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### Preliminary Report on the Archaeological Investigations at the Victoria Concert Hall

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LIM CHEN SIAN

**A**

Archaeology Unit  
 Nalanda–Sriwijaya Centre  
 ISEAS – Yusof Ishak Institute  
 30 Heng Mui Keng Terrace,  
 Singapore 119614

**T**

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www.iseas.edu.sg/centres/nalanda-sriwijaya-centre

**E**

nsc@iseas.edu.sg

## LIM CHEN SIAN

Lim Chen Sian was the Project Archaeologist for the archaeological investigations at the Victoria Concert Hall and Victoria Theatre. Since 2006, he has led all the major archaeological excavations in Singapore. He read finance and archaeology at Boston University, and received his MA in Southeast Asian Studies from the National University of Singapore. He is Associate Fellow with the Archaeology Unit, Nalanda–Sriwijaya Centre, ISEAS – Yusof Ishak Institute.



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## Preliminary Report on the Archaeological Investigations at the Victoria Concert Hall

### ABSTRACT

In September 2010, the Victoria Concert Hall and Victoria Theatre were closed for major redevelopment amounting to the sum of \$158,000,000. The construction project saw extensive demolition works and the compound within was impacted. An archaeological evaluation conducted in July 2010 revealed pockets of cultural deposits from both the colonial and pre-modern eras. This discovery of an in-situ archaeological reservoir led to a three-week large-scale rescue excavation in September 2011. While the excavations were restricted to only a small area of the construction impact zone, the archaeology team successfully recovered approximately 654 kg of artifacts and ecofacts. This preliminary site report details the excavation sequences conducted at the site.

**Keywords:** Pre-colonial Singapore, Pre-modern Singapore, Rescue Archaeology, Temasek, Victoria Concert Hall, Victoria Memorial Hall, Victoria Theatre, Victoria Theatre and Concert Hall.

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## 1: INTRODUCTION

### *1.1 Archaeology in Singapore*

Unlike other Southeast Asian countries with traditions of scientific and archaeological inquiry that began in the 19<sup>th</sup> century, archaeology in Singapore remains a youthful and niche discipline (Glover 2004; Mokhtar and Chia 2007; Clémentin-Ojha and Manguin 2007). Although archaeological investigations in Malaya were conducted by Singapore-based museum staff during the colonial period, systematic archaeological excavations on the island of Singapore were first conducted only in 1984 (Miksic 1985; Choo 1986). While foreigners and expatriates dominated the early days of archaeology in Singapore, local Singaporean archaeologists have led the investigations since 2006. These archaeologists were typically nested within academic institutions such as the National University of Singapore. The excavations were largely dependent upon the individual will and negotiation abilities of the archaeologist and his supporters, and were typically conducted on an ad hoc basis (Lim forthcoming).

The past decade saw much advancement in the development of local archaeology. The Archaeology Unit (AU) was established within the Nalanda-Sriwijaya Centre (NSC), ISEAS – Yusof Ishak Institute (ISEAS) in 2010, and resources were committed from 2014 onwards to seriously promote and engage Singaporeans in the discipline of archaeology. Since then a proper Singaporean-led effort was institutionalised, and the AU team is at the fore of conducting pre-development impact assessments, and when necessary intervene and mitigate with rescue work. Apart from fieldwork, ISEAS has dedicated resources to the post-excavation processes, analysis, custody and publication of research data. This report is part of the AU Archaeological Reports series as a contribution to the promotion of study and knowledge of Singapore's and Southeast Asia's archaeological past.

### *1.2 Circumstances of the Investigations*

The \$158,000,000 redevelopment of the Victoria Concert Hall and the Victoria Theatre national monuments presented an urgent need for archaeologists to investigate the grounds prior to construction development (Shetty 2014). The development works involved the demolition of the Victoria Theatre, a construction of a three-level deep subterranean basement complex for mechanical and engineering services, and major changes to the surrounding landscape and environment. Without any archaeological intervention and mitigation, it would have resulted in the destruction of all archaeological remains within the impact area.

The Singapore Symphony Orchestra (SSO), as the occupant of the Victoria Concert Hall, generously permitted the archaeology team to conduct a trial evaluation within their compound. In July 2010, a two-week excavation was undertaken on the Concert Hall grounds. The successful identification and recovery of artifacts from the colonial and pre-modern periods established the existence of an undisturbed



archaeological reservoir and cultural deposits. The findings from the 2010 evaluation were used to negotiate and convince the state agencies responsible for heritage and the development of the site that a rescue excavation prior to development was required. Discussions for financial support were unsuccessful until the Singapore Heritage Society (SHS) interjected. Under the SHS's auspices, the project obtained partial funding from National Heritage Board's (NHB) Heritage Industry Incentive Programme (Hi2P) Fund which amounted to approximately 50 % of the operational costs of the excavations. The author privately raised the remaining funds.

A rescue excavation was subsequently conducted at the site in 2011. However, the excavation was restricted to a schedule imposed by the development's consultants and contractors. This window was limited to three weeks, which severely constrained the areas for excavation.

### *1.3 Nomenclature and Nature of Report*

As the principal areas of investigation were situated within the immediate compound and proximity of the Victoria Concert Hall (VCH), the VCH prefix was adopted as the site code. The site saw periodic changes to its place name. In the mid 19<sup>th</sup> century it was known as the Town Hall, and later evolved as the Victoria Memorial Hall, Victoria Theatre, and Victoria Concert Hall. The general name of Victoria Concert Hall will be used throughout this publication.

This report serves as an official record and summary of the archaeological investigations conducted on the site between 2010 and 2011. The on-site fieldwork comprised of an evaluation excavation in June 2010, a larger-scale rescue excavation in September 2011, and a limited watching brief during the construction of the underground complex and foundation of the concert hall and theatre. A watching brief is essentially a monitoring exercise where an archaeologist is on-site during the construction phases in order to observe the earthworks and if necessary, recover and document any material cultural remains.

This report stems from an initial unpublished report submitted to the National Arts Council and the National Heritage Board detailing the evaluation and rescue phases (Lim 2013). Post-excavation processing and comprehensive analysis of the finds from the excavations are still underway and are not included in this site report.

## 2: ARCHAEOLOGICAL BACKGROUND

The Victoria Concert Hall and Victoria Theatre site sits upon a historically and archaeologically rich area dating to the 14<sup>th</sup> century (c.1300s) where a trading port settlement existed and was referred to as Temasek or Singapura (Kwa et al. 2009; Lim 2012a). We know very little of this pre-modern settlement from an extremely limited corpus of historic references. However, archaeological research since the 1980s has helped build a greater understanding of the general nature of the settlement (Miksic 2013). The immediate neighborhood of the concert hall and theatre are archaeologically significant and had been cursorily investigated in the past. Excavations in the late 1990s and early 2000s at Colombo Court, The Arts House (Old Parliament House), Parliament House Complex, Padang and St. Andrew's Cathedral (Miksic and Lim 2004) revealed a consistent cultural and occupational layer from the pre-modern or Temasek period. In 2009 and 2010, the author excavated at the National Gallery Singapore, uncovering large tracts of archaeological materials (Lim 2017). More recently, the 2015 Empress Place Rescue Excavations on the lawn in front of the Victoria Theatre yielded three tons of artifacts from the pre-modern settlement – the largest excavation and recovery of artifacts in Singapore to date (Lim 2016a).

Although the excavations have unveiled useful information, the archaeology conducted thus far has focused on the study of a limited sample set from a non-renewable and rapidly vanishing heritage resource – in fact, Singapore's primary pre-colonial heritage asset. Archaeological deposits uncovered also include an abundance of post-14th century remains that can provide a very different yet complementary narrative of Singapore's deeper history and long-term livelihood as a port settlement. Through continued archaeological research and intervention prior to development, scholars will be able to contribute more information about the past and understand the nature of various activities and the developmental sequence of early Singapore within both regional and extra-regional relationships.

Of note, archaeological evaluations at the Victoria Concert Hall undertaken in June 2010 reveal significant pockets of artifacts from the pre-colonial Temasek period (c.1300s-1600s). This is critically important as those centuries represent a significant knowledge gap in Singapore's history and will provide key information for researchers. The findings from the evaluation warranted an archaeological intervention to mitigate and rescue as much of the below ground data and artifacts as possible. This resulted with the large-scale rescue excavation in September 2011.

### 3: THE SITE

The significance of the Victoria Concert Hall site lay primarily in its location that afforded easy access from the Singapore River, as well as being situated within the heart of the downtown colonial administrative and commercial area. Singapore town central was understood here as an area that encompasses the radius of about a kilometre from the Padang (Figure 1). This accessibility allowed the hall to be patronised by all levels of colonial society and later, by the citizens of the island.

Early records from the first half of the 19<sup>th</sup> century detailing the architectural footprint of the Victoria Concert Hall and Victoria Theatre site are not extant. Cartographic regression analysis for the site is limited due to the scarcity of large-scale maps that featured sufficient details outlining the two buildings. The earliest cartographic evidence illustrating the general locality of the Victoria Concert Hall site is an untitled manuscript map dating to c.1820 from the Bute Archives at Mount Stuart in Scotland (Lim 2012b).

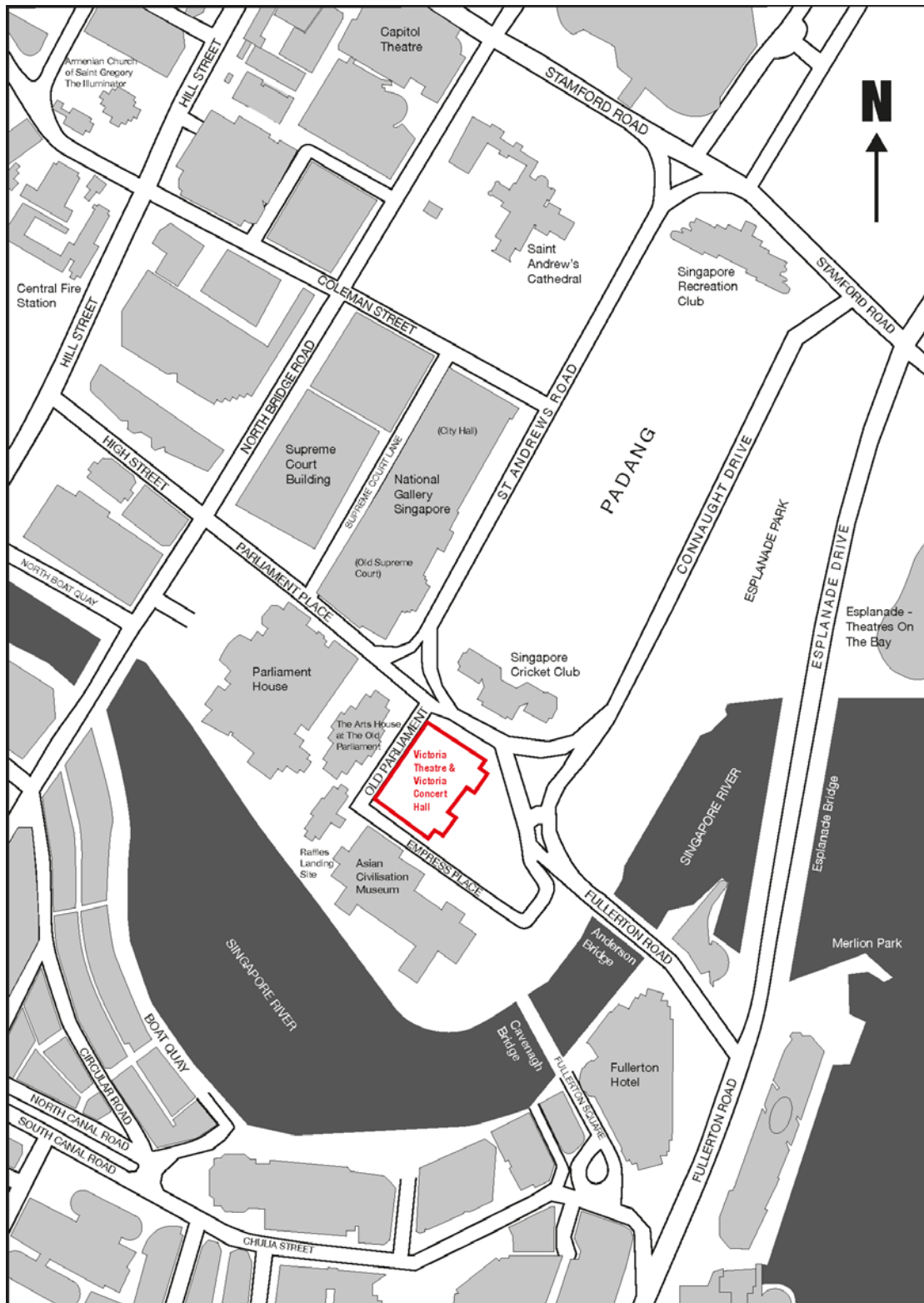
Upon this hand painted map featured the first known representation of the palace complex of Temmenggong Abdul Rahman, the native chief whom Raffles negotiated and signed a treaty of friendship in February 1819, establishing the East India Company station at Singapore. Part of this palace complex would have been within the proximity of the future Town Hall and Victoria Memorial Hall. The map also depicted extensive residences of the early East India Company town along the northern banks of the Singapore River. These houses and structures were likely constructed of timber and thatch, and unless in exceptional preservation conditions such as being buried in a waterlogged environment, these structures are unlikely to survived the archaeological record in the equatorial tropics.

By 1836, a Court House was erected in the vicinity, and there is some evidence to suggests that the Court House also served as a general assembly room for the local population to meet and host events. Within the next decade, the court system in Singapore grew and additional annexes and buildings such as a new Five Courts and new Police Station were constructed around the Court House. The earliest known cartographic representation of the Town Hall is a map dated to 1857, two years after the foundation stone was laid and construction work commenced (Figure 2).

***Table 1: Brief historical chronology of the site***

1855	Foundation stone of Town Hall laid
1862	Construction of Town Hall completed (Figure 3)
1903	Erection of the Victoria Memorial Hall
1906	Addition of the central clock tower
1906	Redevelopment of the Town Hall
1909	Town Hall reopens as Victoria Theatre
1952-58	Redevelopment of Victoria Theatre
1979-80	Refurbishment of Victoria Memorial Hall, renamed Victoria Concert Hall
2010	Redevelopment of the Victoria Concert Hall and Victoria Theatre

Figure 1: Location map of the Victoria Concert Hall site



**Figure 2: Earliest known cartographic representation of the Town Hall 'General Plan of the Town and Environs of Singapore' 1857**



**Figure 3: The Town Hall seen from Singapore River c.1860s**



By 1878 the area established itself as the government quarter of Singapore, and all relevant municipal and government offices were located within the half square mile on the north bank of the river. Apart from the officious architectural façade, several monuments also dotted the landscape (Figure 4). The Dalhousie Obelisk erected in honor of Lord Dalhousie the Governor-General of India who visited the settlement in 1850 was relocated to the area from the Esplanade. Sometime between 1910 and 1915 the Dalhousie Obelisk was relocated for the third and final time to its present location west of Anderson Bridge. A bronze elephant statue was gifted by Siamese King Chulalongkorn as a commemoration of his visit to Singapore in 1871, and was erected in front of the Town Hall in 1872 (Figure 5). This statue was moved in 1919 to make way for the relocation from the Padang of the 1887 statue of Raffles.

*Figure 4: 'Plan of Singapore Town' 1893*



*Figure 5: Elephant statue presented to the people of Singapore in 1871 (courtesy of National Archives of Singapore)*



*Figure 6: Victoria Memorial Hall in the 1960s*



With the completion of the Victoria Memorial Hall in 1903, the addition of the central clock tower in 1905, and the subsequent redevelopment the Town Hall in 1906, the Victoria Theatre and Memorial Hall retained its current architectural footprint for the next century. Redevelopments in the 1950s, 1979 and again for the recent 2010 makeover essentially retained the 1909 building envelope.

Only minor cosmetic changes occurred thereafter, such as the likes of the aforementioned relocation of the various statues and monuments, changes to the carriage and motorway, landscaping and the instatement of a lawn over the post-1950s asphalt car park. The open-air public car park remained in operation into the 1970s (Figure 6). Landscaping works in the 1980s eradicated the final traces of the car park and roadways, and a fountain and plaza was created at the foot of the Raffles statue.

The 2010 development plans for the Victoria Concert Hall and Victoria Theatre site indicated that the Old Parliament Lane to the rear of the buildings would be drastically impacted by construction. The plans envisioned a new large subterranean mechanical and engineering services complex to be constructed beneath the Old Parliament Lane roadway. Needless to say, the construction of this underground facility would eradicate all archaeological remains.



#### 4: THE ARCHAEOLOGICAL OBJECTIVES AND METHODS

Archaeology is the only discipline capable of providing a thorough understanding of the past where records and documents are scarce or do not exist. This is particularly true vis-à-vis the origins of Singapore's port and urban trading complex in the pre-modern and early colonial periods. Archaeology is the study of the past through material remains. Through the recovery and analysis of artifacts, ecofacts, features or structures, the study of a site's usage in the past and also relationships between socio-political-religious lifeways can be discerned. Archaeology involves controlled excavation and the systematic recovery of data. Furthermore, it does not limit itself to the study of artifacts. Information from sediments and soils, stratigraphy, geochemical characteristics and micro-content, alterations, site formation processes and even climate, environment and ecology – ranging from highly localised areas to larger ecosystems such as the historical environment of the Singapore Straits – can provide clues for the archaeologist to interpret past activities.

##### *4.1: Project Objectives*

The project's principal objective was to systematically recover and document the maximum quantity of movable artifacts in their archaeological context prior to their loss to construction development. This necessarily included recording of as much detailed contextual information as possible. The contextual data is paramount in understanding the past. An artifact devoid of provenience loses the required information to properly elucidate an adequate understanding of the site history.

As part of the research objective, the project also sought to determine the nature and extent of archaeological remains in order to better predict the needs for future undertakings in the vicinity. This included all of the estimated extent of the pre-modern Temasek settlement, and post-Temasek to colonial era remains and landscape modifications. The latter likely extends well beyond the estimated 14<sup>th</sup> to 17<sup>th</sup> century chronological boundaries.

The primary foci of the project were to:

- (i) Identify any existing remains from the pre-modern settlement of Temasek/Singapura.
- (ii) Identify any existing remains from the early East India Company factory (1819-1824) and the colonial period (1824-1959).
- (iii) Systematically recover and document all movable artifacts.

#### 4.2: Areas of Investigations

Ideally, archaeological investigations should be as extensive as possible to cover all the areas affected by construction development. However limitations in available resources and the prescribed window for the investigations resulted in the excavation of only two principal areas (Figure 7).

(i) Concert Hall Garden Plot

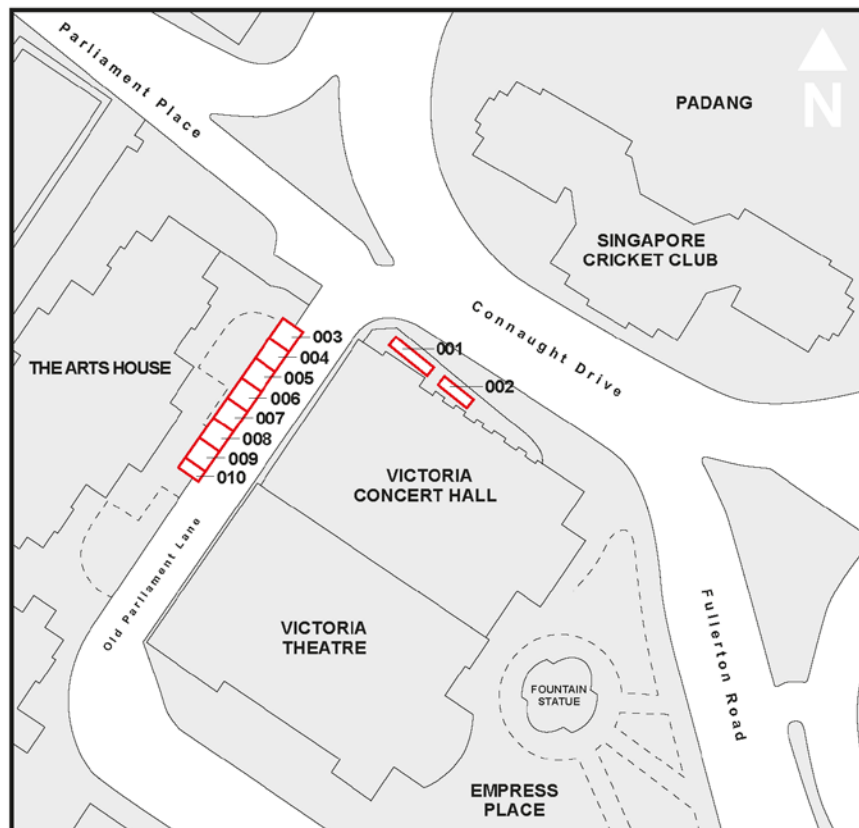
Evaluation units were excavated within the small garden plot along the north wall of the Concert Hall during June 2010.

(ii) Old Parliament Lane

Rescue excavations were directed at the roadway between the rear of the Victoria Concert Hall and The Arts House building in September 2011. This area was prioritised as it was most impacted by the construction of a basement complex.

The restriction of time permitted for the archaeology team to work on site prevented excavations in other areas despite the evidence of existing archaeological remains. These areas include the plot along Emplace Place road and the Theatre's south boundary.

**Figure 7: Site plan showing areas of investigations**



### 4.3: Methods

Archaeological excavation is a manual and labour-intensive undertaking that necessitates appropriately trained, experienced and professional personnel. That is, it requires skilled labour, although volunteerism and unskilled labour can significantly assist when managed appropriately. Therefore, overall design and implementation requires professional management, execution, oversight, and hands-on effort throughout the whole process.

Rescue archaeology generally implies that a site will be seriously compromised if not entirely destroyed. Hence, archaeologists need to collect as much relevant remains and data as possible. Sampling strategies are generally opportunistic and related to time, budget, personnel and logistical constraints including storage and post-excavation treatment. Research questions are general and not necessarily the driving force of project design as in the case of academic research.

The archaeological project at Victoria Concert Hall implemented the following methodology to best salvage and recover archaeological data under the given time, budget and personnel constraints:

(i) Evaluation Excavation

Test pit excavation to assess any significant archaeological deposits and determine any necessity for large-scale intervention or mitigation.

(ii) Rescue Excavation

Large-scale excavation to maximise recovery of archaeological materials and data. Essentially to actively mitigate and rescue the archaeological record prior to imminent destruction by construction development.

(iii) Watching Brief

Monitoring of the site during the construction process for any additional archaeological deposits and remains.

### 4.4: Site Datum

For the 2010 evaluation excavation, individual unit datums were located at the northwest corner of trenches set arbitrarily at 10 cm above the surface. The 2011 salvage excavations were based on detailed land survey plan provided by the project building contractors. This measured plan is referenced to the Singapore Land Authority's cadastral plan. The site datum was established at the northeast corner of the excavation zone (VCH 003). An individual unit datum was located at the southeast corner of each pit and was arbitrarily set at 10 cm above surface level. Unit depth measurements were in metric centimetres below datum (cmbd).

## 5: GEOLOGY, SITE STRATIGRAPHY, AND ARCHAEOLOGICAL SEQUENCE

### 5.1: Geology

The general geology of the north bank of the Singapore River consists of alluvial member typical of a riverine association found as valley fills throughout Singapore. The alluvium is a variable terrestrial sediment ranging from pebble beds through sand, muddy sand, and clay to peat. The member is usually unconsolidated, but lightly consolidated beds may be found (Lee et al. 2009). The riverine alluvium was not exposed during the investigations and lies beyond the extent of the excavation at depths greater than 200 cmbd (centimetres below datum). The site's proximity to the shoreline and the Singapore River however produced sandy strata as characteristic overlays for alluvium.

### 5.2: Site Stratigraphy

Generally, stratigraphy of the site was uniform and typical of the northern bank of the Singapore River. Modern surface comprised of roadway, pavement or grass lawn. This was followed by compact clayey-sand overlaid upon sand. The pre-modern Temasek cultural layer on the northern banks was characteristically situated within fine sand. Colloquially referred to as "black sand" due to its darker carbon rich brown to grey and frequently dark brown, dark grey to almost black colour, the layer was relatively consistent in many excavation sites in the vicinity. This dark sand deposits typified a high concentration of exotic imported ceramic sherds primarily of Chinese origins, earthenware pottery sherds, and low densities of other artifacts such as glass, coins and metals.

The evaluation units within the Victoria Concert Hall garden plot (Figures 10 and 12) was consistent with deposits in the Padang and Empress Place lawn (Lim 2016a; 2017).

**Table 2: Stratigraphy for Evaluation Units (Victoria Concert Hall garden)**

Layer	Description	Basic Soil Characteristics	Depth
I	Modern Layer	Topsoil, sod and clayey-sand	0-40 cmbd
II	Transitional Layer	Sandy-Clay + mixture of colonial and Temasek periods artifacts	40-70 cmbd
III	Temasek Cultural Layer	Dark Sand + artifacts/ecofacts	70-140 cmbd
IV	Sterile Layer	White Sand (culturally sterile)	140 cmbd onwards

The stratigraphy of the rescue excavation zone was more complex, with frequent disturbances from modern 20<sup>th</sup> century utilities and construction. The stratified deposits were not uniform and constantly varied (Figures 15 to 17). A simplified general outline for the rescue excavation zone as follows:

**Table 3: Simplified Basic Site Stratigraphy for Rescue Excavation Zone (Old Parliament Lane)**

Layer	Description	Basic soil characteristics	Depth
I	Roadway and Construction Fill	Modern Fill and clayey-sand	0-60 cmbd
II	Transitional Layer	Sandy-Clay + artifacts/ecofacts 7.5YR 5/8 (strong brown)	60-80 cmbd
III	Temasek Cultural Layer	Dark Sand + artifacts/ecofacts 7.5YR 3/1 (very dark grey)	75-180 cmbd
IV	Sterile Layer	White Sand (culturally sterile) 7.5YR 7/2 (pinkish grey)	175 cmbd onwards

### *5.3: Archaeological Sequence*

Consistent with the civic and colonial district area, three principal periods of occupation were recorded for the Victoria Concert Hall site. The site revealed evidence from the last two centuries, and occupation during the pre-modern period. There is no evidence for any occupation or cultural deposits predating the Temasek period at this site.

#### *(i) Post-Colonial and Contemporary Period (1959-Present)*

Utilities and services made up the principal features from the recent and contemporary layers. Gas and water lines were encountered, as well as concrete housings for utility ducts. A more significant find would be the remains of the brick wall enclosing the Assembly Hall/Parliament House in the 1950s. Wrought iron fencing was mounted on this parameter wall. The fencing was removed and the wall presumed demolished in 2003 when the former Parliament House was converted and repurposed as The Arts House. Only the brickwork and foundations were uncovered, no traces of the iron fencing were found.

#### *(ii) Colonial Period (1819-1959)*

Typical artifact assemblage from the colonial period includes ceramic sherds, glass shards, coins and household fixtures. A 19<sup>th</sup> century brick pavement was uncovered, along with brick and mortar foundations in the Victoria Concert Hall garden. This was possibly associated with the Town Hall in the 1850s.

#### *(iii) Temasek Period (c.1300-1600s)*

Reservoirs of archaeological remains from the pre-modern Temasek period could be found throughout the site. About 69 % of the entire artifact yield from the excavations are confidently dated to this period.

## 6: EVALUATION TEST EXCAVATION

The first investigation season was conducted between 11 and 25 June 2010 (14 working days). The evaluation consisted of two test units (VCH 001 and VCH 002) excavated at the side garden plot adjacent to the concert hall, along Connaught Drive and located opposite the Singapore Cricket Club building. This was a small gated garden compound where the building's air-conditioning compressors were located (Figures 7 and 8). The garden plot was triangular in size and measured 42.6 m at its longest edge, with the sidewalk facing measuring 38 m. The 2010 season's evaluation units were 800 cm x 150 cm (VCH 001) and 600 cm x 150 cm (VCH 002). The two evaluation trenches were excavated and covered an area 14.0 m x 1.5 m (approximately 21 m<sup>2</sup>). This translates to only 0.008 % of the proposed archaeological salvage within the construction impact zone.

Notwithstanding the small sample area of the evaluation and the yet to complete analysis of the finds, unique artifacts were recovered from the excavation. Several new types of artifacts were unearthed for the very first time in Singapore, including rarely preserved material such as timber, possibly dating to the medieval c. 14<sup>th</sup> century context. This suggests that similar well-preserved organic materials may potentially be recovered in the surrounding locality. The excavation also revealed brick features probably as part of the former Town Hall's footprint (c. 1850s), providing a glimpse into the colonial past where there is little record in historical texts.

The overall yield of artifacts from the evaluation was 110 kg of artifacts; this attests to the density of archaeological materials. Similar salvage archaeological excavation works at the former Parliament House/The Arts House in 2002, and in 1998 at the Asian Civilisation Museum riverbank indicate that the entire Empress Place and Singapore River mouth area is enormously rich with archaeological remains from the colonial and pre-modern Temasek periods.

*Figure 8: Area of evaluation excavation – garden plot along the northern perimeter of the Victoria Concert Hall*



#### *6.1: VCH 001*

The first evaluation unit was located in the small garden plot that served as a smoking area for the musicians of the Singapore Symphony Orchestra during their tobacco break. Measuring 8.0 m x 1.5 m unit, the test unit was excavated to 140 cmbd (centimetres below datum), while the northernmost corner of the unit was excavated to the water table at 180 cmbd. Modern intrusions included a lighting conductor rod uncovered at eastern end of the trench, a stainless steel water pipe, and a cast iron piping running parallel to the unit along the south profile (Figure 9).

The stratigraphy for the unit at its upper layers consisted of topsoil and sod with modern remains formed by 20<sup>th</sup> century construction fill and debris. At approximately 70-90 cmbd, transitional brown sandy-clay was encountered. The Temasek cultural layer was located between the depth of 80-120 cmbd, and sterile sand was reached after 120 cmbd (Figure 10).

The construction fill and modern topsoil sediments were soft and sandy with minimal clay deposits enabled easy excavation. The stainless steel piping was narrow being only 2.5 cm wide while the cast iron pipe had a diameter of 60 cm. Another large cast iron water mains approximately 13 cm in diameter ran diagonally across the unit.

The transitional layer between 70-90 cmbd, a brown sandy sediment that was comparatively easy to excavate, separated the modern fill from the undisturbed Temasek cultural layer. Increasing density of artifacts from the Temasek period occurred



with depth and the layer diffusely transitioned to a grey sand. Artifact density was heaviest at the northwest corner of the unit. A modern 100-150 cm wide trench cut on the south profile consisted of granite gravel and mortar. Its function remains undetermined, but it may possibly be remnants of an earlier architectural structure prior to the construction of the Memorial Hall.

The Temasek cultural layer was encountered at the depth between 80-120 cmbd, and was not a consistently uniform deposit. In some parts, the Temasek layer was not particularly dense; occurring almost as a stratigraphic lens only 10-30 cm thick. White sterile sand lay beneath the Temasek layer with no artifacts, likely representing the natural sedimentary deposits in the pre-14<sup>th</sup> century period. Light grey to white sterile sand was common in the lowermost deposits of proximate excavation areas closer to the Singapore River and pre-1819 southern shorelines of Singapore island. Examples where same characteristic sand was revealed include the excavations at Empress Place, National Gallery Singapore, St. Andrews Cathedral, the Padang, and further east of the colonial downtown at Kampong Gelam.

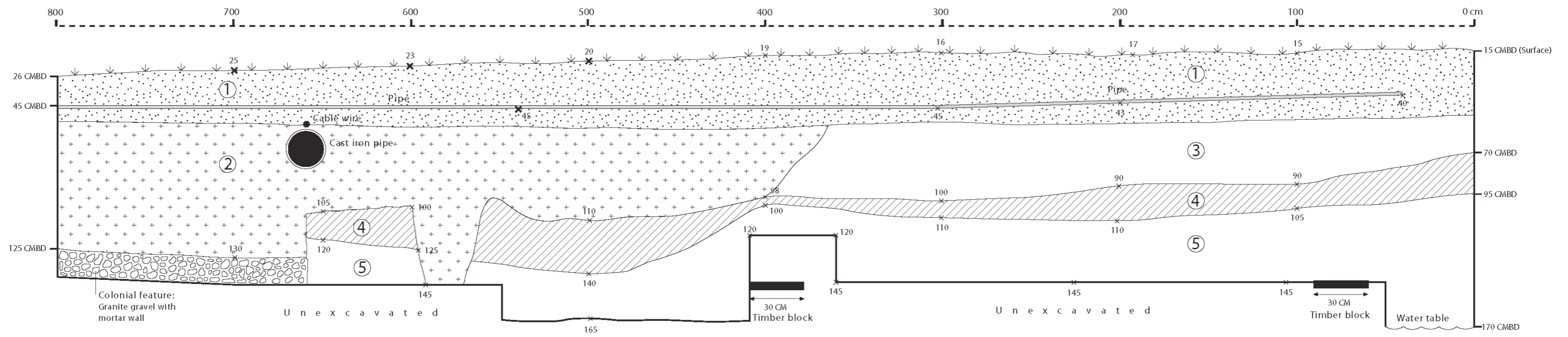
Artifacts recovered from VCH 001 included large numbers of Chinese stoneware sherds which dominate the ceramic assemblage by count and mass, Chinese copper cash, and two timber blocks. The wood (each approximately 30 cm x 15 cm x 5 cm) were found approximately 40-45 cm beneath the Temasek cultural layer within the sterile layer. The timber blocks appeared to have been cut and shaped, suggesting intentional manufacture and use, although their exact purpose remains unknown.

Figure 9: VCH 001



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Figure 10: VCH 001 south profile



### VCH 001 South Profile

Lim Chen Sian  
 Wee Shu Theng  
 22 June 2010  
 1 : 20 cm scale

1. Modern top soil
2. Construction fill
3. Transitional layer
4. Temasek cultural layer
5. Sterile sand

## 6.2: VCH 002

This unit measured 6.0 m x 1.5 m and was situated along the same transect to the southeast of VCH 001 (Figure 11). The stainless steel water pipe extended from VCH 001 into the unit. This steel piping runs diagonally on an east to west axis and was still in use. Therefore, the southern portion of the unit was left unexcavated to prevent damage to the water mains. An older disused sewage or water terracotta pipe embedded in cement was located beneath the steel pipe at 100 cmbd. Despite these intrusions, the Temasek cultural layer was intact with a high-density concentration at the eastern end of the unit.

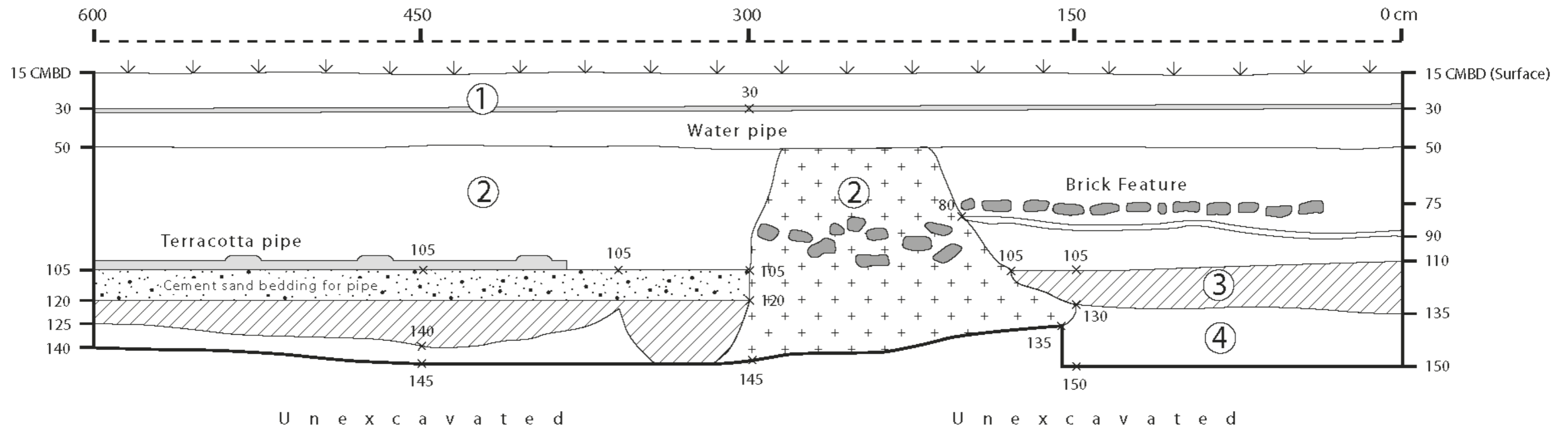
Stratigraphy consisted of similar sandy sediments found in VCH 001 (Figure 12). The topsoil and modern layer extended to approximately 35 cmbd, followed by construction fill and a transitional layer between 35-105 cmbd. The construction fill was particularly dense in the central portion of the unit, where a 1 m wide trench cut was made and deposited with 20<sup>th</sup> century construction debris. The Temasek cultural layer undulated between 105-145 cmbd, and was dense within a 20 cm band. A high-density of Temasek period artifacts were found in the eastern segment of the unit, beneath the terracotta drainage.

Within this unit a single course of bricks was revealed. It was laid without mortar or cement over a bed of sandy-clay. The hand-moulded bricks were likely locally produced and might possibly be remnants of a floor or pavement. It was perhaps associated with the mid-19<sup>th</sup> century Town Hall. Finds from this unit, apart from the bricks and utilities, featured large quantities of modern ceramic bathroom fixtures, Chinese copper cash and ceramic vessel sherds. An earthenware crucible (Figure 41) and a coarse pottery spindle baluster (Figure 42) possibly for the twirling of metal wires (gold or copper) were found within the Temasek context. A single Spanish silver real minted in 1764 was also recovered from the later period (Figure 49). This unit contained a large concentration of 20<sup>th</sup> century construction debris and fill made up of brick and tile fragments and broken porcelain sanitary fixtures.

*Figure 11: VCH 002 revealing colonial period brickwork*



Figure 12: VCH 002 south profile



# VCH 002 South Profile

Lim Chen Sian  
 Wee Shu Theng  
 25 June 2010  
 1 : 30 cm scale

- 1. Modern top soil
- 2. Construction fill
- 3. Temasek cultural layer
- 4. Sterile sand

## 7: RESCUE EXCAVATION

Eight excavation units of rescue nature were undertaken at the rear (west) of the Victoria Concert Hall complex along Old Parliament Lane roadway and the lawn of The Arts House and former Parliament House (Figures 7 and 13). This second and final season was completed from 8 to 28 September 2011 (21 working days). The selection and location of the rescue excavation units were determined through sub-surface survey by a licensed cable detection worker to avoid buried utilities. Restricted by the limited three-week window for excavation, the rescue excavation zone was hence selected to be no larger than 29 m x 4 m (116 m<sup>2</sup>). This was subdivided into seven units measuring 4 m x 4 m each (VCH 003 to 009) and one unit measuring 4 m x 1 m (VCH 010).

The excavation methodology for the 2011 season differed from the 2010 evaluation approach. Being rescue or salvage in nature, the uppermost layers were excavated by machinery to expedite access to the prioritised undisturbed deposits. A mechanised backhoe was brought in to break up the ground and removed the roadway and other construction fill. The machine removal was restricted to the overburden and modern fill, strictly to the upper 60 cm of sediments. No cultural or archaeological deposits were detected within the top 60 cm layer. The roadway debris was stockpiled on-site for backfilling at the completion of the archaeological excavation. This also permitted the archaeology team to inspect the spoil heap for any relevant cultural remains.

The mechanised excavator was carefully supervised and guided by the project archaeologist at all times. This ensured monitoring in case of unusual finds or accidental compromises. A trial area was opened to determine the extent of excavation by the backhoe. The Temasek cultural layer was reached at approximately 70-80 cmbs (centimetres below surface). No 19<sup>th</sup> century or early 20<sup>th</sup> century colonial period cultural layers were identified during the machine-aided excavation. Any post-Temasek historical strata within the topmost layers were likely destroyed during repeated construction and development of the area over the last two centuries.

Following the removal of the roadway fill, the excavation, recording and retrieval of artifacts and soil samples was undertaken manually by hand with handheld tools. Hired field labourers supplemented the archaeology team for the duration of the dig. The excavation was carried out in 15 cm arbitrary levels and 100 % of all sediments were sieved through a 1/4 inch (6 mm) and 1/8 inch (3 mm) mesh screens. Excavations in general, did not extend beyond the depth of 200 cmdbd. Artifacts were bagged for return to the processing and storage facilities, and stratigraphic soil samples were also collected. Data collection on-site included detailed notes, stratigraphic profiles (Figures 15 to 17), plan drawing, photographic archiving, and feature drawings. At the completion of the excavation, the units were backfilled and leveled without the reinstatement of roadway tarmac.



*Figure 13: Rescue excavation zone between Victoria Concert Hall and The Arts House*



### *7.1: Modern Intrusions*

A brick wall with concrete footing was uncovered along the entire length of the eastern boundary of the rescue zone (VCH 003-VCH 010). This brick feature was the remains of the wrought iron fence parameter wall of the former Assembly House and Parliament House, prior to being remodeled into the current The Arts House (Figure 14). This boundary enclosure was demolished in 2003. The typology of the bricks, along with 'Jurong' manufacturer's mark stamped in the frog, indicated the enclosure wall was constructed in the 1950s. A modern concrete housing for utilities running between the Victoria Concert Hall and The Arts House compounds was exposed at the southern end of VCH 008. Other intrusions were a concrete test pile in VCH 005, and the expected pipes and construction trench cuts and fills for laying of services in a highly urbanised environment.

*Figure 14: Brick boundary wall from the 1950s Assembly House*



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Figure 15: East Stratigraphic profile of rescue excavation zone (VCH 003 to VCH 009)

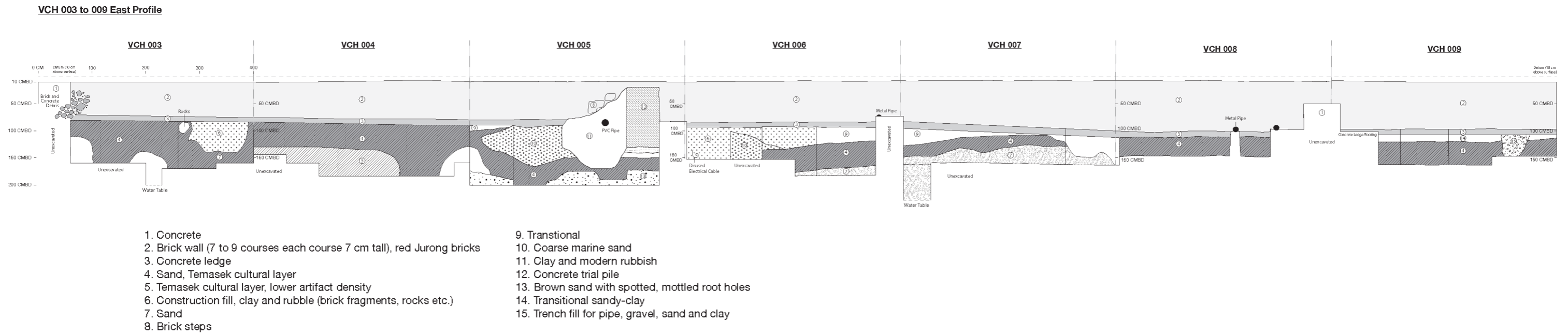


Figure 16: West Stratigraphic profile of rescue excavation zone (VCH 003 to VCH 010)

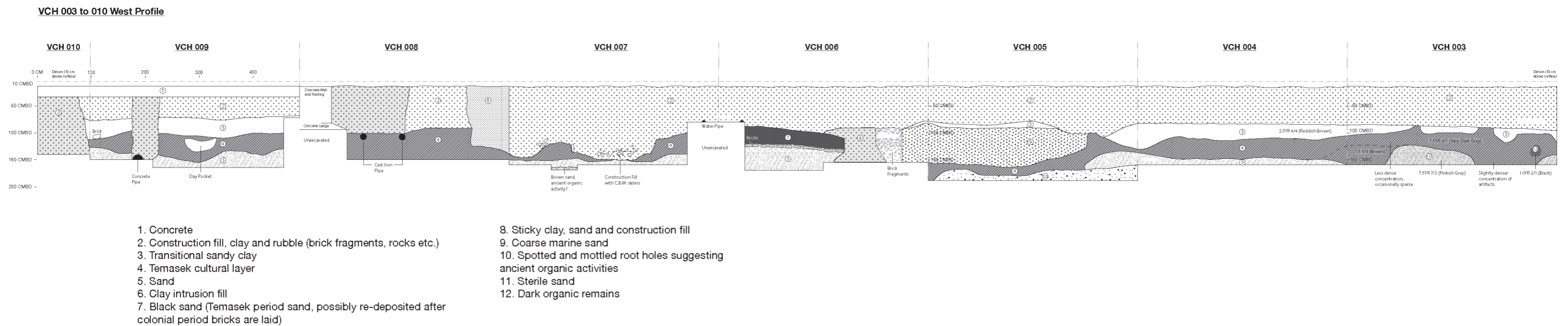
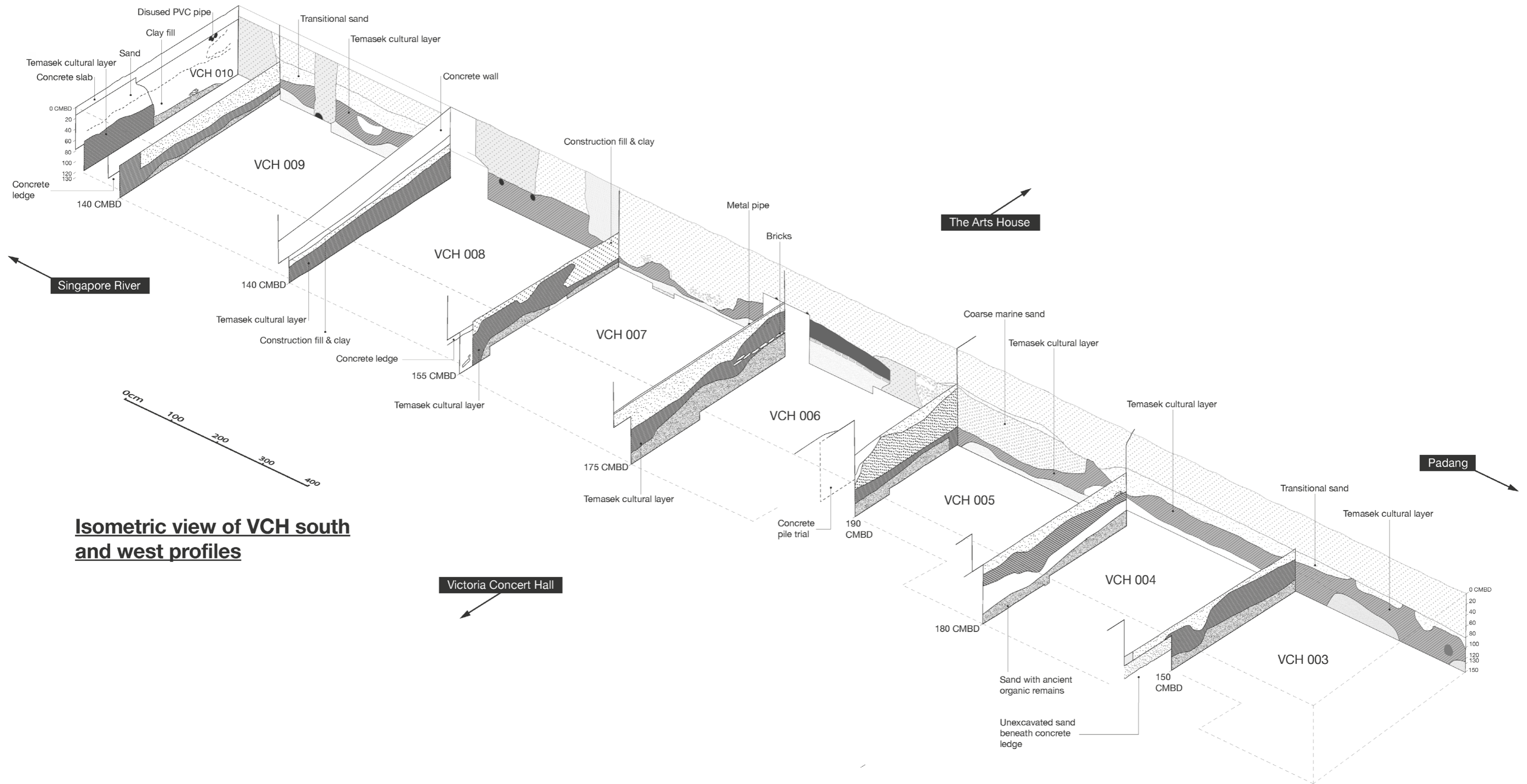


Figure 17: Isometric view of south and west stratigraphic profiles of units within rescue excavation (VCH 003 to VCH 010)



Isometric view of VCH south and west profiles

## 7.2: VCH 003

As the initial trial unit for the mechanised excavation, the roadway fill and uppermost layers were carefully removed by a backhoe in stages. The machine excavation stopped at approximately 80 cmbs (centimetres below surface) where the tip of the Temasek cultural layer was revealed. Once this cultural layer was uncovered, the rest of the unit and site was machined away to 60 cmbs depth. Construction fill and other debris constituted the clayey-sand transitional layer between 60-80 cmbd. The Temasek cultural layer lay between 80-135 cmbd where it diffused to the sterile lowermost layer. The unit was excavated to 150 cmbd and a small section (30 cm x 30 cm) was excavated to the water table at 188 cmbd (Figure 18).

The Temasek cultural layer was within the typical dark grey to black fine sand, which was easy to excavate. The extent of the Temasek remains concentrated within the central and eastern areas of the unit with less dense pockets along the western profile and the southwestern end of the trench. Overall the Temasek period deposits were extremely dense. The unit yielded the largest concentration of artifacts for the entire excavation, approximately 106.5 kg of finds. Ceramics, particularly Chinese stoneware sherds comprised the bulk of recovered materials. Other finds from this unit included glass beads, Chinese copper cash, metal nails, and etched glass. Human teeth were also recovered from this unit at the depth of 150 cmbd. In addition, a comparatively dense concentration of rocks and corals were found within the Temasek cultural layer.

Aside from Temasek materials, the most prominent feature from the later period was the aforementioned brick boundary wall from the 1950s. This wall feature was first encountered forming the eastern profile of the excavation trench, and extended throughout the rest of the rescue excavation zone. This brick wall was made up of seven courses of red bricks (each 7 cm tall) and sat upon a 10 cm thick Portland cement concrete foundation between 75-85 cmbd. The total height of the boundary wall remains was 85 cm high.

**Figure 18: VCH 003 - The boundary wall can be visible running along the eastern profile of the excavation (left)**



### 7.3: VCH 004

VCH 004 continued south of VCH 003. The modern brick boundary wall foundation (described above) extended through this unit along its eastern profile. Apart from this feature, few other later period intrusions were encountered, and the unit was essentially undisturbed with intact Temasek period deposits. Excavation began at 70 cmbd, after the machine excavation of the roadway and the construction fill layers, exposing the transitional sandy layer. The end of the transitional layer varied considerably within this unit and undulated from 90-105 cmbd. The usual assemblage of construction fill debris and a low-density of Temasek period artifacts were recovered from this layer.

The Temasek cultural layer ranged from 90-150 cmbd, with one section along the eastern profile reaching 175 cmbd. A small pocket of clay from the colonial period intruded into the Temasek layer along the western profile. The unit was excavated to 150 cmbd where sterile sand was met, and at the eastern profile beneath the brick boundary wall to a depth of 175 cmbd. Large quantities of artifacts were recovered from this unit, yielding 77.6 kg of Temasek period materials. The densest sub-layer was between 90-105 cmbd, where 58 kg of artifacts were recovered. Significant finds were sizable ceramic sherds, Chinese coins, charcoal, metal nails, copper fragments, and a thin metal wire with rings attached. Human teeth were also recovered in this unit at various depths from 105-120 cmbd and again at 135-150 cmbd.

#### 7.4: VCH 005

The unit, adjoining VCH 004, was machine excavated to 70 cmbd to remove overburden where the transitional layer was revealed. A single concrete test pile measuring 60 cm in diameter was uncovered along the eastern boundary of the unit. This was a very recent intrusion as part of the engineering works for the redevelopment of the Victoria Concert Hall and Victoria Theatre complex. It was situated beside the 1950s brick boundary wall and concrete footing. Accompanying fill of clay and modern rubbish surrounded the test pile (Figure 19).

The depths of transitional and modern construction fill varied significantly, ranging from 105 cmbd in the north of the unit and 170 cmbd at the eastern end. The bulk of this unit consisted of coarse marine sand fill (corals, gastropods, quartz and sand) as a result of modern trenching and backfilling, likely in association with the concrete test pile. This construction fill extended almost across the entire unit (and into neighboring VCH 006) measuring 3 m x 4 m, and lay between 75-150 cmbd. Indubitably, this cut and fill compromised and resulted in the loss of a significant amount of the Temasek deposits within the unit.

The Temasek cultural layer began at varying depths due to the cutting and intrusion of the test pile, and correspondingly, the finds were also lower in quantity compared to the previous VCH 003 and 004 units, yielding only 44.9 kg. Temasek context began at 105 cmbd at the northern sector of the unit neighboring VCH 004, and elsewhere was only uncovered beneath the coarse marine sand fill at 170 cmbd. In some areas the artifact deposits ends at 180 cmbd, while the layer at the southeastern extreme extended to the depth of 200 cmbd. Here the excavation concluded at 210 cmbd where the water table was reached. The Temasek period finds included the typical array of imported and local ceramics, large coral blocks, a single Chinese coin, worked shells with evidence of drilling for apertures, human teeth, fish vertebrae, mammal bones, and an unidentified metal peg, possibly an alloy of copper (Figures 46 and 47).



**Figure 19: VCH 005 with concrete test pile. Coarse marine sand is visible in centre above clipboard**



#### 7.5: VCH 006

VCH 006 was situated south and next to VCH 005. This unit was the most heavily affected by intrusions and disturbances amongst all the excavation units of the project. The majority of this unit had been thoroughly disturbed with most of the archaeological and cultural context lost. Two-thirds of the trench was mixed with construction fill and general debris. These modern intrusions covered the entire centre and western portions of the unit. No transitional layer was discernable along the western profile. The coarse marine sand fill from VCH 005 extended into this unit and occupied the first half-metre of the south section. Where the marine sand deposits end was met with a trench cut filled with brick fragments and other ceramic building materials. An active water main running across on an east-west axis was located at the southern end of the unit at 80 cmbd and the strata beneath was left unexcavated.

A single course of loosely laid bricks was uncovered along the west profile (Figure 20). The purpose of this brick feature was not discernable and might have been part of a floor or platform. The exposed areas measured 2 m x 1 m wide. This course of bricks was found together with Temasek period remains. From their typology, these hand-moulded bricks were likely to be laid during the early 20<sup>th</sup> century colonial period and at some point reburied with churned up Temasek sediments. Hence the contextual data from the artifact assemblage of this pocket was likely compromised and lost.

Despite all the disturbances, a small pocket of in-situ Temasek period sand was found in the southeast corner of the unit. The Temasek layer was limited to this singular

pocket from 105-135 cmbd. The unit yielded only 12.8 kg of artifacts, and was expectedly low due to heavy disturbance. Excavation for the unit ended at 170 cmbd. The 1950s Assembly Hall boundary wall extended through this unit along its eastern profile.

*Figure 20: VCH 006 with colonial period brick feature*



7.6: VCH 007

After the mechanised removal by backhoe, the uppermost exposed layers consisted of the usual construction fill, these debris began from 80 cmbd and in some areas extended to a depth of 150 cmbd. Unlike the previous excavation units, no transition layer interbedded between the construction fill and the pre-modern stratigraphy. An active water pipe ran between Victoria Concert Hall and the The Arts House at 80 cmbd depth at the north end of the unit. The strata below the water mains were left unexcavated. Construction fill and clay was found up to 120 cmbd in the western half of this unit, and up to 150 cmbd in the central section of the trench where colonial period brick fragments and other ceramic building materials were recovered.

The pre-modern sand began at 100 cmbd in the eastern half while the Temasek cultural layer emerged at 117 cmbd along western profile. The unit was excavated to 160 cmbd where sterile sand was uncovered. There was little pre-colonial strata, the only exception was a pocket of Temasek materials continuing to 165 cmbd at the southeast corner. The water table was reached at 215 cmbd in a 50 cm x 50 cm square excavated at the northeast corner of the unit as a probe (Figure 21).

The yield from this unit was low with only 30.7 kg of Temasek period artifacts. Sterile sand was encountered at a comparatively shallow depth of 150 cmbd. Items recovered included Verenigde Oost-indische Compagnie (VOC – Dutch East India Company) coins, metal nails and slag, sizable ceramic sherds that are largely stoneware, and some porcelain remains. The nails and European coins may have been intrusive from the more recent layers. Artifacts and materials confidently identified and attributed to the Temasek period context were the usual imported and local ceramic sherds, a gaming piece from a chess set (Figures 33 and 34), Chinese copper coins and fragments, metal wire, fishing hook, bands, and a bell trinket (Figure 45). Additionally, a small amount of charcoal was recovered in the screens. The eastern boundary brick wall continued through this unit.

*Figure 21: VCH 007 with 1950s brick boundary wall along the east profile*



#### 7.7: VCH 008

VCH 008 was the immediate unit south of VCH 007 (Figure 22). The unit contained two parallel cast iron pipes for sewage (15 cm in diameter) and water (10 cm in diameter) laid between The Arts House and Victoria Concert Hall at 100 cmbd depth. These pipes were not in service at time of excavation. A concrete housing for other utilities (possibly electrical, fiber-optics, etc.) similarly run between the two buildings. This concrete housing was found at 60 cmbd and extended to 90 cmbd resting on a cement footing ledge. It measured 140 cm in width and continued into neighbouring unit VCH 009 (Figure 23). Due to the laying of the services, no transitional layer remains and three distinct clay and construction fill trench cuts were visible. The

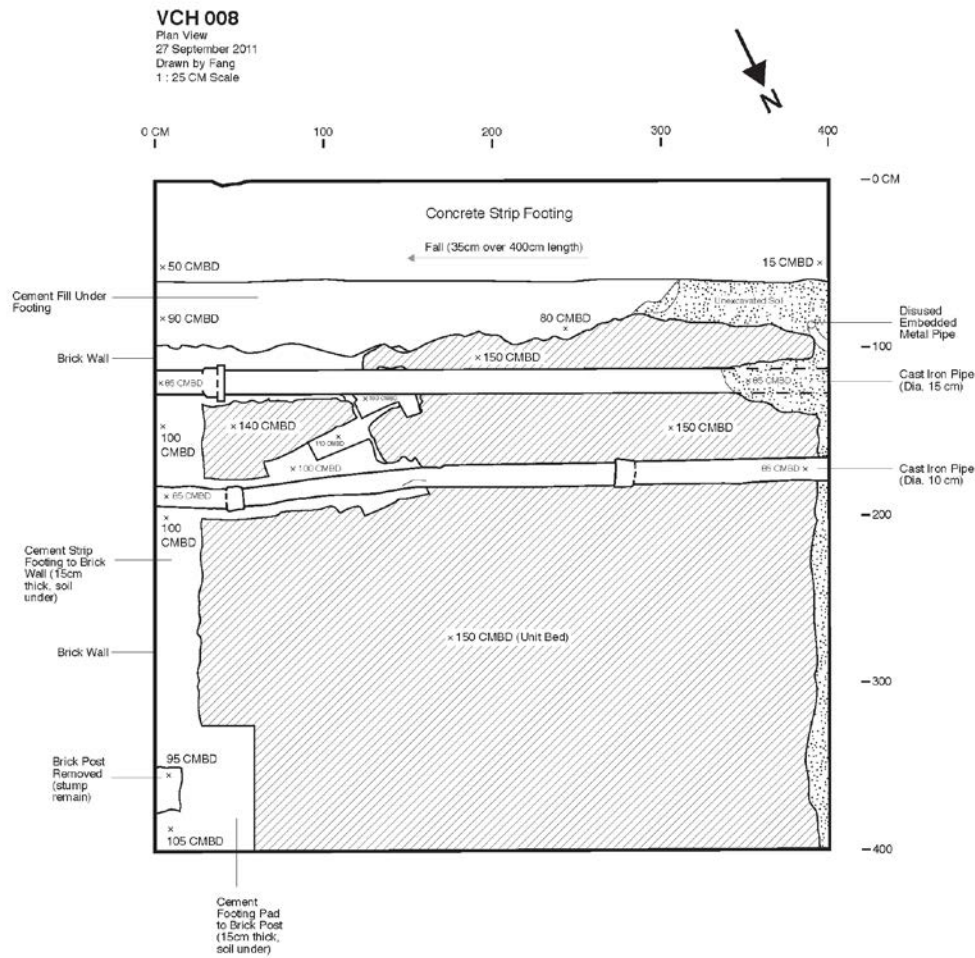
Assembly House boundary brick wall protracted along the eastern profile of the excavation.

Despite the modern utility intrusions, the Temasek cultural layer remained intact beneath the pipes. The pre-modern layer was between 95-125 cmbd, with the highest density of remains occurring between 110-125 cmbd. A dense assemblage of Temasek period artifacts of approximately 65 kg was recovered. Ceramic sherds dominated the finds as expected. Interesting finds from this layer included Chinese copper cash, a glass bangle fragment, and a bead. The exceptional discovery of a fragmented Chinese porcelain blue and white *Chunping* vase was unveiled beneath and in-between the pipelines within a pocket from the Temasek cultural layer at 120 cmbd (Figures 28 to 30). The unit was excavated to 150 cmbd where sterile sand was reached.

*Figure 22: VCH 008 looking south, revealed numerous modern utilities*



Figure 23: Plan view of VCH 008



7.8: VCH 009

Approximately 80 cm of overburden was removed with the backhoe. Construction debris continued beyond this depth. The topmost stratum consisted of a clay, sandy-clay, and clayey-sand mix. Colonial period small finds from this layer included buttons and coins. The clay layer ended at approximately 95 cmbd, however in one section it extended to 140 cmbd along the southern sector and a third of the unit where a distinct rectangular clay trench was uncovered at this depth. This feature represented a modern trench cut for the laying of a concrete sewage pipe running between The Arts House and Victoria Concert Hall. The sewage pipe was found at 140 cmbd. The concrete housing from the previous unit VCH 008 occupied the northern profile of the trench. On the eastern profile of the unit, the 1950s brick boundary wall continued through but with nine courses of bricks surviving demolition (Figure 24).

The Temasek cultural layer began at 95 cmbd and thinned out at 140 cmbd. The deposits between 95-125 cmbd were very dense and some 48.5 kg of finds from the pre-

colonial era were successfully recovered. The following sub-layer from 125-140 cmbd yielded another 16.8 kg of artifacts. Apart from the usual assemblage of ceramics, several interesting small finds were recovered. These included minimally ten complete Chinese copper coins along with multiple fragments, two metal bell trinkets, metal wire, metal pins, a metal blade, slag, an earthenware figurine's head (Figures 43 and 44), and blue glass. Colonial period coins were also discovered within the pre-modern Temasek layer, and typically with small metal objects such as coins, because of their density worked their way down the soft sandy sediments from the upper layers.

A midden feature was identified in the centre of the unit with a dense concentration of finds. This feature was likely a cesspit or former well, which subsequently served as a convenient rubbish fill. The feature measured approximately 100 cm x 100 cm wide and continues to a depth of 205 cmbd where the water table was reached. A total of 22.7 kg of artifacts were recovered from this feature between 140-205 cmbd. Finds included Chinese coins and fragments, large stoneware sherds, an octagonal shaped worked timber, a human tooth, yellow glass vessel shard, metal, and a carnelian bead.

*Figure 24: VCH 009 with concrete housing to the north*



7.9: VCH 010

This was the final excavation unit and measured 4 m x 1 m in size (Figure 25). It was bounded by a concrete ledge at the southern extremity of the excavation zone. The bulk of the unit consisted of clay fill, most likely deposited during the casting of the concrete slab. Hence most of this unit was disturbed and the majority of any archaeological

context lost. However a small Temasek period soil pocket was found on the southeast section of the unit between 100-150 cmbd. Sterile sand was reached at 150 cmbd. Finds were limited to 8.6 kg of Temasek artifacts. The Assembly House boundary wall extended into this unit and continued southwards beyond the rescue excavation zone.

***Figure 25: VCH 010 looking south***



## 8: WATCHING BRIEF

A periodic watching brief was proposed to inspect the site during the construction process. Unfortunately authorization for site access and scheduling conflicts prevented the monitoring of the construction of the basement complex beneath the Old Parliament Lane roadway. When visits were eventually permitted, the area was already developed and any archaeological remains and data were lost (Figures 26 and 27).

*Figure 26: Construction of subterranean complex for mechanical and engineering services*





*Figure 27: Subterranean complex for mechanical and engineering services*



## 9: THE FINDS AND ARTIFACTS

Typically for pre-modern sites in Singapore, the artifact assemblages are generally movable finds (smaller and human-portable objects like ceramic sherds, coins, glass shards etc). However, archaeological finds are not limited to just these movable objects, but rather incorporates the holistic universe of human culture and the materials that represent human thoughts and actions. Modifications to the landscape and interaction with the environment all have telltale remains, and the stratigraphic and historical environment context are also crucially important for the archaeologist.

An artifact is any object that has been manufactured, fashioned or modified by humans according to a set of cultural imposed attributes. Ecofacts are natural materials that have been utilised or exploited by humans as resources. These include plants, animal bones, seeds, and shells as part of a diet or worked to be created into an object. Artifacts and ecofacts are the basic components of the material culture created and left behind by humans as a testament to their past occupation or habitation of a site.

Detailed analytical work on the finds from the Victoria Concert Hall is presently underway and yet to be completed – resources and funding for post-excavation processing and analysis of these finds were insufficient or simply never available (Lim et. al. 2017). However, despite these shortcomings, some observations from the excavation and the finds are possible, and this section represents the preliminary dataset and findings from the investigations.

### *9.1: Preservation of Artifacts in the Archaeological Record*

The archaeological record is never complete and will never be. Preservation conditions of artifacts and ecofacts are contingent on a host of variables, and these ranges from acidity of the soil, climate, humidity, anaerobic levels, presence of water, the nature of archaeological materials, taphonomy, and geochemical interaction between the object and its micro and macro environments, and most crucially anthropogenic activities at the site over time.

Ceramics are the predominant archaeological finds from any excavation site in the world. These inorganic objects made from fired clay survived well in most conditions and climates. This is evident from the recovery of vast quantities of ceramic sherds and artifacts from past excavations in Singapore. Characteristically, ceramics make up between 85-95 % of the artifact assemblages in the country. Organic materials such as textile, timber, paper, bones, plant and food remains decompose quickly in the equatorial tropics. Metal items too deteriorate promptly, corrode and break down, reverting back to its fundamental geochemical or mineralogical state. Hence organic and metal finds are statistically rare and less frequently encountered from sites in Singapore.

Ecofacts tend to include low frequencies of bone, wood and plant remains (eg. seeds) and marine shell in various concentrations. It is noted that many early excavations in Singapore only recovered representative samples of various types of

artifacts, and organic remains in the likes of timber, plant and shell were often ignored or discarded. This low recovery rate from past excavations was also due to lack of stringent excavation methodologies and actual archaeological supervision on site, as well as poor recording and documentation. Therefore the corresponding metrics from previous works may be underrepresented, rendering volumetric comparison somewhat tenuous. The investigation and rescue operations for Victoria Concert Hall were designed to give full representation to all categories of materials for more accurate intra-site and inter-site comparative analysis.

### *9.2: Post-excavation Processing and Analysis*

Completion of the excavation and fieldwork is but only one component of the tedious chain of processes for the archaeologist and his team. Post-excavation is the most resource and time-consuming aspect of archaeological investigations. Post-excavation processing and analysis began with the cleaning of all recovered artifacts and ecofacts. This is followed by the basic inventory of sorting and classification, and obtaining essential metrics (count, mass, dimensions etc.). In general, the post-excavation work takes more time than the excavation itself. Contingent on available funding and resources for post-excavation work, estimates for time necessary pending detail of analysis, will range from several months to years beyond the completion of on-site investigations. The author has computed a single day of fieldwork requires an approximate 21 days to complete the post-excavation processing of the materials (Lim et. al. 2017).

As part of the post-excavation, research on the site's history and evolution is augmented with additional studies into colonial period construction and architecture, social norms and life of the 19<sup>th</sup> and 20<sup>th</sup> centuries, as well as the local history and heritage of the area, incorporating archival, library, and laboratory analysis. At the point of writing, preliminary processing in cleaning and classification of the artifacts, soil samples and data recovered from the site, as well as archival research, have been completed.

### *9.3: Excavation Yield*

The 2010 evaluation and 2011 rescue excavation at the Victoria Concert Hall site yielded a total of 654 kg of artifacts, of which approximately 69 % can be attributed with a high level of confidence to the Temasek period. The evaluation phase yielded 110 kg of artifacts while the rescue excavation season uncovered 544 kg. The following is the breakdown of the artifacts by categories and their associated broad chronological range. For statistical tabulation of selected data, refer to preliminary dataset in the appendices of this report.

**Table 4: Assemblage totals by artifact material and mass**

<b>S/No</b>	<b>Artifact Type</b>	<b>Weight (g)</b>
1.	Ceramic Building Material (excluding complete bricks)	52,100
2.	Ceramic Stoneware	326,448
3.	Ceramic Earthenware	109,910
4.	Ceramic Porcelain (a)	56,463
5.	Metal	30,495
6.	Glass	8,128
7.	Plastic	412
8.	Bone, Shell and Coral	29,511
9.	Charcoal	1,150
10.	Geological (worked and unworked)	37,323
11.	Other (b)	1,970
	<b>Total</b>	<b>653,910</b>

(a) While not technically porcelain, the dataset includes high-fired glazed greenwares (celadon) and whitewares, together with true vitrified porcelain.

(b) Excludes the two timber blocks uncovered in VCH 001.

**Table 5: Assemblage percentage mass per temporal period**

Layers	Chronology	Weight (g)	Percentage
Temasek Period	c.1300s – 1600s	451,502	69.1%
Non-Temasek (a)	1819 – Present	173,565	26.5%
Other – No Context (b)	N/A	28,843	4.4%
Total		653,910	100.0%

(a) Includes materials from the transitional layers where artifacts dating to Temasek period were found but in a disturbed or indistinguishable context with modern construction fill.

(b) Surface finds, artifacts recovered from collapsed trench walls, and due to human error.

#### 9.4: Chinese Ceramics

Ceramics produced in China form the bulk of the pottery assemblage uncovered in Singapore, particularly during the pre-modern period in Temasek. In the later colonial and modern periods, while Chinese porcelain and stoneware jars were still imported onto the island, the 19<sup>th</sup> and 20<sup>th</sup> centuries saw a rise of imported wares from Europe, Japan and elsewhere from Southeast Asia such as Burma and Thailand. Indigenously produced porcelain and stoneware pieces also entered into the market as local entrepreneurs set up pottery manufactories and kilns catering to localised demands. Everyday utilitarian wares based on Chinese designs for household storage and kitchen were produced in Singapore and neighbouring Johore.

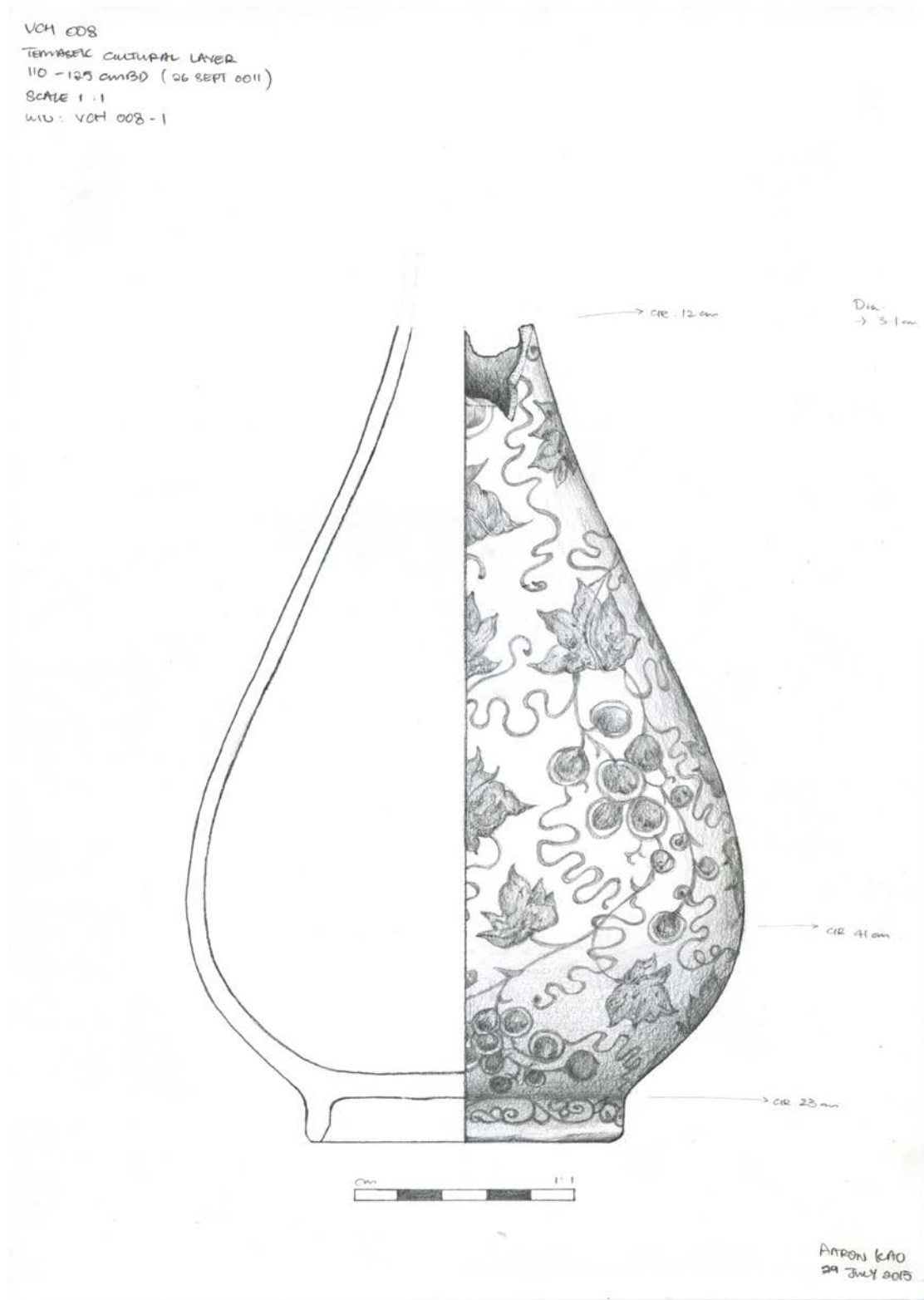
The Victoria Concert Hall site yielded some 284 kg of imported Chinese porcelain and stoneware ceramics. These are identified from the pre-colonial Temasek cultural layers and typified the usual assemblage encountered in pre-modern Singapore. High-fired porcelaineous greenware or celadon from Zhejiang and Fujian provinces, soft paste Dehua whitewares, and true vitrified *Qingbai* (bluish-white) and *Qinghua* (blue and white) porcelain from Jingdezhen. Along with utilitarian glazed and unglazed stoneware storage jars and bottles from Southern China.

Amongst these were some unique pieces that were encountered for the first time in Singapore. Foremost is the Yuan period (1279-1368) blue and white 19 cm tall x 13 cm wide *Chunping* or *Yuhuchun* recovered in VCH 008 at 120 cmbd from an undisturbed Temasek context (Figures 28 to 30). This exceptional vessel featured grape and vine motifs, and a classical scroll on its foot ring. Albeit it was fragmented, the vessel is 90% complete less its topmost portion of the neck and rim. There is no record of a similar vessel with the same design motif and is at present the only known specimen within the scarce numbers of Yuan period blue and white porcelain vases discovered worldwide. This was found together in the same context with another significant blue and white porcelain sherd from the shoulder of a *Meiping* vase, decorated with cloud and lotus motif and the distinct knobbed classical scroll (Figures 31 and 32). Blue and white porcelain were only produced very briefly between c. 1330-1352 during the Yuan Dynasty at Jingdezhen industry kiln complex in Jiangxi province, China (Liu 1982). These pieces employed the underglaze painting technique utilizing cobalt to achieve the distinct blue decorating the ceramic.

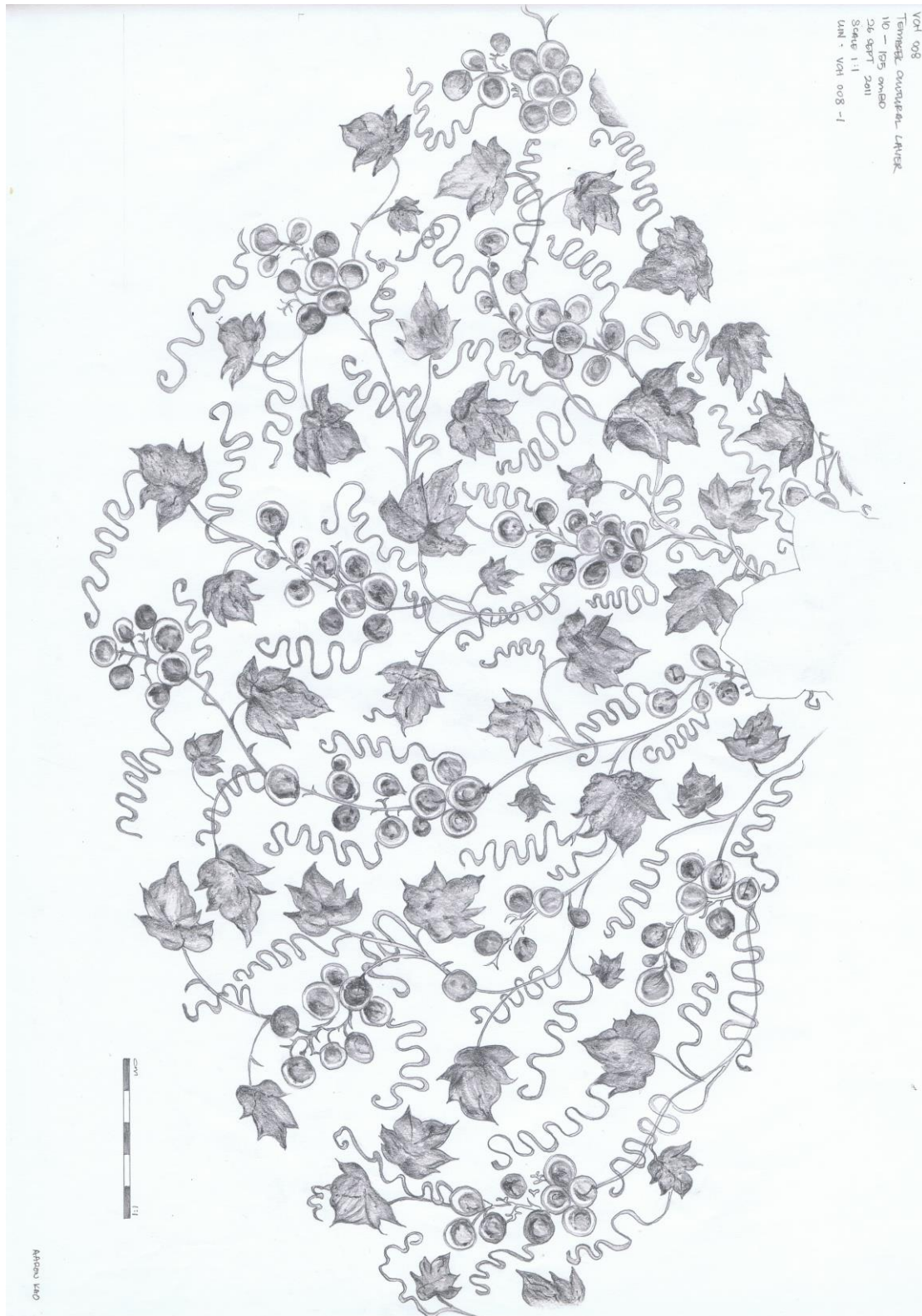
*Figure 28: Rare Yuan Dynasty blue and white Chunping porcelain vase*



**Figure 29: Rare Yuan Dynasty blue and white Chunping porcelain vase  
(illustration 1)**



**Figure 30: Rare Yuan Dynasty blue and white Chunping porcelain vase  
(illustration 2)**

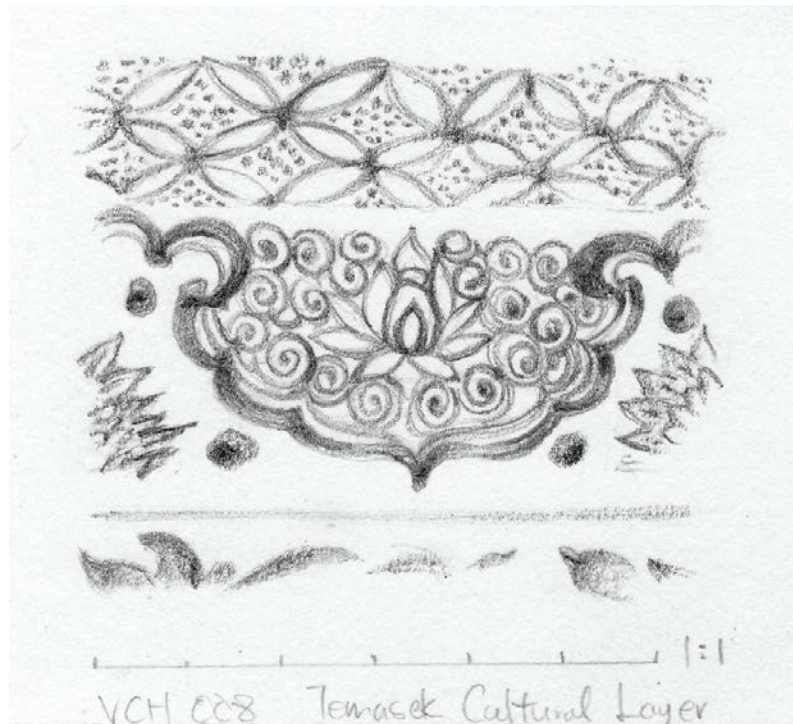




*Figure 31: Fragment of blue and white porcelain sherd from shoulder of Meiping vase*



*Figure 32: Fragment of blue and white porcelain sherd from shoulder of Meiping vase (illustration)*

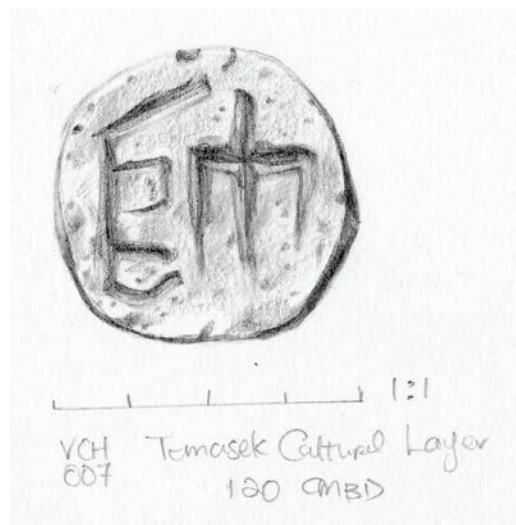


Another special find from the excavation provides evidence for gaming and recreation activities during the Temasek period. This is suggested by the recovery of a stoneware Chinese chess piece bearing the incised marker of *Shuai* (Marshal/General) in Chinese script (Figures 33 and 34). This was uncovered in VCH 007 at 120 cmbd within a Temasek cultural provenience. Other small finds such as ornamental porcelain figurines of mammals such as the head of a horse or camel were also discovered (Figure 35).

*Figure 33: Chinese chess piece*



*Figure 34: Chinese chess piece (illustration)*



*Figure 35: Head of a mammal figurine*



The bulk ceramics were sherds of Guangdong or Fujian brown-glazed utilitarian storage jars with four or five shoulder lugs. Most are undecorated save for the liberal and often rather haphazard application of glazing. A few were found with motifs such as an extended dragon carved around the body of the jar beneath its shoulder (Figures 36 and 37). Several examples of these storage jars also have a variety of maker's mark, manufacturer's or owner's stamp on its shoulder (Figure 38). Examples of these stamps include *An Ding* (steady); "...*Sheng*" (plenty) possibly a brand name; *Guang Xin* (broad and new) a brand or company name; and "...*Bao*" (treasure). These jars come in multiple shapes and sizes.

*Figure 36: Stoneware storage jar sherd with dragon motif*



*Figure 37: Stoneware storage jar sherd with dragon motif (illustration)*

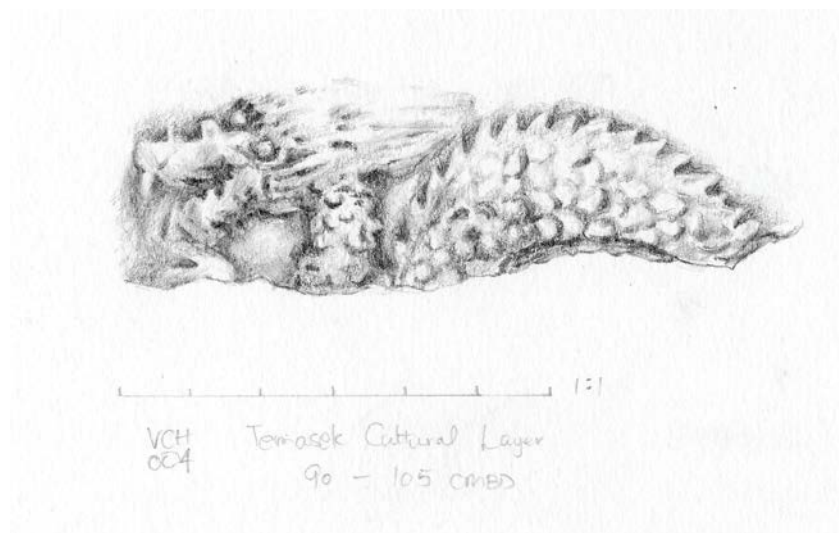


Figure 38: Variety of maker's or owner's stamp



*Xiao kou ping* (bottle with small mouth) stoneware sherds were also frequently encountered (Figure 39). Two fragmented but complete vessels were recovered from VCH 008. *Xiao kou ping* were previously found within proximity of the Old Parliament House (The Arts House) site, and at least eleven of these bottles were unearthed during construction works in 2002 (Miksic 2013). These items were produced in the Cizao kiln complex in Jinjiang county, Fujian province, South China. Past literature on this vessel type depict them as “mercury jars” suggesting that they were used for storage of mercury (Treloar 1972). This is unlikely as the quantity of sherds from this specific ceramic type found in Singapore sites and elsewhere in Southeast Asia and China indicate that they were more ubiquitous and utilitarian in nature for the storage of liquids (Wong 2016).

*Figure 39: Xiao kou ping (bottle with small mouth)*



Celadon or greenware (*qingci*) glazed high-fired ceramics formed another distinct ceramic class within the assemblage. These green glazed wares ranges from low quality crackedled bowls, to higher-quality moulded bowls with motifs in its interior cavetto and scalloped rims. Double-fish or floral motifs moulded or stamped onto the interior of bowls or shallow dishes are common. Platters, dishes, raised stem cups and jarlets of varying dimensions were recovered. A censer or incense burner bowl with false foot was also retrieved (Figure 40). Greenware were produced in Fujian, while the higher-quality celadon were manufactured at the Longquan kiln complex in Zhejiang province.

*Figure 40: Greenware censer*

Whiteware comes in two basic classes, high-fired stoneware with white glazing or highly vitrified vessels that are true porcelain. Common amongst the high-fired whitewares are Dehua shallow dishes with banana or lotus leaf foliage on its exterior. The latter porcelain category includes *Qingbai* (bluish-white) items, such as covered box lid with intricate motifs, and small wine cups. A few iron-spotted whiteware in the shape of small condiment or cosmetic jarlets were also found.

The ceramic assemblage also featured a small quantity of unidentified green over brown glaze stoneware with very flaky glaze, which may possibly be lead-glazed. It has a buff or grey body, and compared to the more common brown-glazed stoneware storage jars, was fired at a lower temperature and less durable. The origins of this type of wares are unknown but it has been suggested that they were produced in Fujian (Chin 1988).

#### *9.5: Southeast Asian and Local Ceramics*

The Temasek cultural layer yielded approximately 90 kg of earthenware sherds. These coarse pottery were commonly found and produced in Southeast Asia. While clay is readily available from sources near riverine estuaries, available technology in the pre-modern period until the 19<sup>th</sup> century limited people in Singapore to producing such low-fired earthenware pottery. These can be made almost anywhere and fired in an open area, or simple kiln where firing temperatures need not rise too high. They were

utilitarian vessels made for the storage of water, grains and foodstuff, and cooking. The pottery in Temasek has two distinct classes, fine paste earthenware with little temper or inclusions, and coarse tempered earthenware. Generally sherds of crockery pots, kendis and parts of stoves were identified. Several unique earthenware items were recovered from the investigations including a crucible (Figure 41), a 'spindle baluster' (Figure 42) for twirling of metal (gold or copper) wires, and the head of figurine (Figures 43 and 44).

*Figure 41: Earthenware crucible*

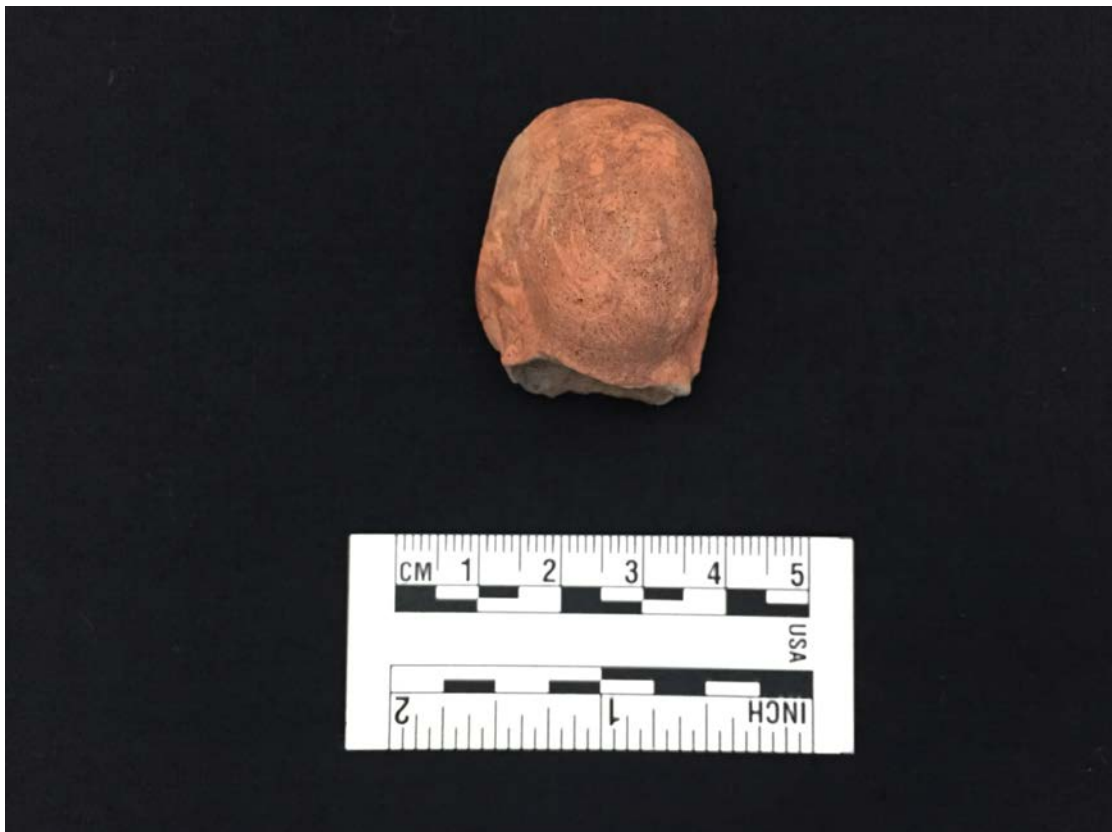




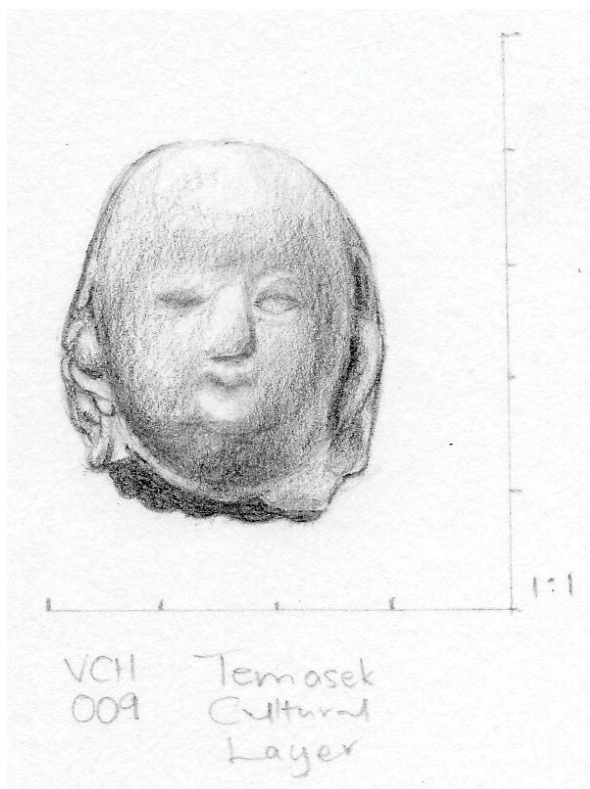
*Figure 42: Earthenware 'spindle baluster'*



*Figure 43: Head of earthenware figurine*



*Figure 44: Head of earthenware figurine (illustration)*



*9.6: European Ceramics*

The rescue excavation zone revealed little intact stratigraphy from the colonial period. Hence few artifacts were recovered aside from being part of the construction fill and disturbed context. The investigation did uncover two 19<sup>th</sup> century brick features but few artifacts were directly associated with them. The limited European ceramic wares collected were generally white earthenwares with tin glaze and some stoneware beverage bottle sherds.

#### *9.7: Ceramic Building Materials*

Ceramic building materials tend to form the bulk of construction fill throughout the site. These consist of fragmentary brick, roof and floor tiles, and sanitary bathroom ceramics. Aside from serving as fill in the construction and roadway aggregate, two separate 19<sup>th</sup> century brick features were found in VCH 002 and VCH 006. They both comprised of a single course of bricks laid over sand. The exact nature of these brick features is not known, and possibly might function as a pavement, flooring or platform.

#### *9.8: Metals*

Metals do not survive well in Singapore's tropical climate. Hence the recovery of the variety of such finds at Victoria Concert Hall is noteworthy. The excavations yielded

approximately 30.5 kg of metals (including coins – see below), of which 17.1 kg can be confidently attributed to the Temasek period. These pre-modern metals are generally small items in the likes of copper fishing hooks, bell trinkets, buckles, and rings (Figure 45). Also recovered were unidentified copper metal scraps and wires. The largest object is an unidentified metal copper alloy peg measuring 5.9 cm from VCH 005 (Figures 46 and 47).

*Figure 45: Fishing hook and bell trinket*



*Figure 46: Unidentified metal peg*



*Figure 47: Unidentified metal peg (illustration)*



### 9.9: Chinese Coins

Coins make up the largest numbers of non-ceramic artifacts. The archaeological excavations at Victoria Concert Hall recovered minimally 62 complete Chinese copper cash, along with substantial fragments (Figure 48). The study of coinage provides an insight into the trade and exchange mechanisms of the period. Chinese copper cash was the standard form of monetary unit in much of Southeast Asia from the 13<sup>th</sup> to 14<sup>th</sup> centuries onwards, and remained in circulation for hundreds of years. Economic historians studying this flow of Chinese coinage note the extent of a Chinese based currency zone occurring for approximately some 700 years between the 12<sup>th</sup> and 19<sup>th</sup> centuries (van Aelst 2007).

The Chinese cash recovered from the site are largely from the Northern Song Dynasty (AD 960-1127). Some examples are *Xiangfu Yuanbao* (AD 1008), *Jingyou Yuanbao* (AD 1034), *Huangsong Tongbao* (AD 1039), and *Tai Ping Tongbao* (AD 976-984).

*Figure 48: Chinese copper cash*



### 9.10: Colonial and Other Coins

A selection of colonial period coins was uncovered. They range from modern post-independence Republic of Singapore coinage in its two evolutionary series (twin paddy stalks 1967-1985 and floral 1985-2013), to coins of the Straits Settlements, and early 19<sup>th</sup> century British East India Company period tokens. Verenigde Oost-indische Compagnie (VOC – Dutch East India Company) coins were also encountered, along with a single Spanish silver real dating to 1764 (Figure 49). A total of 18 colonial period and modern coins were recovered.

*Figure 49: Spanish silver real*



*9.11: Medieval Glass*

Glass is another artifact that survives post-deposition in Singapore well. There is evidence of a glass recycling workshop or facility on Fort Canning Hill, where large ash deposits, melted glass globules and morsels, glass beads and shards were discovered (Miksic 1995; 2013). While not in the quantities of Fort Canning, the Victoria Concert Hall site yielded small numbers of pre-colonial etched glass shards, coloured and clear beads, and blue bangles from the Temasek period. The etched glass were similar with those discovered in the Padang and National Gallery Singapore site (Lim 2017).

#### *9.12: Human Remains*

It is extremely rare to find any human remains from pre-modern archaeological sites in Singapore. This is possibly due in part to the poor preservation conditions of a tropical environment. The Empress Place riverbank excavation in 1998 did yield part of either the sphenoid or parietal bone of a single human skull but its archaeological provenience and chronology is doubtful. At the Victoria Concert Hall site, minimally 45 individual adult teeth were recovered together with fragments from established Temasek period contexts (Figure 50). The teeth were found not within a single cache or deposit but discovered throughout the rescue excavation zone in VCH 003, VCH 004, VCH 005 and VCH 009. Some other bone fragments were also recovered from the site, but these are yet to be identified as human or other mammal.

*Figure 50: Human teeth from the pre-modern Temasek cultural layer*



*9.13: Timber*

Preservation of organic material remains is a challenge for most archaeological sites. Unless an anaerobic (such as waterlogged) or extreme low humidity (for example a dry desert) conditions are met, timber remains decompose and deteriorate rapidly in the tropics. Hence the two cut timber planks uncovered in VCH 001 presents a unique discovery. Both timber are symmetrically similar, each measuring 30 cm long x 15 cm wide x 5 cm thick and were found laid flat 25 cm apart at 145 cmbd. The purpose of these two timber blocks is unknown. Wood identification may help address the question of exotic or local origins and the resulting implications. Samples were recently extracted and sent to the material science laboratory at the British Museum and the conservation science laboratory at the Institute of Archaeology, University College London.

#### 9.14: Shell and Coral

A small quantity of worked shell molluscs were found with drilled holes (Figure 51). The shells varies between 1-3 cm in size, with the drilled apertures as minute as 1 mm.

*Figure 51: Worked shell molluscs*



#### 9.15: Other Materials

A small amount of geological specimens amounting to about 32.7 kg were uncovered within the Temasek cultural layer. These rocks and pebbles were retained, as they were visibly non-native to the site's sandy sediments, and were certainly brought in from elsewhere. Worked orange carnelian beads were also recovered. Other materials were essentially modern domestic rubbish. Examples of these 20<sup>th</sup> century synthetic materials found at the site were plastic wrappers and drinking straws, fragments of polyvinyl chloride (PVC) piping, asbestos, bitumen or tar, and other household refuse.



## 10: DISCUSSION

The 2010 evaluation demonstrated that pre-modern and colonial period cultural deposits exist beneath the Victoria Concert Hall site. The results from the evaluation enabled the archaeology team to persuade the developing agency and heritage bodies the necessity to intervene and mitigate prior to construction works. The 2011 excavation was rescue in nature with the intention of recovering as much archaeological remains and data as possible before the imminent destruction of the site caused by the construction development. However, time, budget and personnel were heavily constrained. Rescue operation dates were restricted to a small window of opportunity over a period of only three weeks. Although the project achieved the goal of 100 % excavation of the selected sample zone, much of the larger construction impact zone and the site was compromised and destroyed by the development.

Apart from the small garden plot adjacent to the Victoria Concert Hall and the excavation zone between the rear of the hall and The Arts House building, the archaeological investigations for 2010 and 2011 were unable to address other areas within the massive Victoria Concert Hall and Victoria Theatre construction zones. The 2011 rescue excavation area of 29 m x 4 m (116 m<sup>2</sup>) represented only 9.61 % of the 78 m x 15 m (1,170 m<sup>2</sup>) construction impact zone along the former Old Parliament Lane roadway, and does not factor the other construction impact zones within and surrounding the Victoria Concert Hall and Victoria Theatre buildings. For example, to the south of the Victoria Theatre, across from the Asian Civilisations Museum, conservation consultant Mr. Garf Sheldon collected buckets of artifacts during the construction phases, illustrating how archaeologically and culturally rich those other areas were. Together with the 2010 archaeological evaluation where an additional 21 m<sup>2</sup> was investigated, a total of only 137 m<sup>2</sup> of the construction site was excavated.

Nevertheless, a reasonable sample of the artifact assemblage was recovered, and the excavation methodology provided sufficient quality control for accurate analyses despite the constraints. Careful monitoring of horizontal stratigraphic controls was successfully maintained throughout the investigations. From the archaeological excavations, only approximately 4.4 % of the artifacts had no detailed context. This was chiefly the result from heavy rainfall destroying the trench walls and stratigraphic profiles, washing out the artifacts, and the dependence on unskilled hired field labour that assisted with the excavations, and a lesser extent to human error in the recovery and collection processes.

No sizable colonial deposits were evident, with the exception of two brick features in VCH 002 and VCH 006, the brick wall and concrete footing of the former Assembly House, sewage pipe systems, utilities and the associated trenches dug to lay these services. It is highly likely that any traces of architectural remains from the 19<sup>th</sup> century and early 20<sup>th</sup> century had since been removed during the construction of the present roadway. The artifacts recovered from the colonial period largely constituted ceramic building materials. The lack of a stratified colonial layer also raises the question how much of the original Temasek deposits may have been truncated or compromised.

This has implications vis-à-vis volumetrics and statistical analysis of the Temasek assemblage. Any disturbances of the archaeological layers during colonial and modern intensive construction activities or boom have certainly affected the deposits.

Although there are little remains of an occupation layer from the colonial period within the rescue excavation zone, there exist significant undisturbed proveniences for the Temasek period. Two major concentrations of Temasek period materials could be discerned from the excavation. The first consisted of finds from VCH 003 and VCH 004 in the northern-most section of the excavated zone, closest towards Parliament Place road. This concentration yielded approximately over 184.1 kg of artifacts and accounts for about 40 % of the entire Temasek period yield from the project. The second prominent concentration for the rescue excavation was located within the areas of VCH 008 and VCH 009. These latter two units together provided 146.9 kg of Temasek artifacts.

It is noted that units VCH 008, VCH 009 and VCH 010 were the most proximate to the riverbanks located to the south of the site where past archaeological excavations and historical data revealed that active commercial activities took place during the Temasek and colonial periods in greater frequency and intensity. Therefore this possibly accounts for the high-density and quantity of artifacts recovered from VCH 008 and VCH 009 at 65.3 kg and 81.7 kg respectively from the Temasek cultural layer. However, VCH 003 and VCH 004 also provided high Temasek material culture yields separately for 106.5 and 77.6 kg. VCH 005, VCH 006 and VCH 007 were the areas most disturbed by modern construction intrusions, hence the actual loss of the Temasek deposits will never be ascertained. Still their respective yields of 44.9 kg, 12.8 kg, and 30.7 kg suggest that there might have been significant reservoirs buried prior to their disturbance and loss.

Throughout the rest of the excavated area, lesser concentrations of artifacts occurred and are generally scattered. The two major concentrations suggest that they might be specific functional areas, with higher intensity or higher frequency activities, possibly demarcating the compounds of either a household or institutional unit. Alternatively, they might represent dedicated refuse deposit areas and were the result of cleaning and waste removal practices. Unfortunately disturbances to the zone (VCH 005, VCH 006 and VCH 007) between these two concentrations eradicated significant data that might have permitted better interpretation of the site.

The excavation uncovered several prominent and significant artifacts from established pre-modern Temasek cultural contexts. Four items stand out not only as highlights from the project, but their discovery has long-term implications on understanding the history and use of the site, and about pre-colonial Temasek at large. These are the blue and white porcelain vase; ceramic chess piece; human teeth, and timber blocks. The late Yuan dynasty blue and white porcelain *Chunping* vase from VCH 008 is a one of a kind object whose design motif was never previously encountered in Singapore or recorded elsewhere in the world. The rarity and scarcity of this item proposes that pre-modern Temasek was an affluent settlement capable of importing such high-valued items.

The Chinese chess playing piece is the first evidence of recreational and gaming activity in Temasek. Researchers are still uncertain when *xiangqi* (elephant or Chinese chess) was first introduced, and some believe it to be as early as the Warring States period (475 to 221 BC) (Lo and Wang 2004). Chess has certainly a long history in China, but there is little evidence for its acceptance beyond the borders of the Chinese empire. The find suggests that in pre-modern Singapore, the individuals partaking in the game must be sufficiently literate in the Chinese script to understand the meaning of the characters incised upon the piece(s).

It is uncommon to recover organic materials from tropical Singapore. Human teeth were found scattered throughout the extent of the rescue excavation zone and not restricted to a single cache or area. They have been preliminary identified as adult teeth and conservatively represent minimally two number of individuals. The Victoria Concert Hall site represents the first time where human remains have been found in established Temasek period context. Inevitably, questions arise about who were these individuals and early Singaporeans? How did they lose their teeth? Was it through trauma and violence, or removal as part of medical treatment? What else can the teeth tell us about the nutrition, subsistence and growth of the individuals? Analysis of these teeth by an osteoarchaeologist or bioarchaeologist would be beneficial. Two timber planks from VCH 001 were the other well-preserved organic recoveries. These two objects were cut and worked into 30 cm x 15 cm blocks. Future species identification may shed some light on its origins, and suggest what the past environment and floral was like in the pre-modern period.

Ceramics make up the bulk finds from the excavations. Utilitarian stoneware storage jar sherds dominated the Temasek materials amounting to some 245 kg or 64 % of the entire Temasek assemblage of finds. Southeast Asian and locally manufactured coarse earthenware pottery represent 90 kg or 23 % of the pre-modern artifacts. Porcelain and other high-fired glazed ceramics such as greenwares account for 39 kg and represent about 10 % of all Temasek period finds. When the small quantities of ceramic building materials and others are included, the Temasek period ceramics and pottery totaled 382 kg, equivalent to 84 % of the pre-modern assemblage (Appendix C).

Other non-ceramic materials recovered from the Temasek cultural layers are metals, and faunal and floral remains including fish vertebrae and petrified seeds. A sizable quantity of pre-modern metals, 30 kg by mass, was uncovered from an area of 116 m<sup>2</sup>. In comparison, the National Gallery Singapore rescue excavation zone of 130 m<sup>2</sup> only yielded 10 kg of metal finds. The variety of metals too differ from the art gallery site and Victoria Concert Hall has a broader range of metal objects such as bell trinkets, buckles, wire, fishing hooks, metal slag, scraps, and coins. The earthenware crucible and 'spindle baluster' found in VCH 001 do suggest metalworking. Nearby, the Parliament House Complex approximately 500 m to the west of the concert hall, revealed evidence of pre-modern metalworking and smelting (Shah 1997).

Past excavations in the 1990s and early 2000s at the Padang, Empress Place riverbank, Old Parliament House, the new Parliament House Complex, Colombo Court, and recoveries of artifacts from sites further inland towards and including Fort

Canning Hill, postulate that the area between the Padang and the Singapore River was the most densely occupied or trafficked during the Temasek period. More recent excavations at the National Gallery Singapore in 2010 and the Empress Place lawn in 2015 further enabled the interpretation and demarcation of specific functional zones during pre-modern Singapore (Lim 2016a; 2017). The Empress Place lawn's volume of artifacts is the highest amongst all the sites in the colonial and downtown civic district, where some three metric tons of pre-modern artifacts were recovered. However, this extends over a large excavation area of 1,050 m<sup>2</sup> compared to 137 m<sup>2</sup> at Victoria Concert Hall.

In terms of density, the Victoria Concert Hall site may as an average statistically yield a higher concentration of finds per square metre than other downtown sites, or is minimally on par with the Empress Place displacement. However, caution on the use of preliminary data and its statistics must be made, particularly on averaging biases. When completed, the post-excavation work on the artifacts for the Victoria Concert Hall and the various other sites will provision a more accurate and updated dataset.

**Table 6: Temasek period artifact yield per square metre**

S/No.	Site	Weight	Excavated Area	Average Yield
1.	Victoria Concert Hall	451 kg	137 m <sup>2</sup>	3.2 kg/m <sup>2</sup>
2.	Empress Place Lawn	3,000 kg (a)	1,050 m <sup>2</sup>	2.8 kg/m <sup>2</sup>
3.	National Gallery Singapore	170 kg	157 m <sup>2</sup>	1.08 kg/m <sup>2</sup>

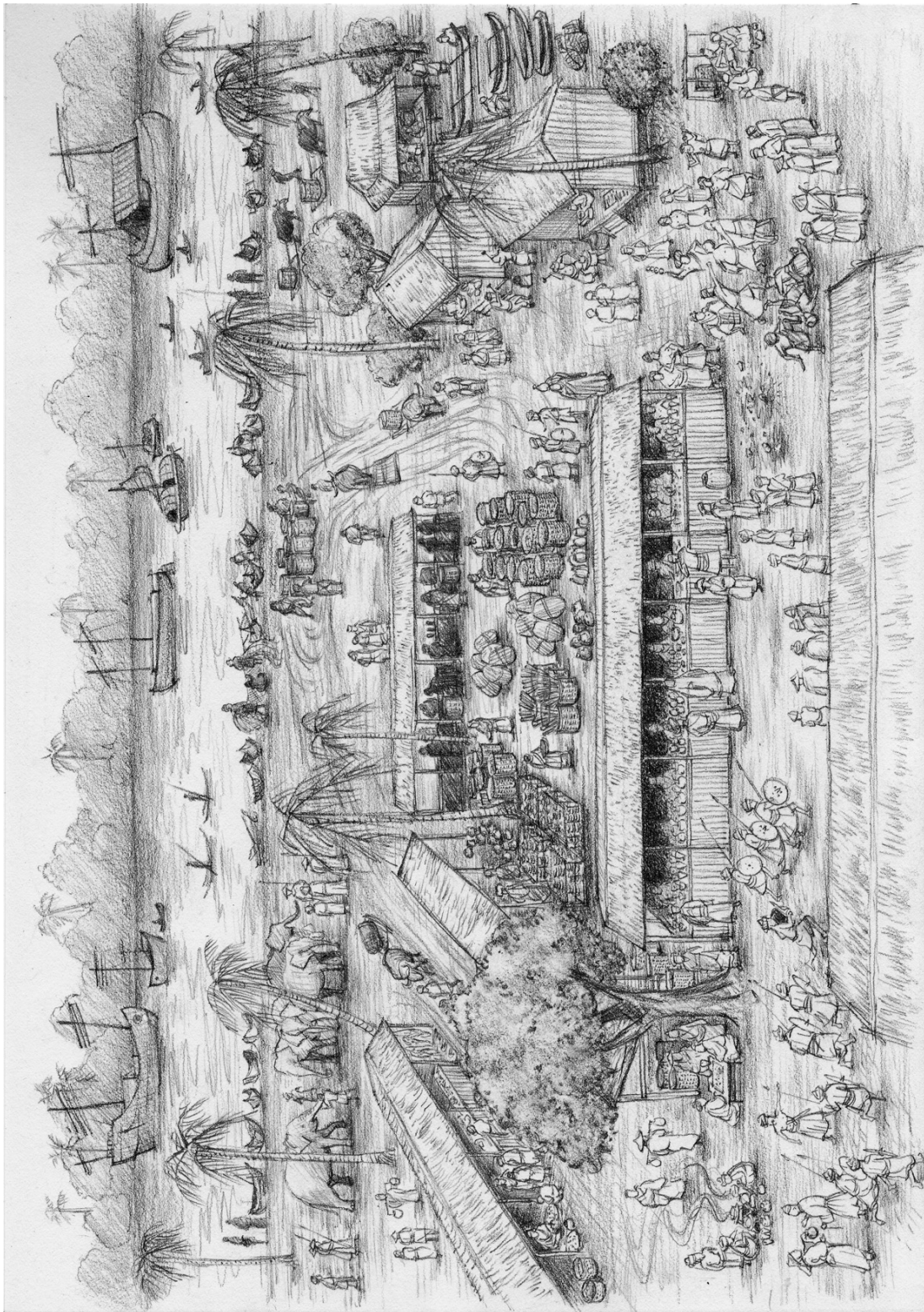
(a) The above data from the Empress Place site is based on weighs of the finds in the field, and are preliminary estimates. The artifacts are still undergoing post-excavation processing and final data yet to be tabulated.

Studies into the intra-site usage, functions and activities are presently underway. The author is also currently computing the ceramic variability from the Victoria Concert Hall and other nearby sites as inter-sites comparisons. Some research themes being investigated include quantitative analysis of the difference in artifact categories and ceramics classes, identifying notably new, absent or present types, and examination of the ratios of these finds as an indication of a site's function or activities. This on-going research seeks to answer several questions about Temasek as a medieval port settlement. For example, what are the discernable high activity zones, and what are the interpretations of higher intensity and frequency of activities? Separately, future attention to the study of the historical environment with focus on archaeobotany, geoarchaeology, and zooarchaeology (floral, geological, and faunal) will also further the understanding of the sites in pre-colonial and early colonial Singapore.

During the pre-modern period, the Victoria Concert Hall site appears to be an extension of a commercial neighbourhood within the larger Singapore riverbank

precinct. The volume and variety of artifacts from the Empress Place rescue excavation demonstrated that the lawn in front of the Victoria Theatre was an active market place or commercial square. Victoria Concert hall site certainly was not limited to a single homogenous and congruous residence or institutional compound, but multiple premises and occupants. There were different activities occurring within the space, be it small cottage industry for copper or metalwork, or shops retailing a variety of wares (Figure 52). The area was likely to function as residential abodes as well, and households indubitably intertwined with other activities. Five hundred years later in the 19<sup>th</sup> century, the locality saw a similar reincarnation as a multifarious space – first as a residential and commercial centre during the early East India Company Factory period, and later evolved into the government and civic hub of colonial Singapore.

**Figure 52: Artist impression of the Victoria Concert Hall site during the pre-modern Temasek period in the 14<sup>th</sup> century**



## 11: CONCLUSION

Astonishingly, despite the ample and rich yield of artifacts uncovered sporadically over the last three decades, the perseverance of Singapore's archaeological heritage is still firmly within the purview of individual archaeologists who spearheaded the lobby for necessary evaluations and intervention prior to development (Lim 2016b). The Victoria Concert Hall excavation exemplifies such ad-hoc pursuit in rescuing the archaeological record. Fortunately, over the last five years, a more pro-active approach by the National Heritage Board and development agencies have brought forth welcomed support and initiatives in attempts to conduct much needed impact assessments for sites under threat of development in the country. It is hoped that current efforts will contribute to the ongoing construction of needed heritage policies pertaining to archaeology in Singapore to all concerned stakeholders – the developers, planners, policy makers, local interest groups and academic researchers.

This report covers the excavation aspects of fieldwork and excludes detailed post-excavation analysis of the finds. Serious resources will need to be allocated for the post-excavation processing of the artifacts and data, as well as their conservation and long-term archiving or maintenance (Lim et. al. 2017). The 654 kg of artifacts and other field data collected from Victoria Concert Hall will require inventories, descriptions, typology creation, basic analysis, and database creation. Proper conservation, storage and archiving will allow future researchers to continue working on the site assemblage. Specialised analyses such as the study of the human and timber remains are yet to be pursued in detail, and should be conducted according to needs and possibilities.

At this juncture in our understanding of pre-modern Singapore, we simply do not know the extent of the archaeological deposits that remain in the country, especially regarding past human undertakings, structures, activity areas and other anthropogenic deposits and spaces. Archaeology also applies to the early modern and colonial periods that may have been well off the historical documentation and attention of historians. Considering the latter possibility, this is an area where archaeology is extremely useful in filling gaps in history and providing insights into complementary as well as counter narratives (Lim 2006).

Many questions still remain from the Victoria Concert Hall site excavations; what was the site's role within the larger settlement and port of Temasek? Is it possible to recreate a nuanced landscape of the neighbourhood and determine boundaries of households and other premises? What are the understanding of the site in relation to the common regional and extra-regional trading port narrative? What are the larger scale implications? As evident from the archaeological materials recovered from a limited area within the vast Victoria Concert Hall and Victoria Theatre compound, archaeology is the only methodology available to understand Singapore's pre-modern and early modern past. Furthermore, the archaeology in the country transcends not only a richer and more fine grained understanding of Singapore itself, but offers data relevant to regional understanding on pre-modern port settlements in Southeast Asia prior to and after European arrival.

## REFERENCES CITED

- Chin, L. (1988). *Ceramics in the Sarawak Museum*. Sarawak, Malaysia: Sarawak Museum.
- Choo, A. A. (1986). *Report on the Excavations at Fort Canning Hill Singapore*. Singapore: National Museum.
- Glover, I. (2004). 'Writing Southeast Asian Prehistoric Archaeology: The Western Contributions – From Colonialism to Nationalism', in V. Paz (ed.), *Southeast Asian Archaeology: Wilhelm G. Solheim II Festschrift* (64-80). Manila: University of the Philippines Press.
- Kwa, C. G., Heng, D. T. S., and Tan, T. Y. (2009). *Singapore, A 700-Year History: From Early Emporium to World City*. Singapore: National Archives of Singapore.
- Lee, K. W., Zhou, Y., Tor, Y. K., Li, J. (2009). *Geology of Singapore*. 2<sup>nd</sup> edition. Singapore: Defence Science & Technology Agency, Singapore.
- Lim, C. S. (forthcoming). 'A Short Historiography of Singapore Archaeology', in Lim C. S. and Rachel C. (eds.), *Saving History to Build a Nation: World Heritage Day Symposium 2015*. Singapore: National Museum of Singapore and ICOMOS Singapore.
- Lim, C. S. (2017). 'Preliminary Report on the Archaeological Investigations at the National Gallery Singapore. *Nalanda-Sriwijaya Centre Archaeology Unit Archaeology Report Series No. 5*'. See [https://www.iseas.edu.sg/images/pdf/AU5NationalGallerySingapore\\_reduced.pdf](https://www.iseas.edu.sg/images/pdf/AU5NationalGallerySingapore_reduced.pdf) (last accessed October 22, 2018).
- Lim, C. S., D. H. Brown, D. Heng, F. M. Meddens, and J. N. Miksic (2017). 'Archiving Archaeological Materials'. *Nalanda-Sriwijaya Centre Archaeology Unit Archaeology Report Series No. 7*. See [https://www.iseas.edu.sg/images/pdf/AU7Archiving\\_Archaeological\\_Materials\\_v3.pdf](https://www.iseas.edu.sg/images/pdf/AU7Archiving_Archaeological_Materials_v3.pdf) (last accessed October 22, 2018).
- Lim, C. S. (2016a). 'Empress Place Rescue Archaeology Excavation Project Preliminary Report.' Report submitted to the National Heritage Board Singapore.
- Lim C. S. (2016b). 'Development-led Archaeology in Singapore.' Paper presented at the Workshop on the Heritage of Ancient and Urban Sites: Giving Voice to Local Priorities, 14-15 March 2016, at the ISEAS – Yusof Ishak Institute, Singapore. See [https://www.iseas.edu.sg/images/centres/nalanda\\_sriwijaya\\_centre/compilations/herit](https://www.iseas.edu.sg/images/centres/nalanda_sriwijaya_centre/compilations/herit)



[age\\_workshop/1\\_lim\\_chen\\_sian\\_development\\_led\\_archaeology\\_in\\_singapore.pdf](#)

(last accessed October 22, 2018).

Lim, C. S. (2013). 'Report on the Archaeological Excavations at Victoria Concert Hall and Theatre.' Report submitted to the National Arts Council Singapore, and the National Heritage Board Singapore.

Lim, C. S. (2012b) 'The First Landward Map of Singapore, Preserved in the Bute Archives, Scotland' in John Bastin, *The Founding of Singapore 1819*, National Library Singapore.

Lim, C. S. (2006). 'Archaeology as a Critical Source of Examining the Past: The Archaeological Potential of Singapore', in D. Heng (ed.), *New perspectives and sources on the history of Singapore: a multi-disciplinary approach*. Singapore: National Library Board.

Lim, T. S. (2012a). *14th Century Singapore: The Temasek Paradigm*. Unpublished MA Thesis, National University of Singapore.

Liu, X. (1982). 'Research on the Yuan Blue and white Wares with Unique Patterns Decoration, Fouliang Porcelain Bureau and Huaju Bureau'. *Journal of Jingdezhen Ceramic Institute*, 3, 9-20. (In Chinese)

Lo, A. and Wang T.-C. (2004). 'Spider Threads Roaming the Empyrean: The Game of Weiqi', in C. Mackenzie and I. Finkel (eds.), *Asian Games: The Art of Contest (186-201)*. New York: Asia Society.

Miksic, J. N. (2013). *Singapore and the Silk Road of the Sea: 1300-1800*. Singapore: NUS Press.

Miksic, J. N. (1985). *Archaeological Research on the "Forbidden Hill" of Singapore: Excavations at Fort Canning, 1984*. Singapore: National Museum.

Miksic, J. N., and Lim C. S. (2004). *Archaeological Research on the Padang and the St. Andrew's Cathedral Churchyard: St. Andrew's Cathedral Archaeological Research Project Progress Report Summary September 2003-June 2004*. Singapore: ARI Working Paper.

Mokhtar Saidin and S. Chia (eds.). (2007). *Archaeological Heritage of Malaysia*. Minden, Pulau Pinang: Pusat Penyelidikan Arkeologi Malaysia, Universiti Sains Malaysia.

Clémentin-Ojha, C. and P. Y. Manguin (eds). (2007). *A Century in Asia: The History of the École Française d'Extrême-Orient*. Singapore and Paris: Editions Didier Millet and École Française d'Extrême-Orient.

Shah Alam bin Mohd. Zaini (1997). *Metal Finds and Metal-Working at the Parliament House Complex, Singapore*. Unpublished MA Thesis, University of Michigan, Ann Arbor.

Shetty, D. (2014). 'Victoria Theatre and Concert Hall opens tomorrow after S\$158-million refurbishment.' *Straits Times*, July 15, 2014. See <https://www.straitstimes.com/lifestyle/entertainment/victoria-theatre-and-concert-hall-opens-tomorrow-after-158-million> (last accessed October 23, 2018).

Treloar, F. E. (1972). 'Stoneware Bottles in the Sarawak Museum: Vessels for Mercury Trade?' *Sarawak Museum Journal*, 20, 40-41.

van Aelst, A. (2007). 'A South-Chinese Currency Zone Between the Twelfth and Nineteenth Centuries', in J. Lucassen (ed.), *Wages and Currency: Global Comparisons from Antiquity to the Twentieth Century* (97-112). Bern, Switzerland: Peter Lang.

Wong, W. Y. S. (2016). 'A case report on the function(s) of the 'mercury jar': Fort Canning, Singapore, in the 14<sup>th</sup> century.' *Archaeological Research in Asia*, 7, 10-17.

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## ARCHAEOLOGY PROJECT TEAM

**Project Archaeologist:** Lim Chen Sian

**Field Crew:** Cheah Fang Leah, Aaron Kao, Michael Ng, Wee Sheau Theng and Margaret Wong

**Photographer:** Ung Ruey Loon

Appendix A: VCH Preliminary Artifact Statistical Dataset

**VCH 001**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	4,197
Ceramics Stoneware	16,869
Ceramics Earthenware	6,781
CBM	7,489
Ceramics Other	0
Metal	5,953
Glass	2,897
Geological	1,050
Organics	1,099
Others	92
Total	46,427

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	1,631
Ceramics Stoneware	6,851
Ceramics Earthenware	3,102
CBM	315
Ceramics Other	0
Metal	210
Glass	50
Geological	270
Organics	393
Others	0
Total	12,822

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	2,346
Ceramics Stoneware	9,681
Ceramics Earthenware	3,625
CBM	6,944
Ceramics Other	0
Metal	5,464
Glass	2,725
Geological	776
Organics	690
Others	92
Total	32,343

**Other**

Material Type	Weight (g)
Ceramics Porcelain	220
Ceramics Stoneware	337
Ceramics Earthenware	54
CBM	230
Ceramics Other	0
Metal	279
Glass	122
Geological	4
Organics	17
Others	0
Total	1,263

Notes:

Ceramic Porcelain – While not technically porcelain, the dataset includes high-fired glazed greenwares (celadon) and whitewares, together with true vitrified porcelain.

CBM – Ceramic Building Material.

Ceramic Other – Small and unique finds such as tokens, figurines etc.

Geological – Includes worked and unworked stone.

Organics – Bone, charcoal, coral, plant remains, shell and wood.

Others – Synthetic materials such as asbestos and plastics, and unidentified items.

**VCH 002**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	3,336
Ceramics Stoneware	18,252
Ceramics Earthenware	5,739
CBM	29,591
Ceramics Other	45
Metal	3,067
Glass	1,767
Geological	408
Organics	788
Others	1,086
Total	64,079

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	1,945
Ceramics Stoneware	4,351
Ceramics Earthenware	3,413
CBM	0
Ceramics Other	45
Metal	464
Glass	2
Geological	20
Organics	242
Others	2
Total	10,484

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	1,361
Ceramics Stoneware	13,610
Ceramics Earthenware	2,296
CBM	28,788
Ceramics Other	0
Metal	2,563
Glass	1,767
Geological	388
Organics	263
Others	1,084
Total	52,120

**Other**

Material Type	Weight (g)
Ceramics Porcelain	30
Ceramics Stoneware	291
Ceramics Earthenware	30
CBM	803
Ceramics Other	0
Metal	40
Glass	0
Geological	0
Organics	272
Others	0
Total	1,466

**VCH 003**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	9,628
Ceramics Stoneware	50,772
Ceramics Earthenware	17,542
CBM	2,489
Ceramics Other	174
Metal	3,275
Glass	231
Geological	20,730
Organics	17,447
Others	142
Total	122,430

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	7,657
Ceramics Stoneware	47,368
Ceramics Earthenware	17,146
CBM	0
Ceramics Other	0
Metal	2,422
Glass	85
Geological	20,150
Organics	11,601
Others	84
Total	106,513

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	1,968
Ceramics Stoneware	3,157
Ceramics Earthenware	385
CBM	1,421
Ceramics Other	174
Metal	433
Glass	141
Geological	580
Organics	6,044
Others	58
Total	14,361

**Other**

Material Type	Weight (g)
Ceramics Porcelain	3
Ceramics Stoneware	247
Ceramics Earthenware	11
CBM	0
Ceramics Other	0
Metal	19
Glass	0
Geological	0
Organics	0
Others	0
Total	280

**VCH 004**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	9,180
Ceramics Stoneware	61,833
Ceramics Earthenware	18,203
CBM	3,865
Ceramics Other	0
Metal	2,500
Glass	218
Geological	6,168
Organics	634
Others	2
Total	102,603

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	6,998
Ceramics Stoneware	46,309
Ceramics Earthenware	14,687
CBM	2,588
Ceramics Other	0
Metal	2,225
Glass	47
Geological	4,304
Organics	467
Others	0
Total	77,625

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	1,523
Ceramics Stoneware	10,058
Ceramics Earthenware	2,520
CBM	1,277
Ceramics Other	0
Metal	135
Glass	140
Geological	1,864
Organics	164
Others	2
Total	17,683

**Other**

Material Type	Weight (g)
Ceramics Porcelain	659
Ceramics Stoneware	5,466
Ceramics Earthenware	996
CBM	0
Ceramics Other	0
Metal	235
Glass	31
Geological	0
Organics	6
Others	0
Total	7,393

**VCH 005**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	4,763
Ceramics Stoneware	31,048
Ceramics Earthenware	9,368
CBM	2,132
Ceramics Other	0
Metal	1,198
Glass	554
Geological	467
Organics	5,592
Others	39
Total	55,161

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	4,043
Ceramics Stoneware	26,633
Ceramics Earthenware	8,686
CBM	1,418
Ceramics Other	0
Metal	1,179
Glass	436
Geological	232
Organics	2,241
Others	39
Total	44,907

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	708
Ceramics Stoneware	4,311
Ceramics Earthenware	678
CBM	714
Ceramics Other	0
Metal	5
Glass	119
Geological	235
Organics	3,351
Others	0
Total	10,121

**Other**

Material Type	Weight (g)
Ceramics Porcelain	12
Ceramics Stoneware	104
Ceramics Earthenware	4
CBM	0
Ceramics Other	0
Metal	19
Glass	0
Geological	0
Organics	0
Others	0
Total	139



**VCH 006**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	3,638
Ceramics Stoneware	16,943
Ceramics Earthenware	5,523
CBM	1,273
Ceramics Other	0
Metal	461
Glass	1,120
Geological	2,426
Organics	1,314
Others	25
Total	32,723

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	886
Ceramics Stoneware	7,548
Ceramics Earthenware	1,990
CBM	409
Ceramics Other	0
Metal	85
Glass	23
Geological	1,790
Organics	76
Others	0
Total	12,807

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	2,446
Ceramics Stoneware	7,315
Ceramics Earthenware	2,728
CBM	645
Ceramics Other	0
Metal	248
Glass	553
Geological	631
Organics	1,152
Others	25
Total	15,743

**Other**

Material Type	Weight (g)
Ceramics Porcelain	306
Ceramics Stoneware	2,080
Ceramics Earthenware	805
CBM	219
Ceramics Other	0
Metal	128
Glass	544
Geological	5
Organics	88
Others	0
Total	4,175

**VCH 007**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	3,628
Ceramics Stoneware	23,615
Ceramics Earthenware	8,706
CBM	2,576
Ceramics Other	40
Metal	1,931
Glass	161
Geological	328
Organics	371
Others	61
Total	41,417

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	2,639
Ceramics Stoneware	16,467
Ceramics Earthenware	7,625
CBM	1,982
Ceramics Other	40
Metal	1,383
Glass	157
Geological	270
Organics	179
Others	13
Total	30,755

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	773
Ceramics Stoneware	5,673
Ceramics Earthenware	808
CBM	594
Ceramics Other	0
Metal	325
Glass	4
Geological	58
Organics	182
Others	48
Total	8,465

**Other**

Material Type	Weight (g)
Ceramics Porcelain	216
Ceramics Stoneware	1,475
Ceramics Earthenware	273
CBM	0
Ceramics Other	0
Metal	70
Glass	0
Geological	0
Organics	0
Others	0
Total	2,034

**VCH 008**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	7,279
Ceramics Stoneware	44,994
Ceramics Earthenware	13,533
CBM	380
Ceramics Other	288
Metal	5,573
Glass	146
Geological	2,573
Organics	716
Others	0
Total	75,482

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	6,181
Ceramics Stoneware	38,665
Ceramics Earthenware	12,129
CBM	140
Ceramics Other	288
Metal	4,529
Glass	105
Geological	2,570
Organics	646
Others	0
Total	65,253

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	902
Ceramics Stoneware	3,333
Ceramics Earthenware	915
CBM	240
Ceramics Other	0
Metal	586
Glass	41
Geological	2
Organics	70
Others	0
Total	6,089

**Other**

Material Type	Weight (g)
Ceramics Porcelain	196
Ceramics Stoneware	2,996
Ceramics Earthenware	489
CBM	0
Ceramics Other	0
Metal	458
Glass	0
Geological	1
Organics	0
Others	0
Total	4,140

**VCH 009**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	8,255
Ceramics Stoneware	51,174
Ceramics Earthenware	20,985
CBM	812
Ceramics Other	148
Metal	5,470
Glass	585
Geological	3,173
Organics	1,855
Others	18
Total	92,475

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	6,392
Ceramics Stoneware	45,738
Ceramics Earthenware	19,838
CBM	635
Ceramics Other	142
Metal	4,145
Glass	178
Geological	3,148
Organics	1,501
Others	3
Total	81,720

**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	1,321
Ceramics Stoneware	2,899
Ceramics Earthenware	1,147
CBM	160
Ceramics Other	6
Metal	1,210
Glass	405
Geological	10
Organics	370
Others	15
Total	7,543

**Other**

Material Type	Weight (g)
Ceramics Porcelain	542
Ceramics Stoneware	2,537
Ceramics Earthenware	742
CBM	17
Ceramics Other	0
Metal	115
Glass	2
Geological	15
Organics	0
Others	0
Total	3,970

**VCH 010**

**Total Artifact Yield**

Material Type	Weight (g)
Ceramics Porcelain	2,138
Ceramics Stoneware	9,912
Ceramics Earthenware	3,420
CBM	1,493
Ceramics Other	61
Metal	1,067
Glass	380
Geological	0
Organics	899
Others	96
Total	19,466

**Temasek Period**

Material Type	Weight (g)
Ceramics Porcelain	896
Ceramics Stoneware	4,999
Ceramics Earthenware	1,444
CBM	179
Ceramics Other	0
Metal	465
Glass	49
Geological	0
Organics	618
Others	0
Total	8,650

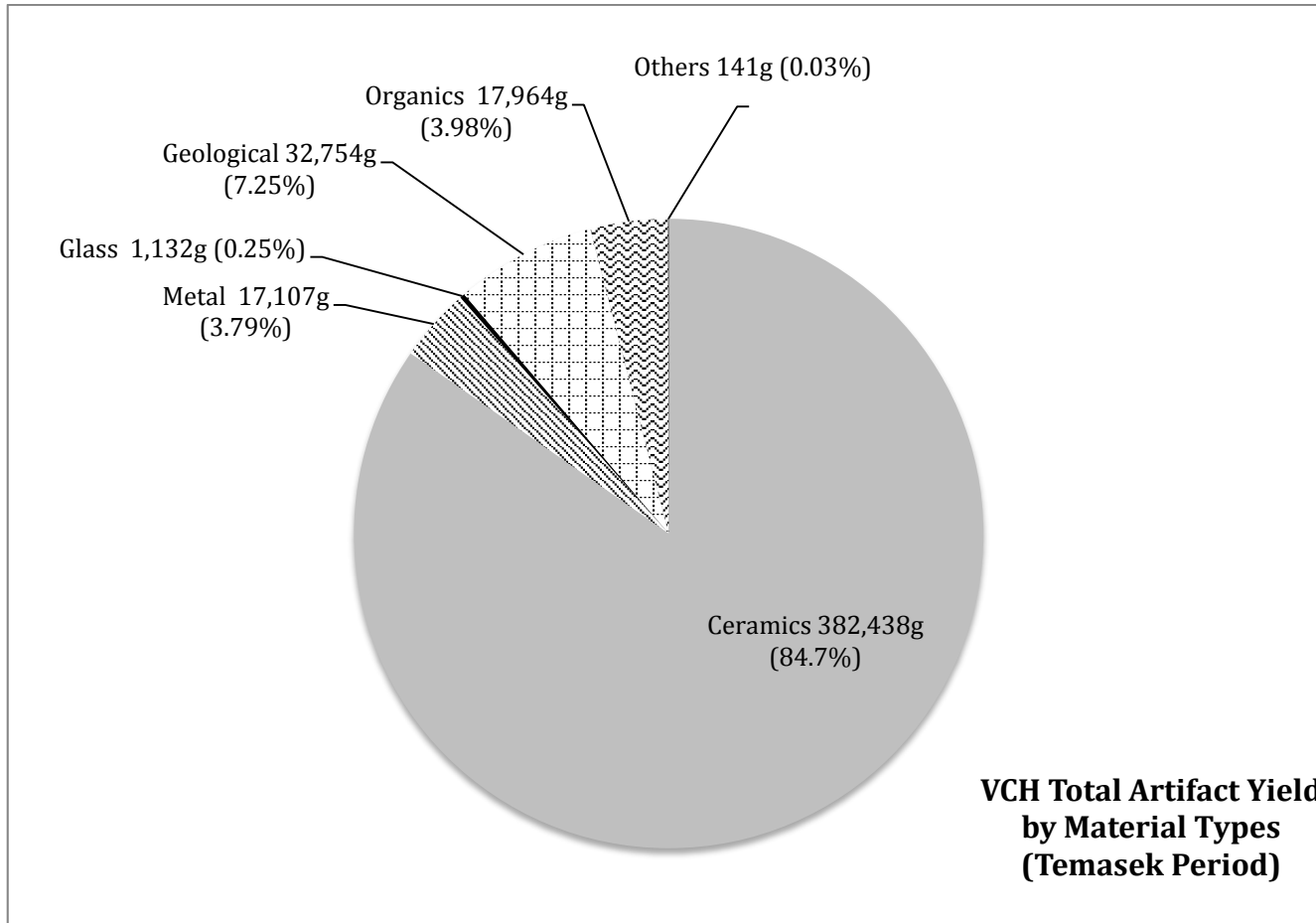
**Colonial Period**

Material Type	Weight (g)
Ceramics Porcelain	727
Ceramics Stoneware	3,932
Ceramics Earthenware	1,808
CBM	1,314
Ceramics Other	61
Metal	547
Glass	331
Geological	0
Organics	281
Others	96
Total	9,097

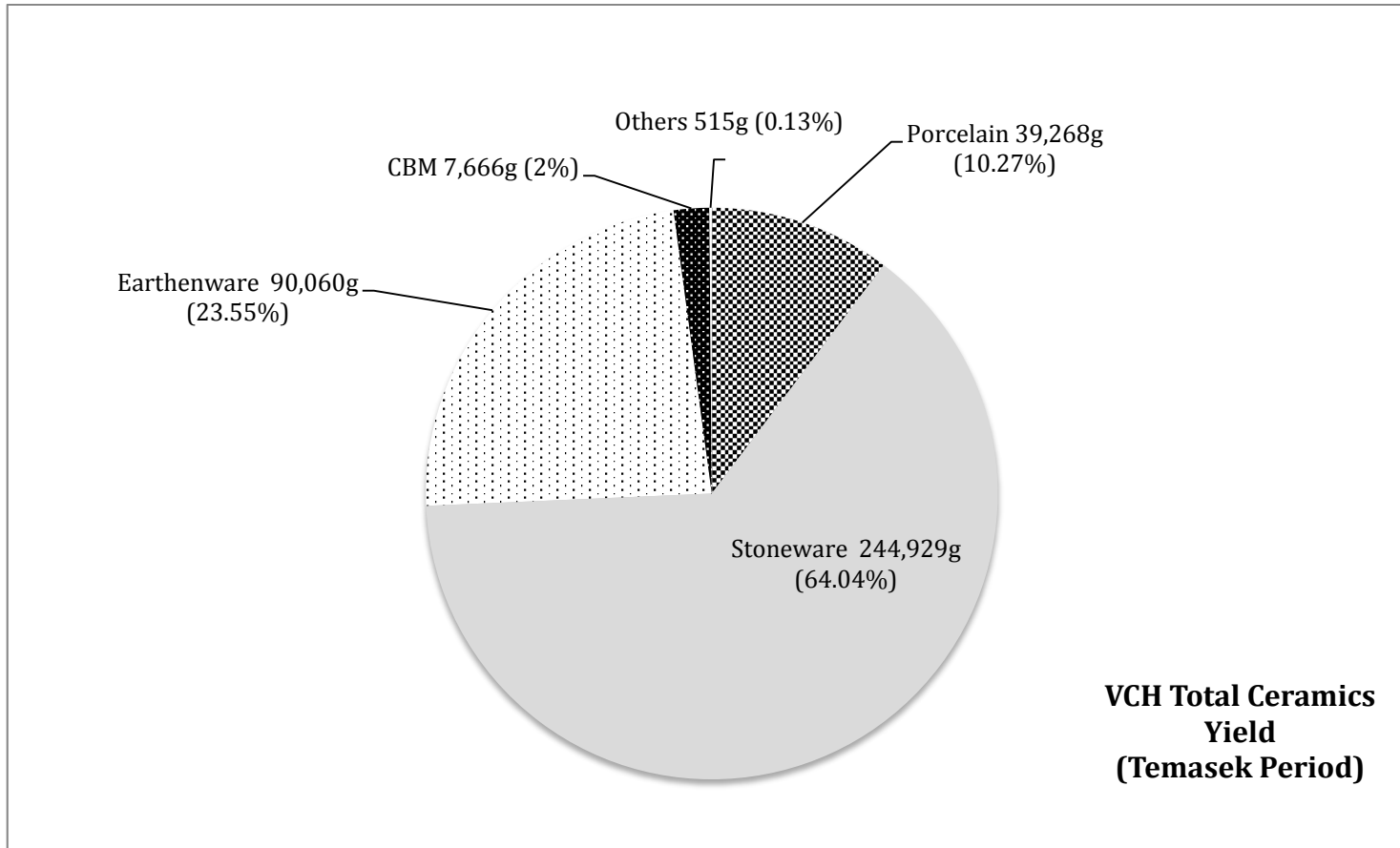
**Other**

Material Type	Weight (g)
Ceramics Porcelain	515
Ceramics Stoneware	981
Ceramics Earthenware	168
CBM	0
Ceramics Other	0
Metal	55
Glass	0
Geological	0
Organics	0
Others	0
Total	1,719

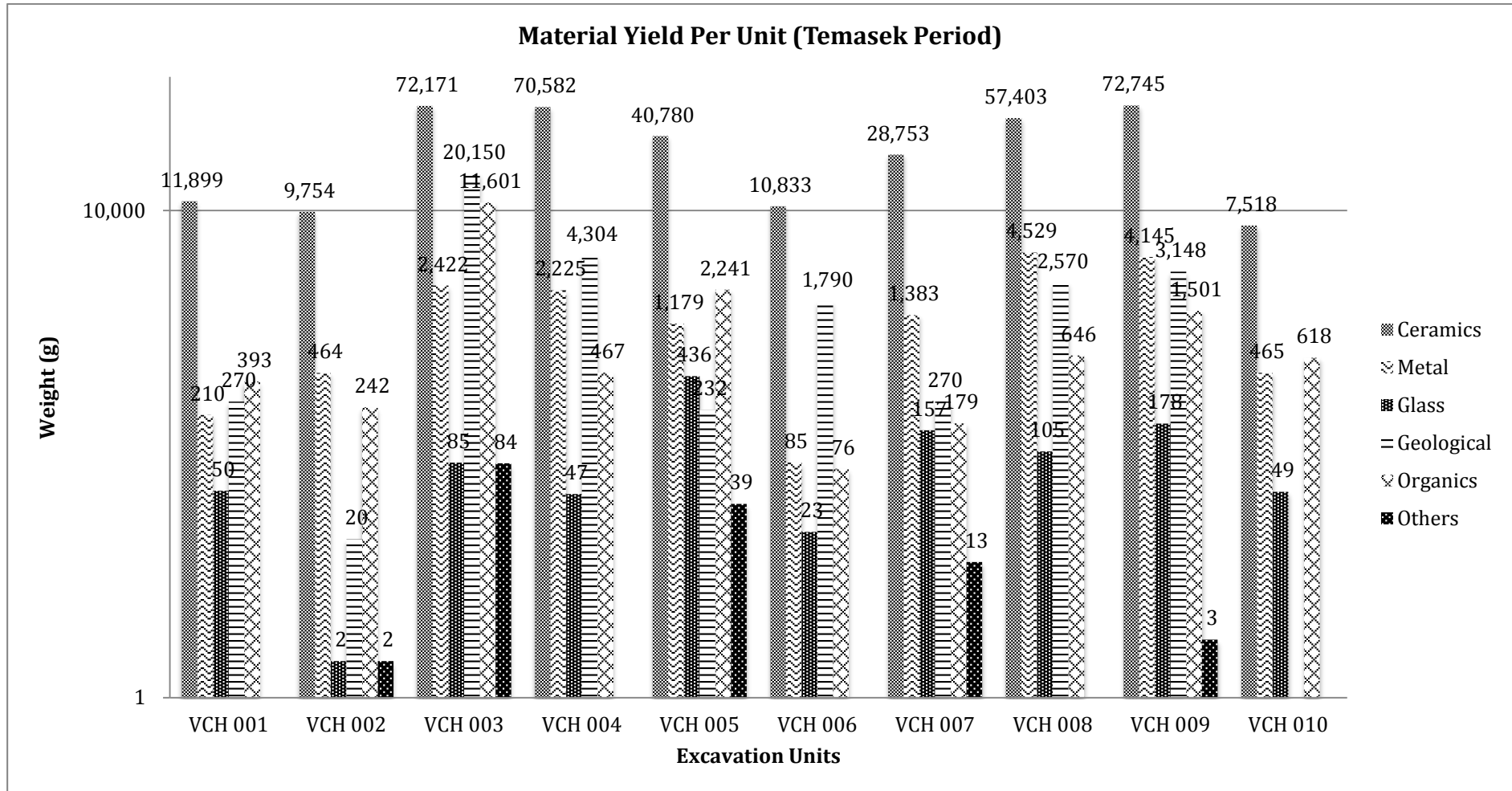
Appendix B: Artifact Yield from the Temasek Period



Appendix C: Ceramics Yield from the Temasek Period



Appendix D: Material Yield Per Unit from the Temasek Period





Appendix E: Ceramics Class Per Unit from the Temasek Period

