

Mulberry Harbour -
Mike Hughes' survey
of Phoenix construction
site at Lepe.

00/2006/36

More details of constructi work
when it was carried out
constructi force - nos of men etc. 2006/966

STONE POINT. LEPE

The Archaeology of D-Day: The remains at Stone Point, Lepe, Hampshire. detail of D-Day ~~landings~~ ^{forces}. (Stephen D-Day Museum).
by M Hughes and C Lewis.

The remains of installations where sections of the floating harbours used in the 1944 D-Day operations were constructed extend SSW/NNE for c. 700m along the foreshore NE of Stone Point. Lepe. Hampshire. between SU46569868 and SU46749935. The surviving structures and platforms, constructed of concrete and brick were surveyed by the RCHME in July 1990 at the request of the Hampshire County Council of the Hampshire County Planning Department. The request was made following severe storm damage to the N end of the construction area amid concern that the weakened structure had become vulnerable to undermining by tides and coastal undertow and that another severe storm would further damage one of the few surviving and best preserved monuments to a major event in recent British ^{military} history. The aim of the RCHME survey was to record in detail the full extent and form of all remains associated with the D-Day operations surviving within the area of the ^{County Council's} Lepe Country Park, including dislodged, damaged and partly obscured component parts. This included the installations where the concrete units or 'caissons' which formed the harbour sections were constructed and launched and the area used for the embarkation of troops and vehicles. It did not include the area previously occupied by the construction workers' camp which was located N of the construction site outside the area now included in the Lepe Country Park. It is hoped that, following the survey, engineering work can be carried out to stabilise the monument and protect it from further damage.

The prefabricatd harbours which were used in the D-Day 'Overlord' and 'Neptune' operations to provide shelter and landing facilities for vessels, troops and machinery during the invasion of German occupied

hardstanding down the beach to the low water line. Two bollards for securing vessels during loading survive on the edge of the hardstanding. On the seaward side of the hardstanding areas of concrete beach hardening mats are still present extending beyond the low water line. Some of these have been shifted from their original position but some areas survive in situ. These mats consist of prefabricated slabs with an indented gridded upper surface held in position at the edge of the hardstanding by a series of iron hooks. Substantial concrete blocks lying SE of the N part of the hardstanding may have been used as additional mooring blocks. Concrete and brick foundations W of the hardstanding represent the remains of building and a water tower (Y) associated with the ~~construction workers~~ ^{army unit in control of} ~~camp to the W of the surveyed area.~~ ^{the Embarkation process.} Two standing iron structures or dolphins lying in the sea beyond the low water line are the remains of jetties used to load vessels bound for Normandy. At the far S end of the surveyed area (Z) lie the tumbled remains of a brick structure built on a substantial concrete foundation.



History of embarkation
 What units What vehicle
 What boats used etc

The RCHME survey has recorded the location of the surviving elements of the construction site for the 'Phoenix' caisson components of the Mulberry Harbours and has revealed that the structure and function of most of the fixed parts can be ascertained with a high degree of certainty. The extent to which the site was used subsequent to the completion of the Mulberry operations is unclear, but the Solent area was the scene of much activity throughout the war, including the pipeline under the ocean (PLUTO) which extended, eventually all the way to Germany, from a point near Lepe. Stone Point was clearly not simply abandoned once construction

had ceased: most of the non-fixed, easily removeable or iron component parts are no longer visible and can be assumed to have been removed. These include not only easily reuseable items such as scaffolding, much of the rolling track and the engines and winches used to provide motive force, but also more specialised items such as the mobile ball carriages and sliding ways on which the caissons were moved and the superstructures of the manoeuvring, launching and holding gear. In addition, much of the deliberately broken up concrete from the surface of the S part of the construction platform and parts of the rolling track walls within the launching site have been removed. Some of the rolling track rails are still present, though not in situ, and more of the iron fixtures within the launching site may still be present buried under the shingle. In April 1946, RAF air photographs (RAF TUD UK pt 2 -116) reveal that many of the buildings within the area of the construction workers camp were still present, and the embarkation jetty was still intact. In addition, some of the structures lying immediately on the landward side of the launching site at V1-7, and others alongside the construction platform are visible. This suggests that the area continued in use in some form until after the end of the second World War. Also visible on the RAF photographs are four 'Phoenix' concrete caissons lying c. 600m offshore in the Solent. While these, which are roofed over and apparently carrying anti-aircraft guns, are evidently not examples of the B2 type built at Stone Point, they do provide a vivid reminder of the purpose for which the surviving remains at Lepe were originally constructed.

France were codenamed 'Mulberry' and comprised a number of different component parts with different functions. These included deep water shipping breakwaters codenamed 'Bombardon', floating pierhead units and roadways codenamed 'Whale', temporary inshore breakwaters consisting of scuttled ships codenamed 'Gooseberry', and permanent inshore breakwaters consisting of concrete caissons codenamed 'Phoenix' (Futter 1981, parts 1 and 2).

Six sections of the Phoenix harbours were constructed at Stone Point. A total of 147 Phoenix caissons of 6 different types were towed across the English Channel in the days following D-Day and strategically sunk off the Normandy coast. These reinforced the temporary Gooseberry blockship breakwaters which were installed during the initial landings as the latter could be brought across the channel under their own power more quickly than the Phoenix units which had to be towed by tugs at a speed of 4 - 4.5 knots. The Phoenix breakwaters were reinforced in the autumn of 1944 by the addition of supplementary strengthened type AX and BX caissons when it had become apparent that they were to continue in use for longer than the 90 days originally planned (Futter 1981 pt 5. 127).

Stone Point was one of ^{the beach} ~~four~~ sites selected for the construction of type B2 Phoenix concrete caissons ^{refer to others - present condition etc} (Wilson and Sully 1947. 227). The B2 type measured 62m (203'6") long, 13.41m (44'0") wide and 10.67m (35'0") high (Futter 1981 pt 5. 125). They were divided internally into 22 compartments arranged in two rows of eleven separated by dividing concrete walls 12" thick at intervals of 4.9m (16'3") (Wood 1947. plate 2). These were to provide stability during sinking. Gangways 1.8m (6') wide were provided around the sides and end of the caissons c. 6.1m (20') below

into the sea. The third part of the site comprises the remains of the concrete hardstandings, beach hardening mats and jetties used for the embarkation of the troops and vehicles taking part in the D-Day landings.

their top. to carry scaffolding during construction. bollards for towing and holes for pumping out water during refloating (Futter 1982 pt 6.. 219). The caissons were made of concrete slabs and assembled by a largely unskilled labour force. The thickness of the slabs for the floors and lower external walls was 15". those for the upper external walls 14". those for the swim ends 12" and those for the internal walls 9" (Ibid.. 221). The B2 type did not carry anti-aircraft guns and only the sections at either end were roofed over. with horizontal concrete slabs (ibid.. 219). 24 B2 caissons were constructed in total. of which 6 were built at Stone Point (Wilson and Sully 1947. 227). In the absence of a dry dock or facilities for building the caissons while floating. the assembled units were launched into the sea sideways. This was carried out when the units had been assembled to a height of 6.1m (20'). and weighed 2000 tons. They were then completed while afloat. towed away and 'parked' on the seabed at Selsey or Dungeness until needed. when they were refloated ready for towing to Normandy. The work at Stone Point was carried out by Wilson Lovatt & Sons Ltd. with technical assistance from Messrs. Holloway Bros. (London) Ltd who had developed the basic techniques used in the constructing and sideways launching of heavy craft during work on a prototype alternative pierhead at Conway (Ibid.. 211. 222-3).

The surveyed Mulberry remains at Stone Point fall into three main spatial and functional areas. The N half of the surveyed area is occupied by a raised concrete platform and associated features where the Phoenix caissons were assembled. Immediately S of the end of the platform are the slipways and winch-house foundations used to launch the caissons sideways into the sea. The third part of the site comprises the remains of the concrete hardstandings. beach hardening mats and jetties used for the embarkation of the troops and vehicles taking part in the D-Day landings.

Key letter references used in the following text refer to those on the RCHME plan.

Phoenix Caisson Construction Site (Area 1)

The raised level concrete platform (G-H), occupying the N part of the site measures c. 375m (1230') long, c. 11m (36') wide and c. 1.3m high (4'6"). The four sides of the platform are formed by a brick wall c. 1.3m (4'2") high, built on a substantial concrete foundation. The area enclosed by this wall, which is filled with shingle from the beach, is topped by a layer of unreinforced concrete c. 10 cm (4") thick, laid in sections on top of the shingle bed to form a solid floor on top of the platform. Single bricks located along the concrete floor at varying intervals are positioned on concrete piers within the shingle body of the platform to facilitate the initial levelling of the wet concrete. At its N end, the seaward side of the platform wall and floor has been extensively damaged by recent winter storms. The S-most 107m of the concrete floor has been broken up, apparently deliberately, and become overgrown. The broken line at J marks the S limit of the in situ, undamaged concrete floor. It is clear from the transverse divisions across the undamaged part of the floor that it was originally divided into alternating long and short sections. The eight N-most sections (K1-K8) are still clearly defined and the dimensions of the platform indicate that there would originally have been eleven: the distance from the S end of the S-most undamaged section (K1) to the S end of the platform (G) is the exact length (114m / 374') of two buttresses, constructed of brick, have been built onto the S end of the wall nearest the sea. There is an additional layer of concrete on the top of the walls but not the buttresses. The concrete walls have been

long sections and one interspaced short section. Each of the long sections, of which there would originally have been six, measures 49m (160'8") long and each of the short ones measures 16.05m (52'6") long. The concrete surfaces forming the shorter sections are laid c. 10cm (4") lower than that of the longer sections and abut the outer brick wall, whereas those of the longer, higher sections partially overlie the wall.

Two linear concrete walls (L-M and N-P), one either side of the raised concrete platform, measure c. 185m long, .9m (3') high and .4m (1'3") wide. The seaward concrete wall has been extensively damaged at its N end by recent winter storms. At their N end, these concrete walls extend c. .6m (2') beyond the end of the raised platform. At their S end they continue into Area 2, used for launching the completed caissons into the water (see below). Both walls lie on the same substantial concrete foundation as the brick wall forming the outer edge of the platform and c. .8m (2'6") away from it. The inner faces of two concrete walls are separated by a distance of 12.7m (41'8"), the outer faces by a distance of 13.5m (44'2"). Along most of their length the walls are buttressed on the external faces, away from the platform. The top surfaces of these protruding structures measure c. .2m (6") wide by c. .5m (1'6") long and stand c 6cm (2") higher than the main part of the wall to which they are attached. They slope down to the concrete foundations c. 1m (3') from the outer edge of the concrete wall. The horizontal dimensions of some of these buttresses vary slightly from these typical measurements. With the exception of those along the S-most 58m (190') of the raised platform, they are spaced at regular intervals c. 1.9m (6') apart. Additional buttresses, constructed of brick, have been built onto the S end of the wall nearest the sea. There is an additional layer of concrete present on top of the walls but not the buttresses. The concrete walls have been

built in regular sections divided at the same points both sides of the platform. These divisions are related to the sections of the concrete floor of the raised platform: 4 divisions at intervals of 9.9m (32'6") are regularly spaced either side of each of the long sections of the concrete floor. There are no divisions beside the short sections of the floor. The space between each section of concrete wall is .3m (1').

The dimensions and structure of the raised platform demonstrate that it represents the remains of the 'keel-block' walls and level base on which the caissons were assembled (Wilson and Sully 1947. 213: IWM neg. 1735383. 1735385. 1735387). These were raised to a height of 4'6" above the ground in order to leave sufficient space below for the construction and operation of the mechanisms used to manoeuvre the caissons to the launching point (Ibid.. 213). The total length of the platform (375m / 1230') is adequate to accommodate six caissons arranged end to end and would have allowed all of the caissons built at Stone Point to be under construction at the same time. (Owing to the short amount of time available for the completion of the units. concurrent construction of units was essential.) The length of the long sections of the platform floor (49m / 160'9") corresponds with the length of the horizontal base or keel of the caissons (c. 47.55m / 156'). excluding the upturned 'swim ends'. and indicates that it was upon the six long sections that the horizontal keels of the six caissons were located during construction. The upturned swim ends at either end of each caisson would consequently have overhung the short sections of the platform. These sections, measuring 16.05m (52'6") long of eighteen ball carriages were needed to support each caisson. Once the carriages had been drawn into position the load was transferred to the ball carriages by tightening screws bringing together, and thus raising

would have accommodated two swim ends each measuring 7.2m (23'9") long, allowing space for shuttering and clearance between neighboring caissons. At either end of the construction platform, the swim ends of the first and sixth caissons would have extended beyond the ends of the raised area. Accordingly, at these points, a concrete floor extending c 9.5m (31') was laid to provide a solid working surface. As it did not carry any of the horizontal keel which was of necessity constructed on a raised surface (see above), this was laid at ground level.

The concrete walls either side of the raised platform carried the rolling track mechanism used to manoeuvre the completed caissons to the launching site to the S of the construction site. (This operation is described in detail in Wilson and Sully 1947). The distance between the outer sides of the walls either side of the keel-block wall platform (13.5m / 44'2") corresponds with the width of the B2 type caissons (44') and the width of the rolling track walls (.4m / 1'3") is the same as that of the lower walls of the caissons. The rolling track consisted of a 12" by 6" timber beam grouted onto the wall with concrete. This concrete grout is still present on the top surface of much of the length of the walls. A bull-head rail was attached on a metal plate to the top of the beam and carried 3" diameter hard steel balls. This mechanism carried the 6' long ball carriages upon which the caissons were carried during transportation. These carriages were placed on top of the steel balls and were constructed in a similar manner to the rolling track: a 6' long section of bull head rail was attached, facing down and thus enclosing the steel balls, to the underside of a 6' by 12" by 6" timber beam. A total of eighteen ball carriages were needed to support each caisson. Once the carriages had been drawn into position the load was transferred to the ball carriages by tightening screws bringing together, and thus raising

the height of a unit within each carriage comprising two horizontal wedges. This was located above the timber beam of the ball carriages and immediately below the base of the caisson. As the wedge unit was raised, the weight of the caisson was transferred from the construction platform, via the wedge units, to the ball carriages supported by the rolling track. The caisson was then rolled forward on the steel balls lying between the rails of the ball carriages and the rolling track, propelled by steam winches and wire-rope tackles (Wilson and Sully 1947, 220-226).

Phoenix Caisson Launching Site (Area 2)

S of the raised construction platform the 2 rolling track walls (L-Q and N-R) continue to the end of the launching site, their form modified to integrate with the mechanisms used to manoeuvre the caissons from the rolling track into the sea. The landward rolling track wall (L-Q) continues for c. 65.3m (214') into the launching site and is buttressed on both sides. Parts of it have been destroyed but its foundations are still visible. The wall is intersected by the exposed ends of 8 low concrete slipways (S1-S8) which lie at right angles to the wall. At the points of intersection the line of the wall is interrupted and a lower section of wall set c. .1m (4") W of the main line traverses the slipways. The sections of wall between the slipways are c. 4.3m (14') long and separated by a gap of c. .9m (3'). They overlap the edges of the slipways by c. .15m (6") at either end.

The continuing line of the seaward rolling track wall (N-R) has been

partially obscured by shingle and appears to have been destroyed at the same points along its length as the landward rolling track wall. Only the tops of the short sections of the walls are visible, set at the same distance apart from the landward wall as in Area 1. 4 of these wall sections are buttressed and mirror the sections in the landward rolling track wall, with corresponding gaps for the 8 slipways. Buttressing, if present, is no longer visible on the other 5 sections. Immediately E of the seaward wall sections lie the tops of 9 partly buried concrete blocks (T1-T9). They are positioned to allow the slipways to pass through the gaps between them and are the same width as the neighboring sections of the seaward rolling track wall: 6 of these blocks measure c. 3.3m (10'10") long and .4m (1'2") wide, the remaining 3 measure c. 2m (6') long and .4m (1'2") wide. The latter are located on the outer sides of the two groups of slipways and a fourth short block between T5 and T6 may be obscured by shingle.

The concrete slipways (S1-S8), lying at right angles to the standing way walls, are spaced c. 4m (13') apart and are arranged in two groups of four separated by c. 14.5m (48'). Each slipway measures 1.2m (4') wide and .3m (1') high and extends from c. .6m (2') W of the landward rolling track wall ESE towards the sea. Much of their seaward extent has been obscured by shingle, but it is clear from the exposed sections in the intertidal zone that they extend in a straight line and continue down the beach. Near the mean low water line the slipways have been damaged and partially broken up by the sea. Below the mean low water line, visible only at exceptionally low tides in the autumn and spring, the continuing line of each of the surviving slipways (S) is flanked on either side by concrete structures measuring .4m (1'3") wide. These extend seaward from a point c. 41.2m (135') down the slipways, where they lie at the same height as the surface of the slipways. The top surfaces of the flanking structures

are horizontal and the surfaces of the sloping slipways descends between them as they extend out into the Solent.

Abutting the W side of the landward rolling track wall are the brick foundations of two rectangular structures (U) measuring 2.4m (8') wide and 2.8m (9') long which display artificially lowered internal floor surfaces. Also lying W of the landward rolling track wall are seven concrete blocks (V1-V7) all placed symmetrically in relation to the eight slipways. Four of these (V1-V4) are cuboid concrete blocks measuring 1.8m (5'10") long, 1.6m (5'3") wide and c. 1.4m (4'6") high, lying c. 3m (10') W of the landward rolling track wall. Each of these is located beyond the ends of, but equidistant between, two of the slipways. A fifth concrete block (V5) c. .9m (3') W of the landward rolling track wall is located centrally between the other four and also centrally between the two groups of slipways. Two further blocks (V6 and V7) measuring 1.3m (4'3") wide, 1.9m (6'3") long and c. 1.4m (4'6") high with a lower section .6m (2') by .9m (3') at the front lie c. 6.8m (22'3") W of the wall. Each is located behind the centre of one of the two groups of slipways.

The features in this area are the remains of the standing ways and mechanisms used to manoeuvre the Phoenix caissons into the sea. (This operation is described in detail in Wilson and Sully 1947). The concrete slipways (S1-S8) formed the sloping standing ways down which the caissons were launched into the sea. Each assembled caisson was manoeuvred along the rolling track walls (M-L-Q and P-N-R) on the mechanism described above beyond the end of the construction platform (G-H) until it lay directly

above the slipways. The distance from one side of the area occupied by the slipways to the other is (48.3m / 158'4") which corresponds with the length of the keel base of the B2 caissons (156'). Special bridging units were used to carry the rolling track over the gaps in the walls left for the slipways. Once in position across the slipways the latter were greased and mobile sliding ways, lying on top of the standing slipways and also greased, were drawn up beneath the caisson. The sliding ways were designed to allow the caisson to remain horizontal while travelling down the sloping standing ways. The weight of the caisson was transferred from the ball carriages on the rolling track walls on to the sliding ways using the same wedge mechanism as in the initial transfer from the keel block walls to the ball carriages (see above). The concrete blocks (T1 - T9) lying on the seaward side of the seaward rolling track wall formed the check blocks holding the check gear which prevented premature launching while the caisson was in position on the sliding ways. These consisted of joists spanning the anchor blocks either side of each sloping standing way (Wilson and Sully 1947. 215-216). Part of the iron fixings of the check gear between the two S-most check blocks (T1 and T2) was briefly revealed during the survey as a result of tidal movement of the shingle. Similar blocks and associated fixtures are visible on a contemporary photograph of an unidentified site (IWM neg 1734930). The flanking structures towards the base of the slipways may have formed part of the mechanism for stopping and retrieving the sliding ways. The brick structures (U) abutting the rolling track walls are the concrete lined pits which formed part of the trigger release gear (IWM neg 1735364: Wilson and Sully 1947. plate 2). These gears held the caissons in position on the sliding ways by means of a strap bolted onto the sides of the sliding way and attached at their landward end to a vertical trigger which extended down into the pit and was held in position braced against the back wall of the pit.

Above the pit a superstructure held a drop weight above the bracing frame. To release the caisson during launching, the check gear on the seaward side was first slowly released, transferring the weight of the caisson on to the trigger gear. The check gear was then removed. Once the tide was fully in, the drop weight on the trigger gear was released which knocked the trigger bracing out of position and thus released the caisson. It took c. 45 seconds from the releasing of the drop weight for the released caisson to become waterborne. Immediately this was achieved, the sliding ways were towed back up the standing ways and secured until they were needed to launch the next caisson (Ibid., 224-226). The seven concrete blocks (V1-7) W of the rolling track walls are the remains of the winch bases used in manoeuvring and retrieving during the launching operation (IWM neg 1735364).

D-Day Landings Embarkation Site. (Area 3)

The S-most part of the site at Stone Point contains the remains of structures and fittings used to facilitate the embarkation of troops and vehicles taking part in the D-Day landings. An area of concrete hardstanding (W) c. 14m (46') wide and more than 60m (196') long lies immediately S of the caisson launching area. It is partially obscured by shingle and narrows at its S end into a concrete surfaced trackway. This joins up with a network of similar wartime trackways to the SW, beyond the area encompassed by the RCHME survey. A raised concrete slipway (X-X1) 2.7m (8'10") wide and 22.8m (75') long extends from the edge of the

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IWM references : ^{from} Imperial War Museum ^{WWII} photograph collect.
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Acknowledge grant for the book during trip

Schedule remaining studies:

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CONTACT SCALE
1:5,000



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S.W.A. HAMPSHIRE



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