Colonial Singapore:
Archaeological vs. Historical Records
The Fort Serapong Case Study

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Abstract

The comprehension of Singapore's colonial heritage and history had been predominantly drawn from texts. Adopting a historical archaeology approach to the exploration of the 19th and 20th century colonial past provides a much-needed different perspective from material cultural remains to interpret and evaluate the past. Archaeological research undertaken in Singapore at Fort Canning, Empress Place, Old Parliament House, Parliament House Complex, Colombo Court, the Padang, and St.Andrew's Cathedral had so far focused on pre-colonial origins of the island, with the historic study of the 19th and early 20th century colonial period in Singapore under-researched and under-explored.

Historical archaeology drawing its sources from both documentation and material remains, has a special ability to address issues that concerns recent evolutionary history such as internationalism, racism, class development and maintenance, mass consumption and consumerism; and more directly related to the Fort Serapong site, changes in military technology, architectural theory, construction methodologies, and the effects of industrialization. The archaeological investigations at Fort Serapong, Blakang Mati will serve as a case study in examining a colonial period site through the lens of the historical archaeologist, and illustrate the potential of archaeology to provide new interpretation and dimension to a site where historical records exist.

Chapter 1

Introduction

1.1 Historical Archaeology

Historical archaeology embraces the interests of a diverse group of scholars representing the disciplines of anthropology, history, geography, folklore, and material culture studies. [1] In North America, Australia, and New Zealand, historical archaeology is described as the archaeology of the most recent past - from approximately AD 1500 to the present - meaning that it is concerned with the material remains of the modern period. [2] One particular focus has been the archaeology of European settler societies and colonies, as distinguished from the archaeology of indigenous inhabitants.

These sites document early colonial settlements, predominantly European, and their effects on indigenous peoples, as well as the subsequent spread of the frontier, immigration of other ethnic groups, and later urbanization and industrialization. By examining the physical and documentary record of these sites, historical archaeologists attempt to discover the fabric of common everyday life in the past and seek to understand the broader historical development of their own and other societies.

There is a measure of debate concerning whether the subfield of historical archaeology should be part of history or anthropology. [3] In most parts of the world, archaeology is seen as a separate discipline or as a tool for unearthing a past defined essentially as history. In Singapore there is no

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1 For most up to date and recent discourse on the applications of the discipline see Hicks and Beaudry's *The Cambridge Companion to Historical Archaeology (2006)*. Also Elizabeth Scot's *Those of Little Note (1994)* for a highly specialized application to understanding gender, race and class through the material record, demonstrating historical archaeology's ability to contribute in a very focused field.

2 In Europe, particularly in the United Kingdom, it is generally referred to as Post-medieval archaeology (circa AD 1450-present). Post-Medieval Archaeology traditionally refers to a period that ends c. 1750, but increasingly includes the 18th and 19th centuries. In the United Kingdom, archaeologists have also begun to engage with archaeologies of the very recent past of the 20th and 21st centuries leading to the emergence of the field of contemporary archaeology. Some refer to the study of the last 200 years as Industrial Archaeology. See Hicks and Beaudry for succinct explanation on these various subfields and sub-subfields.

3 Written 15 years ago when the sub-discipline was trying to break out of the medieval mould in the United Kingdom, Barbara Little's *Text-Aided Archaeology (1992)* still raises important issues on the historical archaeology's allegiance.

clear delineation as the discipline of archaeology has been constantly threading a thin and wobbly line of existence since its inception. [4]

1.2 Archaeological Research in Singapore

The year 1984 saw the birth of archaeology in Singapore and over the course of two decades, archaeological research in Singapore has expanded from its original site at Fort Canning to a total of thirteen excavated sites. [5] However the research question posed by archaeologists in Singapore has traditionally been identifying pockets of the pre-colonial 14th century settlement of Temasek or Singapura. These sites are all located within the present day colonial and civic districts.

A few sites of the colonial period were addressed. The first was in 1989 at Duxton Hill where a brief excavation was undertaken in one of the back lanes. The focus in the 1990s switched back to recovering pre-colonial data by the Singapore River. After this hiatus other colonial sites soon followed, the old palace of the Sultan of Singapore at Istana Kampong Gelam being the next major effort in 2000 with sporadic excavations continuing into 2003 during the retrofitting of the site into a museum. The excavations at the Padang in April 2003, and St.Andrew's Cathedral from 2003 to 2004, albeit primarily aimed at pre-colonial ancient Temasek remains, recovered significant amounts of colonial period material. Following the dig at St.Andrew's Cathedral, came the excavation of the late 19th century Fort Tanjong Katong between 2004 to 2005. Interest in investigating the colonial period continued to rise and 2006 saw the record excavation of four new sites ranging from the mid 19th century to the last quarter of the 20th century.

Investigations were carried out in early 2006 at the compound of the Wang Hai Da Bo Gong Temple at Palmer Road, as well as the hillock to its rear formerly known as Mount Palmer where a 19th century fort (unsurprisingly named Fort Palmer) once stood. In the later part of the year

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4 After 24 years of archaeological undertakings in Singapore, there are as yet no regulations or legislation requiring archaeological investigations at sites under threat of development. Singapore is the only country in Southeast Asia without any regulatory body responsible for archaeology! Archaeology in Singapore, as when it first started in 1984, is still dependent on voluntary independently led efforts.

5 The sites are: Fort Canning, Empress Place, Colombo Court, Parliament House Complex, Old Parliament House, Singapore Cricket Club (Padang), St.Andrew's Cathedral, Duxton Hill, Istana Kampong Gelam, Fort Tanjong Katong, Palmer Road, Neil Road House, and of course Fort Serapong. Several additional sites have been surveyed revealing little archaeological remains; Pulau Tekong, Pulau Ubin, the Southern Islands, Bras Basah Park, Drama Centre, National Museum of Singapore, Keppel Marina, and Sentosa Shoreline. See John Miksic's *Archaeological Research on the "Forbidden Hill" of Singapore: Excavations at Fort Canning 1984 (1985)*; Avieropoulou-Choo's *Report on the Excavation at Fort Canning Singapore (1986)*; and the *Fourth Intra-ASEAN Archaeological and Conservation Workshop in Singapore (1987).*

another urban site at 157 Neil Road was excavated, and an aboveground built archaeology programme studied the architectural and material culture remains of the site. The bulk of the year was spent on Sentosa island undertaking the largest site on Mount Serapong. A shoreline survey with limited excavations was also conducted within the impact zone of the upcoming integrated resort on the island. The field work conducted at these sites highlighted the vast gaps within the historical (ie. documented) record, amplifying the enormous number of colonial period Singapore sites of which little or nothing is known.

1.3 Objectives of Thesis

The arrival of the first Europeans, immigrant settlers, and development of the early trading settlement; Singapore's subjection to Crown administration when the charter lease of the East India Company ran its course and the Company closed its doors; the brief period of military occupation under the Japanese Sphere of Asiatic Co-Prosperity, and the rising post-Second World War tide of nationalism, are vital benchmarks in the history of Singapore. Along with historical documentation of the past charting the island's evolution into a trading center, to what extent can the archaeological record provide a disparate dimension to these known milestones? Will colonial period archaeology be subservient to the discipline of local history, serving as but a handmaiden to the historic field?

The comprehension of Singapore's colonial heritage has been predominantly based on textual documentation and records. Archaeological investigations will provide the much needed material cultural remains to interpret and evaluate existing historical documentation. Perhaps it would be more accurate to indicate that this thesis is essentially exploring the archaeology of the colonial period – or more precisely the historical archaeology of a colonial period military installation in Singapore, seeking to provide the student of the past with another dimension in which to reconstruct the socio-political and economic lifeways of the 19th and 20th centuries.

The study of military sites like Fort Serapong can provide an important means of analyzing the behavioural patterns and cultural expressions of status within a society. As military sites are easy to define archaeologically, and are usually relatively compact social, cultural and physical units, they are ideal for intensive survey and excavation. The archaeological analysis of military sites can also offer unique perspective on the behavioural aspects of the cultures in conflict. Military sites, particularly forts and fortifications, have long been of interest to historical archaeologists.

One of the most often touted military archaeology site is perhaps the Little Bighorn Battlefield National Monument in Montana USA, where an extensive archaeological investigation was

undertaken for over a decade from 1985-1996. The site yielded thousands of cartridge cases, bullets, army equipment, clothing fragments, Native American artifacts, and some skeletal remains of soldiers who died on 25th June 1876. The computer-assisted analysis of the distribution of artifacts on the battlefield yielded information about how the combatant groups utilized the terrain. Firearms identification analysis of the thousands of recovered bullets added substantial knowledge about the role of the firearm in the battle. Most importantly, the archaeological investigation demonstrated in considerable detail how Colonel George Cluster's 7th Cavalry was outnumbered, outgunned and outfought by the Native American adversaries. Similarly, at the 1877 Nez Perce War site of Big Hole Montana, archaeology revealed information that supported Native American oral history and interpretation of the battle events, and demonstrated that the US Army battle accounts were somewhat exaggerated. [6] As with Fort Serapong, the work focuses on identifying the remains of the site and determining positions which were unrecorded or poorly documented in the historical record.

This thesis fundamentally hopes to achieve two objectives: the production of the preliminary report of the Fort Serapong Archaeological Research Project, and to illustrate the potential of archaeology as a discipline to interpret the more recent colonial past, traditionally considered as being the domain of historians.

1.4 Case Study in Colonial Archaeology: Fort Serapong Archaeological Research Project

Interest in Fort Serapong first developed during the archaeological investigation at Fort Tanjong Katong (2004-2005). [7] Both forts had at one point in their evolution emplaced a pair of Elswick Vickers Armstrong 8 inch breech loading guns, not a standard artillery piece of the British coast defence artillery. In Singapore, a total of four such 8 inch guns were emplaced in 1885 and the lack of any archaeological remains pertaining to its emplacement at Tanjong Katong, naturally led to enquiries on the only other installation mounting them – Fort Serapong.

What was known of the history of Fort Serapong was based on a few historical records and eyewitness accounts of the site. Known sources were insufficient to determine how much of the fort underwent upgrading and re-development during its 90-year-long existence between 1879 and 1968, and it was not known which of the remains on Mount Serapong are of Second World War vintage, and what date back to earlier periods. Likewise, little was known about the fort's impact on the local communities and the lives of the soldiers who garrisoned the fort in the 19th

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6 Fox R.A.Jr and Scott D.D. *The Post-Civil War Battle Field Pattern (1991).*

7 See Lim Chen Sian *Fort Tanjong Katong Raising History Planting Roots Project Preliminary Site Report (2005).*

century. The fort's role as Blakang Mati's command center during the battle for Singapore in 1942 had also been forgotten. Fort Serapong was to receive its baptism of fire in the Battle for Singapore during the Second World War, and perhaps the investigation of the fort will add another layer of understanding to the military history of Singapore.

Fort Serapong did not exist in isolation, but was closely related to the other forts of Singapore. Its range of fire was designed for overlapping coverage in coordination with other batteries. Fort Serapong shared the same make and caliber of armaments with Fort Tanjong Katong, the only two forts in the entire British Empire to deviate from the standard coastal artillery weaponry of the time. During the earlier period, Fort Serapong was believed to have emplaced 8 inch guns, and upon upgrading to larger caliber weapons, the barrels of the old 8 inch guns were apparently buried on the hill. A pair of these was uncovered in the 1960s but another barrel still remains unaccounted for.

On the regional and international level, Fort Serapong together with its sister forts grew out of the perceived threat of rival European powers in the region. The industrial revolution, advances in steamship technology, and opening of the Suez Canal made Singapore the most important and largest coaling station for the Empire in the Far East, not only for the fueling of the Royal Navy but also the merchant marine, the latter being the lifeline of trade and economics for Singapore, the Strait Settlements, the Dutch East Indies, the Commonwealth, and the British Empire at large.

Essentially this thesis serves primarily as the preliminary report of the archaeological investigations undertaken at Fort Serapong, detailing the general findings to date. A more comprehensive social-political interpretation of site activities is pending with the on-going artifact analysis, and the final site report will be produced at a later date.

1.5 Archaeological and Historical Background

1.5.1 Pre-European Contact

The etymology of Blakang Mati is somewhat obscured and several generally accepted theories abound. They generally centred round the morbid nature of death, and some theorized that it was the outbreak of small pox or malaria wiping out the inhabitants that gave the island its dark name. Yet others tell of victims of the pirates who flourished in the seas around Singapore, being led to the site and executed. Another variant of the pirate stories says it was the site of a battle between the peaceful inhabitants of neighbouring Pulau Brani and the pirates. [8]

[8] See entry on Pulau Blakang Mati in Victor Savage and Brenda Yeoh's *Toponymics: A Study of Singapore Street Names (2003).*

In truth very little is known about Blakang Mati prior to the arrival of the Europeans. The very name itself, "Blakang Mati" in Malay meaning "Death from Behind" or "Behind the Dead", is ominously sinister, perhaps lending credence to the stories about pirates that prowl the vicinity. There may be some truth behind the tales of pirates. The earliest record of the straits separating Blakang Mati from Singapore island, was by a 14th century Chinese trader-traveler who wrote of how sailing past the navigation landmark "Long Ya Men" (Dragon Tooth Gate) would also bring the vessel into the dominions of the pirates. [9]

> "The strait runs between the two hills of the Dan-ma-xi barbarians, which look like 'dragon's teeth'. Through the centre runs a waterway….the inhabitants are addicted to piracy….When junks sail to the Western (Indian) Ocean the local barbarians allow them to pass unmolested but when on their return the junks reach Ji-li-men (Karimon), the sailors prepare their armour and padded screens as a protection against arrows for certainty, some two or three hundred pirate prahus will put out to attack them for several days. Sometimes (the junks) are fortunate enough to escape with a favouring wind; otherwise the crews are butchered and the merchandise made off with in quick time." [10]

There is archaeological evidence of the narrow straits separating Blakang Mati from mainland Singapore being a trade route plied by ancient mariners. The archaeological survey and excavation conducted prior to the construction of the integrated resort on Sentosa island (formerly Blakang Mati and renamed in 1972), ceramic shards dating between the 16th through 19th century, prior to the arrival of the British on Singapore, were recovered along the shore. [11]

Five hundred years later, a Malay account in the *Hikayat Abdullah* speaks of the remains of the unlucky victims of pirates.

> "Now at this time the seas around Singapore so far from being navigated freely by men, were feared even by jinns and devils, for along the shores were the sleeping huts of the pirates. Whenever they plundered a ship or a ketch or a cargo-boat, they brought it into

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9 The actual locality of "Long Ya Men" is still very much debated. A successive number of scholars have argued that the straits separating Blakang Mati and the Singapore main land was what Wang described, with the granite outcrop at the Labrador promontory being the fabled Dragon's tooth. See works by Carl Gibson-Hill (1956) , Kwa Chong Guan (1985), John N.Miksic (1985), and Derek Heng (1997).

10 Kwa Chong Guan, "*Records and Notices of Early Singapore*" p.106 in *Archaeological Research on the Forbidden Hill of Singapore (1985)* by John Miksic.

11 In 2004 a separate archaeological survey was undertaken on the shores at Keppel Marina. Unfortunately much of the locality has been reclaimed and developed since the mid 19th century and nothing significant in terms of findings was reported.

Singapore where they shared the spoils and slaughtered the crew, or fought to the death among themselves to secure their gains…."All along the shore there were hundreds of human skulls rolling about on the sand; some old, some new, some with hair sticking to them, some with the teeth filed and others without…..The sea gypsies were asked "whose are these skulls?" and they replied "these are the skulls of men who were robbed at sea. They were slaughtered here. Wherever a fleet of boats of a ship is plundered it is brought to this place for a division of the spoils. Sometimes there is wholesales slaughter among the crews when the cargo is grabbed." [12]

1.5.2 Early Colonial Period: Cartographic References to Pulau Blakang Mati and Mount Serapong

Little is known about Pulau Blakang Mati prior to the arrival of the Europeans in Southeast Asia, and only a handful of records were found to describe the island of Blakang Mati and its surroundings in the first half of the 19th century. Maps and charts from the 19th century and earlier generally indicate that the island of Blakang Mati was commonly called "Pulo Panjang" or the 'Long Island' before 1827. Carl Alexander Gibson-Hill cited several other names dating from the 17th to the 18th century for the supposed island. A map by the Portuguese Eredia dated to 1604 clearly depicts a locality with the name "Blacan Mati". However, the cartographic representation and surveying accuracy were doubtful in those early manuscript charts. The precise location of the island and hence the names assigned to these islands are of doubtful validity. [13]

A navigational chart dating to 1680 by Captain Wilde is perhaps one of the earliest charts showing some details of the straits between Singapore and Pulau Blakang Mati. Although Blakang Mati is not named on this chart, it is clearly depicted on the bottom edge of the chart, with Pulau Selegu and Sarong Island just offshore. Interestingly, across the straits huts or some form of dwellings are painted on Pulau Hantu and the general vicinity of Bukit Chermin. This may be the earliest chart or map to show of habitation in Singapore (Map 1). [14]

After the arrival of the British and occupation of Singapore, the earliest known survey by the settlement of the area around Blakang Mati and New Harbour was conducted by Captain Daniel Ross of the Bombay Marines in the year 1819. Captain Ross had accompanied Sir Stamford Raffles to Singapore in search of a suitable location for the establishment of an East India

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12 *The Hikayat Abdullah (1970)* translated by A.H.Hill pp.144-146.

13 See Gibson-Hill "*Singapore Old Straits and New Habour*" in *Memoirs of the Raffles Museum No.3 (1956)*. The Eredia map is illustrated on p.54.

14 Illustrated in Gibson-Hill (1956) pp.65-67.

Company factory. In the chart which he produced in February 1819, he named the island 'Island of Goa' (Map 2). [15]

In 1827, Captain Ross returned to Singapore to conduct a more detailed survey of the New Harbour, and several charts were produced from this survey. The most important feature of these charts is the naming of the island. Captain Ross named the entire island 'Blacan-mattee' (Map 3). [16] Before Captain Ross' survey in 1827 and the charts arising from this survey, the island was named 'Pulo Panjang' or variants of this name meaning 'Long Island'. The 1822 chart by Captain James Franklin of the Bengal Cavalry had the island as 'P. Panjang'. An anonymous chart dating between 1725 and 1750 found in the University of Leiden had the island as 't lang eijlandt', meaning 'Long Island'. [17]

Captain Edward Lake of the Madras Engineers, who was appointed the Inspector General of Works for the newly formed Straits Settlements in his *Report on the best means of fortifying Singapore* had proposed the name of "Island of St. George" in about 1827 (Map 4). [18] Throughout the 1820s and 1830s, the hill now known as Serapong was not labelled on most charts and maps. Captain Ross simply had it as the "Highest hill on Blacan-mattee" in his charts from 1827. Correspondences dealing with George Drumgoole Coleman's topographic survey of Singapore dating from 1829 had the island as "Blakang Matti" but the hill was not mentioned nor named. [19]

In 1841, John Turnbull Thomson was appointed the Government Surveyor of the Straits Settlements. He started a series of detailed surveys around the New Harbour area. He was apparently the first person to record the name of "Serapong" for the highest hill on Blakang Mati Island. His estimate for the elevation of the hill was 301 feet. [20]

Apart from cartographic sources, the earliest known record after the establishment of a settlement at Singapore, of Europeans visiting the Blakang Mati vicinity was by Lieutenant Colonel William

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15 Similarly, J.W.Norie's "*A New Chart of the Straits of Malacca and Singapore*" 1815, depicts an island in the vicinity of Blakang Mati as 'Goa Island'. See also Norie's 1831 edition of the same title for comparison.

16 "*Survey of Harbour Near Singapore*" 1829 and "Straits of Singapore, Durian and Rhio Admiralty Chart No.1336".

17 See catalog heading under "*Map of the Riau and Lingga Archipelago*". Bodel Nijenhuis Universiteitsbibliotheek Leiden.

18 *British & Indian Armies in the East Indies (1984)* by Alan Harfield, pp.143-147 and 190. The plan reproduced by Harfield actually is a later plan map made by Samuel Best in 1843 who based his work on Captain Lake's 1827 plan.

19 George Coleman was appointed government surveyor in 1827 and served till 1841. From his notebooks in the British Library collection, Coleman had undertaken a survey of Blakang Mati island sometime in 1827 or 1828. Unfortunately either no map was ever produced from the survey, or it has yet to be located. Correspondence with Mok Ly Yng, GIS and map consultant.

20 Thomson produced two editions of "Singapore Town and the Adjoining Districts" 1844 and 1846, also "Singapore New Harbour Admiralty Chart No.2023" of 1851.

Farquhar who visited the southern coast of Singapore Island. On 2nd September 1819, Farquhar wrote to Raffles in Bencoolen and announced that he had found a new harbour to the west of the settlement. However, Raffles remained either too preoccupied with matters in Bencoolen or was unimpressed, and a year later in 1820, Farquhar again wrote,

> "Reports have reached me that it has been asserted and credited in Calcutta that the settlement of Singapore affords no adequate protection for shipping in times of war, I conceive it my duty in addition to what I noticed on this subject in my letter to your address under the date the 2nd September last year to state that the harbour pointed out in that letter situated about three miles to the westward of the Town is capable of affording the most complete protection to ships of the largest size, the only entrances into which from the Eastward and Westward being sufficiently narrow to be defended in the most effectual manner from both shores, where from the nature of the ground being high and commanding the batteries would be quite secure against the fire of the enemy's ship. Inside the harbour there is good anchorage from 15 to 4 fathoms, the latter depth being within pistol shot of a small elevated island situated about the centre of the harbour. The sea is at all times perfectly smooth here, being with the exception of the entrances above mentioned completely landlocked; in short nothing in my opinion is wanting to render this harbour a place of the greatest security in cases of danger from an enemy's shipping, and which will, I have no doubt, should this Settlement ever unfortunately fall into the hands of a foreign power be rendered a position of great strength and importance." [21]

In essence, although Farquhar did not name the high ground in his letter, he is perhaps the first to suggest the establishment of a battery on what can only be Serapong hill.

In 1833, Dr. George Bennett, a naturalist, visited Blakang Mati island and left a brief description of his observations. Interestingly, he referred to Mount Serapong as "Blackan Mattee" and the island itself as "Pulo Panjong".

> "We resumed our little voyage to Pulo Panjong, or Long Island, on which the elevated mount, called Blackan Mattee is situated...We landed on Pulo Panjong, among some neat Malay houses, near a sandy beach. The thatched houses, towering cocoa-palms, plantain trees, with rude plantations of suger-canes, yams etc, reminded me of many of the islands forming the Polynesian Archipelago; and the appearance of half-naked Malays did not tend in any degree to dissipate the reality of the comparison, but rather tended to confirm it. A kind of millet, called Sukue, (*Pennisetum italicum*, Brown) was also cultivated in small patches by the Malays, and several magnificent trees of the *Bombax pentandrium*, or silk cotton-tree, rose in towering beauty, mingled with the cocoa-palm above, the dwellings. Only a very small portion of this island was cleared, the remainder

[21] Gibson-Hill, *Memoirs of the Raffles Museum No.3 (1956)* pp.76-77.

> forming an almost impenetrable jungle, a refuge only for monkeys and wild hogs. We found it very difficult to penetrate the luxuriant and entangled branches of the pine-apple plant, as we walked from one part of the island to another to join the boat, at a very short distant." [22]

Between 1843 and 1846, the Government Surveyor, John Turnbull Thomson, conducted the first topographic survey of island. Earlier, George D.Coleman was reported to have surveyed Blakang Mati in 1835, but to date no map of the island by Coleman has been found. Thomson's 1844 and 1846 maps featured the island with a good portion of it was under pineapple cultivation (Map 5).

Around the same time, Dr. Robert Little, a surgeon practicing in Singapore visited the island.
In 1848 he wrote about the alleged coral miasmic fumes causing the "Blakang Mati Fever" that killed inhabitants of the island. Dr. Little wrote of his investigations on Blakang Mati on the 1st and 6th June 1847.

> "Blakang Mati is a small island about 2 miles to the west of Singapore Town...and it contains about 400 square acres. It is completely cleared of jungle. It may be said to be of an irregular triangular shape, having 3 hills, and betwixt each a valley. The highest hill is called Bukit Serapong (Flag Staff hill), the others have no names....There are 3 villages, Blakang Mati, Serapong, and Ayer Bandera. The inhabitants are of 3 classes, Bugis who inhabit Blakang Mati and Ayer Bandera, and detached houses on the hill; Malays who inhabit Serapong; and a few Chinese in Blakang Mati. The island is skirted by mangroves, and covered with pineapples and fruit trees, principally Jack, Chumpadak, and Guava." [23]

Sometime between Bennett's visit in 1833 and 1843, a flag staff station had been established on Mount Serapong, but due to the high death toll of the keepers, it was removed to Mount Faber in May 1845. Continuing Dr. Little's narrative on death from epidemics and fevers. [24]

> "During my residence in Singapore, now 8 years, this locality has been eminently considered unhealthy, and various reports have reached those living in the town, of the numerous deaths in its scanty population. But as only natives were attacked and died, Europeans not living there, but little attention was paid to the remarkable fact, that so near to one of the healthiest stations in India where remittent fever was not known, there

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22 George Bennett, *Wanderings in New South Wales, Batavia, Pedir Coast, Singapore, and China: being the journal of a naturalist in these countries, during 1832, 1833, and 1834 (1834)* pp.221-222.

23 Robert Little, *An Essay on Coral Reefs as the Cause of Blakan Mati Fever and of the Fevers in Various Parts of the East (1848)* pp.572-3.

24 Little (1848) pp.573-577.

should be an island where remittent fever was endemic to such an extent that everyone who resided there, however short the time, was attacked, and so severe in its type, that nearly all who were attacked died. Of the 3 men, and a superintendent who were attached to the Flag Staff, three fourths regularly died off; but as there men were only convicts, there continued to be regularly scarificed to the carelessness of those who ought to have examined into such wholesale manslaughter, nor perhaps, would these disasterous facts have been noticed, if it had not come at last to this state, that they could not get men to live there. Then, but not till then, was the flag staff removed (c.1845)."

"At Blakang Mati of late the casualities have been quite appalling, Shaik Cassin who was employed as a peon at Blakang Mati, died in June last after a month of residence. He was succeeded by Hingon who died in August; his successor Cadoo Mera died in September, and again Bera Gajee died in November, the latter individual had for several years been employed in the Arsenal, and recently discharged consequent on the transfer of the ordinance department to Fort St.George. The climate appears to that baneful character as to prove fatal to Europeans as well as natives."

"At this time the signal staff establishment had been removed, and only a few inhabitants remained, natives of the Celebes and known as the Orang Bugis of Wadju. In one house we found two men and two women afflicted with fever...3 children were subject to intermittent fever....In another house, also inhabited by the Bugis, were 3 men and 3 women, and 3 children, all had a most sickly appearance...they look gastly, all had intermittent fever, and one child died lately of remittent fever after 14 days sickness."

"Close to this house (at Ayer Bandera) is a sandy promontory which forms one of the horns of the bay, extending into the sea to the distance of 80 yards from the beach covered with mangroves. On this spot some time ago 18 Chinamen lived, occupied in collecting and buring coral, which abounds on each sides. Of these 18, the Bugis told us 12 had died of the fever and the rest left for Singapore in fear and horror. In June 1847, 4 houses (Ayer Bandera) remained tenanted where there had been 10 to 12; while in May 1848 of the four only two remained. The remains of houses are still pointed out by the inhabitants that are left, while they can distinctly enumerate how may of their friends were cut off in this year and that. In other island during my the course of my enquires amongst the natives concerning fever, the frequent answer was,'if you want to find that, go to Blakang Mati.'" [25]

[25] Little (1848) p.577.

1.5.3 Colonial Military Occupation

A review of existing literature relating to Fort Serapong revealed that few studies of the site are available. Most works treated Serapong in passing or simply listed the type of armaments mounted at the site. The earliest work to appear which dealt primarily on the military fortifications of Singapore was S.Kathiravelu's thesis *Fortifications of Singapore*. The 1957 academic exercise presents an introductory overview of the defences of Singapore from 1819 up to the island's surrender in 1942. Apart from several interesting photographs which may have depicted Serapong in the post war period, little else specifically addresses the fortifications on Mount Serapong. [26]

Two decades later, a lengthy article titled *Fortress Singapore* appeared in the 1979 issue of *Fort: Journal of the Fortress Study Group*, a United Kingdom based society of fortification historians and enthusiasts. In it, its author a certain P.K.Yeoh, surveyed and wrote on the large numbers of the forts found on Singapore (more on this work below). [27] The next decade in 1984 saw Major Alan Harfield's publication *British Armies of the East Indies: 1685-1935* which provided a list of fortifications, but his entry on Serapong was mainly limited to a cursory paragraph: [28]

> "At the eastern end of the island, and on Mount Serapong, a small fort was constructed and is first mentioned in the plan of defence dated 1885. The fort was designed to hold two 9.2 inch BL guns and by 1892 the fort had been built and the guns mounted. The posted strength of the Royal Artillery personnel stationed at the fort during that year was thirty-six. Fort Serapong was, like the other land forts, completely self-contained and had facilities similar to those listed for Fort Palmer." [29]

In 1997, Gabriel G.Thomas' academic exercise provided another overview of the fortifications, this time addressing only those found on the island of Blakang Mati. [30] Like its 1957 predecessor, it too did not provide much information on the Serapong site.

Following Harfield's book, two other major works which did examined Singapore's fortifications are Murfett et al. *Between Two Oceans: A Military History of Singapore from First Settlement to Final British Withdrawal*" released in 1999, and Karl Hack and Kevin Blackburn's *Did Singapore*

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26 S.Kathiravelu, *Fortifications of Singapore 1819-1942 (1957)*. University of Malaya, Singapore.

27 Yeoh P.K. "*Fortress Singapore*" in *Fort Journal of the Fortress Study Group No.7 (1979).*

28 Harfield also produced an earlier work titled *Singapore Military Defences in the 19th Century* in 1976. This is a forerunner of his book and not much is provided on Fort Serapong specifically.

29 Harfield p.305.

30 Thomas, Gabriel G. *Fortress: A Military History of Blakang Mati Island*. National University of Singapore Honours Thesis Department of History 1996/97.

Have to Fall: Churchill and the Impregnable Fortress" published 2003. The former provided the most concise and detailed military history of Singapore to date, and illustrated in depth the global concerns, threats and perceived threats faced by the British Empire at large, and how these issues translated into defence policies and ultimately construction of fortifications on Singapore.

Included in this publication is a short appendix titled "*Notes on the Forts of Nineteenth Century Singapore*". Fort Serapong can be found briefly under the section "The Forts of 1878: Fort Pasir Panjang, and Fort Tanjong Katong, Fort Connaught, Fort Siloso, and Fort Serapong". [31]

> "These five forts were built as part of a large-scale extension of Singapore's defences…..Remains of Fort Serapong, overlooking Pulau Brani, also on Sentosa, in the 1980s could be reached by following a paved road through the forest, branching off to the left just before the Corallarium. Although overgrown with jungle, many of the fort's structures could still be observed."

The latter book by Hack and Blackburn is perhaps the closest study to be undertaken which dealt with the core of the fortifications itself, the very heart of coastal artillery defences – the guns, devoting an entire chapter to them. However, this work is limited to the defences of the period leading to and during the battle of Singapore in the Second World War and touched little on the earlier 19th century and pre-World War One fortifications.

Other articles and publication both serious and in the popular press, with titles like *The Famous Wrong Way Guns of Singapore*, [32] provided little and otherwise cursory information on the coastal artillery guns and the forts. Most abound with entertaining but not too helpful descriptions, for example "from behind them shells whizzed overhead from the British 9.2 and 6 inch batteries on the island of Blakang Mati opposite the harbour….every time the gun on Blakang Mati fired, Kathleen Stapledon noticed how the blast flapped her trousers against her legs…" [33] Chiang Ming Shun's *19th Century Coastal Artillery in Singapore* left out the fortifications on Blakang Mati completely, even though the forts were certainly operational in the last quarter of the 19th century. [34] Hence, one can be deemed lucky to retrieve a single sentence devoted to any of the forts, let alone specifically about Serapong.

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31 *Between Two Oceans (1999)* p.333.

32 Eric Alfred, *The Famous Wrong Way Guns of Singapore. Where are they Now?(1985).*

33 Collin Smith's *Singapore Burning (2006)* p.521.

34 Chiang's article appeared in "*Defending Singapore 1819-1965*" *Journal of the Singapore Armed Forces Pointer Supplement (1996).* Chiang was to later expand this article and contributed to Chapter 4 and 5 of *Between Two Oceans (1999).* Other noble but not entirely reliable sources include short histories written by military men for their unit magazines eg. Major G.D. Johnson's anecdotal history of the island "*Blakang Mati (1968)*". Some interesting general military history

The most recent article, appearing on the fortifications and coastal defence of Singapore could be found in "Maritime Heritage of Singapore" published in 2005. Titled "Coastal Defence – Forts, Guns, Guardians and Gods of War", this article is fraught with errors and provides very little useful information for the historical archaeologist to identify the individual sites. [35]

Of all the literature reviewed, the most comprehensive and relevant for the Serapong project was P.K Yeoh's 1979 work. Yeoh's main descriptions of Serapong were based on a series of plans WO 78/3947 and WO 78/4225 obtained from the National Archives United Kingdom (formerly Public Records Office). From the few plans he uncovered, he was able to provide some detailed descriptions of the site, and where he could, attempted to interpret the specific site usage. His article supplied most useful information to the archaeologist like dimensions of gun emplacements, thickness of concrete, length of subterranean passageways, height of ceiling etc.

Yeoh aptly summarized the difficulty in obtaining the relevant material while working with primary records. He stated, "it has turned out to be no more than a spectrum (due to) the chronic lack of information in some cases….the main problem was that, in most cases, there were peaks and lows to describe the proposals in considerable detail and the steps which were eventually implemented. Then a period would occur in which no plans, maps or reports mentioning in any detail what was happening at that battery." [36] Albeit incomplete in terms of charting the chronological evolution of Fort Serapong, with many gaps in the story, but because of his often quite elaborate depiction of the site, his work is very much relevant in assisting the historical archaeologist in providing clues to specific areas to excavate. [37]

As far as it could be ascertained, the knowledge of Fort Serapong prior to archaeological field work was as elaborated above. Certainly no archaeological investigations have ever been undertaken on Blakang Mati Island and the project marks the very first attempt of adapting a historical archaeology approach to the site. The challenge was the determination required not to only excavate the great quantities of primary sources in the form of historical correspondences, diaries, gun manuals, plans, and maps that are in the depositories and institutions in Singapore

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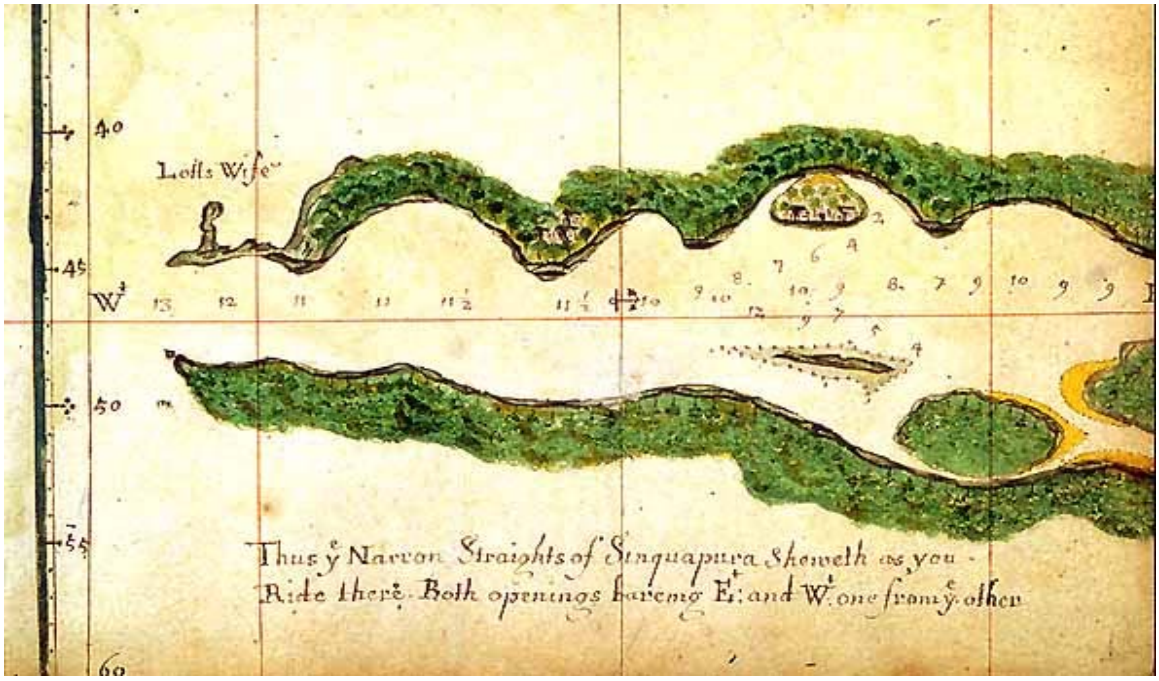
information can also be found in Makepeace et al. *100 Years of Singapore (1991)* where a whole chapter was devoted to military matters of the 19th and early 20th centuries. Likewise, Winsley's *A History of the Singapore Volunteer Corps (1938)* provides some allusions to the forts on Blakang Mati.

35 The authors Irvin Lim and Roy Muthiah appeared to have extracted much of J.Clements erroneous 1981 article "*Isle of Peace: Blakang Mati – Island Fortress of Singapore*" in *Journal of the Royal Artillery Vol.CVIII No.2(1981).*

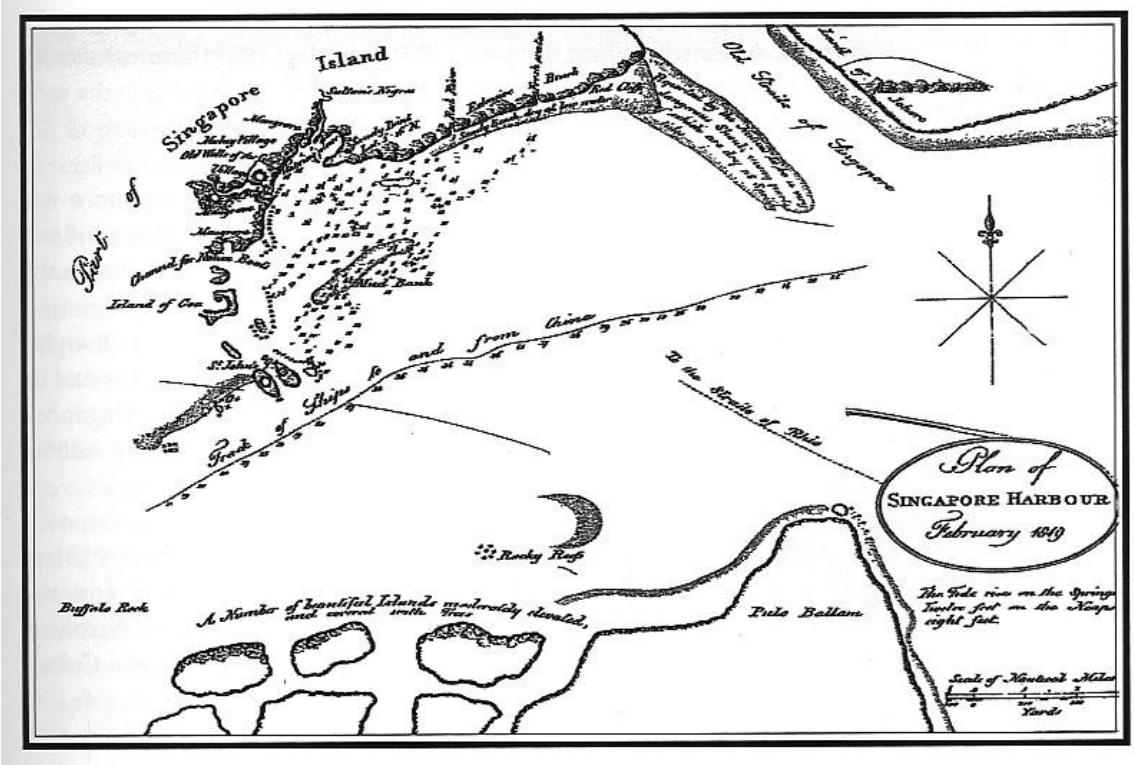
36 Yeoh (1979), p.24.

37 An extract of Yeoh's relevant entries on Fort Serapong is reproduced in Appendix 2.

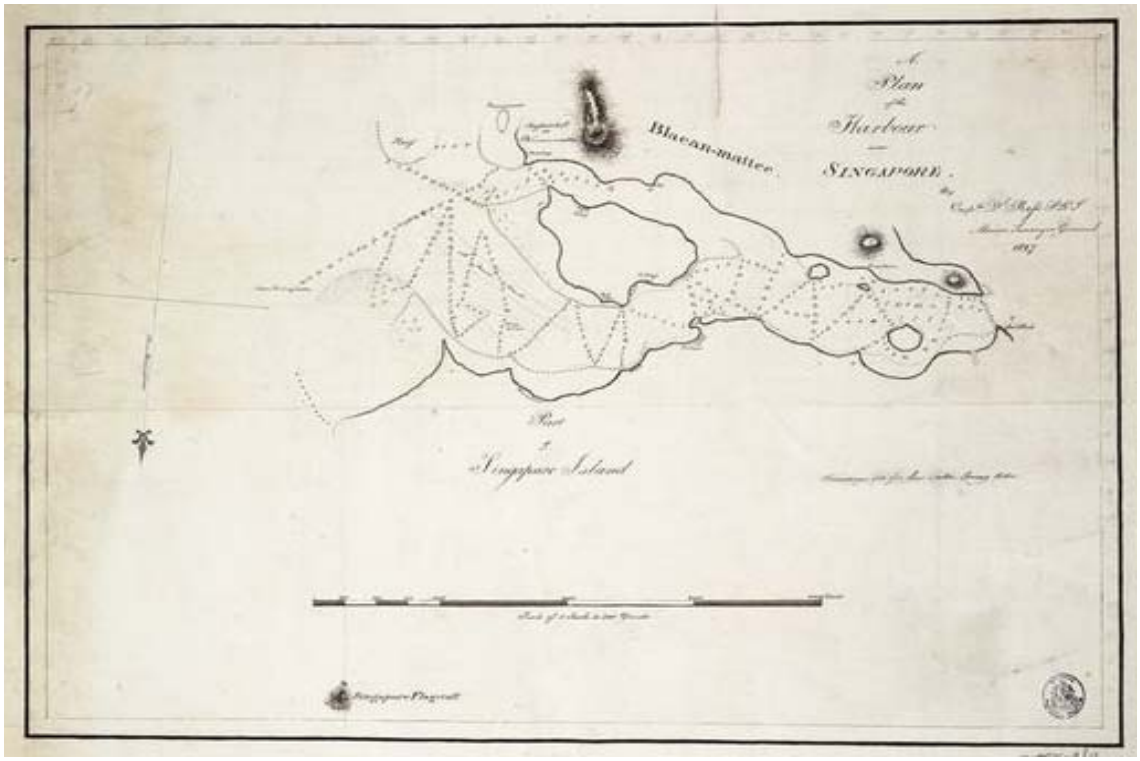
and the United Kingdom, but also the actual material cultural remains buried on the hill - to wrest the secrets from the jungles of Serapong.



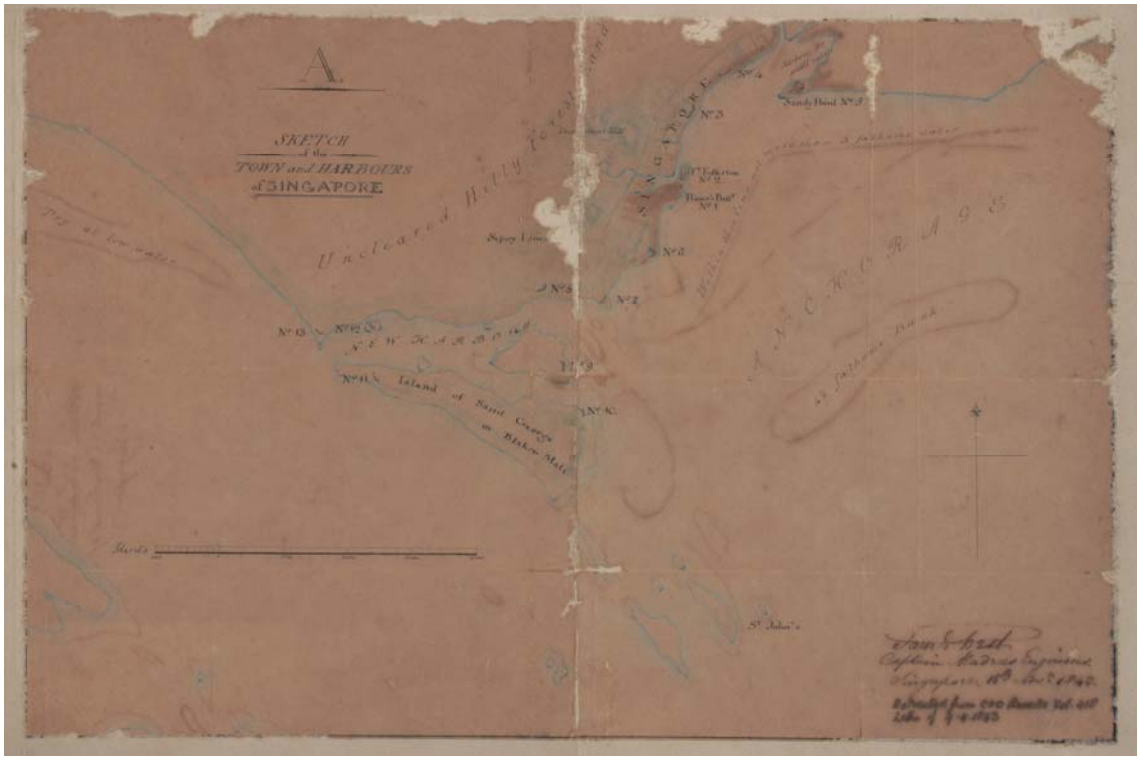
Map 1. Navigational chart produced by Captain Wilde c.1680. Blakang Mati is the land mass depicted in the lower half of the chart. From left to right just north of Blakang Mati are Pulau Renggis (a reef), Pulau Selegu (large round island), and Pulau Sarong. (British Library)



Map 2. Plan of Singapore Harbour by Captain Daniel Ross February 1819. Possibly the first chart to be created after Raffles' landing. Although only the eastern tip of Blakang Mati island was shown, Ross named it "Island of Goa". (Calcutta Journal)



Map 3. 1827 Chart by Captain Daniel Ross of the depth soundings taken in the New Harbour. The name by then reverted to Blacan Mattee. (Author's collection)



Map 4. 1843 Plan for the defences of Singapore based on the 1827 plan by Captain Edward Lake. Here Blakang Mati island was named "Island of St.George". (National Museum of Singapore)

1.6 Objectives of the Project

The first preliminary field survey of Fort Serapong was undertaken in August 2005, the assessment comprised mainly of visual inspections and creating a brief condition report of the site. [38] Extensive jungle growth since the fort's abandonment hindered on site work and additional surveys were conducted periodically over the next eight months, culminating with a large scale archaeological survey and excavation of the site from May through August 2006.

In November 2005 a second site survey was carried out. [39] This was followed by limited field work on the gun emplacements midpoint of the hill on 2nd February 2006, establishing them to be gun pits for 6 inch breech loading (BL) guns. [40] As indicated above, the author's initial interest was in seeking a surviving example of the 8 inch Mk VII BL gun emplacement. However preliminary surveys on Mount Serapong instead revealed that albeit encroached by the jungle, an extensive military installation with a complex chronological sequence remained. The site indubitably warranted a more comprehensive study and by then, a general proposal for investigating the site had been established with the proposed project primary foci as follows:

1) Identify the existing remains of Fort Serapong.

2) Trace the evolution of the fort's development and phases of growth: [41]
   - 1878 - 1885 initial phase
   - 1885 - 1914 first known upgrading
   - 1914 - 1945 First World War, interwar years and Second World War
   - 1945 - 2005 abandonment and beyond

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38 This survey was accompanied by visiting British researcher Mr. Peter Stubbs (webmaster, www.fortsiloso.com), two Singaporean informants, Mr. Aaron Kao and Mr. Reginald Low, military history enthusiasts who have over the past decade explored several of the military ruins in Singapore, and Mr. Ng Ching Huei (research officer, National Museum of Singapore). Messrs. Stubbs and Kao were later to join the archaeological research team for the excavations on Serapong hill.

39 12 November 2005 survey with Dr. Yeo Kang Shua (architectural consultant), Mr. Derek Potter (Sentosa Golf Club magazine editor) and Ms. Wong Choon Wah (research assistant). The potential for a proper archaeological project was realized by Mr. Potter and he actively championed the idea with Sentosa Development Corporation executives.

40 Limited field work by Mr. Aaron Kao and the author consist of the removal of debris, accumulated humus and top soil from the carriage well of the gun emplacement. An additional site assessment was also undertaken that month with visiting British archaeologist Mr. Gary Brown, and I am grateful for his inputs.

41 Note that this was the preliminary chronological sequence that was expected prior to undertaking field and archival research work, and differs with the findings of the report. I have left this unchanged here to emphasize the contrast of the level of knowledge at the start and end of the project.

3) The fort's relation to the rest of the island, Singapore, regionally and the British Empire at large through the study of:
   - socio-political lifeways of the military garrison
   - technological developments in military architecture and engineering

With the following proposed areas for archaeological investigations: [42]

1) Serapong Spur Battery - gun emplacement, underground magazine, battery command post, fire control post, position finder cell, ammunition hoist shaft, utility block and surrounding area.

2) Serapong Main Complex & Battery (hilltop) – two gun emplacements, battery command post, fire control post, secondary fire command, position finder cell, casemate entrances, accommodation bunkers, tunnel system, magazine, ammunition hoist shafts, 17 m escape shaft, and surrounding areas.

3) Serapong Casemates Level 2: Blakang Mati Command Center - underground rooms, tunnels and connecting 17 m escape shaft, and surrounding areas.

4) Water Catchment System & Reservoir - cement catchment area, underground reservoir, meter house and piping system to fort.

5) Ancillary Positions – infantry positions, barracks, observation posts, utility blocks etc.

1.7 Archaeological Methodology

In March 2006 a generous grant from Sentosa Development Corporation was awarded for an archaeological investigation on Mount Serapong and within weeks the project took off. The general research methodologies for the project are as follows:

1) Preliminary archival research was conducted in the month of April 2006 at NUS Central Library, the National Library Board Lee Kong Chian Reference Library, National Archives of Singapore, and remotely through the National Archives United Kingdom. The primary materials sought in this phase were maps, building plans, and correspondence detailing the defences of Singapore. A more detailed and extensive literature review of secondary

[42] Similarly to the above footnote, the names and functions of the sites are still arbitrary during the initial formation of the project objectives.

sources was also conducted during this phase (see Archaeological and Historical Background above).

2) Trial field work on 13th April 2006 where limited site clearance of undergrowth and foliage was carried out at Serapong Spur Battery Gun No.2 position. This trial work was necessary to enable efficient planning and allocation of resources (essentially labour) for the site.

3) Field work. Work on site began in earnest on 16th May 2006 and was concluded on 7th August 2006, with a total of 60 days of onsite work clocked. General direction of site clearance and test excavations were conducted from midway up Serapong Hill where the Spur Battery was located, and proceeded toward the top of the hill. Excavations were conducted by hand for test trenches and by mechanical excavator for removal of construction fill and rubble.

   Apart from clearing of the jungle vegetation, field work consisted of stratigraphic excavation for test trenches, mechanical excavation of Serapong hilltop main battery complex, detailed measurements and drawings of structures and features, production of site plans, surface collections and excavation of a post-war midden (refuse pit).

4) Post-excavation work involves artifact processing (cleaning and sorting) and analysis of finds. The processing work was undertaken off-site at Fort Serapong's sister fort, Fort Siloso, where storage facilities were made available for the project. Artifact processing is perhaps the most time-consuming of all archaeological undertakings, and this phase of the project required some six months (October 2006 – March 2007) where a statistical database of the movable finds was completed.

5) Additional archival research took place over three weeks in August 2006 at several institutions in the United Kingdom, chiefly; the National Archives (formerly Public Records Office), British Library, Royal Engineers Library, Royal Artillery Library, Royal Air Force Library, National Maritime Museum at Greenwich, Royal Institute of British Architects (RIBA), and Institute of Chartered Engineers (ICE). Archival work in the United Kingdom sought to obtain materials on military engineering and architecture, maps, plans and other relevant primary sources on the fortifications and installations on Blakang Mati.

Chapter 2

Mount Serapong in the 19th Century

2.1 The Archaeological Sequence Phase 1: Natural & Topography

Primary forest once covered the entire Blakang Mati island. Sometime around Dr. George Bennett's visit to the island in 1833, a flagstaff station was established on Mount Serapong, and it was probably during the erection of the flagstaff when the jungle was first cleared and a track cut along the northwestern slope of the hill. In Dr. Robert Little's 1848 treatise on Blakang Mati fever, he described the extensive pineapple cultivation throughout the island, and in John Turnbull Thomson's painting "New Harbour from Bukit Serapong" (1847) cultivated rows of agriculture could be clearly discerned. (Illustration 1)

Mt.Serapong is the highest point of Blakang Mati island, at approximately 300ft (91m). The geological structure of the southern part of Singapore comprise of many hills and valleys which lie parallel from northwest to southeast. On the mainland, is a series of parallel ridges which trends in roughly west-northwest through east-southeast with some of the high points like Mount Faber (345 feet, 105m), Pasir Panjang I (226 feet or 'Point 226', 68m) and Buona Vista Hill (270 feet, 82m). This orientation reflects the general direction of the axis of major folding of the parent rocks from which the present residual soils are derived. The ridge which runs the length of Blakang Mati along its southerly coastline (consisting of Mount Siloso, Mount Imbiah, [43] the parade square and barracks) is an obvious point of one fold, with Mount Serapong and Woolwich Hill (later the locality of Fort Connaught) forming another. Between these two main folds, is a synclinal axis which is a trough with rock strata folding upward on either side. The rock has since weathered where today some 70 to 100 feet (21m to 30m) of residual material covers the bedrock which underlies the existing ridge lines. The trough evident around the southwest foot of Mt.Serapong has since filled with soft alluvial clay and today the Serapong Championship golf course comprises what was formerly one of the two major swamp areas on the island. [44]

Construction of the infantry redoubt and later the fort cleared all the remaining natural vegetation and agriculture on Serapong, and while the hill was in used by the military it certainly remained bare and no trace of any primary forest remained. Over the last 40-60 years since the

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[43] Also spelt "Imbeah" or "Imbia" on 19th and 20th century maps. Apparently the names were used interchangeably.

[44] *Resort/Recreation Plan for Blakang Mati Singapore. Prepared for the Government of the Republic of Singapore* by Dillingham Overseas Corporation et al. July 1970. See also *Geology of Singapore* Public Works Department 1976. Also much thanks to Mok Ly Ying for the discussions on topography.

abandonment of the site, secondary forest had reclaimed much of the ground, and the former military structures were overgrown with jungle foliage. In the *Conservation Proposal for Sentosa* produced by the Malayan Nature Society, Mount Serapong was described as "(t)he area contains the largest and richest forest on Sentosa…the forest is the most dense and mature to be found on the island. Although a secondary forest, some of the spots inside are hardly trodden by human beings, imparting to the forest a sense of depth and mystery. In the damp valleys, rattans and ferns are still thriving." [45]

[45] The proposal is undated and is probably produced in the late 1980s or early 1990s. *Conservation Proposal for Sentosa* Malayan Nature Society (Singapore Branch Bird Group). See also *Mt.Serapong, Sentosa Plant List* produced by The Singapore Herbarium, Singapore Botanic Gardens May 2004.

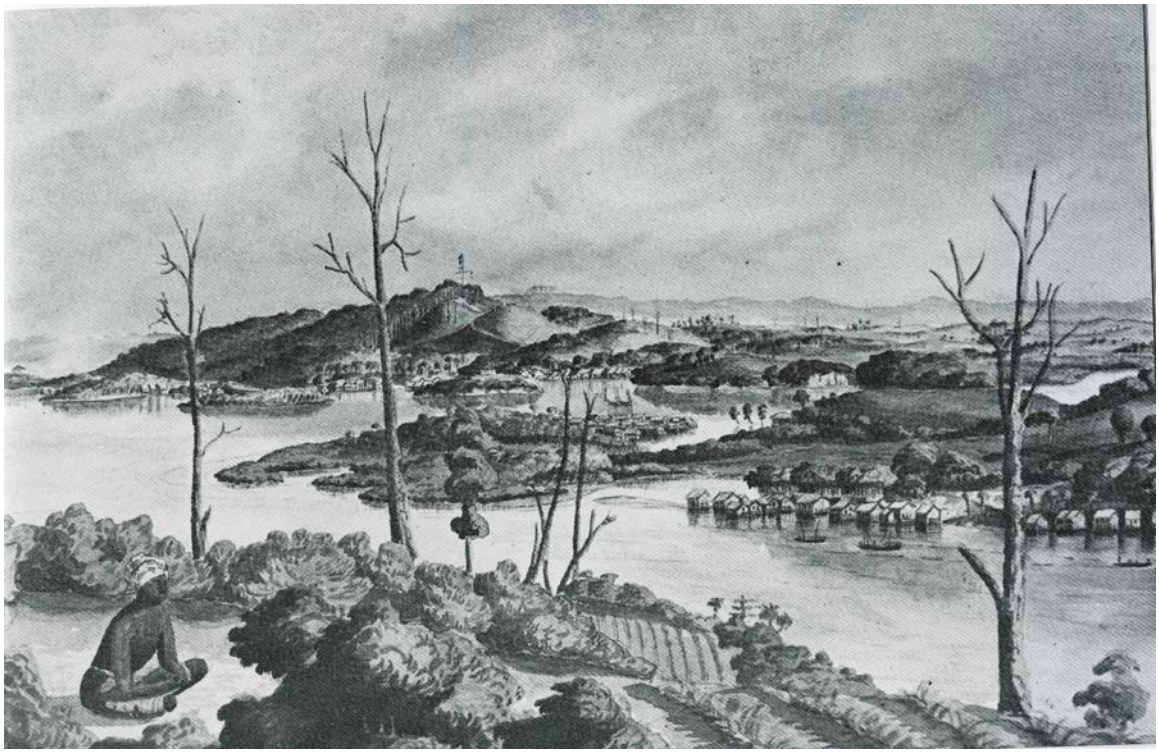
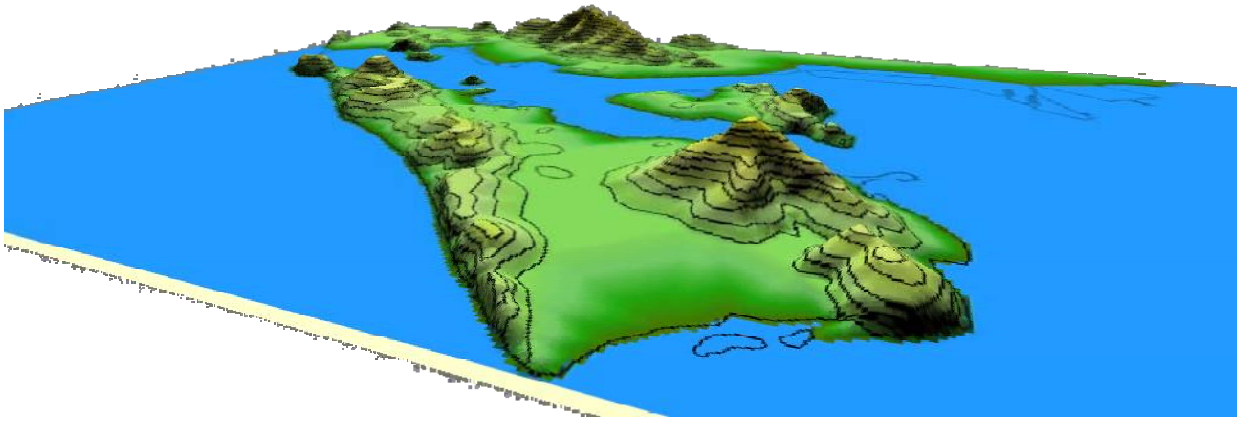


Illustration 1. *View from Bukit Serapong*. In the foreground is Serapong hill, and from this vantage, Pulau Brani can be seen in the centre and the flagstaff on Mount Faber in the distance. Watercolor painting by the surveyor J.T.Thomson 1847. (National Museum of Singapore) [46]



Plan 1 . Perspective view of the island of Blakang Mati. It shows the contours of the island looking from the southeast towards the northwest. The highest point on the island is Mount Serapong. The high point in the background of the image is Mount Faber on the island of Singapore. (Mok Ly Yng) [47]

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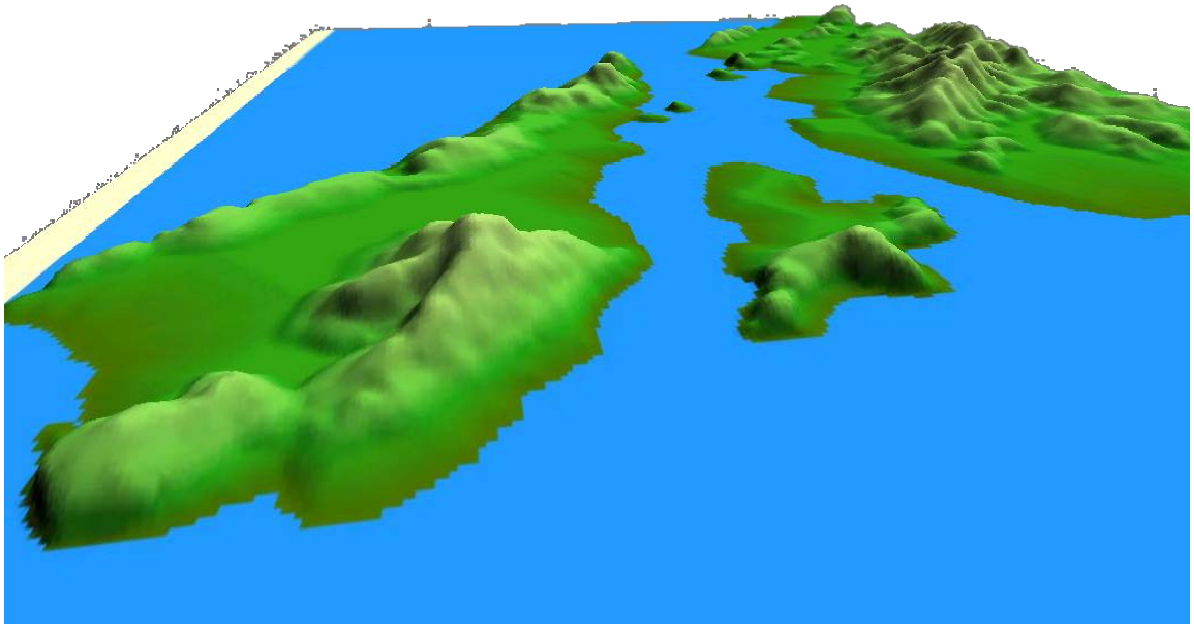
[46] See John Hall-Jones and Christopher Hooi "Early Surveyor in Singapore: John Turnbull Thomson".

[47] I am most grateful for our GIS and mapping specialist Mok Ly Yng for generating these topographic images of Blakang Mati. The images were based on a set of military maps HIND 610 (1:25,000) dated 1945.



Plan 2. The image shows the island without contours looking from the east-north-east towards the west-south-west. From this perspective, it can be seen that the hills on the island are in fact extensions of the parallel ridges found on the main island of Singapore. (Mok Ly Yng) [48]

[48] Ibid.

2.2 The Archaeological Sequence Phase 2: Flagstaff Station c.1833 - 1845

There is no evidence for any remains of the flagstaff station. The station was erected sometime around 1833 and, possibly due to the high malaria death toll suffered by the station staff by 1845 the station was relocated to Mount Faber on the Singapore mainland across the straits. *The Singapore Free Press* on 29th May 1845 ran a short write up on the flagstaff erected on Mount Faber. [49] We only have cursory information from sources like Dr. Little's account and Thomson's maps which indicated its existence. It was most likely constructed of perishable materials (timber and thatch) and would not have survived long after the flagstaff was removed to Mount Faber. During the construction of the infantry redoubt three decades later, where the top of the hill would have most likely been leveled and the last remaining traces of the station were obliterated. No archaeological evidence was uncovered from this phase.

Map 5. Plan of Singapore Town and Adjoining Districts 1846 2nd Edition by J.T.Thomson. In the lower right corner, the flagstaff station can be made out, surrounded by "pineapple gardens". (Antiques of the Orient/Author's Collection)

[49] *Singapore Free Press* Editorial 29th May 1845.

2.3 The Archaeological Sequence Phase 3: Infantry Redoubt 1878/9 - 1885

P.K.Yeoh wrote "the two major infantry defence works on Blakang Mati Island constructed to defend the newly constructed batteries, were at Mount Serapong and Mount Imbeah. Mount Serapong was to be built up to be the main defensive position on the island mounting three 40-pounder guns and a garrison of a hundred." [50] It is not clear what constituted the redoubt and if any field artillery pieces were actually mounted there. Contemporary fortifications of the late 19th century illustrate that it was usually a small enclosed work that did not have flank defence of its ditches. This enclosed work may be of earth or masonry for its parapets. More sophisticated installations have a series of block houses within the compound and its parapets are equipped with fire steps. [51]

Lieutenant Henry McCallum of the Royal Engineers was brought in from Hong Kong and appointed the engineer responsible for the design and construction of defences for Singapore. [52] In his *State of Defences for Singapore Report* dated 16th July 1879 he spoke of the Chinese contractors Chew Ah Seng engaged for labour and Chin Ah Soie for transport, with separate contracts made for supply of cement, lime, broken stones etc for the military construction on Blakang Mati island. Blakang Mati East (later to be renamed Fort Connaught) was the first installation to be undertaken, the ground being broken on 4th July 1878. By July 1879 the Redoubt on Serapong was completed, as well as Blakang Mati East. Mount Siloso commenced construction in August 1878. McCallum writes "with the exception of Tanjong Pagar New Dock…this has been the first use of concrete in the Colony for such a purpose and on so extensive a scale." [53] This is the first official document that specifically refers to the redoubt, and from the description above, it appears that it may have been constructed of concrete.

In 1881 Serapong was still listed in *Report on the Defences of Singapore* (dated 29th April 1881) as a redoubt. The report describes it as a "small infantry work on summit to prevent occupation by hostile riflemen. 160ft over Blakang Mati East (Serapong is approximately 300ft high). Proposed to equip Serapong with rifled howitzer and the general upgrading of the defences, a mortar can be employed until a rifled howitzer found." [54] It is not clear if the rifled howitzer was ever mounted at the redoubt or any troops garrisoned at this position. Archaeological survey and excavations on Mount Serapong have yet to uncover any remains dating from this phase.

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50 Yeoh (1979) p.20.

51 See Anthony Cantwell and Peter Sprack's *The Needles Defences (1985)* for examples of redoubts.

52 See Appendix 1 for biographical sketch of McCallum.

53 CAB 7/4 (1879) National Archives of Singapore.

54 CO273/108/10120 (1881) National Archives United Kingdom.

2.4 The Archaeological Sequence Phase 4: Coastal Defence Fort 1885 - 1907

The growth of Blakang Mati and Singapore Island as a military base slowly continued. Singapore was now very strategically important to the British Empire, particularly for the large coal stocks held there, both for civilian and Royal Navy use, where up to 75,000 tons of coal was available. The War Office, mindful of the importance of coal to the Royal Navy dispatched Colonels Ellis and Barker to report on the Empire's coaling stations including Singapore. The *Précis of Existing and Proposed Defences* for 1886 said, "Singapore may be termed the key of the route to the extreme east and Australia. On account of its situation on one of the chief ocean routes of the world, its admirable strategical position as a base of operations and coaling-station for Her Majesty's ships, and as a protection to British trade, its security is of the utmost value to the interests of the Empire". [55]

Archaeological remains truly began with this phase of the site, along with an increasing number of supporting documents and accounts of the construction. It is however, not clear if like Mount Siloso in 1878, the top of Serapong hill was blasted off employing condemned powder charges from the magazine. Unlike Fort Siloso, where McCallum wrote an extensive technical article complete with detailed plans of the blast craters, no record of this occurring at Serapong have been found thus far. [56]

Construction work in late 19th century Singapore required one with a strong resolve to see things through. Sapper Jack Hartshorn of the Royal Engineers who worked on constructing Serapong painted a rather animated account of his role managing the hired Chinese labour:

> "Took over Mount Serapong and started to clear site and trace out battery for 6 guns. This job is straight-forward, but I had a little trouble with the Chinks at first. They were all the blackguards of the islands. We were sent down there because the overseers could not tackle them. When had done the tracing and leveling the Officers left the island, and as they went away they told me to get the men to work as they had been trying for some time without success. I had 30 Cantonese carpenters waiting to put up sheathing for the concrete. The men up to this time had been gambling instead of working, so next morning I got hold of one of the master gamblers and hit him over the head with a crowbar and set fire to the Attap sheds in which 200 men were gambling, and then they soon hopped off to work. I got hold of the other master gamblers that night and took them over to a Chinese gun boat at Tanjong Pagar, which was commanded by a pal of mine

55 CO273/140. Straits Settlement Correspondence 1886. National Archives of the UK.

56 "*Report on Blasting Operations at Mount Siloso, Singapore*" by Lt.H.E.McCallum in *Professional Papers of the Royal Engineers Vol.IV (1879).*

(ex-gunner Royal Navy), and as he was bound for Sunda he took them from me and gave them free passage overboard outside the three mile. I finished Mount Serapong in two years except for small details, such as laying racers, fixing tackle for ammunition lifts, etc." [57]

There is no precise date given for Sapper Hartshorn's account, but based on dates and events, his tour of duty on Serapong would fall sometime in the 1880s during which Serapong was to mount its first coastal artillery guns. Hartshorn was erroneous with the number of gun emplacements and there is no other record that corresponded with his "battery for 6 guns". Likewise, he must have confused Serapong with his work elsewhere as this phase of the fort with a pair of 8 inch Mk VII guns did not possess any ammunition lifts and instead the ammunition was carted out of the magazine via a ramp.

Hartshorn might not be alone in his opinion of the reliability of local labour. McCallum himself was more subtle about it and in his report on the blasting works at Siloso he described safety precautions of handling the explosive powder in great detail cautioning, "the carelessness of the Chinese coolies made this, and other additional precautions essential." [58]

P.K.Yeoh was the first researcher to examine this phase of the fort in some detail, being assisted greatly by the plans he obtained from the National Archives United Kingdom. The plans of particular importance were found in the WO 78/3947 series:

1) "*Singapore Defences Mount Serapong: Proposed work for the reception of two 8-inch B.L.guns General Plan*" dated 6 August 1885;
2) "*Singapore Defences Mount Serapong: Proposed work for the reception of two 8-inch B.L.guns Top Plan*" dated 6 August 1885;
3) "*Singapore Fort Serapong: Proposed additional stores to obtain increased ammunition accommodation*";
4) "*Singapore Fort Serapong: Proposed fire commander's station*";
5) "*Singapore Fort Serapong Provisional Record Plan*" dated 7 November 1896;
6) "*Singapore Contoured Plan of Mount Serapong*" dated 1884.

Unfortunately Yeoh did not reproduce these references in his thesis. Indubitably these plans would be most useful in identifying any architectural remains on site. A reproduction order was

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57 "*My Last Fifty Years by The Late "Jack Hartshorn*" in *The Sapper – Royal Engineers Magazine (August 1929).*

58 McCallum, *Report on Blasting Operations on Mount Siloso, Singapore (1879)* p.56.

place by the archaeology team with the Archives but regrettably, these plans did not arrive in time for consultation prior to undertaking fieldwork. [59]

Yeoh provides a single paragraph entry on this early phase of the fortification

> "For this period, no more detailed plans than those drawn in the 1886 (sic - 1885) maps are available. This layout showed a hilltop site defended by what appears to be three strongpoints, located to provide enfilade fire down the sides of the polygonal perimeter of the site. No ditch of any sort was indicated, so it would seem that the three protruding positions noted were most probably infantry strongpoints. It is also probable that the casemates for the magazine were located behind the guns. Two positions not marked as gun positions, were also indicated between the two 8-inch armaments. These were probably pre-located gun pits for the sitting of additional field artillery to bolster the defences of the battery in times of war."

2.4.1 Cartridge Stores

Excavations determined that Yeoh's "pre-located gun pits" were actually cartridge stores. From a plan, the cartridge stores would only show up as two square outlines, appearing not unlike platforms for lighter artillery pieces. [60] The structures were identified as cartridge stores from their layout and construction. [61] Sitting to the left of Gun No.1, and the right of Gun No.2 at the inner edge of the emplacement parapet, the stores flanked the central magazine access ramp. Only the floor and some brickwork remained of the Gun No.1 cartridge store. However the Gun No.2 store is almost intact complete with barrel vault roof.

A note is necessary to explain the peculiarities of artillery ammunition (Illustration 2). Large caliber artillery ammunition, particularly those of the coastal artillery, consist of several parts; i) shell (the actual projectile or warhead which is delivered in flight to the target); ii) cartridge or charge bag (the propellant to fire off the projectile eg. gunpowder or cordite); iii) fuse (the igniter for the shell in order to explode it); iv) friction tube or primer (igniter for the cartridge, which

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59 At the time of writing, the plans along with other materials ordered have yet to arrive. The author was however able to access and consult the said plans in person at the National Archives UK during the post field work research trip in September 2006.

60 Similarly even on the ground, several concrete plinths of the later post Second World War period were initially thought to be firing platforms for 25 pounder artillery, instead turned out to be platforms for electric generators after excavations (see below Phase 7).

61 Prior to the introduction of the cartridge bags or cases, the immediate ready to use black (gun) powder was known as expense powder, and hence the store as "expense magazine", and this term continued in usage. Cartridge stores are sometimes labeled "expense cartridge stores" or "expense stores" etc.

essentially fires the gun). The 8 inch gun emplacements would have recesses along their concrete parapet for storage of a quantity of ready shells for immediate use should the gun be called into action. These ready shells were restocked from the main magazine when expanded. Likewise, a limited quantity of cartridges was held at the ready, but because of the dangerous combustibility of the cartridges, a separate and often bombproof structure was built for their storage nearby. Similarly as the ready cartridges are spent, they are restocked from the main magazine.

The intact brick structure measures approximately 2.60m (length) x 2.75m (width) x 2m (height) with a flight of steps leading down into the store. The drainage trap by the entrance and bitumen coating for the floor to prevent water seepage and dampness, its size, and proximity to the gun led to the identification of the structure as the cartridge store. On the top step of the Gun No.1, painted on the step was a red border as some form of demarcation marker, probably served as a warning or reminder to the gunners about the explosive and combustible nature of the cartridges, thereby exercising fire discipline (Illustrations 3 to 7).

2.4.2 8 Inch Gun Emplacements

Of the gun emplacements, only a small portion of Gun No.2 emplacement steps and parapet wall connecting to the cartridge store remains (Illustration 8). Nothing remained of Gun No.1 as it was obliterated during the upgrading of and construction of the 9.2 inch gun emplacements in 1907/8. The cartridge store of Gun No.2 was perhaps the only significant new find from this phase. Some strips of timber was recovered from the interior of the store, the deposition suggesting that minimally the timber fragments date back to the burial of the store during the construction of the 9.2 inch guns. However until detailed analysis is conducted on the wood, it is speculative to suggest that they may be part of the original skidding and racks of the store.

It is perhaps appropriate to include a short discussion of the 8 inch breech loading Mk VII guns. The 8 inch breech loader was not used by either the Royal Navy or coastal defenses in the United Kingdom and it was instead purchased by various local governments in the Empire. Produced by the Elswick Ordnance Company (later Vickers Armstrong), the 8 inch breech loading was a throwback to the designs of the earliest 8 inch rifled muzzle loading guns (20.3cm), with construction being of mixed steel and wrought iron. Four of these 26 caliber guns were eventually mounted at Singapore in long recoil barbette mountings. [62]

[62] *Handbook for the 8 inch BL Gun Marks VII & VIIA Land Service (1891 and 1899).*

The 8 inch guns are not the standard weapon of choice for the Coastal Artillery, and how they came to be mounted in Singapore was an adventure in its own right. In the early 1880s, the Imperial Chinese Government ordered four such guns from the Elswick Armstrong Company, while enroute to China, the Franco-Sino War (1884-5) broke out and the weapons whether by deliberate diplomatic design of the French, became stranded in Singapore. Unhappily for the Chinese, they lost the war and the guns were apparently sold to the local Straits Settlements Government. A reference to one of these Chinese guns appeared in 31st December 1890, when one of the 8 inch guns at Tanjong Katong burst on firing, blowing up its muzzle. [63] No casualties were reported and an interesting note found in the accompanying reports on this incident stated "the damaged piece, which is one of th(ree...those? Writing illegible) purchased from the Chinese government". [64]

In about 1893 the War Office in London, made no objection to demolishing Fort Tanjong Katong, "provided that the guns (8 inch) were remounted at Fort Serapong or elsewhere". [65] One of the surviving 8 inch gun barrels from Singapore remains on display at the Fort Siloso gun museum, while another piece can be found at the Royal Artillery Museum's grounds at Rotunda, United Kingdom listed as No.3/242 in the Royal Artillery Catalog with the serial no.7278 incised on its left trunnion along with 1890 date (Illustration 9 and 10). *The Gunner*, the magazine of the Royal Artillery, recorded the arrival of the gun in 1968. According to various correspondences, it was one of three decommissioned from Serapong and buried in the hill adjacent to the fort in 1913. Sometime between 1956 and 1958 two pieces were disinterred and mounted as a memorial on the main parade square of Blakang Mati and that one was taken back to the UK in 1967/8. The location of the third gun (if it existed) remains unknown. [66]

2.4.3 Casemates & Magazine

The oldest surviving standing structures at Fort Serapong were the casemates and magazine, retaining very much of its original 1885 form and appearance albeit being upgraded with additions and alterations over the 50 odd years since its inception until the outbreak of the Second World War. Casemates were bombproof vaults of brick, masonry or concrete, usually covered with earth to serve as magazines or living quarters for troops; at Fort Serapong it probably served both functions. The Serapong casemates were built into the side of the hilltop and constructed of brick with external cement renderings.

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63 As a precaution against future accidents, the barrels of all four Mk VII guns were sent back to Britain to be strengthened and they are given the new suffix Mk VIIA.

64 CO 273/172/2866 (1890) National Archives of Singapore.

65 Sue Sutton, *Fort Tanjong Katong (2002)* p.6.

66 *The Gunner Vol.49 No.10 (1967), Vol.50 No.1 (1968), and Vol.50 No.7 (1968).*

The casemates consists of five rooms, the smallest room (from the left) is identified from plans as the lamp or lantern room. [67] The room to the immediate right of the lantern room (second from left) leads to the magazine which was dug into the earth (Illustration 11 and Plan 5). The original 8 inch gun magazine was served by a single corridor which becomes a ramp leading to the surface. The ramp exited on the southeast between the two gun emplacements. It was uncovered during the excavations and extends approximately 20m from the magazine (Illustration 12). This was later partially demolished and buried during the 1907/8 up gunning of the fort and a new magazine passageway with hoists put in (see below Phase 6). Upon entering the corridor, two separate doors led to the shell store and cartridge store. Each store was further divided internally into two large chambers (Illustrations 13 and 14).

The cartridge store was served by a "shifting lobby", an antechamber which the men working in the magazine change into and out of magazine clothes, precautionary work wear to prevent the risk of fire ignition in the cartridge store. An explanatory storyboard at Fort Siloso explains the "Instruction relating to entry and leaving of magazines": [68]

> Prohibited Articles
> Matches and tobacco in any form or any smoking materials must be left outside the barrier.
>
> Instructions
> A. For Working Parties
> 1) Wipe your boots or shoes on mat and take them off
> 2) Take off your clothes or uniform and hang them on pegs
> 3) Pass over barrier in your underclothing, put on the magazine clothing and shoes, then proceed to your work
> 4) When leaving the building, the procedure to be followed is the reverse order
>
> B. All other persons
> 1) Turn down ends of trousers and brush them clean
> 2) Wipe your boots or shoes as clean as possible on mat

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67 "Singapore Blakang Mati Fort Serapong Sketch Showing Proposed Emplacements for 2- 9.2 inch BL Mk X Guns." WO 78/4225 National Archives United Kingdom.

68 The storyboard located at the 19th century magazine of Fort Siloso was put up in the late 1990s. All efforts to trace the source of the standing instructions for the shifting lobby have been unsuccessful. Still the instructions probably depict with reasonable accuracy the magazine operations during the late 19th century.

3) Place each foot in succession past the barrier into an overboot or galosh over your ordinary footwear

Note: Magazine clothing or footwear must not be taken outside the barrier. Civilian clothes, uniform and boots or shoes must not be taken inside it by working parties. If magazine footwear is allowed to collect grit, it is just as dangerous and as likely to cause sparks as ordinary footwear.

Lighting within the magazine was provided by lamps and at least six lantern recesses were planned for in the shell and cartridge stores, with a further three lining the ramp. The lamp recesses were essentially a small alcove in the wall with a pane of glass set in a brass frame to prevent sparks from entering the chamber. The frame was hinged on one side and was probably locked with a key. A brass stop was also fixed to the floor of the recess to prevent it from toppling and hitting the glass when inserted. The small lamp room (described above) served as the maintenance store for cleaning, refitting and storage of lamps. [69]

Apart from the lamp room and magazine anteroom, three other rooms made up the casemates. These rooms probably barrack or store rooms were similar in size and layout with some minor exception. At some point a double casement door flanked by windows on each side provided access to each of the rooms. The doors had since been removed or destroyed by vandals. The interior was sparse with plastered rustification on the walls and little else. Some traces of metal bracket and other fixtures still remained on the walls, but it is not possible to discern their purposes. In one of the rooms (two rooms to the right of the lamp room), a mild steel locker was built into the south wall. Along the south end of the casemates, a passageway might have been in place leading to the 8 inch Gun No.1 position.

2.4.4 Other Features

No evidence has come to light regarding Yeoh's reference to the infantry defences for Fort Serapong. Based on the WO 78/3947 plan "*Singapore Fort Serapong*" Yeoh wrote "(the) hilltop site defended by what appears to be three strongholds, located to provide enfilade fire down the sides of the polygonal perimeter of the site". [70] This does not rule out the possibility that these infantry positions were never constructed, but by triangulating their positions based on the plans

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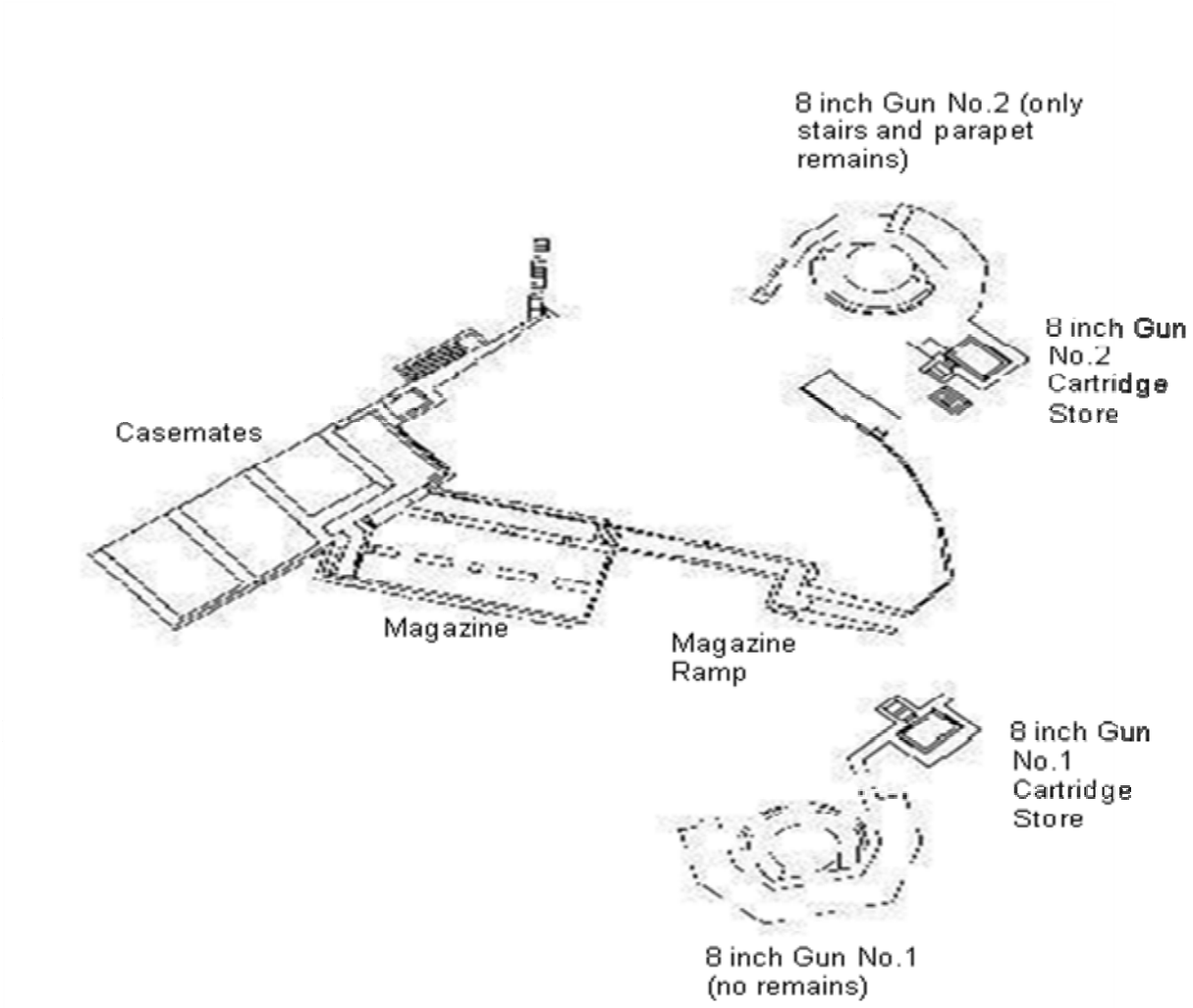
69 For more details about lanterns and lamps employed in magazines and fortifications see "*Wall Lamp Fact Sheet", "Partition Lamps"* and *"Bullseye Hand Lanterns*" by Palmerston Forts Society. Fact sheets obtainable by writing to Palmerston Forts Society Fort Nelson, Portsdown Hill Road, Fareham Hants PO17 6AN.

70 Yeoh (1979), p.28.

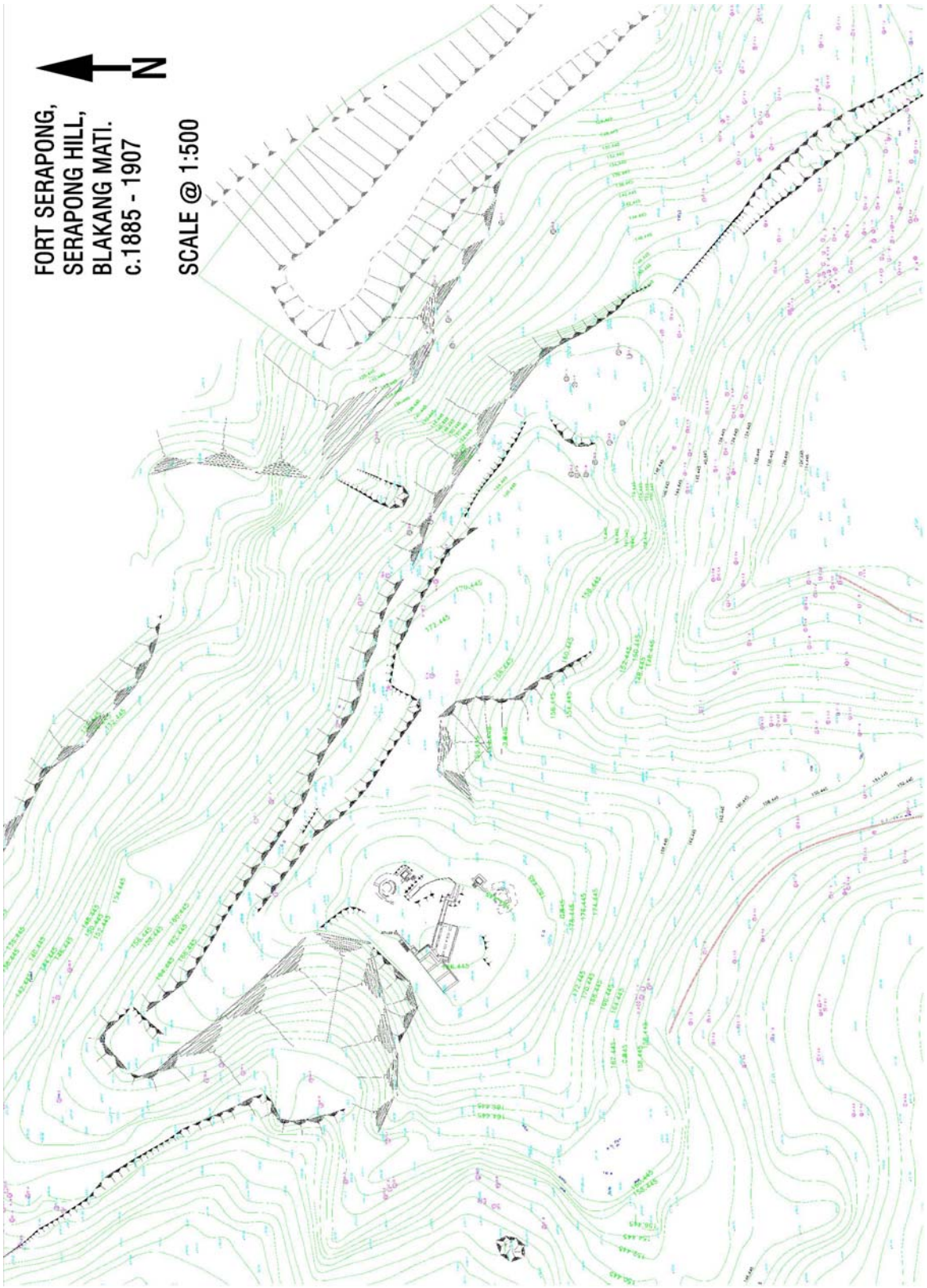
and on the present site, none of these three infantry posts would have remained. The position marked at 215ft on the plan would have been part of the massive concrete water catchment runoff, position at 225ft would be located beneath the post-war chapel, and the last position at 248ft would have probably been demolished to make way for the later artificer's workshop and water tank. Similarly no traces of the iron fencing surrounding the hill fort have been found.

Among the WO 78/3947 plans is one titled "*Singapore Fort Serapong Proposed Fire Commander's Station*" detailing a two storey structure with the lower level being subterranean. The first level features a telephone room [71] and a chart room, and the upper level a circular brick or masonry enclosed pit with a pedestal for range finding most probably housing a depression range finder. As indicated on the plan, a speaking or voice tube would connect the two levels to provide instructions and bearings to be transmitted to the chart room below. Presently, there is no archaeological evidence for this structure. Examples of a similar type of fire commander's station can be found at Fort Pasir Panjang and also further afield in Hong Kong (Illustration 15 and 16).

[71] By 1895 a telephone network was up connecting all the gun batteries, forts, and administrative offices not only on Blakang Mati Island but also Pulau Brani, Fort Pasir Panjang and the rest of mainland Singapore. *Report of Local Joint Naval and Military Committee of May 1895* CAB 11/60.



Plan 3. Archaeological sequence Phase 4 (1885 – 1907). Fort Serapong with its two 8 inch gun emplacements and accompanying cartridge stores. The lower gun emplacement Gun No.1 (no remains) is depicted here in its approximate position. Only the steps ringing the central platform and parapet of Gun No.2 (top) were uncovered. (Daniel Hii)



Plan 4. Detailed plan of Mount Serapong showing Phase 4 (1885 – 1907) occupation which was restricted to the hilltop. (Daniel Hii)

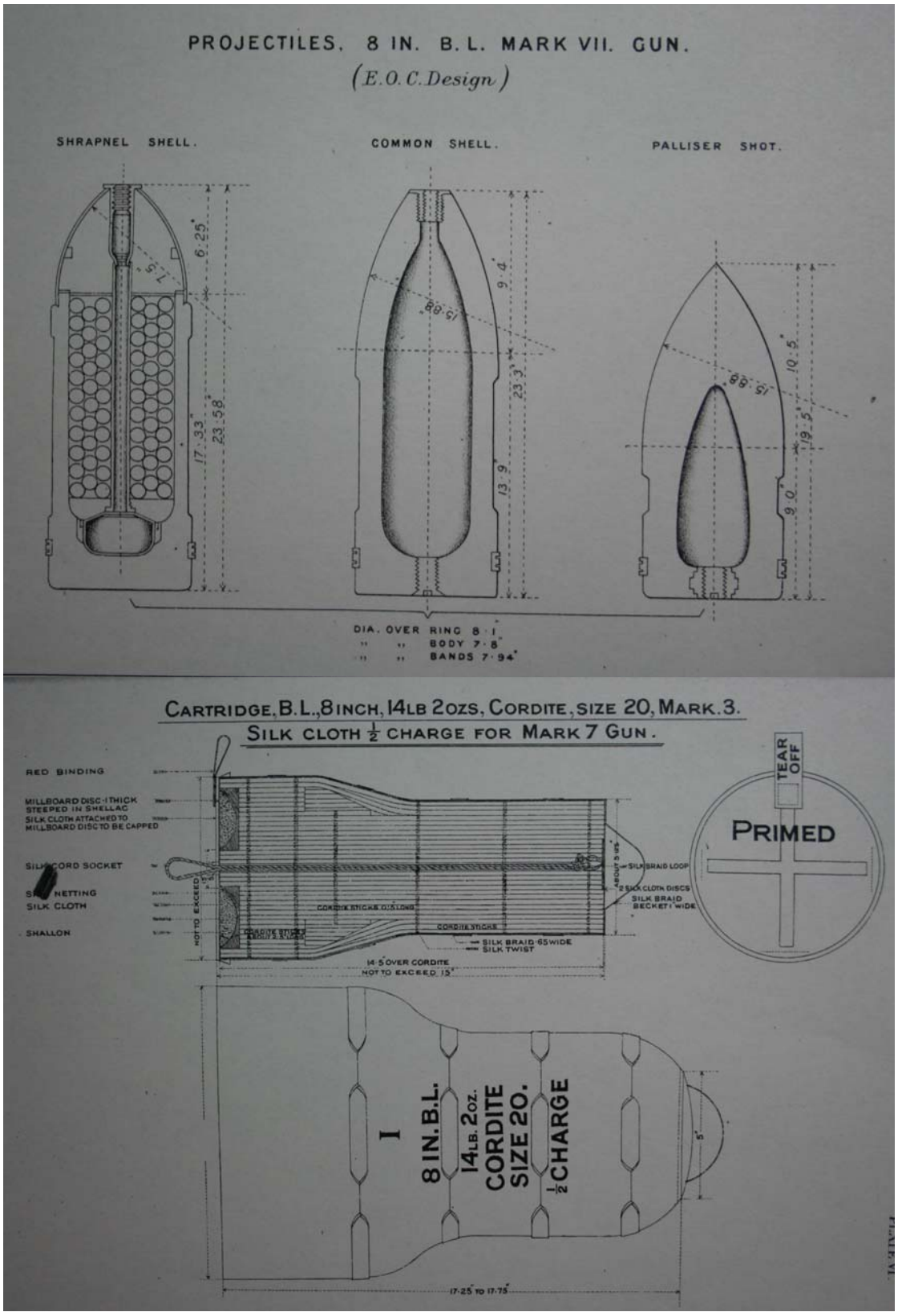


Illustration 2. Ammunition: shell and cartridge for the 8 inch gun. (Royal Artillery Museum Library)

Illustration 3. The remains of the 8 inch Gun No.1 cartridge store. (Author)

Illustration 4. Another view of the 8 inch Gun No.1 cartridge store looking southeast. The drainage gutter can be seen on the third step leading down into the store. In the foreground, are traces of paint on the top step. (Author)

Illustration 5. The uncovering of the top of the 8 inch Gun No.2 cartridge store came as a surprise to the crew. (Aaron Kao)

Illustration 6. 8 inch Gun No.2 cartridge store. The oldest structure of Fort Serapong excavated to date. (Aaron Kao)

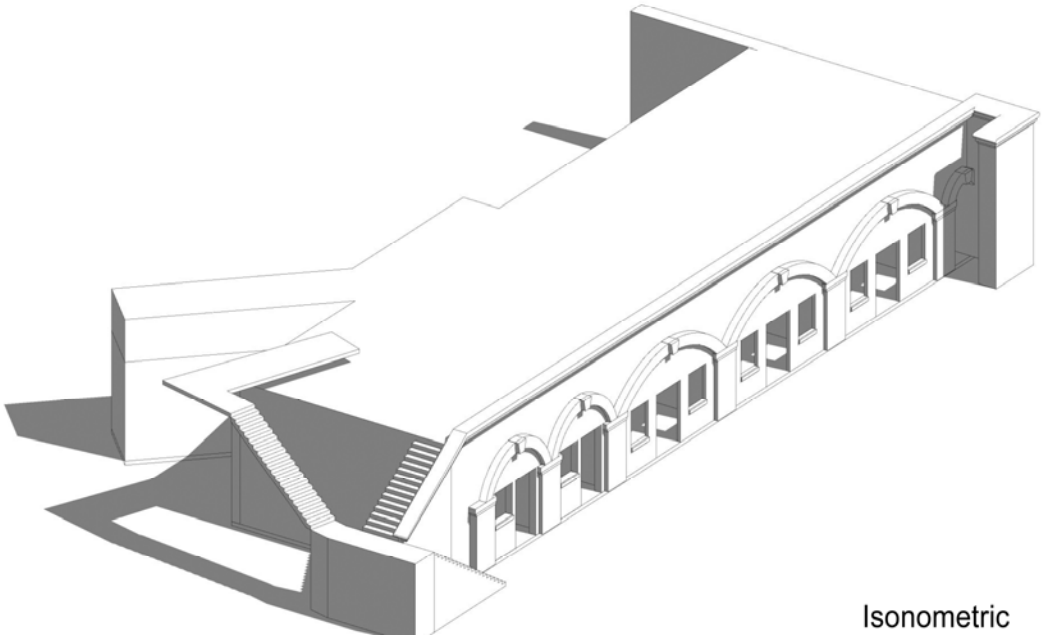
Illustration 7. Interior view of the 8 inch Gun No.2 cartridge store. (Aaron Kao)

Illustration 8. The large concrete apron of the later 9.2 inch gun was built above the 8 inch Gun No.2 emplacement (left). All that remains of the earlier 8 inch gun are the concrete steps (centre) leading up to the central platform and part of the parapet (right). Part of the rectangular primer recess can be seen on the parapet wall by the wicker basket. (Aaron Kao)

Illustration 9. In the foreground is the 8 inch gun barrel from Singapore at the Royal Artillery Museum Rotunda. (David Moore)

Illustration 10. The remaining 8 inch gun barrel from Fort Serapong on display at Fort Siloso. (Author)

Illustration 11. Casemates on Serapong hill. (Author)



Plan 5. CAD drawing of the casemates. (Daniel Hii)

Illustration 12. 8 inch gun magazine ramp. The end of the ramp leading into the magazine has been sealed during 1907/8 when a shell hoist passageway was built. On the top left is the Fort Connaught BCP built in the late 1930s. Just visible on the top right, engulfed by a banyan tree is the 9.2 inch gun BCP. (Author)

Illustration 13. 8 inch gun magazine shell and cartridge store as seen today. The cartridge store would have been the front half of this chamber and separated by a wall since removed. Modern lanterns glow in the lamp recesses. (Aaron Kao)

Illustration 14. Part of the original 8 inch gun magazine cartridge store. Through the doorway on the left is the chamber depicted in the photograph above. (Aaron Kao)

Illustration 15. Fire commander or observation post (c.1879) Fort Pasir Panjang. (Author)

Illustration 16. Another example of a late 19th century fire commander's post (c.1880s) at Lei Yue Mun Fort in Hong Kong. (Author)

Chapter 3

Mount Serapong in the Early 20th Century

3.1 The Archaeological Sequence Phase 5: First Upgrading of the Fort 1907/8 – 1936/7

On 31 March 1885, Inspector General of Fortifications Colonel Henry Schaws affixed his signature to the plan titled "*New Defence Scheme for Singapore*". In the plan he proposed that "Serapong will mount two 9.2 inch BL guns, but their positions cannot be definitely fixed until further surveys are received from the station". [72] For reasons that are still to be completely understood, Serapong was mounted with a pair of 8 inch BL guns instead. The 8 inch guns remained in operation for the next two decades, and as late as 31st March 1905 the guns were still included in the register of armaments at Fort Serapong. [73]

In the 1907 report of the "Committee on the Armament of Defended Ports Abroad" headed by General Sir John Fletcher Owen stated that Singapore defences should be prepared to meet with a 'Class B' scale of attack. This meant a defence against armoured cruisers. It was considered that any attack would be against the docks and wharves of Keppel Harbour and possibly shipping lying outside the harbour. The Master Attendant of the harbour believed that shipping under the British Flag, some fifty percent of the total, could be accommodated until "certain improvement schemes now contemplated, had been carried out". The committee noted that, "the existing heavy armament, viz. 10 inch, 9.2 inch [74] and 8 inch guns is of a heterogeneous description, and composed of old slow firing types, and recommend that, where guns are required, as below they and their mountings should be of modern type". [75]

The 1907 report called for the replacement of the guns on Mount Serapong (and in other batteries in Singapore). Fort Serapong was to be rebuilt and rearmed with two 9.2 inch Mk X BL guns on Mk V 15 degree barbette mountings. Nearby on the spur of Mount Serapong, a completely new emplacement was to be constructed. This would be called the Spur Battery and would be armed with a single 9.2 inch gun Mk X also on an Mk V mounting.

The 8 inch guns were removed by 1st November 1907 but by 15th May 1909 the new guns were still yet to be emplaced. The new targeted completion date of the emplacements was 31st March

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72 SS 5/748 14 April 1885 cited in S.Kathiravelu's *Fortification of Singapore 1819-1942 (1957)* p.26.

73 CAB11/61 pt.9 Defence Scheme Revised 1905. National Archives United Kingdom.

74 Here the report was referring to the 9.2 inch Mk IV an older variant mounted at Fort Blakang Mati East (Connaught). The new 9.2 inch guns were to be of the Mk X types. The Mk X with slight modifications continued to serve the Coast Artillery arm until its disbandment in 1956.

75 WO33/415 Armaments of Defended Ports Abroad. National Archives United Kingdom.

1910 but unspecified delays with construction resulted in only one gun being emplaced at the main battery on the top of Mount Serapong in July 1912. It was to be almost another year in April 1913 before the second armament was in place and the works completed for the hill top. Likewise work on the Serapong Spur Battery too progressed slowly with unspecific delays. The emplacement was ready by June 1911 but it was to be another two years when the Spur gun was finally in place. [76]

Continuing with a desk or plan based analysis of the site for this phase, the following plans of the WO 78/4225 and WO 78/4226 series from the National Archives United Kingdom proved to be most useful providing details for the three gun emplacements, magazine, and battery command post:

1) "*Singapore SS. Fort Serapong Revision for Two 9.2 inch Guns Mk X: Proposed alterations and additions to work shewn on WD drawing No.28897*" dated 1909;
2) "*Singapore Blakang Mati Fort Serapong: Sketch showing proposed emplacements for 2 9.2 inch BML Mk X guns*" dated 1909;
3) "*Singapore Fort Serapong: Details of Ammunition Passage and Shell Store*" dated 1909;
4) "*Singapore Serapong Spur: Proposed Emplacement for 9.2 inch Mk X Gun*" dated 1908;
5) "*Serapong Spur Battery Detail of Emplacement*" dated 1909;
6) "*Singapore Fort Serapong: Sketch for proposed BC Post*" dated 1910;
7) "*Singapore Serapong and Spur Batteries*" dated 1911.

Reviewing P.K.Yeoh's descriptions of this phase of development on Mount Serapong, it became apparent that he had drawn heavily on some of these plans, particularly WO 78/4226 "*Singapore Serapong Spur: Proposed Emplacement for 9.2inch MkX Gun*" of 1908, and "*Serapong Spur Battery Detail of Emplacement*" from 1909, which provided unparalleled details of Spur 9.2 inch gun emplacement construction. [77] Fort Serapong covered an area resembling a four armed star, on which sat the Spur Battery on its southeastern most promontory some 365m (400 yards) from the main gun positions on the hilltop. A track was cut downhill from the fort complex on the hilltop to the new battery and this probably remained the basis for the future metalled road. [78]

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76 CAB 11/62 pt.10 Defence Scheme revised Dec 1907, CAB 11/62 pt.11 Defence Scheme revised June 1909, CAB 11/62 pt.12 Defence Scheme 1910, CAB 11/62 pt.13 Defence Scheme 1911, and CAB 11/62 pt.15 Defence Scheme 1913. National Archives United Kingdom.

77 Yeoh's lengthy description of the Serapong Spur Battery is reproduced in Appendix 2.

78 "*Singapore Blakang Mati surveyed and drawn under Lt.Col.J.T.Bogle corrected 1910*" MPHH 1/497. National Archives United Kingdom.

3.1.1 9.2 Inch Gun Emplacement – Spur Battery

The Spur Battery located too far away from the main complex uphill featured its own magazine, artillery store and personnel shelters. On the plans, the concrete gun emplacement including its apron measures approximately 25m (80ft) in diameter, with the gun carriage pit being 9m (30ft) wide. The gun mounting was held in place by fifty-two 2.75m (9ft) long bolts embedded into over 3m (10ft) thick concrete. The plan also shows four cartridge recesses (each 6ft x 5ft x 3ft 6") shell recess lining the gun pit, a fuse & tube recess (1ft 6" x 1ft 6" x 2ft), small store recess (1ft 6" x 9ft x 9ft). [79] On site today, only the four cartridge recesses and the outline of the concrete apron can still be discerned. The gun pit was adapted and modified significantly to mount a 6 inch Mk VII BL gun during the next modernization programme in the 1930s (see Phase 6 below). Two 2m x 2m test pits were sunk to the front of the apron revealing approximately 1m (3ft) depth of sand surrounding the apron. Sand or earth was essential to resist the penetration and absorb the shock of the projectiles from hostile counter-battery fire directed at the gun position. [80] A sand pit 1m (3 ft 6") thick topped by 6 inches of earth surrounded the entire position but strangely not above the gunner's (or other rank's) shelter.

The magazine complex of the Spur Battery with the exception of minor cosmetic additions appears to have retained its layout from this phase (Illustration 17 and Plan 8). The magazine is built into the earth and situated below ground level with stairway access immediately to the rear of the gun emplacement. The subterranean complex consisted of six chambers or rooms and the entire complex was built of bricks and left fair-faced without any cement renderings. In the interior the vaulted brickwork ceiling is augmented by steel I-beams. The flight of twenty steps (most of the steps had since corroded and are missing) led to a courtyard and surrounding this yard on each side were the various rooms and stores. The smallest room, the lamp room, was situated directly at the foot of the stairway. On the right was the other rank's shelter (entrance from beneath the staircase). Across the courtyard from the other rank's shelter were the officer's shelter and artillery store.

The entry to the magazine was from the south with a passageway separating the shell and cartridge stores, and at the end of this main passage was the ammunition hoist or lift. Upon entering the magazine, a smaller passage branching to the left led to the shifting lobby and

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79 "*Serapong Spur Battery Detail of Emplacement*" WO 78/4226 (1909) National Archives United Kingdom.

80 The sand continued to serve its original intended function almost a century since it was deposited. In June 2006, one of the 2m x 2m test pits was conveniently employed by the Singapore Armed Forces Explosive Ordnance Disposal unit to detonate a World War Two era UXO recovered from the Sentosa Cove development project. Needless to say any of the remaining archaeological data within the pit was destroyed.

cartridge store. Six lamp recesses lined the walls of the passageway. There is evidence for a solitary and seventh recess in the shell store. The recesses were essentially openings made into the brickwork and in order to re-direct the gravitational stress to the sides of these openings, semi-circular arch with rough voussoirs were constructed above the recesses. [81] A single header face arch with voussoir cuts was found on the southern wall of the shell store, and the outline of a recess could be seen albeit bricked up. A drainage passageway surrounds around the entire complex, serving as channel for water but also a ventilation area for the rising damp from the ground.

According to the plan the complex was equipped with five Howorth's revolving ventilators. [82] Stoves were found one each for the artillery store, officer's shelter, and gunners' shelter. Shelving were provided for in the lamp room and shifting lobby. The walls of the magazine were to be lined with Eternit asbestos slabs. Eternit was the propriety name for fibre-cement board popular for its fire retardation qualities. None of these items are found on the site. It is most probable that the shelving, stoves, and revolving ventilators were since removed or vandalized. However no evidence is found of the asbestos slabs being installed in the magazine. Helpful notes for the historical archaeologists are the detailed construction notes penned onto the side of the Spur Battery plan by the engineer (reproduced in Appendix 3).

3.1.2 Position Finding Cells

Moving westwards up the hill via a road were several Position Finding (PF) Cells. The PF Cell was a structure or room for housing apparatus to determine the range and position of a target. Usually two cells work in unison, one for a receiving and the other for a transmitting instrument. The instrument may be little more than a telescope. The elevations of the two cells were known and as they also form the base of a triangle, through trigonometry calculations the distance to the target could be computed. [83] Two maps, one dating 1910 and the other 1922 feature four PF Cells (nos.4, 5, 6, and 7) constructed along the ridgeline running parallel to the road. [84]

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81 A voussoir is a piece of brickwork or masonry, in the shape of a truncated wedge, that form an arch or vault.

82 None of these mechanical ventilators survived on site but in *The Year-book of Facts in Science and Art* by John Timbs published in 1863, the following description of the device can be found. "Howorth's Patent Revolving Archimedean Screw Ventilator has lifting-vanes acting as a screw, suspended within a tube or shaft, and centred upon an imperishable substance; these are moved, "without noise" as it is said, by a description of vane, formed of curved blades, so as to have the appearance of a cage, to catch the wind; and rotating, at least when in order, with the slightest breadth; so that draught upwards is the necessary result". John Timbs (1863) p.123.

83 *Handbook of Military Terms Used in Connection with Fortifications of the Victorian Era (1996)* by David Moore. See also the section on target acquisition and range finding in *The Guns of the Northeast: Coastal Defences from the Tyne to the Humber (2004).* Finally there is Peter Ifland's

Today only PF Cell No.7 immediately to the west and rear of the Spur Battery remains (Illustrations 18 to 20). This cell had internal dimensions of approximately 3m x 2.5m and as it sat on a slope, it had a 40cm thick L-shaped retaining wall at the back. Constructed of reinforced concrete and plastered, with a sloping roof structure to reduce the sun's glare and slits for observation, the PF Cell had the outward appearance of later World War Two bunker for infantry or a machine gun. Entry was via the rear and the door, probably made of timber, is missing. The pedestal for the position or range finding equipment has since been removed as evident from markings on the floor. Mild steel shutters are still in place albeit corroding and falling apart from the slit window. Two rectangular recess measuring 160cm x 35cm x 60cm on each side of the walls under the windows. These are storage areas for batteries for the signaling dials (which are electronically relayed to the battery command post or directly to the guns). [85]

Apart from PF Cell No.7 described above, there were six other PF Cells constructed on Serapong during this phase, making a total of seven. Like No.7 the other surviving cells were generally low lying and sunk into the ground with a long low slit window in the front covered by mild steel shutters. No.1 was located above the water storage tanks on the edge of the concrete water catchment runoff (Illustration 42). Nos.2 and 3 remained today in a wooded area at the southern boundary of the fort. The interior of these cells still feature the three concrete pedestals for mounting the plotting table (Illustrations 21 and 22). Interestingly Cells Nos.1 and 3 interior roof structures differed from No.7 and were instead constructed of corrugated steel. Cell No.2 is similar to No.7 with reinforced concrete and plaster. The roof of all the PF Cells were covered with earth and planted with grass or other forms of vegetation.

3.1.3 9.2 Inch Gun Emplacements – Serapong Hilltop

On Serapong hilltop, extensive modifications and construction were undertaken to mount the newer 9.2 inch Mk X BL Gun, capable of hitting targets over 20km away. The 9.2 inch was the largest calibre gun to be emplaced on Blakang Mati island. Originally developed in 1879, it remained the standard coast defence gun up to 1956 when it was finally phased out. [86] Two models saw service on Blakang Mati, the Mark IV with a barrel of 22 tons, and the Mark X at 28

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comprehensive account of the history of the Barr & Stroud range finders *Finding Distance: The Barr & Stroud Rangefinders (2003)*.

84 "*Singapore Blakang Mati surveyed and drawn under Lt.Col.J.T.Bogle corrected 1910*" MPHH 1/497, and "*Singapore Blakang Mati surveyed and drawn under Lt.Col.J.T.Bogle corrected 1922*"

85 *A Handbook of Military Terms (1996).*

86 However there were exceptions. In Gibraltar, the last 9.2-Inch Gun only fired its final salvo and retired in 1973! For more on the military installations on Gibraltar, see Quentin Hughes and Athanassios Migos' *Strong as the Rock of Gibraltar (1995).*

tons. The total weight of the gun and carriage mount came to over 70 tons. The gun, with a calibre similar to that of a heavy cruiser's, required a crew of 14 to operate and they fired a variety of armour piercing (anti-shipping) and high explosive shells, with each shell weighing approximately 170kg. [87] At varied periods, Blakang Mati island boasted between three and six of these guns: [88]

Gun Battery/Fort	9.2 inch Gun Mark	Quantity
Fort Siloso (1885-1907)	Mk IV	x1
Mount Imbeah Battery (1907/8-1937/8)	Mk X	x1
Fort Connaught (1885-1912)	Mk IV	x2
Fort Connaught (1937/8-1942)	Mk X	x3
Fort Serapong (1907/8-1937/8)	Mk X	x2
Serapong Spur Battery (1907/8-1937/8)	Mk X	x1

The excavations on the hilltop revealed the two 9.2 inch Gun emplacements. Both emplacements were oriented toward the southeast, with the arc of fire bearing from SSE to SSW direction. Gun No.1 was located to the southwest of Gun No.2. [89] The gun carriage pit of Gun No.1 was excavated and found in its entirety. Similar to the single gun of the Spur Battery, the concrete gun emplacement measures approximately 25m (80ft) in diameter, with the gun carriage pit 9m (30ft) wide and the walls of the emplacement about 2m high. The gun mounting was held in place by forty-six 2.75m (9ft) long bolts embedded into over 3m (10ft) thick concrete. The difference in the number of mounting bolts (Spur Battery had fifty-two bolts) was due to the variance in accumulator pit layout. Only two recesses for cartridges or small stores had been provided for Gun No.1, one on each end of the apron wings. The shell hoist was located to the left (7 O'Clock position) and next to the shell hoist were the fuse and tube recess. The shell recess for storage of ready shells lined the front of the emplacement (Illustrations 24, 25, and 27).

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87 Gun specifications and data are infuriatingly confusing, depending on which authorities one chose to accept, and of which date the material was published. Improvements to the field of gunnery and more importantly technological advancement in ammunition led to constant changes in the specifications of the gun. The primary specifications are compiled from a series of gunnery handbooks (various years) held at the Royal Artillery Museum Library *Drill for the B.L. 9.2 inch Mark X Gun (1908,1912, and 1923), Range and Projection Scales for B.L. 9.2 inch guns Mark X (1920).* Also Ian V.Hogg and L.F.Thurston's *British Artillery Weapons and Ammunition 1914-1918 (1972).* The number of crew was an approximate derived from going through several years of the "*Straits Settlements Defence Schemes*" at the turn of the 20th century, computing the number of ammunition gun lascars (native troops) and European gunners assigned during times of emergency and war.

88 Complied from "*Straits Settlements Defence Schemes*" CAB 11 (1880-1939) National Archives United Kingdom.

89 Facing the guns from the rear, the artillery piece to the right is always identified as the No.1 Gun, and the gun to its left it No.2 and so forth.

Although none of it remained and probably fell victim to the scrap man, a mild steel circular platform surrounded the gun at parapet level (approximately 2m high), and served as the working platform for part of the gun crew, consisting of the gun commander, gun layers, and loaders. Beneath the circular platform, or shell-pit shield was a circular track from which hung six trolleys and where more gunners worked on handling the ammunition. Ammunition was supplied to the pit floor by hoists from the underground magazines. A hydraulic ram then lifted the shells until they could be transferred to the trolleys, from which point they ran round the rails until they came into position at the rear of the gun. Here another hydraulic ram, revolving with the mounting, pushed the shell from the trolley through the trap in the shield until it was behind the breech, from this position it was hand rammed into the chamber. The cartridges were passed up by hand. Should there be a failure in the hydraulic system a hand operated hoist was also provided for lifting the shells from the pit floor to the loading tray. Access to the gun platform level was by a steel staircase in the rear. [90] The steel mounts for the platforms were revealed during the excavations.

Prior to the excavations, no traces of the emplacement were visible and the entire area was covered by secondary jungle growth. The location of the emplacement was determined through compass bearings and measurements taken from the underground magazine and shell hoist and computed aboveground identifying the opening of the shell hoist. Initial excavations were conducted manually by hand; a large amount of concrete rubble fill required the rest of the excavation to be conducted with the aid of a mechanical excavator. An estimated 100 tons of concrete rubble were removed from this emplacement alone (Illustration 26).

Partially demolished after the guns were decommissioned in the late 1930s, remains of the No.2 emplacement were visible along the present day track off Serapong Hill Road to the casemates. The rear half of the emplacement had been demolished and only the centre mounting ring, accumulator pit and front apron remained (Illustration 30). The shell hoist was located on the right of the gun mount (approximately 4 o'clock position). A single storage recess was to the right of the shell hoist and another on the opposite wall. Like the other 9.2 inch gun position, the indented shell recess lined the front of the concrete apron. Similarly with the No.1 position, the No.2 emplacement was buried during the next upgrading phase of Fort Serapong. It is however unclear when the rear portion was demolished - during the 1936/7 upgrade or the post-war reoccupation of the island – but an oblique aerial photograph clearly illustrates that it was already so by 1947. [91]

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90 "British Artillery Weapons and Ammunition 1914-1918" p.164.

91 Aerial Photo RAF 81/SEL/30 14 January 1947 300-2,000ft Oblique. Conflicting reports were received from various individuals regarding the demolition and burial of this emplacement. One individual even claimed that he was involved along with the military engineers from the Singapore

3.1.4 Casemates & Magazine

The casemates were remodeled during this phase to serve the newer and larger 9.2 inch guns with the addition of an underground passageway equipped with a mechanically operated shell hoist at each end. The original loading ramp for the 8 inch guns leading from the magazine to the surface was rendered obsolete and buried. The old 8 inch magazine was no longer divided into the shell and cartridge stores, but expanded into one single large cartridge store during this upgrade (Illustrations 13 and 14). Two hatches were cut into the east wall at the back of the store and steel hatch doors placed over to service the transfer of cartridges from the store to the passageway beyond.

The shell hoist passageway was 30m in length and was constructed at the end of the original magazine running on a north-south axis with a shell hoist built at each end (Illustrations 32 and 33). Entry to this shell hoist passageway was through the old corridor leading to the old 8 inch gun loading ramp. The shell hoist passageway also served as the shell store with the shells stored on skids along the east wall. This passageway was 2.75m wide and 2.75m in height, the interior walls and barrel vault roof were constructed of brick and plastered. A double cavity brick wall construction was evident to facilitate rising damp from the earth with the walls held together in place by wrought iron ties. Surrounding the entire brickwork was a layer of concrete (depth unascertained) and followed by a two layers of asphalt or bitumen each 0.95cm thick, and finally depended on the lay of the land covered by approximately between 1m and 2m of earth. The floor of the shell hoist passageway was about 4m from the floor of the gun pit above. No trace of the actual mechanical shell hoist remains, and the steel was no doubt carted off to the scrap man (Illustrations 34 and 35).

It appeared that initially plans were only in place to equip the new passageway with twelve lantern recesses along the east, south, and north walls. This may have been insufficient for at some point five additional lantern recesses were added along the opposite west wall of the passageway. The latter additions can be clearly identified with their ruder construction and lack of metal trimmings surrounding the recess. It is not clear when electricity was first introduced to Blakang Mati, least of all to the fort. Oil lanterns were certainly employed from the inception of the fort until at least sometime in the 1920s. Certainly electricity was available with the next upgrading and modification of Serapong in the late 1930s. The magazine passageway was serviced by three

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Armed Forces to demolish it and built a track to the top of Serapong in the 1970s! There could be some truth to this story albeit less the involvement of the said individual and the Singapore Armed Forces; the British military continued to use Serapong Hill as an observation post, as well as the ceremonial saluting battery of 25 pounders in the post war period, and a track was certainly necessary for the trucks towing the 25 pounder field artillery pieces.

ventilation shafts built into its roof and two shafts built into the east wall. Only the concrete stumps remained above ground and from archival photographs Howorth's revolving mechanical ventilators were seen in place (Illustration 28).

3.1.5 Communication Trench

A communication trench connected the two gun positions above and ran on a North-South axis parallel to the left of the magazine shell hoist passageway (Illustration 31). The communication trench was essentially a semi-exposed opened top narrow passageway (1.2m across) with concrete flooring, bounded on each side by unrendered concrete walls, and sunk partially into the ground. The walls varied in height and are generally of waist height (approximately 1m) along flat ground and over 2m in depth at inclines where flights of stairs were constructed. Part of this communication trench leading immediately away from Gun No.1 was demolished and buried when Serapong's 9.2 inch guns were decommissioned and Fort Connaught's command post was constructed on Serapong hill in the late 1930s (see below Phase 6). Likewise the section leading into No.2 gun was demolished along with the rear portion of that gun position. A mid section of the trench just outside of Fort Serapong's battery command post was converted into a refuse dump in the post war period (see below Phase 7).

In addition, a passageway to Gun No.1 was also built during this period to facilitate access to the gun directly from the casemates. A corridor was added along the southwest end of the casemates which leads to a short flight of steps and opening out to the No.1 emplacement. The end of the corridor leading to the gun pit was sealed with concrete sometime as late as the 1970s. [92]

3.1.6 Battery Command Post

As indicated above in Phase 4, no fire commander's station was uncovered for that period. The 9.2 inch battery command post (BCP) is hence the earliest military command structure to remain in situ atop Serapong Hill (Illustration 31 and 36). [93] Similarly, there is no trace of the BCP for the Spur Battery midway down the hill. This single story command post in all appearance may pass off as one of the many PF Cells that dot Mount Serapong. Closer inspection reveals that it is not so and its true function is deduced. The structure is L-shaped and measures 6m across in the rear (where it is of the greatest length). The BCP like position finding Cell No.1 and Cell No.3 has

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92 PVC pipes were encased within the concrete for moisture in the soil to escape (weeping). PVC was only in widespread use from the 1970s.

93 On occasion the term Battery Observation Post (BOP) is used in military literature. At the present point of writing the author is unable to discern any specific differentiation between the BCP and the BOP.

a corrugated steel roof, the corrugated beams acting as permanent shuttering for the concrete poured above as exterior roofing material.

Entering the door to the right corner is a series of wooden cupboards, and two recesses are located under the left and right wings of the front windows. A wooden plinth is found on the floor which once served as a mount for some instrument or equipment. There is a recessed wooden cupboard with three tiers of shelving immediately to the left of the door. This recessed cupboard was formerly a window which has since been bricked up and painted over. Initially two such windows were constructed with one on each side of the door. Front windows with 1 inch thick steel shutters possessed commanding view of the sea and overlooks the Gun No.1 position. A side window with mild steel frame (which had since been boarded up) had been angled to provide a lookout of the position of Gun No.2. Finally albeit not built to the proposed plan and specifications WO 78/4225 “Sketch for Proposed BC Post” dated 24.9.10 clearly identifies the location of the structure. In the proposed plan, the BCP was to include a two storey (or split leveled) building adjacent to the present post. For reasons which remained to be known, it was not constructed as such.

Several undated photographs uncovered in Sentosa Development Corporation’s archives shows the BCP utilized as part sleeping quarters for perhaps the officer on duty. These photographs probably date sometime after the 9.2 inch guns were removed (post 1937), as no sign of any plotting instruments, range finding equipment and other apparatus associated with an artillery command post was evident in the photo. In effect, the existence of the camp bed in all probability suggested that this room was then employed in a secondary or ancillary role. Presently a large banyan tree is growing on top of the BCP and has engulfed the entire structure.

An ancillary block was added to the BCP and abuts its west elevation (Illustrations 31 and 36). It is a masonry framed structure with brick in-fill walls, with pre-cast concrete ventilation grilles and a timber roof. Corrugated asbestos roofing sheets lined the ceiling and the floor is of concrete. Two rectangular concrete plinths are found in this annex structure. The ancillary block is certainly a later addition and its construction suggests a rather ad hoc or temporary nature. The building is made up of three walls with the forth being the existing west elevation of the BCP. Construction appears shoddy and a rude gap exists between the walls of the structures. Apart from the door, there is a complete lack of fenestration except for the horizontal ventilation grilles. The material remains suggest the structure was perhaps an electrical or generator room.

Other Features

The chronology of the rest of Mount Serapong proved to be more difficult to establish but based on data derived primarily from the combination of recovered archaeological artifacts, analysis of the building materials and construction techniques, and cartographic evidence, a provisional attribution to this phase is given to the following features:

3.1.7 Serapong Hill Road

The earlier incarnation of the present "Serapong Hill Road" was in the form of a track. This was cut by 1922. Prior to this the other roads up to Serapong appeared to be a track from the dhobi village southwest along the water catchment area and tanks, with the main track running northwest towards Serapong Pier. This latter track from Serapong Pier was named "Serapong Road", running south of infantry post no.4 (by cantilevered structure) and on to the hilltop. The track from the old Dhobi village is still in existence, and occasionally employed by extreme sports cross country cyclists. "Serapong Road" from the old Serapong Pier disappeared during the golf course development in the 1970s. By 1910 a road was laid between Fort Serapong on the hilltop and the Spur Battery and appeared to be the predecessor of the top half of the present Serapong Hill Road. A road from the Royal Artillery barracks at the parade square on the central part of the island ran from southwest along the water catchment area. [94]

3.1.8 Infantry Posts

P.K.Yeoh's examination of the plan "*Singapore S.S. Serapong & Spur Batteries*" dated 1911 (WO 78/4225) came to the conclusion that;

> "At Serapong and Spur Batteries no ditch was indicated, but two parallel lines of wire entanglements were to run along the defended perimeter. Further wire entanglements were to be installed within these parallel lines on the outbreak of war. Defending this perimeter there were seven infantry posts which consisted only of parapets located at various positions along the perimeter. The road leading to the battery could be well defended by enfilade fire from two infantry posts before an assaulting enemy could get past the wire entanglements. And even then an attacker must follow the road which led past the infantry barracks, in a circuitous route to the gun positions." [95]

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94 MPHH 1/497 "*Singapore Blakan Mati*" October 1910; WO 78/4225 "*Singapore Serapong & Spur Batteries*" 7 May 1912; and untitled 1922 map in Sentosa Archives.

95 Yeoh (1979), p.29.

According to the plan, the infantry posts are located as follows:

Infantry Post No.1	Midway along the track (today Serapong Hill Road) from Fort Connaught to Spur Battery (SSE)
Infantry Post No.2	Southeast of Spur Battery on the eastern slopes of Mount Serapong
Infantry Post No.3	Northeast of Spur Battery on the eastern slopes of Mount Serapong
Infantry Post No.4	Northern most spur of Mount Serapong by cantilevered structure
Infantry Post No.5	The lower edge of the water catchment concrete and water tanks
Infantry Post No.6	60m south of Fort Serapong's Gun No.2
Infantry Post No.7	In front of casemates

Of the seven infantry positions that at one point ringed Mount Serapong, three posts have since been identified (Infantry Post Nos.1, 4, and 5) and one of them excavated (No.1). The excavated post originally overlooked the jungle trail up to Fort Serapong from Fort Connaught where a gateway and wire fence was installed. By 1922, a track which cut through Infantry Post No.1 was laid and the remains of the two halves can still be seen on either side of the present road. Infantry Post No.1 consisted of a concrete parapet 1.3m in height with a ledge and lip for the infantrymen to brace their arms and weapons (Illustration 37). A 80cm wide concrete firing step can be found at the foot of the parapet and is 20cm high. Earth was mounded to the front of the post and at this juncture it is unclear if a parados existed as the rising slopes of the hill to the rear may have made this unnecessary. [96] The few artifacts recovered from this location include a badly corroded coin attributed to either an issue bearing Queen Victoria or King Edward VII's image. The dimensions are those of a late 19th century or turn of the 20th century one cent bronze piece. [97] Other artifacts like Chinese ceramic sherds and glass bottle shards also suggest of the turn of the 20th century context. [98] From the 1922 map held in Sentosa's archives, a gate at Infantry Post No.1 is indicated and the roadway/track laid all the way to the top breaking the post into two.

Infantry Post No.1 and 4 are similarly constructed and differ only in its shape and length. Post No.4 by the cantilevered structure is U-shaped and hugs the small ridge which upon it is built. Infantry Post No.5 is perhaps the largest infantry defence structure surrounding Serapong hill and the two batteries (Illustration 38). Post No.5 essentially encompassed the entire lower ledge of

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96 A parados is a bank of earth built behind a trench or military emplacement to protect soldiers from a surprise attack from the rear.

97 Bronze one cent coins minted with the image of Queen Victoria were only issued between 1875 and 1901 (the year of the Queen's death). The latter King Edward VII coin was issued from 1901 and 1908. For more on Straits Settlements coins, see Saran Singh's *The Encyclopedia of the Coins of Malaysia, Singapore, and Brunei 1400-1967 (1996)*.

98 These artifacts deposited during the construction of the infantry firing step include pieces of the common "Double Happiness" underglazed blue painted design. They were recovered along with probably three mold black glass bottle shards.

the water catchment concrete runoff. This post is rather more similar to an infantry wall with gun or musket ports. The wall made of concrete is about 70cm high with square firing ports cut approximately every 2m. The entire post was crudely made and appears to have been constructed only as an afterthought with the concrete poured at a date late after the water catchment runoff was in used. The position only permits the soldiers manning it to fire through the ports from a prone position.

Despite the lack of remaining evidence (or if indeed it had been built) of Infantry Post No.7, it may be possible that the casemate itself doubled as an infantry redoubt of sorts instead of a concrete parapet position built in front of it. The casemates overlooked Serapong Road and will be able to bring fire down onto the main track should hostile forces attempt to march from Serapong Pier and up the hill.

3.1.9 Latrine (Block 6B)

It is not entirely clear when the latrine block was constructed on Serapong. The only plan which featured the latrine was the photograph of the untitled 1922 map found in Sentosa Development Corporation's archive, where a structure was labeled as "latrine" ("& seats?" - writing unclear). [99] The present structure architecturally appears relatively modern and contemporary to those from the 1950s with a water borne plumbing system suggesting that it may have undergone retrofitting (Illustration 39). It consist of six individual stalls each with a seat on a pedestal pan, overhead mild steel water elevated cistern and chain attached to discharge valve.[100]

Aerial photographs indicate that the structure was in existence by 1947 and it is likely the present system was remodeled or upgraded sometime in the 1950s when the site on Serapong was used by the Army School of Religious and Moral Instruction. Early latrines in the late 19th century leading up to the First World War mainly relied on the removable dry bucket system where the waste was removed on alternate days. [101] At the conclusion of the archaeological investigation, the location of the septic tank is yet to be determined, and is likely downhill on the eastern slopes.

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99 This photograph of the map depicting Serapong is undated, but another photograph showing Fort Connaught is purportedly from the same map, on Connaught's segment the date 1922 can be faintly discerned.

100 Water closet system similar to those found in Gillman Barracks where it was introduced in the 1950s.

101 Up to 1914, the "*Strait Settlements Defence Scheme*" records the number of latrine wrought iron buckets to be issued to each fort during periods of manning.

3.1.10 Water Catchment Slope, Drainage, Storage Tanks, and Pump Room

It is not difficult to figure out why Mount Serapong was sometimes known as “Cement Hill” (Illustration 40). Modeled after a similar system in Gibraltar, concrete covering two acres was laid on the slopes of the hill to collect rain water runoff and channel it into collection tanks with a capacity of 300,000 gallons (1,365,000 litres) at its foot. At times of very heavy rainfall the tanks were filled by the runoff from the concrete apron alone, but normally this was supplemented by water from a separate reservoir of 6,000,000 gallons (22,705,800 litres) capacity southeast to Mount Serapong on the western periphery of Fort Connaught. [102]

The rainwater harvesting system comprises of rainwater drainage, the above-mentioned concrete surfaced rainwater catchment slope, and a partially subterranean concrete water storage tank (Illustration 41). The thickness of the catchment concrete screed is uncertain and examination of various parts shows that it was applied in an inconsistent manner with varying amounts of cement laid, probably resulting from the sheer variance in the lay of the land. As mentioned above, PF Cell No.1 was constructed atop the water catchment apron (Illustration 42). It was integrated into the water catchment complex built into side of the slope and is only accessible via a passageway from the water tank below. The water tank was manufactured in reinforced concrete and the columns of the passageway leading to the PF Cell are of brick. A row of contiguous bored piles were piled around the water storage tanks to stabilize the slope against the additional weight of water in the tanks.

Along with the water catchment slope and water storage tanks is the pump room (Illustrations 43 and 44). The building is a simple structure and measures 3m x 3m. Inside a Morris Motors industrial engine for powering the pump is still in situ. The Public Utilities Board continued to operate the Serapong water tanks up to sometime in the 1980s when a new service reservoir was built atop the hill. On various maps of Serapong, the water storage tanks have been labeled diversely as Tanks Collecting, Storage Tanks, or Filters and the pump room occasionally referred to as the Meter House. The water coolies huts or village were depicted on the maps just south of the tanks and beyond the wire fence. [103]

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[102] See *Blakang Mati Water Works: A Locally Designed Rapid Gravity Filtration and Pumping Station (1941)* Major A.B.Scrase.

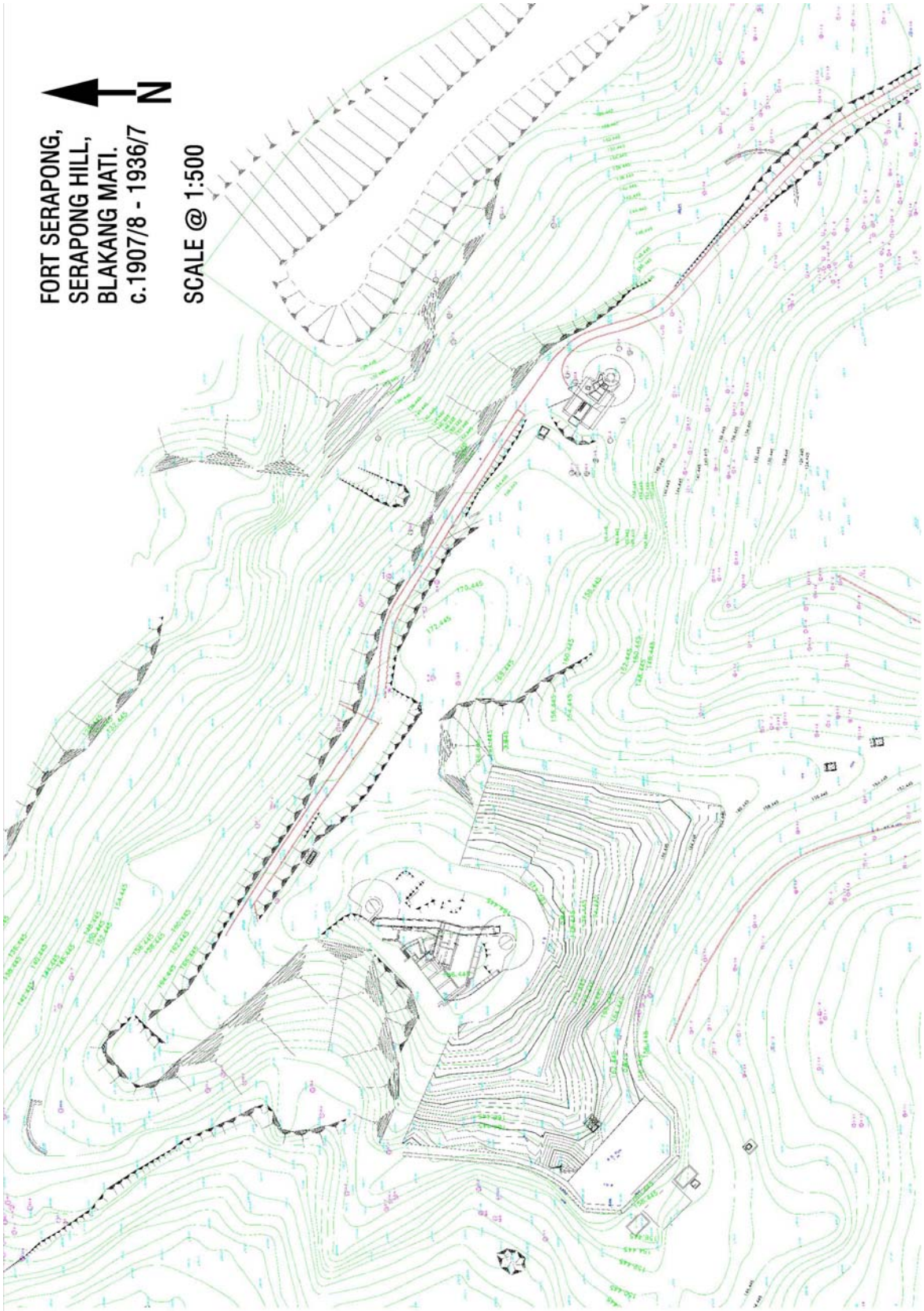
[103] Untitled map dated 1922 in Sentosa Development Corporation’s archives, MPHH 1/497 (1911) and WO 78/4225 (1909).

3.1.11 Unknown Brick Structure: Possible Shrine

South of the water storage tanks and pump room, approximately 50m away, a singular low brick structure was located (Illustration 45). It measures 1.8m x 1.8m and is 1.6m high, its wall made up of brick with a concrete roof. There is evidence of remodeling or some form of upkeep where traces of earlier brickwork and masonry are visible. The nature of this structure is yet to be determined but a guess based its proximity to the former water coolies village suggested that it may be used as a shrine constructed for housing the statuary of a deity, and perhaps accounts for the continuous upkeep and renovation until its final abandonment. Some of the brickwork and contemporary objects found within and around the site indicate that the structure may have been in used through the 1970s or even 1980s.

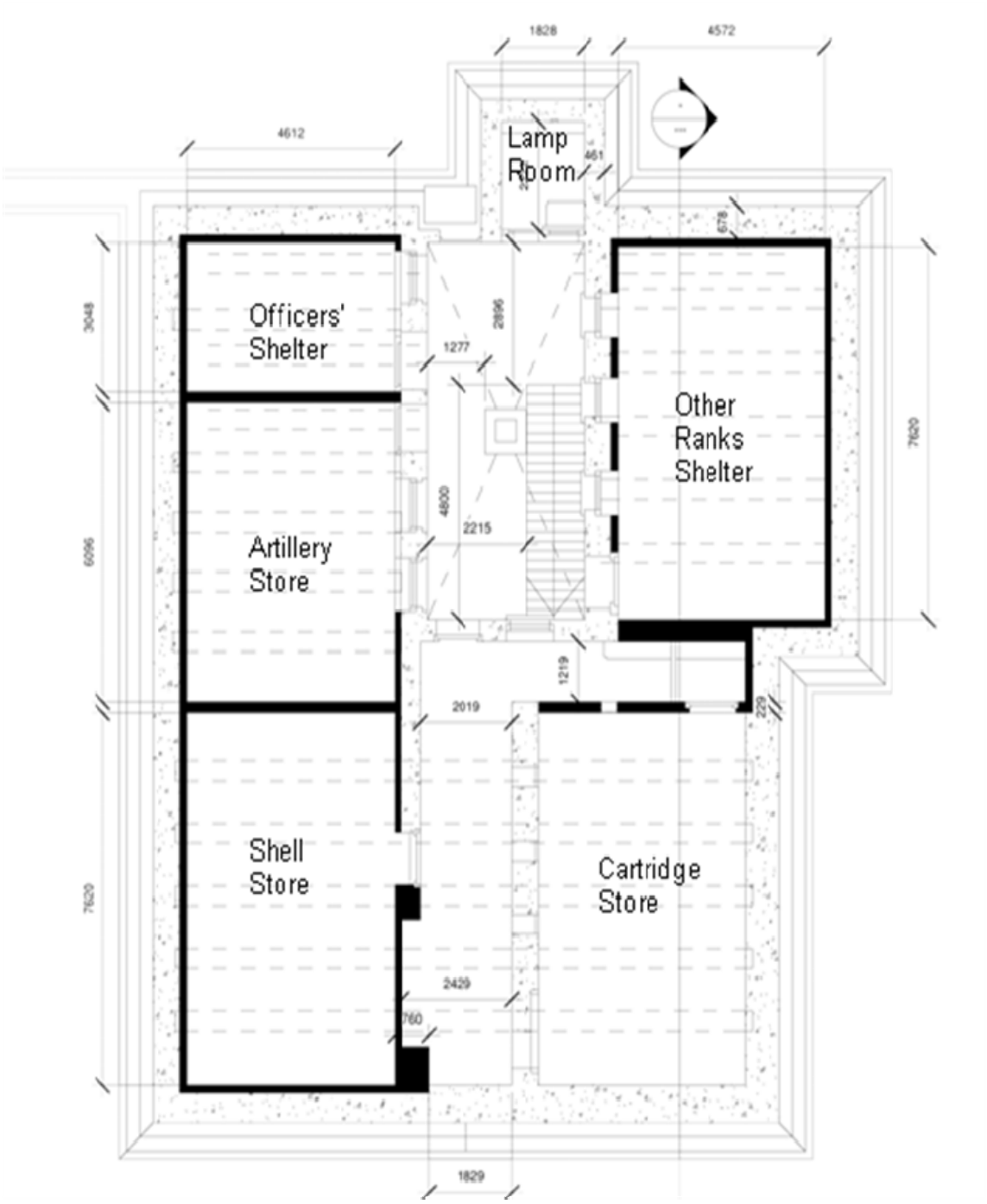
Several other features are found in the 1922 map and the MPH 1/497 plan but no remains of them are visible today; a skidding shed was supposedly located at the foot of Serapong Hill Road. By Infantry Post No.4, there apparently existed the cook house, barrack bungalow, and latrines. An artificer's (craftsman) shop, guard room and water tank were to be located at the present clearing north of the 9.2 inch No.2 gun. The most mysterious structure was labeled as "aerial ropeway" and it sat on the present site of the Sentosa service reservoir. The ropeway appears to be some form of cable system strung between a structure by Serapong Pier and the top of Mount Serapong. If it existed was it perhaps some form of communication cable pulley system? A battery command post was indicated in the plans for Spur Battery south of No.7 PF Cell, as well as a fire command post and latrine built uphill from PF Cell No.4. None of these appeared to have survived the 1930s development. Finally surrounding the entire site was wire entanglement fencing.

Plan 6. Detailed plan of Phase 5: 1907/8 – 1936/7. (Daniel Hii)



Plan 7. Archaeological sequence Phase 5: 1907/8 – 1936/7. (Daniel Hii)

Illustration 17. The Spur Battery 9.2 inch gun magazine, stores, and shelters. (Author)



Plan 8. Plan of the 9.2 inch magazine complex at the Spur Battery. (Daniel Hii)

Illustration 18. PF Cell No.7 was one of the four cells which remained today on Mount Serapong. At one point in time there were a total of seven such structures. (Author)

Illustration 19. Interior of PF Cell No.7 (Author)

Illustration 20. Rear view of PF Cell No.7 (Aaron Kao)

Illustration 21.PF Cell No.2 located on the southern spur of Mount Serapong. (Author)

Illustration 22. Interior of PF Cell No.2. Note the pedestals for the position finding equipment are still in situ. (Aaron Kao)

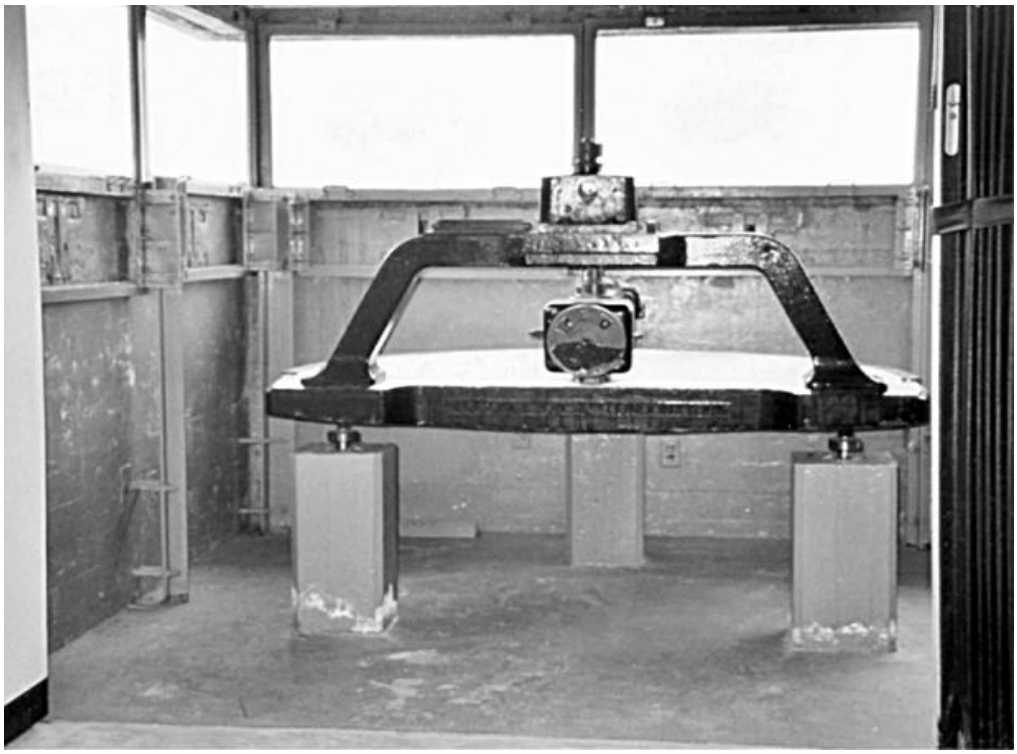


Illustration 23. The Watkins Depression Range Finder seen here at York Redoubt United Kingdom. (Fortress Study Group)

Illustration 24. Test trenching located the edge of the 9.2 inch Gun No.1 shell hoist and determined that the emplacement was covered by construction rubble fill with no artifacts allowing a mechanical excavator to be brought in for the excavation. The small rectangle recess (centre) is for the firing primers. (Author)

Illustration 25. 9.2 inch Gun No.1 revealed. It last saw the light of day in 1936/7. Fort Connaught's BCP (built in the late 1930s) is to the left partly obstructed by the tarp. (Aaron Kao)

Illustration 26. Approximately 1m of concrete rubble deposits were dumped into the gun pit followed on top by packed clay. Some 100 tons of rubble were removed from this emplacement alone. (Author)

Illustration 27. View of the 9.2 inch Gun No.1 emplacement from the rooftop of Fort Connaught's battery command post. The accumulator pits and mounting bolts are clearly visible. Marked by caution tape on the left is the shell hoist. The curved recess beneath the parapet in front is for ready shells to be stocked. (Aaron Kao)

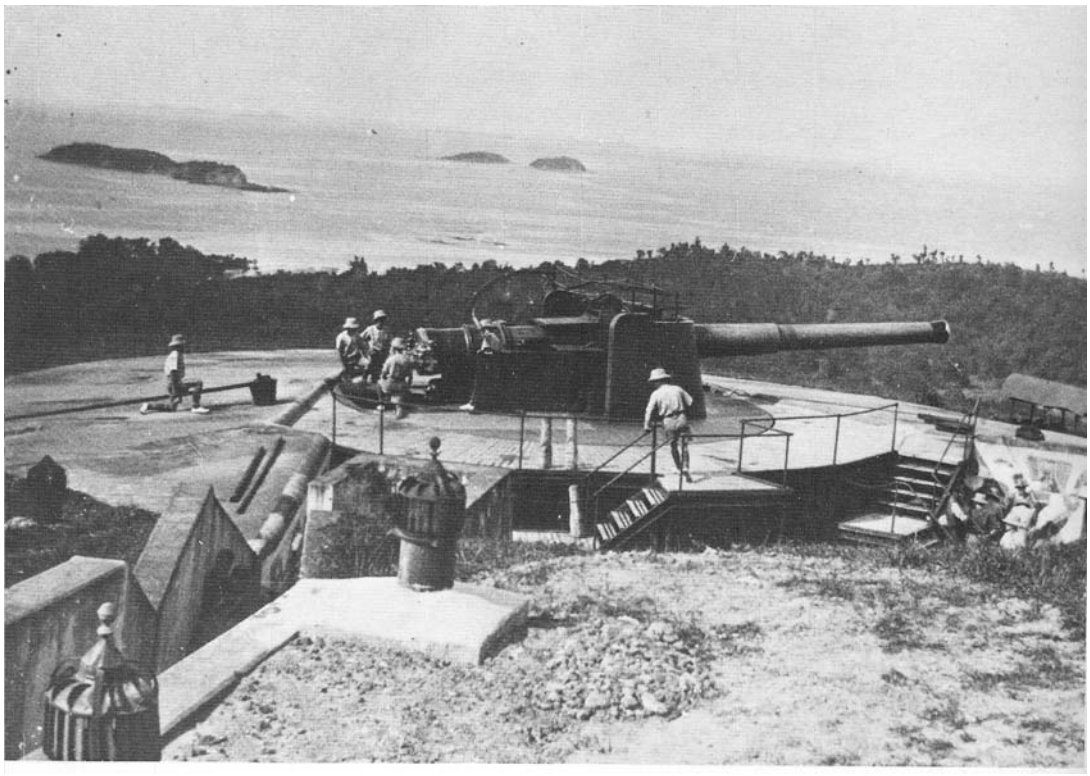


Illustration 28. The 9.2 inch Gun No.1 in its heyday. Several gunners could be seen sheltering in the shade of the communication trench to the left. In the foreground were two Howorth's revolving ventilators for the magazine below. In the distance, were the islands of (L to R) Pulau Sakijang Pelepah (Lazarus), Pulau Sakijang Bendera (St.John's), Pulau Sabar Laut, and Pulau Subar Barata (Sisters Islands). (Author's Collection)

Illustration 29. Artist rendition of the Fort Serapong hilltop. (L to R) Apron of the 9.2 inch Gun No.2, followed by the communication trench, 9.2 inch BCP and annex, and casemates. (Daniel Hii)

Illustration 30. 9.2 inch Gun No.2 emplacement with its accumulator pit and trench prominently exposed. In the background wrapped by the banyan tree is the battery command post. Gun No.1 is beyond the little rise out of sight on the top left corner of the photograph. (Author)

Illustration 31. 9.2 inch gun BCP (enveloped by banyan tree). On the left is the annex building added on at a later date with its ventilation grilles clearly visible. The concrete wall (centre) is part of the communication trench connecting the two gun positions. Gun No.2 is to the right where the excavator is pictured. The BCP overlooks Gun No.1. (Author)

Illustration 32. 9.2 inch gun magazine and shell hoist passageway. The passageway ran on a north-south axis and lead to a shell hoist for the gun emplacements above at each end. Here looking north. (Aaron Kao)

Illustration 33. Passageway looking south and towards the opening for the 9.2 inch Gun No.1's shell hoist at the end. The steps on the floor to the left are for timber skids for stacking the shells. (Aaron Kao)

Illustration 34. 4m below under the Gun No.2 emplacement. The shell hoist mechanisms had since been removed. (Aaron Kao)

Illustration 35. A surviving example of the mechanical shell hoist at Fort Siloso. (Author)

Illustration 36. 9.2 inch BCP and annex structure. Construction methods of the BCP are similar to the PF Cells. (Aaron Kao)

Illustration 37. The author and colleague Omar Chen takes a break at Infantry Post No.1. The author is sitting on the firing ledge. A total of seven infantry posts once ringed Mount Serapong. (Aaron Kao)

Illustration 38. Infantry Post No.5 along the western edge of the water catchment runoff was made up of a concrete wall with firing ports at every 2m distance. (Aaron Kao).

Illustration 39. Latrines. (Aaron Kao)

Illustration 40. Water catchment runoff. It is not difficult to see why Mount Serapong was referred to as "Cement Hill". (Author)

Illustration 41. The water storage tank because it was covered, led many researchers in the past to mistakenly identify it as an "underground" reservoir. (Author)

Illustration 42. PF Cell No.1 located on the southwestern edge of the watch catchment runoff. One of the concrete pedestals for range finding equipment is visible through the slit window. In the rear the water storage tanks can be seen. Unlike the other PF Cells, access was via a passage and stairs below at the water tanks. (Author)

Illustration 43. Pump room, located southwest of the water storage tank. (Aaron Kao)

Illustration 44. Morris Motor Industrial Engine still in situ. (Aaron Kao)

Illustration 45. Unknown brick structure, possibly a shrine. There is evidence of this feature being regularly repaired and modified. (Author)

Chapter 4

Mount Serapong in the Pre-War Period

4.1 The Archaeological Sequence Phase 6: Second Upgrading & Modifications 1936/1937 - 1942

The 9.2 inch guns remained in service till the mid 1930s when a newly rebuilt Fort Connaught with its improved 9.2 inch BL guns Mk X on Mk V 35 degrees mounting came into service. In 1936 Major General F.W. Barron had been sent out by the War Office to review the defences of Singapore and Penang. Following General Barron's tour of the region, he recommended many changes to the coastal defences of Singapore and one of these was that a new two gun battery consisting of 6 inch breech loading guns be built on Serapong Spur. [104]

General Barron noted that the approved close defence armament for Blakang Mati were the 6 inch battery at Fort Siloso and the 6 inch battery at Silingsing on Pulau Brani. He considered that these were insufficient and recommended two more guns to be emplaced where the old 9.2 inch gun emplacement of the Serapong Spur Battery was. He observed that the existing emplacement could be converted for a 6 inch gun at a relatively cheaper cost than building a new emplacement. The second gun was to be in a new emplacement some 50 yards (45m) uphill from the spur. This new 6 inch battery was to be named as the Serapong Battery and will be armed with two 6 inch Mk VII Guns on 15 degrees centre pivot mountings (CPM). These were laid out in tandem fashion rather than the customary side-by-side manner due to space restrictions on the spur. [105]

Apart from General Barron's useful report, further review of existing literature drew a blank for this period in question. Albeit large numbers of books and articles were written over the last 60 years since, on the subject of the fall of Singapore during the Second World War, few made any specific reference to the gun batteries on Blakang Mati, least of all on Serapong. The monumentally comprehensive volumes "Did Singapore Have to Fall?" and "Between Two Oceans", two of the most recent and certainly most detailed study of the military history of Singapore during the years leading up to the Second World War in the Pacific, too possessed little information or clues for the historical archaeologist. Both have but in passing mentioned of the type of guns and their calibre that was mounted at Serapong during those years. Likewise, Yeoh fell completely silent.

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104 WO106/135 (1936). Report on the Defences of Singapore and Penang. National Archives United Kingdom.

105 Ibid.

Indubitably he ran into one of the "lows...a period which there were no plans, maps or reports mentioning in any detail what was happening at that battery". [106]

Despite the want of archival records, archaeological remains abound on Mount Serapong and the following features had been identified and attributed to this phase:

Structural Remains	Remarks
1) 6 inch Gun No.1 Emplacement	Remodeled from 9.2 inch Gun Spur Battery
2) 6 inch Gun No.1 Magazine	Remodeled from 9.2 inch Gun Spur Battery
3) 6 inch Gun No.1 Duty Personnel Rooms & Gunners' Shelter	Constructed 1936/7
4) 6 inch Gun No.2 Emplacement	Constructed 1936/7
5) 6 inch Gun No.2 Magazine	Constructed 1936/7 – destroyed few remains
6) 6 inch Gun No.2 Duty Personnel Rooms & Gunners' Shelter	Constructed 1936/7
7) 6 inch Gun Position Finding Cell	Remodeled from 9.2 inch Gun PF Cell No.7
8) Observation Post	Constructed 1936/7
9) Kitchen	Constructed 1936
10) Stores (Block S7)	Constructed 1936
11) Bathroom	Constructed 1936
12) Connaught Battery Command Post	Constructed 1936/7
13) Blakang Mati Command Centre	Constructed 1936/7
14) Mechanical Services – Generator Room	Constructed 1936/7

In addition, there were also two structures of unknown provenance but suspected to be constructed before the outbreak of the war and tentatively allocated to this phase of development:

15) Unknown Structure with Cantilevered Beam
16) Unknown Structure - Possible Washing/Decontamination Facility

[106] Yeoh (1979), p.24.

4.1.1 6 Inch Gun No.1 Emplacement, Magazine, and Duty Personnel Rooms [107]

Access to the 6 inch Gun No.1 was via the present Serapong Hill Road. Some point between 1922 and 1936 the track from Fort Connaught to Serapong (see above Phase 5) was metalled with asphalt making it accessible to motor vehicles. It is unclear if "Serapong Road" from Serapong Pier continued to be used or was allowed to be reclaimed by the jungle. Only minor modifications were made to the Gun No.1 emplacement to enable it to receive the mounting for the smaller caliber 6 inch gun. The gun carriage pit was reduced in size to 3.8m by the addition of a cement ring and the installation of 28 holding bolts for the pedestal mount. The cast concrete gun carriage pit had four storage recesses for stores or cartridges built into its sides and a flight of six steps lead up to the loading and operating platform. The gun position remained as with its 9.2 inch predecessor, orientated toward the southeast (Illustrations 46 to 49).

Another modification of the original 9.2 inch gun emplacement was the introduction of concrete humps along the entire apron to the front and sides of the position. These humps measuring approximately 20cm to 30cm in diameter with a height of 15cm to 20cm each, varied in shapes and sizes. Several of these humps appear like oversize 'fortune cookies' and yet others like mounds of camel's hump. The purpose of these irregular cement screeds is not entirely known and it is theorized that the indentation may help break up the reflective properties of the concrete, hence reducing the tell-tale glare when viewed from the air. [108]

The 6 inch guns at the Serapong Battery were initially without overhead protection for the gunners – apart from the short shield on the Mark II CPMs. The reason for this was that the guns had to be "capable of and required to fire landwards". [109] Indeed all the 6 inch guns emplaced in Singapore were capable of all-round fire when constructed. The overhead reinforced concrete canopies were only later added to provide some shelter from the rain and sun, and perhaps to an extent offer some protection from exploding shell shrapnel. It was unlikely these were constructed to withstand extensive counter battery fire or aerial bombing. Part of the canopy had since collapsed and large parts of the ceiling exposed by spalling concrete. The canopy was held up by ten reinforced concrete beams of which only five remained in their original position.

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107 Prior to undertaking the project, there were some initial doubts about the location of the pair of 6 inch guns, and the general belief was that they would be located at the hilltop where the existing casemate from 1885 (Phase 4) is readily identified. Preliminary attempts to pry the secrets of Serapong from the jungle resulted in the article "*On the Spur: Evidence from the Serapong Battery, Fixed Defences of Singapore*" in the *Coast Defense Journal Vol.21 Issue 1 (2007)*.

108 These mysterious concrete humps are also found on the 6 inch gun positions at Fort Siloso on western Blakang Mati, as well as at Fort Connaught's emplacements for the 9.2 inch Mk X guns. They appear to be found only on installations dating to the 1930s.

109 WO106/2555 Malaya: Coast Artillery October 1937 – October 1942 (sic – February).

Another feature which had evaded attempts at determining its function is a small rectangular concrete structure built atop rear of the gun position overlooking the canopy (Illustration 52). Resembling an outhouse, this 2m x 2m x 2m structure is accessible by a narrow crawlspace and is only large enough to accommodate a single individual with limited movement. The structure is totally enclosed except for three horizontal rectangular openings towards the top of the north, south, and east elevations. No significant features were found within this structure and today a large banyan tree had enveloped it.

Structurally, the magazine remains the same as with the earlier 9.2 inch gun magazine of the Serapong Spur Battery. The only exception was likely the wiring works for electrical light fixtures installed sometime in the 1920s or 1930s. The site had been stripped of any materials valuable for the scrap yard. Either deliberate demolition by the British military on the morning of the surrender of Singapore, or caused by looting and vandals over the last six decades, the interior of the magazine and the ancillary rooms (ie shelters for officers and other ranks, store etc) are littered with brick rubble and other building debris. Most of the debris was the remains of partition walls which once separated the magazine with the artillery store room and the officer's shelter. None of the fenestration remained. Sown amongst the debris were large numbers of shell fragments in varying states of corrosion. The dimensions from several pieces and the recovery of driving bands indicated that these were of the 6 inch caliber. A single dud Mk V anti-tank mine was also uncovered and disposed of by ordnance specialists from the Singapore Armed Forces. [110]

One of the most distinct features from this phase was the introduction of the duty personnel rooms and gunners' shelter constructed just to the rear of the gun emplacement. An identical structure was provided for both the gun positions, with Gun No.1's situated above ground immediately to the east of the magazine and on the left of the main road leading up the hill (Illustration 53 and Plan 11). In front of this structure was an area of asphalt sufficiently large for the battery parade where the troop of gunners could muster for roll calls and instructions. The shelter made of reinforced concrete was constructed to withstand indirect bombing or counter battery fire, with its rear built into the slope of the hill. Mild steel shutters cover its doors and windows. The rectangular structure measures approximately 10m x 4m and had two rooms; the left room approximately 3.8m x 3.2m, and the right room slightly larger at 4.7m x 3.2m.

Entry to the room on the left was by a Dutch door, consisting of two units horizontally divided so that each half can be opened or closed separately. This suggest that the room with the Dutch

[110] For more on the identification of the 6 inch guns at Serapong see *On the Spur: Evidence from Serapong Battery, Fixed Defences of Singapore (2007).*

doors may have been a store or small arms armoury where issuing of equipment could be made without having to open the bottom horizontal door and restricting access to the stores within to only authorized personnel. This room had only one window while the other larger non-Dutch door room featured two. The latter room possessed a double casement door which swings outwards. A single ventilation shaft is built into the roof of each room. The rooms have both since been stripped bare and nothing significant remained to assist with the identification of its past usage. Attached to the east elevation was a small cubicle measuring 1.2m x 1.8m which may either had served as a sentry post or as a dry bucket toilet.

4.1.2 6 Inch Position Finding Cells

This phase of upgrading saw the removal of several PF Cells that once serviced the old 9.2 inch guns of the Serapong Spur and hilltop Fort Serapong batteries. By 1939, only PF Cell No.7 remained of the cluster of cells. It is not clear if this cell continued to function in its original role and the description is as Phase 5 above (Illustrations 18 to 20). One interesting feature of PF Cell No.7 is the example of Expamet reinforcement bars used in the concrete. Also known as slashed metal screening, it may have been one of the earliest forms of reinforcement introduced into strengthening and producing reinforced concrete in Singapore. This reinforcement is manufactured by slashing slits on metal sheets prior to applying uniform tension force to expand the sheet and forming into a screen. [111]

4.1.3 6 Inch Gun No.2 Emplacement, Magazine, and Duty Personnel Rooms

About 40m uphill and to the north of Gun No.1 was the Gun No.2 emplacement (Illustrations 54 to 58). Due to the restricted amount of flat land along the spur, the guns were laid out in tandem not dissimilar to that of a naval vessel, with a gun mounted higher to the rear and overlooking the forward gun turret. This arrangement was unique and no other gun batteries in Singapore were emplaced as such; instead they usually adopted the standard battery arrangement with the guns lined up side by side. Unlike Gun No.1 downhill, this position was built from scratch. At its widest extent the concrete emplacement stretches approximately 15m across and consists of an apron which slopes away in front and to the sides of the gun platform and carriage pit. As with Gun No.1, concrete humps covered the whole apron.

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[111] Yeo Kang Shua. *Fort Serapong Archaeological Research Project: Architectural Inspection and Conservation Report (2007)* pp.22-29. Unpublished manuscript.

To the northeast of the emplacement was a concrete bank with five storage recesses framed by mild steel. All the locker doors to the recesses are unfortunately missing. On this rectangular bank was also overlaid with the cement screed humps. Storage recesses were also found around the exterior of the concrete gun carriage platform. Seven (five along the bank, and two remaining on the northwest edge of the gun pit) stumps of concrete beams remained revealing that at one point a concrete canopy covered the entire rear end of the emplacement. Again this concrete canopy like Gun No.1 was initially not part of the construction plan, and was only added as an afterthought perhaps a year or two before the war. A rare photograph uncovered at the National Archives in the United Kingdom shows the two 6 inch gun positions without the overhead cover (Illustration 92).

To the north (and rear) of the gun pit were the duty personnel rooms and gunner's shelter (Illustrations 62 to 65). This single storey structure was identical to the above-mentioned for Gun No.1. The only minor difference was that the interior of Gun No.2's shelter are relatively more intact than its sister shelter downhill. There were timber racks for small arms (rifles), timber benches with mild steel supports, and timber shelves. These fixtures particularly of those in the left side room lend credibility that this smaller room with the steel Dutch doors may indeed be that of a small arms armoury or store, where the armourer might issued the equipment through the opened top half of the Dutch doors while keeping the lower horizontal half locked to restrict unauthorized access. The remains of timber benches and artifacts recovered from the room on the right suggest that this room was employed as a rest area for the gunners. [112]

The robustness of the shelter is demonstrated by its partial burial under massive amounts of concrete rubble and earth thrown up from the explosion of the magazine. It is also partly due to the vast amount of debris that the interior of this shelter remained in a better state as it became less accessible for looters and vandals. Again as with the No.1 Gun shelter, an annex structure in the shape of a cubicle abuts on the right of the building. Its use is still unknown and may be either a toilet or a sentry box. To the right of the duty personnel and gunners' shelter was a concrete ramp of approximately 30 degree incline leading down to the road (Illustration 66). This ramp permitted the delivery of ammunition and other supplies by motor vehicles to the gun position.

On 18th January 1942 the war finally arrived on the island of Blakang Mati. An air raid severely damaged Fort Serapong's No. 2 Gun and its protective canopy causing the gun and mounting to be replaced. On 14th February 1942 came the order to destroy the guns. The No. 2 Gun was spiked with a gelignite charge at 1200hrs. At 1400hrs, Blakang Mati was recorded being bombed

[112] An aluminum cap for a water canteen and large numbers of clear glass bottle shards were recovered. The shards have been identified as pre-war soda soft drinks from the now defunct Phoenix Aerated Water Works.

and shelled. Several bombs landed on Mount Serapong and the northern side of the hill was receiving artillery shellfire close to the entrance to the Berhala Reping. Later, at 1700hrs its magazine was spiked. This blew up completely leaving a large crater and severely damaging the emplacement above. Five men were injured in the blast. The No. 1 Gun remained available for action until the next morning of the 15th and it was then spiked. The BCP with all its equipment was destroyed. [113]

War damage to the emplacement and its surrounding are clearly visible today. The gun carriage pit and apron had been sheared in half most likely due to the massive explosion when the magazine detonated on the evening of 14th February 1942. The explosion was so extensive that it left a 30m crater where the subterranean magazine once stood (Illustration 60). Nothing remained of the magazine save for debris found scattered about the site. Apart from the few large slabs of concrete leaning against the gunner's shelter and partially obstructing the entrances, a singular piece of debris some 20m in length was found on the western slope of Mount Serapong (Illustration 61). This has been identified as a part of the magazine roof comprising of corrugated steel beams bolted together with reinforced rebars encased in 50cm thick concrete. Debris from the explosion was also located across the road on the eastern slopes of the hill.

Ground and jungle clearance at the No.2 Gun emplacement ceased with the discovery of a live 6 inch armour piercing anti-shipping shell in the gun carriage pit (Illustration 59). The shell was removed and disposed off by the Singapore Armed Forces' Explosive Ordnance Disposal unit. [114] It is likely because of the large quantity of debris sown about the area, a high potential of artifacts (including ammunition) from the last days of the battle for Singapore are still buried in situ for this site.

4.1.4 6 Inch Gun Battery Command Post Complex

Further up the ridge continuing on a northeast axis and about 25m beyond Gun No.2 gunner's shelter lays the battery command post for the pair of 6 inch guns. The entire BCP complex consists of four rooms, two of which were laid out in a split level configuration. These two rooms were situated side by side and occupy the front of the complex. The lower room to the right was built into the ground with its observation windows just above the surface. On the higher split leveled to the left is the second room. Both rooms face southeast and look over the gun positions on the slopes below. They have been identified as the command and observation posts where

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113 WO176/180 War Diary Faber Fire Command (1942). National Archives of the UK

114 Another 6 inch shell was recovered downhill south of Gun No.1 apron. This shell was found without its explosive charge and fuse.

the range, bearings and other fire direction calibrations were computed and relayed to the guns (Illustrations 67 to 69 and 71).

The lower battery command post is similar in construction to the position finding cells found on Mount Serapong. It is a low rectangular room (3.5m x 5.3m) and has two I beams cantilevering out from two shear walls, to provide an uninterrupted 180 degrees view (Illustrations 70 and 72). A singular concrete pedestal to mount either position or range finding equipment still stands within the room. Stenciled in white paint, a series of range and bearings can still be made out albeit deteriorating. Reference bearings for quick orientation (1, 2, 3, 4 etc) were also painted on the I beams over the slit windows. There were two large storage recesses (1.35m x 0.5m x 0.3m) constructed into both sides under the slit windows with 60cm opening. None of the steel shutters remain on the windows. To the left of the door (which opens to the back) is a vertical recessed cupboard framed with timber. A crawl through opening (88cm x 77cm) on the south wall leads to the upper BCP 1.3m above.

The upper battery command post has an unequal pentagon plan with a maximum width of 3.3m and a maximum depth of 1.6m (Illustration 73). A slit window surrounds the front and side of this room, and one of the 1 inch thick steel shutter is still in place. An intact high timber panel was mounted beneath the window complete with the mild steel voice pipe leading down to the lower BCP. Apart from the crawl through connecting to the lower BCP, entry was by a door located in the back.

Two other rooms were found to the rear, one of which was a small signals or communications office (2.4m x 1.8m) evident from the remains of ceramic electrical insulators, electrical or telephony wires and mild steel brackets. This room also has two ventilation holes cut high up on the walls, one still with a green glazed ventilation grille of Chinese origins. The last room making up the complex may have suffered structural damage from some form of explosion. Its roof had collapsed and the walls buckled. Two windows were found on the north and south walls. This is the largest room (3.7m x 4m) and its use is undetermined.

Steel brackets for radio and signal antennas were found on the roof top of the BCP. Camouflage netting steel hooks were also found embedded along the front and side edge of the roof. There is some evidence to suggest that localized but haphazard attempts at camouflaging the complex had occurred. Bricks and other rocks were employed to create a planter on the roof for grass or other plants. Traces of paint in various colours (black, green of various shades, and brown) were also found brushed hurriedly on the walls.

The BCP complex is connected to a T-shaped concrete communication trench which leads to the Gun No.2 gunners' shelter below, with the BCP located at the shorter end of the "T". It is believed that a flight of steps was once located directly beside the shelter but have since been destroyed by a landslide when the magazine was spiked in 1942. The remaining trench measures approximately 33m in length at its longest, and the shorter trench leading into the BCP is 5.5m, with a varying depth of 1m. The longer communication trench runs parallel with the BCP and as it overlooks Serapong Hill Road, it may also have served as an infantry trench where small arms fire can bring enfilading fire upon hostile forces utilizing the road. Finally the trench may also serve as shell scrapes for the soldiers during counter battery bombardment or aerial attacks (Illustration 74).

A four strand barbwire fence surrounded the northwest and west of the BCP starting from the edge of the Serapong roadway and ending near the crater (former 6 inch gun magazine). The concrete post was approximately 2m in length (50cm sunk into the ground and 1.5m above the surface). The posts were erected approximately between every 1.5m to 2m. A large badly corroded iron gate was also found, suggesting that a track or foot path (now invisible under the jungle overgrowth), running on the ridge parallel to the road once led from the BCP to the hilltop.

4.1.5 Observation Post

Across Serapong Hill Road north of the 6 inch BCP complex, built on silts onto the side of the slope is a square observation post (Illustration 75). Measuring 4m x 5m and standing at 2.4m high (excluding the concrete stilts), the floor of this concrete post was packed with clay and a firing ledge 40cm wide surrounds the insides of the post. The post overlooks the Berhala Reping Anti-Motor Torpedo Boat emplacement battery, as well as Pulau Brani and the stretch of waterway (Sinki Straits) separating the Blakang Mati from the former.

4.1.6 Barracks/Dining Hall/Stores, Kitchen and Bathrooms

Proceeding up Serapong Hill Road passing the singular observation post, rounding a bend and to the left of the road, a series of buildings can be found. In order of succession following the road, the first building was the kitchen block, and is followed by a long rectangular structure which was most likely the dining hall, barracks, stores or a combination of the three functions. Beyond this was a standalone bathroom outhouse. Presently the kitchen and bathroom blocks are in advance stages of disrepair and deterioration. The dining hall or barracks had been converted into general stores for the Sentosa Development Corporation.

The dates of construction for these structures are evident with the practice of surmounting the year of completion in concrete or plaster relief to the capital just below the roof – 1936. The kitchen block's roof and truss had collapsed obstructing closer inspection of the site. However, it can still be discerned that the two rooms on the left of the kitchen block were later additions. This annex is a flat roof lean-to with the original walls of the kitchen cut to provide entry to the two rooms. Collapsible folding metal gates served as the doors. A corridor was found to at the other end of the kitchen, to its left is a small larder still equipped with timber shelving. The corridor extends into a covered concrete passageway connecting to the barrack/dining hall block (Illustration 76).

The roof was constructed with interlocking terracotta tiles on the exterior and layered with asbestos proofing sheets or boards in the inside. Two manufacturers of the tiles have been identified "Guichard Carvin & Co Marseille St.Andre France" (bee/hornet brand), and "The Standard Tile & Clay Works Ltd Feroke" (Kerala Province India). [115] Windows were timbered louvered casements with security horizontal steel bars. Cast concrete vertical ventilation grilles surround the top of the walls. The lower half of the kitchen and annex building walls are still covered with white glazed dust pressed kitchen tiles and the upper half of the walls the brickwork was left unpainted/plastered. The annex however was not constructed of bricks but concrete. No kitchen tiles lined the larder and corridor leading to the barracks/dining hall block. Likewise, the brickwork was left exposed. A small concrete refuse and swill collection station was built outside the kitchen annex block.

The barracks/dining hall or stores block is 38m in length and 7m wide (Illustration 77). The interior had since been modified to serve as stores for Sentosa Development Corporation and is the only structure of Fort Serapong that continues to be in use. The original terracotta roof tiles had been changed to corrugated aluminum roofing sheets, and all the timber truss and fenestrations replaced with either mild steel or aluminum. However, the twenty-four original cast concrete ventilation grilles are still in place just below the roof.

The last block in the row of structures is a standalone bathroom (Illustration 78). The building measures 5.9m x 3.2m and was demarcated into two chambers. The first was the bathing facilities which was internally subdivided into two cubicles with full length vitreous china bathtubs (and soap dishes!), and two stalls with shower trays. Two/fifths of the walls were tiled with white glazed dust pressed tiles. The rest of the walls were plastered and painted. Entry to the bathing chamber was through a door on the east elevation. A large corroded water heater was found in

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[115] See R.V.J.Varman's *The Marseilles or French Pattern Tile in Australia (undated)* for a discussion on the origins of the interlocking terracotta tiles of French designs.

the other room, and the walls were similarly tiled and painted. Steel brackets and pipes protruding from the wall suggest that this room was equipped with faucets and wash basins. Three large cast concrete vertical ventilation grilles were found in the bathing chamber and two in the other room. It is not clear if this structure underwent retrofitting and remodeling during the post war years, and the facilities within described may be later additions.

4.1.7 Fort Connaught Battery Command Post

When Fort Serapong on the hilltop with its pair of 9.2 inch Mk X guns was decommissioned in the late 1930s, most of the features were partially demolished and buried. The hilltop however continues to be useful and when a new BCP was required for Fort Connaught, the highest point of Mount Serapong was chosen. The BCP was built directly in front of the disused 9.2 inch BCP. Part of the old communication trench leading to the 9.2 inch Gun No.1 was demolished and buried beneath this new construction.

Connaught's BCP has an interesting floor plan, composing of a five sided polygon upper level and a curved section transcribing the lower level (Illustrations 79, 80 and 82). The lower section because of its curved walls offers a panoramic view of the southern approach to Keppel Harbour. Interestingly part of the lower section of slit windows was at some point sealed with cement, originally mild steel shutters would have been in place. Nonetheless the brackets to hold up the shutters in its open position are still attached to the exterior of the BCP. The lower section of the BCP was built into the ground, and like the 6 inch BCP (described above), the windows are almost at ground level.

Nothing movable remained of the interior and everything appeared to have been stripped bare over the years except for a small vitreous china wash basin in the corner of the upper level. [116] Evidential from contemporary graffiti, snack wrappers, beverage bottles and even fast food hamburger boxes that the BCP had been extensively disturbed. Still from a combination of historical documents and the remaining material culture, it is possible to make several general observation of the site. Old ammunition boxes filled with soil have been positioned into a makeshift stairs outside the lower level section to access the rooftops. The few photographs from the pre-war and post war years show that removable ladders had been occasionally employed.

[116] Even the wash basin is eyed by souvenir hunters. A visitor to the site remarked that what a pretty addition it would make to his home! There is certainly a market for old wash basins, antique dealers in Singapore and Melaka are hawking similar wares with prices ranging between $100-$300.

One of the rare pre-war photographs illustrated a signal lamp and spotting scopes were temporarily mounted on the roof tops by the gunners on duty. [117]

In the interior, the paintwork consists of sky or baby blue for the walls. The ceiling was painted a light cream, but patches of spalling concrete revealed that at an earlier date it was also painted blue. It was likely that blue was the preferred color for such observation posts as it is a colour least likely to clash with the distant sky as spotters look out through the slit windows. Along the edge of the walls where it meets the floor a band of paint in darker color (in this case deep red) was painted. In the earlier 19th century magazine, a band of black paint was employed to not only hide scruff marks from boots but also to alert the gunners of the floor's edge in low light conditions (the magazines were then lighted with oil lanterns). The purpose of this red band in the BCP may be similar but certainly not as effective. Perhaps it was purely ascetics or simply the want of any other paint colour.

The most prominent features remaining are grooves and depressions indicative of equipment mounts in the BCP. In the lower section, concentric rings are visible in the center of the room and may be the guiding grooves for wheels of the plotting table or other range/position finding equipment (Illustration 81). By this time in the late 1930s the Fortress System of fire control and plotting has been instituted in Singapore. [118]

Another interesting feature in the BCP is the detailing involved during its construction. The central concrete column supporting the roof in the upper level features a curved detail to facilitate easy cleaning of the floors by eliminating any of the 90 degree angle junctions. Correspondingly, the walls along the floors' edge were detailed in similar fashion. There are also several horizontal ventilation grilles found to the rear of the BCP. Outside the BCP is a pair of steel I beams embedded in the concrete. The purpose is unknown, but a photograph from the 1950s and 1960s shows that a bell was hung between the beams. Prior to the Second World War, a signal flagstaff also stood next to the BCP. No remains were found of the flagstaff, but several electrical poles with bell shape porcelain insulators were found around the site.

4.1.8 Blakang Mati Command Centre & Generator Room

With the removal of the 9.2 inch guns, the magazine too became redundant, and clever ways were sought to integrate the existing facilities during the 1930s general rebuilding programme.

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117 This photo is reproduced in Hack and Blackburn (2005), p.38.

118 Foster in his *The Guns of the Northeast (2004)* provides a good section explaining this fortress system, pp.59-68. Also Maurice-Jones' *The History of Coast Artillery in the British Army (1959)* provides background to gunnery and its evolution.

One of which was to excavated a shaft from the old 9.2 inch gun shell hoist passageway down deep into Serapong Hill where a new command centre for the Blakang Mati military command was being built. The command centre was built some 20m beneath the northern end of the 9.2 inch gun magazine passageway, some 6 storeys below the old 9.2 inch Gun No.2 emplacement.

The main entrance to the Blakang Mati Command Centre was via a passageway built into the northwestern slopes of Mount Serapong at about the elevation of 160m (Plan 12). [119] The passageway 31m in length runs southeast into the hill and makes a ninety degree turn to the northeast running another 10m before an antechamber. The passageway was built to the typical British Standard width of 1.2m, and with a height of 2.45m (Illustration 87). Three antechambers were negotiated before entry into the main chamber, and this chamber was further divided with another smaller room in the rear (Illustrations 83 and 84). Dimensions were difficult to obtain for the antechambers as part of the room had been destroyed, but the first two antechambers were in the shape of a square measuring approximately 2m x 2m. The third and final antechamber was the smallest of the three approximately 1.2m x 2m. Entering the third antechamber, a doorway on the left leads into the main room and a small hatch to the right about 1m above ground leads to the escape shaft crawl through passageway. Each antechamber was separated by a steel door.

Large amounts of debris and rubble littered the room and there were clear signs that the command center had since been disturbed by adventure seekers, looters and other scavengers. Graffiti from the post war years up to the 1990s are visible. Albeit disturbed by numerous visitors over the last 60 years, a systematic surface collection of artifacts was conducted and their analysis permitted some preliminary remarks to be made about the command centre including its construction and design (Plan 13).

The entire structure including the entrance passage was constructed of reinforced concrete. The roof constituted corrugated steel beams. The height of the command centre including the antechambers is 3.5m. The internal partition walls segregating the rooms are of brick and reinforced concrete, with the bricks rendered over with plaster. The main room measures 5.8m x 4.5m and the internal room to the rear is 2.4m x 4.5m. Surface recovery of artifacts from the rear room provided a small window into the lives of the men stationed in the command centre during the period leading up to the war. Several game tokens from the Monopoly game have been

[119] The original track to this entrance had since disappeared (or lost in the undergrowth) and access today is by utilizing the concrete stairs of the present Public Utilities Board's service reservoir. Midway descending down the stairs (which leads towards several filtration tanks), track southwest into the bush and the perseverant will find the generator room which will in turn lead to the entrance of the command centre.

recovered along with quantities of one cent coins dated to 1940. The game pieces were identified as those produced between the years 1937 and 1942. [120]

Also in the rear room, floor fixtures, concrete plinth mountings and suspended couplings along with artifacts identified as parts of the ventilation machinery suggests that at least part of this room contained the air purification plant. The main ventilation duct drawing air from the hilltop six storeys above snaked into the rear room and a separate ventilation duct with circular vents, probably the output duct for purified air, leads back out into the main room. Both the rooms were coated with green malleable rubberlike flooring. Most of these materials had melted and transformed into porous clumps. The staggered layout of the steel doors of the first and second antechambers suggests that the antechambers were designed as fire and smoke stops. The antechamber could also have accommodated a desk for the duty NCO (non-commissioned officer) or orderly, and perhaps a guard.

The command centre and its antechambers had suffered enormous damage. Evidence suggests that an explosive device had been detonated within the confines of the main room. The party walls separating the two antechambers from the main room had been completely destroyed crushing several of the steel doors and frames within. The walls of the rear room had also buckled and protrude hazardously into the passageway. Oxygen was no doubt exhausted as the ignition consumed the air within the command centre with such force that the mild steel ventilation ducts overhead supplying the air imploded and crumpled into flattened sheets.

A utility channel runs beneath the floor through the entire centre. Two manholes were found within each of the main and rear (air purification plant) rooms. Three additional manholes were located along the passageway leading to the hillside entrance. The cables for electricity and perhaps telephone lines were likely to be laid within, with the electrical cables feeding to the generator room outside. None of the manhole covers remain. Throughout the command centre, electrical wiring along with parts of switchboards, and lead insulators were recovered. Part of a circular recessed mild steel lamp casing remains on the wall, apart from this singular surviving light source fixture, the rest of the have either been stripped away or destroyed. However timber strips still line the walls of the centre and entrance passageway, where traces of the wiring can be made out and lead insulators still left in place.

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[120] Email correspondence with Hasbro Inc. Monopoly metal die-cast tokens were only issued from 1937. Earlier game tokens were made of wood. Shortage of metal during the Second World War led to the 1943-47 issues to revert back to wooden playing pieces. The post war period saw the replacement of several die-cast tokens with new designs, withdrawing “the purse, rocking horse, and lantern”. At Serapong, the rocking horse and purse tokens were amongst those recovered.

Returning to the old magazine above, the 17.7m deep shaft leading from the magazine passageway served as an escape route and was serviced by a steel cat ladder bolted into the concrete (Illustrations 85 and 86) . A steel cable pulley was also installed in the shaft next to the ladder. Ventilation ducts made of mild steel were also constructed and embedded into another enclosed but parallel (to the escape shaft) concrete utility shaft. These ducts drew in air from the surface through two ventilation stacks above by the disused 9.2 inch Gun No.2 end of the communication trench. At the bottom of the escape shaft leads to a narrow L-shape crawl through passage (76cm to 110cm wide, 150cm high but the ceiling made lower due to overhead ventilation shafts) with the escape ladder at the shorter tail end of the "L". A drainage gutter can be found running along the floor of this passageway. The crawl through ends with a steel hatch, beyond it leads into the third antechamber of the command centre.

An outhouse structure identified for mechanical services and most probably a generator was located 15m northwest of the hillside entrance. This generator room measures 5.9m x 3.3m and is 3.2m high, with a 2m high concrete block wall screening its entrance. The building was constructed into the side of the slope and a 40cm thick retaining wall was built in the rear. Interestingly an additional layer of cement 28cm thick was applied at a later date to reinforce the walls which was already 15cm thick.

Inside, a large concrete plinth measuring 2.6m x 0.8m sits in the centre of the room. The plinth is complete with channels leading away from the building. As the channel departs the site it disappears underground towards the general direction of the command centre. These channels may have served the cable trenches found within the command centre. Along with the concrete plinth and channels, the high pre-cast concrete vertical ventilation grilles and lack of windows and a square opening cut in the roof directly above the plinth (possibly for a smoke stack) all suggests that the structure was an electricity generating facility. However, no fuel storage tanks are found within the immediate facility.

4.1.9 Unknown Structure – Cantilevered Building

This structure is found south of Infantry Post No.4 on Mount Serapong's northern slopes. A banyan tree has engulfed this building and its roof had since been removed (Illustration 88). It measures 3.7m x 3.9m and has only three walls with its front elevation totally open. A high concrete pediment with vertical ventilation grilles can be found on both the front and rear of the building. A cantilevered beam 6.6m in length is featured prominently in the front beneath the pediment and appears that this beam at one point served as a support for a sliding mechanism for doors. On each wall is centered a single window measuring 1.2m x 1.5m. The purpose of this

building is not known. Its construction techniques and materials used tentatively placed it in this phase.

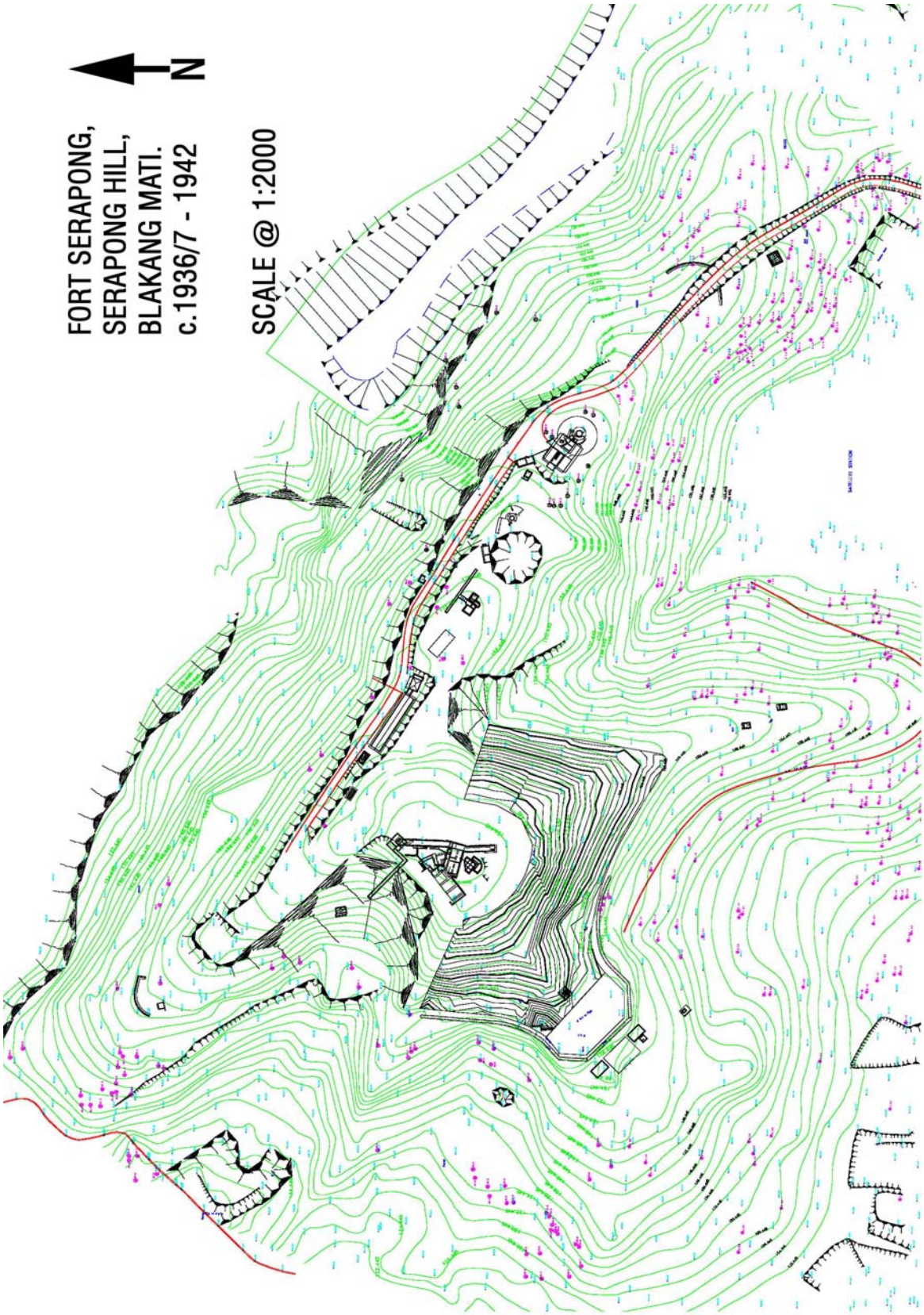
4.1.10 Unknown Structure – Possible Washing/Decontamination Facility

This reinforced concrete structure is located on the left of Serapong Hill Road, 30m south of Infantry Post No.1 close to the foot of the hill. It consists of three chambers and one room, of which three of the chambers are interconnected and were constructed without any doors. The side of two chambers was simply built without a wall and the entry or exit was through this opening. The entire structure is 4.5m x 5.2m and 3.1m high. Two chambers were tiled with dust pressed glazed ceramic bathroom tiles up to a height of 1.5m. The layout suggests that an individual would enter from one side of the structure and move through the three interconnected chambers (Illustrations 89 to 91, and Plan 14).

It is unclear in which direction the procession will start but the individual will pass through the second or central chamber where some form of ablution takes place. This central chamber measuring 2.2m x 1.5m has a drainage pipe in the concrete floor and a raised tiled threshold of 25cm height on both entrances/exits. The entrances/exits are also narrower at only 75cm wide. The sole room with a door has a window opening into the chamber without bathroom tiles. All three chambers and the room have a 46cm x 46cm square opening cut into the roof slab.

The entire set up of this structure is perhaps the most mysterious of the Serapong fortifications and installations. Its remoteness from the rest of the installations, its layout and the existence of two chambers inlaid with bathroom tiles hint of some form of washing facility. The room with a window may insinuate that is function as some form of dispensary or control office to regulate the procession flow of personnel stepping through the chambers. It is certainly speculative that perhaps this structure is a decontamination facility to wash off chemical agents.

Plan 9. Detailed plan of Phase 6: 1936/7 – 1942. (Daniel Hii)



Plan 10. Archaeological sequence Phase 6: 1936/7 – 1942. (Daniel Hii)

Illustration 46. 6 inch Gun No.1 at Serapong Spur prior to field work. (Peter Stubbs)

Illustration 47. The same gun position after removal of the jungle growth. Traces of the older 9.2 inch gun parapet can still be seen on the right encircling the smaller 6 inch gun carriage well. (Aaron Kao)

Illustration 48. Concrete humps on the apron of the 6 inch Gun No.1 position. (Aaron Kao)

Illustration 49. Rear view of 6 inch Gun No.1 as would be seen by the gunners in the past. (Author)

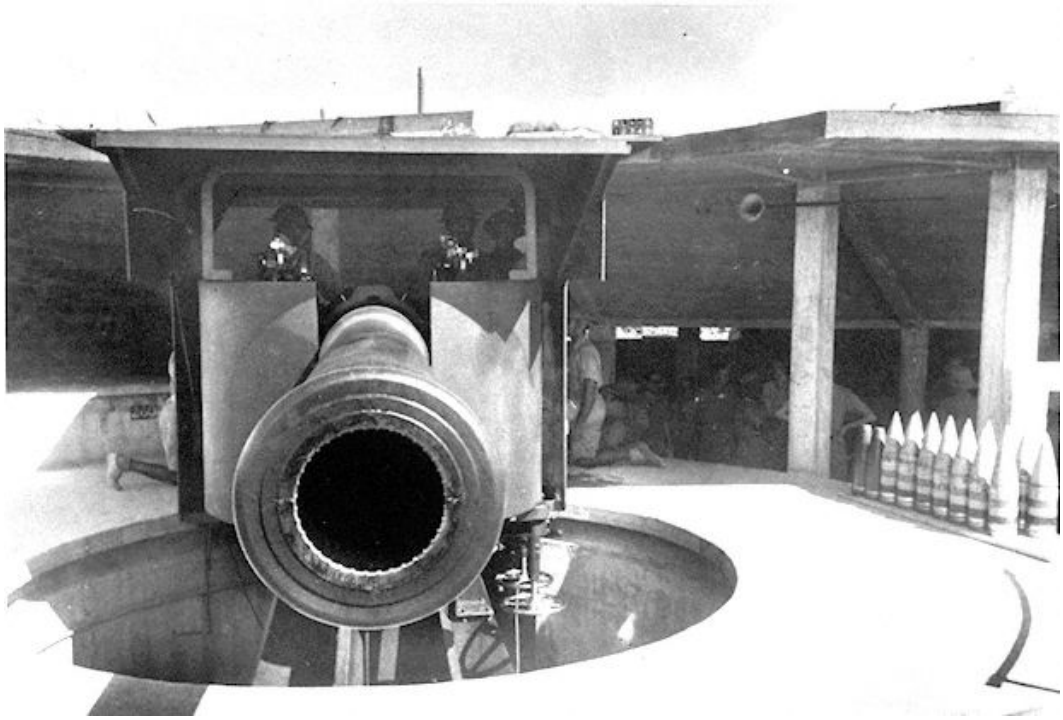


Illustration 50. The location where this picture was taken has yet to be identified. However, note similarities to the 6 inch Gun No.1 emplacement. (Imperial War Museum)

Illustration 51. Again the location of the photograph is unknown, but some striking similarities to the 6 inch No.1 position. (Imperial War Museum)

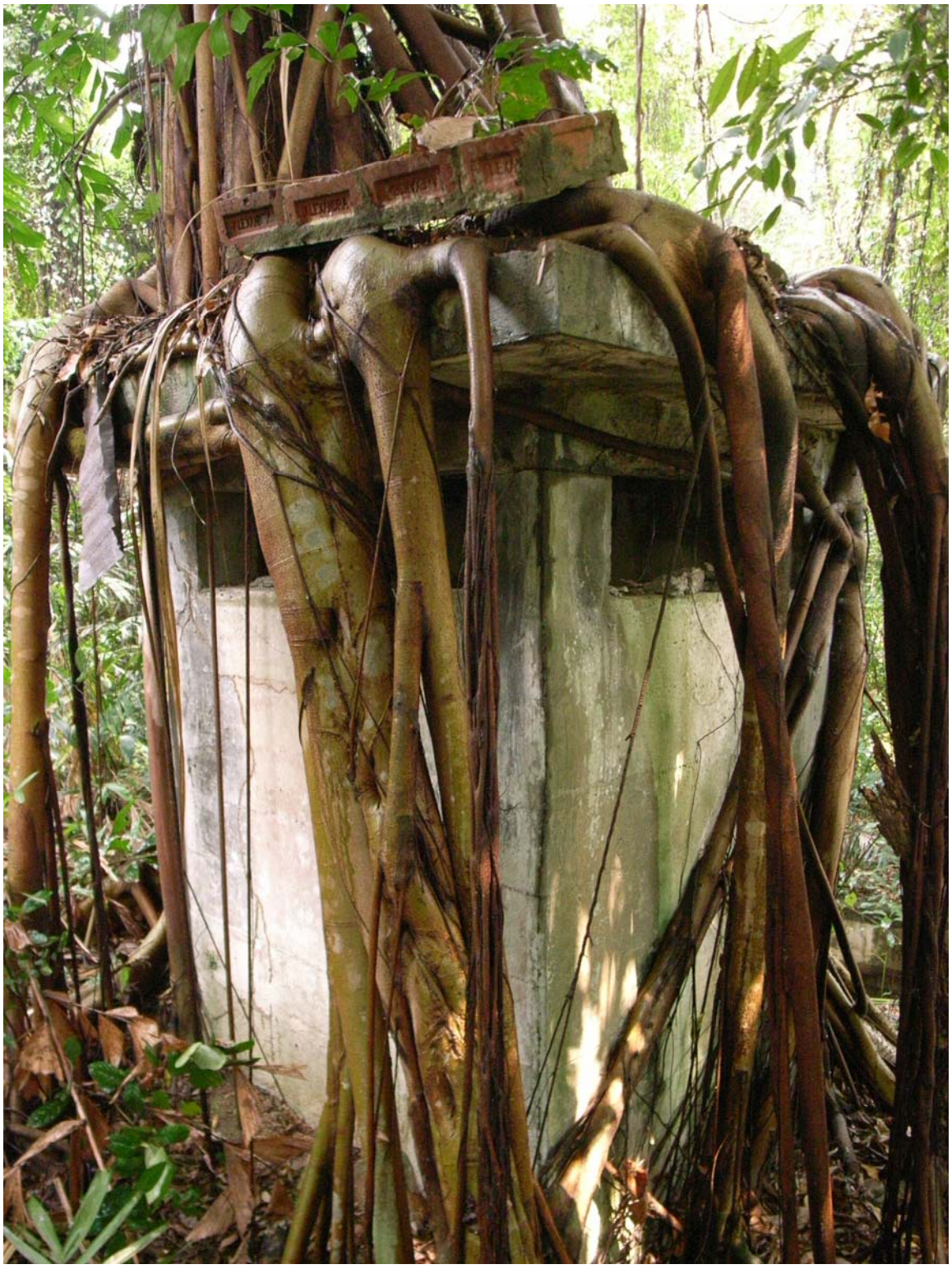
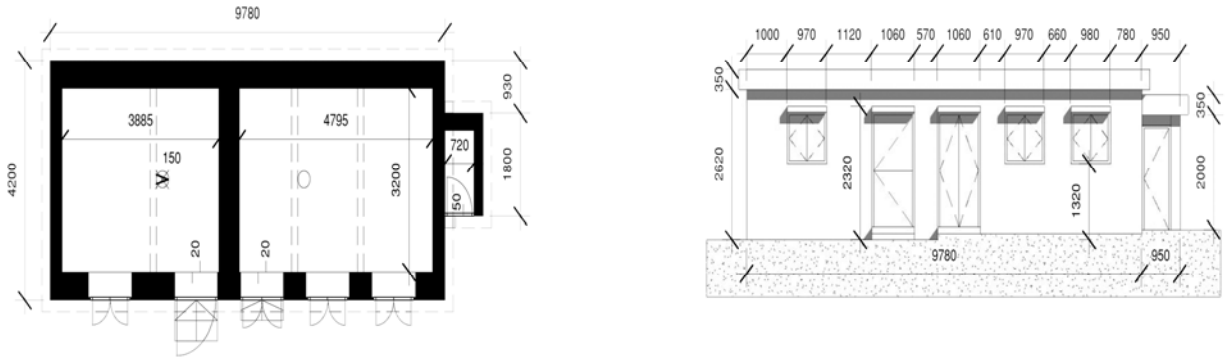


Illustration 52. The strange “observation” tower or post atop 6 inch Gun No.1 position. Inside via a crawl through, there is barely room for a single man. Its function remains unknown. (Aaron Kao)

Illustration 53. 6 inch Gun No.1 duty personnel rooms and gunners' shelter. (Peter Stubbs)



Plan 11. Plan and elevation of the gunners' shelter. A small toilet or sentry box abuts on the side. (Daniel Hii)

Illustration 54. Work barely began at the site of the 6 inch Gun No.2 emplacement. (Aaron Kao)

Illustration 55. 6 inch Gun No.2 Note concrete humps in foreground. (Aaron Kao)

Illustration 56. Close up of the gun carriage pit. (Aaron Kao)

Illustration 57. Front view of the 6 inch Gun No.2 emplacement. The damage and shearing from the magazine's detonation is obvious. In the background under the sunlight is the gunners' shelter. (Aaron Kao)

Illustration 58. Another view showing damage from magazine explosion. (Aaron Kao)

Illustration 59. A live 6 inch armour piercing shell recovered from the No.2 gun carriage pit. The shell was duly disposed by the army explosive ordnance specialists. (Author)

Illustration 60. The rear of 6 inch Gun No.2. To the right is the 30m wide crater where the magazine was formerly located. (Aaron Kao)

Illustration 61. Aaron Kao provides a scale to the massive block of concrete that was once the roof of the magazine. (Author)

Illustration 62. 6 inch Gun No.2 duty personnel rooms and gunners' shelter hidden by the jungle. (Author)

Illustration 63. The gunner's shelter revealed. The magnitude of the magazine explosion can be witnessed by the amount of concrete rubble and earth thrown up and almost burying the structure. (Author)

Illustration 64. The interior of the 6 inch Gun No.2 gunners' shelter first room on the right. (Aaron Kao)

Illustration 65. Interior of room with Dutch doors. (Aaron Kao)

Illustration 66. Concrete and gravel ramp leading to the 6 inch Gun No.2 position from the road. The gunners' shelter is on the top right hidden by the vegetation. (Aaron Kao)

Illustration 67. 6 inch Gun BCP was initially believed to have been demolished and its remains came as a pleasant surprise for the crew. (Author)

Illustration 68. Field crew working on the BCP's rooftop. Hooks for camouflage netting are still in place along the edge of the roof. (Aaron Kao)

Illustration 69. Looking southwest, entry into the 6 inch gun BCP from the communication trench. On the left is the battery command post itself with the position finder. Straight ahead is the communications/radio room, and on the right is probably a large plotting or map room. Rising in the rear is the upper level of the BCP. (Aaron Kao)

Illustration 70. Interior of the 6 inch gun BCP lower level. A single pedestal mount with bearings and instructions painted on is still in situ. (Aaron Kao)

Illustration 71. Front view of the 6 inch gun BCP. The structure is split leveled with the lower room built into the earth and the upper room at ground level. (Aaron Kao)

Illustration 72. Interior of the lower level BCP. The crawl through to the upper level can be seen on the right. (Aaron Kao)

Illustration 73.Interior of the upper level. A timber bench with mild steel voice pipes connection to the lower BCP. (Aaron Kao)

Illustration 74. The author decked out in flak jacket and helmet, checks out suspicious artifact in the 6 inch BCP communication trench. (Aaron Kao)

Illustration 75. Concrete observation post by the main road overlooking Berhala Reping and the eastern entrance to the harbour. (Author)

Illustration 76. Kitchen block along the main road up to the hilltop. (Aaron Kao)

Illustration 77. Next to the kitchen block is the barracks/dining hall/stores. Today it is the only structure on Mount Serapong that is still in use, serving as stores for the Sentosa Development Corporation. (Author)

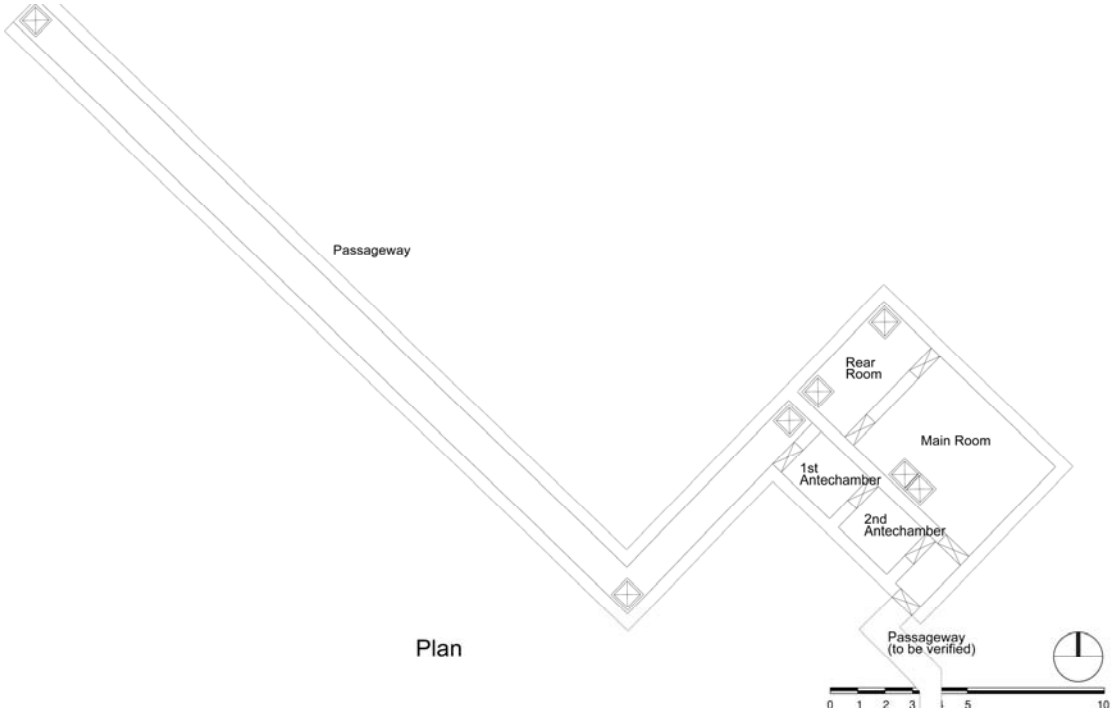
Illustration 78. The bathroom block comes next after the kitchen and barracks. (Aaron Kao)

Illustration 79. Front view of Fort Connaught's BCP from the 9.2 inch Gun No.1 position. After the 9.2 inch guns were decommissioned and a new battery of 6 inch guns was built at the Spur, Connaught's BCP took over the hilltop of Mount Serapong. (Aaron Kao)

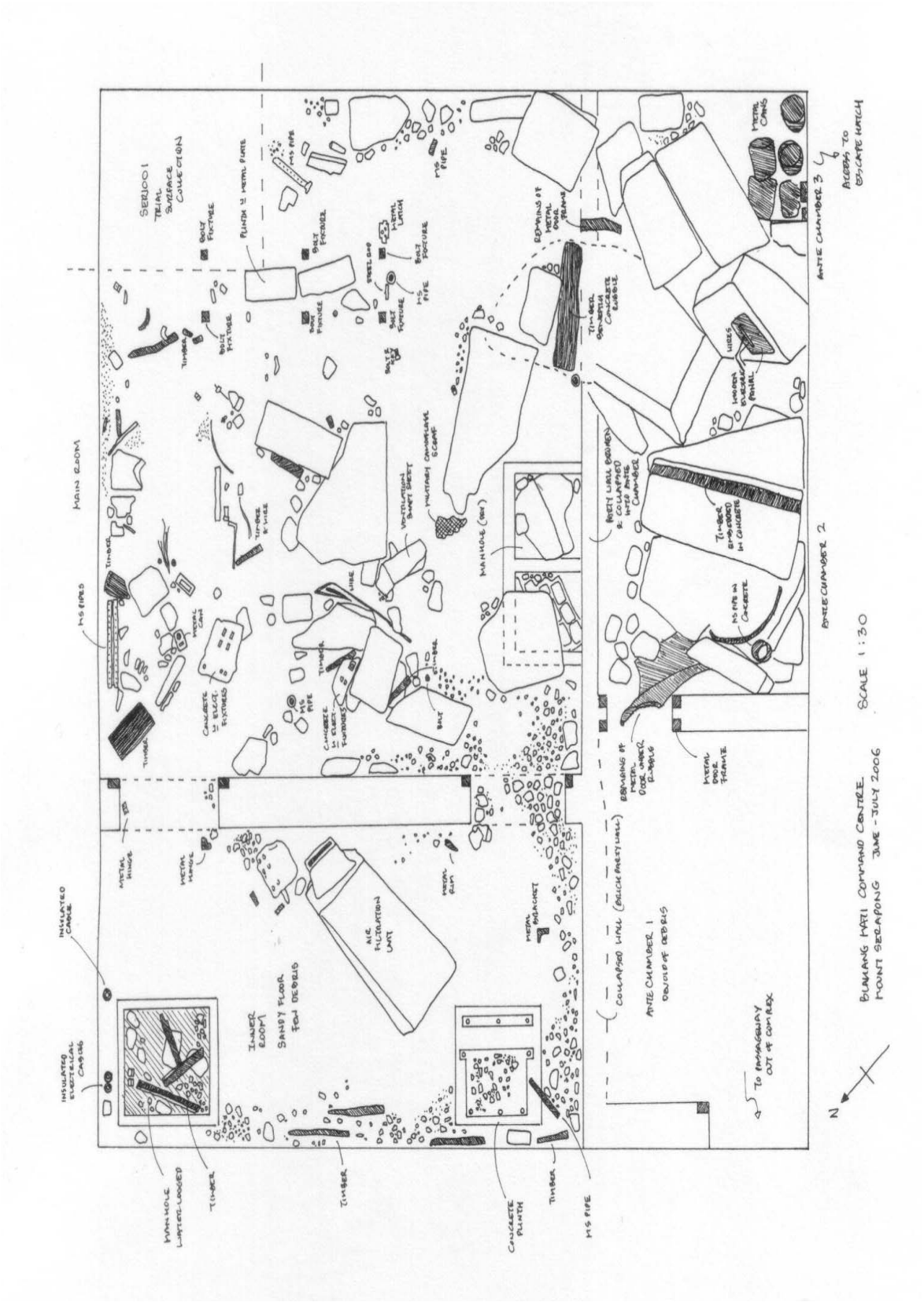
Illustration 80. Eastern view of Connaught's BCP. It too is a split leveled structure. (Aaron Kao)

Illustration 81. Interior of the lower level of Connaught's BCP. (Aaron Kao)

Illustration 82. Connaught's BCP as seen from the rear. To the right in the foreground are remains of the 9.2 inch gun communication trench. (Aaron Kao)



Plan12. Plan of the Blakang Mati command centre. (Daniel Hii)



Plan 13. Plot of surface collection finds in the Blakang Mati command centre. (Author)

Illustration 83. Interior of the main room of Blakang Mati command centre. The doorway leads to a smaller room where the air purification plant was located. Note intake and output air ducts above. (Author)

Illustration 84. Evidence of an explosion is everywhere. The walls separating the main room with the ante-chambers have collapsed. The crawl through leading to the escape ladder and the old 9.2 inch gun magazine 17m above can be seen on the left of the wall ahead. (Author)

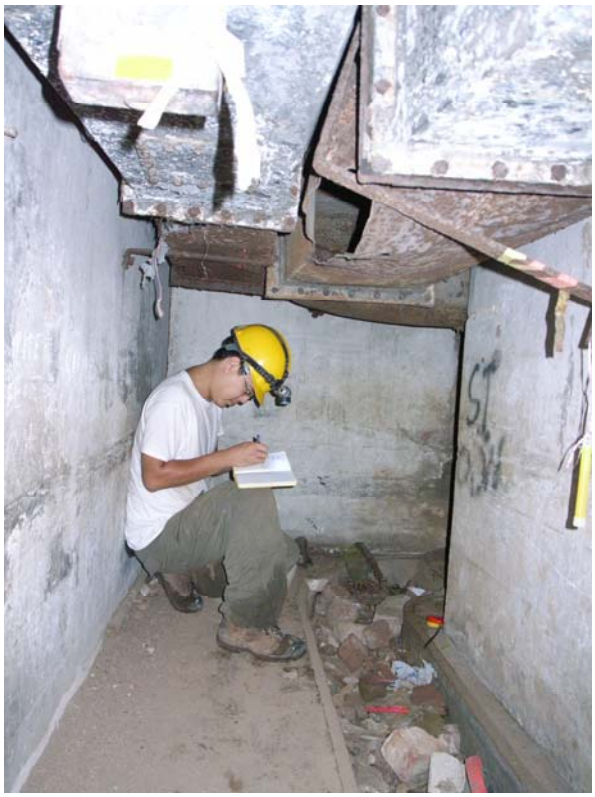
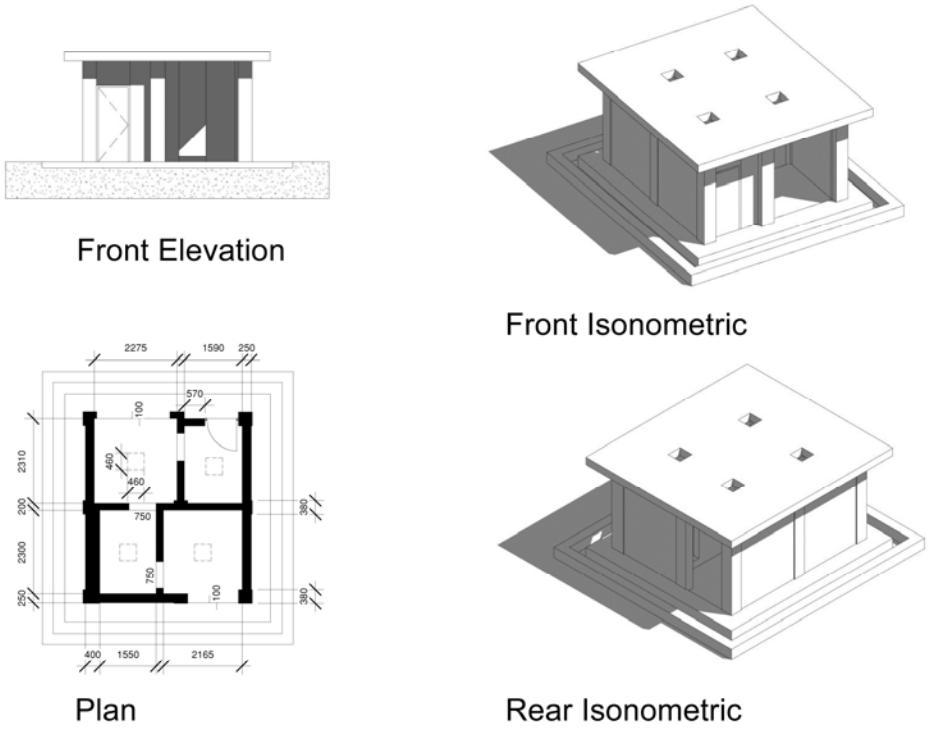


Illustration 85. The author working in the escape shaft Blakang Mati command centre. The mild steel ventilation ducts overhead draws air from the top of the hill some six storeys above. (Aaron Kao)

Illustration 86. Derek Potter looks down into the escape shaft, 17m above from the 9.2 inch magazine passageway. Note ventilation ducts for command centre in rear. (Author)

Illustration 87. The 31m long passageway leading into the Blakang Mati command centre in the northwestern slope of Mount Serapong. (Author)

Illustration 88. Unknown structure with cantilevered beams. Its purpose is still not determined. (Author)



Plan 14. Unknown structure, possibly washing/decontamination facility. Perhaps that most mysterious of the features found on Serapong hill. (Daniel Hii)

Illustration 89. Eastern view of the suspected washing/decontamination structure. (Ung Ruey Loon)

Illustration 90. Unknown structure showing ceramic tiles in chamber. A single similarly tiled bench is located in this room. (Ung Ruey Loon)

Illustration 91. Western view of the same unknown structure. The room on the left is the only one constructed for a door with the only window facing the chamber to the right. The central chamber is tiled and is clearly for some form of ablution. (Ung Ruey Loon)

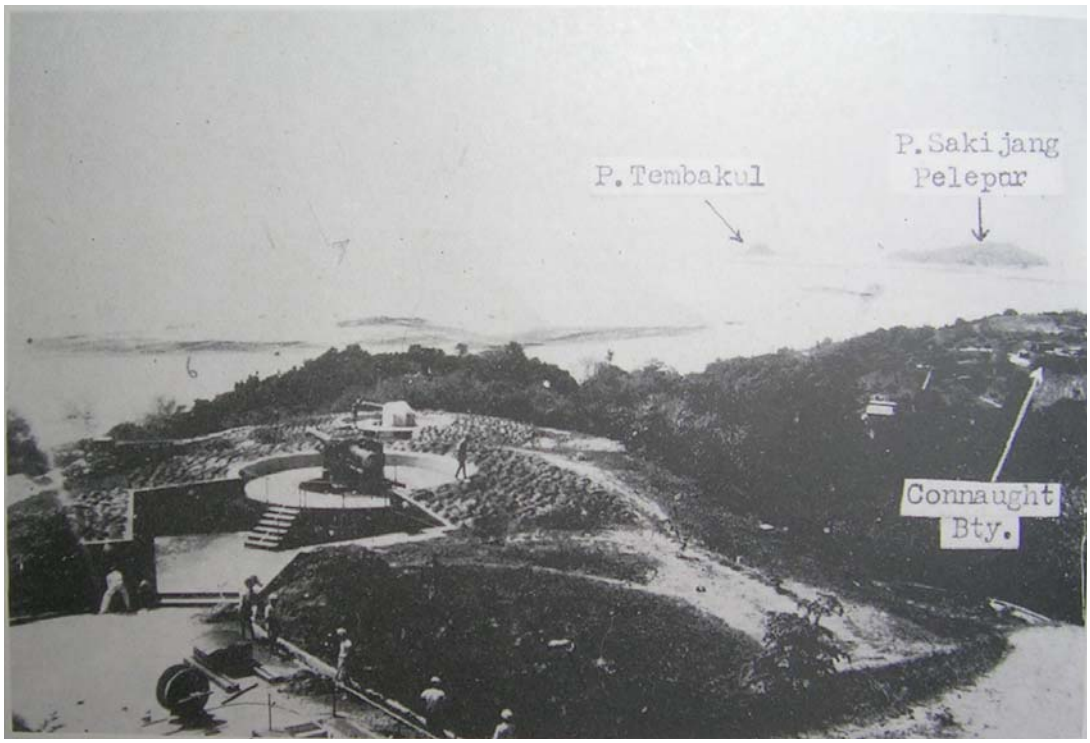


Illustration 92. The only known photograph showing the Serapong Spur Battery pre-Second World War. The pair of 6 inch guns laid out in tandem is clearly depicted. At the time when the photograph was taken, the overhead canopies have not yet been installed. (National Archives United Kingdom)

Illustration 93. Post-war photograph of the 6 inch Gun No.2. Note 6 inch shell lying in the foreground. (National Archives United Kingdom)

Chapter 5

Mount Serapong in the Post-War Period

5.1 The Archaeological Sequence Phase 7: Post War Reoccupation and Final Abandonment 1945 - 1968

For the first few years immediately after the war, Blakang Mati Island was first reoccupied by the Royal Navy and it was only handed back to the Army in 1947. After the war, Serapong was never used as a gun battery again. The battery was condemned by Colonel F.W. Rice in his report after he surveyed and assessed the surviving coastal defences and their capabilities in Malaya and Singapore in 1946. The only fort to be called to active coastal artillery colours again was Fort Siloso at the western end of the island. [121]

However there was life yet at Serapong. Over the next two decades of the 1950s and 1960s, post war reconstruction slowly picking up its pace, and the communists' insurgency in Malaya led to the declaration of a state of emergency in the peninsula. The Korean War, Konfrontasi – President Sukarno's war against the formation of Malaysia, and the Vietnam War all led to increase military presence not only of British personnel but also Commonwealth and other Allied troops in Singapore. Mount Serapong once again found itself teeming with soldiers.

While the 6 inch gun positions midway up the hill were allowed to be reclaimed by the rapidly encroaching jungle, the Army School of Moral and Religious Instruction took over most of the hilltop complex. Mount Serapong still retained its links to the artillery arm, as the guns took on a ceremonious role by performing and firing salutes to mark occasions of importance. A saluting battery was formed and several 25 pounder field pieces were brought up to the hill when the occasion warranted it. The global disbandment of the coastal artillery arm in 1956 led to the withdrawal of artillerymen from Singapore. The gunners fired their last salute from Serapong in 1958. The post war period also saw trials of radar on Blakang Mati experimenting with both coastal and anti-aircraft artillery fire direction and ranging, and because of its height, Mount Serapong became a natural candidate as such a site. [122]

With the Malayan Emergency and "Konfrontasi" winding down, the formation of Singapore as an independent republic in 1965 and economic depression back in the United Kingdom, a gradual

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121 W0203/6034. Singapore and Penang Coast Artillery. Report by Colonel F.W. Rice, February 1946. National Archives UK.

122 Correspondence with Peter Stubbs. Stubbs served with the Royal Corp of Transport and was stationed in Singapore as an air dispatcher from 1966-69.

withdrawal of British military from Singapore took form and Blakang Mati Island was returned to the infant independent Singapore in 1968. For a short while in the closing years of the 1960s, the new republic's incumbent military took over much of the facilities on Blakang Mati. Serapong became the training ground for Singapore Armed Forces, and the engineers undertook explosive and demolition training downhill near today's Sentosa Cove. In 1972, Blakang Mati rid itself of military presence and instead became a resort island for tourists and the public, adopting the new name "Sentosa" – the island of "peace and tranquility" in the process. A name far removed from the island's military past and Serapong was permitted to be slowly engulfed by the jungle.

Literature review for this phase is strangely silent on the military undertakings on Mount Serapong and Blakang Mati. Perhaps the last sixty years is still thought to be much too recent and contemporary for detailed study, and any works that touched on the island apparently have an unexplainable invisible cutoff period concluding with either the beginning of the Second World War or end of. In the works which have been addressed previously in this thesis; Gabriel Thomas concluded his *Fortress: A Military History of Blakang Mati Island* when it fell to the Japanese in 1942. Likewise for Kathiravelu's *Fortifications of Singapore 1819-1942* and P.K.Yeoh's *Fortress Singapore* at 1945. Harfield's *British & Indian Armies in the East Indies* terminated before the war at 1935. The comprehensive *Between Two Ocean: A Military History of Singapore* in its post-war chapter wrote only a single line in passing, "The coastal artillery, partly manned by Malay soldiers, remained on Blakang Mati until 1956; Gurkha and Malay units maintained a training facility thereafter." [123]

No plans or maps of this phase have so far been uncovered, and little has been written in the official records and publications of the period. Interestingly the last six decades since the end of the war saw an increasing number of photographs available, compared to only two photographs detailing Serapong hill in the pre-war days (Illustrations 28 and 92). The post war years also saw a series of aerial photographs taken by the Royal Air Force of Blakang Mati which proved most useful in identifying potential archaeological sites on the island. The interpretations and findings from the post war period relied upon correspondence with eyewitnesses, the more numerous and available photographs, and naturally from the material culture remains. There are but few architectural additions in this phase, and the majority of them were constructed by the Army School of Religious and Moral Instruction.

[123] *Between Two Oceans: A Military History of Singapore (1999)* p.301.

5.1.1 Dormitory, Kitchen, & Bathroom/Toilets

According to Reverend Basil E.Hobbs of the Army School of Religious and Moral Instruction, when he first arrived at Serapong in 1957, an earlier structure constructed entirely of timber was already erected and stood on the very site. Hence the present building of concrete and masonry must have replaced the former timber structure at a later date. [124]

Situated on a terrace behind the 1936 barracks/dining hall block, this large building (23.3m x 5.7m) consisted of two rooms serving as a dormitory or barracks , with a kitchen and bathroom/toilets at the southeastern end (Illustration 94 and Plan 17). The rooms were large and each measures approximately 8m x 5.7m. The entire block consists of two 1.7m wide colonnaded corridors or verandas running on each of the longitudinal sides and covered above by interlocking terracotta tiles of the Marseilles type. The roof and timber truss had since deteriorated and collapsed, along with the asbestos roofing sheets. The gable ends of the roof are still visible. The high ceiling space evident by the high gable ends, exceedingly large windows (2m x 1.2m), and extensive pre-cast concrete vertical ventilation grilles running the entire of length of the walls on all sides suggests that the architect or engineer who constructed the building have taken the tropical weather conditions into consideration. This building was perhaps the most well ventilated of all structures on Serapong to date.

The kitchen was accessed via a short passageway where a small store measuring 1.6m x 1.5m was located to the right. The kitchen itself is 3.8m x 2.7m. The bathrooms/toilets were located at the southeastern end of the block comprising a total of 7 cubicles. Strangely, there is no evidence of any bathroom tiles hence it may possibly instead be toilets of the removable dry bucket types.

Two concrete staircase led down to the 1936 barracks/dining hall and kitchen below. It is in all probability that the earlier kitchen block, dining hall/barracks/store block were refurbished and reoccupied in the post war period. About 30m downhill a concrete badminton court can be found equipped with iron poles for the netting and a pair of electrical lamps overhead. The court was located just outside the old per-war barbwire fence. It is not known if this court was built pre-war and simply reused.

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[124] Correspondence from Reverend Basil Hobbs dated 2001 found in Sentosa Development Corporation archives. Hobbs served as a Chaplain with the Army School of Religious and Moral Instruction stationed on Mount Serapong.

5.1.2 Chapel

The earliest aerial photograph to depict a structure standing on the site of the chapel was dated to 1948. [125] A separate aerial photograph taken a year previously in 1947 revealed that no building had yet been built (Illustration 107). It is unclear if this building from the late 1940s was utilized originally as a chapel and apparently there were at least two incarnations of the chapel with Reverend Hobbs rebuilding one of them. He explains "The Chapel…eaten by white ants just before I got there from Korea in 1957. My senior Chaplain told me that one of my tasks was to build a new Chapel using the unchanged floor of the old chapel. There was a qualified graduate architect doing his National Service stationed on Blakang Mati as a Corporal in the Engineers. He and I designed the replacement chapel." [126]

The chapel measured 11m x 4.7m with a small ancillary room (1.7m x 1.5m) attached to the main hall. In terms of details and ornamentation, this structure can be considered the most elaborate at Mount Serapong. It had a granite-faced rustification on the transverse elevation, a granite-faced rustification low wall outside, pitched suspended ceiling as well covered louvered clearstorey ventilation grilles which terminated on one end with a slated design (Illustrations 95 and 96).

Of the 1957 interior he wrote, "We did everything we could to create a sense of space and coolness in a rather small chapel in a very hot climate. The general consensus was that we had succeeded very well" (Illustration 97). [127] A labeled electrical switch panel recovered from the debris of the abandoned chapel provides an idea of the different spatial usage of the chapel: Sanctuary, Southside, and Vestry. A vestry is a room in or a building attached to a church, in which the vestments, and sometimes liturgical objects, are kept. Also known as a sacristy, this may refer to the little ancillary room connected to the main hall. [128]

Apart from the architectural elements incorporated to provide light and ventilation, Hobb's "coolness" also came in the form of mounted electrical fans. At a point in time the chapel was equipped with at least four units. When surveyed in 2006 the chapel's interior had been divided into two rooms with plywood planks and recent heavy rain had caused the timber truss to give way and the entire roof made up of corrugated asbestos sheets had collapsed.

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125 Aerial Photo RAF 81/286/3167 15th April 1948 at 8,000ft.

126 Correspondence from Reverend Basil Hobbs dated 2001 found in Sentosa Development Corporation archives.

127 Ibid.

128 However, in some churches the vestry is simply a room in or a building attached to a church, used as a chapel, for prayer meetings, or for the Sunday school. So the spatial demarcation of such a "vestry" may only be in name.

5.1.3 Generator Platforms

When Squadron Leader Clements visited Serapong hill in the late 1970s or early 1980s, he found "two concrete platforms, probably for 25-pounder field pieces." [129] The pair of concrete platforms can be found 15m east and southeast-east of Fort Connaught's BCP. These platforms made up of several concrete slabs were mistakenly identified by Clements as platforms for 25 pounders and was again picked up and repeated by Irvin Lim and Roy Muthiah in the 2005 *Maritime Heritage of Singapore*. A closer inspection revealed that the platforms in question are just wide enough for the 25 pounder gun (width 2.2m, length excluding barrel 3.6m) to be parked with little room for the crew of five gunners to take their posts and do anything else. [130]

The platforms crudely made of poured concrete mixed with gravel were situated about 4.5m apart (Illustrations 98 and 99). Each is approximately 5.3m x 2.8m in size. At one end of the platform a concrete sump is connected with a 55 gallon steel drum buried in the ground. The existence of the sump and buried steel drum were the first hints that these may be platforms for generators where engine oil discharge and spilt fuel can be drained away and properly disposed off. Confirmation was obtained when several post war photos uncovered in the archives of the Sentosa Development Corporation showing just that – wheel mounted trailer generators on the platforms.

5.1.4 Midden (Disused 9.2 inch gun Communication Trench) [131]

One of the most exciting finds for an archaeologist is a midden. Essentially it is a mound or deposit containing shells, animal bones, and other refuse that indicates the site of a human settlement. The feature was located in the abandoned 9.2 inch gun communication trench northeast of the old 9.2 inch gun BCP (Illustrations 100 to 104). Immediately by the trench to its east are the ventilation stacks for the command centre six storeys underneath. The flight of stairs within the communication trench leading to the disused 9.2 inch Gun No.2 position has been conveniently converted into a refuse dump. The midden was confined by the walls of the trench with the deposits extending along the trench's north-south axis. A 1m x 0.3m x 0.3m concrete block had been placed at the top of the stairs to demarcate its southern boundary, while the

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129 Clements, *Isle of Peace: Blakang Mati – Island Fortress of Singapore (1981)* p.136.

130 Actual measurements from the 25 pounder Mk II on Mk II carriage on display at Fort Siloso, Sentosa. The Mk II carriage has a narrower base for jungle warfare. Should the gun be mounted on a Mk I or Mk III carriage, the wheels of the gun would be hanging over the sides of the platforms in question! See *The 25-pounder Field Gun 1939-72 (2002)* by Chris Henry for more details.

131 This section provides but a brief summary of the artifacts recovered. Presently detailed analysis of the artifacts is still underway.

northern end spills out beyond the stairs and onto the open ground. The entire extent of deposits is estimated to be 8m in length.

The greatest depth of deposit excavated thus far is approximately 85cm where the first intermediate landing was reached after the flight of eight steps from the south end. From this landing, the height of the trench wall (from the floor to the top edge/lip of trench) is the highest at 2.15m. Beyond this landing, the rest of the trench (and midden) is covered by a reinforced concrete roof between 25cm and 30cm thick. The concrete overhead cover about 5m in length extends all the way over the rest of the trench/midden.

The excavation predominantly concentrated on the southern end and progressively moved down the flight of stairs towards the other extremity in the north. Excavations ceased at the first intermediate landing where the concrete overhead cover is met. Limited excavations were conducted down slope on the northern end where the trench, overhead cover and midden terminate. Only an estimated 50% of this feature has been excavated and there remains more to be uncovered in future excavations. Nonetheless several interesting findings can be made from this feature.

Tell-tale signs suggesting that a midden was in existence abound with large numbers of artifacts accumulated on the surface amongst the leaf litter, top soil and humus. The excavation revealed that the midden comprised a single layer of cultural deposit atop a layer of concrete and gravel rubble. The density of the cultural material was at its greatest at the first intermediate landing. Not unexpectedly the layer of rubble beneath corresponds accordingly not only with the increase in quantity but also the largest pieces of rubble needed to be removed. Naturally, the topmost stairs have the least amount of deposits for both artifacts and rubble. There was no other stratification within the cultural layer to suggest that the midden was made up of multiple and distinct deposits, and the midden appears to have been employed for an uninterrupted period of time. The artifacts recovered indicated that the chronology of the deposits was from sometime between the 1950s and 1960s.

The artifacts recovered provide an interesting window into the lives of the military personnel stationed or visited the Serapong hilltop. Daily consumables were interspersed with more mundane functionary building and service materials employed in and around the facilities on the hilltop.

Glass beverage bottles and shards were some of the most numerous artifacts recovered from the midden, permitting some form of consumption behavior or consumer choices to be discerned.

The most numerous bottles are those that belong to alcoholic beverages, particularly beer (Anchor Beer), followed by dairy (Cold Storage Creameries). Other identifiable beverages were of the soft drink or soda variety dominated by the products of Fraser & Neave (Orangeade and Red Lion), followed by Schweppes, and other lesser known drinks from smaller producers (Tropi German fruitade). So far none of the beverages from abundant family operated Chinese aerated water drinks manufacturers have been identified. (eg. National Aerated Water Factory, Sailing Ship Aerated Water Factory, Long Bros Aerated, Ho Siang Teng Aerated, Tiger Aerated Water, Universal etc). With the exception of a few pieces, glass shards with the embossed manufacturers' name and logo are not generally recovered. Instead silkscreen printed logos predominate the glassware. Most, if not all the identified bottles were manufactured at the Singapore Glass Manufacture factory. Naturally metal bottle caps of the crown crimped pattern were also recovered but the state of corrosion has prevented any further identification.

Tin cans were also recovered in large quantities and not unexpectedly corrosion had since removed any traces of manufacturer's labels or the chromolithographed colours that once adorned its exterior. However, the manner of opening a can reflects to a degree what was contained within the can. Key opened, removable lids, screw caps, paint lids and pry out lids generally contained relatively non-perishable items such as tobacco, creams, wax, lubricants and others. Each was (and still is) traditionally associated with a particular product type. For example key openings were usually associated with lard cans, luncheon meats, sardines and other sea foods. Cans which had either puncture holes, spouts, or had been opened with a church key all probably contained liquids, thus requiring small openings to remove the contents. Cans cut completely around or with X-cut lids are indicative of fruit or vegetables which require larger openings for removal of the product. Likewise the shapes too provide clues to their contents.

It is perhaps not a surprise that beer cans top the list, and these are of the flat top church key selection. The church key by puncturing and prying leaves a pair of distinct triangular openings on the can's inside crimped edge on the top. Other identified items include sardine cans, boot polish, Brasso metal polish with screw top lid and crimped edge for the drip/spill catch, powder cans, portable burner fuel cans, and food cans that were cut completely round. An assortment of keys and forked can openers were also recovered.

Indubitably, artifacts with direct relationship with the military abound in the midden. These included uniform paraphernalia, buttons, collar pins, cap badges, metal eyelets from jungle boots, D-rings, metal clasps for webbing, metal boot heels, studs/boot cleats, boot nails, and small arms ammunition. Interestingly, the quantity of metal eyelets for jungle boots uncovered does raise some speculation on the lifespan and durability of the footwear in the tropical conditions. Small

arm ammunition consists of plastic blanks of the 7.62 calibre, corresponding with the FN L1A1 SLR (self loading rifle) issued and in used from 1957.

In smaller volumes were personal effects that have no immediate or direct relationship with the military. These were represented by ceramic cigarette ash trays, coins, paper clips, pencil eraser nips, safety pins, cooking utensils, enamel mugs, enamel plates, enamel pots and lids, various patterns of cutlery (forks, spoons and knives), and ceramic serving ware shards consisting of porcelain and white-eathernware.

Building fixtures and other objects related to the site and its facilities made up the last category of artifacts uncovered. A surprisingly large numbers of incandescent light bulbs (complete and intact) and fragments were deposited. Ironmongery, door locks, door/window hinges, screws, bolts, nails and nuts, batteries and the carbon rods, electrical insulator parts, rubber/plastic washers, electrical wiring casing (metal) parts, barbwire and even iron pickets had been disposed in the midden. Unquestionably, so were a significant amount of scrap metal, unidentified metal, and plastic in various forms.

5.1.5 Saluting Battery

This site was first identified from archival photographs of the post war period, showing Malay gunners of the 1st Singapore Regiment of the Royal Artillery in their ceremonial uniforms firing blanks for a salute. Reverend Hobbs also helpfully provided a commentary for one of the photographs he deposited (Illustration 106). He wrote, “The Official Saluting Base in action. This was taken a few days after my arrival at Church House in 1957. The occasion was the granting of “Merdeka” to, what was then Malaya….the soldiers were indigenous Malays….the Officers and Sargeants (sic) were all British.” [132]

Royal Air Force aerial photographs show that by May 1950 a platform for the saluting battery was constructed for four field pieces. [133] Examination of the photographs indicated that the saluting platform was made of concrete. A foot path cutting across the communication trench led to the platform, passing the ventilation stacks for the command centre. What appeared to be waist height timber post and cord/rope surrounds the platform. In some photographs, a signboard bearing the Royal Artillery insignia and colours, spelt out the unit and function of the site, “1st Singapore Regiment R.A. Saluting Battery”. The battery was made up of four 25 pounder field guns, the specific mark and model uncertain.

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132 Photographs in the collection of the Sentosa Development Corporation and the National Archives of Singapore. Correspondence from Hobbs.

133 RAF 81/734 series taken at 10,000ft dated 16 May 1950.

With the disbandment of the coastal artillery arm, the gunners fired one of its last salutes (if not the very last) on 18th March 1958 during the farewell parade of the 1st Singapore Regiment Royal Artillery. By November that year the unit was completely disbanded and the links with the artillery arm passed out from Mount Serapong. [134] No traces of the platform remain today though the area was carefully excavated. For some reason after the coastal artillery units were disbanded, it was perhaps thought prudent to remove the platform and footpath as well. A rather odd practice considering all the other building remains were left in situ and allowed to be engulfed by the jungle.

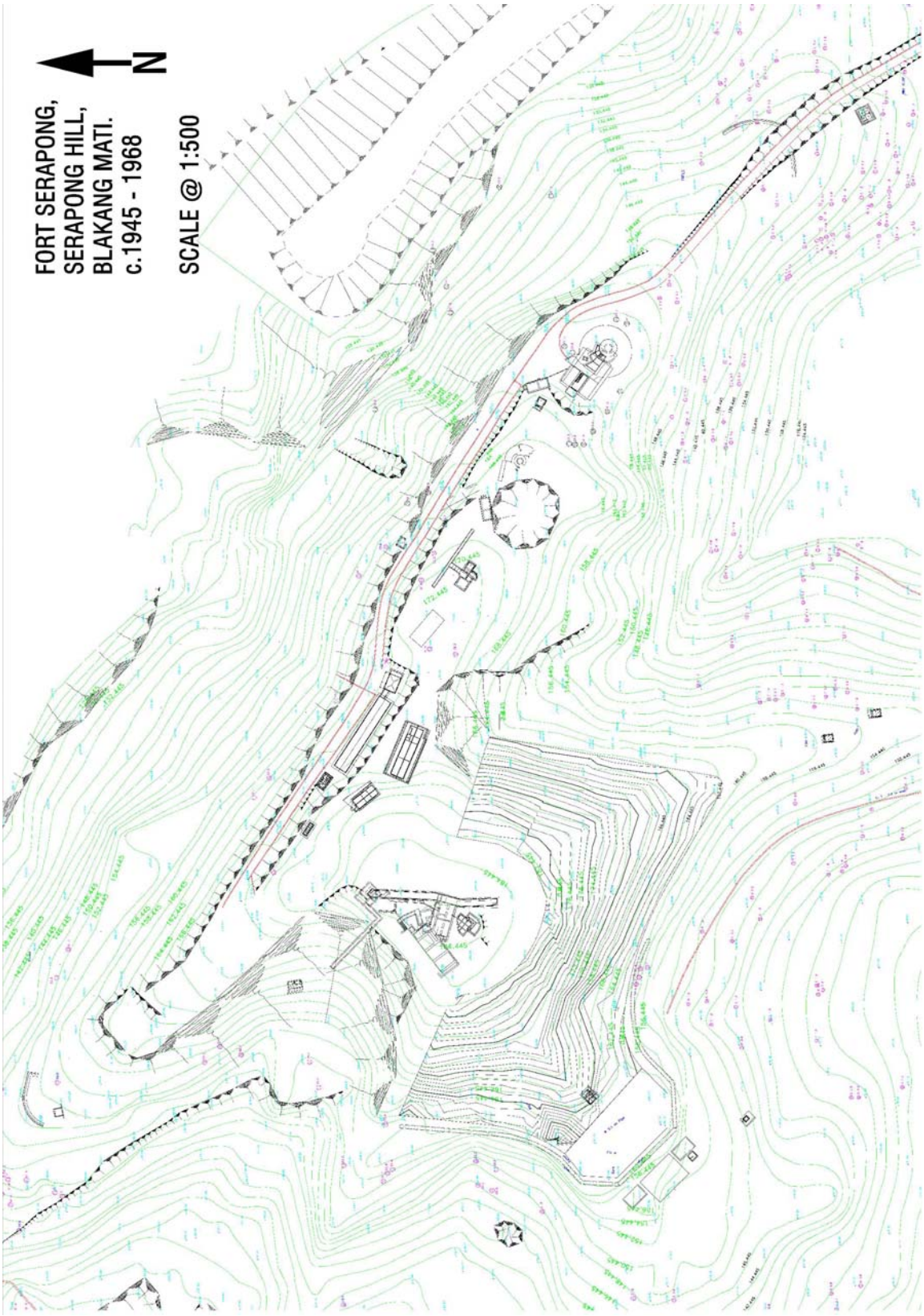
5.1.6 Other Features

This final phase of the occupation of Mount Serapong was limited to the hilltop, and the facilities elsewhere about the hill were simply abandoned and left in ruins. Discussed in this section were the structures and features with clear evidence of occupation and use. There were several other buildings that had since been demolished prior to the archaeological investigations. In several aerial photographs and eyewitness accounts, minimally three other buildings were present near the top of the hill. A bungalow with a water tower was located north of the old 9.2 inch Gun No.2 emplacement. Pre-war maps indicate that at various periods this served as the guardroom and artificer's (craftsman – carpenter, smithy) workshop. Reverend Hobbs remembers this building to be the Warden's apartment which comprised a bedroom, sitting room and toilet.

Hobbs also spoke of the office and recreation centre in a large bungalow on the site presently occupied by the service reservoir. Undoubtedly this building was demolished for the construction of the latter. Similarly, another bungalow situated before the cantilevered structure had also been torn down for the reservoir. It is not clear if the casemates and two BCPs on Serapong hilltop were reoccupied serving as storage rooms or in some other capacity during this phase.

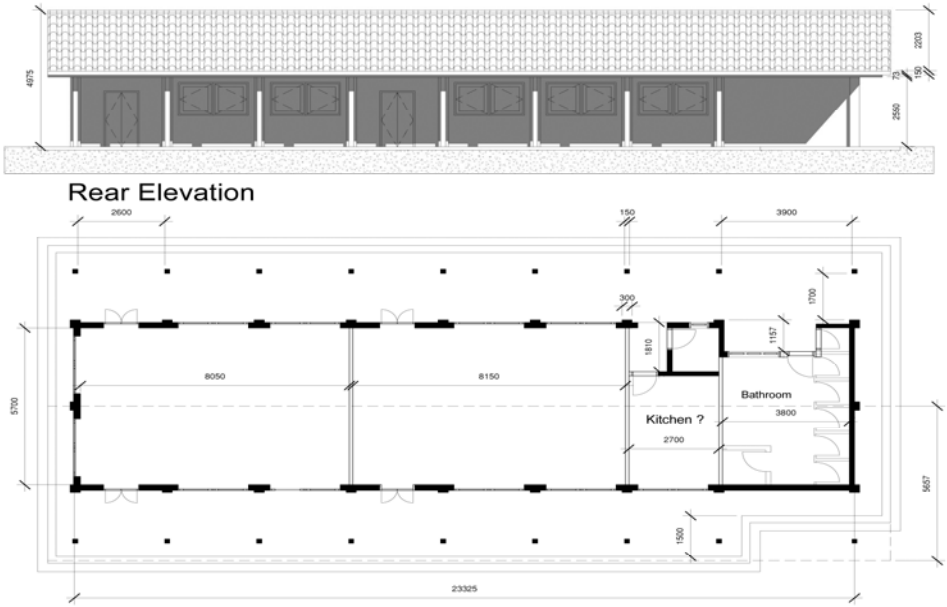
134 From Parade Programme *1st Singapore Royal Artillery Regiment Farewell Parade 18th March 1958* in the archival collection of Sentosa Development Corporation.

Plan 15. Detailed plan of Phase 7: 1945 - 1968. (Daniel Hii)



Plan 16. Archaeological sequence Phase 7: 1945 – 1968. (Daniel Hii)

Illustration 94. Remains of the dormitory and kitchen for the Army School of Religious and Moral Instruction. Apparently there was an earlier barracks made of timber which stood on the very same site. (Aaron Kao)



Plan 17. Plan of dormitory, kitchen, and bathrooms/toilets. Army School of Religious and Moral Instruction. (Daniel Hii)

Illustration 95. Chapel of the Army School of Religious and Moral Instruction. This building constructed in 1957 stood on the very same site of an earlier chapel. (Ung Ruey Loon)

Illustration 96. The chapel in its heyday. Behind the timber barracks is visible. (Rev.Hobbs)

Illustration 97. Interior of the chapel in 1957. (Rev.Hobbs)

Illustration 98. Generator platform built over the old 8 inch Gun No.1 cartridge store. In front of the concrete slabs is the steel 55 gallon drum for collecting waste oil. (Author)

Illustration 99. The pair of generator platforms. Visible in the rear just beyond the tents is the 9.2 inch Gun No.1 emplacement. To the right is Fort Connaught's BCP. (Author)

Illustration 100. Post-war midden in the old 9.2 inch guns' communication trench. The ventilation stacks for Blakang Mati command centre is in the rear. When this photograph was taken, the 9.2 inch Gun No.2 position is yet to be excavated. (Author)

Illustration 101. At the start of the excavations in the midden. Note the initial level of deposit. (Author)

Illustration 102. The steps of the communication trench are revealed. (Author)

Illustration 103. At the end of the excavation albeit only 50 percent of the midden was recovered. (Author)

Illustration 104. The crew works the screen, sieving the buckets of deposits from the midden, while Mr.Chew (right) the mechanical excavator operator looks on. (Aaron Kao)

Illustration 105. Post war saluting battery atop Mount Serapong. The concrete platform is erected over the old 9.2 inch Gun No.2 emplacement. The soldier is standing over the old communication trench and midden. (Author's Collection)

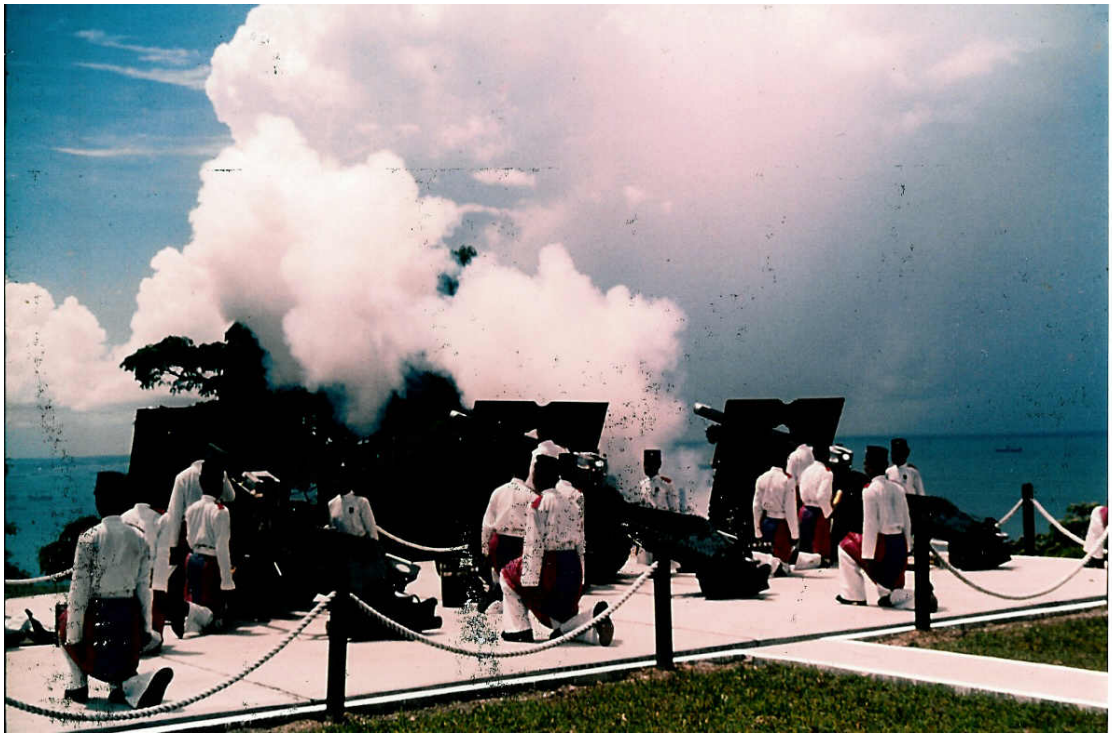


Illustration 106.The ceremonial saluting gun battery of four 25 pounders fire a salute during Merdeka week 1957. (Rev.Hobbs)

Illustration 107. RAF aerial photograph showing Mount Serapong in January 1947. Notice how bare of vegetation the hilltop was. (Author's Collection)

Chapter 6

Site Discussion

6.1 So What Else Can Archaeology Tell Us?

Mount Serapong and its complex of facilities cover an estimated 520,540 square meters (127 acres). In comparison, the Siloso group of hills which include the fortifications of Fort Siloso was but 140,194 square meters (34.6 acres), and Fort Connaught just under 37,410 square meters (9.2 acres). Serapong Hilltop (8 inch and 9.2 inch gun emplacements, BCPs, casemates and magazine) alone is some 11,344 square meters (2.4 acres). To date it is probably the largest site in Singapore ever investigated by an archaeological team.

The archaeological investigations conducted at Fort Serapong in 2006 only probed the extent of the site and made an inventory of the remains. Prior to this study, no accurate information existed identifying the functions and chronology of the remains. The project's undertaking had been most successful in achieving its objectives of minimally determining the order of the scale, scope, functions, and chronology of the fort. More importantly its success lies with producing a record which will be sufficiently useful for future studies.

There remains a vast potential for future investigations at Serapong. Apart from uncovering the major architectural and monumental features, enormous tracts of land have yet to be thoroughly surveyed. The movable artifacts recovered during the 2006 fieldwork have been limited to surface finds from the various individual localities and the thirteen manually excavated 2m x 2m test pits.

A systematic surface collection and plotting of the finds was conducted for the Blakang Mati command centre resulting with the largest quantity of surface material collected. Yet from these few specific localities alone they fill an entire 4m x 3m store room stacked 20 crates high (Illustration 110).

Non-machine excavation has been restricted predominantly to only the midden, Infantry Post No.1, 6 inch Gun No.1 emplacement, and the test pits to determine the stratigraphy prior to employing the mechanical excavator. Manually dug test pits, machine excavation, and surface collections are not without its drawbacks and limitations, and they only open a window into a very small fraction of the deposits.

6.2 The Unraveling of a Fortress

Prior to the investigations, little was known about the Serapong site. Various records tell of the different calibers of coastal artillery mounted on the hill but where were they exactly located and what became of them since? Outlined above in archaeological sequences of the hill are seven distinct phases, of which six are phases of occupation. Having identified their function and chronology, the report details an inventory of all surviving features uncovered to date. Although far from being complete some preliminary highlights of the site can be made. The following are observations from each of the crucial phases of the artillery fort; Phase 4 (1885-1907); Phase 5 (1907/8-1936); Phase 6 (1936/37-42).

Beginning with the initial interest on Serapong's pair of non-standard 8 inch coastal defence guns, the original query was to seek out a surviving example of such an emplacement. Information on other gun calibers were relatively easy to obtain as similar if not identical emplacements of the 9.2 inch and 6 inch guns can be found throughout the British Empire and Commonwealth. On Blakang Mati alone, the 9.2 inch gun position of Mount Imbeah remains readily accessible in a manicured park. Also on Blakang Mati, Fort Siloso and across the narrow straits on main land Singapore at Fort Pasir Panjang, both forts are similarly in a distinct and accessible park setting where remains of the 6 inch Mk VII and 6 inch Quick Firing gun emplacements can be found.

The 8 inch gun was the oddity, there were only four such weapons in service with the coastal artillery arm in the Empire, and all four were stationed in Singapore - a pair at Fort Tanjong Katong and another pair at Fort Serapong. How would its emplacement and supporting ancillary structures be designed and built? Chances are the construction methods would be contemporaneous of its time, prior to the introduction of reinforced concrete with gravel mixed concrete. But what about its dimensions and other specifications? What was the amount of sand buffer surrounding the emplacement? Was sand employed at all or was a mound of earth heaped up around it?

Except for the sliver of evidence uncovered during the excavations, we do know that the gun carriage sat on a concrete platform surrounded by a ring of four steps. That by 1885 when the emplacement was being built, ergonomic features like the recess of igniters was incorporated into the design of the gun carriage well wall, keeping the primers in a dry and easily obtainable position. As excavations at Fort Tanjong Katong had previously failed to reveal any of the remains of Serapong's sister 8 inch gun emplacements, the emplacement designs will probably remain as elusive as ever and regulated to merely a footnote in history.

Nonetheless, important information about the building materials and construction methods were obtained. There were an incredible number of bricks recovered from both Forts Tanjong Katong and Serapong, and many of them still in situ on the walls of the caponiers and in the buildings. At the two forts there are some interesting similarities which may hint at the designer or engineer's whim (ie McCallum). Both forts feature facing bricks to line passageways and walkways. At Serapong it was evident in along the 8 inch magazine ramp, and for Tanjong Katong the caponier were similarly laid. There can be of no other reason but aesthetics for both cases, as they served no real purpose. Facing bricks are generally more expensive as they are either specially selected from the lot of bricks after firing, or are specially prepared and treated to give it a good glaze or colour.

After the 8 inch and 9.2 inch guns were each decommissioned successively, demolition work and their removal began, but surviving remains have shown that it was not quite thorough. Happily for the archaeologist, instead of becoming victims to the wrecking crew, it appears that the most cost effective method of choice decided was to simply bury the works. Perhaps synonymous with the bad reputation of contractors hired for the job, out of sight, out of mind, a job completed. For the earlier 8 inch guns and their ancillary structures, clay was the choice fill employed for the burial. The larger 9.2 inch gun emplacement was covered by concrete rubble (probably from part of the emplacement itself) and packed down with clay. With the exception of a few empty bottles of gin and whisky by the 9.2 inch Gun No.1 apron, hardly any artifacts were recovered from the construction fill.

The up gunning and modification for the 9.2 inch guns two decades after the first 8 inch guns were installed introduced new construction material and methods. Reinforced concrete and more specifically the expamet reinforced concrete system began to make its appearance at the site. Also known as ferroconcrete, reinforced concrete is essentially poured concrete containing steel bars or metal netting to increase its ability to absorb tensile and shearing stresses. The expamet system of messed steel was first introduced in Europe and North America in the 1890s. Its existence at Serapong indicated that by 1907 it was already introduced into Singapore. Several structures on Mount Serapong namely the Serapong Spur 9.2 inch gun magazine, position finding cells No.1 and 2 and the water storage tank further collaborates these buildings and structures were contemporaneous and constructed during this phase.

When compared with other existing 9.2 inch gun emplacements on Blakang Mati, Gun No.1's emplacement on Serapong hilltop had several anomalies which set it apart. The Mount Imbeah Battery constructed concurrently in the years 1907/8 had its gun carriage well to be of a greater depth being 2.5m high from floor of the carriage well to top edge of pit. In comparison, the gun pit

at Serapong was only 2m high. It is estimated that the Imbeah gun had an additional 7.5 tons concrete poured! Interestingly the layouts of the underground magazines for the two were also quite different. Superficially some similarities were at first detected, particularly where the steel stairs descends into the open yard leading to the subterranean chambers, but beyond and within its subterranean walls, the Imbeah magazine had a better process flow allowing the ammunition handlers ample room to move about.

At Fort Connaught, the surviving gun position was from the 1936/7 period of construction. This 9.2inch gun was installed with a shield of the naval turret type, on Mk VII mountings capable of 35 degree elevation. In contrast Serapong's 9.2 inch guns were mounted on Mk V and undeniably built about thirty years before. Still an interesting study between the two emplacements can be made with regards to their evolution. By the late 1930s, the technological advancements meant that the guns were required to hit targets at greater range and speed. Impressively, the gun itself (comprising the barrel and breech block) continued to prove itself and the Mk X soldiered on up to the final disbandment of the coast artillery arm in 1956, and in Gibraltar up to the 1970s. Other features associated with the gun were however improved. These included the ammunition, sighting equipment, and mountings.

The addition of the naval turret type shield for the gun at Connaught meant that considerable weight must now be borne by the emplacement, which translated into more concrete and steel. It also meant that a redesign of the gun carriage well was necessary. Connaught's gun emplacement now featured a 1m high concrete berm surrounding the emplacement before it sloped down as the apron making the entire emplacement some 3.65m high. Correspondingly the shell hoist had also been enlarged considerably, and it was over an average man's height comfortably fitting two gunners for the lifting work. There was no change to the size of the shell and cartridges but merely reflects the overall increase in scale of the emplacement due to the new turret shield and mounting.

As depicted in this report, the reading and analysis of the assortment of written historical record, it was not entirely clear if any or which of the structures survived the Second World War. Some of Fort Serapong's remains like the 6 inch Gun No.1 at the Spur Battery is readily visible and accessible, and it doesn't take too much to guess that it was some form of military installation and a gun position. Reexamining the archival sources, it appeared that quite a few of the fortifications have been deliberately blown up by the British to deny them to the Japanese in 1942. There was no mention of the 1930s 6 inch BCP directly, although references to it were made in passing about the equipment and the post destroyed on the day of Singapore's surrender. Hence the discovery of the BCP relatively intact merely engulfed by the jungle came rather as a surprise.

Inspection of the building revealed that demolition was restricted to the large (suspected plotting) room in the rear, and the rest of the complex remained in a good state of preservation.

The magazine for 6 inch Gun No.2 was totally obliterated leaving nothing but a 30m wide crater on the slopes of Serapong hill. This is an unfortunate state of affairs for the historical archaeologist as with the case of the 8 inch gun emplacement, no surviving example of the 6 inch gun magazine from the 1930s has yet been found in Singapore. The magazine at the lower Gun No.1 position was an adaptation of the older 9.2 inch gun magazine built some thirty years before. Fortress Singapore as it was so-called in the years leading up to the Pacific war had as many as eighteen 6 inch guns emplaced, but to date no specifications have surfaced regarding the layout, construction, and building materials for these magazines. The following is a list of the known 6 inch gun positions of Singapore in 1942, and provides an idea its present conditions: [135]

6 Inch Gun Batteries	Remarks
Fort Siloso (x2 guns)	Upgraded and modified from earlier magazine
Fort Pasir Panjang (x2 guns)	Upgraded and modified from earlier magazine
Pasir Laba Battery (x2 guns)	Access restricted Ministry of Defence Live Firing Area, fate of fortifications unknown
Changi Battery (x2 guns)	Destroyed by post war development, unverified
Beting Kusah Battery (x2 guns)	Destroyed by post war development, unverified
Sphinx Battery Pulau Tekong (x2 guns)	Access restricted Ministry of Defence training ground, destroyed by post war development, verified on ground
Silingsing Battery Pulau Brani (x2 guns)	Access restricted Police Coast Guard Base, fate of fortifications unknown
Pengerang Johore (x2 guns)	Access restricted Malaysian Navy Base, fate of fortifications unknown

One of the greatest myths circulating after the fall of Singapore was that the coastal defence guns were facing the wrong way towards the sea and were therefore unable to fire upon the Japanese attacking overland from the north. Karl Hack and Kevin Blackburn are among the most recent historians to question this and provided ample data to show otherwise. However the two authors

[135] Two pairs of 6 inch guns were purportedly emplaced in the island of Penang, Malaya. Two guns are found at Batu Muang and the other two at Fort Cornwallis. Fort Cornwallis was a late 18th century rhombus shaped fort with four bastions at each corner. No visible traces of any 6 inch emplacement can be seen on the surface today. Batu Muang was apparently constructed in the 1930s and may provide some clues to the 6 inch magazine. Today both sites are opened to visitors.

too find references to Fort Serapong at best vague and concluded that the guns of Serapong were silent and did not join in the battle.

Fort Serapong, along with its sister batteries on Blakang Mati, and essentially all the coastal defence guns in the south and west of Singapore were under Faber Fire Command's order of battle. Other gun batteries included Pasir Laba, Pasir Panjang, Silingsing, and the two battleship calibre 15 inch guns at Buena Vista, as well as a host of smaller habour defence weapons like the anti-motor torpedo boat 6, 12 and 18 pounders. Faber Fire Command in turn took its instructions from Fortress Commander stationed at Fort Canning.

One of the most important pieces of historical document which may shed some light on Serapong's guns is the *War Diary of Faber Fire Command*. The diaries did not mention Serapong's guns firing at all except to warn ships off the minefields. It also indicated that on the 9th December 1941, all 6 inch batteries were ordered to have twenty 6 inch shrapnel shells fused for action against low-flying aircraft. [136] Whether the guns of Serapong did execute this order and engaged Japanese aircraft on the bombing runs is unfortunately unconfirmed. Major C. C. M. Macleod-Carey, second-in-command of 7 Coast Regiment (which the garrison on Serapong was part) after the war expressed doubt that either Serapong Battery or Silingsing Battery (Pulau Brani) opened fire, because hills or buildings to the rear prevented their doing so. [137]

On 20th January 1942, a secret cipher from the Chiefs of Staff to General Wavell in Batavia stated that, "Full preparation should be made to use fortress guns against landward attack and effective fire control should be organised. Report most urgent requirements H.E. when possibility of provision will be examined". [138] This would eventually meant at least partial demolition of overhead cover at some 6 inch batteries, and as witnessed at the Gun No.1 position the overhead concrete cover is still presently in place therefore ruling this out for the first gun. Gun No.2 was reported to have been damaged by an air raid on 18th January, wrecking its canopy and causing sufficient destruction to the gun and mount that it needed to be replaced. By default of Japanese action, theoretically the canopy of Gun No.2 would have been removed to permit rotation of the weapon to its rear, but this would entail firing over their BCP and the hillcrest of Mount Serapong!

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136 WO172/179 (1942) War Diary Faber Fire Command. National Archives United Kingdom.

137 Macleod-Carey, "*Singapore (1942)*", in Jon E. Lewis (ed.), *The Mammoth Book of Battles: The Art and Science of Modern Battles (1995)*, p. 217.

138 WO106/2555. Malaya Coast Artillery October 1937 to March 1942. Extract from Telegram from W.O. to ABDACOM rptd G.O.C. Malaya 20 January 1941. National Archives United Kingdom.

The location of the battery would have prevented it firing on the Japanese advancing from the west from Pasir Panjang and Kent Ridge, northeast of Serapong. Gun No.2 situated at 166m above sea level, even with maximum elevation of 15 degrees on its Mk II mount, it is with most absolute certainty that the rounds would slam into the BCP at 170m above sea level, just 25m northeast from the emplacement. It would have been possible for it to fire eastwards towards the Kallang area. Even if the guns had taken part in the war, there was little they could have done to repel the Japanese. The ammunition, being mainly armour piercing was totally unsuitable for counter-battery and anti-personnel work.

Monumental architectural features have dominated the research undertaken at the Fort Serapong site thus far. With this completion of a basic inventory of buildings, structures and large features, focus can in the future be place on the smaller things. The past is recorded in many ways and new dimensions may be given by studying the small things so often forgotten.

6.3 In Small Things Forgotten: On the Trail of Green Spot [139]

What else can archaeology tell us about the fort? Archaeology is the study of material culture but unless the archaeologist has access to an extremely large database(s) of artifacts with its known identity, function, and chronology (it is already an exasperatingly difficult task to provide just that), the archaeologist needs to assemble his or her own study samples and artifacts database to enable comparative analysis of the finds. It is only within living memory and the last two decades that archaeologists have started to probe into the colonial history of Singapore, and the sites excavated are few and far between. Until recently no study collection or database even of the most rudimentary nature exists. [140]

The importance of a material cultural database cannot be further emphasized. This section on the Singapore Glass Manufacture Company and the selected examples will highlight the usefulness of subjecting the often overlooked and deemed lowly glass shards for analysis – the small things which detail ordinary living. My interest in glass bottle typology first came about with nostalgic memories of a particular brand of non-carbonated soft drink named 'Green Spot'. Inevitably the

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139 James Deetz's monumental and entertaining book *In Small Things Forgotten: An Archaeology of Early American Life (1996)*. Deetz is considered one of the founding fathers of historical archaeology as a sub-discipline. As the title of the book implies, from the small and overlooked things a great many things can be told.

140 An exception would be the work on the ceramics from Pulau Saigon, where a surprising large number of researchers (3) undertook the task to study the finds and assemble them into some semblance of order. See Jennifer Barry's *Pulau Saigon: A Post-Eighteenth Century Archaeological Assemblage Recovered from a Former Island in the Singapore River (2000)*, Koh Lian What's *Artefacts from Pulo Saigon (1989)*, and Cheryl-Ann Low's *Uncovering Pulo Saigon (1996)*.

excavations uncovering such bottles and shards brought about the curiosity which fevered into obsession to identify corresponding shards. A breakthrough came when several patterns begin to surface amongst the thousands of shards identifying these belonging to bottles containing the orange beverage 'Green Spot'. Soon this expanded to other drink manufacturers. The result is a very skeletal and certainly preliminary typology on the glass bottles produced by the Singapore Glass Manufacture Company for the various beverage and soft drinks company had been assembled from the glass shards and bottles recovered at Fort Serapong.

As with almost any item of machine manufactured and mass produced, model numbers are given to identify a manufacturer's catalog of products, and glass bottles are not exempted. The Singapore Glass Manufacture Company [141] embossed its bottles with an "SG" prefix beneath on the base, followed by a series of numbers in Arabic numerals. Model SG339 has now been identified as the pebble textured (heel of the vessel to its hip) for the 280-295ml capacity bottles. Known soft drinks which employed the Model 339 were Framroz's 'Nomber Satu', and 'Marco'. Model SG507 was also of the pebble textured design but for the 200ml and the only known drink associated with this model was 'Green Spot'. Yet another model, Model SG114 featured the pebbled textured. This 200ml version had the texture from its base to rim with unembossed central band for silk screen printing of the beverage's trade name or logo. Soft drinks associated with Model SG114 include 'Red Lion' pasteurized non-carbonated fruitade. Model SG518 was a large 330ml capacity clear glass bottle with chromolithographic prints. Two rival soft drinks manufacturer are known to have adopted this vessel – Fraser & Neave, and National Aerated Water Company. [142]

The Singapore Glass Manufacture Company was certainly not the only concern manufacturing glass bottles. A varied selection of yet to be identified glass manufacturers includes firms which prefixed its bottles with the alphabet "N"; a three cap crown; numerals or alphabets within diamonds; and double diamonds to just highlight a few. Increasing the challenge are those without any form of makers marks.

With a known context where the chronology can be established with some certainty, it provides the archaeologist with a control group to compare the finds of one site with others. The excavation at Fort Tanjong Katong produced an equally large number of glass bottles and shards.

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141 No comprehensive history of the Singapore Glass Manufacture Company exists. Most of my data have been assembled from varied sources, news clippings, magazine advertisements, directory listings, as well as from oral history. A brief one page summary about the company can however be found in *Bukit Merah: From a Hilly Kampong to a Modern Town (1996).*

142 In a similar vein, William Rathje under the aegis of his Garbagology project embarked upon a large typology of aluminum pull tabs, identifying the tabs to various beverages and manufactures of cans. See *Rubbish! The Archaeology of Garbage (2001).*

The deposits for this latter site are from between 1969 and 1970 when the last remnants of the fort were buried during the massive land reclamation programme along the entire East Coast. Working with the data sets from Forts Tanjong Katong and Serapong, a useful system of cross referencing resulted in the identification of several finds from both sites, and providing a preliminary chronological timeline where the artifact remained available in the market.

For the determined historical archaeologist, there still remains the excavation of archival records of the manufactories concerned. Oral interviews too are useful, and as already illustrated in Phase 7 of the Serapong report, photographs. As information in the glass database grows, interpretation of the consumption preference and pattern for the site can take on more significant meanings. At Serapong hilltop in the 1950s and 1960s, it appears that dairy beverage particularly those of Cold Storage Creameries actually rivals the consumption of alcohol!

6.4 What Else Can Archaeology Tell Us About the Fort?

There is a lot that excavation alone cannot tell about the fort. The historical archaeologist unlike his or her prehistoric colleague is perhaps encumbered by too wide a spectrum of material remains for a single individual to grasp. The worst may await him with the daunting number of avenues of inquiry and potential historical resources that are available; unit histories, war diaries, newspaper accounts, oral histories, eyewitness accounts, photographs, maps, and plans. If he will be so willing to understand the artifacts he is dealing with and will certainly need to embark on a study of the material culture, crafts, architecture, engineering, military technology, arms, uniforms., etc of the chronological period(s) in question. In order to put the material in context, he then needs to undertake an examination into the social and political histories. Clearly it is not a discipline which one can essentially remain alone and aloof.

As demonstrated in this thesis, a combination of historical documents, photographs, oral histories, material culture studies, and of course excavation has only managed to produce this preliminary report. Without the maps and plans uncovered in the National Archives of the United Kingdom, work would have been decidedly frustrating though not impossible. From his writings P.K.Yeoh did not appear to have visited the Serapong site, but extracting details from the plans he found, he provided a sufficiently comprehensive description of the 9.2 inch gun emplacement and magazine at Serapong Spur. Squadron Leader Clements did visit Serapong and noticed the concrete platforms which he interpreted as for 25 pounders. The archaeological investigations was able to verify and add on to Yeoh's thesis on the conversion of the gun emplacement for the later 6 inch guns, and likewise reexamine Clements' gun platforms which turned out to be for generators instead.

Archaeology draws from both Clements and Yeoh's work, not in a quest to point out omissions and errors, but as a basis to start. Without Clements, we will not be alerted to the location of a pair of platforms, or without Yeoh the plans he uncovered at the archives may remained hidden. Likewise, the War Diaries of Faber Fire Command has proved an indispensible chronological details of the time leading up and during the battle for Singapore, but it never made a reference to the command centre buried deep in the earth of Mount Serapong, and certainly nothing about the soldiers whiling their time with a game of Monopoly during the dull hours of a quiet watch.

Numerous questions arose from the field and with each new find posing additional queries for the already burgeoning list. Some are at large thematic while others are more specific to the individual features. The possibility of determining the number of soldiers based on Fort Serapong is often raised. The surest method is to obtained the order of battle for the 7th Coast Regiment Royal Artillery, but to date documents relating to this have not surfaced, so can archaeology based on material cultural remains provide some suggestions? [143] The 6 inch Gun No.2 shelter may provide some hints of the personnel involved, where the room with the rifle racks, benches and hanging racks seem to cater to 15 men. Assuming that this shelter caters only to the gun detachment, what about the ammunition crew? Are they sheltered within the magazine?

Another mystery of sorts is the question of electrical power. So far only one structure from Phase 5 (1936/7 – 1942) has been identified as the mechanical services room where the generator may be housed. This building provides power to the command centre, but what about the rest of the fortifications? Recalled that the gun positions from this phase were midway up on Serapong hill, electricity was required for the guns to traverse. In Comparison, Fort Connaught possessed a large engine room generating the electricity for its three 9.2 inch guns and lighting for the magazines etc. So did Fort Siloso, Fort Pasir Panjang and the Tekong Besar Battery. Where did the electric power come from for Serapong's barracks block, kitchen, magazine, BCP etc? Was Serapong on the island's power grid? Taking it further, when was electricity first brought to Blakang Mati and what were the tell tale material remains?

Thematic examination of broader issues relating to the socio-political and military practices abound. Essentially what can material culture tells us, and will there be any clear indication of these practices? For instance, military and social hierarchy segregated the soldiers. The main

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143 There is also some confusion as to which batteries of the 7th Coast Regiment Royal Artillery actually manned the guns of Serapong in 1942. Maurice-Jones in his *The History of Coast Artillery in the British Army (1959)* gives 11th Coast Battery. Hack and Blackburn list the Hong Kong and Singapore Royal Artillery (HKSRA) which could be either the 5th HKSRA or 7th HKSRA, both subordinate to the 7th Coast Regiment.

barracks for the garrison of Blakang Mati were located at the parade square in the central part of the island. The officers and the senior NCOs (Warrant Officers and Sergeants) lived separately with their own mess and quarters apart from the junior NCOs and men. Even within the corps of officers, accommodations are accorded by rank, seniority and social standing. Unmarried subalterns were quartered in singular rooms at the Officers' mess. Field officers (Majors, Lieutenant Colonels, and Colonels) had their own bungalows. Finally, Asiatic or native officers were quartered separately from their European brother officers.

Mess activities like dinners, games, dances and musical evenings were only available to members of that mess and their guests. Hence a junior NCO and his family would not be eligible to attend a Sergeants' or Officers' mess event. The married ordinary British soldier's family lived in relative isolation in the hierarchical society of pre-Second World War Singapore. The officer's family kept to those of their own military and social status and often did not interact with the family of the enlisted men. In essence, married soldier who were not officers had limited finances and they (and their families) were regarded as "poor whites". [144]

On Serapong, where were the officers quartered? Did they have separate facilities? What was segregation like on the hill? In the late 19th century the barracks at Fort Serapong were only likely to be occupied when the fort was manned during training camps or in times of war. The gunners would be usually quartered at the main barracks at the parade square and only march to take their posts at the fort when required. A small guard detachment provided by the infantry company would likely have a roster at the fort. After the barracks were constructed on the hill, it is not clear if the gunners were permanently stationed on the hill. In addition, there was the infantry company detailed to protect the fort in times of war. Where did they encamped and how was their relation with the gunners like?

Mundane queries on the small things forgotten can provide a chronology guideline to confidently date the finds of not only those from Mount Serapong but also from other sites. A sample of the questions includes; when was mild steel introduced? When was philip head screws first introduced to Singapore? When was the ventilation grill introduced and ceased? When did movable glass/aluminum louvered windows come about? When was mosaic tiles introduced? What did the brackets and fixtures once held? What was the camouflage scheme like, how does it differ from other British military fortifications elsewhere in the world?

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144 "*The Forgotten Soldiers: A Glimpse of Pre-war Life on Blakang Mati*". By Iskander Mydin in *Pointer: Journal of the Singapore Armed Forces 1987 Vol.3 Part 3,* pp.52 and 54.

The data recovered thus far provides a unique comparative analysis of Fort Serapong with other fortifications in Singapore. Although no detailed investigations or excavations were conducted, site visits to the Mount Faber and Pulau Tekong military installations contemporaneous of the 1930s – World War Two period yielded significant new information for the Singapore fortifications database. Based on the architectural, construction methods, and building materials alone, enabled the preliminary identification of the flooded underground facility on Mount Faber to be one of the fire direction posts or the actual Faber Fire Command centre itself.

For the Mount Faber facility, main entry to the facility was by stairs, with another entry via a long passageway in the rear, which was an escape exit (which might had served as an alternative point of entry, but the designer's intention was essentially for emergency escape). There are two interconnecting ante-chambers on the left of the entry stairway that could possibly be the orderly room, duty NCO room, or telephone exchange. The facility was further partitioned into a main room and large side room. Should this really be the fire command center, these two large rooms would serve as the plotting and map rooms, as well as communications centre. However, until a more thorough examination of the site, the actual spatial usage and chronological evolution of the facility is not readily determined.

The remaining fortifications on Pulau Tekong are the heavily demolished Tekong Besar Battery (3 x 9.2 inch Mk X guns), and the two Close Defence Batteries (CDB) of Ladang and Calder Harbour. As indicated in this report previously no traces of the Sphinx 6 inch battery was found as the Ministry of Defence had constructed a training camp over the site. Of the Tekong Besar Battery six major features had been located but yet to be identified for their function. None of these features which appears to be observation and command posts bear any similarity in design and layout to those uncovered at Fort Serapong and Fort Connaught, and will prove to be a great potential for future study.

A large portion of Fort Serapong lay as it had since the fateful day of 15th February 1942, frozen in time. Future archaeological investigations at the fort will indubitably uncover new material and revise the findings in this preliminary report. At this stage we are minimally able to weave together the basic chronology of the different periods of occupation on Mount Serapong. The spatial usage, form and function of the site have been, with a level of confidence been identified and briefly discussed. Still much more remain about Fort Serapong that we are uncertain and do not know about. For the sensationalist, perhaps the most interesting finding would be the evidence seems to suggest that the Japanese bombing and shelling did far less damage to Fort Serapong, and that most of the damages were due to demolition carried out by the British!

But that is not the point of this thesis, and the main underlining message is that the greatest challenge remains in convincing the present denizens of Singapore that archaeology provides a unique multidisciplinary approach employing data and materials from the historical records and coupled with the actual artifacts, is able to provide a window into the past. A past that speaks from the things once forgotten.

Illustration 108. Archaeological fieldwork is a physically demanding task. (Author)

Illustration 109. Bricks of Serapong awaiting the historical archaeologist to tell their tales. (Author)

Illustration 110. Trays of finds from Mount Serapong sit patiently for the archaeologist to process them. Post excavation work is usually the most time consuming part in archaeology. The general rule of thumb is a day in the field equates to fourteen days processing and analyzing the finds. This photograph is somewhat dated. The room now fills to the brim with artifacts! (Author)

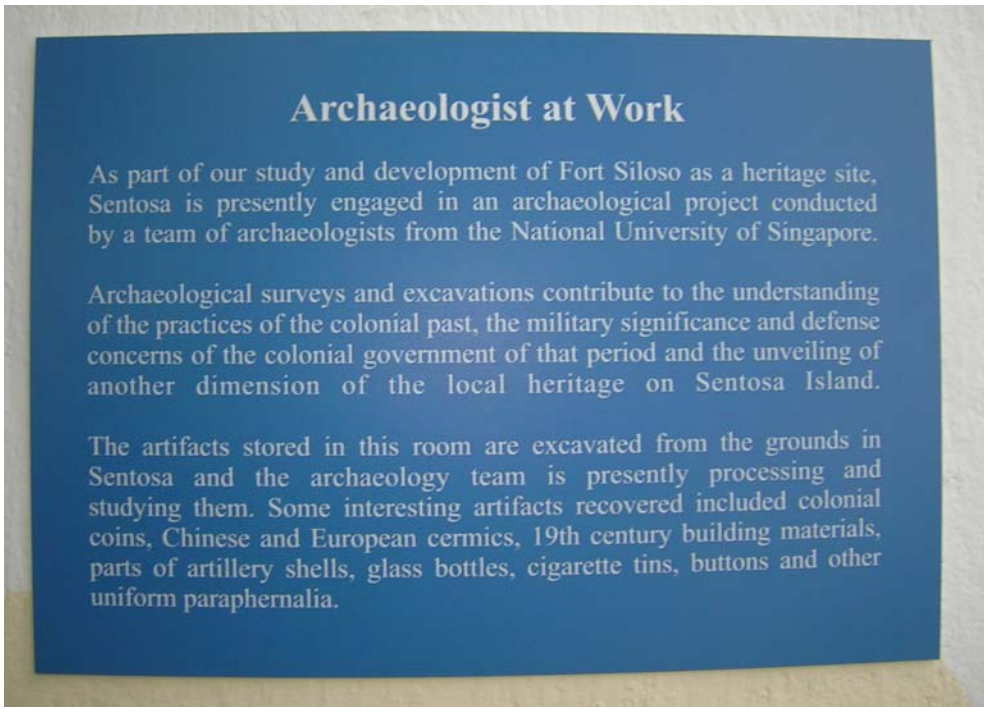

Illustration 111. Time detectives at work. Sign put up in Fort Siloso where the artifacts are kept. (Author)

Chapter 7

Conclusion

7.1 Historical vs. Archaeological Records?

This thesis essentially hopes to achieve two objectives. First and foremost to put to paper the preliminary report of the Fort Serapong project. Archaeologists are sometimes notorious for delaying writing up their findings from the field. I am no different and several reports from other sites remained to be penned. It has become an inside joke amongst the discipline that every archaeologist will go to his or her grave without having complete several site reports. Thankfully, the material from the 2006 season Fort Serapong shall not fall into this category and the bulk of this thesis comprises the report.

The second objective of illustrating the potential of archaeology as a discipline to interpret the more recent colonial past is considerably more difficult to achieve. It is perhaps as clear as crystal for the archaeologist or just about any researcher the importance of his or her own field of research, but to convince others its relevance is conceivably more challenging, and I hope that after ploughing through the above report, the merits of archaeological investigations in the recent past is convincing.

For an archaeologist working on a chronological period where historical data is available perhaps the greatest challenge is refuting the remark "that archaeology is the most expensive way to show us what we already know". We know that there was a fort atop Mount Serapong and it was in service from the late 19th century to the fall of Singapore in 1942, but what else do we know about it apart from the fact that a fort was built there? As demonstrated above in this report, there were a lot we did not know prior to the investigation. Presently only a brief inventory and sketch had since been produced, and there remain hundreds of unanswered questions.

Archaeological work undertaken so far in Singapore consists of small-scale operations on shoestring budgets constricted often by limited preparatory and excavation time windows. It may be possible to critique that the archaeology conducted hitherto in Singapore has been generally descriptive, concentrating on the physical remains of the past rather than as expressions of human nature. Perhaps this is in line with the general thrust in the study of local history and heritage, where within the ranks of historians, emphasis is placed more on addressing events as oppose to the social history, memories and interaction within the population.

Elsewhere in Singapore, archaeological work which specifically addressed colonial period sites had been limited to only a handful: Duxton Hill (1989); Pulau Saigon (surface collection only 1986-1988); Istana Kampong Gelam (2000); St.Andrew's Cathedral (2003-2004); Fort Tanjong Katong (2004-2005); Palmer Road (2006); Neil Road House (2006).

Although St. Andrew's Cathedral is certainly recognized as one of the iconic monuments of the colonial period, the primary research question for the archaeological excavations at the church was addressed at investigating the pre-colonial settlement of Temasek. Nevertheless the excavations at the church exposed and recovered an enormous quantity of colonial period and modern material. A preliminary and random inspection of the recovered artifacts attests to much building and landscaping activity within the contested space of the present church grounds. Building material from the varied stages of church renovation and construction were recovered and can be distinguished from the construction fill imported from elsewhere to level the church grounds. In the western lawn, several courses of bricks were found laid out and it is not known if it was part of a former feature of the church or predates the institution. Presently there has yet to be a study of the bricks and brick working in Singapore, such analysis can serve as a chronological benchmark for colonial period sites, as well as provide indication to the form and use of the elapsed structure.

Within the Cathedral's grounds, several test trenches yielding World War Two period artifacts enable the analysis of the spatial and intra-site usage during the battle for Singapore. Features include refuse pits and a suspected air raid trench dug in the early days of the Pacific War. From historical and anecdotal sources, it is known that St. Andrew's Cathedral was employed as a field hospital for several weeks just before the fall of Singapore but little else is known. One of the middens revealed large quantities of tin cans and associated paraphernalia (eg. can opener keys) among which intact ceramic serving wares from the Adelphi Hotel, then situated across the road, were found. The tin cans were opened and devoid of their contents. It is still unclear if the serving wares were part of a deliberate burial to prevent the items from falling into the hands of the invading Japanese army or looters. [145]

The site of Fort Tanjong Katong was believed to have suffered the fate of modern development and the fortification demolished. The few scant records and eyewitness accounts tell of the fort undergoing systematic demolition over a period of time. Archaeological excavation work so far revealed significant portions of the fort, a pair of infantry caponiers and its accompanying passageways, moat escarpment wall which remained intact with glass shards still embedded, and

[145] See John N.Miksic, and Lim Chen Sian *Archaeological Research on the Padang and in the St.Andrew's Cathedral Churchyard: St.Andrew's Cathedral Archaeological Research Project Progress Report Summary Sept 2003 – Jun 2004 (2004).*

the drawbridge superstructure that may be the sole remaining Victorian example in the world. Interestingly, remains of Fort Tanjong Katong were still visible until 1970 when the reclamation of the east coast resulted with the fort being buried and forgotten. Archaeology in Singapore faces the prospect of development on such scale and pace that sites still within the living memory are rapidly erased. [146]

A short excavation at Duxton Hill was conducted when the district of Tanjong Pagar came under the large scale urban redevelopment program. The excavation which was conducted over 10 days, involved opening a trench in the back lane of the shop houses lining the district. In the preliminary write up for the Duxton Hill excavations, John Miksic wrote in his introduction, "…when archaeologists dig, they are not searching for particular artifacts. Archaeologists are looking for any remains which will help them better understand the past" and in the case of Singapore, the citizen's own immediate immigrant ancestors. [147]

The Duxton Hill and the Istana Kampong Gelam projects embody the essence of historical archaeology, amalgamating historical records and oral history of the area to the material culture that was recovered from the excavations. Both sites began as residences of the elite, Kampong Gelam being the palace of the Sultan, while the Duxton Hill area housed a plantation owner's residence and later terraced houses of the more affluent Chinese. These two sites began to suffer the effects of urban decay and eventually became working class quarters and tenement slumps.

From the above sites, archaeological investigations can reveal a lot about the social stratification and its evolution. Obvious questions on parity between the social strata can be addressed, but as Miksic pointed out in his final parting commentary, the archaeological study of ethic immigrant communities still remains unexplored. The New Mexico State University's excavations on the Chinese community at El Paso, Texas underline the feasibility of conducting such avenue of inquiry. In "*The Overseas Chinese in El Paso: Changing Goals, Changing Realities*", Edward Staski successfully discerned that the overseas Chinese in the community experience little assimilation, and was able to trace the general history of the overseas Chinese experience in El Paso through examining the archaeological record and the patterns of behavioral changes reflected. The lack of assimilation of the Chinese community resulted instead in an attempt to achieve self-sufficiency within their enclave. American producers however were also quick to

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146 The example of the apartment high-rise complex adjacent to the Fort Tanjong Katong site vividly illustrates the ferocious pace of development in Singapore. When archaeological work started at the fort, the apartment still housed residences, over the course of six months, it was pulled down to make way for a newer apartment complex. The former structure was constructed in the 1980s.

147 John Miksic, "*Archaeology in the City: Digging at Duxton Hill*" in *Tanjong Pagar: Singapore's Cradle of Development (1989)*.

recognize the growing demands of this booming ethnic group, and brewers of beer and manufacturers of medicine began to market their products in dual scripts – both English and Chinese. [148] The ethnic enclaves in Singapore will make an interesting study of the interactions within the communities, particularly the cultural assimilation of the Anglophone elements within the communities.

The Neil Road House archaeological investigation was just one such Anglophone community. The three storey townhouse was constructed sometime around the turn of the 20th century, its owners a family of Anglophone Straits Chinese. Material culture study undertaken of the house revealed that though the household was educated in English ways, the architectural fixtures are distinctively Southern Chinese in origin. Iconographic study of the panels, wood lintels, corbel carvings, plaster reliefs etc all tell of an obsessive reference for good fortune and prosperity. The inhabitants of the household no doubt believed that to surround themselves with auspicious iconography in the design and decor of their house, it would translate into the actual blessings for them. The study also shows that individually the artifacts are of distinct origins from Southern China (architectural timber fixtures, plaster reliefs), England (ceramic serving ware, tiles), Japan (tiles) etc but collectively are commonly referred to as Peranakan. There is nothing Straits Chinese or Peranakan with the artifacts and iconography themselves, but it appears that their association with this sub-group of society has resulted with the misnomer of labeling the artifacts as so. [149]

At the Palmer Road site a Second World War midden was uncovered, like its post war counterpart on Mount Serapong, is an archaeologically important find for its narrow chronological range allows it to serve as a benchmark for the comparison of artifacts from other sites in Singapore. More importantly the artifacts raised crucial queries about the site which no historical records had been found. From the contextual evidence retrieved, the midden was created either at the end of the war or the years following the close of the war, certainly no later than 1950. Why then was a large cache of Second World War material dumped into the site? All the items were containers or receptacles of some kind (beverage, liquor or chemical bottles, rifle oil containers, medicinal, and tea cups). How are these items used in relation to the temple and the Tanjong Malang vicinity at large? Does it suggests that within the temple's present compound, a storage,

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148 Staski in "*Images of the Recent Past: Readings in Historical Archaeology*" Edited by Charles Orster Jr. Altamira Press, 1996. Other similar works are Priscilla Wegars' *Uncovering a Chinese Legacy: Historical Archaeology at Centerville, Idaho (2001).* Also Anne-Marie Cantwell and Diana diZerega's *Unearthing Gotham: The Archaeology of New York City (2001).*

149 Lim Chen Sian and Wee Sheau Theng, *157 Neil Road House Archaeological Research Project Preliminary Report (2007).*

or service (quartermaster) site related to the military existed, or perhaps it was merely a looter's hoard? [150]

Archaeological research into this particular period of history is limited and it is rare to come across such finds in Singapore. What is known about the Second War World is usually told through the lens of historians from documents and eyewitness accounts as opposed to material culture from site specific excavations. The disciplines of archaeology and history cannot work in isolation and it is only with the cross disciplinary approach of adopting techniques from each that a more complete picture of the past is revealed.

As demonstrated throughout the main body of this thesis, little analysis of the construction methods and building materials of the colonial period have been undertaken so far in Singapore by either historians or archaeologists. The investigations at Fort Serapong does not pretend to be an expert treatise on architectural designs, construction methods, and building materials, but it illustrates the crucial role such analysis play in assisting with the identification of the function of a feature and to allocate a chronology to it. Correspondingly, the material culture of the colonial period in Singapore is in part the result of the larger world wide interaction and deposition of artifacts from the European or Asian colonizer, and analogous studies like *An Archaeological Guide to British Ceramics in Australia 1788-1901* will be indubitably valuable for sites in Singapore and Bernard Fontana's *The Tale of a Nail: On the Ethnological Interpretation of Historic Artifacts* exemplifies the study of the often overlooked and dismissed material culture in the colonial period. [151] From the small mundane things that are often dismissed and overlooked, archaeology along with historical sources can bring insight into the past lives of ordinary living.

The archaeological record of the earlier pre-colonial Temasek period has taken over twenty years of research to arrive at its present level of understanding. In contrast, little emphasis has been made for the colonial period and will certainly involve years in establishing a record to function as inter and intra site comparables. However, the field of colonial period archaeology has its advantages of examining similar studies conducted elsewhere. The Fort Serapong project has its counterparts in the United Kingdom, Australia and New Zealand, where the same perceived threat of Russian Imperialism resulted in the construction of a series of Victorian era coastal artillery fortifications in the last decades of the 19th century and later were upgraded and served through the First and Second World Wars.

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150 Lim Chen Sian, *Palmer Road Foot Tek Soo Khek Temple Archaeological Research Project Preliminary Site Report (2006).*

151 In *The Florida Anthropologist Vol.XVII No.3 Part 2 September 1965.*

Despite their recent date, the understanding of rates of survival and historical context of the late 19th century and 20th century military sites worldwide has been surprisingly poor. When first hand memories come to an end – soon in the case of the Second World War, these structures will be left firmly in the realms of history and archaeology. In the United Kingdom, the study and recording of 20th century military sites was first stimulated in 1995 by volunteers working with the Fortress Study Group and the Defence of Britain Project resulting in thousands of sites studied and recorded over the last decade. Another significant development in the United Kingdom affecting military sites was the enactment of Planning Policy Guidance (PPG) 16 in 1990, where archaeology is a material consideration in the planning process, thus stating the requirement for archaeological recording in advance of redevelopment or removal.

The conservation and recording of recent military sites is now a common practice across Europe and in the United States. In Europe this ranges from the Atlantic Wall of the Second World War to Warsaw Pact airfields. No such development guidelines or policies apply in Singapore, and hence a maximum amount of data needs to be recovered from each site investigated by the archaeologist. At Serapong, an extremely fine-grained research was conducted because one cannot predict what data will be useful for comparative research by future archaeologists, and the lack of planning policies requiring archaeological investigations prior to development may result in the site completely bulldozed and lost with no further chances for research; therefore it is necessary to record and collect as much as possible.

The velocity of modern development in Singapore has dramatically altered the socio-political and economic landscape of the isle. A relatively short period of a decade or quarter century had removed much from the living memory, yet there are many when prompted who will still vividly recall the not so distant past and the final decades of colonial rule. It is hoped that through this thesis, the merits of archaeology methodology and theory will permit the documentation through the material record of the rapid changes that had occurred on the island, and the exploration of the evolution of a modern cosmopolitan city. Our knowledge of Singapore's military sites has grown enormously and will continue to do so. Many have since disappeared, and others are only intelligible from scraps of documents, aerial photography, or perhaps like the case of Fort Serapong may be preserved in the reports of archaeological field surveys. Fort Serapong, the largest fortification complex on Blakang Mati still possesses enormous potential for future archaeological investigations. It cannot be further emphasized that faced with the exuberant pace of development, the archaeological reservoir of colonial period Singapore diminishes with each passing day.

Appendix 1: Biographical Sketch of Colonel Sir Henry Edward McCallum (b.1852 d.1919) extracted from "Memoir: Colonel Sir Henry Edward McCallum G.C.M.G" in The Royal Engineers Journal (March 1920) pp.152-163.

McCallum was born on October 28, 1852 in Yeovil, Somersetshire, England. He was first tutored privately and then attended the Royal Military College in Woolwich at the age of 16, passing out in 1871, first among a batch of 52 cadets with the Pollack Medal, and received a Commission in the Royal Engineers. After two years spent in practical training at the School of Military Engineering, Chatham, where his ability in construction work gained him the Fowke Medal, he was appointed in 1874 Superintendent of Telegraphs for the Southern District. A few months later he was transferred to the Office of the Inspector-General of Fortifications, remaining there until the following year when his long association with the East began.

In 1875, McCallum, who was then 23 years of age, accompanied Sir William Jervios, the Governor of the Straits Settlements and himself a Royal Engineer Officer, to Singapore as Private Secretary. McCallum took part in the Perak War of 1876 receiving the medal and clasp, and was several times mentioned in despatches. In 1877 he returned to his Corps, and after spending a short time at Hong Kong as Superintending Engineer of the Admiralty Works he returned the following year to Singapore, where he had been chosen to devise measures for the defence of the port. In 1884 he was appointed Colonial Engineer and Surveyor-General, and for the next thirteen years his lot was cast with the Straits Settlements.

He was intimately associated in a number of important capacities with the administrative and social life of the Colony. A member of both the Legislative and Executive Councils, he was also the first Commandant of the Singapore Volunteer Artillery. For some years he was the President of the Singapore Municipality as well as the Singapore Cricket Club. As Colonial Engineer, he designed and constructed many public works including the National Museum at Stamford Road. McCallum was knighted C.M.G for his undertaking of the fortification of Singapore, designing and building the military installations and Forts Siloso, Serapong and Connaught of Blakang Mati.

Although in the service of the Colonial Office, he retained his connection with his Corps, and was promoted Captain in 1883; Major in 1890; made Lieut-Colonel in 1897; and finally retired from the Corps as a Colonel in 1907. His retirement from the Corps of Engineer did not signal the end of his rise in office. In 1897, much to the regret of the people of Singapore and the Strait Settlements, McCallum left the Colony for the Governorship of Lagos (now part of Nigeria). A string of Governorships followed in Newfoundland (Canada), Natal, and finally Ceylon (Sri Lanka). Retiring in England in 1913, and he died there on November 24, 1919.

Today, apart from the architectural marvel of the National Museum, and the remains of the forts on Sentosa, Labrador and Katong Parks, McCallum Street at Telok Ayer still bears his name in his honour.

1875 - 1877: Private Secretary to Sir William Jervois
1877 - 1878: Superintendent, Admiralty Harbour Works, Hong Kong
1878 - 1879: Singapore
1879 - 1880: Woolwich
1880 - 1884: Deputy Colonial Engineer, Penang
1884 - 1897: Colonial Engineer, Straits Settlements
1897 - 1899: Governor of Lagos
1899 - 1901: Governor of Newfoundland
1901 - 1907: Governor of Natal
1907 - 1913: Governor of Ceylon

Appendix 2: Extract from "Fortress Singapore" by P.K.Yeoh in Fort the Journal of the Fortress Study Group No.7 (1979) pp.28-30

"For this period, no more detailed plans than those drawn in the 1886 maps (sic) are available. This layout showed a hilltop site defended by what appears to be three strongpoints, located to provide enfilade fire down the sides of the polygonal perimeter of the site. No ditch of any sort was indicated, so it would seem that the three protruding positions noted were most probably infantry strongpoints. It is also probable that the casemates for the magazine were located behind the guns. Two positions not marked as gun positions, were also indicated between the two 8-inch armament. These were probably pre-located gun pits for the sitting of additional field artillery to bolster the defences of the battery in times of war.

In 1894, a map showing the location of batteries and the surrounding military land and road communications on Belakang Mati Island included the batteries at Mount Siloso, Mount Serapong and at Belakang Mati East. East-north-east of the two 8-inch guns at Mount Serapong, two 6-pounder QF guns were added. These were mounted on the cliff-sided promontory to play on any fast enemy craft which might try to clear a path through the eastern minefield defences of the new harbour.

In the wake of the Japanese capture of Port Arthur in the Russo-Japanese War of 1904-05, there was a flurry of activity to upgrade the defences of Singapore, and Mount Serapong received especial attention. It was to be referred to as 'Fort Serapong' from then on, although there were times when the 'fort' prefix was dropped.

Various plans and sections were prepared during the period 1907-1911 showing the battery as it was to be constructed and improved. A layout of the battery dated 1911 indicated that three 9.2-inch BL guns were to be mounted. Two of these guns were to be paired and they probably occupied the positions of the two original 8-inch guns mounted when the battery was first constructed. A third gun was mounted at the spur running south-east, away from the first two guns. The paired guns were referred to as 'Serapong Battery' while the single gun was known as the 'Spur Battery'.

The hilltop placement of the guns and the defensive perimeter around them recalls the German 'feste' system of fortified batteries. This system called for the sitting of guns at the tops of the hills and ridges. The battery was defended by an irregular perimeter with ditches and wire entanglements following the run of the contours of the hill. At Serapong and Spur Batteries no ditch was indicated, but two parallel lines of wire entanglements were to run along the defended

perimeter. Further wire entanglements were to be installed within these parallel lines on the outbreak of war. Defending this perimeter there were seven infantry posts which consisted only of parapets located at various positions along the perimeter. The road leading to the battery could be well defended by enfilade fire from two infantry posts before an assaulting enemy could get past the wire entanglements. And even then an attacker must follow the road which led past the infantry barracks, in a circuitous route to the gun positions.

The paired guns at Serapong Battery shared a common magazine situated between the two gun positions. The cartridge store opened onto a corridor running towards the two gun emplacements. It doubled as the shell store for the guns. The battery commander's post was located directly above the cartridge store which was carved out of the rock of the site, and vaulted over with concrete. The rock above this concrete itself was covered with a layer of sand. All these layers would have helped to absorb some of the impact of shells directed at the battery by counter-battery fire from hostile ships. The cartridge store and the corridor where the shells were stored was probably equipped with overhead pulleys and pull tracks which led from the cartridge store along the shell stores to the gun pits. At the end of the run, a shell lift was located to hoist the rather heavy shells and their attendant charges up to the gun pits above. An infantry post was located directly behind these guns and there appears to have been a series of casemates possibly for use as shelter by the defending infantrymen during any counter-battery bombardment from the enemy.

The single gun emplacement at the Spur Battery was actually planned and constructed after the main position at Serapong Battery had been started. As this gun was situated approximately four hundred yards from the other two guns, it had its own cartridge and shell store constructed below the gun pit.

The shell and cartridge stores, together with the artillery store, and shelters for both officers and artillerymen were located below ground level and access was via a steel staircase. The rooms and stores was spanned by rolled steel joists spanning across the shorter sides and vaulted by concrete to a height of nine feet. The walls were constructed of brickwork, and where a room or store faced the air well where the access stairs were located, the rooms had windows set in the walls facing onto the air well. The only area accessible directly from the air well were (sic) the shelters and artillery store.

Passing from the air well, one entered a six-foot wide passage, nine feet high from the asphalt floor to the vaulted ceiling. This passage would have been very dark even on bright tropical days, so a series of lamp recesses were built into the corridor walls. The cartridge and shell stores

opened off this passage, and were constructed of concrete walls over two feet thick. In turn these walls were surrounded by a dry area which ran as a continuous passage around the casemate. This dry area was not sufficiently wide for a man to move in. In fact no one was supposed to use it, for it was merely a device to keep the shell, and especially the cartridge stores, from getting damp. Such an occurrence would have destroyed the charges needed to fire the gun.

It is interesting that the gun apron, which was constructed of concrete, was actually built of several layers of concrete which were of differing water-to-cement ratios, the ratio increasing as it went down.

The gun pit had a continuous shell recess built around it, as well as cartridge, and fuse and tube recesses set into the concrete apron. At the turn of the century, the 9.2-inch BL gun was improved, and the mark V mounting provided for the new mark X gun then brought into service. Those mounted on Serapong and Spur Batteries were therefore the latest 9.2-inch guns and they were mounted to fire over 6’6” high parapet. A circular platform surrounded the gun at parapet level, and a shield protected the gunners. This shield was also known as the ‘shell-pit shield’, and beneath this platform was a circular track from which hung six trolleys. The shells and cartridges were supplied to the floor of the gun pit by the lift mentioned earlier, and there a hydraulic ram lifted the shells so that they could be transferred to the trolleys, where they were run along the track until they were positioned at the rear of the gun. Another hydraulic ram, which revolved with the gun mounting, pushed the shell from the trolley through a trap in the gun shield until it was behind the breech mechanism. From this point it was hand-rammed into the chamber. There was a manually operated hoist provided with the mounting so that, in the event of a power failure, the shells could still be lifted for ramming into the chamber for firing. The cartridges were passes up by hand as they were not so heavy as the shells.

Appendix 3: Extract of engineers notes from WO 78/4226 "Singapore Serapong Spur Proposed Emplacement for 9.2 inch Mark X Gun (1908)"

"The nature and construction of the foundations and the arrangements for drainage are left for local consideration in order to prevent the desiccation of concrete by the direct or indirect action of the sun, concrete surfaces should on completion, be kept covered with a layer of earth or sand kept in a damp state. This covering should not be removed for a period of time three to six months according to circumstances.

If sand for slopes to parapet cannot be obtained locally, the best substitute should be used but it must be free from stones. Sand to be free from stones.

The aprons of emplacements are to be coloured to assimilate with the natural surroundings.

Q.R.Lift, steel doors for recesses, davit, steel platform, accumulator and plates, over and in front, standards for removable iron railings will be supplied by W.O.

Bars or hooks, should be provided in Shelters for slinging hammocks also any other internal fittings that may be considered necessary.

Lamp recesses lighting stores under Magazine conditions only will be fitted with fixed frames and wire guards other recesses will remain open – if considered advisable a padlock, chain and staple may be provided to secure the lamps in position in the recesses.

The steel loading platform should not be erected in the emplacement until the pedestal has been finally fixed in position for mounting the gun.

There must not be any distinct dividing line between the various classes of concrete, but where the quality changes one class must gradually be merged into the other the whole being as far as possible worked so as to form one solid mass."

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MPH 1127/2 Outline map of Singapore showing the military defences and the ranges of gun fire.

MPH 1127/3 Map to accompany report of Commission on the Defences of Singapore showing the ranges of gun fire.

MPHH 384 Map of Brani. Key to buildings and facilities 1909

MPI 458 Map of the Island of Singapore and its Dependencies 1911.

MPG 821/2 Accompany report of Commission on the Defences of Singapore.

MPG 821/3 Map to accompany report on defences of the Straits Settlements.

MPG 821/4 Map to accompany Colonel Cavenagh's Memorandum on the Defences of Singapore.

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MPG 1/770	Plans of Mount Palmer Battery; Teragag Battery; Mount Seloso Battery; War Department Land 1888
MPG 1/821	Map Southern Singapore showing Mt.Faber, Mt.Palmer, and proposed work at Tanjong Katong 1864.
MPG 28	Proposed PF Cells at Mount Imbiah
MPG 270	Blakang Mati
MPG 881	Plans Showing Buildings
MPHH 1/497	Maps of Blakang Mati 1911-22
MR1/1126	6 Plans of Batteries
WO 32/4183	Defence of Singapore
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WO 78/3700	Blakang Mati Barracks
WO 78/3702	Contoured Map of Blakang Mati
WO 78/3941	Siloso Proposed 9.2 Inch Gun
WO 78/3942	Fort Siloso Proposed 2 x 6 inch Q.F.
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WO172/176 War Diary HQ fixed Defences

WO172/179 Faber Fire Command Operations

WO172/180 Faber Fire Command Operations

WO172/183 War Diary 16 Defence Regiment RA

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