Joint
Army and Navy Action
in
Coast Defense

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JOINT ARMY AND NAVY ACTION IN COAST DEFENSE.

The following papers which enunciate, respectively, the principles that will govern the joint action of the Army and Navy in coast defense, the action of the Navy in coast defense, the system of coast defense to be employed by the Army, and the procedure to be followed by the Army in the preparation of defense projects and plans, are published, upon the recommendation of the Joint Board, for the information and guidance of all officers of the Army and Navy:

Part I.—Joint Army and Navy action in coast defense.
Part II.—Action of the Navy in coast defense.
Part III.—A positive system of coast defense.
Part IV.—Defense projects and plans.

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Part I.

JOINT ARMY AND NAVY ACTION IN COAST DEFENSE.

The following principles will govern the joint action of the Army and Navy in coast defense:

1. *Coast defense* includes dispositions and operations having for their object the repulse of a hostile attack upon any portion of the seacoast of the continental United States, the Panama Canal, or the insular possessions, or upon naval vessels or merchant shipping in or off harbors or in coastwise sea lanes.

2. The elements which enter into coast defense comprise—

(*a*) Naval forces.

I. The United States Fleet, other fleets and detachments.

II. The naval coast defense forces.

III. The Marine Corps.

(*b*) Military forces.

I. The harbor defenses.

II. The mobile forces of the Army.

3. The missions and functions of the naval forces in coast defense are:

I. *The United States Fleet* is a mobile force free to move from area to area in accordance with the strategic situation, to operate against the main or most dangerous enemy forces and all enemy forces within striking distance for the purpose of gaining and maintaining the command of vital lines of sea communications. Such a command, when won, insures freedom of movement on the sea to our vessels and denies such freedom of movement to enemy vessels, thereby protecting our coasts from attack. Other fleets or detachments may be organized in secondary areas for the control of the sea communications within those areas in which only small detachments of enemy fleets may be expected.

II. *The naval coast defense forces* are usually assigned to naval districts for the purpose of controlling the sea communications therein. The limits of the naval districts are considered to extend to seaward so far as to include the coastwise sea lanes. It is a policy of the Navy Department that naval vessels and aircraft assigned to naval districts in the continental United States shall be kept at a minimum so that all naval vessels which will add to the power of the United States Fleet may be assigned to it. The naval

coast defense forces are adjuncts to and operate in connection with such fleets or detachments of fleets as are based in their general locality.

III. *The Marine Corps* may, in execptional cases required by the national interest, be used for coast defense in the continental United States and insular possessions in the way described for the Army. The most important function of the Marine Corps is to seize and hold temporary advanced bases in cooperation with the fleet and to defend such bases until they are relieved by the Army. In such cases the Marine Corps detachments will have, in general, a mission in coast defense similar to that for Army garrisons of insular possessions. Their methods of defense will generally correspond to the principles laid down herein for the Army, as far as they apply to the defense of advanced bases. This coordination of the Army and Marine Corps in coast defense is important, as it will preserve the mobile character and facilitate the relief of marine advanced base detachments by permanent Army garrisons when the line of communications has been made secure.

4. The missions and functions of the military forces are:

I. *The harbor defenses.*—Harbor defense includes dispositions and operations for the defense of limited portions of the seacoast, ordinarily confined to important harbors. Such dispositions usually include fixed armament, mobile armament, controlled submarine mines, and the troops and accessories required for their employment and local defense. Harbor defenses have distinct missions over the sea and the land areas covered by their armament:

(1) To deny the enemy possession of the position and its facilities.

(2) To prevent destruction or serious injury by bombardment of the harbor utilities.

(3) To provide an area off the harbor entrance in which naval vessels and merchant shipping will be protected as far as possible against all forms of enemy attack.

II. The mobile forces of the Army.—The mobile forces of the Army include combat troops of all arms and have the mission in coast defense of operating against enemy forces making attacks on the seacoast or operating in the coastal area.

5. The usual composition and organization of the naval forces are:

I. *The United States Fleet or other fleets.*

(*a*) Battleship division: Four battleships.

(*b*) Battleship squadron: Two battleship divisions.

(*c*) Battleship force: All battleship divisions or squadrons of the fleet.

(*d*) Cruiser division: Four cruisers or light cruisers.

I. *The United States Fleets and other fleets*—Continued.

(*e*) Cruiser squadron: Two cruiser squadrons.

(*f*) Cruiser force: All cruiser divisions or squadrons of the fleet.

(*g*) Destroyer division: Six destroyers.

(*h*) Destroyer squadron: Three destroyer divisions, one light cruiser (flagship), one destroyer tender.

(*i*) Destroyer flotilla: Three destroyer squadrons, one light cruiser (flagship).

(*j*) Destroyer force: All destroyer squadrons or flotillas of the fleet.

(*k*) Submarine division: Three to 10 submarines of the same type, one submarine tender.

(*l*) Submarine force: All submarine divisions of the fleet.

(*m*) Air force: Aircraft carriers and tenders with attached airplanes and seaplanes, rigid dirigibles, kite balloons.

(*n*) Mine force: Minelayers, light minelayers, and mine sweepers.

(*o*) Train: Oilers, colliers, repair ships, store ships, hospital ships, etc.

(*p*) Naval Transportation Service: Colliers, oilers, store ships, transports, etc.

(*q*) Advanced base forces (Marine Corps): Infantry, machine guns, field artillery, fixed batteries, controlled mines, antiaircraft batteries, searchlights, aviation squadrons, and auxiliary services.

II. *The naval coast defense forces.*

(*a*) Naval Communication Service: Radio stations, radio compass stations, telegraphs, telephones, lookout system.

(*b*) Patrol divisions: Patrol vessels.

(*c*) Naval air stations: Scouting planes, patrol planes, bombing and torpedo planes, nonrigids, and kite balloons.

(*d*) Mine divisions: Mine layers and sweepers.

(*e*) Submarine divisions: Three to 15 submarines.

III. *Marine Corps.*

(*a*) Local defense forces: Infantry, machine guns, and such light fixed or mobile guns as may be useful for purely local defense without duplicating the Army plans for coast defense.

6. The composition and organization of the military forces are:

I. *The harbor defenses.*

(*a*) Fixed armament: Guns, howitzers, and mortars mounted in permanent emplacements, incapable of being moved or readily transferred and designed to fire over limited areas. The fixed armament is classified as major, intermediate, and minor, depending on the caliber.

I. *The harbor defenses*—Continued.

1. Major armament consists of 8, 10, 12, 14, and 16 inch guns, 16-inch howitzers, and 12-inch mortars.
2. Intermediate armament consists of 5 and 6 inch guns.
3. Minor armament consists of 3, 4, and 4.7 inch guns.

(*b*) Mobile armament: Guns, howitzers, and mortars on movable mounts, capable of being readily moved or transferred. The mobility possessed by armament of this class is limited by the type of mount and may be classified as strategical and tactical mobility. For example, all types of railway armament possess strategical mobility, but the tactical mobility of certain types is limited, due to the characteristics of the mount. The mobile armament is classified as primary and secondary, depending on the caliber.

1. Primary armament consists of 12 and 14 inch guns, 16-inch howitzers, and 12-inch mortars on railway mounts.
2. Secondary armament consists of 7, 8, and 10 inch guns on railway mounts, and 6-inch, 155-millimeter, G. P. F., 7-inch guns, 8 and 9.2 inch howitzers, on caterpillar mounts or tractor drawn.

(*c*) Antiaircraft armament: Three and 4.7 inch guns, on fixed and mobile mounts.

(*d*) Submarine mines: Shore controlled mines, mine planters, and accessories.

(*e*) Coast defense aircraft: Observation units, lighter and heavier than air types.

(*f*) Accessories: Searchlights, coast defense radio, fire-control installations, etc.

(*g*) Organization: The elements above indicated are organized at present as follows:

1. Gun defense: (1) Battery commands consisting of one or more guns, howitzers, or mortars, commanded directly by a single individual, together with all structures, equipment, and personnel necessary for their emplacement, protection, and service. (2) Fire commands consisting of two or more battery commands, the additional fire-control stations and accessories and the personnel assigned thereto. The senior officer present for duty is the fire commander.

I. *The harbor defenses*—Continued.

2. Mine defense: Mine commands consisting of such portions of the mine defense as can be controlled advantageously by a single individual. The senior officer present for duty is the mine commander.
3. Fort commands consisting of all the means of seaward and landward defense, including both personnel and matériel, located at any coast fort. Unless otherwise directed by the Secretary of War, the senior coast artillery officer present for duty, other than the coast-defense commander, is the fort commander.
4. Coast-defense commands consisting of a group of fort commands provided for the defense of a harbor or point of the coast. The senior coast artillery officer present for duty is the coast-defense commander.

Our harbors, if undefended, would be the weakest points in our line of defense, and since they are also of greatest value to the enemy it becomes important that these points be strengthened by more complete fortifications than other parts of line.

II. *The mobile forces.*

(*a*) Infantry division: Combat unit consisting of—

One division headquarters.
Two Infantry brigades.
One Field Artillery brigade.
Auxiliary and special division troops, including—
- Engineers.
- Air Service.
- Medical.
- Signal.
- Military police.
- Trains.

(*b*) Army corps: Consisting normally of—

One corps headquarters.
Three Infantry divisions.
Auxiliary and corps special troops, including—
- Artillery.
- Engineers.
- Air Service.
- Antiaircraft.
- Medical.
- Signal.
- Military police.
- Trains.

II. *The mobile forces*—Continued.

(*c*) Field army: Consisting normally of—

One army headquarters.
Three army corps.
Auxiliary and army special troops.

Tables of Organization published by the War Department show in detail the distribution of personnel and armament in the above organizations.

III. *Defense sectors.*—For command and other purposes the seacoast areas are divided into sectors, which usually include defended and undefended areas. The limits of defense sectors are prescribed by the War Department. According to the foregoing, a defense sector comprises the entire sea frontier within its limits, of which the harbor defenses are strong points and not isolated points to be defended. A major sector is a sector of such magnitude as to require a sector reserve of a division or more and not susceptible of reinforcement except from the general strategical reserve or by transfer from another sector. A minor sector is a sector of such magnitude that the sector reserve may be less than a division and yet so situated as to make inexpedient to organize it as a subsector. A minor sector is not susceptible of reinforcement except from the general strategical reserve or by a transfer from another sector.

A subsector is a part of a major or minor sector, but forming a separate tactical command, with its own reserve, under the sector command and susceptible of reinforcement by the sector reserve. Corps areas and oversea departments will constitute defense sectors, similarly named. Corps area and department commanders thus become the "sector commanders" and as such are responsible for the defense of their respective sectors.

7. In general, attacks on the seacoast can be divided into two classes:

(*a*) Unsupported attacks.
(*b*) Supported attacks.

Unsupported attacks are surprise attacks or raids made by light enemy forces for the accomplishment of a minor mission.

Supported attacks are those in which the forces which carry out the actual attack are escorted, assisted, or supported by considerable naval forces in the attempt to carry out an important mission, which will affect the entire campaign.

8. There are the following eight general forms of attack on the seacoast, each of which may be made as either unsupported or supported attacks:

A. Aircraft attacks on seaports.
B. Mine-laying attacks off the seacoast.

C. Torpedo, bombing, and gunfire attacks on vessels off the seacoast.
D. Torpedo fire into seaports.
E. Blocking attacks on seaports.
F. Bombardment of seaports by naval vessels.
G. Penetration into a harbor or water area by naval vessels.
H. Landing attacks.

9. The following types of enemy vessels or enemy forces may be used to make attacks on the seacoast or to assist or support those actually making the attack:

Battle squadrons.
Cruisers.
Destroyers.
Submarines.
Minelayers.
Light minelayers.
Mine-laying submarines.
Mine sweepers.
Landing parties.
Aircraft carriers.
Fighting planes.
Torpedo and bombing planes.
Observation planes.
Aircraft tenders.
Scouting planes.
Rigid dirigibles.
Battleships, second line.
Blockships.
Expeditionary forces.

10. In the case of unsupported attacks our forces must obviously operate against the enemy force actually making the attack, thus frustrating it, if our operations are successful. In the case of supported attacks our forces have the choice of operating against either.

(*a*) The enemy forces actually making the attack, which, on account of the hazardous nature of the duty, are usually composed of small and unimportant vessels.

(*b*) The enemy forces supporting or assisting the attacking force, which are usually composed of larger and more valuable vessels.

In the first case we may sink or damage unimportant naval vessels, and by doing so frustrate the attack and prevent the enemy from inflicting damage on the objectives of their attack.

In the second case we may sink or damage important naval vessels, but we can not frustrate the enemy immediate attack, the objectives of which may be damaged.

That course of action should be pursued which it is estimated will result in the greatest advantage for us in the conduct of the combined Army and Navy campaign.

11. The primary functions or missions of the various arms, branches, and types of the Army and Navy forces are given in the following paragraphs. These functions are assigned for the usual conditions and do not prohibit the use of the arms, etc., on other missions dictated by the actual situation. The fact that the function

given to certain arms, etc., in coast defenses is that of operating against enemy forces attacking the seacoast does not mean that all such arms, branches, and types are necessarily essential for the defense of any particular section of the coast; the functions or missions are stated so that such types, branches, and arms, if assigned, may be used in accordance with an accepted doctrine for their employment.

12. The primary missions or functions of naval forces—whether attached to the United States Fleet or the naval coast defense forces—in coast defense are, in probable order of contact with the enemy:

(*a*) *Rigid dirigibles.*—To locate and report enemy forces approaching or operating off the coast, particularly where great cruising endurance is required.

(*b*) *Naval Communication Service.*—To receive and forward reports of enemy forces approaching or operating off the seacoast, and to receive and forward reports from, and transmit instructions to, all our forces, active or passive, and to maintain liaison with all friendly activities.

(*c*) *Scouting planes.*—To search for, locate, and report enemy vessels and, in case of submarines, to attack them, to bomb enemy surface craft during darkness, low visibility, or other favorable conditions.

(*d*) *Patrol planes.*—To search for, locate, and report enemy vessels and, in case of submarines, to attack them; to bomb enemy surface craft during darkness, low visibility, or other favorable conditions; to escort naval and merchant vessels and attack enemy submarines encountered; to search for enemy anchored mines, when water is clear enough for them to be seen.

(*e*) *Nonrigid dirigibles and patrol vessels.*—To search for, locate, and report enemy vessels and in the case of submarines, to attack them; to escort naval and merchant vessels and attack enemy submarines encountered.

(*f*) *Submarines.*—To search for, locate, and attack enemy vessels and dirigibles, making such reports as will not interfere with the effectiveness of their attack.

(*g*) *Destroyers.*—To search for, locate, and attack enemy vessels, those having greatly superior gun power being attacked during darkness, low visibility or other favorable conditions; to escort naval and merchant vessels, attacking enemy vessels encountered, those having greatly superior gun power being attacked during darkness, low visibility or other favorable conditions; to attack all enemy vessels, when reported by other craft,

those having greatly superior gun power being attacked during darkness, low visibility, or other favorable conditions.

(*h*) *Cruisers.*—To search for, locate, and report enemy vessels, attacking those having approximately equal or inferior gun power; to escort naval and merchant vessels, attacking enemy vessels encountered which are approximately equal or inferior in gun power; to attack enemy vessels reported by other craft, when the enemy vessels are approximately equal or inferior in gun power.

(*i*) *Torpedo and bombing planes.*—To attack all enemy vessels reported by other craft, taking advantage, where possible, of low visibility.

(*j*) *Mine layers and light mine layers.*—To lay fields of contact mines immediately before enemy attacks in limited areas through which enemy forces are expected to pass; such fields should not limit the activities of our naval and military forces.

(*k*) *Mine sweepers.*—To sweep such channels as are necessary for our naval forces and merchant shipping and to clear mine fields laid by the enemy when they are encountered or reported.

(*l*) *Battle squadrons.*—To operate against enemy capital ships or other forces as required by the actual situation.

13. The primary missions or functions of the military forces in coast defense are as follows:

(*a*) *Intelligence Service.*—Reports all enemy forces approaching or operating off the seacoast.

(*b*) *Air Service.*

1. Pursuit planes attack all enemy aircraft operating over and off the seacoast, and enemy landing parties; protect Army and Navy aircraft against enemy aircraft.
2. Bombing planes attack all enemy vessels off the seacoast and enemy landing parties.
3. Observation planes assist in directing the fire of batteries, particularly when firing at long range.
4. Observation balloons assist in directing fire of batteries at all ranges.
5. Dirigibles assist Intelligence Service; assist in directing fire of batteries, particularly when firing at long ranges; attack enemy vessels off the seacoast and enemy landing parties.

(*c*) *Harbor defenses.*

1. Fixed armament attack all enemy forces within effective range, by day or night.
2. Mobile armament supplement the fire of fixed armament and attacks suitable targets within effective range by day or by night.
3. Antiaircraft armament attack all enemy aircraft within effective range and by its fire keep enemy aircraft outside of effective range of important targets for their bombs, torpedoes, and machine-gun fire.
4. Mine defenses close harbor entrances to enemy vessels and deny specified areas to enemy vessels.
5. Searchlights search for and illuminate targets for all of the above elements.

(*d*) *Mobile forces.*—The mobile forces are charged with the defense of the several beach positions in the intervals between the harbor defenses. These positions are organized for defense in accordance with the principles stated in Appendix II, "A Positive System of Coast Defense."

14. When an enemy attack on the seacoast is made, the senior naval officer within the limits of the naval district or districts in which the attack is being made, whether commanding a district or a detachment of the fleet, will assume the strategical direction of all naval forces within the district or districts.

15. The senior naval officer afloat in the area in which the attack is being made, whether attached to the fleet or a district, will assume the tactical direction of all naval forces in contact with the enemy.

16. Army sector commanders are responsible for the defense of the sectors and for the initial distribution of the troops allotted to sectors. The senior local Army commander in any subdivision of a sector is responsible for the tactical dispositions or operations of the military forces against enemy attacks of whatever nature.

17. Cooperation between Army and naval officers directing operations against enemy attacks will be governed by the following principles:

(*a*) When an enemy force of a strength greatly superior to that of the naval force available for use against it approaches the coast, the naval officer will inform the Army officer of the situation and shall assume that the Army has a paramount interest in the operation and shall coordinate the operations of the naval forces with those of the military forces.

(*b*) If, however, the conditions are such that the enemy is, or can be, engaged by a naval force approximating in strength that of the enemy, the Army officer shall be so informed and shall assume that the Navy has a paramount interest in the operation and shall coordinate the operations of the military forces with those of the naval forces.

(*c*) In the application of these principles, it is assumed that both the Army and Navy have forces suitable for operating against enemy attacking forces; one service obviously could not be given a predominating interest in frustrating an enemy attack, if it did not have available forces which were suitable for operations against the attacking forces, even though the other service were greatly inferior in strength to the attacking forces.

18. The best assurance of effective cooperation between the Army and Navy commanders within a given region will be found in cooperation in the preparation of defense plans in time of peace. Intelligent work of this character will result in the determination of the more probable situations likely to arise and in advance agreements upon plans of joint action for each such situation.

The principal responsible subordinates and staffs must be informed of such plans and conform their peace organization and training thereto.

19. Any instructions for cooperation between officers of the two services must fail of complete effectiveness unless the cooperation is brought to its logical focus in the offices of the Secretary of the Navy and the Secretary of War.

20. To obtain this cooperation the Joint Board was reorganized in 1919 with the following members:

Chief of Staff.
Director Operations Division—General Staff.
Director War Plans Division—General Staff.
Chief of Naval Operations.
Assistant Chief of Naval Operations.
Director of Plans, Naval Operations.

21. The Joint Army and Navy Board takes cognizance of questions referred to it by proper authority, involving joint action of the Army and Navy and joint Army and Navy policy relative to the national defense. It also has the duty of originating consideration of such subjects when in its judgment necessary, and is responsible for recommending to the Secretary of War and the Secretary of the Navy jointly whatever it considers essential to establish the sufficiency and

efficiency of cooperation and coordination of effort between the Army and the Navy.

22. In order to provide an agency for detailed investigation, study, and development of policies, projects, and plans relative to the national defense and involving joint action of the Army and Navy, the Secretary of War and the Secretary of the Navy organized a Joint Army and Navy Planning Committee, consisting of:

(1) Three or more members of the War Plans Branch, War Plans Division, General Staff, to be designated by the Chief of Staff.

(2) Three or more members of the Plans Division of Naval Operations, to be designated by the Chief of Naval Operations.

The Joint Army and Navy Planning Committee investigates, studies, and reports upon questions relative to the national defense and involving joint action of the Army and Navy referred to it by the Joint Army and Navy Board. It also has the duty of originating consideration of such subjects when in its judgment necessary. The members of this committee are authorized to consult and confer freely on all matters of defense and military policy in which the Army and the Navy are jointly concerned, and this joint work is considered as their most important duty.

23. It may often be found practicable and desirable, especially where an army corps area or department headquarters and naval district headquarters are in the same locality, for the two commanders concerned to organize a joint planning committee for the purpose of coordinating the plans and operations of the corps area or department and the naval district.

Part II.

ACTION OF THE NAVY IN COAST DEFENSE.

THE UNITED STATES FLEET.

The mission of the fleet is to gain the command of the sea by operations against enemy naval forces. These operations usually give efficient protection to the seacoast. The protection can be afforded in several ways:

1. By occupying a position in enemy waters and operating offensively.
2. By occupying an advanced position and operating on the offensive defensive against enemy forces approaching our coast.
3. By occupying a position on our coast and operating on the offensive defensive against enemy forces approaching it, denying by local defense our advanced positions to the enemy.

Naturally the most satisfactory course will be for the fleet to occupy a position in enemy waters and to operate offensively against the enemy forces. If our fleet is exerting decisive pressure in enemy waters by attacking enemy ports, by enforcing a strict blockade or by assisting the Army to invade enemy territory, the enemy will require all his naval forces for defensive purposes in his home waters and will not be able to detach vessels to attack our ports. Thus, in the Russo-Japanese War the Japanese carried out strong offensive operations against Port Arthur and consequently the Russian naval forces there were unable to attempt any offensive operations in Japanese waters. On the other hand, the Japanese did not attempt any operations against Vladivostok and the Russian naval forces there were able to make several raids into Japanese waters.

If our forces will not be sufficiently strong to operate in enemy waters or if bases are not available, and we are therefore forced to remain on the defensive, the best plan would be for the fleet to take a position in a base well advanced from our coast line. The enemy is thereby given the choice of passing our fleet in its advanced position or of attacking the advanced position itself.

There are the following disadvantages for an enemy force passing our advanced base:

1. It will have to proceed from its most advanced base direct to our coast without the use of an anchorage for refueling. Thus it must—if the two opposing nations are at a distance from one another—either arrive off our coast with but a small amount of fuel in its bunkers or must refuel at sea. Both of these courses are almost impracticable.
2. It will be subject to attack by the various forces of our fleet at the advanced base, particularly destroyers and submarines, during the period beginning at the time it passes our advanced base on its advance, and ending at the time it passes it on the return. This is a very serious disadvantage.
3. If we desire to force a general action upon the enemy, either immediately or after the enemy forces have been reduced by destroyer or submarine attacks, his retreat to his home bases is cut by our forces, thus rendering a defeat particularly disastrous to him.
4. As the enemy will not be able to maintain his lines of transportation with his home bases, due to the fact that our advanced base will be near his lines, he must either take with him a very large train or must carry through his operation very quickly. Either course imposes serious limitations on him.

It therefore seems extremely improbable that the enemy would pass our advanced base. He must attack it. Therefore our defense is limited to one small position rather than an entire coast line and our problem is greatly simplified.

If we have no advanced base which may be occupied by the fleet upon the outbreak of hostilities or if our fleet is unable to occupy the advanced base in time it must select a base on our coast and operate from it. All advanced bases which might be seized and used by the enemy should be secured by local defenses.

Of the various types of enemy vessels which may be used for attacks on the seacoast only submarines and very fast surface craft, such as battle cruisers, light cruisers, mine layers, destroyers, and aircraft carriers, can operate effectively unless the command of the sea along the coast is first gained by the enemy fleet; these types of vessels can not be used with their maximum effect unless their fleet has gained the command of the sea, for the fast surface craft may come in contact with superior forces of our fast surface craft, while their submarines will be attacked by our antisubmarine organization, which consists mainly of small vessels which would be unable to

operate if the enemy enjoyed the command of the sea. Therefore in most cases the enemy will be required to support his attacking vessels by superior squadrons of battleships.

The enemy would be very loath to use his battleships in this way, because they would be exposed to the attack of our submarines and destroyers. In the World War the British were willing to risk any ships but modern battleships in operations against German bases. The presence of the German high sea fleet would have compelled the British to have used their battle fleet as a support for any British vessels detailed to attack Heliogland. As the British could not risk their modern battleships in such dangerous waters, Heligoland was never attacked. On the other hand, the German high sea fleet could not protect their bases in Belgium, and therefore the British were able to attack them without bringing their battle fleet into dangerous waters, although it was so stationed that it could have cut off the retreat of the high sea fleet had it attempted to interfere with the operations of the British destroyers and cruisers used in blocking Zeebrugge and Ostend and the monitors used in the frequent bombardments.

There are, however, many cases where our fleet will not be able to afford this protection to the coast. This applies especially to our outlying possessions which are much nearer the home bases of an enemy than they are to our home bases. Again, our fleet may be so inferior in fighting strength that a general action must be avoided, and it must therefore be based on a strongly defended port. It will always be desirable for our fleet to keep in port a large part of the time in order to conserve fuel, to repair machinery, and to be secure from the attacks of enemy submarines and destroyers. This makes it necessary for us to have ports so protected that our fleet will not be exposed to the attacks of these craft. The British battle fleet was compelled to remain at sea for nearly all the time during the first months of the war because it had no base protected against German submarines. This cruising, which served no offensive purpose, caused many bad machinery breakdowns.

For these reasons, the naval coast defense forces, the Army harbor defenses, and the mobile forces of the Army are also necessary for coast defense.

AIRCRAFT ATTACKS ON SEAPORTS.

1. Enemy aircraft attacks on our seaports can be launched in two ways:

(*a*) From a land base.

(*b*) From a ship base.

In order to carry out an effective bombing attack it is necessary for the enemy to have a base within several hundred miles of the

object of attack. There are at present practically no places in the possession of a possible enemy from which enemy air raids may be launched over the ocean at our seaports.

There are very few places on either coast which might be seized by an enemy during the war and used as aircraft bases for attacks on our ports.

Aircraft attack from land bases, therefore, does not require special attention. The measures for preventing such air attacks will be similar to those which will be described for preventing air attacks launched from ships, except that instead of counterattacking the ships used as bases the land bases should be counterattacked either by planes and ships or by Army forces.

In launching attacks from a ship base two kinds of ships can be used:

(*a*) Aircraft carriers, which carry planes assembled and ready for use on short notice, and have a flying-off deck from which airplanes may rise and upon which they may land.

(*b*) Aircraft tenders, which may either accompany seaplanes as they fly from place to place, providing quarters for the plane crews, supplies of fuel, oil, and spare parts and repair facilities, or which may carry the seaplanes or airplanes, so that after arriving at the place for launching the attack seaplanes may be assembled and lowered over the side and airplanes taken ashore and assembled for use from a beach or field.

The development of aircraft carriers has been rapid and generally successful. Fighting planes, observation planes, scouting planes, and torpedo and bombing planes may be used. The planes are stowed below; the smaller types can be raised to the flying-off deck by elevators and can take off immediately; the larger types must have their wings attached after having been raised to the flying-off deck and this causes a certain delay in sending them out and receiving them aboard. Specially designed aircraft carriers of 10,000 tons can carry about 25 planes of various types. Landing on the flying-off deck presents some difficulties, and a considerable percentage of crashes must be expected, especially in rough weather.

The use of a stabilizer to decrease the rolling of a carrier while planes are landing should greatly improve landing conditions and reduce the number of accidents.

In carrying out a bombing attack from a carrier, the bombing planes should be accompanied by fighting planes for protecting them from the attack of enemy fighting planes, if any are present, and for assisting the bombers by attacking with machine-gun fire and small bombs enemy forces on the ground, particularly antiaircraft batteries and fire-control stations.

Aircraft tenders may be used in four ways by an enemy:

1. To carry reserve fuel, bombs, and torpedoes, and to make necessary repairs for large seaplanes, which actually fly from the enemy bases to the place from which the attack on our port is to be launched.
2. To assemble seaplanes and lower them into the open sea for taking off.
3. To assemble seaplanes and lower them into calm water in the lee of the land for taking off.
4. To place on shore airplanes which may be then assembled so as to take off from a suitable beach or field.

When the planes assigned to attack a certain port have to fly from their shore bases to the place from which the actual attack is to be launched there will usually be little chance of success, unless the enemy has air bases reasonably close to the ports to be attacked, or unless there are sheltered anchorages spaced at intervals of less than 500 miles along their line of advance, in which they can receive supplies from their tenders and have repairs made.

As a general rule, it will be an unsatisfactory operation to attempt to use seaplanes which have to take off from the open sea. Only in weather much better than the average will large seaplanes with a heavy load of bombs be able to take off in the open sea. However, in many cases an enemy will be forced to resort to this method of attack, because all the sheltered anchorages will be under the gunfire either of fixed or mobile batteries. This condition prevails on our Pacific and Atlantic coasts. When planes are to be launched in the open sea accurate weather predictions will be invaluable.

Wherever possible, an enemy wishing to use seaplanes in a bombing attack will attempt to find sheltered water from which his planes may take off. If he is making a surprise attack he will select a location in which there are either no inhabitants to report his presence to our forces or no means of communication for making such reports. There are many such places near the Pacific entrance to the Panama Canal which an enemy could use for a surprise attack. There are some places in the Hawaiian Islands from which an enemy might launch a surprise air attack upon Pearl Harbor, and there are many places not covered by gunfire which could be used if surprise were not considered necessary.

Airplanes are more efficient than seaplanes for bombing and torpedo attacks because they can carry a greater load of bombs or a larger torpedo. It is possible that aircraft tenders could land bombing and torpedo planes near the port to be attacked, assembling the planes ashore and having them take off from a beach or field. There are probably places near the Pacific entrance to the canal where this could be done without reports reaching our forces. While it would hardly be posible for an enemy to effect a landing on Oahu, he could

land on another island in the Hawaiian group and launch air attacks from there against Pearl Harbor.

The objects of attack by enemy aircraft will usually be:

A. By bombs—

1. Dry docks.
2. Navy-yard shops and fuel-oil tanks.
3. Naval vessels.
4. Merchant vessels.
5. Industrial plants of military importance.

B. By torpedoes—

1. Caissons of dry docks.
2. Floating dry docks.
3. Naval vessels.
4. Merchant vessels.

Now consider the ways in which enemy air attacks launched from aircraft carriers or tenders may be countered. The most effective method is to scout for and attack the enemy aircraft carriers and tenders.

The following naval forces may possibly be available for scouting for enemy aircraft carriers and tenders:

1. Submarines.
2. Aircraft.
3. Patrol vessels.
4. Destroyers.
5. Cruisers.

Submarines will be very efficient for such scouting operations. The latest boats have radio with a sending radius of about 300 miles and could quickly report all enemy vessels sighted. Submarines have the additional advantage that they will be in a position to make an immediate attack on the aircraft carrier and will not themselves be exposed to attack unless the enemy's planes which can rise from the flying-off deck are equipped with depth bombs.

Aircraft will also be very efficient scouts. Both dirigibles and seaplanes can be used. Dirigibles have a much longer radius of action than seaplanes and can thus remain on their scouting stations for a longer time. They are, unfortunately, somewhat vulnerable to attack by enemy fighting planes which aircraft carriers could send up. Small nonrigid Blimps could not withstand the attack of fighting planes. Large rigid dirigibles would be more satisfactory; they could probably escape by means of their ability to climb faster and maintain a greater altitude than heavier-than-air craft; even if overtaken they could make a moderately good defense if a noninflammable gas—such as helium—is used.

The seaplanes available for scouting from shore bases are scouting planes and patrol planes. Both types would be excellent for

locating and reporting the enemy aircraft carriers and tenders; patrol planes, being moderately large, slow-speed seaplanes, would be vulnerable to attack by enemy fighting planes. On the other hand, the scouting planes, being medium-sized fast seaplanes with a heavy machine-gun armament and being specially designed for fighting, would be able to maintain a position near the enemy ship, beating off attacking enemy planes.

Destroyers and cruisers would be very well suited for locating and reporting enemy aircraft carriers or tenders, but being very valuable ships would seldom be available for this duty.

The following vessels may possibly be used for attacking enemy aircraft carriers and tenders:

1. Submarines.
2. Aircraft.
3. Minelayers.
4. Destroyers.
5. Cruisers.

Submarines will be especially efficient for attacking enemy aircraft carriers, and, when the fleet is not present, they will be the principal instrument for breaking up this form of coast attack.

Not under even the most favorable conditions will dirigibles be able to carry out bombing attacks on aircraft carriers or tenders. In clear weather naval airplanes and seaplanes carrying bombs and torpedoes and acting without the assistance of surface craft will have only a fair chance of making successful attacks, except when they are carried out simultaneously by large numbers of planes. In misty weather or when the clouds are low even a single plane has good chances of making a successful attack with bombs or torpedoes; during rain squalls, at dusk, or at night, when the sea can be lighted with parachute flares while the planes remain invisible, the chances of success are even better. One hit by a bomb on the flying-off deck of a carrier will probably prevent planes from leaving the deck or landing.

Contact mines may be placed in the sheltered anchorages which aircraft carriers or tenders might use. This, however, is a very questionable operation and one which would be very expensive for the results which would probably be obtained.

Destroyers and cruisers, attached to the fleet, may be within striking distance of enemy aircraft, carriers, and tenders when reported; in such cases they could often be spared to carry out attacks on the enemy vessels. Cruisers will usually have superior gun power and may attack at any time; destroyers will usually make night attacks with torpedoes.

The Naval Communication Service will be very valuable in all coastal operations as an instrument for directing the patrolling and

scouting operations; for receiving reports from scouting and patrolling vessels announcing the location of enemy vessels; for broadcasting this information to other vessels at sea and for informing the Army sector and subsector commanders; for issuing instructions for vessels at sea to concentrate on and attack the aircraft carriers and tenders. The radio direction stations will be very useful for locating enemy vessels which use radio.

In case the enemy escorts his aircraft carriers and tenders by other important vessels such as cruisers, battle cruisers, or battleships, a decision must be made as to whether the carriers themselves or the supporting vessels should be attacked. This decision depends on an estimate of the following:

1. The damage which the enemy may inflict upon our shore facilities by his bombing or torpedo attack, and the influence of this possible damage upon the entire campaign; in this estimate, we should consider the Army forces available for keeping off the enemy's bombing planes, such as antiaircraft guns and pursuit planes.
2. The relative importance for us of sinking or damaging the carriers or the supporting vessels; in this estimate, we should consider the relative strengths of our own and the enemy Navy in the types of ships subject to attack.
3. The relative chances of sinking or damaging the carriers or the supporting vessels, including the chances for making contact and of carrying out successful attacks.

For example, assume that an enemy aircraft carrier is attempting to penetrate to within a short distance from the Pacific entrance to the canal; that it is known to carry large bombing planes; that the Army defenses are probably insufficient to prevent bombing attacks on the locks and spillway; that it is known that the bombs carried by the enemy planes are likely to cause serious damage to the locks and spillway; that the canal is vitally necessary for our Naval Transportation Service; that the enemy carriers are escorted by several light cruisers. In this case, every effort should be made to attack and sink or damage the carriers before their planes are able to get off.

As another example, assume that an enemy aircraft carrier, escorted by a battle cruiser, is attempting to gain a favorable position for launching a bombing attack on an unimportant naval station; that this station is well protected by antiaircraft guns and pursuit planes, and that, even if the enemy could make hits, our campaign will not be materially retarded; that we have no battle cruisers, and, therefore, the sinking of the enemy battle cruisers will be an important gain for us. In this case the greatest effort should certainly be concentrated on sinking or damaging the enemy battle cruiser.

MINE-LAYING ATTACKS OFF THE SEACOAST.

The mine has become a very effective offensive weapon. The Japanese used mines offensively at Port Arthur; all nations employed them with great effect during the recent war for blocking entrances to ports and even to whole sea areas. The Dover barrage was finally so perfected in 1918 that German submarines were unable to pass through. The North Sea barrage had become very effective by the time the armistice was signed. Had the war continued longer the German submarines would soon have found both exits from the North Sea closed to them. Mines will undoubtedly be laid extensively in the next war near the entrance to enemy ports, both with the object of completely closing the entrance to the port and of inflicting losses upon enemy naval vessels entering or leaving port.

Mines may be laid offensively by the following types of vessels:

(1) Minelayers, carrying about 350 mines.
(2) Light minelayers, carrying about 60 mines.
(3) Submarine minelayers, carrying from 25 to 50 mines.

There are, in general, the following types of anchored mines:

(1) Contact mines.
(2) Controlled mines.

Contact mines explode when a vessel comes in contact with the mine itself or with a wire antenna spread from the mine in a vertical direction. This antenna may be stretched upward by means of a float or may stretch downward along the mooring cable, or both. Mines can be laid effectively in 1,000 feet of water, and experiments are under way for mining in greater depths. The length of antenna can be varied to fit the conditions to be met. Thus, if it were desired to mine surface vessels, the charge should be exploded practically against the hull, and a very short antenna could be used above the mine or the antenna could be eliminated altogether. At the same time, if it were considered that the mine charge would be effective against a submarine some distance below it (possibly 70 to 80 feet), a bottom antenna of this length could be used. One row of mines under the best possible condition with top and bottom antennæ of 80 feet would cover a depth of 160 feet. Another row of mines could be laid below the first row to cover greater depths. The distance at which a mine explosion is effective against a submarine increases materially with the distance the mine and submarine are below the surface.

Controlled mines may be either anchored or ground mines. This is the general type of mine used by the Army in coast defense, and is a very valuable type around harbor entrances and channels to be used by our own vessels. A controlled mine can be fired in any one of three ways. In the first method, the vessel's position is plotted from shore observation stations, and at the proper time the mine is

fired by closing a circuit on shore. Second, a vessel striking a mine will cause a signal to be made at the switchboard on shore. The key is immediately closed and the mine fires. Third, power may be so turned on that when the mine is struck by a passing vessel it immediately fires. Controlled mines have a further advantage in that several mines can be fired simultaneously, thus making it probable that one or more explosions will be moderately close to enemy vessels. The mines have one disadvantage; this is that friendly vessels striking the mines will possibly damage and sink them. The enemy can not use controlled mines in our waters. He is limited to mines which explode automatically.

Now consider the conditions most favorable for the laying of mines. It is important that the vessels doing the mining have open and unrestricted approaches to the ports in front of which mines are to be planted. The width of the actual harbor entrance itself is not a matter of much importance, for while a narrow entrance would be easier to close with mines, the mine-laying vessel would hardly dare to penetrate into such a narrow and dangerous area. If submarines are to be used for the mine laying, the water through which they must pass should be at least 50 feet deep, so as to allow them sufficient room for maneuvering.

The currents, rise and fall of tide, and depth of water should all be a minimum.

Currents cause a typical anchored mine to dip a number of feet below its set depth, as shown by the following table:

Current, in knots.	Length of mooring, in feet.	Dip, in feet.
1	60	0.3
2	60	1.5
3	60	8
1	180	1
2	180	13
3	180	43
1	300	4
2	300	45

There are two kinds of currents to be considered:

1. A steady current, usually along a coast.
2. A tidal current, the direction of which changes about every six hours.

A steady current whose speed is generally constant will not materially reduce the effectiveness of mines. Such currents are usually of moderately low speed. The dips for the lowest and highest currents which may be normally expected in a certain location should be averaged; the anchor cable to be let out should be lengthened by an additional number of feet equal to the average dip, provided this

does not bring the mine to the surface when the current is at a minimum. This would be undesirable unless it is not important to conceal the location of the mine fields.

A tidal current, on the other hand, decreases very materially the effectiveness of mines. The antennæ of the mines provide a means of compensating to a slight extent for this loss of efficiency. If 10 feet of antenna is let out, and the mine is planted so as to be 15 feet beneath the surface at slack water, the end of the antenna will be 5 feet below the surface. Then when a current produces a dip of 15 feet the mine itself will go to 30 feet beneath the surface and the top of the antenna to 20 feet, making the mine still effective against vessels of more than 20 feet draft. If the dip were 25 feet, two courses could be taken:

1. Ten feet of antenna could be used, and the top of it would be 30 feet under water when the maximum dip of 25 feet was reached.
2. Twenty feet of antenna could be let out, so that at maximum dip the top of it would be only 20 feet under water. This would expose the antenna at slack water and while the current was weak. In some cases it would be very undesirable to expose the position of the mine field; in others this exposure would not be important.

A dip of more than 15 feet, therefore, very materially decreases the efficiency of the mine; thus, with a length of mooring of 60 feet the mine will be effective in any current; with a length of mooring of 180 feet a current of 2 knots is allowable; with a mooring of 300 feet a current of $1\frac{1}{2}$ knots is allowable. For currents in excess of this a part of the explosive charge can be taken from the mine, increasing its buoyancy and decreasing the dip.

A rise and fall of 15 feet has an effect similar to a tidal current, the maximum strength of which cause a dip of 15 feet. A rise and fall of this amount is therefore allowable.

Mines are less effective in tropical waters than in northern waters because they can be seen by aircraft down to 30 feet, the maximum depth to which they would be effective against surface vessels.

The following naval craft can be used to operate against enemy mine layers and to clear the approaches to ports of mines which have already been laid:

1. Submarines.
2. Aircraft.
3. Mine layers.
4. Mine sweepers.
5. Patrol vessels.
6. Destroyers.
7. Cruisers.

Submarines will be able to operate against all classes of enemy mine-laying craft. They will usually prevent mine laying by slow cruisers; against other types of mine layers they would not be so effective. Mines would probably be laid at night; therefore, enemy submarines would be difficult to locate, while enemy destroyers and fast mine layers would be difficult to hit with torpedoes on account of their high speed. Still, submarines, even if these are unable to score torpedo hits, will have an important moral effect and will force the enemy to hurry his operations. On the other hand, the submarines themselves may be damaged or sunk by the enemy mines.

Aircraft will be effective for detecting and attacking enemy surface craft laying mines in daylight; they will also be effective in preventing enemy submarines from laying mines close inshore during daylight in tropical waters and will be moderately effective in all waters against submarine mine layers; they will, however, be of little use in the night against any type of mine layer. In tropical waters they can be used to locate mines after they are planted.

The laying of contact mines as a defense against enemy mine layers is a questionable operation. These mines in most cases would be effective against our own ships and would greatly limit our freedom of action. We might, however, lay deep mine fields against enemy submarine mine layers which our surface craft could pass over without danger. Our submarines, however, would have to give these areas a wide berth except when on the surface. Other small mine fields could be laid in carefully selected locations, especially if we had reason to believe enemy mine layers would operate in known areas. In general, however, it must be realized that the laying of mines in our waters is a dangerous procedure because our vessels may enter the mine field through carelessness or some mistake or neglect in disseminating information. Mines may also break adrift and become dangerous to our vessels. Wide entrances to important harbors should be closed with an antisubmarine net, having a gate which can be opened for our vessels to pass through.

Mine sweepers should be used to sweep lanes in the approaches to ports and along the coast and to clear enemy mine fields reported. All shipping should be warned to avoid such mine fields until they have been cleared.

Patrol vessels will be very useful to locate and report enemy vessels laying mines. Their listening devices, which are now effective to distances of about 10 miles, will make them especially valuable. Submarines when located can be attacked with depth charges.

Destroyers may be used to search for and attack all enemy mine layers; submarines may be attacked by gunfire or depth charges; light mine layers by gunfire and possibly torpedo fire. Mine layers

must usually be attacked by night torpedo fire, but this will probably not be effective if the enemy vessels have high speed.

Cruisers will seldom be available for searching for enemy mine layers, but may be used to attack light mine layers or mine layers when they are reported by other vessels.

TORPEDO, BOMBING, AND GUNFIRE ATTACKS ON VESSELS OFF THE SEACOAST.

Attacks on vessels off the seacoast may be made by the following types of enemy naval vessels:

Submarines.
Aircraft carriers.
Destroyers.
Light cruisers.
Battle cruisers.

These vessels may be supported by battle squadrons.

In general, these attacks may be met in three ways:

1. By searching for the enemy craft to seaward of the coastal shipping routes, and concentrating against them superior forces, at the same time withdrawing our merchant shipping temporarily from the area into which the raid or sweep is being made.
2. By patrolling the area through which the shipping actually passes, attacking enemy vessels encountered.
3. By forming the merchant shipping into convoys and escorting them with naval vessels, for the purpose of counter attacking all enemy vessels which attack the convoy.

For defense against submarines, the third method has proved best, the escort consisting of destroyers, nonrigids, planes based on shore stations, and patrol craft. The second method may also be used, the same types of craft being employed. The measures already described for use against submarine mine layers will also be effective against submarines attacking with torpedoes.

Against aircraft carriers the first method will probably be desirable, except that our merchant shipping probably will not need be withdrawn if the enemy attack can be met in time. Our measures would be similar to those described for preventing aircraft attacks on shore stations.

Against enemy destroyer raids the third method will be most desirable, but the others may be used in addition.

Against frequent light cruiser raids the third method will be the best with cruiser escort for the convoys. If only isolated raids are made, the first method may be used.

Against battle cruisers or battle squadrons the first method is the most desirable, our battle squadrons being held in readiness to meet

the enemy if his force is not greatly superior. If the enemy battle squadrons are greatly superior to all our forces available, our shipping must be withdrawn during their sweep, while our submarines, destroyers, and aircraft are concentrated upon them with the object of reducing the enemy's superiority by torpedo attacks.

TORPEDO FIRE INTO SEAPORTS.

An open and unrestricted approach and a wide, straight entrance to the harbor are necessary for this form of attack; an open roadstead is the most favorable condition. If the attack is to be made by submarines there should be at least 50 feet of water right up to the entrance. Torpedo attacks during daylight, while possible for submarines, will probably be ineffective if proper measures are taken to counter them; during darkness attacks by destroyers and submarines running on the surface are possible.

All the counter measures developed for use against minelayers will be effective against vessels making a torpedo attack on vessels in port. Submarines will be moderately effective; aircraft will make submarine attacks difficult during daylight, particularly in tropical waters. Small fields of contact mines may be laid in the approaches to the port in areas in which enemy vessels are expected to pass and in which our ships will not operate; in the case of an open roadstead, the entire anchorage may be inclosed by a mine field, preferably outside of torpedo range from the vessels at anchor. Patrol vessels with listening devices will be very useful to detect enemy vessels and to attack submerged submarines with depth charges.

There are other methods which can be used in addition to those employed against minelayers. It will often be possible for the ships to anchor in positions where they will be out of the direct line of fire of torpedoes coming through the entrance. For example, vessels in Colon Harbor could take five courses to avoid torpedoes:

1. Go alongside docks at Cristobal, where they would be out of the direct line of fire.
2. Anchor to the southward of the docks, where they would be out of the line of fire.
3. Anchor in the southern part of the harbor, where they would be distant 5,000 yards from the entrance and almost out of range.
4. Anchor close to the breakwaters, where they would be practically out of the direct line of fire and could use their guns effectively against attacking craft.
5. Go to Gatun Lake.

Vessels could in some cases be moored bow and stern in the direction of the entrance so as to present the minimum width of target

for torpedoes. All vessels should screen lights at night and the entrance should not be indicated by navigational or other lights.

A final method of defense is the torpedo net. These nets may be placed at the entrances to important ports which are exposed to torpedo attacks; they should have gates which can be opened for our vessels. Torpedoes, fitted with net cutters, can penetrate torpedo nets. As torpedo nets are a very costly method of defense, they should not be used if there are other effective means which can be used to counter torpedo attacks on vessels in our seaports.

BLOCKING ATTACKS ON SEAPORTS.

The *Merrimac* was the first blockship in modern naval wars; her attempt to close the narrow entrance to Santiago Harbor was unsuccessful. The Japanese made repeated but ineffective attempts to block Port Arthur. The British succeeded in blocking for a time the entrance to the Zeebrugge Canal with two ships, but failed twice at Ostend.

Only very narrow entrances, as at Pearl Harbor or Balboa, can be blocked; the operation can be carried out only under cover of darkness, and this of course adds to its difficulty and uncertainty. Blockships will usually be escorted by a naval force sufficient to protect them against attacks of the naval vessels assigned to the local defense. The enemy may carry out diversions to distract the attention of the defenders, such as—

1. Bombing attacks by aircraft.
2. Bombardment by surface vessels and submarines.
3. Landing attacks.

The blockships may be hidden from the shore batteries as long as possible by a smoke screen, laid by small craft. As it will be difficult to find the entrance, rockets or flares may be used. In the second attack on Ostend a million candlepower calcium flare was lighted. Small craft may accompany the blockships to take off the crews after the ships are sunk. Enemy submarines, without escorts, might be used as blockships.

Our submarines will probably not be able to break up the attack due to the strong escorting force; they should, however, be able to make torpedo attacks on the escorting vessels and to give warning of the approach of the enemy. Aircraft probably will be of little use on account of the darkness. Contact mines will be effective against blockships and large fields of them should be laid in the approaches to a harbor when blocking attacks are expected, straight and wide channels being left for our vessels. Patrol vessels with listening devices will be valuable for reporting the approach of the enemy. Nets and booms will not be of any use, as was proven at Zeebrugge.

The most effective measure for countering this form of attack will be to search for and locate the attacking force while still at a distance from the port to be attacked and to concentrate a superior force against it.

BOMBARDMENT OF SEAPORTS BY NAVAL VESSELS.

There are, in general, two forms of bombardment of seaports:

1. Bombardment by surface craft.
2. Bombardment of submarines.

As a general rule, bombardment of our ports by surface craft is possible only when the enemy has the command of the sea; it is true that on several occasions the German surface craft bombarded English coast towns, but on no occasion was any important damage caused; the last time a raid was attempted the German battle cruiser division was brought to action and the *Blucher* was sunk. These raids, moreover, were made mostly for political and moral effect.

But while the command of the sea is usually necessary for bombardments by surface craft, submarines will be able to bombard ports when their own surface craft are held securely in port. Submarines, of course, will not attempt to attack large and important seaports where elaborate defenses will be prepared. They are limited to raids on small ports, which are usually undefended, and to exposed naval stations, such as air stations and radio stations.

The main defense against bombardment will usually be provided for by the Army; the Navy will attack the enemy vessels taking part in or supporting the bombardment in accordance with the procedure already recommended for other forms of enemy attack.

PENETRATION INTO A HARBOR OR WATER AREA BY NAVAL VESSELS.

This operation has two general forms:

1. The forcing of a passage by main force.
2. The penetration of a passage by light craft by stealth.

Penetration into a harbor is a very difficult operation and will seldom be attempted. The penetration of a narrow passage, such as a river or strait, offers better chances of success.

The forcing of a passage by main force was accomplished a number of times in the Civil War by Farragut. In the World War it was attempted three times:

The attempt of the British to force the Dardanelles.

Two attempts of the Germans to force the entrance of the Gulf of Riga.

Of these only the second attempt to seize the Gulf of Riga was successful, and this can be accounted for largely by the demoralization

of the Russians. These operations show the difficulty of forcing even a passage a number of miles wide. The forcing of a harbor entrance will be much more difficult and will seldom be attempted.

As one of the principal means of defense will usually be the laying of large fields of contact mines the first operation of the enemy will be to sweep a passage through the mine fields. The sweepers will be supported by destroyers and light cruisers. When a passage is cleared the heavy ships will arrive off the port, escorted by destroyers to protect them from submarine attack. These heavy ships will probably then carry out prolonged bombardments of the shore batteries. If the batteries are silenced, or their fire greatly reduced, the fleet may then attempt to run past them during the daylight, possibly using a smoke screen as an additional protection. If the batteries are still strong a dark night will probably be the best time to run the forts. Air attacks will probably be carried out all through the operations.

All weapons will be effective in defeating an attempt to force the entrance to a seaport or a narrow strait, particularly large fields of contact mines, torpedo and bombing planes, and submarines.

Often an entrance into a large harbor, a bay, or a sea will be so well defended by batteries that it will be impracticable for large vessels to force it. However, it may be possible for light craft, particularly submarines and destroyers, to run past the defenses and operate inside. The best examples of this were the penetration of the Dardanelles by British submarines which operated in the Sea of Marmora and the penetration of the entrances to the Baltic by British submarines which worked effectively against the German trade with Sweden.

There are, in general, three methods of preventing this form of attack:

1. By gunfire of forts at the entrance.
2. By closing the entrance with mine fields and obstructions.
3. By using a naval force to attack the enemy while passing through the entrances or after he has reached the harbor or body of water inside the entrance.

In order to use the gunfire of shore batteries effectively, the enemy vessels attempting to pass the defenses should be discovered while still at some distance from the entrance and illuminated by star shells and searchlights. Small patrol vessels similar to our submarine chasers would be well suited for this purpose. They have a small searchlight, and the 3-inch antiaircraft gun could be used for throwing star shells over the enemy. If discovered in time the gunfire of shore batteries should prohibit the entry of cruisers and pos-

sibly destroyers. Submarines, however, offer such a small target, even when awash, that it is doubtful whether they could be kept from passing through an entrance a number of miles wide by the gunfire of shore batteries alone.

Nets, booms, and mine fields should be effective in keeping out enemy submarines. Mines will be effective against destroyers and cruisers, but nets and booms will probably be broken by them without serious injury to themselves. Their greatest chance of being injured is that their propellers maye be fouled. Small nets, which are held in position by light lines, would be useful for this purpose.

In case it is not considered that these two methods are sufficient, local naval forces must be used. Submarines will not be very effective in preventing the entrance at night of the enemy vessels, particularly submarines and destroyers, but they will be very useful in attacking all classes of enemy vessels after they have entered, as in this case they will be able to operate in the daytime.. Destroyers and cruisers will be necessary for attacking with gunfire and depth charges enemy vessels attempting to enter and will be needed for maintaining the command of the water area inside against enemy vessels which pass the entrance.

LANDING ATTACKS.

Landing attacks may assume either of two general forms:

1. Raids by small forces for the temporary occupation of positions on shore for effecting military damage.
2. Attacks in force.

Examples of raids in the World War were the seizure of the forts on the southern shore of the Dardanelles for the purpose of destroying them after their garrisons had been driven off by the bombardment of naval vessels, and the British landing on the mole of Zeebrugge during the blocking attack for the purpose of destroying the German seaplane base and shore batteries on the mole and to create a diversion for the blockships. Such raids may be carried out by landing forces formed from the crews of naval vessels or by small detachments of troops carried on naval vessels or transports.

Landing attacks in force are illustrated by the operations of the British Army at the Dardanelles and the "Great Landing" which the British were prepared to make on the Belgian coast.

In general, the following operations may be carried out by naval forces to break up a landing attack:

1. Operations for gaining information of the approach of the enemy and of the locality in which he intends to land.
2. Attacks on enemy naval vessels and transports.
3. Attacks on enemy troops while landing.

It may be assumed that when landings in force are made the transports will be accompanied by naval forces superior to our naval forces available for defense. This condition justifies the use of all our available naval forces against the attacking enemy force.

It is very important to locate the approaching enemy forces while still at a great distance from the coast, so that naval and military forces may be concentrated against them. Aircraft (particularly rigid dirigibles), destroyers, and cruisers will be effective for obtaining this information by searching out an area extending out several hundred miles from the coast and reporting all enemy vessels or forces sighted. When the enemy transports are definitely located, the searching operations should be discontinued, unless other enemy transports are expected; the vessels used in the searching operations should be used for contact scouting, relocating the transports at short intervals, or, if possible, keeping in constant touch with them, so that their position will be known at all times.

For making attacks on the transports and naval vessels escorting them submarines, destroyers, and aircraft will be very effective. Bombing and torpedo planes will be particularly valuable. Assuming that our battle squadrons are so inferior as not to be able to risk a general action, they should, nevertheless, be held in readiness and kept at sea in close proximity to the enemy forces in order to take advantage of any particularly favorable opportunity for attack.

In the case of attacks on insular possessions submarines will be particularly valuable as a defensive force as they are not dependent upon the support or assistance of other vessels and have a secure means of retreat should the possessions be captured by the enemy.

Contact mines may be used, but it must be realized that contact-mine fields constitute a menace to our own forces as well as those of the enemy; they also limit our activities; thus it is a principle that mine fields should never be laid for the purpose of repulsing a landing attack until the attacking force is sighted or there is good reason to believe that an attack is imminent. This principle limits the use of mines to the following:

(*a*) To close narrow approaches to landing places, such as small unfortified harbors.

(*b*) To form fields off the coast across the line on which the attacking force is approaching.

(*c*) To form fields off narrow beaches or landing places, so as to deny them to the enemy, allowing the naval and military forces to concentrate for the defense of other sectors.

Attacks on the enemy troops while they are landing in small boats may be carried out by bombing and fighting planes.

PROJECTS FOR SEACOAST DEFENSE BY THE ARMY AND NAVY.

The necessary military and naval defenses for any particular sector of the coast or insular possession, should be determined by the foregoing general principles. The following decisions must be made:

1. With what power or combination of powers is there a reasonable possibility of war.
2. What degree of protection will the fleet probably afford against the attacks of these powers by its operations against enemy naval forces.
3. Which of the above eight forms of attack can the enemy make with reasonable chances of success.
4. How can each form of enemy attack be best countered by the Army and Navy.
5. What combination of military and naval defenses will successfully repulse all forms, or combinations of forms, of attacks.

When these decisions are made, the following estimates should be set down:

1. How soon after the beginning of the war may the various forms of enemy attack be expected.
2. How soon after the beginning of the war may the military equipment and personnel and naval vessels, equipment and personnel necessary for defense be provided in the United States.
3. What time will be required for this equipment and these vessels to reach the seacoast exposed to attack, considering the fact that the enemy may take measures to prevent this equipment and these vessels from reaching the area to which they are assigned.

Then the final decisions must be made:

1. What part of the necessary military equipment and personnel must be permanently installed on the coast ready for instant operation.
2. What part of this equipment may be stored on the coast ready for immediate installation after the declaration of war.
3. What part may be stored in other places and transported to and installed on the coast after the beginning of war.
4. What part may be manufactured or provided after the declaration of war, and shipped to the coast for installation.

5. What naval vessels of the district forces must be permanently stationed during peace near the seacoast to be defended.
6. What equipment, such as dry docks, repair facilities, mines, spare torpedoes, fuel, nets, etc. must be maintained on the seacoast to be defended.
7. What naval vessels of the district forces should be sent to the seacoast exposed to attack after the declaration of war.
8. What naval equipment should be sent to the seacoast exposed to attack after the declaration of war.

These decisions constitute a logical Army and Navy project for the defense of a sector of the seacoast.

Part III.

A POSITIVE SYSTEM OF COAST DEFENSE (ARMY).

1. The present war has so materially modified our ideas as to land and coast defense by the introduction and development of new means and methods of combat on the sea, on land, and in the air that it has become necessary for the Army to undertake a revision of practically all of its defense projects and plans.

2. Existing plans have, in general, been based upon the idea of defending important seaports, naval bases, etc., by the occupation of selected covering positions. With our present increased resources in matériel, personnel, and war experience, a more aggressive attitude of defense is warranted. It is proposed to show in this memorandum that by a properly organized system of beach defense of the favorable landing places near all vitally important objectives it will be possible positively to secure the United States against invasion from the sea, even should we lose command of the sea in both oceans.

3. The scheme herein outlined is based upon the idea that a successful invasion of the United States must be directed against certain vital areas, and that the problem of defense against invasion from the sea is solved if large landing operations are prevented in those seacoast sectors which cover these vital areas.

4. These vital areas include the following:

(*a*) The portion of the United States covered by the seacoast line from Portland, Me., inclusive, to Chesapeake Bay, inclusive.

(*b*) The southern California area from San Diego, inclusive, to Los Angeles, inclusive.

(*c*) The San Francisco basin.

(*d*) The area including Puget Sound and the mouth of the Columbia.

Certain other areas contiguous to the South Atlantic and Gulf coasts may properly be added to the above. But in any event it is obvious that the portions of the coast line of critical strategic importance are of limited extent compared with the total extent of the coast line.

5. But within any particular seacoast sector a reconnaissance of coast line will show that only a limited portion of the coast is favorable for landing operations, and that among beaches favorable for landing operations only a limited number are favorably located with reference to important military objectives. A positive system of coast defense thus resolves itself into the defense not of the entire coast line, but of a limited number of favorable landing places all included within a limited number of critical strategical areas. The basic idea is this: That the enemy must be denied access to any landing place upon which he could quickly establish himself in force, but it is not necessary to defend places where a landing would be so difficult that an enemy would be unable to land in sufficient strength before our reserves could be brought up in numbers adequate to dislodge him.

6. In order to illustrate this conception of a system of positive coast defense, a hypothetical seacoast sector is shown on the attached map. Near the center of this sector is the important harbor A, a large seaport B, a navy yard C, and two seacoast fortifications, d and d′ commanding the entrance to the harbor A. Back of the seaport is a populous basin more or less surrounded by mountains. E and F are trunk-line railways leading to the interior of the continent. G, H, and I are important railways leading to adjoining coastal areas and there connecting with other trunk lines to the interior. The basin is provided with connecting railways. There is also an extensive system of tramways and highways along and throughout the basin which are not shown on the map. The harbor A and the city B, with the adjoining basin, would be an important objective for an enemy having command of the sea.

7. A reconnaissance of the coast line reveals the following characteristics:

1–2. This beach is favorable for landing operations, but is 130 miles from B. The enemy would have to advance through difficult passes through the mountains at K.

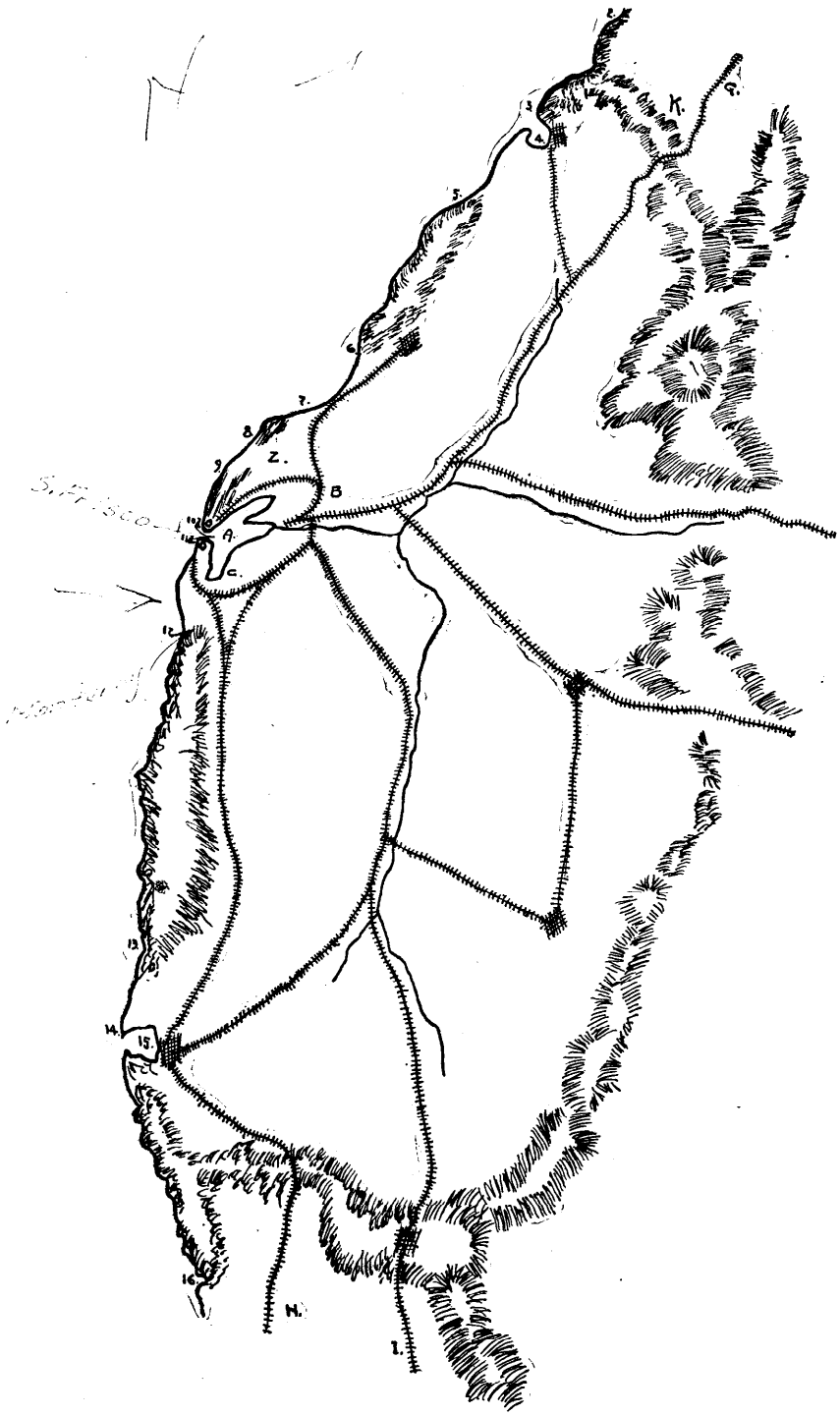
2–3. A difficult and precipitous coast.

3–5. A favorable beach adjacent to the small unfortified harbor 4. An enemy landing here might establish a subbase at 4.

5–6. A difficult beach, with few good landing places and no good communications.

6–7. A beach exceptionally favorable for landing operations; 7 is about 20 miles from the seaport. A strong mobile force, if unopposed, might land here and secure a footing in rear of the harbor defenses.

7–8. A difficult beach covered by reefs.


K.
G.
Z.
B
A.
C.
H.
I.

8–9. A favorable beach for landing but not favorable for a speedy advance on account of the shallow tidewater at L.

9–10. A difficult beach, covered by reefs, impracticable for landings on a large scale.

11–12. A favorable beach for landing operations partly covered by fire from the seacoast fortifications at d′. But in favorable weather an enemy landing here might attack the fortifications from the land side as a first step toward securing the harbor.

12–13. A difficult beach covered in places by reefs and generally impracticable for landing operations on a large scale.

13–14. A favorable beach, from which the minor harbor 15 might be secured as a sub-base.

15–16. A more or less impracticable beach. Few good landing places and few communications through the mountains.

16–17. A beach favorable for landings, but a long distance from the objective. Difficult communications through the mountains at M.

8. Before considering the positive defense of the indicated sector, the land-defense plans existing prior to the war may be considered.

Permanent fortifications.—These are shown at d and d′. They are modern seacoast fortifications designed to resist a direct naval attack and to prevent a long-range bombardment of the seaport B and the naval base C. It is considered that the armament is still adequate for the assigned missions. Two additional long-range, high-powered guns were authorized by the Board of Review just before the war, but it is possible that these may not be installed, as certain types of railroad artillery procured during the war are being considered as suitable equivalents.

Mobile forces.—The field forces available before the war were very limited in number and consisted of a few Regular and National Guard regiments without divisional organization. Plans for organizing new troops were unsettled, few suitable reserve officers were available, and only limited equipment and munitions were procurable.

Land-defense plans.—With the limited field forces available there was practically no basis for complete defense plans. Detailed plans for the immediate defense of the fortifications against naval raids had been drawn up and approved. A defensive line covering the fortifications and the city had been established, but the provision of a suitable garrison, armament, and equipment was highly conjectural.

9. In considering the revision of the land-defense projects after the war it becomes apparent that there is a great change in the situation as regards available resources:

(*a*) The principle of the selective draft adopted at the outbreak of the war may be assumed as the future national policy in the event of a great war. This assures a definite basis for the development of man power.

(*b*) The war has developed a large body of more or less experienced officers. Under a sound policy of national military education this body of officers should be perpetuated.

(*c*) Large quantities of armament, munitions, and equipment provided for the war Army are still available and the capacity of our industries to augment these supplies has been greatly developed.

(*d*) A large number of our officers have acquired important experience in command and staff duties during the war.

(*e*) Our General Staff has acquired experience in the practical handling of large bodies of troops and this experience is to be perpetuated and transmitted through our military educational system.

(*f*) Many tactical methods, weapons, and mechanical appliances recently developed in the land warfare are especially applicable to the problems of coast defense.

10. Having in view the advantages enunciated in the preceding paragraphs we may consider the best methods now permissible for the complete defense of the coast sector shown in the sketch map.

Assuming that the seacoast fortifications are capable of defeating a direct naval attack on the harbor, and that an efficient observation service is maintained along the entire coast line of the sector, it is obvious that the enemy can secure a footing only by landing operations at one of the favorable beaches, 3–5, 6–7, 11–12, and 13–14.

If, then, it is practicable to defeat serious landing operations on these beaches, the tactical measures accomplishing this result constitute a complete and positive defense of the entire sector.

11. It is believed that a properly constituted mobile detachment of reasonable strength can accomplish this object by preventing landings at 4–5, 6–7, 11–12, and 13–14. Beaches 1–2 and 16–17 and similar beaches more remote from B need not be considered in determining the strength of the necessary mobile garrison of the sector. They are so remote from the objective and separated from it by such difficult country that their use, if attempted, can be met by reenforcements from the general strategic reserve. *This is an illustration of the principle that landing operations on a sufficient scale to form the basis of invasion must be within striking distance of a*

harbor where an enemy can secure or extemporize facilities for unloading artillery and other heavy material of war.

12. Whether a positive defense against landings is feasible for any extensive sector or for the United States as a whole must depend upon its relation to the general problem of economy of forces. It will, no doubt, be conceded that any particular beach can be defended if a sufficient garrison and suitable material are provided, but whether this method of defense is permissible as a general policy must depend upon the number of men required to secure all critical landing places and the relation of this number to the total number of available troops.

13. Whether an extensive seacoast sector can actually be defended in this manner depends upon whether we can check landing at all favorable beaches and at the same time avoid the danger of an undue initial dispersion of available forces. If the entire force available is deployed as a cordon along the shore line the entire defense will break down as soon as the enemy has penetrated any part of the line. A successful defense must depend upon bringing up strong reserves in time to defeat the enemy before he can secure a solid footing at any part of the beach.

It should be possible by means of wire entanglements and other obstacles placed at or near the water's edge and covered by small-arms fire to cause delay and heavy losses to any landing party. Under such circumstances the enemy will not be able to rush his covering detachments ashore on a broad front, and if the delay is sufficient to enable us to bring up adequate reserves we should be able to defeat him at the several points of penetration. The success of the defense must depend on the actual existence of these reserves, and this implies that a water-line defense, like any other defense, must depend upon having formed troops free to move to threatened points of the line.

For example, if in a given seacoast sector 20,000 men are required as deployed detachments for the immediate defense of the shore line, and the total force available is only 20,000 men, the defense is weak, and must necessarily break down. But if means can be provided through which 10,000 men can be relieved from the beach detachments and concentrated as supports and reserves, the chance of success is greatly increased. If this process can be still further continued, so that 5,000 men can form an efficient beach guard and leave 15,000 men in reserve, the prospects of a successful defense are still further increased. If these reserves are within easy marching distance of threatened points, or if they can be brought up rapidly by rail or automobile from a greater distance, they should have some very decided advantages against an enemy who is still struggling to penetrate a fire-swept obstacle.

Having in view, then, the defense of any given shore line, it would seem that success is to be secured by forming a sufficient initial resistance by means of shore detachments of minimum numerical strength, with the view of conserving the maximum number of men to be employed as supports and reserves.

14. Under the contemplated system each beach considered favorable for landing would be prepared for defense by providing fire-swept obstacles in the manner developed on the western front during the recent war; that is, wire entanglements or other suitable obstacles would be emplaced in such a manner as to check and retard the enemy from the moment that he attempts to leave his boats. Each of these entanglements would be covered by machine-gun barrages. Suitable small-caliber artillery would supplement these barrages, and would also fire on small boats as they come within range.

Experience on the western front has shown that such a position can only be taken after careful preparation, involving the expenditure of large amounts of ammunition by highly specialized artillery, and then only when the actual assault is carefully organized in waves and is delivered as a surprise over a short distance from prepared parallels of departure and under the cover of carefully timed barrages. All of these essential conditions for success would be denied to an enemy who must advance to the position in small boats over several thousand yards of open water.

If his ships were held at a distance by the fire of heavy mobile artillery, he would be denied the necessary artillery preparation, because the guns of his fleet would be unable to deliver the observed fire required for the destruction of widely scattered machine-gun nests. He could expect but slight relief from the preliminary destruction of obstacles, as the attack of extensive belts of wire entanglement requires an accuracy of fire observation and an expenditure of ammunition that would probably not be within the capabilities of a fleet. He would probably be unprovided with or unable to make use of trench mortars and other special appliances recently developed for the attack of such positions. During his advance to the beach, his boats would come within the range of small and medium caliber guns that would suffer little from any counter battery effort from the fleet. Finally, on account of the extent and uncertainty of ranges and the flat trajectory of naval weapons, he would be denied any close artillery support at the moment of contact with his prepared enemy on the beach.

15. The defensive system above outlined would require few, if any, permanent works to be constructed in time of peace. There would be ample time on the imminence of war for the works to be completed by the several sector garrisons assisted by civilian labor.

Plans for the proposed works adapted to the requirements of each position as determined by careful reconnaissance should be prepared in peace and arrangements made for assuring the procurement of necessary material. The detailed reconnaissance of the position preliminary to the preparation of the plans will also determine the number of troops required for the initial garrison and the number and organization required for the local supports and reserves necessary for each position. The total number of reserves required for each coast defense sector as a whole will depend upon the extent and configuration of the coastline, the number and extent of positions to be defended, and the general relation of railroads, tramways, highways, and other communications within the region. More or less isolated sectors like that centered on SanFrancisco would require a sufficient reserve to be practically independent of reenforcement. In closely connected sectors such as would be developed on the New England coast the sector reserves would be economized through the use of general strategic reserves for employment in any one of several adjoining sectors. While permanent works would not be required in the beach positions, some peace-time development of roads and other communications might be necessary in certain areas. In many cases these communications and portions of the area in rear of the beach should be screened or camouflaged by means of trees or other vegetation.

16. Referring to the map, the defense of the indicated coast-defense sector would be organized and developed as follows:

On the imminence of war the troops allotted to the sector would be concentrated there and the several beach positions would be promptly prepared for defense. Upon the completion of this work all troops would be withdrawn to predetermined reserve positions, except the limited garrisons required to outpost the positions and to man the fixed machine guns and small cannon required for the beach barrages. Small patrols would also be detailed for the observation of intervals of coast between the prepared positions. A complete system of signal communication throughout the sector would be installed and arrangements made for the rapid transport of reserves to any threatened position by means of mechanical transport. The theory of the defense would be that the fire-swept obstacles at the beach could not be rushed by the enemy on a broad front, and that small bodies that might succeed in penetrating the beach defenses would be disposed of by local supports until stronger reenforcements could be forwarded from the reserves.

17. The strength of the permanent beach cordon would be determined largely by the number of men required to man the fixed

machine guns and small and medium caliber cannon assigned to the beach position. By disposing the machine guns so that their fire will flank sections of beach they at once secure better protection and greater fire effect. Bearing in mind that .50-caliber machine guns can deliver an effective barrage up to 6,000 meters, it will be possible with 10 machine guns per mile to bring an effective barrage of more than 30 machine guns upon any wire entanglement within the position. Each machine gun installed in a flanking position near the shore line will sweep the immediate beach with direct flanking fire and will be able to join in indirect fire barrages on more distant beaches. Machine guns firing at approaching small boats will have a great advantage in that the splash of the stream of bullets rises to a height of 15 or 20 feet and is a very conspicuous guide for accurate ranging. Allowing 10 machine guns and 4 small or medium caliber guns per mile, the personnel for serving them will not exceed 75 men for each mile of beach favorable for landings. This is ample, as it is assumed that no mobility will be required for these weapons and that a sufficient supply of ammunition will be kept at all times near the guns. With a total allowance of 150 men per mile there will be an ample force for manning these guns and providing local supports. This detachment will constitute the beach outpost and will furnish night patrols equipped with portable lights and flares. When the weather is favorable for landing operations small motor boats, provided with rockets and other signal material, will extend the night reconnaissance to the front.

18. The number of reserves required for a beach position will depend upon a great many factors that will be more or less variable in different sectors. However, a consideration of the probable development of the combat will throw some light on their employment and approximate number. The enemy on leaving his boats will immediately become involved in a difficult obstacle and will be exposed to a heavy machine-gun and shrapnel fire to which he can not reply. At the moment of landing he will be unsupported by artillery, and after traversing several thousand yards in boats it is hardly conceivable that he will be able to take a definite attack formation or to synchronize his attacks over any wide extent of beach. Under the circumstances, over considerable portions of the front his advance will be checked, and if he succeeds in passing the obstacle at all it will be by penetration on a narrow front by more or less disorganized columns. It will be the function of the small beach supports to meet the heads of these columns with the heavy fire of additional machine guns and automatic rifles or to counterattack them, as the situation may require. In the preliminary or-

ganization of the position in depth the ground in rear of the beach will be prepared to facilitate communication for these supports to favor their fighting power in every way and to hamper and distract the advance of columns that succeed in penetrating the beach cordon. It is probable that tanks or other lighter and more mobile forms of armored cars will be used to great advantage with these beach supports. Under the circumstances, the enemy will be able to secure a footing only at the expense of heavy losses, and where he succeeds it will take him some time to mop up and secure the ground gained and prepare his advance to a suitable covering position or preliminary base. In the meantime, formed reserves will concentrate on the area of penetration. These reserves will consist of infantry, machine-gun battalions, and light and medium artillery provided with mechanical transport capable of moving at a speed of 12 miles per hour. These reserves will move into a battle field prepared in advance for them and will act offensively. Assuming mechanical transport and a suitable system of roads, a properly organized reserve detachment will be able to intervene within an hour and a half at any point of penetration on a beach front of 20 miles. Assuming this reserve to be one regiment of infantry with two additional machine-gun companies, one battalion of light artillery, and one battery of 155-millimeter howitzers, the number of combatant troops for a 20-mile beach position would be as follows:

Beach cordon	1,500
Beach supports	1,500
Beach reserve:	
One regiment of infantry	3,742
Two machine-gun companies	356
One battalion light artillery	780
One battery medium howitzers or guns	210
	8,088

With this arrangement there would be a strong resistance to landing parties on the entire front, with a highly mobile reserve of 5,000 men prepared to deal with the enemy at points of penetration.

19. In the imaginary sector shown on the sketch map the entire front of the sector is 300 miles. The extent of beach indicated as favorable for landings and within striking distance of useful objectives is about 70 miles. Under these conditions the combatant mobile troops required for the complete defense of the sector will be approximately as follows:

Beach cordon	5,250
Beach supports	5,250
Beach reserves	20,352
Total combatant mobile troops	30,852

The number of reserves allotted above would comprise four reserve detachments of the kind described in paragraph 18. They would be disposed along the roads so as to facilitate their prompt advance by mechanical transport.

If a detailed joint study of the sector with the Navy should indicate that effective use of the minor harbors at 4 or 15 can be denied to the enemy by means of mine fields or other naval agencies, this would affect the importance of 4–5 and 13–14 as critical landing places and would result in a reduction in the number of troops required for the beach cordon and beach subposts.

20. The feasibility of this method of defense depends upon the following factors:

(*a*) An enemy landing from boats on an open beach will consist largely of infantry without transportation, with limited ammunition and with no artillery except the smallest portable guns. Such a force has only a limited radius of action and must secure a favorable place for landing heavy materials, transportation, and reinforcements before it can engage successfully with a force of all arms. Until such an objective is reached and particularly at the moment of landing such a force will have but limited fighting power against a mobile force freely supported by suitable artillery. The landing force will, of course, receive certain support from the ships' guns, but, when the situation demands it, this may be minimized by the appropriate use of fixed and railway artillery employed to hold the ships to a distance from which effective artillery support will be impracticable.

(*b*) Our capacity to operate against detachments of this character is greatly increased through the recent development of machine guns and entanglements for the beach defense and the great increase in the radius of action of mobile troops through the development of mechanical transport.

(*c*) If we prepare to resist landings at all beaches within one day's march of a favorable base or subbase, we can draw reserves from a distance of 100 miles before the enemy can secure his preliminary objective. This great development in the mobility of reserves makes possible a positive defense of all critical seacoast sectors without undue dispersion.

21. The applicability of the system to the coast line as a whole must depend upon detailed reconnaissance of all critical sectors and of all beaches favorable for landings.

22. It is believed that this method of defense is particularly adapted to the defense of islands such as Oahu and that with a reasonable garrison landings can be positively prevented. By the same means landings within striking distance of the Panama Canal Zone also can be positively prevented. The positive defense of any naval base located on a small island such as Guam or Culebra is practicable in a similar manner.

With all naval bases and all critical areas on our coast line secured in this manner, naval strategy will be completely freed from any purely defensive burden and the fleet will be able to concentrate all of its resources upon the campaign against the hostile navy.

Under such a system the mobilization and expansion of our military forces can be developed in a deliberate and orderly manner without risk of invasion by any group of enemies, no matter how great its naval preponderance may be.

23. *It is not to be understood that the beach defense outlined in this memorandum is proposed as sufficient in itself.* It is proposed as the foundation of our coast-defense system, with which all other tactical resources should be coordinated. Among these other resources are the following:

The Army system of coast defense should be constructed on the assumption that the battle fleet will not participate in coast defense as such and that the defense should be complete and self-contained even if our fleet should lose command of the sea. Even under this assumption, however, certain naval agencies will be available and will exercise an important influence in the development of the project as a whole.

Naval reconnaissance with its aerial observation and radio communication will locate hostile naval forces at a great distance and will give timely warning as to their position and direction of motion. Seacoast submarines will dominate the coast line near certain naval bases and will greatly increase the difficulties of hostile convoys. This will influence the distribution and total number of troops required for the beach cordon. In a similar way the approaches to certain otherwise practicable objectives may be completely barred by naval mine fields. Expert naval opinion as to effectiveness of the Army's proposed system of defense against landings will be indispensable in the preparation of detailed plans.

Field armies.—The defense against hostile landings outlined in this paper will require but a small part of the land forces of the

United States in time of war. After the coast defense forces are deployed, the remaining mobile forces will be formed into armies and employed as the plan for the particular war may demand.

With a proper organization of our resources, a serious invasion of of the United States would be impracticable even for a hostile combination holding the command of the sea or both oceans.

Movable heavy artillery.—In many cases movable high-power artillery will form an important auxiliary for the mobile detachments assigned to beach defense. Such weapons will increase the difficulty of hostile landings by keeping hostile warships at a distance from certain particularly favorable beaches. Artillery of this type should, however, be regarded purely as an auxiliary. Except as auxiliaries to mobile forces, they will have no conclusive influence on coast defense, and, on the other hand, mobile forces equipped with the usual field artillery types will generally be sufficient for the purposes of the defense even without the intervention of the heavier types. Another important rôle of these heavier weapons will be in the reenforcement of the armament of existing harbor defenses and as auxiliaries to the field army wherever siege operations may develop.

Air forces.—The air forces will have an important function in seacoast reconnaissance. They will also be able to attack hostile warships and transports, thus contributing to harbor defense and to coast defense as a whole. It is possible that they may also develop a capacity to convey supports at high speed to distant beach defense sectors. They should be able with machine guns and bombs to take an effective part in the beach combat itself, especially at points of penetration and before other reserves can arrive.

Chemical Warfare Service.—If gas remains a recognized military agency, it will frequently be of decisive value in the beach defense.

Tanks.—The probable use of tanks and other armored cars as parts of the beach supports where the terrain is favorable has already been indicated.

Cavalry.—With the resources of naval and aerial reconnaissance, and the development of mechanical transport for forwarding supports and reserves, there will be but a limited rôle for cavalry in the proposed system of coast defense.

While there are important fields of cooperation for all military agencies, it should be distinctly understood that a sound system of coast defense, except within the limits of the fixed harbor fortifications, depends primarily upon the provision of mobile field forces; that the principal agencies for this defense are infantry with machine guns, light and medium field artillery, and mechanical transport; and that the rôles of all other agencies and services should be considered strictly with reference to their subordinate capacities as highly useful but not indispensable auxiliaries.

24. The positive defense against landings as proposed herein is simply a modern development of the "First defense" as proposed in the plans of the National Land Defense Board before the war. The effect of the development of fire-swept obstacles and mechanical transport on enormous scale has increased the fighting power and radius of action of "First defense" troops to such an extent that they may now be employed in a more positive scheme of defense than was practicable when the original land defense plans were prepared.

Part IV.

DEFENSE PROJECTS AND PLANS (ARMY).

1. In connection with the revision of existing defense projects and plans and the preparation by the Army of new defense projects and plans, and in order to secure uniformity in procedure the following compilation of decisions and policies of the War Department has been prepared in the War Plans Division, General Staff. The general direction and control of the development and execution of defense projects and plans by the War Department will be exercised as follows:

(*a*) The War Plans Division, General Staff, is charged with cognizance of all matters involving new or modified defense projects and plans, and, in cooperation with the several divisions of the General Staff, in coordinating the action of the several services and agencies of the War Department in connection therewith. It shall also have the duty of originating consideration of such subjects when in its judgment necessary, and of recommending to the Chief of Staff whatever it considers essential to establish the sufficiency and efficiency of the defense of the continental United States and its oversea possessions.

(*b*) The War Plans Division, General Staff, will consider the subject of national defense in its broadest sense, with the object of utilizing all the means and elements available to accomplish the end in view. It will state the mission of each element and such general principles and instructions as will enable the elements involved to accomplish their specific missions. General instructions to tactical and territorial commanders concerned will issue from the War Plans Division on the authority of the Chief of Staff relative to details or development of approved defense projects or plans. Copies of such instructions will be furnished to the chiefs of War Department bureaus and services concerned.

(*c*) Cooperation with the Navy in the different phases of development of defense projects and plans will be secured through the Joint Army and Navy Board and the Joint Army and Navy Planning Committee.

(*d*) The chiefs of the several bureaus and services of the War Department will cooperate to the fullest extent in the execution of these instructions, and in the development of the technical duties of defense projects and plans.

2. The development and execution of defense projects and plans by territorial or tactical commanders will be governed by the following:

(*a*) The limits of defense sectors are prescribed from time to time by the War Department. As a general rule, the areas included in the several corps areas and overseas departments constitute defense sectors similarly named. For purposes of inspection, maneuvers, and tactical control, corps areas within the continental limits of the United States are grouped into Army areas. The Army area commanders, when designated, are charged with the development and coordination of war plans and defense projects within their areas.

(*b*) Corps area and department commanders become the "Sector commanders" within the meaning of these instructions and as such are responsible for the defense of their respective sectors. The troops attached to each corps area or overseas department by the War Department constitute the forces available for the initial defense of the several sectors.

(*c*) Projects and plans relative to the defense of any sector will be developed, completed, and kept up to date by the responsible commander thereof. Every phase of this work pertains to functions for which the staff of every tactical or territorial unit is or should be at all times constituted and prepared to perform as one of its normal and most important duties. Therefore, throughout all phases of the work staffs will be expected to function normally and the formation of special boards or other agencies as substitutes for normal staff agencies or tactical command should not be resorted to. Any part of any staff may be increased by temporary detail without modification in its normal responsibility or functions. The officers selected for this important duty must be especially qualified for the work. If qualified officers are not available within the command, application should be made to the War Department for the detail of such officers.

(*d*) Plans relative to subsectors will be prepared by the responsible tactical commanders thereof and after approval by the sector commander will constitute the plan for that particular subsector and will be included as such in the plant for the sector.

(*e*) Cooperation with the Navy will be secured through the commandants of the naval districts embraced in the limits of the sector. Responsible tactical and territorial commanders are authorized to confer directly with such commandants and will designate liaision officers whenever desirable.

3. In order to avoid confusion and to establish uniformity in terminology the following will govern the use of certain terms or expressions:

(*a*) *A project* is a tentative outline of construction and of procurement of means. It is necessarily presented in general terms, but

nevertheless has in view the attainment of a definite result. Projects are, therefore, indicative of policy and usually form the basis for estimates and legislation. The construction and procurement programs are later elaborated in more detail in connection with preparation of the plan of defense. For example, "Project for the defense of the Panama Canal." Projects which have been approved by the Secretary of War become and are designated, "Approved project of the War Department for ———."

(*b*) *A plan* is a formulated scheme for attaining some definite end and consists of a detailed and methodical arrangement of the means or successive steps believed to be necessary or conducive to attainment of the objects in view. Plans are based on approved projects of the War Department and on instructions of higher commanders or of the War Department. Plans are prepared by responsible territorial and tactical commanders. For example, "Plans for defense of Oahu, H. T."

(*c*) *Coast defense* includes dispositions and operations having for their object the meeting of a hostile attack made upon any portion of the seacoast of the continental United States, the Panama Canal, or the insular possessions. The elements that enter into coast defense comprise the naval forces, the harbor defenses, and the mobile forces of the Army.

(*d*) *Harbor defense* includes dispositions and operations for the defense of a limited portion of the seacoast, ordinarily confined to important harbors. Such dispositions generally include fixed armament and their accessories. The harbor defenses will be considered as units of fixed or sector artillery having definite missions over sea and land areas, and as such form an important part of the sector garrison. Pending preparation and approval of a project providing for the organization of harbor defense troops into units corresponding to battalions, regiments, and brigades, the principal harbor defense tactical unit requiring consideration under these instructions is the *coast defense*. The relation of coast defense commanders to the sector, subsector, and other commanders is the same as in the case of other commanders of tactical and combat units of the mobile forces of the Army.

(*e*) *Fixed armament* includes guns, howitzers, and mortars mounted in fixed emplacements, incapable of being moved or readily transferred and designed to fire over limited areas.

(*f*) *Mobile armament* includes guns, howitzers, and mortars on movable mounts. The mobility possessed by armament of this class is subject to limitations and may be classified as strategical and tactical mobility.

(*g*) *Mobile forces of the Army* include combat troops of all arms comprised in divisions, corps, and armies.

(*h*) *Defense sectors.*—For command and other purposes the seacoast areas are divided into sectors, which usually include defended and undefended areas. The limits of defense sectors are prescribed by the War Department. According to the foregoing, a defense sector comprises the entire sea frontier within its limits, of which the harbor defenses are strong points and not isolated points to be defended. A *major sector* is a sector of such magnitude as to require a sector reserve of a division or more and not susceptible of reinforcement except from the general strategical reserve or by transfer from another sector. A *minor sector* is a sector of such magnitude that the sector reserve may be less than a division and yet so situated as to make it inexpedient to organize it as a subsector. A minor sector is not susceptible of reinforcement except from the general strategical reserve or by a transfer from another sector. A *subsector* is a *part* of a *major or minor sector*, but forming a separate tactical command, with its own reserve, under the sector command and susceptible of reinforcement by the sector reserve.

4. In the development of defense projects and plans the normal procedure will be as follows:

(*a*) Instructions from the War Department directing the preparation of a project or plan will, whenever practicable, state the mission to be assumed as a basis for the project or plan. The War Plans Division, in conjunction with Naval Operations, is studying and revising all the more important war plans. This will take a long time and until completed it will be impracticable to furnish corps area or department commanders (except in the case of Panama, Oahu, and the Philippines) definite missions, together with a statement of the forces they will have at their disposal and the necessary information as to the mission of adjoining commanders with whom they must cooperate. However, it is the desire of the War Department that each corps area or department commander study and revise his local plans of defense without waiting for the results of the War Plans Division work. In doing this, he will assume the more obvious and natural missions inherent in the location of his command and will assume the troops and material now at his disposal as available in the execution of such plans.

(*b*) In working out these plans the corps area or department commander should carefully consider and apply, whenever practicable, the principles enunciated in W. P. D. Memorandum No. 1, entitled "A Positive System of Coast Defense." This will necessitate a reconnaissance of the entire coast within the assigned limits with a view of classification as follows:

(1) The location and extent of coast line which, for specified reasons, may be regarded as unfavorable for landing operations.

(2) The location and extent of coast line considered favorable for landing operations, with the possible objectives and lines of advance in each case.

(3) The beaches under (2), after consideration of the other elements of the problem, will be further classified into beaches where landings should be definitely resisted and beaches where, for specified reasons, arrangements for serious defense need not be provided.

The corps area or department commander's study will undoubtedly show the necessity for certain increased numbers of troops, machine guns, artillery, permanent works, communications, reserve supplies, and additional storage facilities. The increases that are desired should be listed in order of priority, as to urgency, with results that will be obtained if they are furnished, in such manner that the War Department can readily see that by furnishing certain of these items it can obtain a definite increased security to that portion of the coast. These various projects for employment of reinforcements, listed item by item and giving in each case the security that would result, would be such that if all were granted the corps area or department commander would be willing to acknowledge that with such means a positive system of coast defense would be obtained.

(*c*) Five copies of the corps area or department project, prepared as above directed, together with necessary maps and estimates of funds required for the project, will be submitted to the War Department.

(*d*) The project is then considered by the War Department and studied with a view of ascertaining if it fits into the general plans for national defense, and is approved in whole or in part or modified according to circumstances.

(*e*) One copy of the approved project is returned to the sector commander, and the other four copies are filed in the several divisions of the General Staff.

(*f*) The approved project is the basis for the development of the detailed plans which are kept on file at the headquarters of the tactical or territorial commander and subject to inspection by duly authorized representatives of the War Department.

5. All defense projects and plans and papers pertaining thereto will be marked "*Secret*" and so considered.

6. Nothing in the foregoing instructions should be construed as limiting the responsibility of chiefs of services or territorial or tactical commanders in initiating action relative to the sufficiency or efficiency of seacoast or harbor defenses as provided for in regulations.

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