

THE MILLBANK PENITENTIARY: EXCAVATIONS AT THE TATE GALLERY (NOW TATE BRITAIN), CITY OF WESTMINSTER

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SUMMARY

An archaeological watching-brief and excavation carried out by AOC Archaeology at Tate Britain, City of Westminster (site code MBK 97) revealed the remains of Millbank Penitentiary which occupied the site between 1812 and 1890. The penitentiary comprised six pentagons surrounding an inner hexagon with a chapel at its centre; it was three stories high, with basement cells in some of the pentagons. Millbank was the first 'super-prison' of its day. The archaeological investigation revealed segments of Pentagon 6, which would have accommodated the prisoners' cells, and the inner hexagon which was occupied by civilian offices. The remains of the prison were substantially truncated by the construction of the Tate Gallery. The archaeological evidence largely related to the exterior walls of the prison and its large concrete raft foundation, the first of its kind in Britain. Some internal structures were also recorded, including a relatively well-preserved segment of the inner hexagon which revealed internal room divisions, a corridor and part of a network of culverts that removed water and sewage from the penitentiary to the perimeter moat and ultimately to the River Thames. Millbank Penitentiary was eventually abandoned and demolished, being superseded by the construction of Pentonville and other centralised prisons.

INTRODUCTION AND CIRCUMSTANCES OF EXCAVATION

An archaeological watching-brief and excavation at Tate Britain was conducted by AOC Archaeology Group in advance of the redevelopment of the north-west quadrant of the Gallery (Fig 1). Tate Britain lies on the north bank of the Thames (TQ 3003 7857) and is bounded to the east by the Millbank embankment, to the south by Atterbury Street, to the west by John Islip Street, and to the north by various office buildings. The Centenary Development site was located in the north-west quadrant of Tate Britain and comprised an open courtyard area surrounded by various galleries and workshops. The development involved the construction of a new approach to the gallery from Atterbury Street and a new basement level within the quadrant area.

The archaeological investigations commenced in 1997–1998 with an archaeological watching-brief on geotechnical investigations (Fig 1). The investigation comprised 12 test pits, varying in size, spread across the development site. The test pits revealed the structural remains of Millbank Penitentiary, including sections of the large concrete base that supported the entire structure, thick exterior walls, internal corridor walls, brick and flagstone surfaces, and brick culverts (AOC



Fig 1. Site location

1998). Three further phases of archaeological investigations were subsequently undertaken at the site: a watching-brief on the general ground reduction and other intrusive ground-works; a watching-brief on the ground reduction and excavation work for the new entrance; and an open area excavation within the courtyard area of the Gallery.

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Prehistoric

With a few exceptions, most of the prehistoric

material from the area surrounding the site has been recovered from the Thames, often as the result of dredging operations. Bronze Age weapons, thought by some to have been deliberately deposited in the water as votive offerings, are possibly the most common single class of prehistoric object from the Thames. A leaf-shaped sword was recovered during the early 19th-century excavation for the foundations for Millbank Prison (GLHER No. 081252); however due to the date and circumstances of the find, no exact location or description can be determined.

Roman (c.AD 43–450)

Westminster is something of a conundrum in the study of Roman London. It is postulated that it was possible to ford the Thames between Lambeth and Westminster, and it has been suggested that this could be the site of the first Roman crossing of the Thames (Margary 1955). While this is possible, there is currently a lack of conclusive evidence supporting this theory (Perring 1991). The archaeological record in the surrounding locality does, however, suggest Roman utilisation of the wider landscape, for example, at Thorney Island (approximately the area now covered by Parliament Square and Westminster Abbey), to the north of the site (Thomas 1993).

There is only one known discovery of Roman date within the immediate study area: a partially burnished Antonine greyware vessel found between 1901 and 1910 ‘in Millbank Prison’; the prison no longer existed at this point, and it seems most likely that it was recovered during the construction of the extensions to the Tate at this time. A further possible indication of Roman activity on the site is an ‘orange-brown roof tile fragment’ found in a layer of peat buried beneath 650mm of clay in Probe 3 (Gallery 18) (AOC 1997). Its presence within the alluvial material suggests that it must be of some antiquity, and its description suggests that it could be Roman.

Saxon (c.AD 450–1066)

During the early medieval period the site area was known as Bulinga Fen (MoLAS 1996) and was clearly still marshy, although it may have been in pastoral or agricultural use during this period. To the north-west of the site, the place name ‘Tothill’ is thought to be of Saxon origin and is possibly connected with the use of a (no longer extant) mound near Horseferry Road as a watch hill (Pepper 1996).

Medieval (c.1066–1485)

The place-name ‘Millbank’ is believed to derive from the Westminster Abbey mill (probably itself of medieval origin) which was demolished around 1736 by Sir Robert Grosvenor to make way for his house

(Weinreb & Hibbert 1983, 534). By the end of the Saxon period a complex of buildings had developed at Westminster, following the construction of the Palace and Minster by Edward the Confessor. The Domesday Book indicates that the Abbey estate had pasture to support 11 teams of oxen, an estimated 250 acres out of Westminster’s total of 1000 acres. The Domesday Book also records 41 cottagers with gardens, probably largely situated on the fringes of the higher ground and along the river (Sullivan 1994).

The Tothill Fields area, in the south of the modern day borough of Westminster, is likely to have comprised market gardens and dispersed settlement along parts of the riverside, with the remaining area likely to have been waterlogged and marshy waste ground, used for rubbish disposal (Watson 2002). Excavations at 1 and 17 Elverton Street (just over 500m north-west of the site) recorded scores of animal burials dating to the 15th century, largely of horses but including a few dogs (Cowie & Pipe 1998). There is no evidence of settlement activity within the site area during this period. The site would have remained part of Westminster Abbey’s extensive properties until the dissolution of the monasteries in the 16th century.

Post-medieval (c.1485–modern)

Henry VIII assumed direct royal control of Westminster Abbey in 1539 and granted it cathedral status by charter in 1540, simultaneously issuing letters patent establishing the Diocese of Westminster. (In 1579, Elizabeth I re-established Westminster as a ‘Royal Peculiar’ and made it the Collegiate Church of St Peter.) At the same time, Henry vacated Westminster Palace and moved north to Whitehall, confiscated from Cardinal Wolsey, leaving the palace as the seat of government. These two changes quickly led to the transformation of the landscape of Westminster. By the 1640s Westminster had spread well south of Great Peter Street, and Market Street, and the future Horseferry Road, had been formed.

18th-century cartographic evidence, including a plan of 1720 produced by William Stukeley, suggests that a Civil War star or tennille fort was constructed in the area of the site but no archaeological evidence has yet

been recorded for this structure. Otherwise the area of the Tate Britain site is thought to have remained undeveloped and likely still marshy waterlogged ground. Indeed Tothill Fields is recorded as having been so marshy that it was possible to go duck shooting there as late as the early 1800s, whilst it was still undeveloped enough for various fringe and illicit activities — bearbaiting and duels — in the 18th century (Watson 2002).

During the late 18th century the ideology of the prison as a concept, as well as a physical structure, was evolving, and a competition for the design of a penitentiary was held in the 1780s. In 1810, a select committee of the House of Commons was established, under the chairmanship of George Holford, to examine the laws relating to penitentiary houses. The committee proposed the establishment of one purpose-built penitentiary that would promote reformation through religious reflection and labour (Brodie *et al* 2002, 60). The new penitentiary was to epitomise the committee's desire to create a stronghold for the seclusion and isolation of the prisoner within a reforming environment (Brodie *et al* 2002, 59).

John Howard, High Sheriff of Bedfordshire, and architect William Blackburn were leading figures in the drive for prison reform. Howard's key themes were separate sleeping cells, which were to be clean and dry, airy buildings, a good diet, and classification and separation of prisoners by sex, age and crime (Brodie *et al* 2002, 33). The philosopher and jurist Jeremy Bentham also campaigned for prison reform; his ideas involved the construction of a Panopticon, a large rotunda in which all of the cells were arranged around the outside of the structure, with an inspection area in the centre (Brodie *et al* 2002, 58). In this layout, the prisoners and the guards would have been watched at all times by those within the inspection area. The prisoners would have been kept separate, working in their cells, and would only have left their cells to visit the chapel.

Although Bentham was actively involved in choosing Millbank as a location and carrying out initial works on site, it was not his design that was used in the construction but a design by William Williams, in consultation with Thomas Hardwick. A number of long delays and set backs meant that it was not

until the end of 1812 that the construction of the perimeter wall commenced but by the summer of 1813 the first group of prisoners was admitted. Horwood's map of 1813 shows the new Millbank Penitentiary. However by 1816 cracks were appearing in the walls and floors and a section of the outer wall sank. This forced the demolition and rebuilding of three towers of one wing and the section of outer wall (Griffiths 1875, 34). Robert Smirke was brought in to investigate the problems with the construction. He found a number of fundamental flaws, such as too narrow and shallow footings and the poor construction of the main sewer which allowed Thames water back into the building (Griffiths 1875, 35). Smirke established new techniques for the concrete footings using load-bearing foundations of lime concrete mixed in measured quantities. He was also among the first to make consistent use of load-bearing cast-iron beams in domestic (as opposed to industrial) architecture (Crook 1965, 8); Griffiths (1875) states that there was now 'more stuff below ground than above at Millbank'.

By the end of 1821, the prison was completed. The former deputy governor of the penitentiary, Arthur Griffiths (1875, 26), described it as:

The Penitentiary; as it is still commonly called, looks on London maps like a six-pointed star fort [Fig 2]. The central point is the chapel (circular building), with open space around it, covering more than half an acre. A narrow building, three storeys high, forming a hexagon, surrounds the chapel, with which it is connected at three points by covered passages. The chapel and the hexagon create the centre circle from which several bastions of the star-fort radiate. Each of these salients is pentagon in shape, of which six lie at opposite sides of the hexagon. The pentagons are the prisoners' cells, while the inner space in each is about two-thirds of an acre containing airing yards, grouped round a tall central watch-tower. The ends of the pentagon join the hexagons at certain points called junctions. The whole space equals about seven acres and something more than that amount is included between them and the

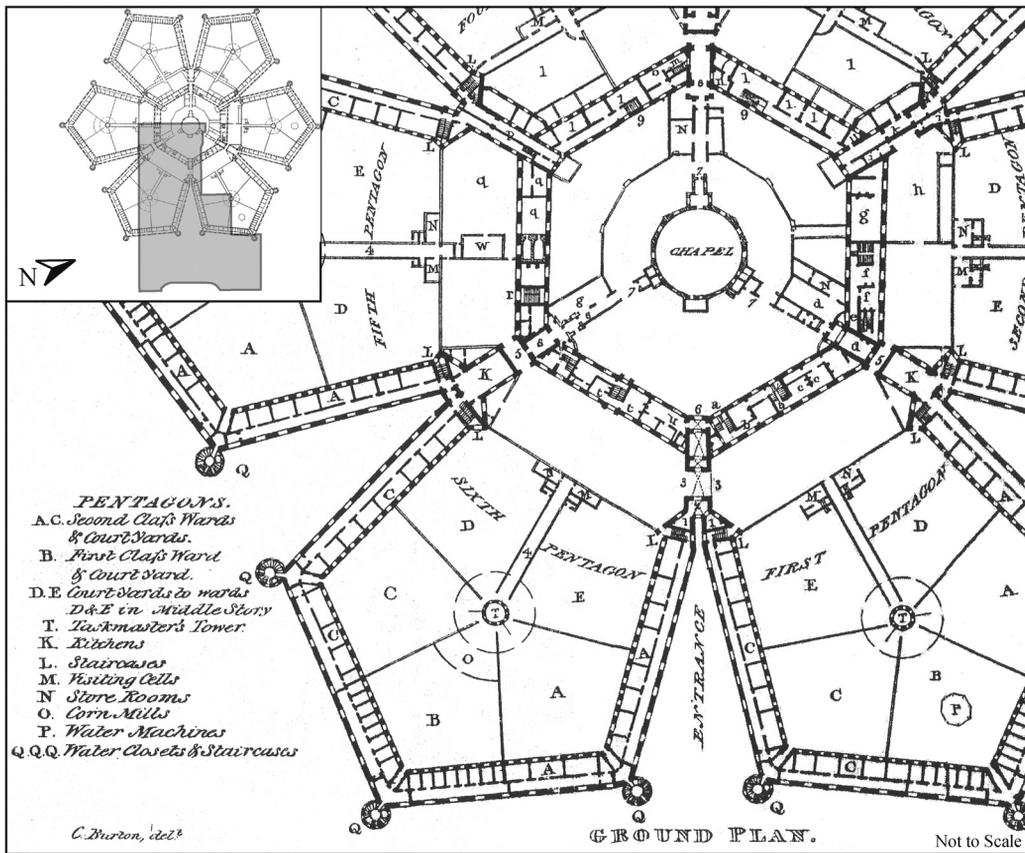


Fig 2. Millbank Penitentiary from 'An Account of the Millbank Penitentiary', George Holford, 1828. Insert shows Tate Gallery layout overlying prison plan

boundary wall, which takes shape of an octagon and beyond which was a moat now filled up.

He also remarked that (Cieskowski 1986, 39–40):

hidden amongst its hundreds of cells, its length of corridor and passage, beneath its acres of roof, are, without exaggeration, miles of lead piping, hundreds of tons of iron, immense iron girders, gates in dozens — some of wrought iron, some of cast — flagstones without end, shiploads of timber, millions of bricks. If ever the old place comes to be pulled down, the anxious enquirer may perhaps understand why it was that it cost half a million of money.

The reforming aspirations of the prison were

soon confounded by reality and in 1842 it became a transit point for prisoners being sent to the Antipodes. After being held at Millbank for a few weeks, the prisoners would be transferred from the adjacent river wharf to Gravesend, where they would await the ships that would carry them round the world. The prison, having become an unhealthy environment and derelict, was abandoned in 1890. Its ultimate demolition was to make way for Henry Tate's National Gallery of Art in 1892. Tate's Gallery was opened in 1897 as the National Gallery of British Art. Over the years there have been numerous extensions, most recently the Clore Gallery in 1982–86.

GEOLOGY AND TOPOGRAPHY

The site is situated some 150m north of the

River Thames and stands on deposits of Shepperton Gravels (recorded at -1.9m OD), which were deposited under cold climate conditions during the late Devensian period. The gravels were overlain by alternating layers of bedded clay silts and organic-rich sediments, reflecting successive changes in sea-level. Current ground level, composed of made ground, varied in thickness from 6.00m to 1.50m at *c.*3.8–4.8m OD.

RESULTS

Prehistoric

During excavations along Atterbury Street, a deep test pit was excavated revealing a 4.7m-deep section of geological stratigraphy. The section revealed 2.3m of made ground associated with the development of both Millbank Penitentiary and the Tate Gallery. Below this layer was a series of alternating bedded clay-silts and organic-rich sediments. These deposits are typical of water lain floodplain sediments found elsewhere in the Thames area and probably represent shifts between phases of mud flat (sub-tidal/inter-tidal) environments and phases when alder carr or reed swamp dominated the local environment. The organic-rich sediments contained well-preserved plant remains (including wood, stem and leaf material) in certain horizons in addition to well-preserved insect remains. Environmental samples taken from peat exposed during geotechnical investigations in 1998 were subjected to C14 dating. The results of this dated the deposit to 2σ 2580–2280 cal BC, cal BP 4529–4229 (Lab GU-7503, 3930 ± 60 , $\delta^{13}\text{C} = -28.9\text{‰}$) in the Late Neolithic period, within a period of marine regression (Bates & Whittaker 2004). No associated finds or features relating to this period were recovered from the site.

Post-medieval: Millbank Penitentiary

The majority of archaeological deposits dating to this period are associated with the construction, use and demolition of Millbank Penitentiary. The majority of the evidence recorded on site related to Pentagon 6 and the inner hexagon (Fig 3). The largest and most informative phase of archaeological work was the open area excavation in which

external and internal walls, corridors, rooms, and drainage culverts were recorded.

Concrete foundations

By the time Robert Smirke was employed on the project in 1816, the foundations constructed by Thomas Hardwick and his successor John Harvey were already sinking. By May 1816 little more than one third of the building had been constructed and what was complete was already subsiding (Crook 1965). Smirke's foundations took the form of a large concrete raft, which he called a stratum of grouted gravel. The concrete was composed of gravel and sand with inclusions of brick and tile fragments mixed together with lime water to form a lime concrete. It was thought that the concrete had been laid in courses measuring approximately 6in (0.15m) (Crook 1965); however the investigations on site recorded the concrete in courses measuring 0.3m. This technique had been tried and tested on at least eight structures in France, *eg* Toulon Harbour *c.*1748, but had only been experimented with in Britain (Crook 1965).

The true depth and expanse of the concrete used in the construction was not fully recorded in any of the excavations on site, due in part to the truncation caused by the Tate Gallery foundations but also to the extreme depths to which the foundations were established: 'At Millbank Smirke's foundations were crude in application and unnecessarily deep — as much as 18ft (5.50m) in places' (Crook 1965). The foundation was recorded to a maximum thickness of 2.6m and the largest exposed area of the foundations recorded was 11.34m+ wide. The use of timber in the construction of the foundations was also apparent from the impressions of timber still remaining on the faces of the concrete.

The concrete raft was reputed to have been constructed across almost the entire area of the prison, which would have reduced the costs by avoiding narrow trenching (Pasley 1826). However the recording of two possible construction cuts in two of the geotechnical test pits, TP 8 and TP 26, both of which were excavated to the natural alluvial clay, might suggest more localised excavations for the construction of the foundations in some cases.

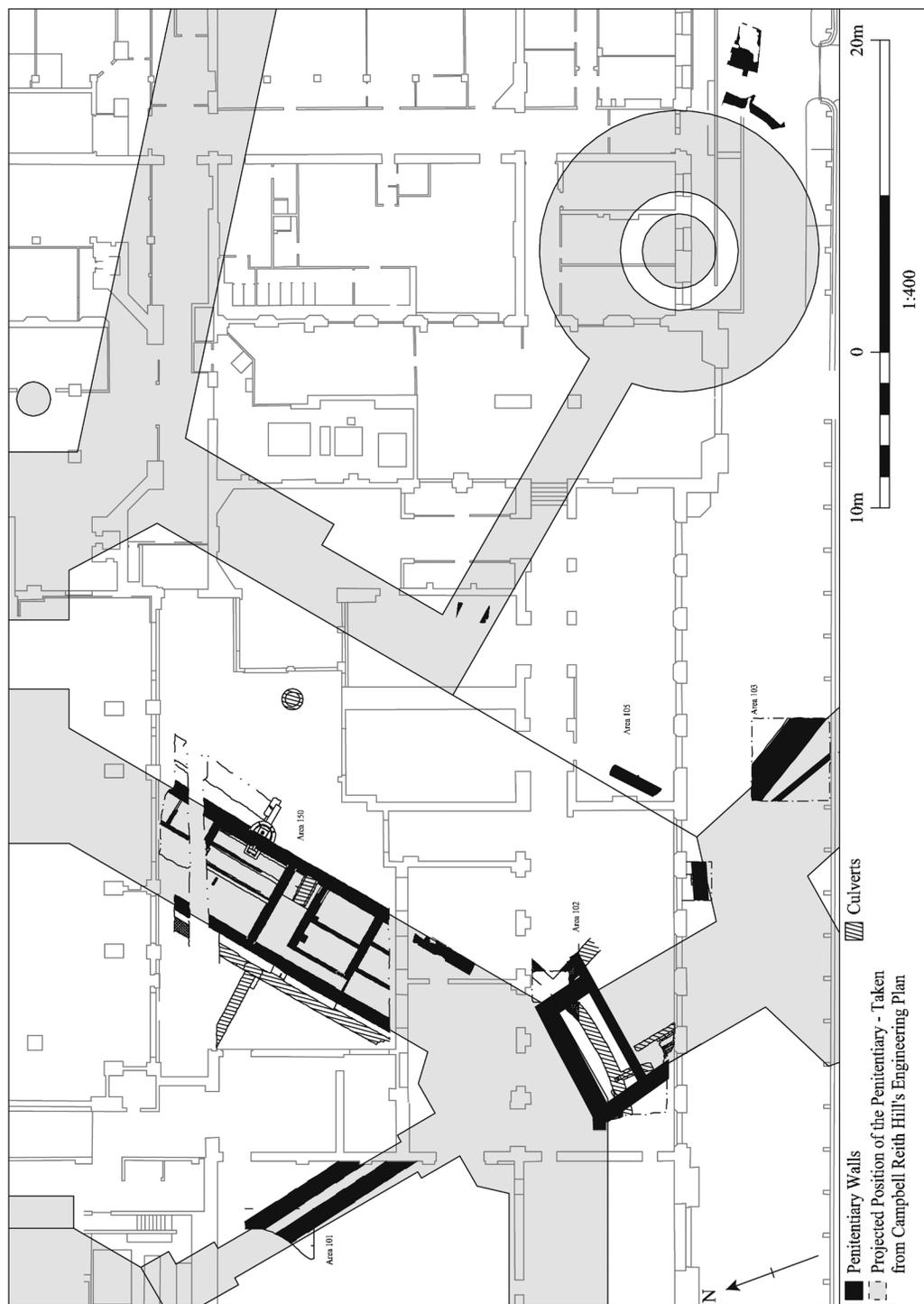


Fig 3. Detailed plan showing all planned archaeological features

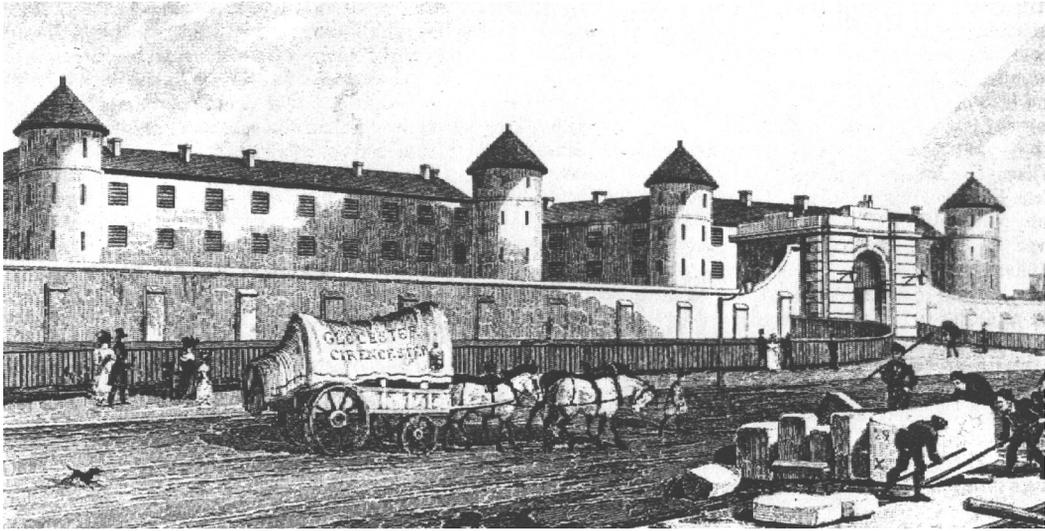


Fig 4. Millbank Penitentiary, engraving by J Tingle, published in 1829 by Jones & Co, London

Penitentiary structure

Mayhew and Binny (1862) in their account of criminal prisons of London write that upon arrival the layout of the prison 'gives it the appearance of a gigantic puzzle; and altogether the Millbank prison may be said to be one of the most successful realizations, on a large scale, of the ugly in architecture, being an ungainly combination of the mad house with the fortress style of buildings, for it has a series of Martello-like towers, one at each of its many angles, and was originally surrounded by a moat, whilst its long lines of embrasure-like windows are barred, after the fashion of Bedlam and St Luke's' (Fig 4).

Exterior walls

Evidence relating to the exterior superstructure of the penitentiary was first recorded during the watching-brief on the geotechnical test pits in the form of red brick walls bonded with a white mortar of sand and lime. The walls observed during this phase relate to Pentagon 6 and the inner hexagon of the penitentiary.

The open area excavation (Area 150) revealed the most complete remains relating to the superstructure of the prison — part of the inner hexagon surrounding the central chapel (Fig 5). External walls [150/001]

and [150/018], measuring 15.80m and 16.60m respectively, ran parallel to each other, approximately 6m apart. The walls were constructed of red bricks (100 x 215 x 70mm), laid in English bond and bonded by yellow and white sand and lime mortar. The walls were 0.65–0.7m thick, widening to 0.7m and 0.83m at the base, and survived 0.84–1.5m high.

The remains of one of three internal corridors, which led directly from the central chapel through the inner hexagon to the pentagons, was revealed in both TP 27 and the subsequent ground reduction (Area 101) (Fig 3). The remains of the corridor consisted of two red brick walls bonded with sand and lime mortar, cut directly into the concrete base. The walls measured 1m thick and were spaced 0.7m apart. This narrow corridor would have been used on a daily basis as the prisoners travelled to and from their daily sermons. In the watching-brief Area 102, approximately 12m south of the corridor, three external walls were recorded relating to both the inner hexagon and Pentagon 6. All three walls were built into the concrete base; they formed a sub-rectangular area 8.6m long by 4.2m wide and 0.36m deep. The walls, which were composed of red brick, are thought to have formed the gap between the southern exterior wall of the inner hexagon and the northern exterior wall of Pentagon

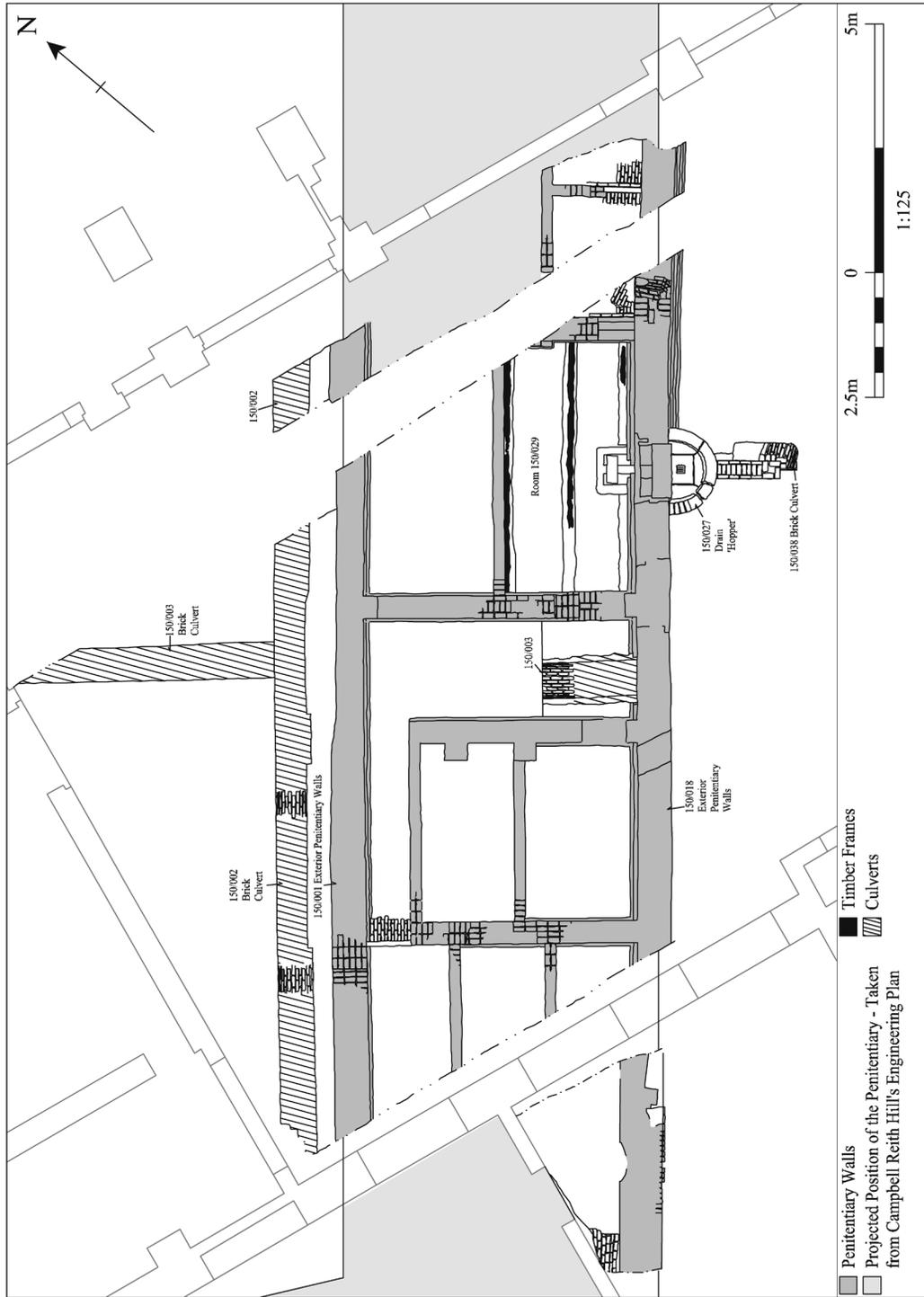


Fig. 5. Excavation Area 150, showing the internal remains of the inner hexagon

6, which would have formed part of the outside yard between the two buildings, whilst also forming the archways for the above mentioned corridor linking Pentagon 6 to the central chapel area.

Although Millbank Penitentiary was not built according to Bentham's panopticon design (rather it was constructed along the lines of the isolation principle), the architects of Millbank did try to incorporate the idea of inspection areas within their design and Taskmaster Towers were located in the centre of each pentagon to allow monitoring of the prisoners whilst they were exercising in the airing yards. Excavations along Atterbury Street revealed the remains of the circular Taskmaster Tower of Pentagon 6. The remains consisted of a 2.6m-wide curved external wall and a 0.6m-wide internal wall. Both were constructed of red bricks bonded with pale grey sandy mortar. There was also evidence of a patchy mortar and plaster surface, which is likely to be the remains of an internal floor.

Similar exterior walls were recorded in other phases of watching-briefs (Areas 103 and 105) which related to the Pentagon 6 superstructure. In most cases, only a small proportion of these walls remained due to

the high level of truncation following the construction of the Tate Gallery; however the construction type and composition were consistent throughout.

Internal structure

The design and construction of the internal space of the penitentiary was guided by the ideas of supervision, control and reform of the prisoners through solitary reflection, isolation and strong Christian practices. The passages were narrow, the cells were solitary and barren, hard labour was employed through water machines and treadmills in the corn mills, and church sermons and religious guidance were strictly enforced. Unfortunately the archaeological works on site did not reveal any of the cells or the later larger workrooms and associated rooms, which might have expanded our knowledge of the internal layout of the pentagons. Only the internal arrangements of the inner hexagon which housed offices were observed in the open area excavation (Fig 5).

The space between the two large exterior walls was sub-divided by brick walls into small rooms and a passageway (Fig 6). Thick (0.44m wide), load-bearing walls

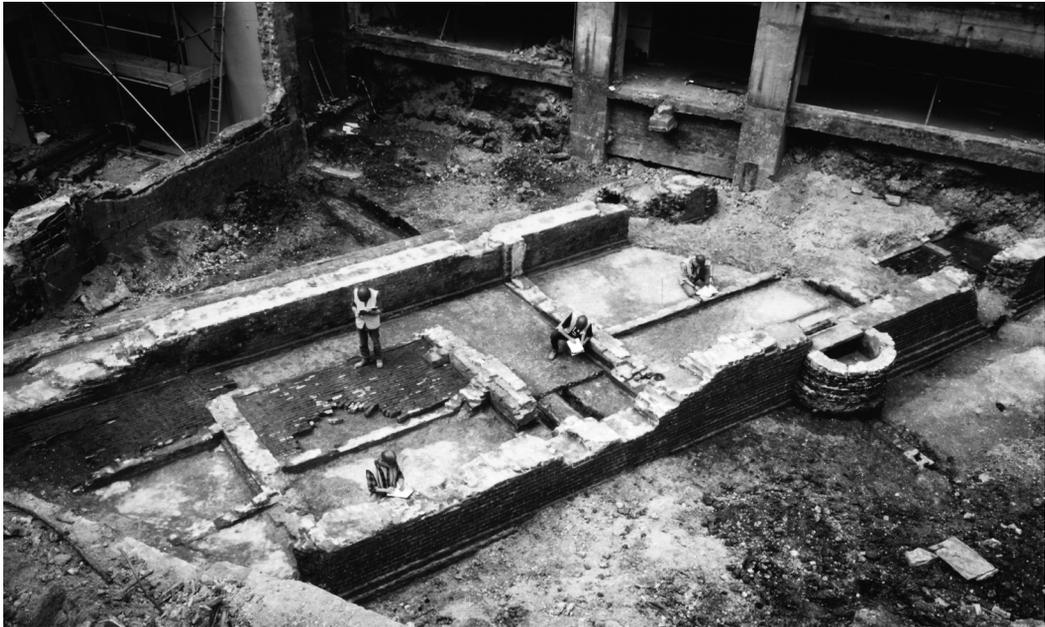


Fig 6. Excavations of the inner hexagon

braced the structure between the two external walls, whilst individual rooms were formed by thinner (0.22m) partition walls. With the exception of one room, all of the floors, including those of the corridor, were composed of brick. In places, the floor had been removed, probably during the demolition of the prison, exposing a thin bedding layer of sand. This brick flooring was also observed in a watching-brief south of the excavation area, which exposed more of the inner hexagon. In this area, room [150/029] did not contain any of the brick flooring. In its place were the remains of three wooden floor joists, measuring 5.0m by 0.20m. The joists were set into shallow trenches, approximately 0.03m deep, which ran the length of the 5.0m by 2.6m room. The joists probably represent either the foundations of timber flooring (which might suggest that this room was for someone of importance) or a framework for a staircase. The prison plan (Fig 2) indicates the presence of a staircase in the approximate location of the excavation; however the absence of any further structural remains means that the purpose of the timber frame is uncertain. A brick structure excavated towards the southern edge of the room could have supported a stone slab onto which a stove or heater may have been installed to provide heat for the room. However no evidence of any soot or ash was recorded, which might have been expected in a room containing a stove. It seems more likely that this feature had a structural function, possibly relating to the timber joists.

The inner hexagon did not contain prisoner cells but housed the offices of the Governor as well as numerous civilian offices which would have been occupied by the surgeon, clerks, matrons, messengers, chaplain, laundry, bake house and storerooms. Unlike the cells within each pentagon which were located in a single line on the inside of the range, with the passageway around the outside, the internal layout of the inner hexagon was organised with rooms grouped into small blocks with an associated passageway (Fig 2) (Brodie *et al* 2002, 60).

Further evidence relating to the internal features of the prison was limited. The watching-brief investigations toward the south-west of the site revealed the fragmentary

remains of a badly damaged brick floor that was probably associated with the structure that joined Pentagon 6 to Pentagon 5, whilst a flagstone floor was recorded on the eastern side of Pentagon 6. It is unclear whether the isolated occurrence of flagstones represents a repair or is perhaps an example of the flooring used within the cells or corridors of the pentagons.

Culverts and drainage

Drainage was very important on this site due to its proximity to the River Thames. The management of water and sewage from the penitentiary was controlled by a network of brick culverts that would have drained the water and sewage away from the structure into a large moat which was constructed around the entire penitentiary. Evidence of the culvert network was revealed in several of the phases of work on site. An east-west-aligned brick culvert [29/015]/[150/002] was recorded in both Test Pit 29 and the open area excavation; this was 16m long, 0.6m wide and 0.7m deep. A similar culvert [150/003] ran north-south through the excavation area crossing beneath [150/002] (Fig 7). Both culverts were constructed using a double layer of bricks and were circular in section. At the crossover point between the two culverts, a square-shaped conduit probably allowed drainage from [150/002] into [150/003]. These culverts possibly formed a drainage 'ring' around the inside of the inner hexagon, removing waste water and possibly sewage away from the penitentiary. A second possible drainage 'ring' was recorded in watching-brief Area 102 (Fig 8). Culverts [102/011] and [102/012] were joined together to form a T-junction where culvert [102/012] drained into culvert [102/011]. A third and later circular brick culvert [102/015], recorded to the south of the T-junction, would have drained into [102/012]. Culvert [102/012] continued to the north and was recorded in the excavation area as [105/038] outside the inner hexagon. This 'ring' would probably have formed the second group of culverts in the network, constructed around the outside of the inner hexagon.

Evidence of other culverts was recorded on site, although they were not as well preserved.



Fig 7. Intercutting culverts 150/002 and 150/003

An east–west-aligned culvert recorded approximately 20m to the south-east of the above complex ran on a similar alignment to culvert [102/012]. This may represent a further ‘ring’ of culverts continuing outwards towards the moat. The location of the moat lay outside the investigation area; however excavations conducted by AOC Archaeology Group in 2004 on the grounds of the former Army Medical College (Atterbury Street) revealed the location of the moat running east–west towards the southern limits of the site (Edwards 2007). The moat appears to have been backfilled towards the end of the 19th century.

Other forms of drainage were also recorded on site in the form of a square drain, perhaps a later addition or alteration to the culvert network, and a small box drain abutting the exterior Taskmaster Tower wall, recorded during the watching-brief adjacent to Atterbury Street; the latter probably represents drainage specifically for the removal of rain water from the guttering above, which would have drained into the larger culvert system and away from the penitentiary site.

Drainage and water management were key aspects in the design of a penitentiary. John Howard had already established that sewers were not to be located beneath the structures but were instead to be placed under the yards

(Brodie *et al* 2002, 33). This idea appears to have been utilised at Millbank, as the culverts were located in the yard area between the inner hexagon and the outer pentagons and between the inner hexagon and the chapel. The inclusion within Millbank of water machines, corn mills, laundries, bake houses, pump rooms and engine room would have required access to large quantities of clean water. The culverts and drains of Millbank would have had to manage a large volume of water as well as protecting against tidal rises from the Thames. The original scheme to establish clean water for the penitentiary was to excavate a well, which would have provided access to a local spring; this was abandoned when the water was claimed to be impure. Instead a mains line was created taking water from the Thames (Griffiths 1875, 30). Only on one occasion did the site flood as a result of inundation from the Thames (Griffiths 1875, 30). This occurred prior to Smirke’s alterations on the site and one might assume that this was also prior to the culvert system. There is no contemporary or historical reference that documents any major issues with the drainage on site; Griffiths (1875) notes that there was not a spot of dampness observed. Later additions to the drainage are likely to reflect internal changes that occurred sporadically in line with legislation, such as the installation and

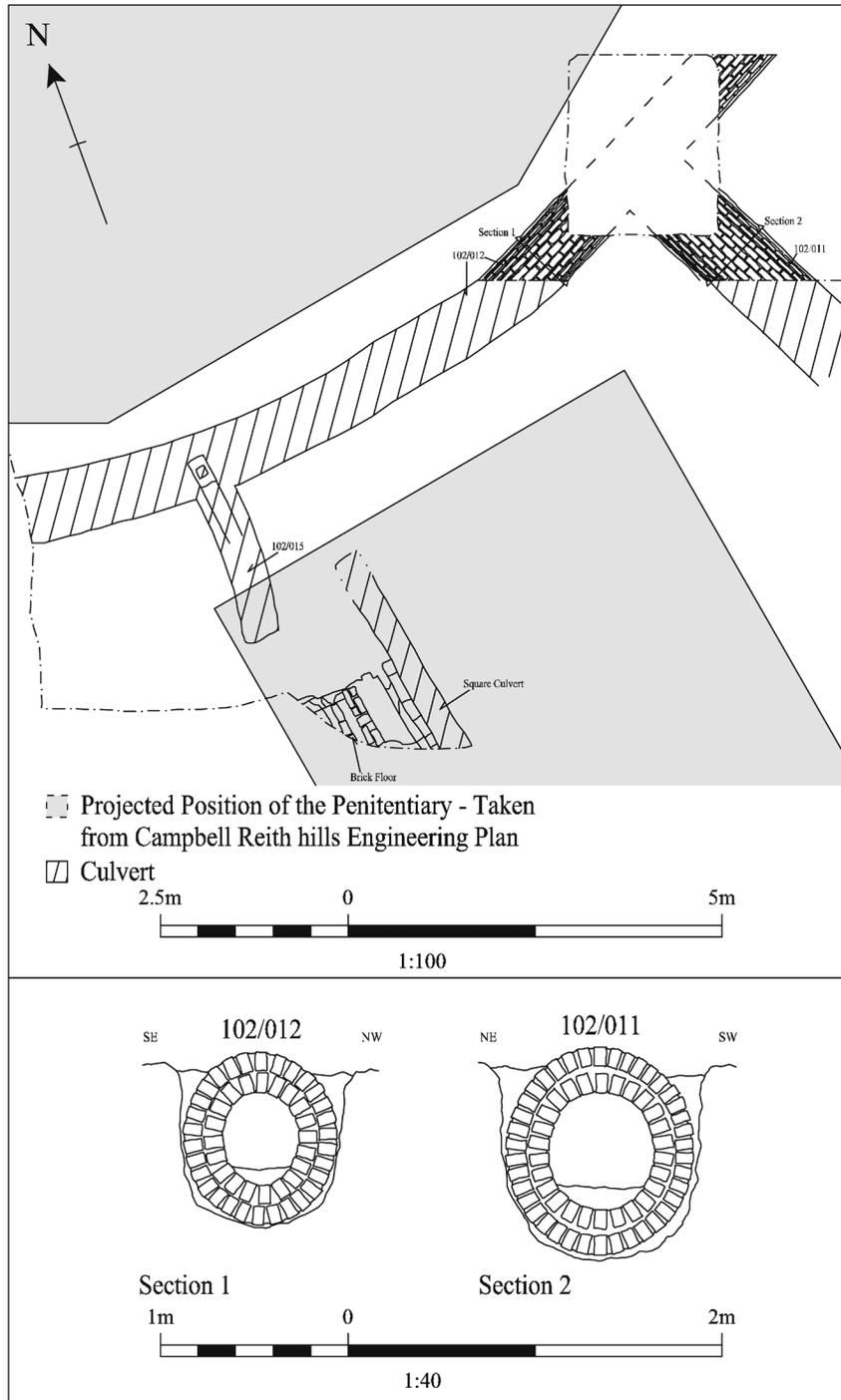


Fig 8. Plan and section of intercutting culverts

later the withdrawal of basins and toilets in cells. Other additions are likely to have been part of the constant upkeep of the prison.

Alterations

The most notable alteration observed on site was within the open area excavation (Area 150). A small semi-circular structure [150/027] was added to the southern exterior penitentiary wall. The structure was brick-built with a base layer constructed from York Stone slabs into which a small iron grate was set. It probably functioned as a drain 'hopper', restricting the movement of rain water as it drained from guttering above so that it could then drain through the grate into a box drain, which would in turn have drained into a culvert. A window was also inserted into the southern exterior wall, directly above the drain 'hopper'. The window was 1.4m from the base of the wall and the sill was 1.08m long and occupied half the thickness of the wall. The remains of a wooden window frame were also recorded across the northern part of the wall, on the inside of the sill; only two very decayed timbers remained of the frame, one upright, truncated to the same level as the wall, while the other lay horizontally across the back edge of the window sill. Towards the northern edge of the window sill was a rectangular void. At the base of the void was a channel which ran towards the outside of the building. The void is thought to have accommodated some sort of trough and the channel, which ran underneath the window sill and the drain 'hopper', is likely to have run directly into the abutting box drain. The purpose of this feature is unclear. It is possible that the void and channel are associated with a drainage system linked to the function of the room, such as a sink. If this was the case, the construction of the window and the outer drain 'hopper' may suggest that the room had changed function, requiring more light and ventilation and improved drainage.

An undated circular brick soakaway [150/048] recorded approximately 9m south of the inner hexagon may also have been part of later alterations. The structure had an internal diameter of 1.2m and was more than 1.98m deep (not fully excavated). It was constructed using a single width of red

brick and circular drainage pipes fed into the chamber. On the outside of the feature was the remains of a copper strap lightning conductor. The conductor was recorded to a depth of approximately 2.1m OD, where it passed through a rough hole in the brickwork and continued down into the inside of the structure. This feature lies in the middle of the yard between Pentagon 6 and the inner hexagon and may have been added to supply water or drainage to either the workrooms located within the penitentiary or as an additional drainage tool for the removal of excess water.

The purpose of these alterations remains unclear; however it is possible that they were carried out as a reaction to 'gaol fever'. In 1823, scurvy (a deficiency in vitamin C) was recorded on site affecting half the prisoners (Griffiths 1875, 57); this led to outbreaks of dysentery and diarrhoea. Those who worked in the kitchens and the staff remained unaffected. It was suggested that the close proximity of the marsh or dampness within the penitentiary may have caused the illnesses; however investigations by Doctors Roget and Latham revealed that it was the reduction in the food rations provided to the prisoners that was the true cause (Griffiths 1875, 61). Several months later a new disease attacked the inmates. The disease, which attacked the stomach, was not identified. Instead it seemed that some prisoners suffered from cholera, some from dysentery, whilst others had spasms and delirium. Once again it was speculated that the penitentiary itself was to blame, *ie* lack of clean air and stagnant moat water, or the cold winter. An Act was passed in Parliament which allowed the removal of the inmates to other prisons or boat hulks to allow them to recover. Millbank was left empty for several months whilst plans were developed for its further use; better ventilation was required, the structure was completely fumigated with chlorine, the moat would now feed into the Thames, additional stoves were placed in several pentagons, the diet was reorganised, the prisoner labour would be improved with extra crank mills and water machines, more schooling and better lighting, using candles rather than gas lamps, were provided (Griffiths 1875, 90). However, these changes did not prevent another case of dysentery

in 1841 (Griffiths 1875, 236) and this last illness led to the infilling of the moat and the abandonment of waste distribution directly outside the building. It was not until after these changes were made that it was finally acknowledged that the consumption of Thames water was to blame for the sickness and shortly afterwards the prison was closed and the buildings became a temporary depot.

The construction of the penitentiary had been costly and, as Griffiths (1875, 56) states, 'Here was a building upon which half a million had been spent, and now, when barely completed it proved uninhabitable! Money cast wholesale into a deadly swamp, and all the talk of reformation and punishment to give way to coroners' inquests and deaths by a strange disease'. The two main alterations recorded appear to be in line with the Parliamentary Act. The drain and window would have established more light, better hygiene and water management.

Post-Penitentiary

In 1885 the failing prison was earmarked for public housing by a Royal Commission and by 1886 Millbank had ceased to hold inmates, eventually closing in 1890 (Brodie *et al* 2002, 60). The 'gloomy and depressing institution' was demolished in 1903 (Ward & Lock 1904, 327). The truncated and half demolished remains of the penitentiary itself are evidence of this, as are the layers of demolition rubble which covered the site. This rubble consisted of broken brick, heavily corroded ironwork, shards of thick corrugated window glass, splintered timber and other miscellaneous demolition debris. The corrugated glass may have been part of the fenestration of the penitentiary but due to its presence within a mixed deposit, this cannot be confirmed. This material was probably the unsalvageable debris that was used to landscape the site following the demolition of the prison.

DISCUSSION AND CONCLUSIONS

Prior to the construction of prisons designed under penal reform, the most common form of detention in the 17th and early 18th centuries was a small lock-up which would be

used to hold individuals for a night or two (Brodie *et al* 2002, 20). Market place gaols, medieval castle prisons and prisons located in city gates were used to house inmates, but again for a short time only. 'Bridewells' and Houses of Correction were used to house vagrants, debtors and petty criminals, whilst the majority of crimes were settled by the use of fines, punishment or death (Brodie *et al* 2002, 12). This meant that there was little demand for large-scale prisons. However by the late 18th century, the rise in crime necessitated the construction of larger institutions. At this time prison construction varied little from domestic construction, as was the case with Bath Prison, which architecturally looked like a Georgian townhouse (Brodie *et al* 2002, 25). Newgate Prison, constructed in 1770–1783, was a national prison and gaol for the City of London. The prison was rebuilt in an attempt to create a new and better designed prison; however, as the rebuild was carried out prior to the new wave of penal reform, the prison failed to provide satisfactory segregation of prisoners and the block-based structure suffered from poor lighting and ventilation (Brodie *et al* 1999, 5). The free movement of prisoners, visitors, spectators and staff within the buildings (a practice abandoned in later prisons) also brought in diseases from the outside and the presence of vermin further encouraged the spread of diseases (Markus 1993, 119).

During the late 18th century John Howard became a spokesman for prison reform. It was his published writings that led to Parliamentary Acts issued to reform the penal system; fundamental changes within prison designs were already in place prior to the construction of Millbank, as a result of the 1779 Penitentiary Act. This had a profound effect, as it established a strategy for prison function, according to Howard's reforming principles of solitary housing, hard labour and religious instruction. Each prisoner would have their own individual cell whereas previously they would have shared large rooms (Brodie *et al* 1999, 7). Howard's model prison was the Maison de Force in Ghent, which was built for Count Vilain XIII by Montfeson in 1772 (Markus 1993, 121). Each prisoner had their own cell, each separated class had their own airing yard, each block was located above

ground on raised arches, and the chapel and guards were located centrally; this allowed surveillance of the prisoners during yard time, although not when they were within their cells. Howard's visits to American prisons inspired further modifications, in the form of strategically placed observation posts which allowed surveillance of the prison wings, whilst complete silence and segregation of the prisoners enforced reflection and reform. William Blackburn also used the principles set out by Howard in prison design, whilst modifying the layout of the prisons from more conventional block-based or courtyard layouts, to polygonal or radial layouts, *eg* Ipswich and Liverpool. These would allow greater flexibility and also good visibility between prison staff and the inmates (Brodie *et al* 2002, 52).

The demolition of prisons and their rebuilding, *eg* Shrewsbury Prison, appear to have been preferred to large-scale alteration, and the 'model' prisons at Gloucester and Stafford were also designed according to isolationist principles (Brodie *et al* 2002, 45). Later prisons attempted to prevent infection by building detached reception areas and healthcare facilities, enforcing the washing of inmates and clothes on arrival, and creating on-site hospitals and isolation wards (Brodie *et al* 2002, 153).

At the time of its official opening in 1821, Millbank was the largest penitentiary in Europe. The expense was enormous and the construction audacious but it became a legendary landmark during its lifetime (Cieszkowski 1986) — the composition of the concrete and Smirke's innovative use of concrete as a foundation raft being the first of its kind in Britain. The importance of the concrete was demonstrated in 1903 when a specimen was placed in the Munich Museum of Masterpieces of Natural Science and Technical Arts at the request of the German ambassador (Crook 1965). More recently Millbank Penitentiary became the focus for an episode of Channel 4's 'Lost Buildings of Britain' (Episode 6, aired 30 August 2004), due to its celebrated size, design and construction and its strict reforming policies.

However, the construction of Millbank was unfortunately carried out whilst the principles of penal reform were still being

established. In many ways it upheld many of the reformers' principles such as separate cells, religious instruction and hard labour. The design, however, had major drawbacks: the layout was too complicated, which led to staff becoming lost, it was difficult to patrol, and it was extremely expensive. The observation towers located within the yards only allowed observation during exercise rather than whilst the prisoners were in their cells. The tower would, however, have dominated the internal yard and been an imposing presence, emphasising the prisoners' feeling of 'being watched'.

The massive exterior walls of the penitentiary were recorded throughout the archaeological investigations. Although the remains were often fragmentary, the results of the archaeological work matched historical accounts of the prison layout. Of particular interest with regard to the construction of the prison and its use of space were the two parallel walls that would have formed one of the three entrance corridors into the inner hexagon and the central chapel. The corridor was narrow, only 1.20m wide, which would only have allowed movement in single file, restricting movement from the cell all the way to the chapel and reinforcing the prisoner's solitude. This was continued within the chapel, as the prisoners would have been kept separate from each other by being seated in individual booths. The internal space of a segment of the inner hexagon was revealed in the open area excavation where eight individual rooms, divided by narrow red brick walls, and a corridor were recorded. All but one room contained evidence for brick floors; the exception contained the remains of wooden joists possibly for a wooden floor. The room layout for the inner hexagon differed significantly from the room layout for the pentagons, reflecting use as civilian offices rather than for housing prisoners. Historical accounts of the time describe the Governor's room as 'an ordinary, but neat apartment, the furniture of which consisted principally of a large official writing-table; and the end window of which, facing the principle entrance, was strongly barred, probably with no view to prevent either egress or ingress, but merely for the sake of being in keeping with the other windows of the establishment'

(Mayhew & Binny 1862). The prisoners' cells reflected the philosophy behind the creation of the prison. Historical accounts describe the cells as having a 'solitary window, which, like all the cell windows, looked towards the "warders tower", in the centre of the pentagon', underneath 'was a little square table of plain wood, on which stood a small pyramid of books, consisting of a Bible, a Prayer-book, a hymn-book, an arithmetic-book, a work entitled "Home and Common Things", and other similar publications of the Society for the Promotion of Christian Knowledge'. The cells also contained a washing tub, a wooden stool, a hammock and bedding (Mayhew & Binny 1862).

The proximity of the prison to the River Thames, its location within a low-lying area and the hard labour equipment on site meant that a substantial arrangement of culverts and drains was required to drain away waste water and sewage. Two large culverts recorded in the open area excavation probably formed part of a drainage 'ring' or network of culverts that ran around the inner hexagon. Further culverts were recorded elsewhere on site which probably relate to second and third culvert 'rings' which would have continued to drain the water and sewage away from the penitentiary, initially towards the perimeter moat and eventually into the River Thames.

By the 1840s Millbank prison was in a poor state, with dysentery epidemics and rioting. By 1842 the new Pentonville Prison was opened which would now shoulder the responsibility of prisoner reform. This model prison encompassed all of the reform principles of the previous hundred years. The radial layout was arranged so that each prisoner had their own cell, watched by staff, who were watched by the governor. Individual segregation was also maintained in the airing yards and the chapel, which had individual pews. Silence was strictly enforced. Millbank Prison became a depot for the transport of prisoners to the Antipodes; this continued until 1871 when transportation ceased. Millbank was gradually replaced by new, centralised prisons such as Pentonville and Brixton and by 1890 the prison was abandoned (Cieszkowski 1986). Its ultimate demolition was to make way for Henry Tate's National Gallery of Art in 1903.

ACKNOWLEDGEMENTS

The author and AOC Archaeology Group would like to thank the Trustees of the Tate Gallery for commissioning and generously funding the investigation, analysis and publication. Thanks are due to Alan Froud of the Tate for his support during the publication process and to Catherine Cavanagh and Diane Walls of GLAAS for their advice and support. Thanks are due to Campbell Reith Hill for supplying the Engineering Base Plan. Thanks are also due to Karl Hulka who supervised the on site archaeological work.

The author would also like to thank Martin Bates and Lucy Whittingham for their specialist contributions. Thanks to the excavation staff: Paul Fitz, Karl Hulka, Diccon Hart, Tony Howe, Al Telfer, Al Harper, Jo Wood, Dan Swift and Darryl Palmer. Illustrations were by Jonathan Moller. The report was edited by Ron Humphrey and Melissa Melikian.

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