PANAMA - DEFENDING THE HARBOURS IN 1940-41

As explained previously, the US planning for harbour defences before World War 2 were intended to have three purposes –

- To protect the defended area against invasion and capture;
- To protect the area from naval bombardment, and shipping from submarine or surface torpedo attack; and
- To cover the seaward approaches sufficiently far out to enable the Navy to emerge and meet an attack.

While, in general, close-in defence of the Panama Canal, its locks and the harbours in the Canal Zone was the responsibility of the US Army (as was such "coastal" defence in the Continental US), the US Navy retained responsibility for certain aspects, this including taking over responsibility from troops for the Transit Guard aboard ships using the Canal from February 1942, using its marines. Other responsibilities included underwater installations, including the anti-torpedo and anti-submarine defences; and from 1942, the indicator loop underwater submarine detection system[1] (of which more below).

In 1939, funds were authorised for improvement of the Canal Zone's defences included provision of underwater protection against submarines and torpedoes, including those dropped by aircraft.

By July 1941, anti-submarine nets had been installed to protect the outer reaches at the entrance to the Colón breakwater and in the area of La Boca at the other end of the Canal. However, the attacks by torpedo-armed aircraft on the Italian fleet at Taranto, and subsequently the Japanese attack on Pearl Harbor, demonstrated that shallow water and short locks were no longer a guarantee of security from air-launched torpedoes. Immediately following the Pearl Harbor attack, on 8 December 1941, the War Department issued instructions for the Commanding General of the Army's Panama Canal Department to put in place all underwater harbour defence measures, in coordination with the Navy.

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[1] Developed by the Royal Navy and first tested at the end of World War 1, these used long lengths of cable on the sea floor to detect submarines. The system was used by the British during World War 2, both in home ports and in various Dominion and Allied countries. By 1942, the US had adopted the technology: http://indicatorloops.com/loopworks.htm

It was felt that traffic in the Canal's main channel, and in Gatun and Miraflores Lakes, were vulnerable to torpedo attack. Then, in March 1942, a technical report said that the Japanese had developed a new type of torpedo which effectively rendered existing defences obsolete, and this resulted in proposals to upgrade and strengthen the nets protecting the Miraflores and Pedro Miguel Locks[2]. Another net was installed on 8 December 1942, to protect Madden Dam, which had been completed in 1935 and was vital in regulating water levels in Lake Gatun. This 800-feet (244 metres) long net had a depth of 40-feet (12.2 metres).

However, on 30 May 1943, a net installed to protect the Miraflores Spillway, alongside the Miraflores Locks, came free only two days after being installed, and went over the spillway. This incident led to a recommendation that such spillway nets should be abandoned due to the strong currents involved.

Another proposal, in June 1943, but one which was not pursued, was to provide for a more proactive defence by fitting a net equipped with pre-installed depth charges on the approach to the Gatun Locks.

As the Canal Zone, or rather its offshore islands, was used as a base for PT boats during the war, and the US was a major use of such light coastal motor torpedo craft, it may not be surprising that the War Department in February 1942 highlighted the threat from attacks on harbours, fleet anchorages etc using fast-moving, shallow-draught torpedo boats.

To counter the threat from torpedo boats, there were recommendations for the use of existing weapons. For ranges up to 2,000 yards (1,829 metres), 37 mm or 40 mm guns (intended for anti-aircraft defence) with a director or remote control systems was proposed. It was decided to relocate existing fixed seacoast or anti-aircraft 3-inch (76.2 mm) guns, supported by additional 60-inch (152.4 cm) searchlights, linked by telephone to harbour defence command posts. At Balboa harbour, the Army deployed 13 75mm (3-inch) field guns. Latterly, the 3-inch guns would be replaced by more modern 90 mm weapons.

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[2] These locks are at the Pacific end of the Canal, the Gatun Locks are at the Atlantic end.

However, it had also been decided that anti-aircraft defences should not be adversely affected by changes made to combat small craft, and some of the sites for the protection of vital installations did not permit their dual use. On the Atlantic end of the Canal, Limon Bay was usually crowded with waiting vessels, and at the Pacific end many ships were anchored further out, outside the defensive minefield, making protection of such vessels difficult. At Thatcher Ferry alone[3], providing protection for the vessels at anchor required the siting of at least five gun batteries.

Despite the difficulties involved, in October 1942, the Coastal Artillery Command reported that all armament was well placed for defence against torpedo boats (and low-flying torpedo-launching or mine-laying aircraft)[4].

There is little available information on the US Navy Loop Stations and the indicator loop system which apparently operated along the Panama coast[5]. It had been claimed that there is, or was, about 850 nautical miles (1,574 km) of 8-inch (20.3 cm) cable running down the full length of both coasts of Panama, and that the main cable had several 2-inch (5.08 cm) feeder cables running back to the mainland.

The indicator loop system relied on the magnetic properties of submarine hulls. Loops of cable were laid on the ocean floor in shipping channels and when a submarine passed overhead an induced current was produced and this can be detected on the galvanometers at the nearby shore station. Even if wiped or degaussed (as many vessels were during World War 2, to reduce the risks from magnetic mines), submarines still have sufficient magnetism to produce at least a small current in a loop.[6]

The first installation in the US was made at Cape Henry, Virginia in Summer 1941, after which the necessary equipment (loops, hydrophones, etc) was installed in practically every major and medium-sized Continental US harbour in the few months following August 1942. By the end of

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[3] As the name suggest, where a ferry service operated. This was close to the Pacific entrance to the Canal, and where the Bridge of the Americas (opened in 1962) now lies, linking the North and South America land masses.

[4] *Security and Defense of the Panama Canal 1903-2000* by Charles Morris, Panama Canal Commission: https://original-ufdc.uflib.ufl.edu/AA00047733/00001/6j

[5] http://indicatorloops.com/panama.htm

[6] http://indicatorloops.com/usnlrs.htm

1942 systems were also being shipped to the South Pacific. It was installed in the 15th Naval District in the Canal Zone, as well in Australia and South America and, at the time of its surrender, several units were ready in California to be shipped to Japan. In the Canal Zone, the control stations were at Cristobal on the Atlantic side at Fort Sherman; and at Balboa on the Pacific side at Fort Amador.[7]

While the Navy would deploy mines in the open sea, the Army had its own mines, which were used to defend harbours and waterways, including those in the Canal Zone. Unlike the minefields of the Navy, those of the Army were controlled, and could be detonated on command from a shore station. One of the obvious advantages of such a controlled minefield was that a shipping channel could be completely mined, and yet still usable for friendly shipping, with the mines only being used or activated if or when a threat emerged.

The US Army had what was called the Army Mine Planter Service (AMPS), dating back to 1918, and which laid the minefields. Like the gun defences, it came under the Coastal Artillery Corps, which installed and maintained all underwater minefields forming part of the US coastal defences – including those in the Canal Zone and Manila Bay in the Philippines.

Rather than being detonated merely by contact (although they could be set to do so), Army minefields were connected to the shore via a series of electrical cables. Main cables from shore went to a junction box, with each junction box typically supporting 19 mines[8].

Of course, establishing an effective controlled minefield involved a fairly large investment in infrastructure ashore, plus the trained personnel and vessels to lay (or "plant") and operate and maintain the minefield, with other smaller vessels also needed for various tasks, such as to lay cables[9]. The minefield would actually only be planted (using specialist Army-run mine planter vessels[10]) when hostilities are imminent (in the Canal Zone, this took place in 1940) and hence

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[7] Ibid.

[8] DC current was used to monitor and test the mines, as well as signal to the shore that contact had been made. AC current would then be used to detonate the mine.

[9] https://xbradtc2.com/tag/coastal-artillery/

[10] The Army maintained one such mine planter ship in the Canal Zone (although two were used to plant the minefield in the Canal Zone in 1940). The Army ships are "mine planters", as opposed to "minelayers", which are the ships used by the Navy. Mine planters had to be of a fairly substantial size, despite being

storage and maintenance facilities ashore would also be needed for the mines (with, naturally, a separate magazine to hold the explosives). It required a complex organisation, with wharves for the "mine planting" ships, tramway tracks to facilitate the movement of the mines from storage to the wharf, and storage for many miles of electrical cable, in addition to other specialised equipment and facilities. If electricity supplies were not available, power generation facilities would also be needed.

However, the Army's sea mines did offer a more flexible and proactive defence arrangement for a harbour or channel. Generally speaking, such controlled minefields could be fired one of three ways -

- By command detonation, controlled by a central control (known as the mine casemate). This control centre also needed communications to its observation stations, as well as plotting tables and plotters to track any enemy and decide which mines to detonate etc. In addition, for use at night, searchlights would be required to track and illuminate targets;
- By contact (as with an ordinary mine), where visibility was impaired for some reason; or
- By delayed contact, where the mine itself served as a sensor, informing the control centre when contact had been made – so that detonation could be ordered or delayed for a few seconds (which could have advantages involving where damage to the ship might be caused). This method also allowed the mine commander discrimination in his targets, so that, for example, he could ignore a small scouting vessel in favour of a better target.

The state of the Canal Zone defences was summarised by the Commandant of the 15th Naval District to the Chief of Naval Operations (CNO) in Washington on 10 July 1941, in response to a letter of 3 July which had asked if the measures taken by the Army and Navy were adequate to prevent sabotage. The Commandant said he did not think the measures were adequate and mentioned that protection from the water left much to be desired, with a need for a harbour police, which was not employed due to lack of men and boats (and even if it existed, he said, would not be a sure cure). He also complained about Army discipline, and said that the transit guards aboard ships passing through the Canal were "wholly ineffective and futile" (despite the

purely for coastal use, as they had to be able to carry several mines, plus the equipment (booms etc) to deploy or recover them.

Army employing 20-30 officers and 500 men for the task, who were said to be "working hard but to no effect").[11]

Interestingly, while the harbour defences of the Canal Zone were not tested during World War 2, there was one planned attack that would have bypassed them, another possible attack that might have done so – both involving aircraft, and a third type of attack (actually planned for New York harbour) which would have tested them, and likely found them wanting. The latter template was offered by a plan using Italian-built two-man midget submarines to attack shipping in the docks in New York. The Italians had made several successful attacks in the Mediterranean using frogmen and "human torpedoes" – and the midget submarines to be used in New York were more capable. Preparation and training got underway, but the plan was aborted in 1943 after the intended large Italian submarine mothership, based in Bordeaux, was sunk by the Royal Navy when on trials in the Bay of Biscay[12].

As it was, although German U-boats did attack and sink vessels in the approaches to the Atlantic end of the Canal, they did not venture into the inshore waters themselves. The defences did not suffer the embarrassment of neighbouring Costa Rica, where a U-Boat entered Port Limon in mid-1942 and sank a merchant ship in the harbour[13].

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[11] https://ncisahistory.org/wp-content/uploads/2019/12/Canal-Zone-Response-to-CNO-on-Preparations-to-Prevent-Sabotage-Jul-10-1941.pdf

[12] https://www.youtube.com/watch?v=_c0iy2ylz-E

[13] The U-Boat involved, U-161, was lost with all hands off Bahia, Brazil 3 months later, after an attack by a US Navy patrol bomber.