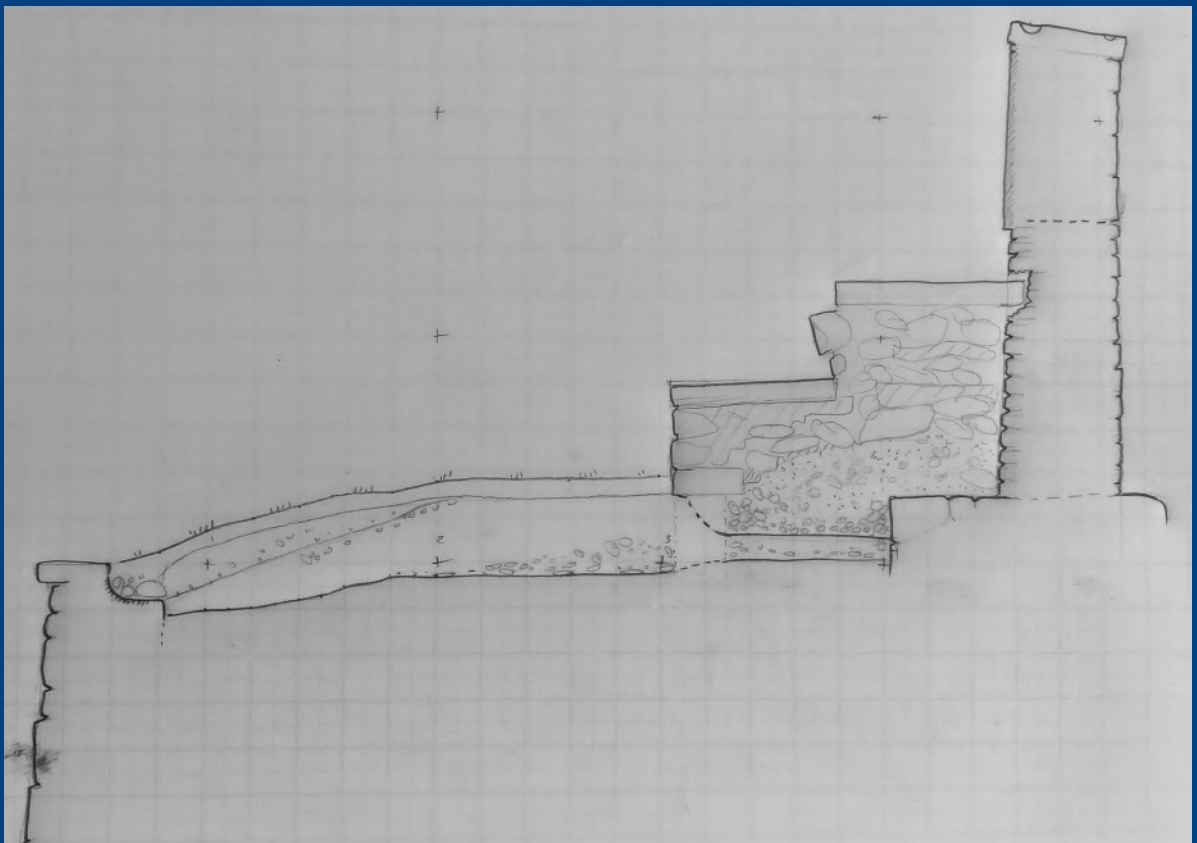


# Magazine Fort Phoenix Park Survey and Testing 2015



GIACOMETTI 23/12/2015

LICENCE 15E540

OFFICE OF PUBLIC WORKS

**SITE NAME**

Magazine Fort, Phoenix Park, Dublin 8

**CLIENT**

Office of Public Works, Jonathan Swift Street, Trim, Co. Meath

**PLANNING**

Pre-planning for 1916-2016 Commemoration conservation works

**LICENCE**

Testing License 15E540

**REPORT AUTHORS**

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Eve Campbell PhD MIAI

**DATE**

23 December 2015

**ABBREVIATIONS USED**

DoAH&G	Department of Arts, Heritage and the Gaeltacht
NMI	National Museum of Ireland
NMS	National Monuments Service
OS	Ordnance Survey
RMP	Record of Monuments and Places
NIAH	National Inventory of Architectural Heritage
LAP	Local Area Plan

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# Section 1 Introduction

## Report Summary

In December 2015 a programme of archaeological surveying and test trenching was carried out at the Magazine Fort, Phoenix Park, Dublin, by Antoine Giacometti and Eve Campbell. Archaeological investigation focused on three areas of the fort targeted for consolidation by the OPW (Areas A, B and C). Two of the areas are intended to be used as viewing platforms for public access during the 1916-2016 centenary, and the third is for improved accessibility.

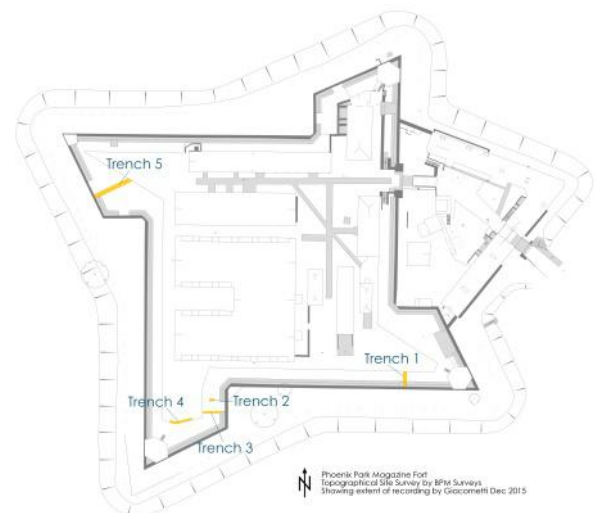
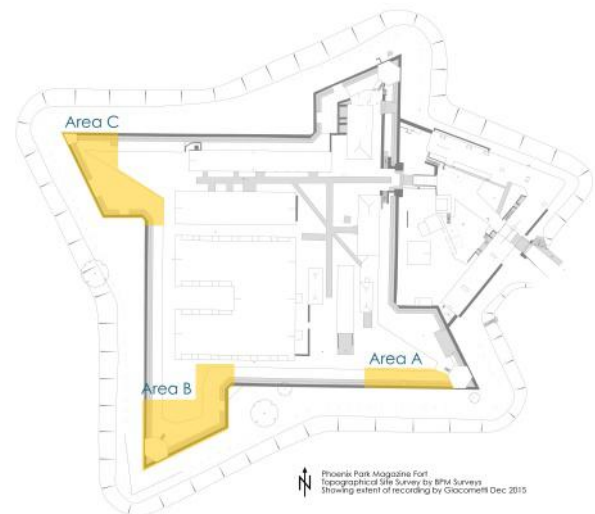
Archaeological investigations revealed multiple phases of construction and repair on the fort ramparts dating from between its construction in c. 1736, and its abandonment in the mid-20th century. Three major phases of activity were elucidated:

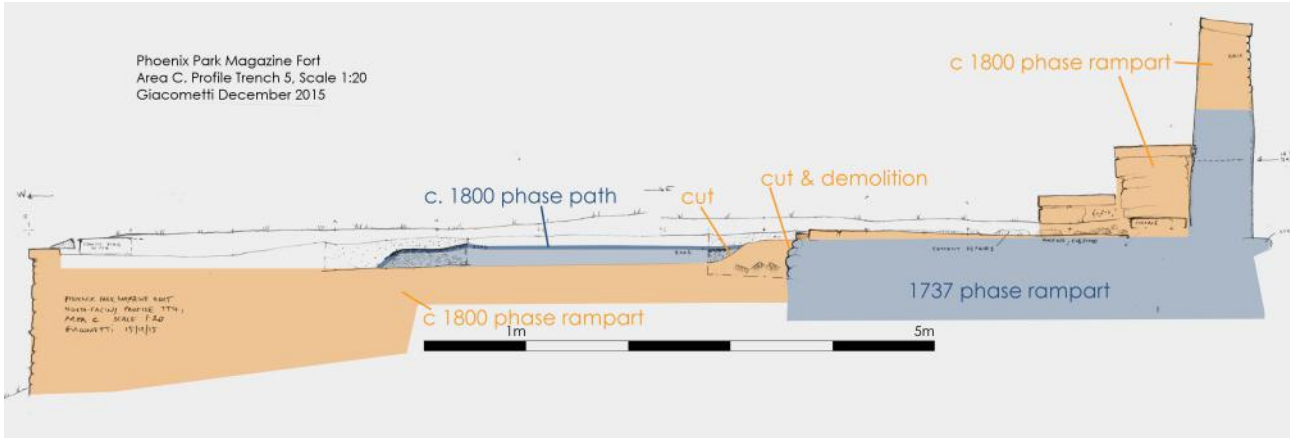
### *Early 18th century*

Cartographic evidence suggests that the ramparts in the bastions of the fort were originally narrower, having the same width as the long walls of the fort (4.25m or c.14 foot) (NLI 16G 17, 42). This was confirmed by archaeological excavation. Evidence for the original 18th century internal rampart retaining walls was uncovered in test trenches in Area B and Area C.

- In Area B the original retaining wall was found under the west end of the gun emplacement platform in test trenches 2 and 3. The wall was c. 550mm wide, composed of red brick and stone, and had a granite step keyed into it at a depth of c. 400mm below current ground level. The ramparts were originally 4.25m or c. 14 foot wide.

- In Area C the rubble core behind the original rampart retaining wall was uncovered under the northeast end of the gun emplacement





platform in test trench 5. Assuming the original wall had the same width as in Area B (550mm), the original rampart was 4.3m wide or c. 14 foot.

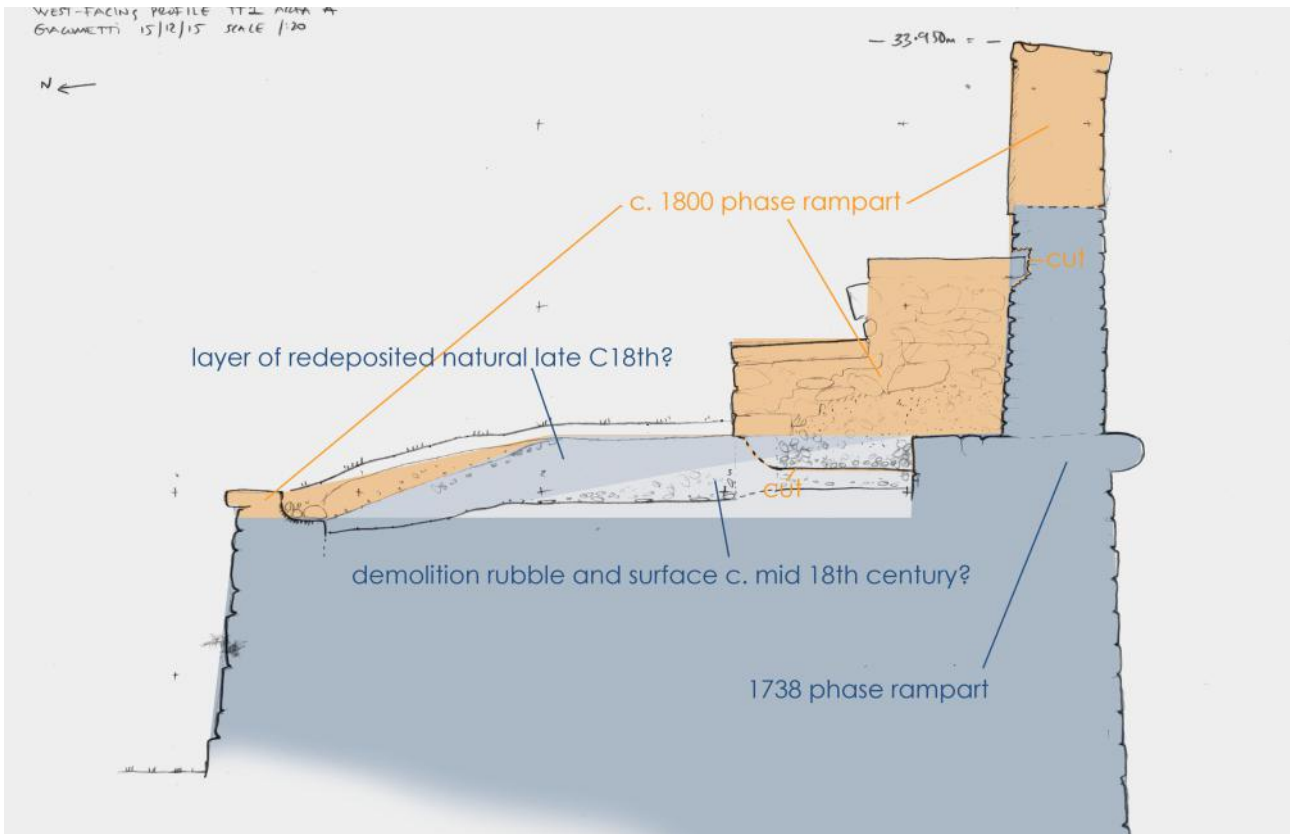
Test trench 1 in Area A showed that the original parapet wall was composed of brick and stood c. 1.2m above the limestone string course in the external retaining wall of the fort.

**Late 18th century- early 19th century**

A major phase of building took place at the

Magazine Fort between c. 1793 (George Armitage's map) and c. 1801 when the ravelin, designed by Francis Johnston, was added. This phase is characterised architecturally by the use of cut granite. During this phase the parapet was raised, a stepped parapet walkway was added, the ramparts were widened at the bastions, and granite gun emplacements were built. Four cavaliers appear to have replaced the former watchtowers at time time also.

- The parapet wall was raised by the addition of



a course of stone. The wall was surmounted by a course of granite capstones featuring circular indentations which served as musket rests. The musket rests are present along the entire perimeter of the fort, including the E side, suggesting that this phase of works was conceived of before Johnston's 1801 ravelin.

- A walkway consisting of two granite steps supported on limestone risers was built. The upper step was set into a groove carved out of the original brick parapet wall.
- The ramparts were widened in the bastions to facilitate the construction of gun emplacements accessed by gravel paths.

### *Early 20th century*

A phase of early 20th century activity was identified at the site including both of the construction of new elements as well as repair and consolidation of the aging structure.

- The parapet walls were rendered with cement pebbledash, and cement signs were affixed to the wall. Rectangular niches lined with cement were created along the interior of the parapet wall.
- Extensive cement repointing and repair was carried out on the stepped parapet walkway and the rampart retaining wall. This work attempted to address the significant subsidence that caused the collapse of segments of the walkway. Part of the parapet walkway was replaced with concrete steps in Area C. The openings leading to the external squinches were covered over with cement.
- The cavaliers were converted for use as guncotton stores. Plans for this work are housed in the Military Archives (IE/MA/MPD/AD119294-001). Buttresses were added to the cavaliers and they were rendered with cement. The northwest cavalier (Area C) was completely rebuilt in concrete for use as a cordite store (Arnold 2008, 13).

### Site location

The site is in the south of the Phoenix Park, near the Islandbridge Gate. The Magazine fort is an impressive mid-18th century fortification with massive rampart walls, a huge ditch, and internal structures. The fort is situated on a hill



One of two bullets recovered from Trench 5. This is a .303 British of the type used for the Lee Enfield SMLE rifle which was the primary arm of the British army c.1902-1941.

200m north of the River Liffey with commanding views across the river valley, and south to the Dublin Mountains. The ground falls away steeply to the south and west, giving the site a defensive quality. This hill is called Thomas' Hill on the first-edition 6-inch map (1837).

### Aim of 2015 investigations

The archaeological investigations aimed to record the areas of the monument selected for consolidation works by the OPW. Detailed written, drawn and photographic survey was completed to make a record of the fabric of the site prior to consolidation works. Test trenching across all three areas aimed to assess the character of the archaeological remains in the three areas with a view to informing the process of consolidation works.

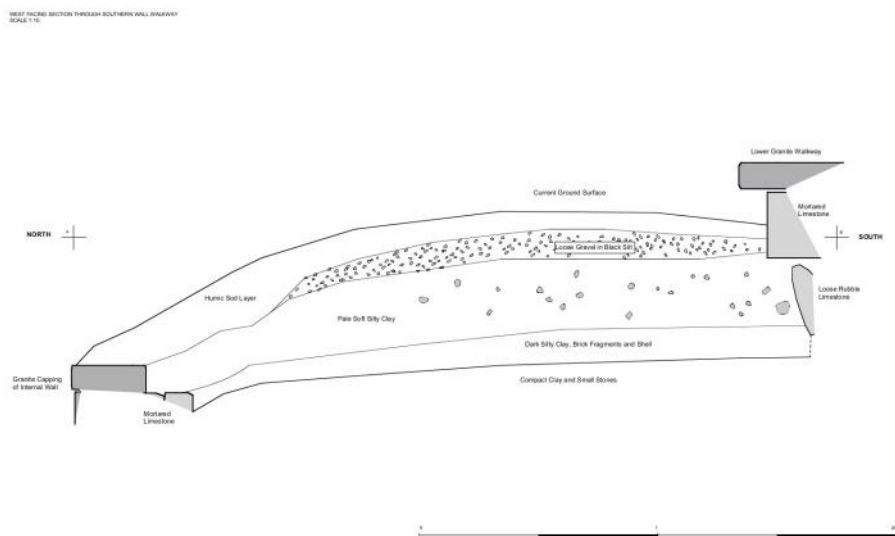
## Archaeological Potential

The Magazine Fort is a very important historic and archaeological monument. The fort (constructed 1734-35) is an RMP (DU0018-0719; also RPS 6896) and sits on the probable site of a 17th century house (constructed c. 1611) called the Phoenix House (DU018-0713). The hill on which it is situated was known as St. Thomas' Hill, and may have been significant prior to the 17th century. It is the best surviving magazine fort in the country, and many similar forts in other countries have become Unesco World Heritage Sites.

The Magazine Fort played an important part in Irish history, from symbol of the British military presence in Ireland to site of Nationalist struggle at key moments in history. In 1882 the Invincibles (Fenians) assassinated the British secretary Lord Frederick Cavendish nearby; in 1916 the Magazine Fort was captured by rebels and failed to explode properly to signal the beginning of the Easter Rising; in 1939 the IRA stole a huge quantity of arms in the Christmas Raid; and in 1939-46 massive bread ovens still visible in the fort supposedly baked for soldiers during the Emergency.

fort by John McCullen (2015). A comprehensive topographical survey of the fort was conducted by BPM Surveys Ltd for the OPW in April 2008.

The OPW excavated two trial trenches in the rampart in 2010. Archaeologist Stephen Johnston monitored these and identified the original rampart core (comprising a compact layer of small stones and clay at c. 600mm-700mm below rampart surface level (refer profile image below). Above this was a layer of root and humus to c. 150mm underlain by a layer of loose gravel, both interpreted as post-1736 in date. The gravel layer was interpreted as being associated with the granite rampart walkway, which is a later addition to the fort (as per Paul Arnold 2008).



Above and below: 2010 test trench profiles

## Previous research and testing

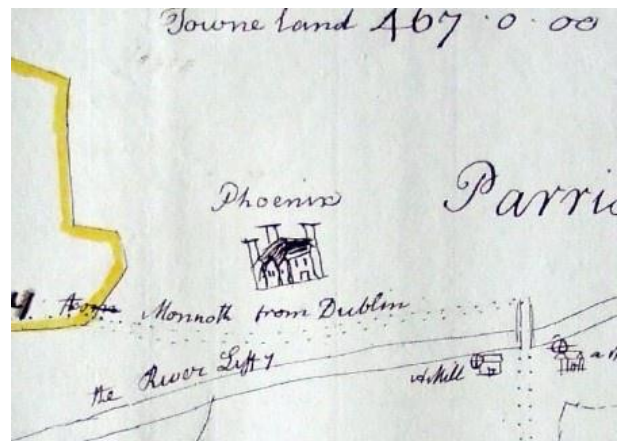
A number of detailed baseline heritage surveys of the Magazine Fort have been conducted. They include a statement of significance prepared by Paul Arnold Architects (2008), and a historical report on the



## Section 2 Historical Background

The Magazine Fort is one of 64 bastioned forts record in the Republic of Ireland recorded by the ASI. The fort is sited on a hill 200m north of the River Liffey with commanding views across the river valley, and south to the Dublin Mountains. The ground falls away steeply to the south and west, giving the site a defensive quality. This hill is called 'Thomas' Hill on the first-edition 6-inch map (1837).

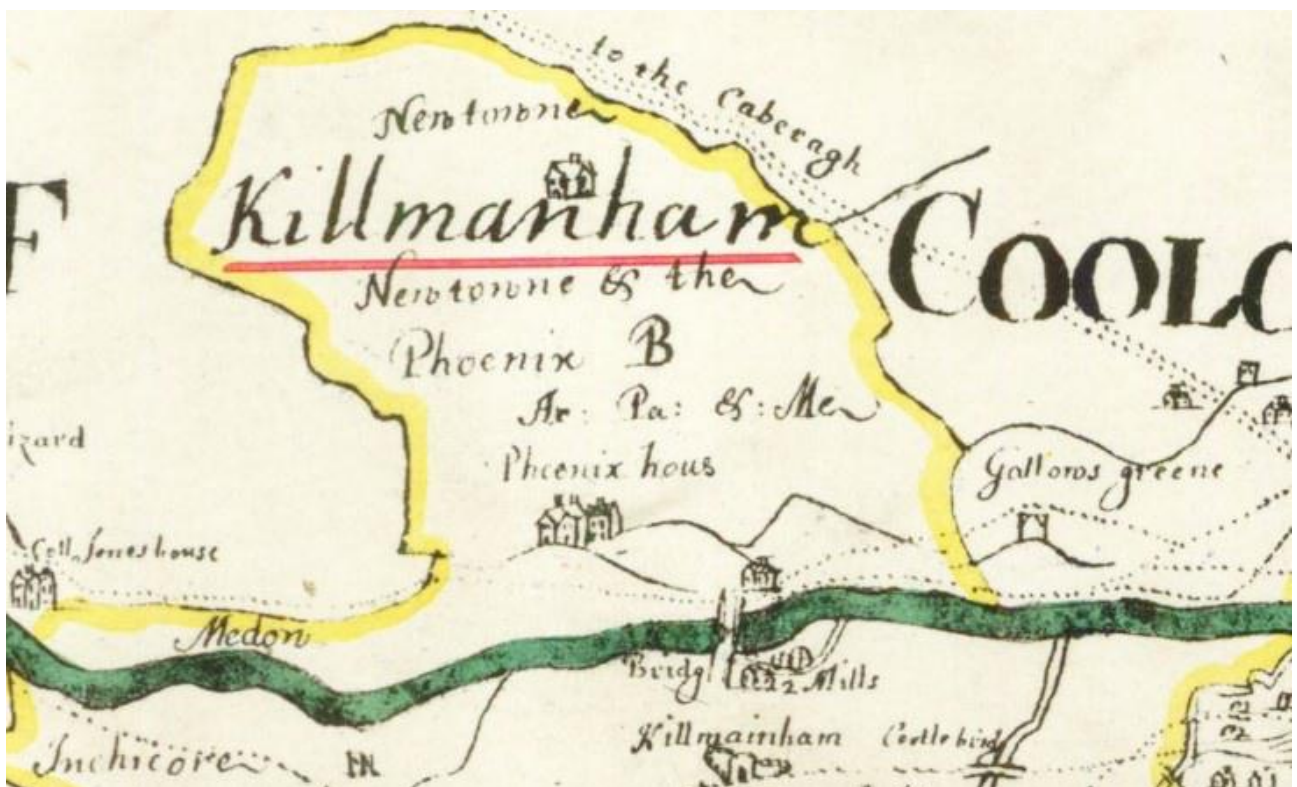
Thomas' Hill was the site of an early seventeenth-century house built by Sir Edward Fisher c.1611. Fisher's dwelling was set in substantial grounds and included 300 acres of land and 60 acres of woodland, known as Kilmainham Wood. His holding became Crown property in 1618, and from at least 1619 the house was known as 'the Phenix'. The Phoenix House became the principal residence of the Chief Governors of Ireland until 1665, and its occupants included the Earls of Strafford, Henry Cromwell, and the Duke of Ormond (Litton-



1650s Down Survey parish map

Falkiner 1900-2, 470-1). The house was augmented a number of times by its various owners, notably by Ormond who added stables among other improvements. Ormond's most significant achievement was the development of the land-

1650s Down Survey barony map







John Rocque 1756

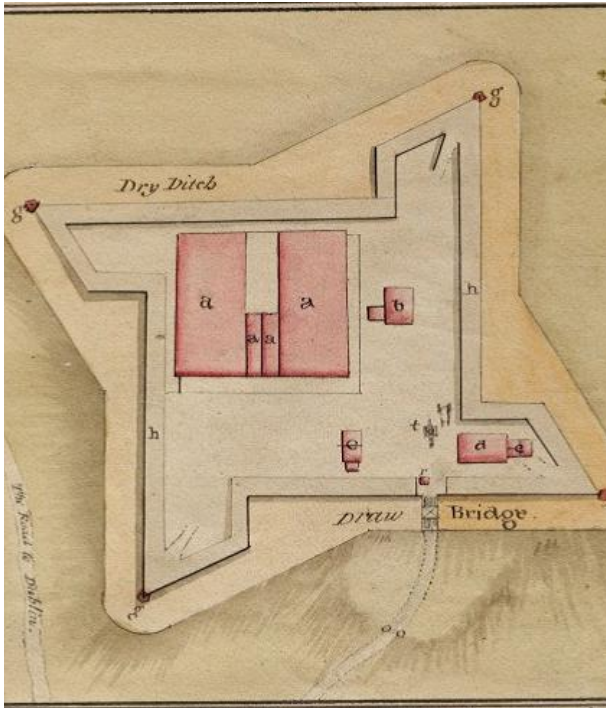
scape around the house. He purchased lands contiguous to Phoenix demesne enlarging the holding to above 2000 acres and commenced the construction of a stone wall emparking the lands for deer (ibid, 476).

In 1665 the Viceregal residence moved to Chapelizod. The Phoenix House was demoted to a residence for the Lord Lieutenant's staff. In 1719, for example, it was occupied by an official with the title 'Gentleman of the Horse' (ibid, 473). In 1734 the Duke of Dorset (Lord Lieutenant or Viceroy) ordered the construction of a powder magazine in the Phoenix Park and an initial sum of £2,300 was made available for the project. It was decided to build the magazine on or near the site of the Phoenix House, using the building as a quarry for stone (Litton-Falkiner 1900-2, 473; McCullen 2015, 4).

Part of the impetus for the construction of the fort was the need for safe store for gunpowder. The Powder Tower in Dublin Castle had almost exploded during at fire at the castle in 1684, after which it was moved to a flanker at the Royal Hospital of Kilmainham (McParland 2001, 140). The relocation of the powder magazine to the Phoenix Park reduced the risk of large-scale damage in the event of an accident, while keeping the valuable stores in easy reach of Dublin Castle and the Royal Barracks (ibid, 4).

1789 NLI MS 16G 17 (38) Brown's map of the Phoenix Park





1793 Armitage survey (McCullen 2005)

The Magazine Fort was designed by the military engineer John Corneille (d.1761). Corneille's father, a Dutch Huguenot, was also a military engineer, and he succeeded him in 1716 as second engineer in the Irish Ordnance. Corneille designed the Magazine Fort c.1734, and later in his career supervised repairs at Charles Fort, Kinsale (dia.ie). Corneille's design was for a bastioned fort, a form whose origins

lay in early modern Europe. The development of artillery from the 1400s had a profound impact on military architecture. Defences came to include thick earthen ramparts to absorb the shock of gun fire and wide platforms with space to mount cannon (Barrass 2011, 2). Bastioned forts first appeared in the first quarter of the sixteenth century in the north of Italy, and they remained a mainstay of military architecture into the nineteenth century (Kerrigan 1995).

The fort is quadrilateral in plan with demi-bastions on each corner. Its ramparts are thick stone-faced earth and rubble banks, and it is surrounded by a flat-bottomed dry ditch. The original entranceway was inscribed with the date 1736 (McCullen 2015, 4). In addition to the ramparts, the earliest building at the site was the powder magazine itself. The magazines date from c. 1738 when the first powder and shot was supplied to the fort (Arnold 2008, 7). The magazine building was expanded in 1758, when the Duke of Bedford (Lord Lieutenant) requested the construction of an infill between the two original valued magazines (McCullen 2015, 4).

One of the earliest depictions of the fort is on Roque's 1756 map of Dublin. The map shows the original rampart line with circular towers protruding from each corner. The fort is surrounded by a ditch which is crossed by a causeway leading to its east gate. Four buildings are shown in the interior: the two magazines enclosed by a boundary wall, and two other structures either side of the entrance near the E wall. Brown's map of the Phoenix Park (1789) shows the magazine buildings and the draw-bridge accessing the fort.

1837 First Edition 6" OS map



The fort was surveyed in 1793 by George Armitage. The survey shows the original ramparts with five internal buildings: (i) the magazines, (ii) an ammunition magazine, (iii) officers' rooms, (iv) a guard room and (v) a sentry box. The survey shows a howitzer gun protecting the entrance, which is accessed by a drawbridge over the ditch. It depicts ramps accessing the ramparts at the NE, SE, and SW bastions, and watchtowers at the corner of each bastion.

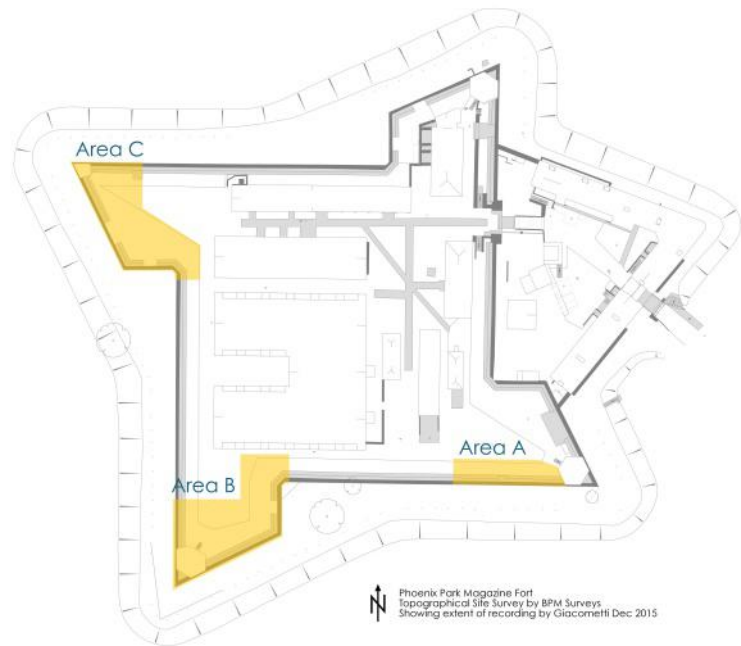


# Section 3 Survey of Areas A, B and C

## Introduction

Detailed written descriptions, accompanied by detailed plans and profiles and photographs, were compiled for three areas of the Magazine Fort rampart (Areas A-C). The plans and profiles are presented in the Appendix.

Areas A, B and C



## Area A

### Overview

Area A comprises the S part of the SE demi-bastion of the Magazine Fort. It runs W along the S rampart of the fort from the SE cavalier for c.32m.

### Internal rampart retaining wall

The internal rampart retaining wall is made of limestone with granite capstones. The wall has a batter of 10mm per 1m. It is composed of regularly-cut blocks of limestone with straight sides and rusticated faces. The E 20m of the wall is built in five regular courses measuring c.0.31m (1 foot) in height. Each course is made up of single or double layers of stone blocks. Blocks measure between 620mm x 310mm (max) and 150mm by 150mm (min). The W 7m of the wall are built in rough courses. The blocks are bonded by a pale grey lime-based mortar. This is overlain by cement; strap pointing is used throughout and has an average width of c.27mm. Lumps of mortar are visible at the base of the wall suggesting that the ramp leading to the cavalier is original. A ramp is shown in this corner on the 1793 map. The wall slopes down from west to east by c.100mm per 27m.



View along Area A looking E to SE cavalier.



Rampart retaining wall at E end of Area A. Note regular coursing.



Detail of cement strap pointing on retaining rampart wall.



Rampart retaining wall in at W end of Area A. Note junction between coursing styles.



Ramp and concrete step at E end of retaining wall leading to cavalier.



Concrete capstone at E end of rampart retaining wall.

The wall is surmounted by a line of granite capstones. The capstones protrude over the wall by 50mm. Capstones measure c. 800mm x 320mm x 80mm. The westernmost capstone near the cavalier has been replaced by a concrete block measuring 800mm x 300mm x 80mm. Its W end is rounded and its E end is broken, suggesting that it was recycled and cut to fit this spot. The insertion of this concrete block is associated with the construction of a step accessing the cavalier and walkway. The capstones are bonded with lime mortar. A band of cement is visible between the capping and the top of the wall. Two or three capstones are missing from the wall 20m from the SE cavalier. The capstone directly above the change in coursing style is broken and has been mortared back together. Cement repointing is absent from this part of the wall, and it has been heavily impacted by recently-removed ivy.

### *Rampart platform*

This is a grass-covered platform on the top of the rampart. It measures 2.5m from the S edge of the granite capping of the retaining wall to the base of the parapet walkway. The platform is roughly level for 1.7m, steeply sloping down to meet the retaining wall for 0.8m. There are no features visible in this platform except a single iron fitting protruding from the bank c.23m W of the SE cavalier. The feature has a T-shaped profile with three small circular perforations. It measures 50mm x 60mm, and is 220mm high. It is located 550mm from the internal edge of the capstone of the internal retaining wall.

### *Stepped rampart walkway*

A walkway comprising two granite steps was built against the parapet wall on top of the rampart platform. It has an overall width of 1.44m. The lower step is c.410mm high (310mm limestone wall; 10mm granite slab) and 740mm wide. The top step is c.440mm high (340mm limestone wall; 100mm granite slab) and 700mm wide. The walkway abuts the SE cavalier at its E end. At least three phases of the cavalier are visible: an earlier phase of pale brick, a phase of dark brick, and a late phase of cement render.

The riser of the lower step is made from

square-cut limestone blocks. The blocks have straight sides and dressed faces (pecked) with roughly cut backs internal to the walkway. The blocks measure between 450mm x 200mm x 170mm (max) and 100mm x 80mm x 170mm (min). They are bound by lime mortar and have been repointed using cement strap pointing.

The lower step is composed of a line of finely-cut granite slabs c.890mm x 770mm and 100mm thick. The stones have irregular lengths. Max 130mm. The slabs are joined by joggle joints (51mm x 51mm x 51mm). All the joints face the same way and indicate that the walkway was laid from E to W. The lower step has substantially subsided, and the granite slabs have a pronounced slope (N-S) of 1/10 (70mm/700mm).

The riser of the upper step is composed of a single course of cut-stone blocks. The faces and sides of these stones are straight and the faces are dressed, while the backs are roughly hewn. These blocks have average dimensions of 180mm x 350mm x 120mm. Much of the face of this wall has collapsed out along the western 10m. There is a 90mm gap between the base of the wall and the top of the first step. This gap is due to subsidence. Adjacent to the SE cavalier the wall is 250mm high, while it has a max height of 310mm. The gap has been patched with a thick layer of cement and small stones to prevent the collapse of the facing stones.

Similar to the lower step, the upper step is composed of finely-cut granite slabs fitted together with joggle joints (51mm x 51mm x 51mm). All the joints face the same way and indicate that the walkway was laid from E to W. The slabs in the upper step measure c.840mm x 780mm x 100mm. Again, the steps vary in length. The upper step is very level. It has a slope of 10mm/27m. This is because it was keyed into the parapet wall and so hasn't subsided. The parapet wall has a slot cut into it to hold the granite slabs. The carved slot is two brick courses high (160mm high; 150mm deep max). The parapet platform has a mixed rubble core composed mostly of stone and mortar with some brick. The brick is handmade, pale orange-red in colour, and identical to that in the parapet wall.



Looking E along rampart platform in Area A.



Looking W along rampart platform in Area A.



Detail of iron fitting located along rampart platform in Area A.



View W along the stepped rampart walkway from the SE cavalier.



View of rampart walkway mid-way along Area A. Note collapsed facing stones on upper riser.



SE cavalier showing junction with walkway.



Details of joggle joint with strap pointing on granite walkway slab.



Junction of SE cavalier and stepped rampart walkway. Note facing of step risers.



Detail of riser of upper step. Note how cement has been used to fill gap created by subsidence.



Detail of well preserved section of stepped walkway.



Breach in parapet walkway. Note slot in brick section of parapet wall created to hold granite slabs.

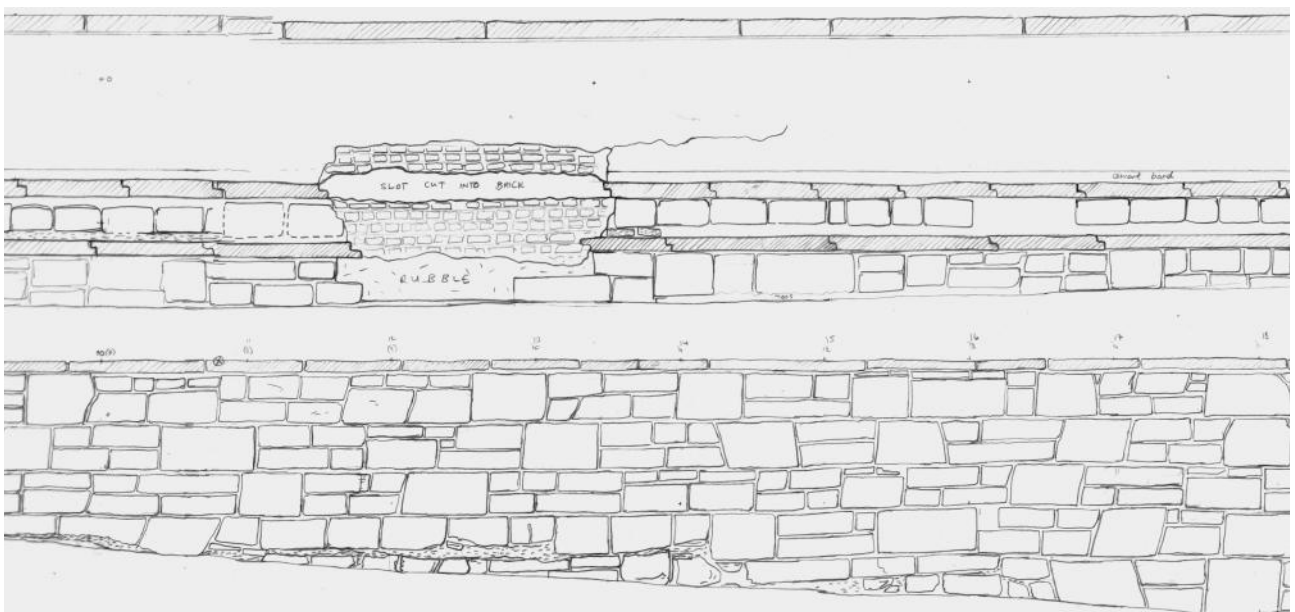
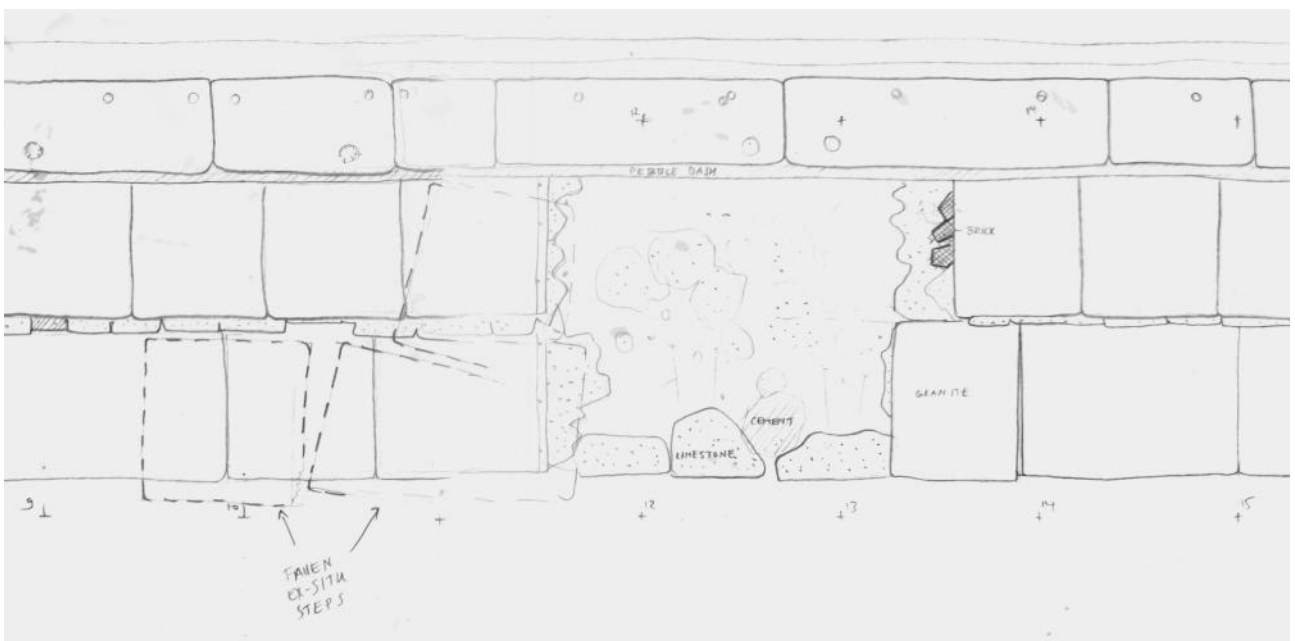
There is a 1.7m wide breach in the parapet walkway c.11.5m W of the SE cavalier. At this point the granite slab steps have been removed and the rubble core and brick parapet wall behind have been exposed. This is an engineering test pit.



*Parapet wall*

Below: Extracts from plan and profile of Area A. See appendix for full hi-resolution versions.

Rubble core of parapet walkway visible at breach in the feature. Looking W.



Phoenix Park Magazine Fort Area A. Profile, Scale 1:20 Giacometti December 2015







Detail of parapet wall.



Detail of parapet wall stripped of pebbledash on N wall of SE bastion. This is outside but close to Area A.

The parapet wall is made of red brick and stone covered in pebbledash render and surmounted by a course of granite capstones. The brick segment of the parapet is 440mm high (from the top of the walkway to the start of the stone). This is overlain by a layer of stone wall c.700mm high. The entire wall is covered in pebbledash (>20mm thick) that post-dates the parapet walkway. The wall has a basal band of cement 80mm high just above the walkway. There is a second narrower band of cement (20mm high) just under the course of granite capstones. Overall the parapet wall is vertical on interior, unlike the rampart walls which are battered on the interior and exterior. The exterior of the parapet wall is brick and stone and is also pebbledashed. It measures 2.10m from the top of the capstone to the top of the string course.

The brick portion of the wall is visible at the breach in the parapet walkway. The brick is handmade, pale orangey-red, and bonded with lime. It is irregular in colour and has large stone inclusions. It has very irregular dimensions (e.g. 230mm x 110mm x 55mm). There is no obvious pattern of coursing. The wall is mostly composed of headers with occasional stretchers.

The parapet wall is surmounted by a course of granite capstones, similar to those on the internal rampart retaining wall. They measure 110mm high and 530mm wide. They vary in length from c.0.6m to 1.4m. Two phases of mortar visible in this capping course: earlier lime mortar and later cement pointing similar to that found elsewhere in Area A. The capstones of the parapet wall slope down towards the exterior. The slope is 45mm/ 530mm width, and is probably intentional.

Numerous circular indentations are visible in the top of the capstones. A row of both large and small indentations is present. The first row comprises large circular indentations 100mm in diameter by 15mm deep. It is located c.100-130mm from internal (N) edge of parapet wall, and spaced c.1-2m apart. There are twice as many small circular indentations 45mm in diameter and 15mm deep. They are along near the exterior (S) edge of the parapet wall.

A single feature is visible in the pebbledash. This is a rectangular niche located 400mm above the top step. It measures 270mm by 130mm and is 110mm deep. It is lined with cement. No obvious purpose.

*Squinches*

Four squinches were identified at each demi-bastion flank in the lower walkway step. These have been blocked by early 20th century concrete slabs.



Squinch arch from outside.



View up into arch from outside, showing squinch hole.



Looking W along the granite capstones of the parapet wall in Area A.



Oblique view of large indentation in parapet wall capstone.



Oblique view of small indentations along outside edge of granite capstones on the parapet wall. Looking W.



Detail of rectangular niche in parapet wall.

## Area B

### *Overview*

Area B is located in the SW corner of the Magazine Fort. It includes the ramparts, walkway and retaining walls of the SW demi-bastion.

### *Internal retaining rampart wall*

The internal retaining wall in Area B is irregular in plan, partially running parallel to the line of the external retaining wall of the ramparts. It runs for c.35m, taking in part of the N-facing S wall of the fort, and the interior of the SW bastion. It runs E-W for 9.4m, before turning SSW for 5.55m. It then turns, running N-S for 8.6m, before turning and running WSW for c.11.5m.

This wall is composed of squared and dressed limestone blocks have dimensions of 0.58m x 0.33m (max); 0.12m x 0.05m (min). The wall is bound with a lime mortar. It was later repointed using cement strap pointing. The wall is built in rough courses. Coursing is most clear along the W-facing segment of wall where regular courses are visible. Much of the wall is covered in ivy

which has recently been cut at the base. The ivy has damaged the wall making it difficult to see the coursing and contributing to the collapse of several stones from the face of the wall. The wall is battered along its N-facing and WNW-facing segments, where the slope is of c.13/100.

The wall varies in height along its various faces. The N-facing segment of wall is 1.85m high. The WNW-facing segment of wall is 5.55m long. The base of the wall is obscured by a ramp of rubble and soil which slopes up from the internal level of the fort (at the 18th-century magazine building) to the rampart platform of the S bastion. The wall is 1.28m above ground level at its S end and 1.77m at its N end. This difference is due to the ramp. The W-facing segment of wall has a maximum height of 1.67m. It is 400mm higher than the WNW-facing segment. The base of the wall is concealed by a ramp of earth and rubble. At its S end the wall slopes down for 2.4m. Its S end is 0.50m above ground level. The NNW-facing segment of wall has a height of 0.24m (max). It is 250mm lower than the W-facing segment. Its base is concealed



General shot of Area B looking SE.

by soil and rubble. Less than one course of limestone blocks is visible. The wall runs for 2.2m before being obscured by the rubble and soil ramp for a stretch of 4.7m before reappearing on the other side and curving around to meet the E-facing retaining rampart wall at the SW cavalier.

The entire wall is surmounted by a course of granite capstones. This course comprises a row of cut blocks of granite overhanging the wall by c.20mm. The blocks are 70mm high and 300mm wide. They have irregular lengths, varying between 1200mm and 660mm. The blocks are bonded with lime mortar with a later phase of cement pointing. The southern-most capstone of the west-facing segment of retaining wall has been replaced by a concrete block. It is 560mm x 90mm x c.300mm. Much of the inner (NE) edge of the granite capstone course is obscured by soil spill and vegetation from the rampart platform.

The W-facing segment of retaining wall has a layer of cement and broken glass overlying the granite capstones. This layer is 0.27m wide and c.50mm high. It does not extend beyond the wall onto the rampart platform. The cement is light grey in colour with moderate inclusions of rounded pebbles and frequent shards of black and clear broken glass. Based on shape, the glass appears to be derived from broken bottles. Only three capstones remain on the NNW-facing segment of wall. The rest have been robbed out from a length of 4.7m section, possibly connected to the construction of the (modern) soil and rubble ramp. The capstones are all 70mm high and have widths of 900mm, 800mm and 600mm. Their widths are obscured by soil spill from the rampart platform.

### *Rampart Platform*

The top of the rampart forms a grass-covered platform that runs between the internal retaining rampart wall and the rampart walkway and parapet. Along the S fort wall the platform is 4.6m wide (from the internal retaining wall to the rampart walkway). The 1.7m flanking the walkway are level, with a meter strip sloping down to meet the internal retaining wall. There is a rectangular-shaped pit (engineering test pit) located on the return of the platform (E end).



General shot of rampart retaining wall in Area B. Looking E.



View of the N-facing rampart retaining wall in Area B. Looking E.



NNW-facing retaining rampart wall. Note batter at N end of wall and step at S end.



W-facing segment of the rampart retaining wall.



E end of S rampart retaining wall.



View along cutting 4 looking W showing full extent of S rampart retaining bastion wall in Area B.



View S along W-facing rampart retaining wall showing cement and glass layer above capstones.



Detail of concrete capstone at S end of W-facing wall.



Looking E along rampart platform at E end of Area B.



View across Area B from SW cavalier showing stepped walkway. Looking E.



NW-facing segment of rampart walkway in Area B.



Half concrete slab inserted into lower step at NW-facing segment.



Rampart walkway to N of gun emplacement.

The pit measures 1.10m x 0.80m (N-S). As the platform turns S at the SW bastion, the platform becomes substantially wider with a max width of 4.6m. The platform is quite uneven, sloping down to the retaining wall on all sides. It is narrowest at the SE corner of the SW bastion (3.5m). A modern ramp of earth and rubble joins the rampart platform at the S side of the SW bastion.

### *Stepped rampart walkway*

The rampart walkway runs along the entire length of the rampart in Area B, breaking only for a gun emplacement in the E wall of the bastion. It is in poor condition and has suffered substantial subsidence. This is particularly bad at the site of two major cracks in the S and E walls of the bastion.

The walkway is composed of two granite steps supported on limestone risers. The steps consist of cut granite slabs c.0.76m wide, c.0.10m high and with irregular lengths of between 1.24m and 0.30m. They are fitted together with joggle joints (40mm x 40mm x 40mm). The joggles indicate that the slabs were laid from E to W, except for at the W end of the upper step along the S wall, where they appear to have been laid from W to E. Slabs on the corners are trapezoidal, specially cut to fit their individual spots. They do not have joggles. The slabs are bound with a pale greyish cream lime mortar with occasional inclusions of grit (2mm in diam.). Along the NW-facing section of parapet wall, the half of a slab on the lower step has been replaced with concrete. The slabs were originally keyed into the brick parapet wall. They have been placed in a groove cut into the original brick (c.90mm deep). This is visible in a breach in the platform along the S wall of the bastion.

The top riser is c.0.40m high. It comprises a single course of squared and dressed limestone blocks c.0.19m high and with irregular lengths (c.0.35m). The stones are bound with lime mortar with a later phase of thick cement strap pointing. The blocks have collapsed along the face of the riser for much of its length due to subsidence. Along parts of the riser there is a gap of up to 80mm between the top step slab



Detail of upper step and riser to N of gun emplacement in Area B. Note joggle on granite slab. Note also large gap between upper slab and facing stones and thick cement pointing along base of risers.



Rampart walkway to S of gun emplacement. Note substantial subsidence of steps under the crack in parapet wall.



Junction of rampart platform and SW cavalier.



Looking W along the S wall of the SW bastion. Note collapsed granite walkway slabs.



Looking E along the S wall of the SW bastion.



E end of S wall of bastion. Note subsidence of granite steps and the total collapse of the facing stones of the upper riser.

and the riser wall; an attempt has been made to fill this gap in places with a layer of cement c.50mm high. The bottom riser is 0.25- 0.48m above rampart platform. It comprises one to two courses of squared and dressed limestone blocks. The wall is bonded with lime mortar and a later phase of cement pointing is also evident.

The rampart walkway has subsided considerably. Along the E wall of the bastion, the entire wall has tilted forward, leaving a 0.26m gap between the upper granite step and the parapet wall. Along the S wall many of the granite step slabs have fallen forward and a number have collapsed out of the walkway entirely.

Two gaps are present in the rampart walkway. The first is at the gun emplacement where the walkway stops for c.3m to allow the placement of a gun ope and granite platform. The second is along the S wall of the bastion, 5.9m E of the cavalier. It is 1.62m wide. Here the granite slabs have been removed to reveal the rubble core of the walkway. The core is composed of stone rubble in a matrix of light grey lime mortar. This latter breach may be associated with recent engineering works.



Terminus of rampart platform to N of gun emplacement.

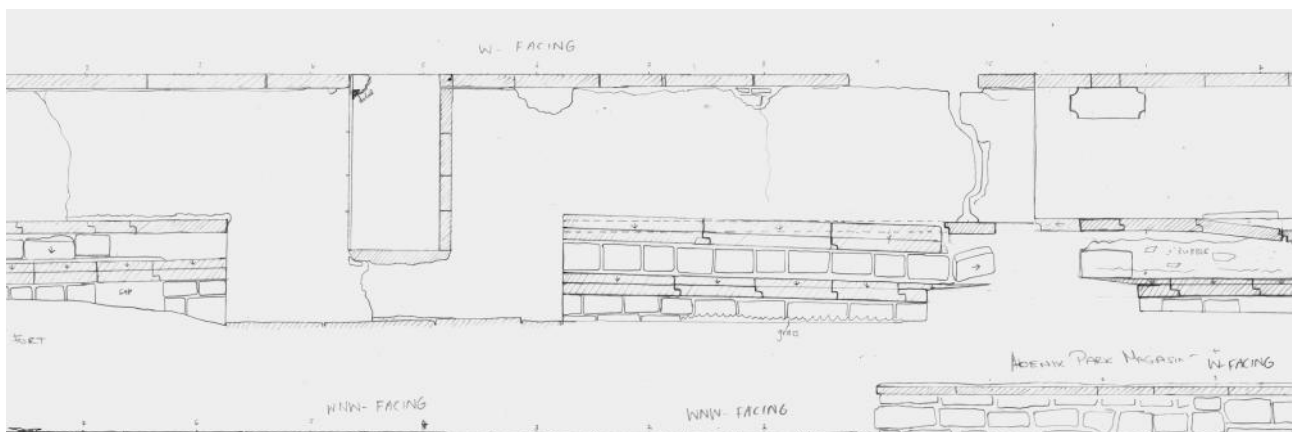


Terminus of rampart platform to S of gun emplacement. Note how the walkway has tilted forward due to subsidence.

Right: Breach in parapet walkway at W end of S wall of SW bastion.



Extract from profile Area B. Full size version available in appendix







Rectangular cement-lined niche in W end of S wall of fort.



Detail of rectangular cement-lined niche at W end of S wall of bastion.

### *Parapet wall*

The parapet wall is 1.28m to 1.31m high above the upper step of the walkway. The wall is composed of brick and stone covered in a layer of pebbledash c.20mm thick. There is a band of cement c.80mm high along most of the base of the wall, and another, c.20mm high, running between the capstones and the pebbledash. The brick portion of the wall is c.0.40m high and the stone is 0.80m high (visible in crack in the E wall of SW bastion). The wall is surmounted by a course of granite capstones. These stones are 120mm high and 0.50m wide. They have various lengths ranging between 0.27m and 1.08m. The capstones slope slightly towards the exterior of the fort. The granite capping has a series of circular indentations in it. The holes are c.50mm in diameter and 15mm deep. The holes are located along the external edge of the capping and are spaced irregularly (c.0.25m to 0.96m apart). The holes are only present along the S wall of the bastion and the fort. They are absent from the E and SE walls.

There are two niches in the parapet wall in Area B. The first is in the NW-facing segment of wall. It is rectangular in shape, measuring 230mm x 100mm and 120mm deep. The niche is lined with cement and is 0.44m above the upper step of the walkway. The second niche is located 7.52m E of the SW cavalier. It is 270mm x 160mm and 100mm deep. It is also lined with cement, and is 0.41m above the upper step of the walkway.

There is a cement sign reading 'BASTON' at



Parapet wall at NW-facing segment of parapet wall. Pebbledash had fallen off here revealing the courses of brick and stone in the wall.

the SE corner of the S wall of the bastion. The sign is rectangular with indented corners. It is flush with the granite capping, it measures 0.28m x 0.68m and is 20-30mm thick. There was originally other sign located 0.80m S of the gun emplacement. The shadow of this sign is visible in the pebble dash (0.40m x 0.23m).

There are two major cracks in the parapet wall in Area B. The first is c.0.60m from the S end of the E wall of the bastion. The crack is c.100mm wide. The walkway has substantially subsided below this crack and the capstones are missing for a length of 1.10m above it. There is another major crack 2.5m from the E corner of the S wall of the bastion. The granite slabs of the walkway have collapsed out under this crack. There is a smaller crack in the SE-facing wall. Here the pebbledash has flaked off the wall revealing the stone behind.

### *Gun emplacement*

There is a gun emplacement in the E wall of the SW bastion. The feature comprises a platform of granite slabs laid out in a rectangle orientated E-W. It is placed in a gap in the stepped parapet walkway. The platform is 4.32m long and is 2.96m (E end) and 3.06 (W end) wide. This difference in width is because the E end is bookended by the parapet walkway preventing subsidence. The platform is composed of seven rows of 3-5 cut granite slabs. The slabs have various lengths. The first 6 rows (E-W) have a uniform width of 600mm. The westernmost row is narrower (400mm wide), and one of its



Cement BASTON sign in E end of S wall of bastion.



Detail of major crack in SE corner of W-facing wall of bastion.



Detail of major crack in E end of S wall of bastion. Note collapsed walkway slabs under crack.



Gun emplacement in W-facing wall of bastion.



Gun emplacement platform.



Detail of W end of gun emplacement platform. Note shorter slabs at W end of platform.



View of drain in E end of gun emplacement platform.



Detail of drain in E end of gun emplacement platform.



Gun embrasure in E wall of SW bastion.

stones has a carved rebate on its W edge. This last row has thick cement pointing with incised lines between the stone blocks and appears to be a later addition.

The first row abutting the parapet features a stone-cut drain. The drain is formed by a shallow groove, 110mm wide and c.20mm deep, running 120mm from the E edges of the slabs. The groove leads to a drain in located 1.42m from the S end of the platform. The drain comprises a sub-oval hole in the granite slab (150mm x 100mm N-S) surmounted by an iron setting set into the stone. The setting is 190mm by 170mm. Its sides are 15mm wide. There is a 50mm gap between the platform and the parapet wall due to subsidence.

There is a gun ope located centrally over the gun platform in the parapet wall. It is 0.90m wide and 1.49m high, and is 0.68m above the level of the granite platform. The ope is surrounded by cut granite blocks 380-300mm high and bound with lime mortar. The stones along the S side of the ope have a bevel of 100mm; there is another bigger bevel on the external side of this stone. The ope has been blocked up with a concrete wall set 60mm back from inner face of the parapet wall. This blocking wall has an L-shaped metal bar in its top N corner.

The cap stones either side of the gun ope have distinctive holes carved into them. These carvings consist of two closely-spaced circular holes (70mm in diameter; 45mm deep) and a groove leading to the external bevelled corner of the cap stone. These grooves are situated directly over a set of iron hinges or similar on the exterior parapet wall. They may have supported shutters associated with the gun opes.



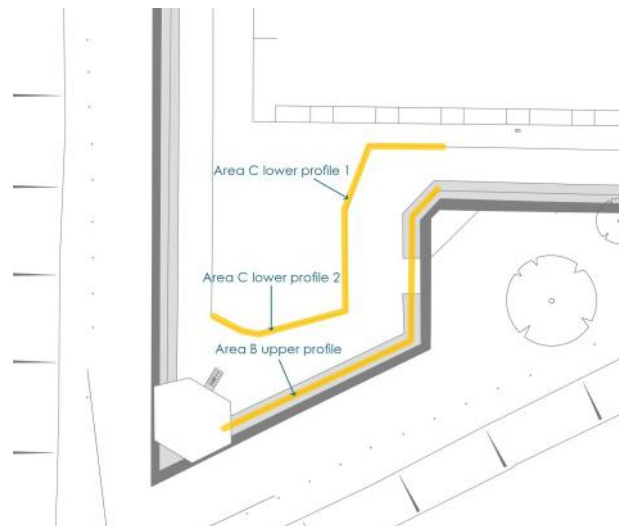
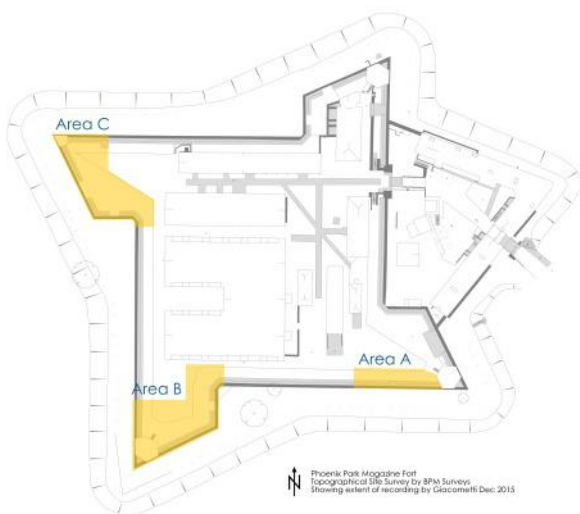
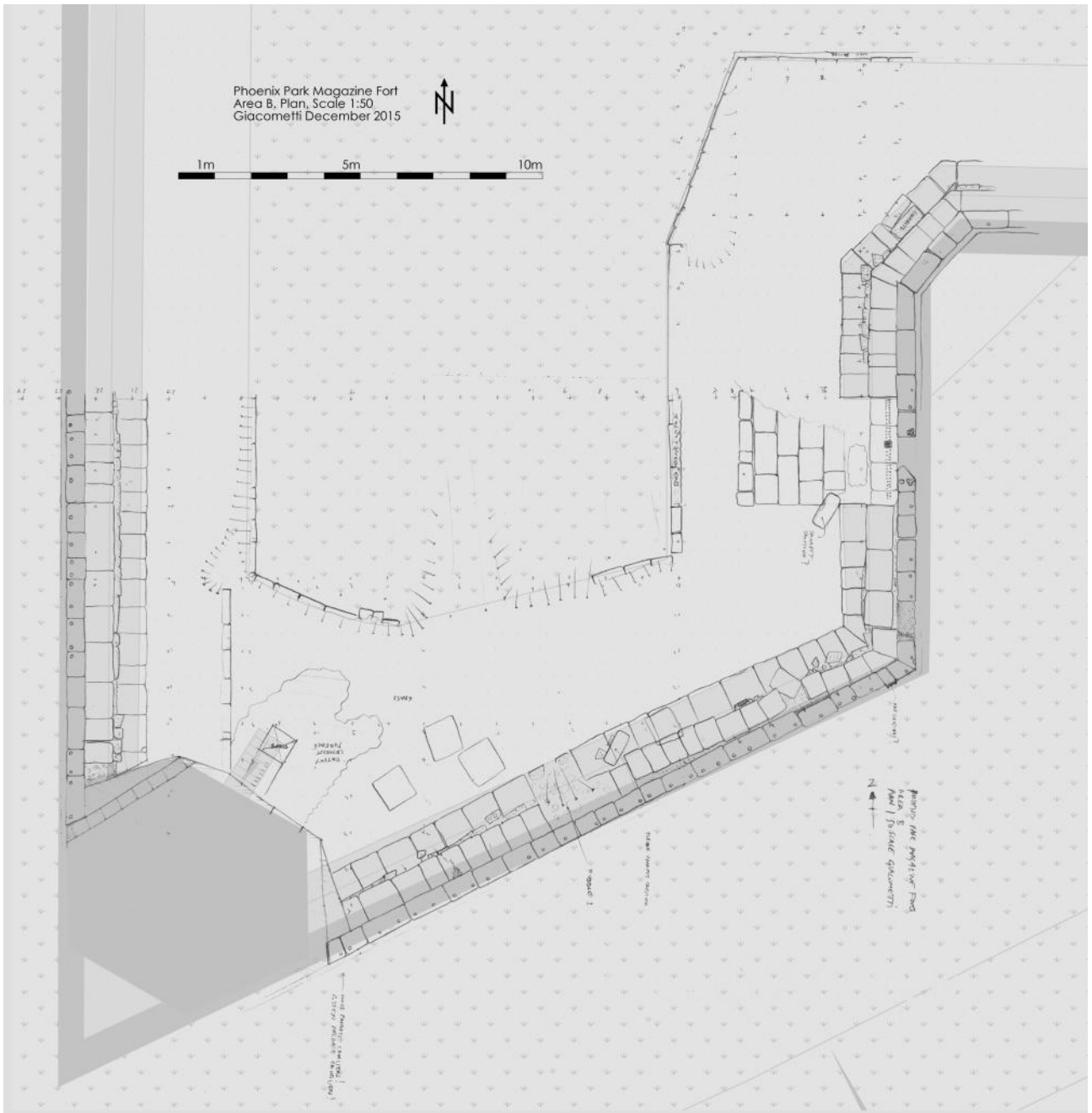
External view of gun embrasure in E wall of SW bastion. Note metal hinges at base of gun embrasure.



Detail of feature on N quoin of gun embrasure.



Detail of feature on S quoin of gun embrasure.



## Area C

### *Overview*

Area C comprises the ramparts at the NW part of the Magazine Fort, which are shaped into a W-facing demi-bastion. The cavalier at the western tip of the area and the walkways and parapet wall around it have been repaired in the mid-20th century.

### *Internal retaining rampart wall*

Area C contains two stretches of internal rampart retaining wall: a larger stretch facing NE and a shorter stretch facing S. Both stretches are in bad condition, and are constructed of regularly-cut limestone blocks (max 490mm x 240mm) bonded with lime mortar and later cement repointing in irregular courses. One granite block (seems original) was visible near the base of the NE facing section of wall, but the remainder is limestone. No foundations visible and wall continues below existing ground surface. Gaps in the wall reveal the rampart behind to be composed of earth mixed with stone rubble. The wall is capped with rectangular granite capstones 1.15m long and 100mm high (width not visible due to grass) which is outset 50mm (2") from the wall. The capstones and top portion of wall are missing in the S-facing section of wall, which is in particular bad condition, and the western portion of this wall is no longer visible, and may be fully demolished or else overgrown/buried by grass and soil.

The S-facing wall is battered, however the NE-facing wall is vertical. The S-facing wall may be original to the 1730s fort (though the granite capstones may be early 19th-century), however the NE-facing wall is at a different alignment to the 1756 and 1793 plans and may be early 19th century in date, though the accuracy of the late 18th-century maps is uncertain.

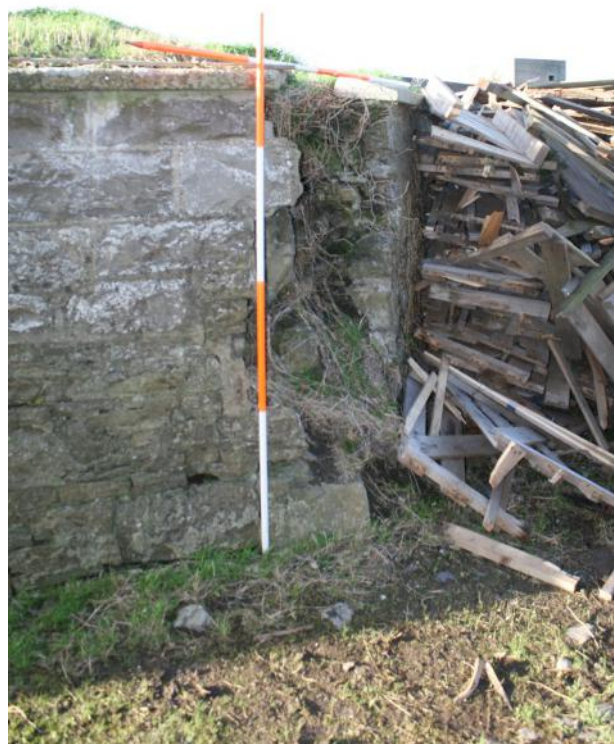
The maximum height of the wall is 1.65m from the top of the granite capping to a cobbled surface at the base of the wall, in the south of Area C. The wall shortens from this point onwards as the ground ramps up towards the cavalier at the corner of the demi-bastion. The capstones of the wall are not level. The highest point is near the cavalier, and the level of the capstones falls away from this point at a regular



Overview of Area C looking S.



View along NE-facing rampart retaining wall.



Return of NE-facing wall as it turns to join the W rampart retaining wall of the fort.



W end of the NE-facing rampart retaining wall.



View E along S-facing rampart retaining wall.



Detail of S-facing rampart retaining wall. View of the wall is obscured by piles of cut stone.



NW cavalier.

rate of c. 1mm to 2mm fall per metre across, for a total fall of 48mm over c. 35m. This fall is not reflected in the parapet wall or walkway.

Two parts of the wall have been repaired. The first is a small brick repair in the south-facing wall just below the westernmost surviving granite capstone. This repair does not appear to have been effective. The second repair comprises the last 4m of the NE-facing wall, at its NW end. This has been rebuilt out of cement, with a cast cement capstone imitating the granite capping. The concrete rebuilt wall terminates further up cavalier ramp, and it is unclear if this termination is intentional or a break.

### *Rampart platform*

This is a grass-covered platform on the top of the rampart. The platform undulates but is relatively level before sloping down to meet the inner rampart retaining wall at a very steep angle. There is a low mound in the SE of the area which probably represents the spoil heap of an engineering trial pit (c. 2010). Similar mounds surrounding the cannon emplacements (S & W) may also represent spoil heaps from earth clearance of these features, possibly also from 2010, or possibly from an earlier half-hearted phase of investigation. Occasional granite stones lie on the grassy surface, derived from both the inner rampart retaining wall capping and the granite steps. These stones correspond with gaps in the wall capping/steps nearby, and could be replaced.

A linear depression which is also visible as a vegetation anomaly (shorter and less lush vegetation) runs NW-SE through the centre of the southern portion of Area C. This may represent the NE side of a path marked on the 1861 (and indeed a subsequent test-trench showed this to be the case).

The two cannon emplacements are visible on the ground as sunken areas of differential vegetation (shorter and less lush vegetation). The south emplacement measures 2.9m wide and c. 3.4m long from parapet wall. Some large granite paving stones are visible below the grass. The west emplacement is wider (possibly due to modern repair, though it is also wider on the 1861 map), and the opening is off-centre to the

opening in the parapet wall. Small granite paving stones are partially visible up against the parapet wall. The paving stones forming the south emplacement appear to be different from those of the west emplacement.

A sunken areas of differential vegetation (shorter and less lush vegetation) is also visible at the top of the access ramp to the cavalier. The ground here is gravelly and has patches of damaged cement, possibly the remains of surface.

### *Stepped rampart walkway*

A walkway comprising two steps runs along the rampart platform, abutting the parapet wall. In the N half of the Area C demi-bastion the walkway was replaced by concrete in the 20th century. The walkway terminates either side of two cannon emplacements.

The lower step is c. 200mm high above the grassy surface (of which 100mm is the granite slab) and 700mm wide. The upper step is c. 360mm high (of which 100mm is granite slab) and 690mm-700mm wide. Individual stones vary in length from 600mm to 830mm, and measure an additional 100mm-110mm in width more than the step, as they are slotted into the parapet wall or upper tier. The granite slabs located in the corners are specially cut to fit. The steps are in bad condition overall, increasingly leaning downwards towards the interior and coming away from the wall towards the N. The lower step is in a particularly bad state with extensive subsiding and ivy growth. The granite steps are connected to each other by joggles measuring 51mm (2 inches) on all sides. No lime mortar is visible anywhere on the joggles, but there is cement strap pointing.

The risers are faced with well-shaped rectangular limestone blocks measuring 450mm x 200mm x 170mm (max); 100mm x 80mm x 170mm (min). The blocks are bound by lime mortar and have been heavily repointed using cement strap pointing. The quality of the riser stonework is particularly evident at the cannon emplacements, which are very well preserved in contrast to the rest of the steps. The lower riser is overgrown and has a big gap between the top of the riser and the base of the capstone, partially repaired by small stones and cement



Rampart platform of S-facing wall. Looking W.



Rampart platform at S of NW bastion.



Ramp leading to cavalier in Area C.



Rampart platform looking NW.





View E along S-facing rampart walkway.



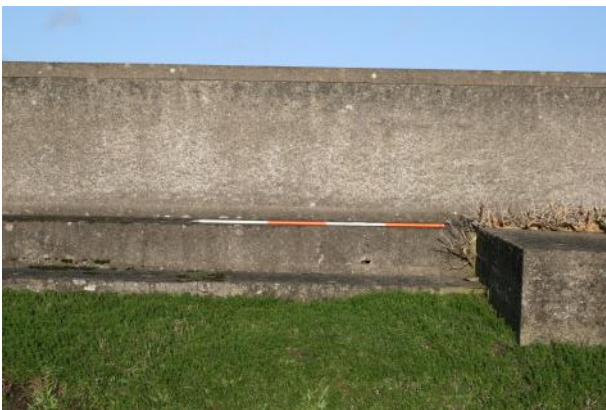
NE-facing segment of parapet walkway.



Looking W along S-facing rampart walkway to NW cavalier.



General view of stepped walkway in NW bastion. Looking W.



Detail of concrete steps at W end of S-facing rampart.



Detail of N-facing section of walkway E of S gun emplacement.



Detail of granite slab steps at E end of S-facing rampart.



Detail of walkway at SW corner of NW bastion as it runs between the two gun emplacements.



General view of stepped walkway in NW bastion looking SE from NW cavalier.



Detail of concrete section of walkway running SE of cavalier.



Return on walkway to E of S gun emplacement.

pointing.

The cast concrete steps in the N half are roughly similar in dimensions to the 19th-century stone steps. The top step measures 790mm wide, the top riser measures 390mm high, the lower step measures 670mm wide, and the lower riser c. 250mm (overgrown). The concrete steps predate the modern concrete cavalier and run below it. The steps also predate and run below the modern concrete 'sentry' platform.

### *Parapet wall*

The parapet wall is constructed of stone and brick c. 1.35 high above the top step, covered in pebbledash with granite capstones. Pebbledash has a basal band of cement 80mm high just above upper step. There is a second narrower band of cement 20mm high just under granite capping stone. The parapet wall is vertical and c. 500mm thick.

A painted cement sign is situated on parapet wall, over the pebbledash, between the two cannon openings, and says BASTON. Two rectangular niches are located in the parapet wall, post-dating the pebbledash, one in the vicinity of each cannon emplacement. They measure 300mm wide, 100mm high and 170mm deep (west wall) and 240mm by 140mm by 120mm (south wall). They are cut through the pebbledash and brick parapet wall. The niches are lined with cement which also extends to the sides and top of the niches, creating a frame echoing the shape of the cement signs.

Granite capstones measure c. 1.4m long (varies) x 530mm wide and x 100mm high. They are bonded with lime mortar with later cement strap repointing and repair. Numerous circular indentations are visible in the upper surface of the parapet capstones. These comprise larger circular indentations 100mm in diameter by 15mm deep, situated c. 100-130mm from the internal edge of the parapet wall capstone and 1m-2m apart; and smaller circular indentations 45mm in diameter and 15mm deep, situated c. 100-130mm from the external edge of the parapet wall capstone and 1m-2m apart. The holes are partially absent along the south-facing stretch of the parapet wall, and this appears to be intentional. The holes are also absent on the

northern side of the SE-facing cannon opening, and this is due to the absence of a walkway here, indicating the holes are contemporary with the walkways. The parapet capstones slope down towards the exterior intentionally.

The parapet wall of the N half of the Area C demi-bastion has been rebuilt. The join between the old wall and the new are marked by three holes drilled into the pebbledash of the old wall. These may have held temporary repair fittings prior to the reconstruction of the wall. The modern wall is capped with a cast concrete plinth mimicking the granite capping in size and shape and slope. The pebbledash on the modern wall is paler than the pebbledash elsewhere, and it is likely to be later. This parapet wall is 1.38m high above the top walkway step. A band 130mm along the base of the parapet wall has been left in plain cement and not pebbledashed.

A number of features are present in the modern wall. These comprise (i) c. 16 ferrous hook fittings 530mm-999mm apart in the N-facing parapet wall, in a line 20mm below the top. These may have held a cable. (ii) an electrical switch of metal and ceramic marked GRABTREE, attached to a copper pipe entering the wall near the cavalier. (iii) a metal strip just above the switch, probably to label it (iv) two gunloops either side of the cavalier. These are situated 430mm above the top step and measure 400mm wide and 390mm high tapering to 90mm wide and 240mm high on the external face. The northern gunloop is partially concealed by the cavalier.



NE-facing segment of parapet walkway.



Detail of BASTON sign.



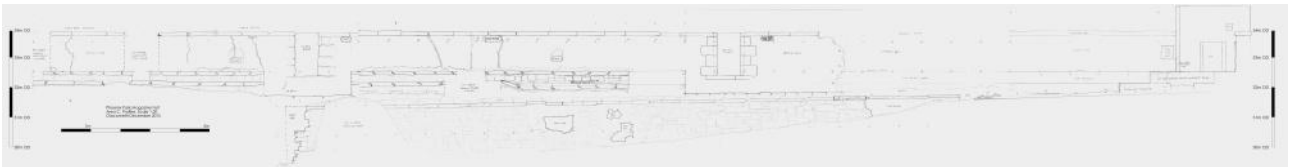
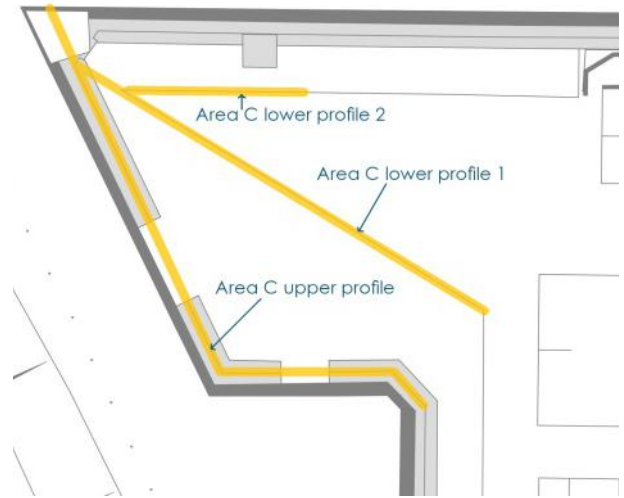
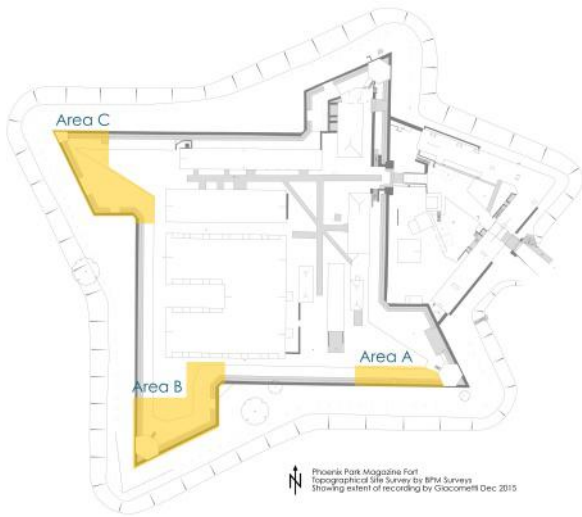
Detail of granite capstones. Note circular indentations along the internal edge of the stones.



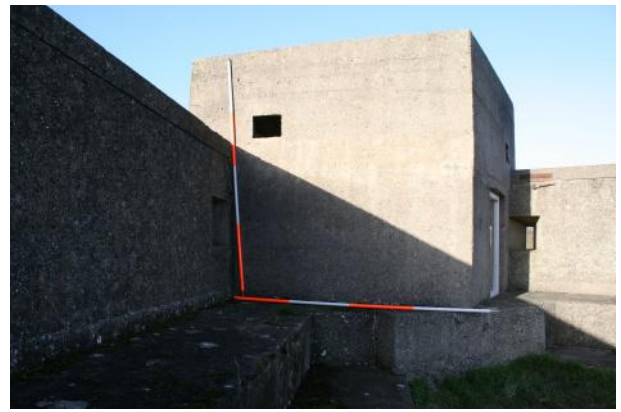
Detail of rectangular niche in SW wall.



Detail of rectangular niche to E of gun emplacement in S wall.



Detail of joint between old and rebuilt segments of parapet wall.



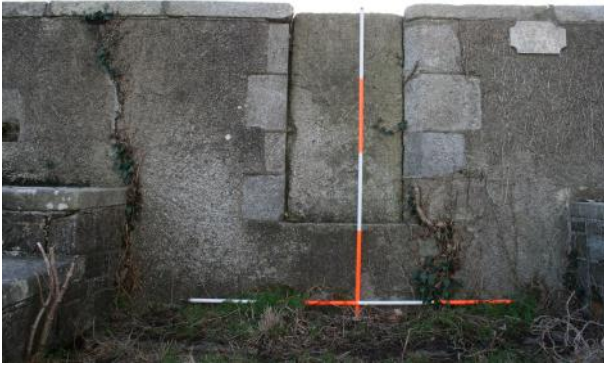
View of NW cavalier. Note gunloops either side of the cavalier and metal fittings above right gunloop.



Detail of fittings in parapet wall.



Detail of gunloop in parapet wall immediately SE of NW cavalier.



Gun opening.



Grassed over gun platform of S gun emplacement.



Detail of illegible cement plaque at S gun ope.



SW gun emplacement.

### *Gun emplacements*

Two gun opes are set into the parapet wall, one in the S wall and one in the SW wall. Both are lined with cut granite quoins and sills. Both sides of the SW gun ope and the W side of the S gun ope are bevelled internally and externally on quoins and capstones. The granite lining has been left exposed by the later pebbledashing of the parapet wall. The openings measure 800mm wide internally by 1.48m-1.50m high (from top of sillstone to top of parapet capstone), and were open at the top. There is an illegible cement plaque to the W of the S gun ope. There is another similar cement plaque affixed to the parapet wall N of the SW gun ope. It reads WEST.

Features are cut into the granite parapet capstones either side of each cannon emplacement. These comprise a pair of circular holes and a broad and shallow diagonal groove leading to the external bevelled corner of the opening. These grooves are situated directly over a set of iron hinges or similar on the exterior parapet wall, and may have supported a system of shutters to open and close the gun openings.



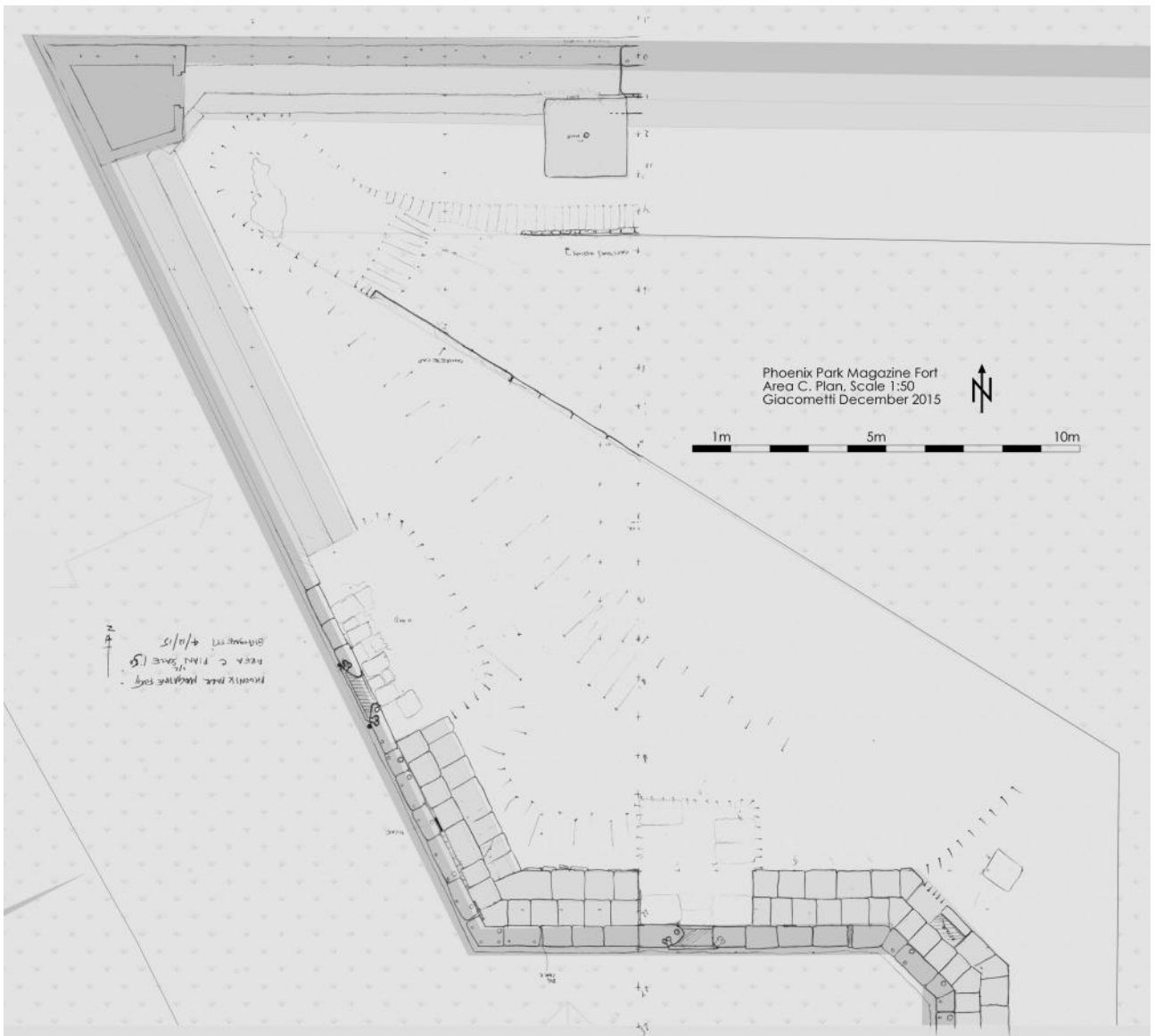
Granite platform at SW gun emplacement.



Cement plaque at SW gun emplacement. Reads WEST.



Circular indentations cut into granite capstones at S gun ope. Looking E.



## External face

The majority of the parapet wall in areas A, B and C is pebbledashed from the outside. In some areas the pebbledash has been stripped exposing a red brick parapet wall surmounted by a masonry parapet wall.

The blown up plate on the right shows the original (1738) brick parapet with a top header course, surmounted by the c. 1800 masonry parapet, later cut by the 19th century cavalier.



Area A, external view of SE cavalier looking SW



Area A, external view of SE cavalier looking SW, detail showing masonry over brick in parapet



Area A, external view of SE cavalier looking N



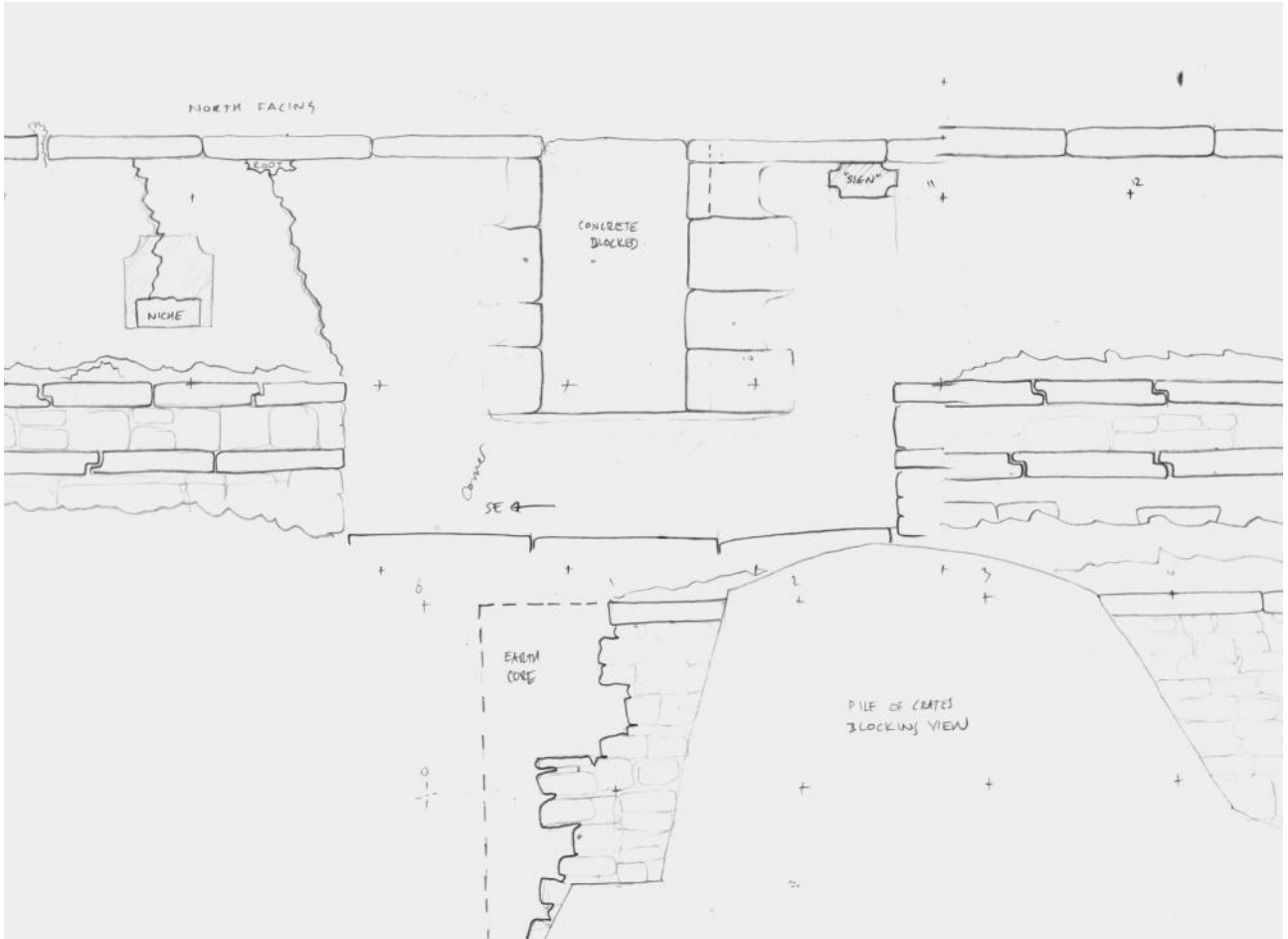
Area B, SW cavalier looking E Note major crack.



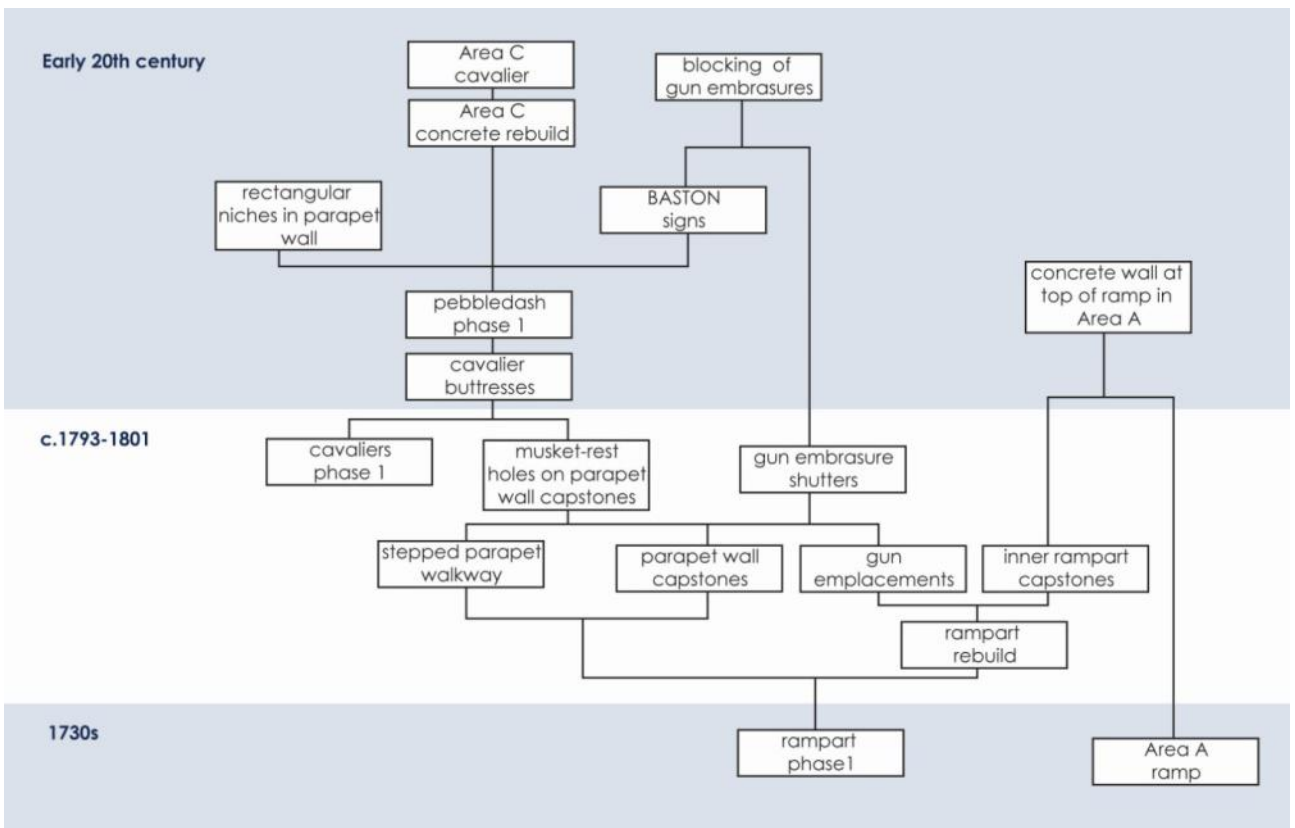
Area B, junction of SW cavalier with S wall of fort. Note squinch and gun embrasure.



Area C, NW cavalier looking N



Above: Extract from Area C profile. See Appendix for full sized version.  
 Below: Stratigraphic matrix based on the visual survey.





# Section 4 Test Trenches

Trench	Area	L	W	D (max)	Orient	Main findings
1	A	4m	650mm	1.2m	N-S	Construction of walkway over earlier rampart
2	B	1.45m	92mm	300mm	E-W	Earlier rampart retaining wall
3	B	5m	40mm-165mm	70mm	E-W	Earlier rampart retaining wall and steps
4	B	5.5m	500mm	800mm	E-W	Later rampart retaining wall
5	C	11m	600mm-1.15m	600mm	E-W	Rampart path

## Introduction

Five test trenches were excavated through the rampart in December 2015. These aimed to inform the planned 2016 consolidation works in Areas A-B. Dimensions of each trench are presented in the table above.

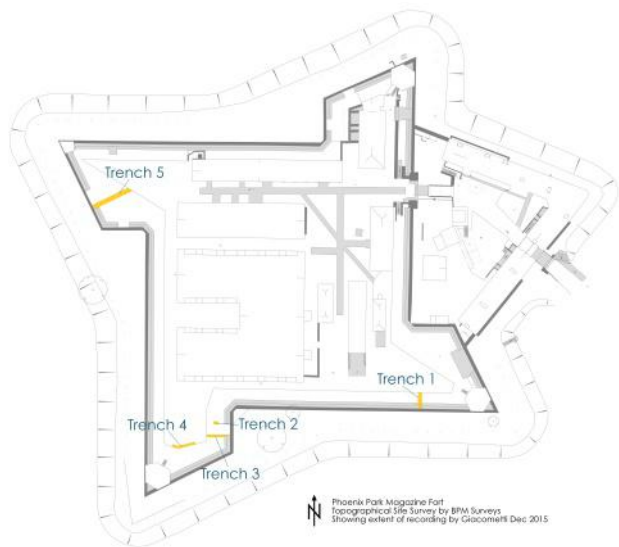
## Test Trench 1

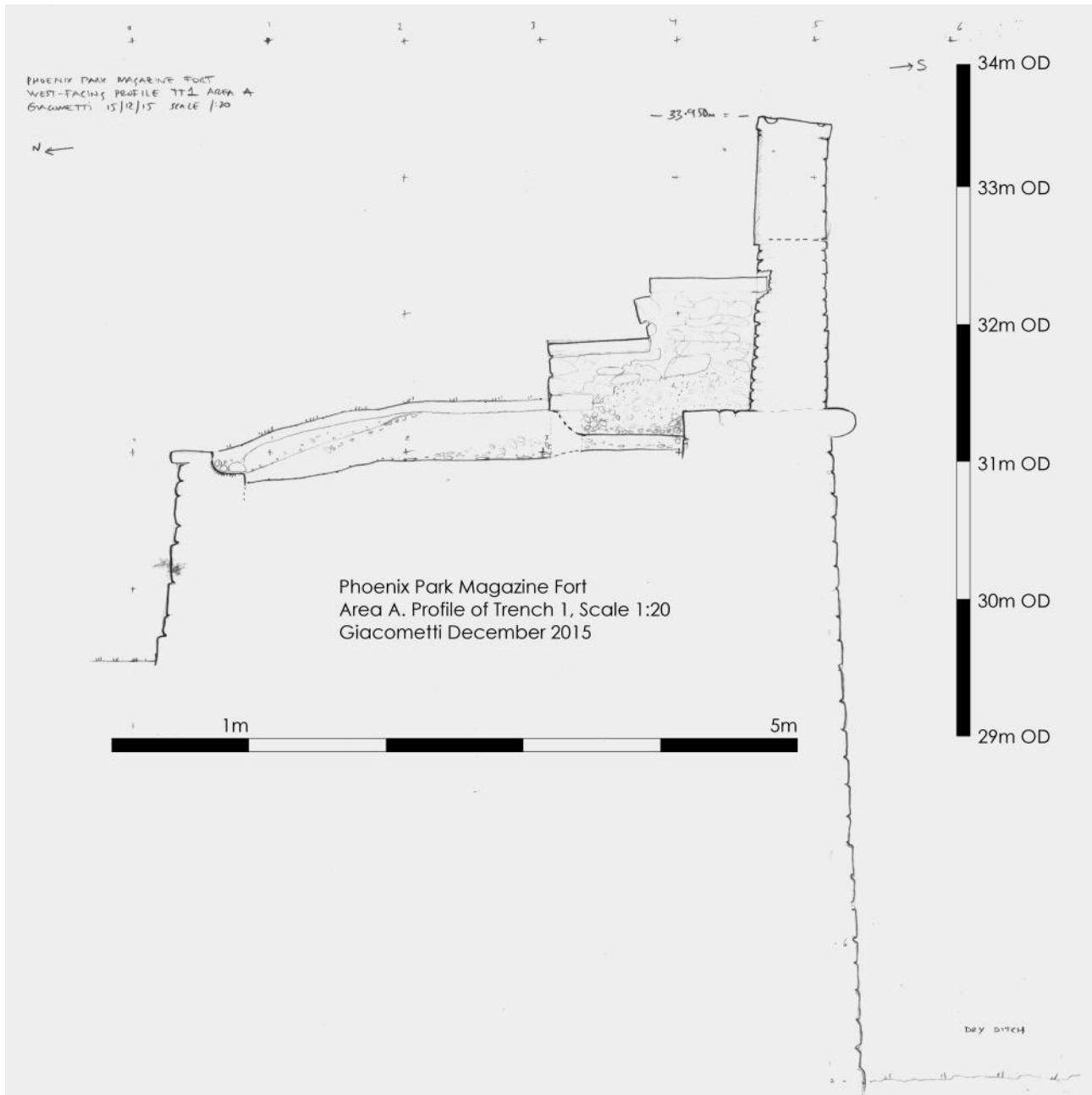
Test trench 1 was situated in Area A and measured 4m long (N-S) by 650mm wide and up to 1.2m in depth at the southern end. It was excavated through the walkway and rampart, at a point where the rampart was disturbed, in order to assess the construction of the c. 1800 rampart walkway and identify the earlier c. 1736 rampart surface.

A modern (21st century) pit, probably an engineering trial pit purposes, was identified in the southern end of the test trench. This pit had been dug through the walkway and half of the rampart and was backfilled with loose stones, soil, rubble from the demolished parts of the fort, and plastic bags. It reached a maximum depth of 1080mm below the upper step of the walkway and a maximum length of 2.79m north from the parapet wall.

### Topsoil

Topsoil was present in areas untouched by the





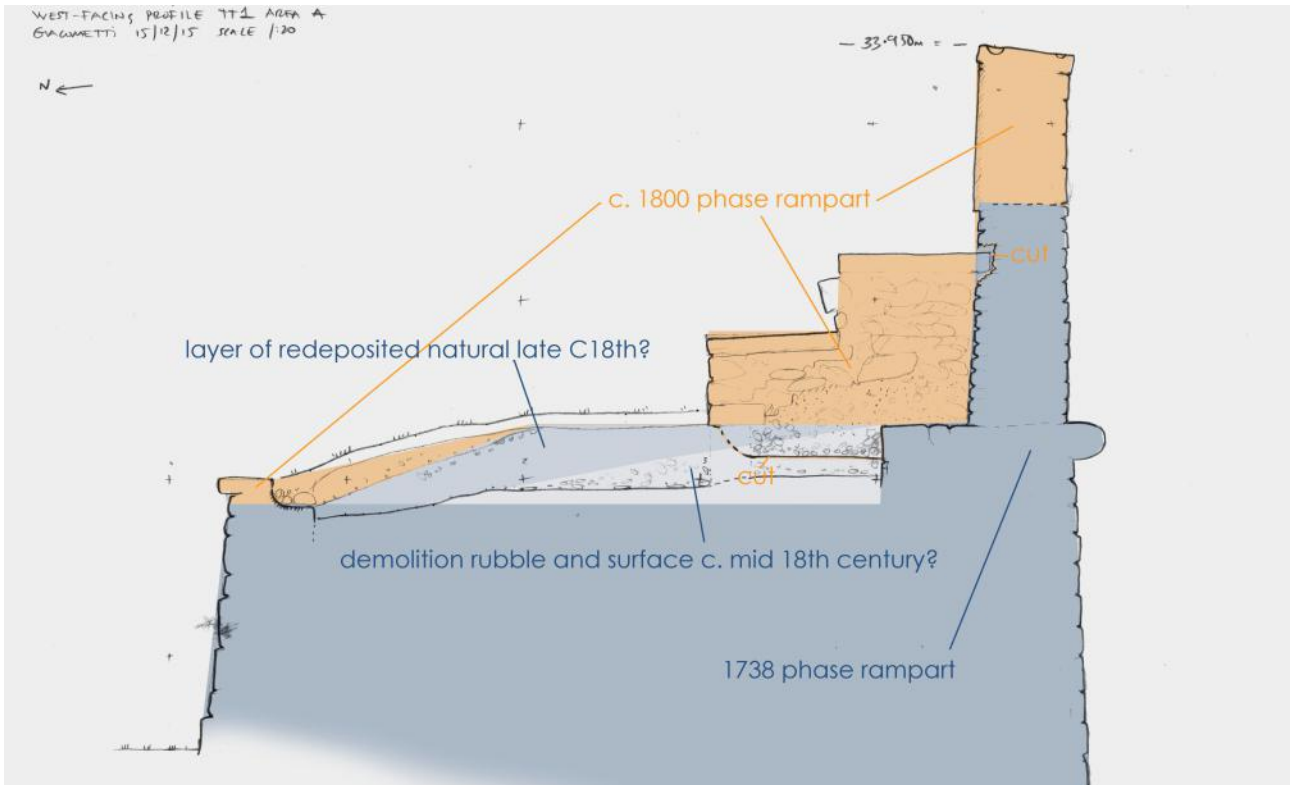
parapet-rampart walk. This surface was 940mm below the existing top step of the walkway. The north-facing edge of the rampart wall was well constructed and was probably intended to be visible, sticking up above the rampart body like a step.

A thick deposit of dark-brown clay containing brick, mortar and stone demolition rubble was found abutting the masonry wall of the rampart. This extended across the rampart. It was not excavated, but a test-trench in 2010 (by Stephen Johnston) identified the same layer and

found it to be c. 200mm thick and overlying a compact layer of small stones and clay at 600-700mm below current ground level, which is likely to form the core of the rampart. This layer was retained by both of the existing rampart retaining walls.

***Surface and redeposited natural and***

The top of the dark-brown clay with demolition rubble was completely level. The southern half of it was sealed by a gently-sloping thin layer of pale yellowish-brown compact silty-clay packed with small to medium sized stones. This layer



Interpretation of Trench 1 profile.

may represent a path or sub-surface along the rampart, either soon after the rampart was constructed (c. 1837) or sometime afterwards. It abutted the original (1736) rampart retaining wall/parapet walkway, where it was thickest, and sloped downwards to the interior of the fort, petering out half way across the rampart.

Above this was a layer of distinct sterile pale yellowish-brown soft silty-clay. This layer ran along the entire rampart. This is an unusual material to lay on top of the rampart surface, as it would have been very sticky to walk on when wet. It is likely that it represents redeposited natural subsoil derived from sub-surface excavations nearby in the interior of the fort at some point in the later half of the 18th century.

### *19th century walkway*

The cut for the construction of the 19th century walkway was identified. It was cut through the pale yellowish-brown soft silty-clay redeposited natural layer. The cut of the walkway was 1.35m wide (from the parapet wall), and was filled by densely packed small stones. The two-stepped walkway was constructed directly over this, however the walkway measures 1.45m wide (from the parapet wall), meaning that the



Trench 1 facing east showing redeposited natural layer.



Trench 1 facing west showing redeposited natural layer and cut for engineering pit.

foundation trench and foundation fill was too narrow. As a result, the facing course of risers on the lower course of the walkway was laid directly onto clay rather than onto the foundation material. This meant that the entire walkway inevitably sunk and slumped downwards towards the interior of the fort. The granite step surface of the upper course had been keyed into a trench dug into the brick parapet wall, and this allowed the upper course to remain level in much of the fort. Numerous instances of 20th century cement repair indicate that this slumping was identified and attempts were made to slow it down or halt it, without success.

It is interesting to speculate why the foundation trench might have been thinner than the finished walkway. It may have been an error, or it is possible that the width of the walkway was altered after construction had started.

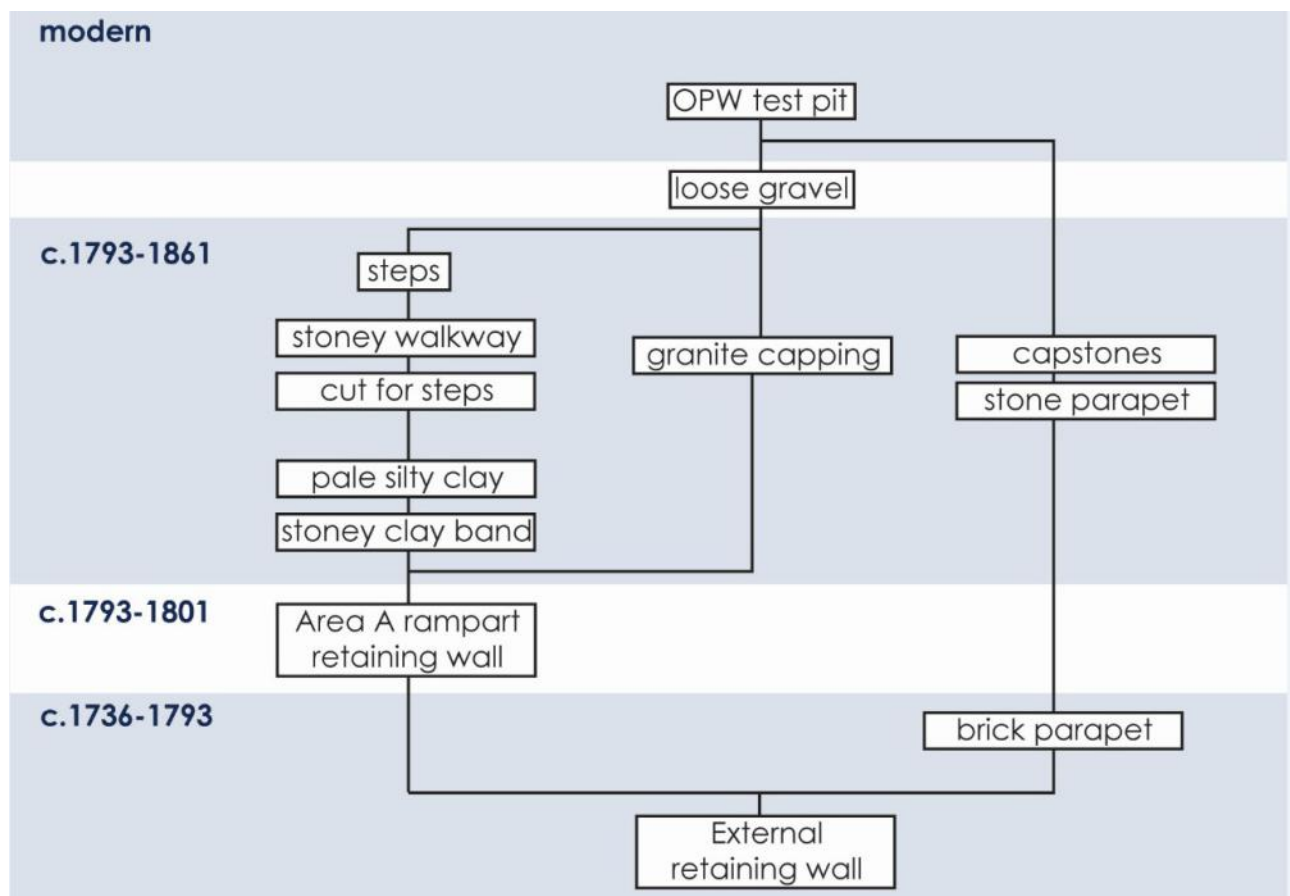


Trench 1 facing east showing redeposited natural running under c. 1800 walkway steps.



Trench 1 facing east showing c. 1800 walkway (left) and c. 1738 walkway and brick parapet (right)

Trench 1 stratigraphic matrix



## Trench 2

Trench 3 is located at the NW corner of the gun emplacement platform in Area B. The trench is 0.92m N-S by 1.45m E-W, and was excavated to a maximum depth of 300mm. The trench is covered by a layer of topsoil c.50mm deep. This is underlain by a layer of fine gravel (c.50mm deep) that runs under the gun emplacement platform, serving as a bedding layer. A wall runs N-S under this gravel layer. The wall is composed of red brick bound with lime mortar and is 600mm wide. It extends under the gun platform and emerges to the S in trench 3. It has been demolished to this level. The wall is abutted to the E by an uneven heavy mortar surface that continues S under the gun platform. This wall predates the construction of the gun emplacement. It relates to an earlier 18th-century phase of rampart walling.



View of trenches 2 and 3. Looking NW.

## Trench 3

Trench 3 extends along the S edge of the gun platform in Area B. The trench is 4.9m long, extending from the inner E edge of the stepped granite walkway to the rampart retaining wall. It has a minimum width of 0.40m and a maximum width of 1.20m. The trench was excavated to a maximum depth of 0.55m.

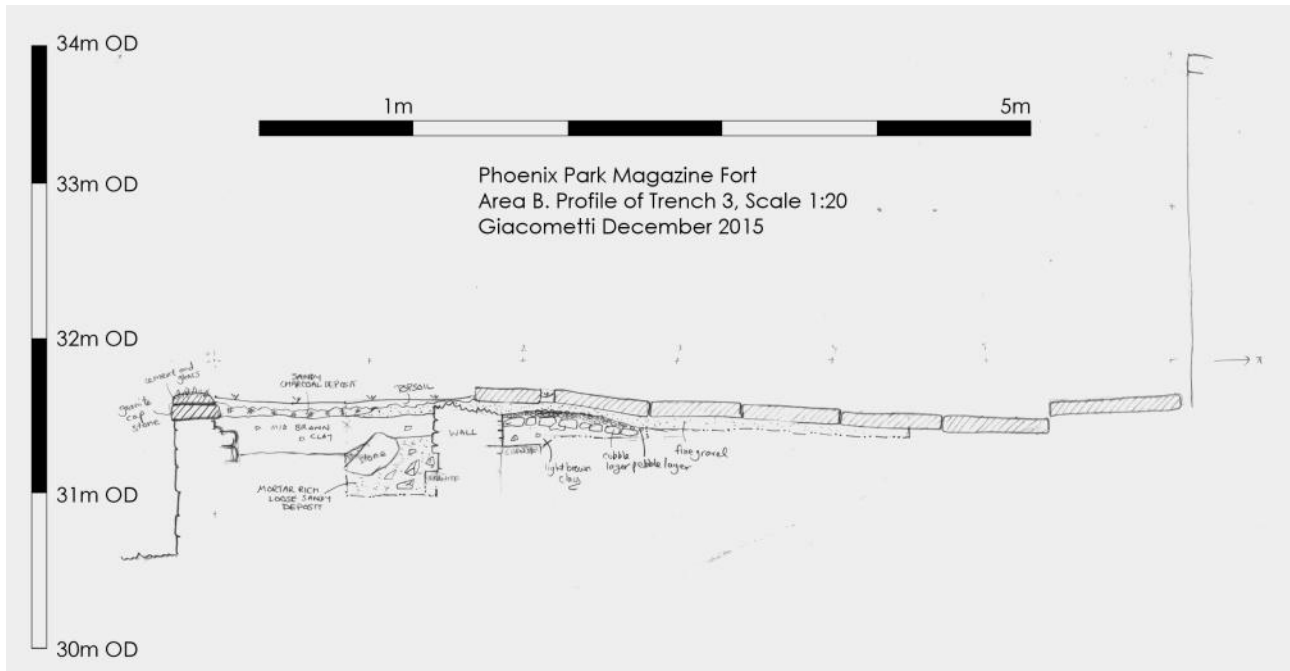
A layer of topsoil c.50mm deep (max.) covers the entire trench. This overlies a dark brown charcoal-rich gritty layer that is restricted to the W end of the trench. The deposit runs 1.20m E



Pre-ex photo of trench 3.



View of trench 3. Looking W.



from the rampart retaining wall; is c.40mm deep and extends the full width of the trench. The gritty layer overlies a layer of loose fine gravel that serves as a bedding layer for the granite gun emplacement platform. The gravel layer is 50mm deep and c.4.1m long E-W. The granite slabs of the gun platform are set into this gravel layer. The slabs are c.100mm high and bonded with soft lime mortar with later cement pointing. The slabs to the E of the platform have subsided substantially, while those at the W have not. This is due to the presence of a wall that runs under the W end of the platform, emerging N in Test Trench 2. The top of the wall lies directly under the fine gravel at a depth of c.100mm.

The wall is aligned NE-SW. It is 0.55m wide and was excavated to a depth of 0.50m (below top of wall) on the NW side. The wall has been demolished to this level and its top is uneven. The SE face of the wall comprises four course of red brick laid in stretches. The brick has average dimensions of 160mm x 100mm x 80mm. A granite slab is keyed into the SE face of the wall at a depth of 0.35m (below top of wall). The slab is 310mm wide. Its length or depth were not determined. It may form part of a step. The top 170mm of the NW side of the wall is covered in a thick layer of plaster c.20mm deep; the lower 330mm is composed of brick and



W face of wall. Note granite lip and thick mortar layer on face of wall.



E face of wall showing keyed-in granite step. Note coursed red brick in face of wall.



Looking E along trench 3. Note wall running under granite gun platform.



Inner E face of rampart retaining wall at W end of cutting 3.

Fragments of red brick and slate recovered from clay layers.

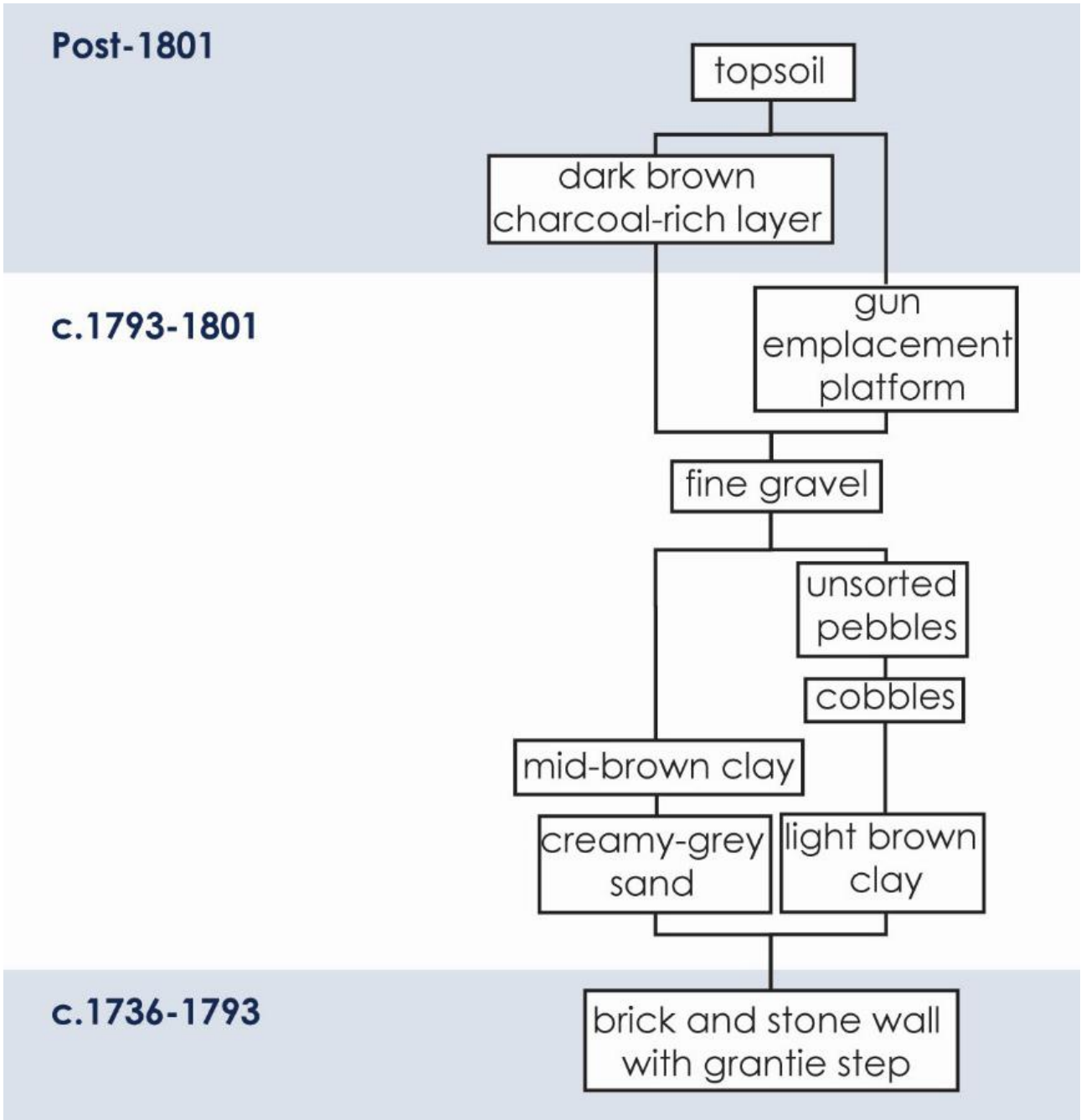


stone. A cut granite block is visible at the base of the exposed wall at the N end of the cutting. The block has a lip at a depth of 0.42m (below top of wall). This lip is 40mm wide and 280mm long. Its depth is not clear as it continues down into the unexcavated fill.

Different deposits were encountered on either side of the wall. In the E of the trench the fine gravel was underlain by a layer of unsorted pebbles of dimensions 30mm x 20mm x 20mm. This layer was 50mm deep and overlay a deposit of rounded cobbles c.150mm deep. Cobbles were of average dimensions 140mm x 80mm x 70mm. Under the cobbles was a deposit of light brown silty clay c.150mm deep. This clay layer contained moderate inclusions of handmade red brick and slate. It came down onto a granite slab keyed into wall.

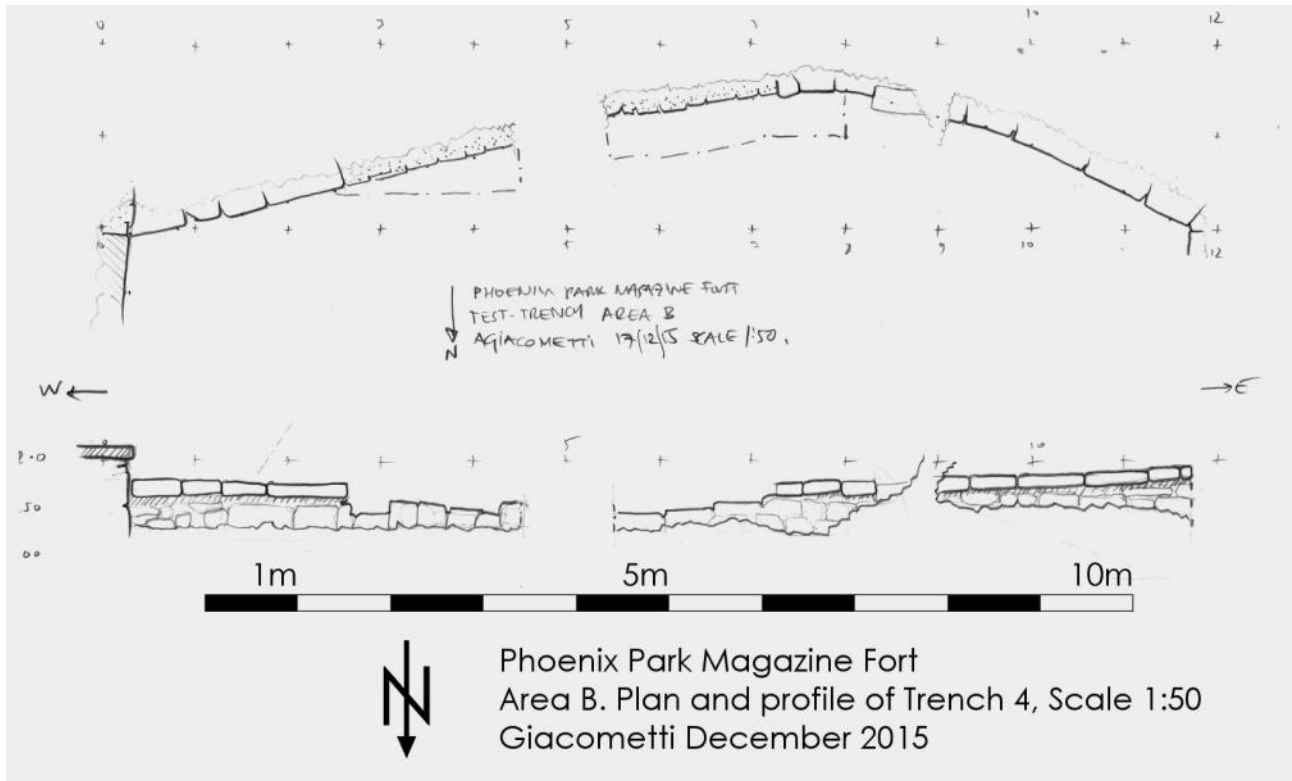
At the W end of the trench the fine gravel layer came down onto a deposit of mid-brown silty clay with occasional inclusions of handmade red brick and slate. This layer was 200mm deep and lay directly above a deposit of very loose mid creamy-grey sand. This deposit is mortar-rich and contained moderate inclusions of shattered limestone. It was excavated to a depth of 300mm but continues down.

The wall in trench 3 relates to an earlier 18th-century phase of rampart walling. The mid-brown silty clay, loose mid creamy-grey sand, and light brown silty clay can be interpreted as part of the extension of the ramparts (1793-1801). The layer of cobbles, pebbles and fine gravel can be interpreted as bedding material laid down for the construction of the gun emplacement platform. The dark brown charcoal-rich gritty layer may be related to surfacing of the rampart platform.



Trench 3 stratigraphic matrix





Pre-ex photo of trench 4. Looking E.

## Test Trench 4

Test Trench 4 is located in Area B. The trench lies along the S rampart retaining wall of the bastion. It begins 2.2m W of the E corner of this wall and extends W. The trench is 5.6m long; it has a max width of 0.5m and a max depth of 0.60m.

The trench follows the face of the retaining wall, aiming to uncover and assess it. Much of the wall is concealed by a ramp of soil and rubble that runs N-S from the foot of the 18th-century magazine building to the top of the bastion ramparts. The trench is filled by a single deposit: a dark greyish brown humic material containing modern rubbish (beer cans, plastic lighters, modern glass bottles), and rubble from the fort, including collapsed facing stones from the risers of the stepped walkway. This is interpreted as a modern ramp, possibly created to provide machine access to the rampart platform. While original ramps are shown on the 1793 plan of the fort in the SE and NW bastions, none is indicated in the SW bastion. There is no evidence for the presence of an ori-



Trench 4 looking E.



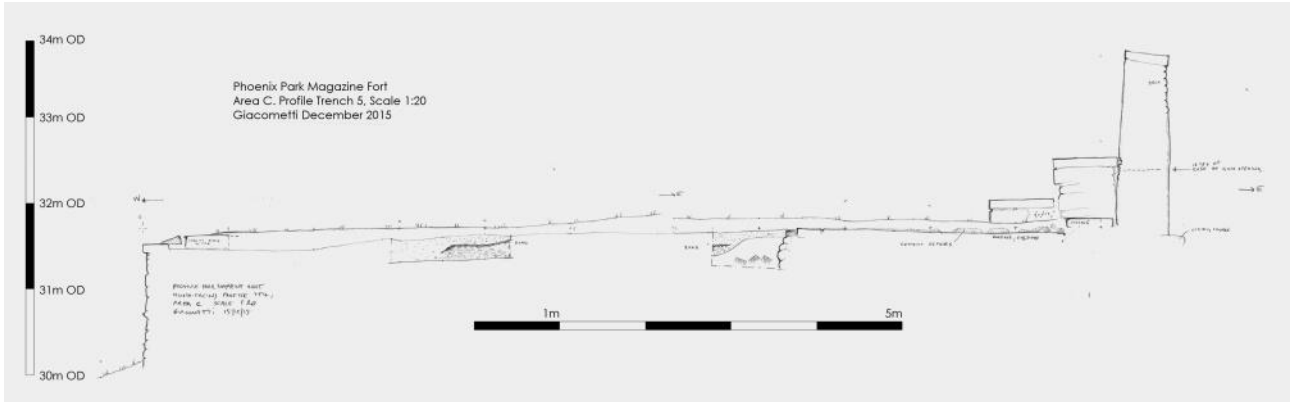
W end of trench 4 showing max depth of the trench. The wall continues down. Note the large collapsed facing stone from the risers of the stepped walkway in the left of the photo.



Trench 4 looking W.

ginal ramp on the rampart retaining walls in this area.

The trench confirmed that the retaining wall continues under the ramp, running W before turning N and connecting to the N rampart retaining wall of the fort. For the E 4.7m of the trench the capping stones have been removed or collapsed from the wall. The trench was dug to a max depth of 0.60m but the base of the wall was not found. It is likely that the modern ramp is quite deep here, possibly up to 1.7m.



## Trench 5

Test trench 5 was situated in Area C and measured 11m long (E-W) by 600mm to 1.15m wide and up to 600mm in depth. It was excavated through the rampart, along the edge of a gun emplacement platform, in order to assess the construction of the gun emplacement and identify phases of construction and use of the rampart surfaces, and investigate a linear vegetation and topographical anomaly.

Topsoil comprised an extremely rooty dark blackish-brown organic soil 100mm to 200mm in depth (thickest and deepest to the east). A slab of granite at the eastern end of the trench that was sticking up out above the topsoil had originally been assumed to be an ex-situ walkway stone. Clearing the topsoil, however, exposed the edges and it was apparent the stone

was part of an in-situ platform (e.g. a 19th century sentry platform) overlooking the interior of the fort. A band of cement along the edge showed this platform remained in use, and was maintained, during the 20th century.

### *Rampart fill*

The earliest layer in the trench comprised a dark brown silty-clay with frequent brick, mortar and stone demolition rubble. This was very similar to the rampart fills identified in Trenches 1 and 3. The brick is handmade, bad quality, non-standardised in size and thinner than modern brick, which would be consistent with either 17th or early 18th century brick. It is very similar to the brick used in the 1736 phase of the parapet wall. It was unclear if this fill represents the earliest phase of the rampart construction, or a c. 1800 extension.

Trench 5 pre-excavation view facing south.





Trench 5, overview looking northeast



Trench 5, gun emplacement platform



Trench 5, detail of senty platform

A very rough unfaced retaining wall or foundation was identified directly below the end of the gun emplacement platform. This was composed of large rounded stones one over the other bonded heavily with lime mortar, and extended at least 400mm in depth below the platform, continuing below the trench base. If it was a wall, the facing has been removed. No cut was visible through the rampart fill and the wall appeared to be abutted by the fill, however the trench was too small to be sure of this.

The feature could be interpreted as the foundation for the gun emplacement platform. However, the platform has subsided heavily in the centre from being unsupported, and this feature is unnecessarily deep for a platform foundation. The feature is better interpreted as part of the earliest phase (1736) of the rampart, either its rubble core or the part of the facing wall directly behind the (robbed out) facing stones). This interpretation is consistent with the results of Test Trench 3, and implies that the rampart fill to the east may date to c. 1800.

### *Path and cannon emplacement*

The cannon emplacement platform was constructed directly over the demolished wall/feature. It has subsided extensively in the centre, and only the east end (where it sits over the demolished wall/feature) and west end (at the parapet wall) are at the original level. A patchy cement surface lies directly over the granite platform running from the centre towards the parapet wall. The cement thickens towards the west, indicating that the platform had already subsided at this stage and the cement was intended as an (unsuccessful) repair to even it out. This suggests the gun platform remained in use during the early 20th century.

600mm past the end of the gun emplacement platform, a cut was identified through the rampart fill. This cut measured 200m in depth and was oriented N-S. Only the western side of the cut was identified, and there was no need for a cut at the eastern end as the rampart surface sloped downwards to the east. The base of the cut was completely level, and the cut formed a level pathway across the centre of the rampart. The cut was filled by a c. 150mm thick layer of pale brown silty-clay packed with loose small

stones, grit and gravel. To the east this layer sloped down onto the rampart fill 3.4m from the western edge of the rampart. Above this was a 50mm thick layer of the same material that was extremely compact and densely packed into a surface.

The surface was level and measured 3.4m in width, running N-S along the central third of the rampart. This surface represents a path that is depicted on the 1861 map of the fort, and ran from the ramp (from north) towards the gun emplacement (to south).

A 150mm thick layer of pale sterile silt was identified east of the path. This is probably the same layer as the redeposited natural subsoil identified in Trench 1.

A 150mm thick layer of loose small stones and gravel covered the path and the pale silt layer and abutted the western end of the gun emplacement platform. This is likely to represent maintenance of the path during the late 19th and 20th centuries.



Trench 5, cut for path



Trench 5, profile showing path, facing northwest

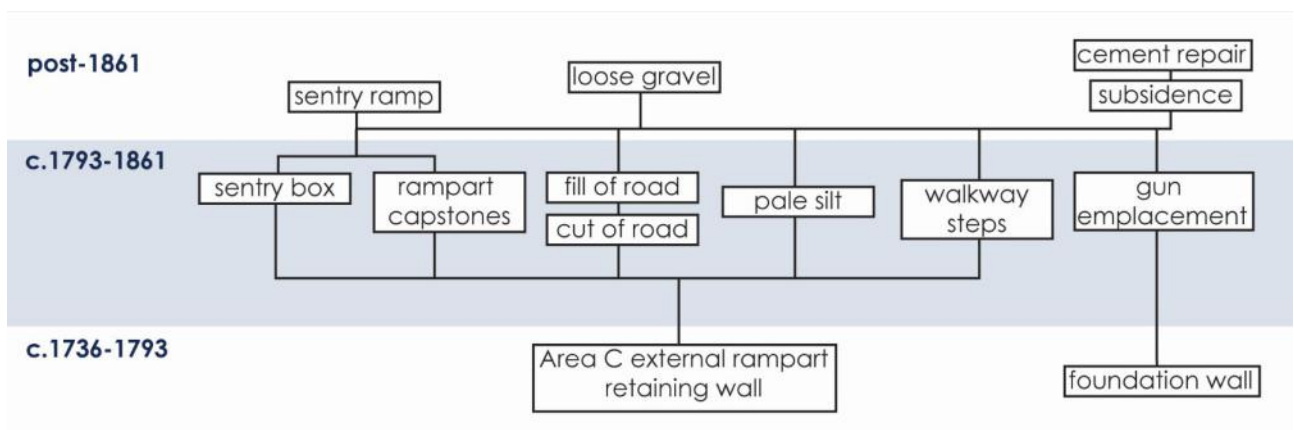


Red brick demolition rubble from Trench 5



Trench 5, rubble core/back of 18th century rampart retaining wall below c. 1800 gun emplacement platform, facing southeast

Trench 5 stratigraphic matrix



## Artefacts

### *Trench 1 Dark brown clay demolition rubble*

Iron nail, square section & L-shaped head.  
Black glazed earthenware, rim sherd of utilitarian vessel  
North Devon gravel-tempered earthenware, body sherd of utilitarian vessel  
Unglazed earthenware pan-tile (roof tile)  
Small fragment of animal bone

### *Trench 5 Topsoil*

Bullet  
Iron fitting  
Clear bottle glass fragment (modern)

### *Trench 5 Gritty gravel layer (path)*

Bullet  
Creamware, body sherd of tableware

### *Trench 5 Dark brown clay with demolition rubble*

Handmade red brick fragments  
Unglazed earthenware pan-tile (roof tile)  
Dark green bottle glass fragment  
Creamware, body sherd of tableware  
Glazed red earthenware, body sherd of vessel  
Animal bone rib

### *Pottery dating*

A small amount of pottery, glass and brick was recovered from the dark brown clay layer in Trenches 1 and 5. All the artefacts appeared to date to the 18th century (1725-1800).

### *Bullets*

Two bullets were identified in Trench 5, in topsoil and in a layer of gravel directly above the 19th century path. Both bullets are .303 British of the type used for the Lee Enfield SMLE rifle which was the primary arm of the British army c.1902-1941 (pers. comm. Dave Swift 2015).



# Discussion of key findings

The December 2015 archaeological investigations revealed multiple phases of construction and repair on the fort ramparts dating from between its construction in c. 1736, and its abandonment in the mid-twentieth century. Three major phases of activity were elucidated.

## Early 18th century phase

Cartographic evidence suggests that the ramparts in the bastions of the fort were originally narrower, having the same width as the long walls of the fort (4.25m or c.14 foot) (NLI 16G 17, 42). This was confirmed by archaeological excavation. Evidence for the original 18th century internal rampart retaining walls was uncovered in test trenches in Area B and Area C.

- In Area B the original retaining wall was found under the west end of the gun emplacement platform in test trenches 2 and 3. The wall was c. 550mm wide, composed of red brick and stone, and had a granite step keyed into it at a depth of c. 400mm below current ground level. The ramparts were originally 4.25m or c. 14 foot wide.
- In Area C the rubble core behind the original rampart retaining wall was uncovered under the northeast end of the gun emplacement platform in test trench 5. Assuming the original wall had the same width as in Area B (550mm), the original rampart was 4.3m wide or c. 14 foot.

Test trench 1 in Area A showed that the original parapet wall was composed of brick and stood c. 1.2m above the limestone string course in the external retaining wall of the fort.

## Late 18th - Early 19th century

A major phase of building took place at the Magazine Fort between c. 1793 (George Armitage's map) and c. 1801 when the ravelin, designed by Francis Johnston, was added. This phase is characterised architecturally by the use of cut granite. During this phase the parapet was raised, a stepped parapet walkway was added, the ramparts were widened at the bastions, and granite gun emplacements were built. Four cavaliers appear to have replaced the former watchtowers at time time also.

- The parapet wall was raised by the addition of a course of stone. The wall was surmounted by a course of granite capstones featuring circular indentations which served as musket rests. The musket rests are present along the entire perimeter of the fort, including the east side, suggesting that this phase of works was conceived of before Johnston's 1801 ravelin.
- A walkway consisting of two granite steps supported on limestone risers was built. The upper step was set into a groove carved out of the original brick parapet wall.
- The ramparts were widened in the bastions to facilitate the construction of gun emplacements accessed by gravel paths.

## Early 20th century phase

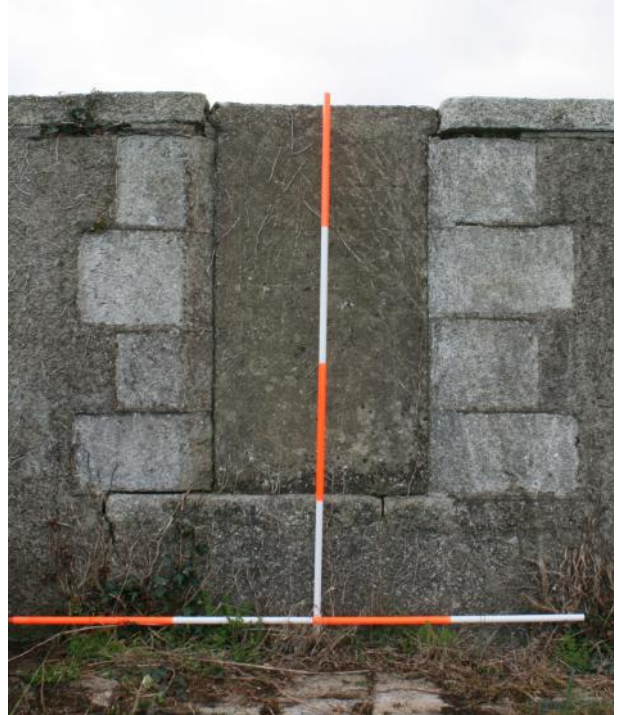
A phase of early 20th century activity was identified at the site including both of the construction of new elements as well as repair and consolidation of the aging structure.

- The parapet walls were rendered with cement pebbledash, and cement signs were affixed to the wall. Rectangular niches lined with cement were created along the interior of the parapet

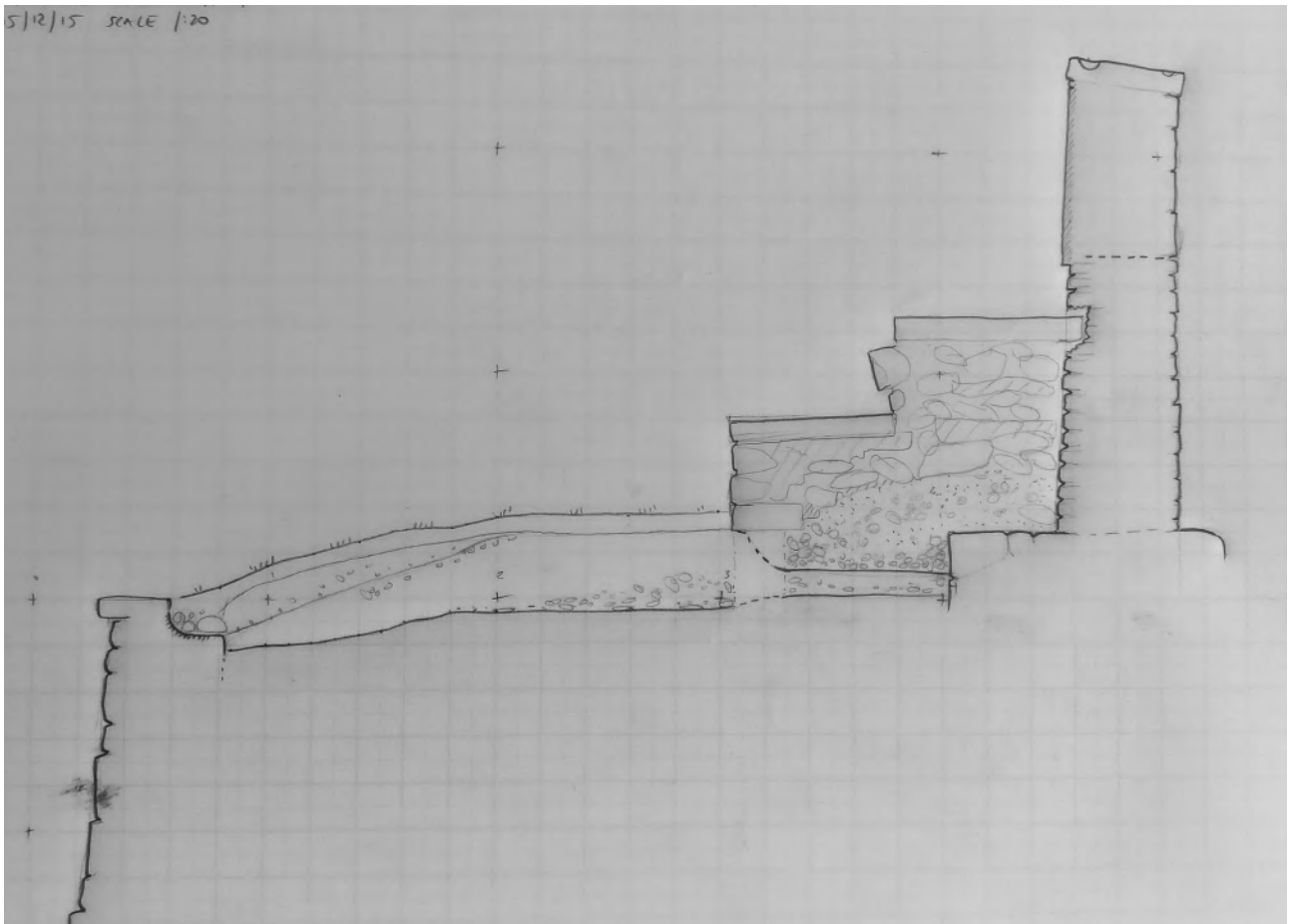
wall.

- Extensive cement repointing and repairs were carried out on the stepped parapet walkway and the rampart retaining wall. This work attempted to address the significant subsidence that caused the collapse of segments of the walkway. Part of the parapet walkway was replaced with concrete steps in Area C. The openings leading to the external squinches were covered over with cement.
- The cavaliers were converted for use as guncotton stores. Plans for this work are housed in the Military Archives (IE/MA/MPD/AD119294-001). Buttresses were added to the cavaliers and they were rendered with cement. The northwest cavalier (Area C) was completely rebuilt in concrete for use as a cordite store (Arnold 2008, 13).

These discoveries will have implications for the OPW consolidation works proposed for early 2016.



c. 1800 gun emplacement





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