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Determination of the plan of the A Famosa Fortress, Malaysia

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ABSTRACT

The "A Famosa Fortress" is one of the oldest partially extant European buildings in Malaysia. It was built in 1511 by the Portuguese and went through several architectural developments and changes before being largely destroyed during the British occupation in 1824. With the subsequent overbuilding of the site by Melaka city today, it is impossible to fully reconstruct this fortress in its physical context. In this paper, we focus on determining the fortress layout based on various textual descriptions and old drawings and plans in preparation to building a detailed 3-D digital model. We have identified several important issues arising from the lack of any authoritative documentation. Such plans as exist not only differ in their depiction of the fort, but also use various ancient measurement systems. The paper gives examples of these problems and shows how a verifiable conjectural layout has been constructed. This is then compared against such archaeological evidence as is currently available. We are not aware of any previously published attempt to verify the consistency, similarity and integrity of the documentary data.

Keywords
A Famosa,3-D digital model, fortress

1.0 INTRODUCTION

Historically, Melaka's strategic position in South East Asia has made it as an important centre of commerce (Thomaz & Pintado, 2000). The traders used to trade various items such as spices, cloth, tin, silk, porcelain and many more. These traders came from all over the world: India, China, Borneo, Arabia and Europe. Melaka's popularity attracted the Portuguese to expand their power in commercial dealings, military occupation and religion. The Portuguese believed that by controlling Melaka, they could monopolise spice trading which was a very valuable item in Europe and expand their military power. One said that whoever is lord of Melaka has his hand on the throat of Venice (Pires & Rodrigues, 1944). Besides, one of the Portuguese's objectives was to expand the influence of Christianity in this region and this could only be done by seizing Melaka. In 1511, the Portuguese, with fifteen small and great sails and with sixteen hundred fighting men laid siege to Melaka (Ryan, 1960). With advanced strategy and weapons, the Portuguese managed to capture Melaka within three weeks and, on August 10th, 1511 Melaka fell into Portuguese hands (Noonan, 1989). Albuquerque was the captain for the new Portuguese government in Melaka. He immediately ordered a fortress to be built for defensive purpose (Godinho de Eredia & Mills, 1997). With this success, it also attracted the Dutch with the monopoly of the trading in South East Asia. The fortress of Melaka continued its architectural development over this time. Prior to the occupation of the Dutch, they heavily bombarded the fortress which has critically destroyed part of the fortress. After they succeeded to conquer Melaka in 1641, the Dutch carried out major reconstruction on the fortress as part of their strategy to strengthen their power. This reconstruction involved the extension of the fortress walls and bastions (Leupe & Hacobian, 1936). When the British took over the Dutch's position in 1824, the British captain in Melaka, William Farquhar instructed the fortress to be destroyed. As the result, the only evidence left today is a gate to access the fortress which is known as Porta de Santiago (Figure 1).

Figure 1: Remnant of Old Portuguese fortress in Melaka, Porta de Santiago (Asia Explorers, 2003)

1.2 Motivation

In 2003, the foundation of the Santiago bastion, part of the walls of the Fortress Melaka was discovered during piling works for the Dataran Pahlawan Melaka Megamall project in Bandar Hilir. In November 2006, while the Melaka Government was building the 120 meters high "Melaka Tower" project just inside the heritage zone, besides the Melaka river, the piles of the tower hit something hard below the ground. Only upon excavation, the workers discovered the walls and foundations of another fortress bastion identified as Middleburgh. This new discovery was so important that the Ministry of Culture, Arts and Heritage has allocated more than RM 12 million to excavate and do research of this new founding. However, work to uncover more of the buried wall, despite its historical significance and potential to draw more tourists into the area, may not be feasible as it would involve tearing up the major road that links the old town with the new commercial area. Hence, only certain part of the fortress can be reconstructed. In order to solve this problem, we propose to digitally reconstruct this fortress in form of 3D model which can be navigated in the virtual world. Since the fortress itself has faced several changes in its design and layout, by reconstructing it in 3D allows the researchers to investigate and study the development of these changes from architectural and historical aspects.

2.0 DATA COLLECTION

2.1 Tracing A Famosa

Tracing back A Famosa is one of the biggest challenge in this research. This is because, besides, a very minimal physical evidence available today, it also requires a conscientious bibliographic research since it lacks of systematic historical and documental history of Malacca (Viana De Lima 1988).To obtain as much as possible available resources on A Famosa, we have done an extensive web search on worldcatalog.org and traced all available resources from around the world. Through Strathclyde University library, we loaned these books and journals for our main references. Some of these books are listed in the reference section of this paper. We have also purchased some drawings of A Famosa which are available from the collection at The National Archive of Portugal. We also have established contact with researchers who have done research related to the history of Melaka such as Dr Nordin Husin from University Kebangsaan Malaysia (UKM) and Professor Pierre-Yves Manguin from Ecole française d'Extrême-Orient, Paris. Another approach is to establish a strong partnership with the representatives from Culture, Arts and Heritage Ministry of Malaysia (CAHMM) and Warisan, the government bodies that are responsible to reconstruct some of the fortress vital portions for conservation and tourism purpose. Through this partnership, it is possible the get the latest update on the excavation works on site and we can easily get permission to access the site for this research purpose.

2.2 Types of data

After getting our resources, we started to extract the relevant data and classified it into different forms. They are listed below.

2.2.1 Visual data such as drawings, paintings and map

We have extracted and collected a lot of visual data related to A Famosa from books, journals and even direct from the national archives. Among them are old drawings dated from year 1500 to 1700 recorded by various artists, draftsmen and architects from the Portuguese era until the British era. Unlike the drawings from the Portuguese era most of the drawings during Dutch era are more precise. They are in the form of plans, drawn according to scale with specific measurement unit. However, the measurement unit used are old units such chain, rod, furlong and fathoms which are no longer used nowadays. Besides that, even the same unit might use different conversion value such as listed in Table 1 below.

Table 1: *Conversion of old units (Murray, 1862)*

Name	Conversion (1 unit equivalent)
Dutch foot	11 Dutch inches 11 3/8 English inches
English foot	12 inches
Dutch rod	Sometimes 11,12 13 Dutch feet
English rod	16.6 English feet

2.2.2 Textual descriptions

Drawings extracted from the reports, books, journals, paper and etc are usually further explained in textual forms. In not to scale drawings, some of the measurements are described in the text explaining the drawings. Even though the information is quite scattered compared to the visual from, proper extraction can give important information on the fortress material, height, position, elements and functions which can give better understanding of the fortress. This can be an important reference and support data for translating the visual data.

2.2.3 Physical data

The physical data of the fortress is the most accurate data to represent the fortress. Initially, the only available remain of the fortress after the British era is Porta de Santiago, which was one of the gates to the fortified city of Melaka. However,

after years of excavation works, a bastion known as Middleburgh has been successfully reconstructed. At the moment, the excavation team is working on reconstructing another bastion, known as Frederick Hendrick. The data we obtained from the physical inspection of the fortress can be used as our main reference in our analysis and can be projected to the findings from visual and textual data in order to get a complete accurate data of the whole fortress wall.

3.0 DATA ANALYSIS AND RESULTS

Based on the collected data, we realized that data during the Dutch era are more detail compared to the Portuguese. Thus we decided to start tracing the fortress from this era. The first analysis is to identify the fortress wall measurement. Currently there is no available wall measurement on the fortress site. However, we managed to trace a report of Governor Balthasar Bort in Malacca dated 1678 (Bort, 1927). In this report, there is a detail measurement for the wall connecting each bastion. Table 2 presents the data extracted from the report.

Table 2: *Data extracted from Bolt Balthasar's report on Dutch's administration in Melaka*

Points	Innermost polygon			Outermost lines		
	Rod	Feet *	Meter **	Rod	Feet*	Meter**
Fredrick Hendrick to Middleburgh	16	192	55.47	18	216	62.40
Middleburgh to Ernestus	41.3	495.6	143.19	40.3	480	138.6
Ernestus to Amsterdam	16.8	201.6	58.24	15.9	190.8	55.12
Amsterdam to Victoria	26.4	316.8	91.53	28.6	339.6	98.11
Victoria to Emelia	56	672	194.15	62.8	753.6	217.73
Emelia to Henriette Louijse	46	552	159.48	49.2	590.4	170.58
Henriette Louijse to Wilhelmus	39	468	135.21	42.4	508.8	147.00
Wilhelmus to Mauritius	40.8	489.6	141.45	43.11	517.32	149.46
Mauritius to Frederick Hendrick	59.9	718.8	207.67	64.11	769.32	222.27
Total circumference	342.2	4106.4	1186.44	364.42	4373.04	1263.48

* 1 rod is equivalent to 12 feet, Rhenish measure. (Extracted from the report)
** The conversion is based on 1 Dutch feet equivalent to 11.375 English inch (Refer table 1)

1 English inch = 25.4 mm thus 1 Dutch feet equivalent to 11.375 x 25.4 mm = 288.925 mm

From the given data, we try to transform it into visual form by first constructing the innermost polygon. Figure 2 gives the visual representation of the data according to the angle and measurement given.

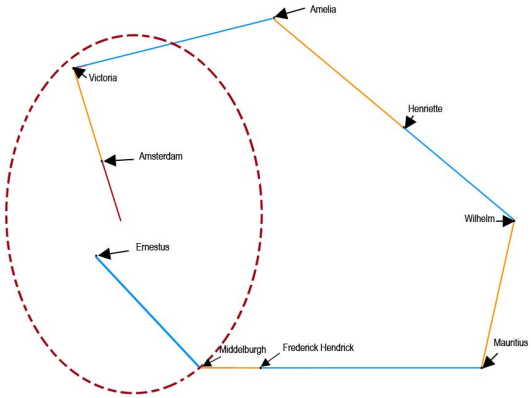


Figure 2: Visual representation of the data according to scale

As we can see from the figure, there are some inconsistencies in the highlighted area as discussed below:

1. According to the report, there is no inner polygon angle for Ernestus and Amsterdam because they are laid together on a straight line. However, given the inner polygon angle for Middleburgh and Victoria, there is no way that Ernestus and Amsterdam would lie on a straight line.
2. The innermost polygon distance given for Middleburgh to Ernestus and Ernestus to Amsterdam is questionable because it is longer than the outermost lines. This is impossible if the Ernestus and Amsterdam are built out of a straight line.

To clarify this ambiguity, we have chosen to confirm the given angles and distances using the rule of sine and the rule of cosine. For this purpose, we have divided the innermost polygon as in Figure 2 into small triangles. Then we calculated the angles and distances based on various assumptions:

1. Assuming the Ernestus and Amsterdam lies in a straight line. The result is shown in Table 3.
2. Assuming the angle for Victoria and distance from Victoria to Amsterdam is correct. The result is shown in Table 4.
3. Assuming the angle for Middleburgh and distance from Middleburgh to Ernestus is correct. The result is shown in Table 5.

Table 3: *Result for assumption 1*

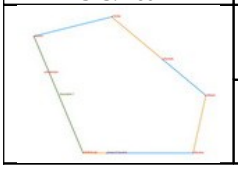
Inner polygon shape	Victoria to Middleburgh			Inner polygon angle			
Circumference: 345.7rod	Inner polygon	Inner polygon	Outermost line	Victoria		Middleburgh	
	From the report	From the calculation	From the report	From the report	From the calculation	From the report	From the calculation
	84.5	88	84.8	87	80.78	133	113.2

Table 4: *Result for assumption 2*

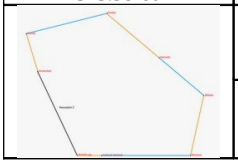
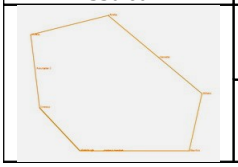
Inner polygon shape	Amsterdam to Middleburgh			Inner polygon angle			
Circumference: 345.98rod	Inner polygon	Inner polygon	Outermost line	Amsterdam		Middleburgh	
	From the report	From the calculation	From the report	From the report	From the calculation	From the report	From the calculation
	58.1	61.88	56.2	180	171.5	133	115.5

Table 5: *Result for assumption 3*

Inner polygon shape	Victoria to Ernestus			Inner polygon angle			
Circumference: 350rod	Inner polygon	Inner polygon	Outermost line	Victoria		Ernestus	
	From the report	From the calculation	From the report	From the report	From the calculation	From the report	From the calculation
	43.2	51	44.5	87	96.6	180	144.4

After analyzing the shape based on the 3 assumptions, we decided to remove the result from assumption 3. This is because the error between the calculated value and the report is very big (more than 15%) in most cases for assumption 3. Another finding that is observed from this assumption is that the outermost line for Victoria to Middleburgh should be longer compared to the distance given in the report which implies that the total circumference would also be bigger than the value from the report.

Based on the inner polygon shape, we try to construct the outermost line. The Balthasar's report has stated 7 bastions and 2 angles as detailed in the Table 6.

There are few challenges in validating the measurement of the outermost line. The challenges are listed below.
1. The Balthasar's report did not specify whether the measurement of the outermost line include the size of the bastions. There is also no explanation on the size of the fortress or any visual information on the shape.
2. It also gives inconsistent value on the circumference of the outside wall. The circumference of the outside wall is stated to be 365.5 rod, while the detail point to point value (as shown in Table 1) total up to be 364.2 rod.

Table 6: *List of bastions and shapes for A Famosa extracted from the report*

No.	Bastion	Shape
1	Middleburgh	Half bastion
2	Ernestus	Half bastion
3	Amsterdam	Angle
4	Victoria	Full bastion
5	Emilia	Round
6	Henriette Louise	Full Bastion
7	Wilhemus	Round
8	Mauritius	Obtuse Angle
9	Fredrick Hendrick	Full bastion

To solve this ambiguity, we used 2 approaches. First, we adopted the point to point measurement and assumed that it is just a straight line connecting the bastions (without considering the bastion shape and size). Figure 3 shows the complete visualization of innermost polygon and the outermost line of A Famosa based on this approach. The total circumference calculated from Figure 3 is 1.29 km, slightly longer than the circumference calculated from the report (1.26 km, as in Table 1).

In the second approach, we adopted the shape and size of the bastions from general observation on the collected drawings and plans and include the bastions into Figure 3. We adjusted the original point to point measurement so that it would include the bastions size and tried to minimize the total circumference. The result is shown in Figure 4 with the circumference increased to 1.475km.

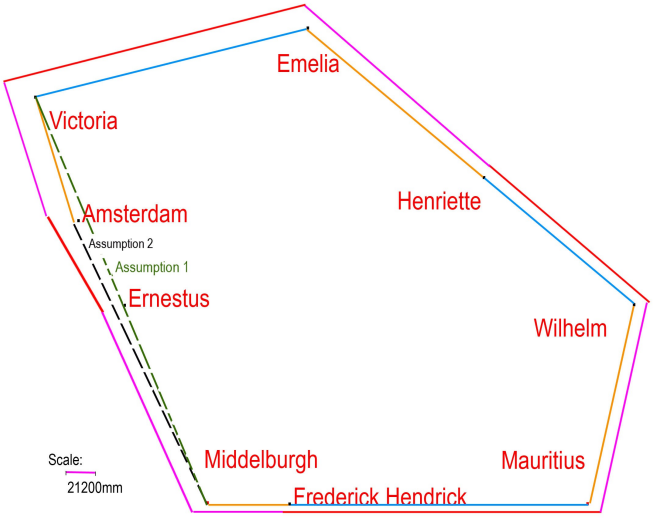


Figure 3: Complete visualization of innermost polygon and the outermost line of A Famosa without the bastions

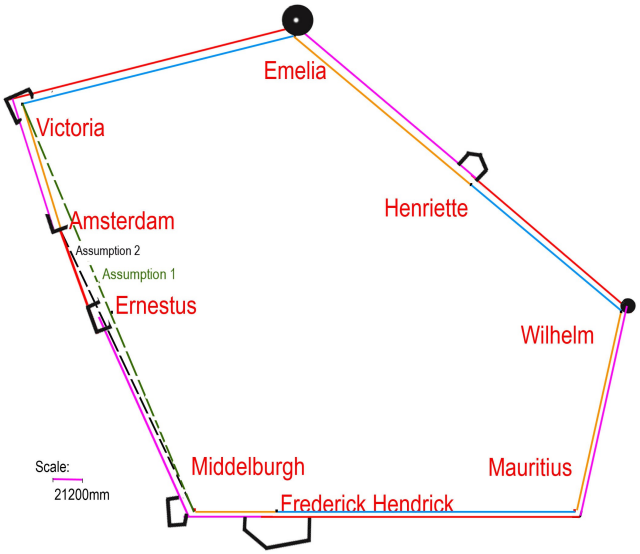


Figure 4: Complete visualization of innermost polygon and the outermost line of A Famosa including the bastions

To further verify the circumference measurement, we have compared the data with the description given by Manuel Godinho De Eredia in 1604 (Godinho de Eredia & Mills, 1997). This description is about A Famosa during the Portugese era, thus it might not be directly comparable with the one extracted from Balthasar's report. This is because, in Balthasar's report, he had stated some modifications done on

the fortress during his time such as the bastion of Victoria was extended to 1/3 of it's original size and the addition of Middleburgh bastion, which is not exist during the Portuguese era. However, the measurement from Emilia to Fredrick Henrick should be similar since there is no modification reported. The result is presented in Table 7.

Table 7: *Comparison of the measurement from Balthasar's report (Bort, 1927) and Godinho de Eredia (Godinho de Eredia & Mills, 1997)*

Points	Balthasar 's report	Figure 4	Manuel Godinho De Eredia	
	Meter	**Meter**	**Fathoms**	**Meter (1 fathom =1.82 m)**
Fredrick Hendrick to Victoria	354.33	452.3	150	273
Victoria to Emelia	217.73	222.51	100	182
Circumference 1	572.06	674.81	250	455
Emelia to Henriette Louijse	170.58	269.88	100	182
Henriette Louijse to Wilhelmus	147.00	163.24	100	182
Wilhelmus to Mauritius	149.47	179.69	75	136.5
Mauritius to Frederick Hendrick	222.28	188	130	236.6
Circumference 2	689.33	800	405	737.1
Total circumference	1261.39	1474.81	655	1192.1

The total circumference given by De Eredia is smaller compared to Balthasar's report. This is due to the fact that during the Dutch era, there has been some modification and extension as explained before. However, it is difficult to say which is the most accurate measurement because the measurement from both sources used very old unit and there might be a small error in converting the old unit to the current metrics unit. Considering that, we assume that the plan we have as in Figure 4 is consistent with both sources.

To further verify the consistency and reliability of our finding, we have projected the plan in Figure 4 to the current Melaka map as shown in Figure 5. On the map, we have identified few spots such as Middleburgh bastion and Santiago bastion, discovered from the excavation and the gate of Santiago. From the figure, we observed that preliminary visualization match the identified A Famosa spots on the map. However, further analysis need to be done before the measurement can be finalized.

Figure 5: The projection of the visualization on to the current Melaka map

4.0 CONCLUSION AND FUTURE WORKS

The data from Balthasar's report has been very helpful in reconstructing the complete wall of A Famosa fortress. The inner polygon measurement and angle has been proven using the rules of sine and the rules and cosines and the outer wall is constructed based on the inner polygon shape. From the analysis, we found that data extracted form old reports are prone to recording mistake or error and need to be further clarified. Besides, the conversion of various ancient measurement systems to current matrix system might also contribute to some conversion error. The fortress layout that we have from this finding is basically based on textual description. In future research, we plan to conduct procrustes analysis to compare our finding with selected visual data consisting of drawings from the Dutch era.

REFERENCES

Asia Explorers., 2003. Article on Exploring the Porta de Santiago (A Famosa) Remains of old Portuguese fort, Malacca, Malaysia. http://www.asiaexplorers.com/malaysia/__porta_de__santiago.htm (accessed 02 Jun. 2008)

Bort, B. (1927). *Report of Governor Balthasar Bort on Malacca, 1678*. Singapore: Malayan Branch, Royal Asiatic Society.

Godinho de Eredia, M., & Mills, J. V. (1997). *Eredia's description of Malaca, Meridional India, and Cathay*. Kuala Lumpur, Malaysia: Malaysian Branch of the Royal Asiatic Society.

Leupe, P. A., & Hacobian, M. (1936). *The siege and capture of Malacca from the Portuguese in 1640-1641: extracts from the archives of the Dutch East Indies Company*. [Singapore, Malayan

Murray Hoffman (1862). *Treatise Upon the Estate and Rights of the Corporation of the City of New York*, E. Jones & Co.

Noonan, L. A. (1989). *John of Empoli and his relations with Afonso de Albuquerque*. Lisboa: Ministério da Educação, Instituto de Investigação Científica Tropical.

Pires, T., & Rodrigues, F. (1944). *The Suma oriental of Tomé Pires, an account of the East, from the Red Sea to Japan, written in Malacca and India in 1512-1515, and The book of Francisco Rodrigues, rutter of a voyage in the Red Sea, nautical rules, almanack and maps, written and drawn in the East before 1515*. London: The Hakluyt Society.

Ryan, N. J. (1960). *Malaya through four centuries an anthology, 1500-1900.* London, Oxf. Univ. Press, pp. 6

Thomaz, Luís Filipe F. R., and Manuel Pintado. 2000. *Early Portuguese Malacca.* [Macau]: CTMCDP/IPM, pp. 19.

Viana de Lima, A. E. (1988). *Reviver Malaca = Malacca, a revival.* Porto, Viana de Lima e Livraria Figueirinhas.