEMENT 1

Classification.	Designation of the works.	Garrison in war.	42-pounders.	32-pounders.	24 pounders.	18-pounders.	12-pounders.	Field-pieces.
	B.—*New works completed.*							
1	Fort Hamilton, New York harbor, N. Y.	800	14	18	–	5	5	6
2	Fort Lafayette, New York harbor, N. Y.	370	24	24	18	–	2	2
3	Fort Washington, Potomac river, Md. -	400	–	–	66	–	–	3
4	Fort Macon, Beaufort, N. C. - -	300	–	12	15	4	4	3
		1,870	38	54	99	9	11	14
	C.—*Works under construction.*							
1	Fort Warren, George's isl'd, Boston, Mass.	1,500	64	137	58	–	–	–
2	Fort Adams, Newport, R. I - -	2,440	59	90	98	21	13	12
3	Fort Trumbull, New London, Conn. -	350	14	14	14	3	3	3
4	Fort Schuyler, Throg's neck, N. Y. -	1,250	48	48	70	8	12	6
5	Fort Delaware, Delaware river - -	750	32	32	54	–	–	–
6	Fort Monroe, Old Point Comfort, Va. -	2,450	42	189	10	14	25	12
7	Fort Calhoun, Hampton roads, Va. -	1,120	54	54	88	–	–	–
8	Fort Caswell, Oak island, N. C. - -	400	–	20	32	2	2	–
9	Fort Sumter, Charleston, S. C. - -	680	41	41	33	–	9	–
10	Fort Pulaski, Cockspur island, Georgia -	800	–	65	53	4	–	–
		11,740	354	690	510	52	64	33
	D.—*Works to be first commenced.*							
1	Fort at Bucksport, Penobscot river, Me. -	500	–	45	50	4	6	5
2	Fort at mouth of Kennebeck river, Me. -	500	–	45	52	4	6	5
3	Fort Scammel, House island, Portland, Me.	250	–	17	18	–	–	–
4	Works in Portsmouth harbor, N. H. -	750	–	45	52	4	6	5
5	Fort Pickering, Salem, Mass. - -	300	–	16	21	2	3	6
6	Fort on Jack's point, Marblehead, Mass -	350	–	32	20	2	2	3
7	Works at Provincetown, Cape Cod, Mass.	1,000	40	56	56	–	–	–
8	Works at New Bedford, Mass. - -	750	–	45	52	4	6	5
9	Fort on Rose isl'd, Narragansett roads, R. I.	470	30	27	21	–	–	–
10	Fort on Sollers' point flats, Md. - -	800	38	76	33	–	–	–
11	Fort on Thomas's point, Patuxent river, Md.	350	–	20	25	2	–	3
		6,020	108	424	400	22	29	32
	Deduct garrison and guns of Nos. 4, 7, 8, and 15, of A - - - - -	280	–	8	23	–	–	9
		5,740	108	416	377	22	29	23
	E.—*Works to be commenced next after those in* D.							
1	Fort Preble, Portland harbor, Me. -	300	8	15	18	4	4	6
2	Works at Gloucester, Mass. - -	500	16	30	33	–	–	–
3	Closing Broad Sound pass, Boston harbor, Mass. - - - - -	–	–	–	–	–	–	–
4	Works at Gurnet point, Plymouth, Mass. -	500	–	–	33	4	4	3
5	Works at Stonington point, Conn. -	375	–	20	36	–	–	6
6	Fort on Cedar point, Potomac river, Md.	550	–	24	50	2	4	6
7	Works at Georgetown harbor, S. C. -	500	–	20	44	2	4	6
8	Works in Port Royal roads, S. C. -	550	–	24	50	2	4	6
9	Works on Tybee isl'd, Savannah river, Ga.	100	–	16	–	–	–	3
10	Works at Cumberland sound, St. Mary's river, Ga. - - - - -	550	–	20	56	2	4	3
		3,925	24	169	320	16	24	39

* Not projected; guns, cost, &c., conjectural.

—Continued.

Armament.										Expended.	Required to complete.	Total cost of repairs or construction.
Carronades.	8 inch howitzers, heavy.	8 inch howitzers, light.	13-inch mortars.	10-inch mortars, heavy.	10 inch mortars, light.	8-inch mortars, light.	16-inch stone mortars.	Coborns.	Total.			
48	8	–	2	4	–	2	1	5	118	$479,236	–	$479,236
–	6	–	–	–	–	–	–	–	76	318,305	–	318,305
–	7	–	–	2	–	2	–	–	80	454,103	–	454,103
14	6	–	–	2	–	–	–	2	62	349,500	–	349,500
62	27		2	8		4	1	7	336	1,601,144		1,601,144
23	30	–	8	16	–	–	–	–	336	470,000	$470,000	940,000
83	27	7	3	7	5	7	1	25	458	1,330,060	148,482	1,478,542
10	8	–	1	3	1	1	–	4	79	30,000	243,000	273,000
70	19	6	2	7	3	5	2	12	318	450,000	290,000	740,000
20	10	–	1	2	–	–	–	–	151	363,800	491,000	854,800
16	20	5	3	7	3	5	5	15	371	1,806,917	223,367	2,030,284
8	20	–	–	–	–	–	–	–	224	1,567,726	416,000	1,983,726
–	8	–	–	–	–	–	–	–	64	491,179	6,000	497,179
–	12	–	–	–	–	–	–	–	136	226,921	286,000	512,921
4	12	2	1	7	–	–	–	2	150	685,308	215,000	900,308
234	166	20	19	49	12	18	8	58	2,287	7,421,911	2,788,849	10,210,760
9	16	2	–	4	2	2	1	2	148	–	150,000	150,000
9	16	2	–	4	2	2	1	2	150	–	300,000	300,000*
9	2	–	–	–	–	–	–	–	46	–	48,000	48,000
9	16	2	–	4	2	2	1	2	150	–	300,000	300,000*
11	7	–	1	4	–	–	–	2	73	–	174,000	174,000
10	7	2	1	4	–	–	1	4	88	–	144,000	144,000
20	16	–	2	6	2	2	–	–	200	–	600,000	600,000*
9	16	2	–	4	2	2	1	2	150	–	300,000	300,000*
–	12	–	1	3	–	–	–	–	94	–	150,000	150,000
–	12	–	–	–	–	–	–	–	159	–	1,000,000	1,000,000
6	6	2	1	2	–	–	–	2	69	–	259,000	259,000
92	126	12	6	35	10	10	5	16	1,327	–	3,425,000	3,425,000
–	6	–	3	6	–	–	–	–	55			
92	120	12	3	29	10	10	5	16	1,272	–	3,425,000	3,425,000
10	6	2	–	–	–	–	1	4	78	–	155,000	155,000†
10	8	–	1	2	–	–	–	–	100	–	200,000	200,000‡
–	–	–	–	–	–	–	–	–	–	–	210,000	210,000†
–	4	–	–	2	–	–	–	–	50	–	100,000	100,000‡
10	–	–	1	2	–	–	–	–	75	–	200,000	200,000‡
10	8	–	1	3	–	2	–	–	110	–	300,000	300,000‡
10	8	2	–	2	–	2	–	–	100	–	250,000	250,000‡
10	8	–	1	3	–	2	–	–	110	–	300,000	300,000‡
–	2	–	–	2	–	–	–	–	23	–	120,000	120,000‡
10	8	2	–	3	–	2	–	–	110	–	200,000	200,000‡
70	52	6	4	19		8	1	4	756		2,035,000	2,035,000

* Work projected. ‡ Guns, cost, &c., conjectural.

STATEMENT 1

Classification.	Designation of the works.	Garrison in war.	42-pounders.	32-pounders.	24-pounders.	18-pounders.	12-pounders.	Field-pieces.
	F—Works to be last commenced.							
1	Works in Eastport harbor, Me.	250	–	–	–	–	–	–
2	Works in Machias harbor, Me.	250	–	–	–	–	–	–
3	Works on Mount Desert island, Me.	1,000	–	–	–	–	–	–
4	Works at Castine, Me.	125	–	–	–	–	–	–
5	Works at St. George's bay, Me.	1,000	–	–	–	–	–	–
6	Works at Damariscotta bay, Me.							
7	Works at Broad bay, Me.							
8	Works at Sheepscot bay, Me.							
9	Works in Hog island channel, Portland, Me.	150	–	–	–	–	–	–
10	Works at the mouth of Saco river, Me.	150	–	–	–	–	–	–
11	Works at the mouth of Kennebunk river, Me.							
12	Works at York, Me.							
13	Works at Newburyport, Mass	250	–	–	–	–	–	–
14	Works at Beverly, Mass.	125	–	–	–	–	–	–
15	Works at Nangus head, Salem, Mass.	180	–	–	–	–	–	–
16	Works at Fort Sewall, Marblehead, Mass.	280	–	–	–	–	–	–
17	Fort and outworks at Nantasket head, Boston, Mass.	1,700	–	–	–	–	–	–
18	Redoubt on Hog island, Boston harbor, Mass.							
19	Works at Nantucket harbor, Mass.	625	–	–	–	–	–	–
20	Works at Edgartown, Mass.							
21	Works at Falmouth, Mass.							
22	Works at Holmes's Hole, Mass.							
23	Works at Tarpaulin cove, Mass.							
24	Works at Canonicut island, R. I.	1,800	–	–	–	–	–	–
25	Closing west passage of Narraganset roads, R. I.	–	–	–	–	–	–	–
26	Fort Griswold, New London, Conn.	500	–	–	–	–	–	–
27	Works at the mouth of Connecticut river, Conn.	250	–	–	–	–	–	–
28	Fort Hale, New Haven harbor, Conn.	125	–	–	–	–	–	–
29	Fort Wooster, New Haven harbor, Conn.	120	–	–	–	–	–	–
30	Works for harbors and towns between New Haven and New York	500	–	–	–	–	–	–
31	Works in Gardiner's bay, Long Island sound, N. Y.	750	–	–	–	–	–	–
32	Works in Sag harbor, N. Y.	250	–	–	–	–	–	–
33	Fort on Wilkins's point, Long island, N. Y.	1,336	–	–	–	–	–	–
34	Redoubt in advance of Fort Tompkins, Staten island, N. Y.	800	–	–	–	–	–	–
35	Fort on Middleground shoal, Sandy Hook, N. Y.	1,760	–	–	–	–	–	–
36	Fort on East Bank shoal, Sandy Hook, N. Y.	1,760	–	–	–	–	–	–
37	Fort at Delaware breakwater	1,125	–	–	–	–	–	–
38	Fort opposite Fort Delaware, Del.	760	–	–	–	–	–	–
39	Fort on Elk river, Md.	169	–	–	–	–	–	–
40	Fort on Hawkins point, Md.	800	–	–	–	–	–	–
41	Works at Annapolis harbor, Md.	500	–	–	–	–	–	–
42	Fort on Point Patience, Patuxent river, Md.	400	–	–	–	–	–	–
43	Works at St. Mary's, Potomac river, Md.	550	–	–	–	–	–	–
44	Works at Bald Head, Cape Fear river, N. C.	450	–	–	–	–	–	–

* Guns of Fort Sullivan, No. 1, A. † Guns.

—Continued.

Armament.										Expended.	Required to complete.	Total cost of repairs or construction.
Carronades.	8-inch howitzers, heavy.	8-inch howitzers, light.	13-inch mortars.	10-inch mortars, heavy.	10-inch mortars, light.	8-inch mortars, light.	16-inch stone mortars.	Cohorns.	Total.			
-	-	-	-	-	-	-	-	-	-	-	$100,000	$100,000*
-	-	-	-	-	-	-	-	-	50	-	100,000	100,000†
-	-	-	-	-	-	-	-	-	200	-	500,000	500,000†
-	-	-	-	-	-	-	-	-	25	-	50,000	50,000†
-	-	-	-	-	-	-	-	-	200	-	400,000	400,000†
-	-	-	-	-	-	-	-	-	21	-	135,000	135,000†
-	-	-	-	-	-	-	-	-	30	-	75,000	75,000†
-	-	-	-	-	-	-	-	-	50	-	100,000	100,000†
-	-	-	-	-	-	-	-	-	25	-	50,000	50,000†
-	-	-	-	-	-	-	-	-	40	-	51,000	51,000‡
-	-	-	-	-	-	-	-	-	55	-	174,000	174,000‡
-	-	-	-	-	-	-	-	-	334	-	1,020,000	1,020,000‡
-	-	-	-	-	-	-	-	-	125	-	250,000	250,000†
-	-	-	-	-	-	-	-	-	403	-	1,200,000	1,200,000‡
-	-	-	-	-	-	-	-	-	-	-	307,000	307,000
-	-	-	-	-	-	-	-	-	82	-	198,000	198,000‡
-	-	-	-	-	-	-	-	-	50	-	100,000	100,000†
-	-	-	-	-	-	-	-	-	25	-	48,000	48,000‡
-	-	-	-	-	-	-	-	-	12	-	42,000	42,000‡
-	-	-	-	-	-	-	-	-	100	-	200,000	200,000†
-	-	-	-	-	-	-	-	-	150	-	400,000	400,000†
-	-	-	-	-	-	-	-	-	50	-	100,000	100,000†
-	-	-	-	-	-	-	-	-	195	-	686,000	686,000‡
-	-	-	-	-	-	-	-	-	26	-	52,000	52,000‡
-	-	-	-	-	-	-	-	-	332	-	1,681,412	1,681,412‡
-	-	-	-	-	-	-	-	-	332	-	1,681,412	1,681,412‡
-	-	-	-	-	-	-	-	-	225	-	600,000	600,000†
-	-	-	-	-	-	-	-	-	112	-	521,000	521,000‡
-	-	-	-	-	-	-	-	-	25	-	50,000	50,000†
-	-	-	-	-	-	-	-	-	131	-	376,000	376,000‡
-	-	-	-	-	-	-	-	-	100	-	250,000	250,000†
-	-	-	-	-	-	-	-	-	87	-	246,000	246,000‡
-	-	-	-	-	-	-	-	-	110	-	300,000	300,000†
-	-	-	-	-	-	-	-	-	87	-	180,000	180,000‡

*cost, &c., conjectural. ‡Works projected.

STATEMENT I

Classification.	Designation of the works.	Garrison in war.	42-pounders.	32-pounders.	24-pounders.	18-pounders.	12-pounders.	Field-pieces.
	F—Continued.							
45	Works at Federal point, Cape Fear river, N. C.	200	–	–	–	–	–	–
46	Works at the mouth of Santee river, S. C.	250	–	–	–	–	–	–
47	Works at Bull's bay, and other inlets, S. C.							
48	Works at Stono sound, S. C.							
49	Works at North Edisto sound, S. C.	375	–	–	–	–	–	–
50	Works at South Edisto sound, S. C.							
51	Works at St. Helena sound, S. C.	375	–	–	–	–	–	–
52	Works at Wassaw sound, Georgia							
53	Works at Ossabaw sound, Georgia							
54	Works at St. Catharine's sound, Georgia							
55	Works at Sapelo sound, Georgia							
56	Works at Doby inlet, Georgia	4,000	–	–	–	–	–	–
57	Works at Altamaha sound, Georgia							
58	Works at St. Simon's sound, Georgia							
59	Works at St. Andrew's sound, Georgia							
		25,740	574	1,390	1,366	86	109	142
	Deduct garrison and guns of Nos. 9, 10, and 18, of A	195	–	8	24	–	–	3
		25,545	574	1,382	1,342	86	109	139
	RECAPITULATION.							
	A Old forts and batteries	5,445	168	268	343	5	14	57
	B New fortifications completed	1,870	38	54	99	9	11	14
	C Fortifications under construction	11,740	354	690	510	52	64	33
	D Fortifications to be first commenced	5,740	108	416	377	22	29	23
	E Fortifications to be next constructed	3,925	24	169	320	16	24	39
		28,720	692	1,597	1,649	104	142	166
	F Fortifications to be last commenced	25,545	574	1,382	1,342	86	109	139
		54,265	1,266	2,979	2,991	190	251	305

* Work projected.

WASHINGTON, *April* 23, 1840.

—Continued.

Armament.										Expended.	Required to complete.	Total cost of repairs or construction.
Carronades.	8-inch howitzers, heavy.	8-inch howitzers, light.	13-inch mortars.	10-inch mortars, heavy.	10-inch mortars, light.	8-inch mortars, light.	16-inch stone mortars.	Cohorns.	Total.			
–	–	–	–	–	–	–	–	–	40	–	$18,000	$18,000*
–	–	–	–	–	–	–	–	–	50	–	100,000	100,000†
–	–	–	–	–	–	–	–	–	75	–	150,000	150,000†
–	–	–	–	–	–	–	–	–	75	–	150,000	150,00 †
–	–	–	–	–	–	–	–	–	800	–	1,600,000	1,600,000†
402	401	33	46	145	17	33	12	73	4,829	–	14,241,824	14,241,824
–	2	–	–	2	–	–	–	–	39			
402	399	33	46	143	17	33	12	73	4,790		14,241,824	14,241,824
34	114	–	27	64	–	–	–	3	1,097	699,319	1,227,918	1,927,237
62	27	–	2	8	–	4	1	7	336	1,601,144	–	1,601,144
234	166	20	19	49	12	18	8	58	2,287	7,421,911	2,788,849	10,210,760
92	120	12	3	29	10	10	5	16	1,272	–	3,425,000	3,425,000
70	52	6	4	19	–	8	1	4	756	–	2,035,000	2,035,000
492	479	38	55	169	22	40	15	88	5,748	9,722,374	9,476,767	19,199,141
402	399	33	46	143	17	33	12	73	4,790	–	14,241,824	14,241,824
894	878	71	101	312	39	73	27	161	10,538	9,722,374	23,718,591	33,440,965

† Guns, cost, &c., conjectural.

For the board. JOS. G. TOTTEN, *Col. Eng.*

Estimated cost of ordnance of all kinds required for the armament of 100 rounds of ammu

		42-pound. guns.	32-pound. guns.	24-pound. guns.	18-pound. guns.
Old forts and batteries. Table A.	Required - - -	168	268	343	5
	On hand - - -	168	268	343	5
	To be provided - -	-	-	-	-
New fortifications completed. Table B.	Required - - -	38	54	99	9
	On hand - - -	13	54	99	9
	To be provided - -	25	-	-	-
Fortifications under construction. Table C.	Required - - -	354	690	510	52
	On hand - - -	-	690	510	52
	To be provided - -	354	-	-	-
Fortifications to be first commenced. Table D.	Required - - -	108	416	377	22
	On hand - - -	-	416	293	22
	To be provided - -	108	-	84	-
Fortifications to be next constructed. Table E.	Required - - -	24	169	320	16
	On hand - - -	-	8	-	16
	To be provided - -	24	161	320	-
	Required from A to E -	692	1,597	1,649	104
Fortifications to be last constructed. Table F.	Required - - -	574	1,382	1,342	86
	On hand - - -	-	-	-	86
	To be provided - -	574	1,382	1,342	-
	Grand total required -	1,266	2,979	2,991	190
	Grand total on hand -	181	1,436	1,245	190
	Grand total to be provided	1,085	1,543	1,746	-

fortifications, agreeably to statement 1, *embracing cannon mounted and nition for each piece.*

CANNON.											
12 pound. guns.	Field guns.	Carronades.	8-inch seacoast howitzers.	8 inch siege howitzers.	13-inch mortars.	10 inch heavy mortars.	10-inch light mortars.	8-inch light mortars.	16 inch stone mortars.	Cohorns.	Whole number of cannon.
14	57	34	114	–	27	64	–	–	–	3	1,097
14	57	–	21	–	–	19	–	–	–	–	895
–	–	34	93	–	27	45	–	–	–	3	202
11	14	62	27	–	2	8	–	4	1	7	336
11	14	–	–	–	–	–	–	4	–	–	204
–	–	62	27	–	2	8	–	–	1	7	132
64	33	234	166	20	19	49	12	18	8	58	2,287
42	33	–	–	–	–	–	12	3	–	–	1,342
22	–	234	166	20	19	49	–	15	8	58	945
29	23	92	120	12	3	29	10	10	5	16	1,272
–	23	–	–	–	–	–	7	–	–	–	761
29	–	92	120	12	3	29	3	10	5	16	511
24	39	70	52	6	4	19	–	8	1	4	756
–	39	–	–	–	–	–	–	–	–	–	63
24	–	70	5	6	4	19	–	8	1	4	693
142	166	492	479	38	55	169	22	40	15	88	5,748
109	139	402	399	33	46	143	17	33	12	73	4,790
–	139	–	–	–	–	–	–	–	–	–	225
109	–	402	399	33	46	143	17	33	12	73	4,565
251	305	894	878	71	101	312	39	73	27	161	10,538
67	305	–	21	–	–	19	19	7	–	–	3,490
184	–	894	857	71	101	293	20	66	27	161	7,048

STATEMENT—

		For 42-pounder guns.	For 32-pounder guns.	For 24-pounder guns.	For 18 pounder guns.
Old forts and batteries. Table A.	Required - - -	168	268	343	5
	On hand - - -	50	268	343	–
	To be provided - -	118	–	–	5
New fortifications completed. Table B.	Required - - -	38	54	99	9
	On hand - - -	–	54	99	–
	To be provided - -	38	–	–	9
Fortifications under construction. Table C.	Required - - -	354	690	510	52
	On hand - - -	–	224	33	–
	To be provided - -	354	466	477	52
Fortifications to be first commenced. Table D.	Required - - -	108	416	377	22
	On hand - - -	–	–	–	–
	To be provided - -	108	416	377	22
Fortifications to be next constructed. Table E.	Required - - -	24	169	320	16
	On hand - - -	–	–	–	–
	To be provided - -	24	169	320	16
	Required from A to E -	692	1,597	1,649	104
Fortifications to be last constructed. Table F.	Required - - -	574	1,382	1,342	86
	On hand - - -	–	–	–	–
	To be provided - -	574	1,382	1,342	86
	Grand total required -	1,266	2,979	2,991	190
	Grand total on hand -	50	546	475	–
	Grand total to be provided	1,216	2,433	2,516	190

Continued.

CARRIAGES.										
For 12-pounder guns.	For field-guns.	For carronades.	For 8 inch sea-coast howitzers.	For 8-inch siege howitzers.	For 13-inch mortars.	For 10-inch heavy mortars.	For 10-in. light mortars.	For 8-inch light mortars.	For stone mortars.	For cohorns.
14	57	34	114	–	27	64	–	–	–	3
–	57									
14	–	34	114	–	27	64	–	–	–	3
11	14	62	27	–	2	8	–	4	1	7
–	14									
11	–	62	27	–	2	8	–	4	1	7
64	33	234	166	20	19	49	12	18	8	58
–	33									
64	–	234	166	20	19	49	12	18	8	58
29	23	92	120	12	3	29	10	10	5	16
–	23									
29	–	92	120	12	3	29	10	10	5	16
24	39	70	52	6	4	19	–	8	1	4
–	39									
24	–	70	52	6	4	19	–	8	1	4
142	166	492	479	38	55	169	22	40	15	88
109	139	402	399	33	46	143	17	33	12	73
–	139									
109	–	402	399	33	46	143	17	33	12	73
251	305	894	878	71	101	312	39	73	27	161
–	305									
251	–	894	878	71	101	312	39	73	27	161

STATEMENT—

		42-pounder shot.	32-pounder shot.	24-pounder shot.	18-pounder shot.
Old forts and batteries. Table A.	Required - - -	16,800	26,800	34,300	500
	On hand - - -	13,835	26,800	34,300	500
	To be provided - -	2,965	-	-	-
New fortifications completed. Table B.	Required - - -	3,800	5,400	9,900	900
	On hand - - -	-	5,400	9,900	900
	To be provided - -	3,800	-	-	-
Fortifications under construction. Table C.	Required - - -	35,400	69,000	51,000	5,200
	On hand - - -	-	69,000	32,000	5,200
	To be provided - -	35,400	-	19,000	-
Fortifications to be first commenced. Table D.	Required - - -	10,800	41,600	37,700	2,200
	On hand - - -	-	11,020	-	2,200
	To be provided - -	10,800	30,580	37,700	-
Fortifications to be next constructed. Table E.	Required - - -	2,400	16,900	32,000	1,600
	On hand - - -	-	-	-	1,600
	To be provided - -	2,400	16,900	32,000	-
	Required from A to E -	69,200	159,700	164,900	10,400
Fortifications to be last constructed. Table F.	Required - - -	57,400	138,200	134,200	8,600
	On hand - - -	-	-	-	8,600
	To be provided - -	57,400	138,200	134,200	-
	Grand total required -	126,600	297,900	299,100	19,000
	Grand total on hand -	13,835	112,220	76,200	19,000
	Grand total to be provided	112,765	185,680	222,900	-

Continued.

PROJECTILES.							CANNON POWDER.
12-pounder shot.	Shot for field-guns.	24-pound. shells.	8-inch shells.	13-inch shells.	10-inch shells.	Charges for stone-mortars.	Pounds.
1,400 1,400	5,700 5,700	3,700 3,700	11,400 6,120	2,700 –	6,400 6,400	– –	878,800 878,800
–	–	–	5,280	2,700			
1,100 1,100	1,400 1,400	6,900 5,348	3,100 –	200 –	800 800	100 –	205,800 60,170
–	–	1,552	3,100	200	–	100	145,630
6,400 6,400	3,300 3,300	29,200 –	20,400 –	1,900 –	6,100 6,100	800	1,616,300
–	–	29,200	20,400	1,900	–	800	1,616,300
2,900 2,900	2,300 2,300	10,800 –	14,200 –	300 –	3,900 3,900	500	874,300
–	–	10,800	14,200	300	–	500	874,300
2,400 2,400	3,900 3,900	7,400 –	6,600 –	400 –	1,900 54	100	471,300
–	–	7,400	6,600	400	1,846	100	471,300
14,200	16,600	58,000	55,700	5,500	19,100	1,500	4,046,500
10,900 10,900	13,900 13,900	47,500	46,500	4,600	16,000	1,200	3,388,750
–	–	47,500	46,500	4,600	16,000	1,200	3,388,750
25,100 25,100	30,500 30,500	105,500 9,048	102,200 6,120	10,100 –	35,100 17,254	2,700 –	7,435,250 938,970
–	–	96,452	96,080	10,100	17,846	2,700	6,496,280

STATEMENT—

Old forts and batteries. Table A - -	Required - - - - - On hand - - - - -
	To be provided - - - -
New fortifications completed. Table B -	Required - - - - - On hand - - - - -
	To be provided - - -
Fortifications under construction. Table C -	Required - - - - - On hand - - - - -
	To be provided - - - -
Fortifications to be first commenced. Table D	Required - - - - - On hand - - - - -
	To be provided - - - -
Fortifications to be next constructed. Table E	Required - - - - - On hand - - - - -
	To be provided - - - -
	Required from A to E - - -
Fortifications to be last constructed. Table F	Required - - - - - On hand - - - - -
	To be provided - - - -
	Grand total required - - - - Grand total on hand - - - -
	Grand total to be provided - - -

Note.—The cost of saltpetre and brimstone may

ORDNANCE OFFICE, *Washington, January* 16, 1840.

Continued.

COST OF ARMAMENT.

Of cannon.	Of carriages.	Of projectiles.	Of powder.	Total amount.
$403,935 00	$361,935 00	$203,340 00	$175,760 00	$1,144,970 00
338,115 00	242,375 00	151,782 40	175,760 00	908,032 40
65,820 00	119,560 00	51,557 60	-	236,937 60
105,065 00	105,455 00	47,283 00	41,160 00	298,963 00
69,105 00	55,275 00	28,454 00	12,034 00	164,868 00
35,960 00	50,180 00	18,829 00	29,126 00	134,095 00
816,770 00	739,590 00	351,484 00	323,260 00	2,231,104 00
502,360 00	99,025 00	164,284 00	-	765,669 00
314,410 00	640,565 00	187,200 00	323,260 00	1,465,435 00
451,405 00	411,685 00	188,547 00	174,860 00	1,226,497 00
290,925 00	6,900 00	39,560 40	-	337,385 40
60,480 00	404,785 00	148,986 60	174,860 00	889,111 60
243,410 00	240,320 00	102,333 00	94,260 00	680,323 00
11,500 00	11,700 00	4,203 60	-	27,403 60
231,910 00	228,620 00	98,129 40	94,260 00	652,919 40
2,020,585 00	1,858,985 00	892,987 00	809,300 00	5,581,857 00
1,692,110 00	1,551,500 00	746,770 00	677,750 00	4,668,130 00
35,400 00	41,700 00	17,202 00	-	94,302 00
1,656,710 00	1,509,800 00	729,568 00	677,750 00	4,573,828 00
3,712,695 00	3,410,485 00	1,639,757 00	1,487,050 00	10,249,987 00
1,247,405 00	456,975 00	405,486 40	187,794 00	2,297,660 40
2,465,290 00	2,953,510 00	1,234,270 60	1,299,256 00	7,952,326 60

be estimated at one-half of the cost of gunpowder.

STATEMENT 2.

Of the fortifications constructed, constructing, or repairing, and of those from Cape Florida

Classification.	Designation of the works.	Garrison in war.	42-pounders.	32-pounders.	24-pounders.	18-pounders.	12-pounders.	Field pieces.
	A—*Old works repaired, and those proposed to be repaired, with the amounts expended, and the amounts required to put them in a serviceable condition.*							
1	Fort Barrancas, Pensacola, Fla.	250	–	11	10	5	3	3
2	Fort St. Philip, Mississippi river, La.	100	–	–	16	–	–	–
3	Fort Pickens, Pensacola harbor, Fla.	–	–	–	–	–	–	–
4	Fort Morgan, Mobile point, Ala.	–	–	–	–	–	–	–
5	Fort Pike, Rigolets, La.	–	–	–	–	–	–	–
6	Fort Wood, Chef Menteur, La.	–	–	–	–	–	–	–
7	Battery Bienvenu, La.	–	–	–	–	–	–	–
8	Tower at Bayou Dupré, La.	–	–	–	–	–	–	–
9	Fort Jackson, Mississippi river, La.	–	–	–	–	–	–	–
		350		11	26	5	3	3
	B—*New works completed.*							
1	Fort Pickens, Pensacola, Fla.	1,260	63	17	49	5	13	6
2	Fort Morgan, Mobile point, Ala.	700	14	–	52	3	4	6
3	Fort Pike, Rigolets, La.	300	–	–	28	–	6	–
4	Fort Wood, Chef Menteur, La.	300	–	–	28	3	6	–
5	Battery Bienvenu, La.	100	–	–	8	–	3	–
6	Tower at Bayou Dupré, La.	50	–	–	4	–	–	–
7	Fort Jackson, Mississippi river, La.	350	–	–	42	–	7	–
		3,060	77	17	211	11	39	12
	C—*Works under construction.*							
1	Fort on Foster's bank, Pensacola, Fla.	650	24	24	66	–	–	3
2	Fort Livingston, Barrataria island, La.	300	–	–	28	–	6	3
		950	24	24	94		6	6
	E—*Works to be constructed after those in* D *of statement* 1 *are completed.*							
1	Tower at Pass-au-Heron, Mobile bay, Ala.	60	–	–	6	2	2	–
	F—*Works to be last commenced.*							
1	Works at Key West, or Tortugas, Fla.	2,500	–	–	–	–	–	–
2	Works at Charlotte harbor, Fla.							
3	Works at Espiritu Santo bay, Fla.							
4	Works at Appalachicola bay, Fla.							
5	Works at Appalachie, Fla.	1,250	–	–	–	–	–	–
6	Works at St. Joseph's bay, Fla.							
7	Works at Santa Rosa bay, Fla.							
8	Works to cover navy yard at Pensacola, Fla.	100	–	–	–	–	–	–
9	Works at Perdido bay, Ala.	400	–	–	–	–	–	–
10	Fort at Dauphin island, Mobile bay, Ala.	900	–	–	–	–	–	–
		5,150	118	61	394	21	58	25

* Included in B. † Work projected.

STATEMENT 2.

proposed to be constructed or repaired for the defence of the Gulf frontier, to the Sabine bay.

Armament.										Expended.	Required to complete.	Total cost of repairs or construction.
Carronades.	8-inch howitzers, heavy.	8-inch howitzers, light.	13-inch mortars.	10-inch mortars, heavy.	10-inch mortars, light.	8-inch mortars, light.	16-inch stone mortars.	Coborns.	Total.			
8	4	-	-	2	-	1	-	2	49	$75,000	$100,000	$175,000
-	4	-	-	-	-	-	-	-	20	-	3,300	3,300
-	-	-	-	-	-	-	-	-	-	-	8,000	8,000‡
-	-	-	-	-	-	-	-	-	-	-	10,000	10,000‡
-	-	-	-	-	-	-	-	-	-	-	5,000	5,000‡
-	-	-	-	-	-	-	-	-	-	-	3,580	3,580‡
-	-	-	-	-	-	-	-	-	-	-	2,500	2,500‡
-	-	-	-	-	-	-	-	-	-	-	400	400‡
-	-	-	-	-	-	-	-	-	-	-	20,000	20,000‡
8	8			2		1		2	69	75,000	152,780	227,780
26	13	-	1	4	4	4	2	5	212	677,000	-	677,000
26	10	-	2	4	2	2	2	5	132	1,026,777	-	1,026,777
9	5	-	-	1	-	-	-	-	49	314,597	-	314,597
9	5	-	-	1	-	-	-	-	52	378,642	-	378,642
-	2	-	-	-	-	-	-	-	13	96,447	-	96,447
-	2	-	-	1	-	-	-	-	7	16,677	-	16,677
10	5	-	1	2	-	-	-	-	67	638,766	-	638,766
80	42		4	13	6	6	4	10	532	3,148,906		3,148,906
-	10	-	-	2	-	-	-	-	129	302,648	14,000	316,648
9	5	-	-	1	-	-	-	-	52	75,000	325,000	400,000
9	15			3					181	377,648	339,000	716,648
-	2	-	-	-	-	-	-	-	12	-	25,000	25,000†
-	-	-	-	-	-	-	-	-	500	-	3,000,000	3,000,000‡
-	-	-	-	-	-	-	-	-	250	-	1,000,000	1,000,000‡
-	-	-	-	-	-	-	-	-	-	-	200,000	200,000‡
-	-	-	-	-	-	-	-	-	50	-	200,000	200,000‡
-	-	-	-	-	-	-	-	-	128	-	880,000	880,000‡
113	78		5	21	7	8	5	14	928		5,280,000	5,280,000

‡ Guns, cost, &c., conjectural.

STATEMENT 2

RECAPIT

Designation of the works.	Garrison in war.	42-pounders.	32 pounders.	24-pounders.	18 pounders.	12 pounders.	Field pieces.
A Old forts and batteries - - -	350	-	11	26	5	3	3
B New fortifications completed - -	3,060	77	17	211	11	39	12
C Fortifications under construction - -	950	24	24	94	-	6	6
E Works to be constructed after those in D of statement 1 are completed - -	60	-	-	6	2	2	-
	4,420	101	52	337	18	50	21
F Works to be last commenced - -	5,150	118	61	394	21	58	25
	9,570	219	113	731	39	108	46

WASHINGTON, *April* 23, 1840.

—Continued.

ULATION.

Armament.										Expended.	Required to complete.	Total cost of repairs or construction.
Carronades.	8-inch howitzers, heavy.	8-inch howitzers, light.	13-inch mortars.	10-inch mortars, heavy.	10-inch mortars, light.	8-inch mortars, light.	16-inch stone mortars.	Cohorns.	Total.			
8	8	-	-	2	-	1	-	2	69	$75,000	$152,780	$227,780
80	42	-	4	13	6	6	4	10	532	3,148,906	-	3,148,906
9	15	-	-	3	-	-	-	-	181	377,648	339,000	716,648
-	2	-	-	-	-	-	-	-	12	-	25,000	25,000
97	67	-	4	18	6	7	4	12	794	3,601,554	516,780	4,118,334
113	78	-	5	21	7	8	5	14	928	-	5,280,000	5,280,000
210	145	-	9	39	13	15	9	26	1,722	3,601,554	5,796,780	9,398,334

For the board: JOS. G. TOTTEN, *Col. Engs.*

Estimated cost of ordnance of all kinds, required for the armament of 100 *rounds of ammu*

		42-pounder guns.	32-pounder guns.	24-pounder guns.	18-pounder guns.
Old forts and batteries. Table A.	Required - - -	-	11	26	5
	On hand - - -	-	11	26	5
	To be provided - -	-	-	-	-
New fortifications completed. Table B.	Required - - -	77	17	211	11
	On hand - - -	28	17	211	11
	To be provided - -	49	-	-	-
Fortifications under construction. Table C.	Required - - -	24	24	94	-
	On hand - - -	-	24	94	-
	To be provided - -	24	-	-	-
Works to be constructed after those in table D statement 1 are completed. Table E.	Required - - -	-	-	6	2
	On hand - - -	-	-	-	2
	To be provided - -	-	-	6	-
	Required from A to E -	101	52	337	18
Works to be last commenced. Table F.	Required - - -	118	61	394	21
	On hand - - -	-	-	-	21
	To be provided - -	118	61	394	-
	Grand total required -	219	113	731	39
	Grand total on hand -	28	52	331	39
	Grand total to be provided	191	61	400	-

fortifications, agreeably to statement 2d, embracing cannon mounted, and nition for each piece.

	CANNON.										
12-pounder guns.	Field-guns.	Carronades.	8-inch seacoast howitzers.	8 inch siege-howitzers.	13-inch mortars.	10-inch heavy mortars.	10 inch light mortars.	8-inch light mortars.	16-inch stone mortars.	Cohorns.	Whole number of cannon.
3	3	8	8	–	–	2	–	1	–	2	69
3	3	–	–	–	–	–	–	–	–	–	48
–	–	8	8	–	–	2	–	1	–	2	21
39	12	80	42	–	4	13	6	6	4	10	532
39	12	–	–	–	–	–	–	–	–	–	318
–	–	80	42	–	4	13	6	6	4	10	214
6	6	9	15	–	–	3	–	–	–	–	181
6	6	–	–	–	–	–	–	–	–	–	130
–	–	9	15	–	–	3	–	–	–	–	51
2	–	–	2	–	–	–	–	–	–	–	12
–	–	–	–	–	–	–	–	–	–	–	2
2	–	–	2	–	–	–	–	–	–	–	10
50	21	97	67	–	4	18	6	7	4	12	794
58	25	113	78	–	5	21	7	8	5	14	928
–	25	–	–	–	–	–	–	–	–	–	46
58	–	113	78	–	5	21	7	8	5	14	882
108	46	210	145	–	9	39	13	15	9	26	1,722
48	46	–	–	–	–	–	–	–	–	–	544
60	–	210	145	–	9	39	13	15	9	26	1,178

STATEMENT—

		For 42-pounder guns.	For 32 pounder guns.	For 24-pounder guns.	For 18 pounder guns.
Old forts and batteries. Table A.	Required - - -	-	11	26	5
	On hand - - -	-	11	26	-
	To be provided - -	-	-	-	5
New fortifications completed. Table B.	Required - - -	77	17	211	11
	On hand - - -	-	17	211	-
	To be provided - -	77	-	-	11
Fortifications under construction. Table C.	Required - - -	24	24	94	-
	On hand - - -	-	7	6	-
	To be provided - -	24	17	88	-
Works to be constructed after those in table D statement are completed. Table E.	Required - - -	-	-	6	2
	On hand - - -				
	To be provided - -	-	-	6	2
	Required from A to E -	101	52	337	18
Works to be last commenced. Table F.	Required - - -	118	61	394	21
	On hand - - -	-	-	-	-
	To be provided - -	118	61	394	21
	Grand total required -	219	113	731	39
	Grand total on hand -	-	35	243	-
	Grand total to be provided	219	78	488	39

Continued.

CARRIAGES.										
For 12-pounder guns.	For field-guns.	For carronades.	For 8-inch sea-coast howitzers.	For 8-inch siege howitzers.	For 13 inch mortars.	For 10 inch heavy mortars.	For 10-inch light mortars.	For 8-inch light mortars.	For stone mortars.	For cohorns.
3	3	8	8	-	-	2	-	1	-	2
-	3									
3	-	8	8	-	-	2	-	1	-	2
39	12	80	42	-	4	13	6	6	4	10
-	12									
39	-	80	42	-	4	13	6	6	4	10
6	6	9	15	-	-	3				
-	6									
6	-	9	15	-	-	3				
2	-	-	2							
2	-	-	2							
50	21	97	67	-	4	18	6	7	4	12
58	25	113	78	-	5	21	7	8	5	14
-	25									
58	-	113	78	-	5	21	7	8	5	14
108	46	210	145	-	9	39	13	15	9	26
-	46									
108	-	210	145	-	9	39	13	15	9	26

STATEMENT—

		42-pounder shot.	32-pounder shot.	24-pounder shot.	18-pounder shot.
Old forts and batteries. Table A.	Required - - -	-	1,100	2,600	500
	On hand - - -	-	1,100	2,600	500
	To be provided - -	-	-	-	-
New fortifications completed. Table B.	Required - - -	7,700	1,700	21,100	1,100
	On hand - - -	-	1,700	21,000	1,100
	To be provided - -	7,700	-	-	-
Fortifications under construction. Table C.	Required - - -	2,400	2,400	9,400	-
	On hand - - -	-	2,400	5,915	-
	To be provided - -	2,400	-	3,485	-
Works to be constructed after those in table D statement 1 are completed. Table E.	Required - - -	-	-	600	200
	On hand - - -	-	-	-	200
	To be provided - -	-	-	600	-
	Required from A to E -	10,100	5,200	33,700	1,800
Works to be last commenced. Table F.	Required - - -	11,800	6,100	39,400	2,100
	On hand - - -	-	-	-	2,100
	To be provided - -	11,800	6,100	39,400	-
	Grand total required -	21,900	11,300	73,100	3,900
	Grand total on hand -	-	5,200	29,615	3,900
	Grand total to be provided	21,900	6,100	43,485	-

Continued.

PROJECTILES.							CANNON POWDER.
12-pounder shot.	Shot for field-guns.	24-pounder shells.	8-inch shells.	13-inch shells.	10-inch shells.	Charges for stone mortars.	Pounds.
300 300	300 300	1,000 1,000	900 –	– –	200 200	– –	38,950 38,950
–	–	–	900				
3,900 3,900	1,200 1,200	9,000 6,800	4,800 –	400 –	1,900 1,900	400 –	327,450 95,735
–	–	2,200	4,800	400	–	400	231,715
600 600	600 600	900 –	1,500 –	– –	300 300	–	122,400
–	–	900	1,500	–	–	–	122,400
200 200	–	–	200	–	–	–	6,700
–	–	–	200	–	–	–	6,700
5,000	2,100	10,900	7,400	400	2,400	400	495,500
5,800 5,800	2,500 2,500	12,700	8,600	500	2,800	500	579,850
–	–	12,700	8,600	500	2,800	500	579,850
10,800 10,800	4,600 4,600	23,600 7,800	16,000 –	900 –	5,200 2,400	900 –	1,075,350 134,685
–	–	15,800	16,000	900	2,800	900	940,665

STATEMENT—

Old forts and batteries. Table A - -	Required - - - - -
	On hand - - - - -
	To be provided - - - -
New fortifications completed. Table B -	Required - - - - -
	On hand - - - - -
	To be provided - - - -
Fortifications under construction. Table C.	Required - - - - -
	On hand - - - - -
	To be provided - - - -
Works to be constructed after those in table D of statement 1 are completed. Table E.	Required - - - - -
	On hand - - - - -
	To be provided - - - -
	Required from A to E - - -
Works to be last commenced. Table F -	Required - - - - -
	On hand - - - - -
	To be provided - - - -
	Grand total required - - - -
	Grand total on hand - - - -
	Grand total to be provided - - -

NOTE.—The cost of saltpetre and brimstone may be

ORDNANCE OFFICE,
Washington, January 16, 1840.

Continued.

COST OF ARMAMENT.

Cannon.	Carriages.	Projectiles.	Powder.	Total amount.
$20,320 00 15,550 00	$20,660 00 13,200 00	$9,138 00 6,762 00	$7,790 00 7,790 00	$57,908 00 43,302 00
4,770 00	7,460 00	2,376 00	-	14,606 00
164,075 00 101,975 00	164,745 00 78,125 00	76,870 00 43,626 00	65,490 00 19,147 00	471,180 00 242,873 00
62,100 00	86,620 00	33,244 00	46,343 00	228,307 00
62,530 00 43,150 00	59,950 00 6,200 00	23,812 00 11,243 00	24,480 00 -	170,772 00 60,593 00
19,380 00	53,750 00	12,569 00	24,480 00	110,179 00
3,550 00 500 00	3,590 00 -	1,372 00 244 00	1,340 00 -	9,852 00 744 00
3,050 00	3,590 00	1,128 00	1,340 00	9,108 00
250,475 00	248,945 00	111,192 00	99,100 00	709,712 00
293,080 00 7,750 00	290,990 00 7,500 00	130,181 00 5,412 00	115,970 00 -	830,221 00 20,662 00
285,330 00	283,490 00	124,769 00	115,970 00	809,559 00
543,555 00 168,925 00	539,935 00 105,025 00	241,373 00 67,287 00	215,070 00 26,937 00	1,539,933 00 368,174 00
374,630 00	434,910 00	174,086 00	188,133 00	1,171,759 00

estimated at one-half of the cost of gunpowder.

REPORT

ON

THE NORTHERN FRONTIER.

This frontier extends, as described by the terms of the resolution, from Lake Superior to Passamaquoddy bay, a distance of somewhat more than two thousand miles, binding all the way on the British American Provinces.

Whether we regard the strongly marked geographical features of this frontier, presenting, as it does, for the most part, a chain of great lakes or inland seas, stretching along the border, the common property of both nations, and affording facilities for an extensive commerce, almost rivalling that of the ocean itself; or whether we look to the growing strength of our colonial neighbors, fostered by the immense power and resources of the mother country; its vast importance cannot fail to impress us with the necessity of being prepared, not only for defence along that line, but also to act offensively, with decisive effect, in the event of our being involved in a conflict.

From the peculiar character of this frontier, its defence must necessarily partake somewhat of the system applicable to the seacoast; for, although it is denominated inland, in contradistinction to the latter, it is, nevertheless, maritime in many of its features, and must be treated accordingly for purposes of defence.

So important is the mastery on the lakes, in any military operations in that quarter, that it is scarcely to be doubted that, in the event of war, there will be some naval preparations on both sides, and a struggle for the ascendancy on those waters. Whichever Power shall acquire that, even temporarily, will have the means of assailing his adversary with great effect along the shores of the lakes, in the absence of fortifications, by occupying the harbors, destroying the towns, (some of which are fast advancing to the rank of cities,) and controlling the commercial operations of which those lakes constitute the principal channel. These considerations render it highly expedient—indeed, necessary,—to fortify the larger harbors on the lakes, as well as the more important passes on the straits and rivers by which they are connected.

Without entering fully into the military details of the subject, which might be deemed somewhat out of place here, regarding the object of the resolution, which seems to look rather to the expense involved, the board will proceed to enumerate the works of defence deemed necessary on the northern frontier, beginning at Lake Superior; merely glancing at the effects and advantages which are likely to result from the establishment of those works.

1. *Fort at Falls of St. Mary.*—A fort here will control the communication between Lake Huron and Lake Superior, and, at least, prevent an enemy from availing itself of it for purposes of communication and for the transportation of supplies, if it does not secure those important advantages to us; which it would do, unless counteracted by a work on the British side of the line. In that event, almost certain to occur, it would be neutralized, but would still serve to cover and protect our settlements along the St. Mary, and form a rallying point for local defence in times of alarm.

Estimated expense of fort, barracks, &c. - - - $75,000

2. *Fort at Michilimackinac.*—Although this position is somewhat interior, it is regarded of high importance from its geographical relations. A fort here, in conjunction with floating batteries, may be made to command, effectually, the approach to Lake Michigan, and shut out an enemy who might possess a naval ascendancy on Lake Huron; thus protecting the entire circumference of Lake Michigan from attacks to which it would otherwise be exposed, even from a small force, and securing it to ourselves, as a safe channel of communication with the rich and productive States in the rear, whose shores it washes.

Estimated expense - - - - - 50,000

3. *Fort at the foot of Lake Huron.*—A work here will control the outlet of Lake Huron, and interrupt the navigation between that and Lake St. Clair and the river Detroit. It will serve, also, to cover the settlements on that part of the frontier, and form a rallying point for the neighboring militia for local defence.

Estimated expense - - - - - 50,000

4. *Fort and barrack establishment at Detroit.*—In the event of war, Detroit would undoubtedly be a point of considerable concentration of troops, not merely for the defence of that portion of the frontier, but for such offensive operations as might be deemed expedient in that quarter. It may be regarded as the centre of the upper section of the northern frontier, and has important relations, both geographical and military. Although true policy would, in such a case, dictate that our chief efforts should be directed against the vital points of the enemy's possessions as low down the line as practicable, still it might become expedient, with a view to distract his attention and divide his forces, to menace him above; and this is one of the points from which he might be assailed by minor expeditions, especially if he should relax his measures of defence, in looking to his safety elsewhere.

Estimated expense of barracks for one regiment, including site - - - - - - - $150,000

Estimated expense of fort at Spring Wells, including site - - - - - 100,000

250,000

5. *Field-work and barrack-establishment at or near Buffalo.*—The wealth and commercial importance of Buffalo, and its close proximity to the British line, will make it an object of attack in time of war, unless it be protected by the presence of a respectable force there. It may also become a point of concentration of troops for minor offensive movements, by way of diversion; and is thus, in every view, entitled to seasonable attention. An extensive barrack-establishment, defended by field-works, would be sufficient for all necessary objects.

Estimated expense - - - - - 150,000

6. *Fort Niagara to be rebuilt.*—A fort at this position is important, on the assumption (admitting, it is believed, of but little doubt) that in time of war there would be some naval

preparations on Lake Ontario. It commands the entrance into the Niagara river; and a work here will shut the enemy's vessels out from that harbor, while it will afford protection under which ours may take shelter in case of need.

Estimated expense of completing the work now in progress - - - - - - - $27,500
For repairs of buildings and new barracks there 37,500

$65,000

7. *Fort at Oswego.*—The growing importance of Oswego, the relation it bears to the great line of internal communication to the west, and its exposed situation, directly on the shore of the lake, from whence it might be assailed by armed vessels without the co-operation of a land attack, call for works of defence to protect the harbor, and thus secure a safe retreat for our vessels in case of need, while we shut out those of the enemy. Besides, this place possesses many advantages for naval preparations for vessels of light draught of water, and would probably be made a subordinate depot in time of war.

Estimated expense of completing the works now in progress - - - - - - - $20,000
For barracks, quarters, storehouses, and magazine - - - - - - 25,000

45,000

8. *Fort at Sackett's Harbor.*—In the event of naval armaments, to any considerable extent, being resorted to on Lake Ontario, Sackett's Harbor, from its bold water, and its excellence as a harbor, would at once become a depot of great importance; the safety of which should be insured against the enterprises of the enemy, by the timely construction of appropriate works of defence. Situated directly opposite to the strong post of Kingston, on the Canadian side, and adjacent to the head of the St. Lawrence, it is one of the points at which a concentration of troops may become expedient for the defence of that portion of the frontier and the protection of the naval depot. The barrack accommodations already established there are deemed sufficient, and it remains to fortify the approach to the harbor.

Estimated expense of fort and barracks within - - 75,000

9. *Fort at the narrows of the St. Lawrence, below Ogdensburg.*—The chief object of a work here would be to cut off the enemy's communication, by the river, between Montreal and Kingston, and thus prevent him from availing himself of that channel for the transportation of troops and supplies, if we cannot entirely secure it to ourselves. By this obstruction on the St. Lawrence, he would be thrown altogether upon his back line of communication by the Ottawa, which, although it has the merit of being more secure from interruption, is longer and more difficult, especially in seasons of drought. This would also be another point from which the enemy might be menaced, and from which auxiliary movements might be made in aid of the chief attack.

Estimated expense of fort and barracks - - - 100,000

10. *Fort near the line on Lake Champlain.*—A work here may be made to command the pass of the lake, and is considered by far the most important of any proposed on the whole line of frontier.

The position of Lake Champlain is somewhat peculiar. While Ontario, Erie, Huron, and Superior, stretch their whole length directly along the border, (forming, in fact, the boundary,) Champlain extends deeply into our territory, at right angles with the line of the frontier; and, while its southern extremity reaches almost to the Hudson, it finds its outlet, to the north, in the St. Lawrence, nearly midway between Montreal and Quebec, the two great objects of attack.

This is undoubtedly the avenue by which the British possessions may be most effectually assailed; while, at the same time, it would afford to the enemy possessing a naval ascendancy equal facilities for bringing the war within our own borders, if it be left unfortified. It therefore becomes important to fortify a point as near the line as practicable, so as to shut out the enemy's vessels, and thus effect the double object of protecting the interior shores of the lake from the predatory attacks to which they would otherwise be exposed, and of securing it to ourselves, as the great channel by which our troops and supplies may be rapidly thrown forward to the points of attack or defence.

For a permanent work on Stony point, (N. Y.,) including purchase of site - - - -	$300,000	
For a permanent work on Windmill point, (Vt.,) including purchase of site - -	300,000	
		$600,000

11. *Barrack establishment and depot at Plattsburg.*—In the event of war, Plattsburg will become the great depot for the operations on the Champlain frontier, the point of concentration of troops preparatory to any offensive movements, and the station of the reserve to sustain those movements, and the posts that may be established in advance. Even in time of peace, a respectable force should be posted here, especially during the continuance of the boundary question and border disturbances. Barracks for a regiment, at least, with suitable storehouses, are recommended to be erected, on a plan admitting of extension, if required, and also of suitable defensive arrangements.

Estimated expense of completing the works in progress, on the scale here suggested - - - -	150,000

12. From Lake Champlain, eastward, the geographical features of the frontier materially change character, and require a corresponding modification of the means of defence. The line no longer intersects great lakes, admitting of naval preparations, nor binds on straits and rivers, the navigation of which may be controlled or interrupted by fortifications. It is altogether *inland*, until it reaches the St. Croix, where the principles that have been applied to other portions of

the frontier similarly situated will again become applicable. Running on a parallel of latitude to the Connecticut river, and thence along a chain of highlands, not yet clearly defined, to the Province of New Brunswick, the board are not aware that there are any points immediately on the frontier sufficiently commanding, of themselves, to call for the establishment and maintenance of fortifications, or works of defence.

Should it ever become necessary to sustain, by force, our title to the territory now in dispute, it must be done, not by isolated forts along the frontier, commanding, probably, nothing beyond the range of their own guns, but by an active army, competent not only to occupy the country and hold it, but also to assume the offensive, if necessary, and carry the war beyond our borders.

But while it is not deemed expedient to construct a chain of forts along this portion of the frontier, the board consider it a proper measure of precaution, in the present state of our relations with the British Provinces, that positions should be selected, and preparatory arrangements made, for the establishment of depots of supplies at the head of navigation on the Kennebunk and Penobscot. In the event of movements in that quarter, these would be proper points for the concentration of troops, and would serve as a base of operations, whether these should be offensive or defensive in their character.

Estimated expense of storehouses and other accommodations - - - - - - - $150,000

13. *Fort at Calais, on the St. Croix river.*—A work here, while it will serve to cover that part of the State of Maine from the attacks to which it would otherwise be exposed, may, from its advanced position, be made to act an important though indirect part in the defence of the more northern portion of the frontier. Calais appears to be a very eligible point for the concentration of troops, with reference to existing circumstances. A strong force stationed here, threatening the enemy's posts on the lower St. John's, and held ready to strike in that direction, in case of movements from New Brunswick towards the disputed territory, could not fail to have a decisive influence on such movements; since it is obvious that they could not be made with safety, while exposed to attack in flank and rear, and to have their line of communication intercepted, and their depots seized, by a prompt movement on our part from the St. Croix.

Estimated expense of fort and barracks - - - 100,000

14. In reference to the northern frontier, generally, it is the decided opinion of the board, that, besides the defences which have been suggested along the border, chiefly for purposes of local protection, there should be a great central station at some position in the interior, at which troops might be assembled for instruction, and where they would still be

within supporting distance of the more exposed parts of the frontier.

Turning our views inland in search of some single position at which preparations might be made for extended operations on this frontier, and from which aid and succor could always be speedily derived, some position which, while it shall be equally near to many important points of the enemy's possessions, shall afford, at no time, any indication of the direction in which our efforts are to be made; which will, if it be possible, unite the opposite qualities of being at the same time remote and proximate, far as to distance, but near as to time; which, while it brings a portion of the military resources of the country to the support of the inland frontier, and places them in the best attitude for operations in that quarter, whether defensive or offensive, at the same time takes them not away from the seacoast. Looking for these various properties, we find them all united, in a remarkable degree, in the position of Albany.

From this place, by steamboat, canal-boat, or railroad-car, troops and munitions could be transported, in a short time, to Buffalo, or onward to Detroit, to Oswego, to Sackett's Harbor, to Plattsburg, to Boston, and along the coast of New England; to New York by steamboat now, and soon by railroad also; and thence onward to Philadelphia, Baltimore, Washington, and the heart of the southern country, if necessary. In a word, Albany is a great central position, from which radiate the principal lines of communication to the north, to the south, to the east, and to the west; and combines so many advantages for a military depot, that the expediency of occupying it, and thus availing ourselves of those advantages, would seem to be manifest.

Estimated expense of the purchase of land, and the construction of barracks and other buildings - - -	$300,000
Total for northern frontier - - - -	$2,160,000

The board beg leave to observe, in conclusion, that, in the preparation of the estimates submitted, they have not attempted to aim at precision. Hence the amounts stated for the various objects are to be regarded only as approximations. They could not be any thing more, on the data used, which, for want of minute surveys and reconnoissances, were necessarily vague. It is believed, however, that the results presented will be found sufficiently accurate for the general purposes contemplated by the resolution under which this report has been prepared.

JOS. G. TOTTEN,
Col. Engineers.
S. THAYER,
Lieut. Col. of Engineers and Bvt. Col.
T. CROSS,
Col. and Ass't Quartermaster General.
G. TALCOTT,
Lieutenant Colonel of Ordnance.

Estimated cost of ordnance of all kinds, required for the armament of the northern frontier, embracing cannon mounted, and one hundred rounds of ammunition for each piece.

ARMAMENT OF	CANNON.														CARRIAGES.								
	24-pounder guns.	18-pounder long guns.	18-pounder medium guns.	12-pounder long guns.	12-pounder field guns.	6-pounder field guns.	Carronades.	24-pounder howitzers.	12-pounder howitzers.	8-inch howitzers, heavy.	10-inch heavy mortars.	8-inch light mortars.	Cohorns.	Total number of cannon.	For 24-pounders.	For long 18-pounders.	For long 12-pounders.	For medium and field cannon.	For carronades.	For 8-inch howitzers.	For 10-inch heavy mortars.	For 8-inch light mortars.	For cohorns.
Works at Falls of St. Mary - -	-	-	4	-	-	4	-	-	2	-	-	2	-	12	-	-	-	10	-	-	-	2	
Fort at Michilimackinac - -	4	-	-	-	-	4	-	-	2	-	-	2	-	12	4	-	-	6	-	-	-	2	
Fort of Lake Huron - -	-	-	4	-	-	4	-	-	2	-	-	2	-	12	-	-	-	10	-	-	-	2	
Fort for Spring Wells, below Detroit -	-	-	10	-	-	4	-	2	2	-	-	4	-	26	-	-	-	22	-	-	-	2	
Fort for Buffalo and Black Rock -	-	-	10	-	-	4	-	2	2	-	2	2	-	26	-	-	-	22	-	-	2	2	
Fort Niagara - - - -	-	12	4	-	-	4	-	2	2	-	2	2	4	36	-	12	-	16	-	-	2	2	4
Fort Ontario at Oswego - -	-	8	-	9	-	4	-	2	2	-	2	2	4	37	-	8	9	12	-	-	2	2	4
Sackett's Harbor - - -	-	-	10	-	-	4	-	2	2	-	2	2	-	26	-	-	-	22	-	-	2	2	
Fort at the narrows of the St. Lawrence	-	-	10	-	-	4	-	2	2	-	-	4	-	26	-	-	-	22	-	-	-	4	
Fort on New York side, at Champlain -	64	10	-	-	-	4	20	2	2	8	4	4	4	126	64	10	-	12	20	8	4	4	4
Fort on opposite side - - -	64	10	-	-	-	4	20	2	2	8	4	4	4	126	64	10	-	12	20	8	4	4	4
Plattsburg - - - -	-	-	4	-	-	4	-	-	2	-	-	2	-	18	-	-	-	16	-	-	-	2	
Head-waters of the Kennebec - -	-	-	4	-	-	4	8	2	4	-	-	2	-	24	-	-	-	22	-	-	-	2	
Head-waters of the Penobscot - -	-	-	4	-	-	4	8	2	4	-	-	2	-	24	-	-	-	22	-	-	-	2	
Calais - - - - -	-	-	4	-	-	4	8	2	4	-	-	2	-	24	-	-	-	22	-	-	-	2	
	132	40	68	9	48	72	40	24	36	16	16	38	16	555	132	40	9	248	40	16	16	38	16

ESTIMATE—Continued.

ARMAMENT OF	PROJECTILES.								POWDER.	COST OF ARMAMENT.				
	24-pounders.	18-pounders.	12-pounders.	6-pounders.	8-inch shells.	10-inch shells.	24-pounder shells.	12-pounder shells.	Pounds of cannon powder.	Cannon.	Carriages.	Projectiles.	Powder.	Total amount.
Works at Falls of St. Mary - -	-	400	-	400	200	-	-	200	2,700	$1,540	$3,160	$1,016	$540	$6,256
Fort at Michilimackinac - -	400	-	-	400	200	-	-	200	3,900	2,040	1,960	1,128	780	5,908
Fort of Lake Huron - - -	-	400	-	400	200	-	-	200	2,700	1,540	3,160	1,016	540	6,256
Fort for Spring Wells, below Detroit -	-	1,000	400	400	400	-	200	200	6,900	3,630	6,920	2,376	1,380	14,306
Buffalo and Black Rock - -	-	1,000	400	400	200	200	200	200	8,700	4,010	7,160	2,928	1,740	15,838
Fort Niagara - - - -	-	1,600	400	400	200	200	600	200	14,300	6,170	8,460	3,760	2,860	21,250
Fort Ontario at Oswego - -	-	800	1,300	400	200	200	600	200	12,200	6,170	9,650	3,058	2,440	21,318
Sackett's Harbor - - -	-	1,000	400	400	200	200	200	200	10,200	4,010	7,160	2,928	1,740	15,838
Fort at the narrows of the St. Lawrence	-	1,000	400	400	400	-	200	200	8,400	3,630	6,920	2,356	1,680	14,586
Fort on New York side at Champlain -	6,400	1,000	400	400	1,200	400	2,600	200	52,250	31,350	32,620	12,280	10,600	86,850
Fort on opposite side - - -	6,400	1,000	400	400	1,200	400	2,600	200	52,250	31,350	32,620	12,280	10,600	86,850
Plattsburg - - - -	-	400	400	400	200	-	200	200	5,100	2,290	4,960	1,416	1,020	9,686
Head-waters of the Kennebec - -	-	400	400	800	200	-	200	400	6,000	2,890	6,760	1,610	1,200	12,460
Head-waters of the Penobscot - -	-	400	400	800	200	-	200	400	6,000	2,890	6,760	1,610	1,200	12,460
Calais - - - - -	-	400	400	800	200	-	200	400	6,000	2,890	6,760	1,610	1,200	12,460
	13,200	10,800	5,700	7,200	5,400	1,600	8,000	3,600	197,600	106,400	145,030	51,372	39,520	342,322

WASHINGTON, *April* 23, 1840.

For the Board:

JOSEPH G. TOTTEN,
Colonel of Engineers.

REPORT

ON THE

WESTERN FRONTIER, FROM THE SABINE BAY TO LAKE SUPERIOR.

The principles which should govern in fortifying the seaboard are not considered applicable to our inland frontiers, which will very rarely be found to call for regular fortifications. Hence, in relation to that portion of the frontier now under consideration, the duty of the board will be performed by indicating the military positions or stations which should, in their opinion, be occupied by troops, in order to accomplish the objects in view, and in presenting estimates of the probable cost of constructing the necessary barracks, quarters, and storehouses, combined with such works of defence as circumstances may appear to require, to insure their protection against the attacks to which they may be exposed.

The want of personal knowledge, on the part of the board, of our extensive western frontier, and the very limited surveys which have been made in that quarter, have somewhat embarrassed them in the selection of positions; but they desire to be understood as merely designating places in a geographical sense, leaving the particular sites on which the works should be erected to be determined hereafter, by minute examinations of the country at and around those positions; which become the more important, inasmuch as the original locations of some of the places that will be recommended to be retained have been considered faulty.

The southern section of this frontier, extending from the Sabine bay to the Red river, borders all the way on Texas, and has, it is believed, little or nothing to apprehend from Indian aggressions. The Cumanches, the only tribe of any power in that quarter, are represented as gradually receding to the westward, and the progress of the Texian settlements will tend to push them farther from our border. But our relations with the Texian republic, however amicable they may be at present, would seem to require that some military force should be stationed on or near the boundary-line; and the board therefore recommend the establishment of two small posts on the Sabine river, suppressing Fort Jesup, which is considered too far within the frontier, or retaining it merely as a healthy cantonment.

As these would be posts of observation, having reference to national police more than to military defence, they ought to be established on the river where the principal roads cross it, by which we should be enabled to supervise the chief intercourse with our neighbors by land, and, at the same time, control the navigation of the Sabine. The points where the Opelousas and Natchitoches roads, leading to Texas, strike the river, are therefore recommended as the positions which should be occupied, and at which barracks for two or three companies, defended by light works, should be constructed.

The middle section, which extends from the Red river to the Missouri, is by far the most important portion of the whole of our western frontier. It is along this line that the numerous tribes of Indians who have emigrated from the east have been located; thus adding to the indigenous force already in that region, an immense mass of emigrants, some of whom have been sent thither by coercion, with smothered feelings of hostility rankling in their bosoms, which, probably, waits but for an occasion to burst forth

in all its savage fury. These considerations alone would seem to call for strong precautionary measures; but an additional motive will be found in our peculiar relations with those Indians.

We are bound, by solemn treaty stipulations, to interpose force, if necessary, to prevent domestic strife among them, preserve peace between the several tribes, and to protect them against any disturbances at their new homes, by the wild Indians who inhabit the country beyond. The Government has thus contracted the two-fold obligation of intervention among, and protection of, the emigrant tribes, in addition to the duty which it owes to its own citizens of providing for their safety.

It appears to the board that this obligation can only be properly fulfilled by maintaining advanced positions in the Indian country with an adequate restraining military force; and that the duty of protecting our own citizens will be best discharged by establishing an interior line of posts along the western border of the States of Arkansas and Missouri, as auxiliaries to the advanced positions, and to restrain the intercourse between the whites and the Indians, and serve as rallying-points for the neighboring militia in times of alarm.

With these views they would recommend the maintenance of Fort Towson, on Red river, and Fort Gibson, on the Arkansas; and the establishment of a post at the head of navigation on the Kansas, and one at Table creek, on the Missouri, below the mouth of the Big Platte, as constituting the advanced positions on this portion of the frontier.

For the secondary line intended for the protection of the border settlements, the board would adopt the positions which have been selected by a commission of experienced officers, along the western boundary of Arkansas and Missouri; at some of which, it is understood, works are already in progress, namely, Fort Smith, on the Arkansas river; Fort Wayne, on the Illinois; Spring river, and Marais de Cygne; terminating to the north at Fort Leavenworth, on the Missouri. They would also recommend the establishment of one or two intermediate posts between the Arkansas and Red rivers, if, on further examination of the country, suitable positions can be selected near the State line. It is not deemed advisable to establish those posts on the route of the road lately surveyed, which (especially the southern portion) is considered too far in advance of the border settlements to accomplish the object in view; but if eligible positions cannot be found along the line, then a post on the road, where it crosses the Poteau river, which is not very remote from the settlements, might have a salutary influence.

On the northern portion of this frontier, extending from the Missouri river to Lake Superior, the board would recommend the establishment of a post near the upper forks of the Des Moines river; the maintenance of Fort Snelling, on the Mississippi; and the ultimate establishment of a post at the western extremity of Lake Superior. The last is suggested with some qualification, for want of the necessary information by which to determine the channel of communication to that remote position. Whether it shall be through Lake Superior, or by the Mississippi and its tributaries, it would, in either case, be difficult in peace, and next to impracticable in time of war. As the position has, however, important geographical relations, and would enable us to extend our influence and control over the Indians within our territory, and afford protection to our traders in that remote region, it would seem to be worthy of early occupation, if its maintenance can be

rendered secure—a point which can only be determined by a careful examination of the country.

It is, nevertheless, recommended to retain Fort Crawford, at Prairie du Chien; Fort Winnebago, at the portage of the Fox and Wiskonsin rivers; and Fort Howard, at Green bay. These posts are deemed necessary to protect that portion of our frontier, while, at the same time, they serve to cover an important line of intercommunication between the northern lakes and the western waters.

It has not been thought expedient to continue the interior line of defence, suggested for the middle section of this frontier, across from the Missouri to the Mississippi river. Our Indian relations in that quarter assume a different aspect. There is no special guaranty of perpetual occupation of that country by the tribes who now inhabit it; nor can it be doubted that they will ultimately be pushed, by the advance of our population, to the west of the Missouri river. Under those circumstances, it is believed that the intermediate post recommended to be established on the Des Moines river, co-operating with the posts on the Missouri, and those on the Upper Mississippi, will afford adequate protection to the border settlements against any attacks to which they are likely to be exposed.

The board have not felt called upon, by the terms of the resolution under which they act, to project a plan of operations for the western frontier; nor to go into an estimate of the military force that will be required there, farther than was necessary to determine the extent of accommodations to be erected, and the expense which these will involve. They would, however, observe, that the positions which have been designated will not, of themselves, have the desired influence in restraining the Indian tribes and protecting our border settlements, without the aid of a respectable force, of which a full proportion should be mounted and held disposable, at all times, for active service in the field. To effect this, the works should be so constructed that, while they will afford adequate accommodations for all the troops when they are not actively employed, their defence may be safely intrusted to a small force. With these precautionary measures, and the co-operation of small but effective reserves posted within sustaining distances of the several sections of the frontier, it is believed that peace may be preserved, and the first onset of war met, until the militia of the neighboring country could be imbodied and brought into the field.

It only remains to recapitulate the positions which have been recommended to be occupied, apportion the requisite force, and present a conjectural estimate of the cost of erecting the accommodations and defences deemed necessary at each.

1. For quarters for 100 men at the post on the Sabine where the Opelousas road crosses that river, including defences -	$20,000
2. For quarters for 100 men at the post on the Sabine where the Natchitoches road crosses, including defences -	20,000
3. For permanent quarters and other accommodations for 500 men at Fort Towson, including defences - -	100,000
4. For permanent quarters and other accommodations for 1,000 men, at Fort Gibson, including defences - -	180,000
5. For quarters for 300 men at the post on the Kansas river, including defences - - - - -	60,000

6. For quarters and other accommodations for 500 men at the post at Table creek, near the mouth of the Platte, on the Missouri, including defences - - - -	$75,000
7. For quarters and other accommodations for 400 men at the post on the Des Moines river, including defences -	60,000
8. For the enlargement and repair of Fort Snelling, to fit it for the accommodation of 300 men, including defences -	30,000
9. For quarters for 400 men at the post at the western extremity of Lake Superior, including defences - -	50,000
INTERIOR LINE.	
10. For quarters for 200 men at the post between the Red and Arkansas rivers, including defences - - -	50,000
11. For completing quarters and other accommodations for 200 men at Fort Smith, including defences - -	50,000
12. For completing quarters and other accommodations for 200 men, at Fort Wayne, including defences - -	50,000
13. For quarters and other accommodations for 200 men at the post at Spring river, including defences - -	50,000
14. For quarters and other accommodations for 200 men at the post at Marais de Cygne, including defences - -	50,000
15. For completing quarters and other accommodations in progress for 400 men at Fort Leavenworth, including defences - - - - - - - -	50,000
Total for western frontier - - -	$895,000

All which is respectfully submitted:

JOS. G. TOTTEN,
Colonel Engineers.
S. THAYER,
Lieut. Col. Engineers, Brevet Colonel.
T. CROSS,
Col. and Assistant Quartermaster General.
G. TALCOTT,
Lieutenant Colonel Ordnance.

Estimated cost of ordnance of all kinds, required for the armament of the western frontier, embracing cannon mounted, and one hundred rounds of ammunition for each piece.

	CANNON.					CARR'GES.		PROJECTILES.				POWD.	COST OF ARMAMENT.				
	18-pounder guns, medium.	6-pounder guns.	12 pounder howitzers.	8-inch light mortars.	Total number of cannon.	For medium and field cannon.	For 8-inch light mortars.	18-pounders.	6-pounders.	12-p'nder shells.	8-inch shells.	Pounds of powder.	Cannon.	Carriages.	Projectiles.	Powder.	Total amount.
Post on the Sabine, at the crossing of the Opelousas road	2	2	1	1	6	5	1	200	200	100	100	1,550	$770	$1,455	$508	$310	$3,043
Post on the Sabine, where the Natchitoches road crosses	2	2	1	1	6	5	1	200	200	100	100	1,550	770	1,455	508	310	3,043
Proposed establishment for 500 men, at Fort Towson	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
Proposed establishment for 1,000 men, at Fort Gibson	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
Proposed establishment for 300 men, at the Kansas river	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
Proposed establishment for 500 men, at a post on Table creek	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
Proposed establishment for 400 men, at a post on the Des Moines	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
Repairs, &c., of Fort Snelling, for 300 men	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
Proposed establishment for 400 men, at a post on western extremity of Lake Superior	4	12	1	2	19	17	2	400	1,200	100	200	4,150	2,892	2,523	1,166	830	7,411
Interior line.																	
For proposed establishment for 200 men, at a post between Red and Arkansas rivers	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
For establishment at Fort Smith for 200 men	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
For establishment at Fort Wayne for 200 men	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
For establishment at Spring river for 200 men	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
For establishment at Marais de Cygne for 200 men	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
For establishment at Fort Leavenworth for 400 men	-	10	-	-	10	10	-	-	1,000	-	-	1,500	1,000	1,000	250	300	2,550
	8	136	3	4	151	147	4	800	13,600	300	400	25,250	16,432	17,433	5,182	5,050	44,097

WASHINGTON, *April* 23, 1840.

For the Board :

JOSEPH G. TOTTEN, *Colonel Engineers.*

REPORT

ON THE

ARMORIES, ARSENALS, MAGAZINES, AND FOUNDRIES, WHICH ARE MENTIONED IN THE THIRD SECTION OF THE RESOLUTION OF THE SENATE IN THE FOLLOWING WORDS, VIZ:

"The armories, arsenals, magazines, and foundries, either constructed or deemed necessary, with a conjectural estimate of the expense of constructing such of said establishments as may not yet be completed or commenced, but which may be deemed necessary."

The necessary arsenals and magazines will be first considered, as armories and foundries, being manufactories of arms destined for general distribution, do not pertain exclusively to any particular frontier. Arsenals and ordnance depots will be understood to include magazines in the general sense of the term; and these establishments will be rated, according to their relative importance or magnitude, in three classes:

I. Arsenals of construction, which embrace also repairs, and for deposite.

II. Arsenals for repairs and for deposite.

III. Depots, or places for deposite and safekeeping of arms, and other ordnance stores.

I. *On the northern frontier, from Lake Superior to Passamaquoddy bay.*—An arsenal, or ordnance depot, will be required at some suitable point on the Upper Mississippi; and Fort Crawford, at Prairie du Chien, offers a good position, particularly with reference to supplying the line or tract of country extending southwesterly from Fort Snelling, through the Territory of Iowa, towards the Des Moines river, as well as northwardly toward Lake Superior, and eastwardly through the Territory of Wiskonsin to Lake Michigan. The expense of constructing this depot, on a scale commensurate with the probable importance that must be given to it, will not be less than - - - - - - - $70,000

forming an arsenal of the third class.

The Detroit arsenal, on the river Rouge, twelve miles from Detroit, now nearly finished, is an arsenal of the 2d class, destined to supply the lake frontier from the Sault de St. Marie, the outlet of Lake Superior, to Lake Michigan and Lake Erie - - - - - - 20,000

will effect the completion of this arsenal.

Allegany arsenal, at Pittsburg, an establishment of the 1st class, is also available for the supply of the lake frontier, as well as the western frontier, through the western arsenals.

Rome arsenal, of the 3d class, is the place of deposite for stores required at the posts on Lake Ontario.

Champlain arsenal, at Vergennes, Vermont, also of the 3d class, will supply the posts on Lake Champlain and the northern part of Vermont. But the whole lake frontier, and the arsenals in that region, may be supplied from the Watervliet arsenal, near Albany, which is an establishment of the 1st class, and admirably located for the preparation and sending forth of ordnance stores, not only to the northern, but likewise to the maritime frontier. The periods of

free navigation of the New York canals, and the Hudson river, are used for the distribution from Watervliet of such supplies as may be required in the winter season.

The Kennebec arsenal, at Augusta, Maine, of the 2d class, is designed to supply the northern and eastern frontiers of that State, and part of New Hampshire; but arms would be furnished to the frontier of the latter State from Springfield armory, and ordnance stores would be passed up the valley of the Connecticut from arsenals either east or west of that river.

It may become necessary to establish a depot on the Penobscot, at Bangor. But this point is only 60 miles from Augusta; and no estimate of the cost is furnished, as the deposite would, probably, be temporary.

II. *The maritime frontier from Passamaquoddy bay to Cape Florida.*—The Kennebec arsenal is the place of deposite for the greater part of the seacoast of Maine; the sum of $30,000 00
will finish the additions required.

The Watertown arsenal, five miles in the rear of Boston, also of the 2d class, will supply the westerly part of Maine, the seacoast of New Hampshire, Massachusetts, and Rhode Island; and - - - - - - 25,000
will be required for additional buildings and enclosures.

Both the Kennebec and Watertown arsenals are of considerable extent, with every facility for being converted into arsenals of the 1st class; and the construction of gun-carriages, necessary for arming the forts and batteries within the limits above stated, may be effected at both or either. The Watervliet arsenal, before mentioned, is, however, the principal one relied on for supplies required, not only from Cape Cod to the capes of Delaware bay, but for much of the maritime as well as the lake frontier. Additional quarters and storehouses at this post will cost - - - 50,000

A depot in the harbor of New York receives articles from Watervliet, during the season of navigation, which are transhipped, in time of peace, to all parts of the coast and to the Mississippi. During a war, supplies would be furnished from arsenals in the more immediate vicinity of the seacoast defences, viz: Frankford arsenal, six miles above Philadelphia, is of the 2d class, and will supply works on Delaware bay and river; Pikesville arsenal, of the 3d class, four miles from Baltimore; Washington arsenal and Fort Monroe arsenal, both of the 1st class, will furnish what may be required for the seacoast defences of Chesapeake bay and Potomac river. The last mentioned was established with special reference to the construction of the gun-carriages required at that post and at Fort Calhoun. It has been found advantageous, however, to construct there carriages for other southern forts; but it cannot be considered as a permanent establishment of the 1st class, to be kept up after the occasion which called for it shall have passed by.

The North Carolina arsenal, at Fayetteville, on Cape Fear river, is under construction, and was originally in-

tended to be made one of the 1st class. Doubts have been entertained whether it ought to exceed those of the 2d class; but the plan is such that it can at any time be extended according to the original design. The sum of eighty thousand dollars will be required to finish it as one of the 2d class - - - - - - - - $80,000

Charleston depot is at present of diminitive capacity. It is proper to enlarge it, and thirty thousand dollars will make it useful as a place of deposite - - - - - 30,000

Augusta arsenal, at Augusta, Georgia, is of the 2d class, and, with the two last mentioned, will furnish supplies required from Chesapeake bay to Cape Florida.

The Augusta arsenal has its powder magazine detached and located at an inconvenient distance, beyond the control of the force at the post. For the construction of a new magazine, and other necessary additions to this establishment, sixty thousand dollars will be required - - 60,000

Several of the arsenals have been built upwards of 20 years, and require extensive repairs and additions, which it is supposed may be effected, from time to time, by the aid of annual appropriations, amounting in all to about - 180,000

III. "*The Gulf frontier, from Cape Florida to Sabine bay.*"—Appalachicola arsenal, at Chattahoochie, just below the junction of the Chattahoochie and Flint rivers; Mount Vernon arsenal, on the Mobile river; and Baton Rouge arsenal, on the Mississippi, are all establishments of the 2d class, and destined to supply the whole of the Gulf frontier, and the forts below New Orleans, on the Mississippi. About sixty thousand dollars will be required to complete them, and erect some additional buildings at Baton Rouge - 60,000

IV. "*The western frontier, from Sabine bay to Lake Superior.*"—Baton Rouge arsenal, already mentioned, will furnish supplies for posts on the Sabine and Red rivers.

Little Rock arsenal, just commenced, will be the source of supplies for posts on the Arkansas, and along the western border of that State. It will necessarily become, at first, an arsenal of the 2d class, with the depot at Memphis as subsidiary, and will require one hundred thousand dollars to complete it - - - - - - 100,000

St. Louis arsenal is a large establishment of the 2d class, but, with very little expense, can be raised to the 1st class; with the subsidiary depot at Liberty, on the Missouri, it will supply the posts on that river, the western border of the State, the posts on the Des Moines, and the Upper Mississippi.

A depot at Prairie du Chien, mentioned in relation to supplies required in the direction of Lake Superior, and southwesterly, through the Territory of Iowa, would be sustained by the St. Louis arsenal, and completes the chain upon the several frontiers embraced in the resolution.

Total amount required for constructions, additions, and repairs to arsenals and depots - - - - $705,000

Armories.

The two national armories at Springfield, Massachusetts, and Harper's Ferry, Virginia, are the only public establishments for the manufacture of small arms. They furnish about twenty-five thousand stand of arms yearly. This number might be extended; but it has been an object of solicitude with the Government, for nearly twenty years past, to establish an armory west of the Alleganies.

Commissioners were employed in 1823 to examine the western waters, with a view to the location of an armory. Many sites were surveyed, and careful estimates made of the cost of an armory at each, with an exhibit of their several advantages and disadvantages. The result of their investigations may be found at large in Gales & Seaton's reprint of American State Papers, folios 729 to 790 inclusive, vol. 2, Military Affairs.

It is perhaps fortunate that the place then selected was not adopted by Congress; for, since that period, the immense increase, not only of population and the general resources of the western region, but of the particular articles required for the manufacture of arms, by the discovery of masses of coal, and the extensive working of iron-mines, where nothing of the kind was then found, has shown that an armory should be located much farther west.

The data collected by the commissioners in 1823 may be usefully applied in estimating the probable cost of an armory at the present day, making suitable allowances for the increased price of every thing connected with such an establishment. This cost will be found to vary, according to localities of positions, from $280,000 to $500,000 for an armory capable of furnishing twelve thousand muskets per year. It will therefore be stated at the mean of $390,000, to which twenty per cent. should be added; making the sum of - - - $468,000

Another mode of proceeding proposed, consists in forming an establishment complete in itself, of limited extent, and having the great mass of component parts of arms manufactured by the piece in private workshops, and only the inspecting, assembling, and finishing be done at the public works. This course would materially reduce the first cost, or necessary expenditure for buildings and tools. It also admits of extension to a great amount of fabrication, with but little additional cost of permanent fixtures. But, whichever mode is followed, or whatever site may be selected for its location, there can be no question of the necessity for an armory on the western waters; and as regards a proper location, it may be observed, that, to consider the relations of an armory in the same light as that of an arsenal or magazine, would be an error; the means of production being the principal requisite for the one, and those of transportation or distribution for the others.

Total required for an armory on the western waters - $468,000

Foundries.

The United States own no cannon-foundry. Although possessing some ore-beds, from which iron of approved quality for casting cannon

has long been made, yet artillery of every description is procured from private foundries. This subject has been so recently before Congress, and so ably treated, that nothing will be said further than to state the probable cost of such an establishment; and here, again, so much depends upon the location, that only an approximation will be attempted. A report from the War Department made to the 24th Congress, 1st session, Doc. No. 106, states the cost of a foundry, to be located at Georgetown, in the District of Columbia, at $312,000. If this estimate is correct, (and it is known that great care was bestowed on its preparation,) it may be assumed that about - - - - - - $300,000
will be required for a foundry when favorably located for the use of water-power. Should steam-power be adopted, the first cost of the establishment would be less, while the annual expenditure would be greater than for water-power.

As regards a suitable location for a foundry, the great weight and bulk of the raw materials used in the manufacture of cannon, and the weight of heavy guns, which are required for use only on the seaboard, would seem to demand that particular attention should be given to the means of transportation both to and from the foundry.

Total amount required for a foundry - - - $300,000

Recapitulation.

Total amount required for constructions, additions, and repairs to arsenals and depôts - - - - -	$705,000
Total amount required to establish an armory on the western waters - - - - - - - -	468,000
Total amount required to establish a national foundry -	300,000
Total -	1,473,000

All which is respectfully submitted:

JOS. G. TOTTEN,
Colonel Engineers.
S. THAYER,
Lieut. Col. Engineers, Brev. Col.
T. CROSS,
Colonel, Asst. Quarterm'r Gen'l.
G. TALCOTT,
Lieutenant Colonel Ordnance.