



# Evaluating the Feasibility of a Historic Ship Exhibition at Central Pier 8

An Interactive Qualifying Project Report  
submitted to the Faculty of the  
Worcester Polytechnic Institute  
in partial fulfillment of the requirements for the  
Degree of Bachelor of Science  
in cooperation with the  
Hong Kong Maritime Museum, Hong Kong  
Submitted on March 4, 2011

**Submitted By:**  
Jessica Holmes  
Codie Keene  
Stephen Lee  
Mitchel Wilkinson

**Submitted To:**  
Dr. Richard Wesley, Sponsor Liaison

**Project Advisors:**  
Professor Robert Kinicki  
Professor Zhikun Hou

## Abstract

This project assesses the feasibility of the Hong Kong Maritime Museum to berth a historic ship at Central Pier 8 in Victoria Harbour to be used as a permanent ‘floating’ exhibition. Our team examined all pertinent maritime laws and undertook a comprehensive review of harbour movements, pier loading conditions, and best-practice safety guidelines. Interviews with local experts facilitated determining cost estimates for vessel purchase, maintenance, typhoon sheltering, and fendering. A team survey estimated the price the public is willing to pay to see such an exhibit and determined that a tall ship or junk were the most popular options. It was concluded that exhibition feasibility is highly dependent on current uncertainties over a set of technical, market, and financial conditions.

## Acknowledgements

Our project team would like to thank the Hong Kong Maritime Museum and its entire staff for making our project possible. We would like to give special thanks to Mr. Richard Wesley, Museum Director and Dr. Stephen Davies, Maritime Heritage Resource Centre Research Fellow, for their kind support and willingness to share an office with us. Our team would also like to thank Ms. Catalina Chor, Executive Manager and Curator; and Assistant Curators Ms. Moody Tang and Ms. Carlie Au Yeung for providing guidance and support as we progressed through our project.

We also would like to thank Worcester Polytechnic Institute for coordinating this project, and especially our advisors Professor Robert Kinicki and Professor Zhikun Hou. We would also like to acknowledge Professor Creighton Peet, our Project Site Director.

Our team is also grateful for the assistance of Mr. Peter Arenstam, Professor Jeffrey Forgeng, Ms. Charlotte Ho, Mr. W.M. Leung, Ms. Jennifer To, Mr. Roger Tupper, Mr. Li Wang, Ms. Elim Wong, and Mr. W.T. Wong, all of whom took the time to sit with us and showed great patience in answering our questions. Our team also extends its thanks to the sailing and maintenance crews of the Bounty III.

Finally, we would like to acknowledge and thank the kind people of Hong Kong, both for taking part in our survey, and for their gracious hospitality.

## Authorship Page

<u>Section</u>	<u>Primary Author</u>	<u>Secondary Author</u>
<b>Abstract</b>	Mitchel Wilkinson	
<b>Acknowledgments</b>	Codie Keene	Mitchel Wilkinson
<b>Executive Summary</b>	Stephen Lee	Mitchel Wilkinson
<b>1</b>	Mitchel Wilkinson	Jessica Holmes
<b>2</b>	Mitchel Wilkinson	
<b>2.1</b>	Mitchel Wilkinson	
<b>2.1.1</b>	Mitchel Wilkinson	Codie Keene
<b>2.1.2</b>	Codie Keene	
<b>2.1.3</b>	Jessica Holmes	Mitchel Wilkinson
<b>2.2</b>	Mitchel Wilkinson	
<b>2.2.1</b>	Stephen Lee	
<b>2.2.2</b>	Stephen Lee	
<b>2.2.3</b>	Codie Keene	Mitchel Wilkinson
<b>2.2.4</b>	Stephen Lee	
<b>2.2.5</b>	Jessica Holmes	
<b>2.2.6</b>	Stephen Lee	
<b>2.2.7</b>	Stephen Lee	
<b>2.2.8</b>	Stephen Lee	
<b>2.2.9</b>	Mitchel Wilkinson	
<b>2.2.10</b>	Mitchel Wilkinson	
<b>2.3</b>	Mitchel Wilkinson	
<b>2.3.1</b>	Mitchel Wilkinson	
<b>2.3.2</b>	Mitchel Wilkinson	
<b>2.4</b>	Jessica Holmes	
<b>2.4.1</b>	Jessica Holmes	
<b>2.4.2</b>	Jessica Holmes	
<b>2.4.3</b>	Jessica Holmes	
<b>2.4.4</b>	Jessica Holmes	
<b>2.4.5</b>	Codie Keene	Mitchel Wilkinson
<b>2.5</b>	Mitchel Wilkinson	
<b>3</b>	Mitchel Wilkinson	Jessica Holmes
<b>3.1</b>	Mitchel Wilkinson	Codie Keene
<b>3.1.1</b>	Codie Keene	Mitchel Wilkinson
<b>3.1.2</b>	Mitchel Wilkinson	Codie Keene
<b>3.2</b>	Mitchel Wilkinson	Jessica Holmes
<b>3.2.1</b>	Jessica Holmes	Stephen Lee
<b>3.2.2</b>	Stephen Lee	Jessica Holmes
<b>3.2.3</b>	Stephen Lee	Jessica Holmes
<b>3.2.4</b>	Jessica Holmes	Stephen Lee

<b>3.2.5</b>	Stephen Lee	
<b>3.2.6</b>	Stephen Lee	
<b>3.3</b>	Mitchel Wilkinson	Codie Keene
<b>3.3.1</b>	Codie Keene	Mitchel Wilkinson
<b>3.4</b>	Mitchel Wilkinson	Codie Keene
<b>3.4.1</b>	Codie Keene	Mitchel Wilkinson
<b>3.4.2</b>	Mitchel Wilkinson	Codie Keene
<b>3.5</b>	Mitchel Wilkinson	Stephen Lee
<b>4</b>	Mitchel Wilkinson	
<b>4.1</b>	Mitchel Wilkinson	Codie Keene
<b>4.1.1</b>	Jessica Holmes	
<b>4.1.2</b>	Jessica Holmes	
<b>4.1.3</b>	Jessica Holmes	
<b>4.1.4</b>	Jessica Holmes	
<b>4.1.5</b>	Jessica Holmes	
<b>4.1.6</b>	Jessica Holmes	
<b>4.1.7</b>	Jessica Holmes	
<b>4.2</b>	Mitchel Wilkinson	
<b>4.2.1</b>	Codie Keene	Mitchel Wilkinson
<b>4.2.2</b>	Codie Keene	Mitchel Wilkinson
<b>4.2.3</b>	Codie Keene	Mitchel Wilkinson
<b>4.2.4</b>	Mitchel Wilkinson	Codie Keene
<b>4.2.5</b>	Codie Keene	Mitchel Wilkinson
<b>4.3</b>	Mitchel Wilkinson	
<b>4.3.1</b>	Mitchel Wilkinson	Codie Keene
<b>4.3.2</b>	Stephen Lee	
<b>4.3.3</b>	Mitchel Wilkinson	
<b>4.3.4</b>	Stephen Lee	
<b>4.3.5</b>	Stephen Lee	
<b>4.3.6</b>	Stephen Lee	
<b>4.3.7</b>	Stephen Lee	
<b>4.3.8</b>	Stephen Lee	
<b>4.4</b>	Mitchel Wilkinson	Codie Keene
<b>5</b>	Codie Keene	Stephen Lee

## Table of Contents

Title Page.....	i
Abstract.....	ii
Acknowledgements.....	iii
Authorship Page.....	iv
Table of Contents.....	v
List of Tables .....	ix
Table of Figures.....	x
Executive Summary.....	xi
1. Introduction .....	1
2. Background .....	3
2.1 Hong Kong Maritime Activity: Past and Present.....	3
2.1.1 Early Chinese Maritime Activities .....	3
2.1.2 Maritime Activity in Hong Kong .....	5
2.1.3 Harbour’s Impact on Daily Life in Hong Kong .....	7
2.2 Technical Background .....	11
2.2.1 Harbour Overview.....	11
2.2.2 Tide and Current .....	12
2.2.3 Typhoon Overview .....	15
2.2.4 Ship Berthing.....	17
2.2.5 Berthing Energy.....	19
2.2.6 Ship Mooring.....	24
2.2.7 Ship Maintenance and Repair .....	25
2.2.8 Ship Access from a Port Structure .....	26
2.2.9 Secondary Effects of Vessel Movement and Berthing.....	28
2.2.10 Ambiance and Microclimate .....	29
2.3 Safety and Legality .....	30
2.3.1 Regulations.....	30
2.3.2 Limiting Cases and Best Practices .....	32
2.4 Market Research .....	34
2.4.1 Attitudes Towards Museums .....	34
2.4.2 Museum Experience: China and Hong Kong versus the West .....	34

2.4.3	Museum Setup.....	36
2.4.4	Hong Kong Maritime Museum: History and Purpose .....	38
2.4.5	Benefits of Central Pier 8 .....	39
2.5	Summary .....	40
3.	Methodology.....	42
3.1	Assessment of Market Conditions .....	42
3.1.1	Survey Creation and Administration.....	43
3.1.2	Drawing Comparisons to Similar Exhibitions .....	46
3.1.3	Museum Capacity and Operations Management.....	47
3.2	Technical Considerations .....	48
3.2.1	Analysis of Structural Engineering Report .....	48
3.2.2	Contacting the Star Ferry Company.....	49
3.2.3	Contacting the Hong Kong Observatory .....	49
3.2.4	Contacting the Hong Kong Hydrographic Office.....	49
3.2.5	Study of Typhoons and Typhoon Shelters .....	50
3.2.6	Gangway Systems Research.....	50
3.3	Legal and Regulatory Framework .....	50
3.3.1	Ensuring Safety and Accessibility .....	51
3.4	Promotion and Outreach .....	51
3.4.1.	Promotional Opportunities: Touring Companies.....	53
3.4.2	Reaching out to School Groups.....	53
3.5	Summary .....	54
4.	Results.....	55
4.1	Survey Results .....	55
4.1.1	Demographic Comparison to Internal Museum Data.....	56
4.1.2	Response to Question #1 .....	58
4.1.3	Response to Question #2 .....	60
4.1.4	Response to Question #3 .....	64
4.1.5	Response to Question #4 .....	68
4.1.6	Response to Question #5 .....	72
4.1.7	Survey Results Summary.....	77
4.2	Promotional Activities.....	78

4.2.1	Big Bus Company.....	78
4.2.2	Cruise Lines .....	79
4.2.3	School Groups .....	80
4.2.4	Bounty Meeting .....	80
4.2.5	Bounty Touring.....	82
4.3	Technical and Safety .....	86
4.3.1	Legality and Interpretation .....	86
4.3.2	Analysis of the Structural Engineering Report .....	87
4.3.3	Ship Availability .....	88
4.3.4	Star Ferry.....	90
4.3.5	Hong Kong Observatory .....	91
4.3.6	Hong Kong Hydrographic Office.....	92
4.3.7	Typhoons and Typhoon Shelters.....	93
4.3.8	Gangways .....	93
4.3.9	Fendering Systems .....	94
4.4	Summary of Results .....	95
5.	Conclusions .....	96
	References .....	101
	Appendix A: Sponsor Description .....	105
	Appendix B: What is an IQP?.....	107
	Appendix C: Interview Transcripts .....	108
	Appendix D: Mayflower II Case Study .....	122
	Appendix E: Questionnaire .....	126
	Appendix F: HKMM Newsletter .....	127
	Appendix G: HKMM Coupon.....	130

## List of Tables

<b>Table</b>	<b>Page</b>
Table 1: Comparison of Museum Visitation	35
Table 2: Response to WHS Question #4 by gender	69
Table 3: Response to WHS Question #4 by respondents' reasons for being in Hong Kong	70
Table 4: Response to WHS Question #4 by age range	70
Table 5: Response to WHS Question #5 by respondents' reasons for being in Hong Kong	74
Table 6: Response to WHS Question #5 by age range	74
Table 7: Response to WHS Question #5 by preferred ship type	75

## Table of Figures

<i>Figure 1.</i> Pacifying the South China Seas. (Hong Kong Maritime Museum, 2010) .....	7
<i>Figure 2.</i> View of Hong Kong from Victoria Peak. (Famous Wonders, 2009) .....	8
<i>Figure 3.</i> A Princess cruise ship in Victoria Harbour. (Rogers, 2008) .....	8
<i>Figure 4.</i> Harbour reclamations proposed by the government. (Society for Protection of the Harbour Ltd., 2008) .....	10
<i>Figure 5.</i> Port of Singapore. (Olsen, 2010, Port of Singapore).....	12
<i>Figure 6.</i> Visual depiction of spring and neap tides. (Gardiner, 2008).....	13
<i>Figure 7.</i> Typhoon warning from the MTR. (Hong Kong Experience, 2010) .....	16
<i>Figure 8.</i> USS Missouri being berthed. (Fry, 1998).....	19
<i>Figure 9.</i> Visual reference for berthing energy calculations. (Gaythwaite, 2004) .....	20
<i>Figure 10.</i> Visual reference for block coefficient calculations. (Transport Canada, 2010) .....	22
<i>Figure 11.</i> Visual reference for berthing force calculation. (Wang, 2009).....	24
<i>Figure 12.</i> A typical mooring scheme. (Wikipedia, 2011) .....	24
<i>Figure 13.</i> A ship in drydock. (Wikipedia, 2010) .....	26
<i>Figure 14.</i> A typical ship gangway. (Clow Group Ltd., 2011).....	27
<i>Figure 15.</i> An Artist’s Rendering of the HKMM at Central Pier 8. (Hong Kong Maritime Museum, 2010).....	40
<i>Figure 16.</i> Promotional museum banners for survey; at left, an English version; at right, Chinese. ....	44
<i>Figure 17.</i> The Bounty III (HMS Bounty Organization, 2010) .....	47
<i>Figure 18.</i> WPI-HKMM Survey Respondent gender distribution. ....	56
<i>Figure 19.</i> WPI-HKMM Survey age distribution. ....	57
<i>Figure 20.</i> WHS reason for travel distribution. ....	58
<i>Figure 21.</i> WHS Question #1: Overall HKMM recognition by age.....	59
<i>Figure 22.</i> WHS Question #2: HKMM recognition by reason for being in Hong Kong.....	60
<i>Figure 23.</i> WHS Question #2 response distribution.....	61
<i>Figure 24.</i> WHS Question #2: Willingness to visit the HKMM at Central Pier 8 by gender. ....	62
<i>Figure 25.</i> WHS Question #2: Willingness to visit the HKMM at Central Pier 8.....	63
<i>Figure 26.</i> Willingness to visit the HKMM at Central Pier 8 by age of survey respondents.....	63
<i>Figure 27.</i> WHS Question #3: Ship preference. ....	64
<i>Figure 28.</i> WHS Question #3: Ship preference by gender. ....	65
<i>Figure 29.</i> WHS Question #3: Ship preference by respondents’ reasons for being in Hong Kong. ....	66
<i>Figure 30.</i> Willingness to visit the HKMM at Central Pier 8 if a ship exhibit existed. ....	67
<i>Figure 31.</i> WHS Question #4: Level of agreement with the statement. ....	68
<i>Figure 32.</i> WHS Question #4: Level of agreement by willingness to visit the HKMM at Central Pier 8. ....	71
<i>Figure 33.</i> WHS Question #4: Agreement values by preferred type of ship.....	72
<i>Figure 34.</i> WHS Question #5: Maximum price range respondents would be willing to pay to tour preferred ship. .....	73
<i>Figure 35.</i> WHS Question #5: Level of agreement by price range to tour preferred ship.....	76
<i>Figure 36.</i> Vessel Leasing Calculator showing profit and loss for the Bounty III. ....	85

## Executive Summary

A number of the museums who protect and preserve the world's shared cultural history find themselves struggling to stay afloat, victims of the age of instant information. Despite the best efforts of the many dedicated professionals working in museums today, museum attendance around the world is falling at an alarming rate, with no signs of slowing. It is with this challenge to the collective livelihood of the museum in mind that the Hong Kong Maritime Museum (HKMM) has offered our IQP group the opportunity to examine the feasibility of berthing a historic ship at their new location at Central Pier 8. In seeking to utilize this vessel as a floating exhibition, it is the hope of the HKMM that the public may better appreciate and experience the unique maritime culture of Hong Kong.

In attempting to persuade the public to visit, several museums have developed "signature" exhibitions. In essence, these exhibitions establish the museum as a part of the intellectual life of the city or region by drawing directly from the region's history with the chosen subject. For a signature exhibit to succeed, the chosen content must address the attitudes held by the public regarding this history. Unfortunately, in the absence of costly and time consuming data gathering, information concerning these attitudes is simply unavailable to museum curators and staff. This deficiency can be detrimental to a museum which simply forges ahead in developing a signature exhibit without accurate information, ultimately losing both time and money on an exhibit the public does not accept.

The goal of our project was to determine the feasibility of the HKMM acquiring a vessel to convert and operate as a "signature" museum exhibit, and to make recommendations based on our findings to the Director of the HKMM, Mr. Richard Wesley. To facilitate these recommendations, our group created and administered a public survey, completed a standard engineering analysis of likely vessels in conjunction with a review of the structural report of Central Pier 8, and explored avenues of museum promotion. In completing this research, our group has made several findings as to the feasibility of berthing a vessel at Central Pier 8.

To examine market conditions, a questionnaire was created and administered to the public with the purpose of gathering information on museum recognition, likelihood of visitation, ship types, and admission prices, in addition to basic demographic data. The project group received 304 usable responses to this questionnaire over three days of surveying on the MTR Skywalk overlooking the Central Pier complex. As a whole, respondents were more likely to visit the HKMM (men slightly more than women) if the museum had a historic ship exhibit. The results also showed a large preference for junks or tall ships across almost all demographic lines. The average admission price respondents were willing to pay was calculated to be \$24.2 HKD, with men willing to pay more than women to tour the vessel (\$26.5 HKD versus \$21.2 HKD). In addition, it was found that tourists and residents alike preferred junks and tall ships. The average admission price for residents and tourists was \$23.5 HKD and \$25 HKD, respectively. Overall, it is recommended that if the HKMM were to proceed with a historic ship exhibition, the displayed vessel should be a junk or tall ship and the exhibit admission price be set between \$20-\$25 HKD.

In addition to the survey, letters were sent via email to several Hong Kong organizations that our group believed could help us in determining the overall feasibility of the proposed museum exhibit. For our questions concerning marketing and promotion, we contacted the Big Bus Company, the Bounty III, and several cruise lines and schools. The Big Bus Company representatives were enthusiastic about plans for increased marketing and promotion of the HKMM, while responses from the other organizations, if any, were mostly indifferent.

For issues of safety and legality, the project group turned to the Hong Kong Marine Department. Specifically, Director Roger Tupper informed our group that any ship used as an exhibit by the HKMM would be considered a Class I Vessel; therefore, the ship would be subjected to all rules and regulations of this class, including yearly maintenance and inspections.

Emails containing technical questions were sent to Atkins Engineering, the Star Ferry Company, Hong Kong Observatory, and Hong Kong Hydrographic Office. Our team obtained pertinent answers to all technical questions, including the berthing and mooring procedures of a Star Ferry, water depth around Central Pier 8, and the berthing load limitations of Central Pier 8.

This investigation considered two methods of obtaining a ship to use as a floating museum exhibit, namely owning and leasing. Each mechanism of ownership has both advantages and disadvantages. For example, leasing a ship does not require the museum to pay maintenance costs that a vessel owner would be required to pay. However, these costs would most likely be reflected in a higher vessel rental fee, affecting the financial feasibility of a historic ship exhibition.

Concerning ships available in Hong Kong, the project team explored the possibility of leasing the Bounty III, a replica European Tall Ship. However, it was found that the rental and travel costs for the Bounty could not be recovered in estimated exhibit ticket sales, thereby causing the museum to lose money. This makes the Bounty III an infeasible option at this time. Although the Bounty III was deemed infeasible, the project team would advise the museum to continue looking into other vessels that may have more desirable rental rates and financial outcomes.

Overall, our project group felt that the historic ship exhibit would be a feasible extension of the Hong Kong Maritime Museum's existing atmosphere, provided that many prerequisites (such as suitable ship and admission price) are met beforehand. Accordingly, a strategy of "hold and observe" is advised, consisting of maintaining museum facilities and capacity, while keeping open the possibility of the HKMM developing a future historic ship exhibition.

In completing this investigation, our project team was able to remedy the information deficiency currently facing the staff of the HKMM and provide recommendations regarding the feasibility of the proposed exhibit. We hope that from this investigation, the HKMM will be better able to utilize their resources in support of the broader mission of preserving the maritime heritage of Hong Kong.

## 1. Introduction

Museums all over the world have the same fundamental goal: to educate people. For a museum to be successful in this endeavor, it must continually attract new visitors and motivate these visitors to return. In attempting this feat, there are a number of techniques to make a museum more visible and appealing to first time visitors, and an equal variety of tactics to encourage additional visits. One of the most common strategies is having a large, 'signature exhibit' that can serve as both a cultural and physical landmark for the museum. The Hong Kong Maritime Museum (HKMM) currently does not have an exhibit of this type.

The Harbourfront Commission, the governing branch for Hong Kong's harbour planning, suggests that "[the] HKMM actively promote the berthing of 'historic ships' as a part of the future use of Pier 8 [its future location]" (Stephen Davies, personal communication, October 26, 2010). The Commission believes that a historic ship exhibit could benefit the HKMM while exciting both the Hong Kong public and visitors to Hong Kong. However, the museum anticipates a significant number of problems with this concept. Most notably, due to the museum's private funding structure, the cost of implementing this plan is a significant challenge. In the words of Maritime Heritage Research Fellow and former museum director, Dr. Steven Davies, "...museum ships are a trap for the unwary, often being a major millstone around a museum's neck and seldom a significant asset" (Stephen Davies, personal communication, November 9, 2010). Although Mr. Richard Wesley, the museum director, and Dr. Davies are skeptical about such an undertaking, additional research and data gathering concerning exhibition costs and revenue is required before making an informed executive decision.

To expand its audience and facilities, the HKMM will be relocating to Central Pier 8 from its current location at Murray House in Stanley beginning in 2012. By moving to a more visible and accessible location in comparison to Stanley, the HKMM could possibly "quadruple annual visitation and

tap into new market segments” (Depot, Goldberg, Nadeau, and Rodriguez, 2010, p. xiv). This hypothesis, coupled with Central Harbourfront’s conversion into a cultural and recreational center, has resulted in the HKMM making a top priority of maximizing this opportunity. As a part of the Harbourfront’s new, increased role in public life in Hong Kong, the proposed historic ship exhibit must be cost-effective while enhancing Central’s waterfront.

There is previous research concerning the HKMM’s move to Central Pier 8. In 2010, Depot et al. completed a marketing study for the HKMM involving its future relocation to Central Pier 8 and determined that a historic ship exhibit would improve the HKMM’s overall visibility (pp. 125-127). Furthermore, other prominent people in Hong Kong also hold favorable views concerning a historic ship exhibit. Professor Patrick Lau, Chairman of the Legislative Council’s Panel on Development’s Harbourfront Sub-committee, believes that “it will be most exciting if the Maritime Museum can bring in historic ships docked next to the Pier for visits by the HK public” (Stephen Davies, personal communication, October 26, 2010). However, as previously stated, the HKMM has several fundamental concerns about the nature of the exhibit, particularly the high cost of owning and maintaining a vessel, and they feel a study of pertinent contingencies is required before proceeding.

This project has compiled and assessed relevant data regarding the feasibility of berthing a historic ship at Central Pier 8 in Hong Kong, and provides recommendations to the Hong Kong Maritime Museum concerning the legal, engineering and promotional challenges facing this exhibit. In addition, to assess public demand for different types of historic vessels and to gauge the public’s willingness to pay a reasonable admission fee, our group surveyed pedestrians on the MTR Skywalk between Central Pier 7 and the IFC Mall. Our team also conducted interviews with various local experts in the legal, technological, and promotional regimes. This detailed assessment of the potential for a floating ‘signature’ exhibit at the HKMM will aid museum staff in making a reasoned decision regarding the

future of the proposed historic ship exhibit and indirectly further its mission of preserving the maritime history and culture of Hong Kong.

## **2. Background**

In approaching an inherently interdisciplinary problem like the feasibility of berthing a ship at Central Pier 8 in Victoria Harbour, a multitude of both technical and cultural considerations naturally arise. In the course of conducting preliminary background research, our team identified and evaluated several factors which outline the unique history and challenges facing the Hong Kong Maritime Museum, but more broadly, which describe the singular maritime culture of Hong Kong.

It is with this rich cultural legacy in mind that this chapter briefly reviews Hong Kong's maritime history in both regional and national terms. While it must be acknowledged that entire volumes may (and have) been written about maritime history, this introduction, representing a meager fraction of the whole, provides the reader with a starting point.

### **2.1 Hong Kong Maritime Activity: Past and Present**

In considering the possible addition of a new feature to the Hong Kong waterfront, it is important to understand the historic and cultural background of the surrounding area. Encompassing centuries of history and serving as a vital trade artery for East Asia, Hong Kong's Victoria Harbour is renowned both for its beauty and bustling activity. Its continued prominence in the daily life of the city serves to underscore its lasting importance and value to modern Hong Kong.

#### **2.1.1 Early Chinese Maritime Activities**

The established historical record regarding Chinese maritime activity extends as far back as the Han Dynasty (221 BCE-220 CE), whose naval fleet was shown to have visited and indeed helped to conquer portions of present-day Korea and Vietnam in 111 BCE (Davies, 2008). While it is possible and

even likely for coastal trade to have occurred during the Zhou and Qin Dynasties preceding the Han, a distinction must be made between long-range ocean going vessels used either in trade or warfare and those used for short sea shipping, loosely referred to as *Nanhai*, which describes travel in waters claimed and policed by China. Focusing primarily on the former, the Han appear to be the earliest dynastic family to have been involved in this more expansive trade (Davies, 2008). Following in this tradition, during the Jin Dynasty (265-316 CE), Chinese sailors extended the trading range of the empire to include Sri Lanka (then Ceylon) and the southern coast of present day India (Ancient Gallery, Hong Kong Maritime Museum, G/F Murray House, Stanley Plaza, Stanley, Hong Kong, January 17, 2011). Trading primarily silks, spices, ivory, gold, and other “exotic” wonders of the Far East, this established a precedent for the “Maritime Silk Road” most commonly associated with the Song (960-1279 CE) and Yuan (1279-1368 CE) Dynasties.

The Yuan Dynasty was the first of the Chinese dynasties to have a large navy and treasure fleet (Lo, 1955), as a result of experience gained by Chinese prisoners of war who were forced to build approximately 45,000 ships for the Mongol regime. This increase in shipbuilding activity was further spurred and incentivized by the desire to circumvent blocked land trade routes to the Middle East, particularly those leading to the Ottoman Empire of present-day Turkey. This may be seen as the golden era of Chinese deep sea shipping, or *Nanyang*, describing waters policed by foreign powers until the early 18<sup>th</sup> and 19<sup>th</sup> Centuries and the advent of the steam ship (Davies, 2008).

Following the Yuan Dynasty, the revolutionary Ming Dynasty marked a transition in Chinese maritime history where, for the first time, a large treasure fleet was commissioned by a native emperor and built using local labor (Lo, 1955). However, this expansion of naval power also coincided with the establishment of a closed-border policy, a decision rooted equally in Confucian ideology, a desire for self-sufficiency brought on by decades of foreign rule at the hands of the Mongols, and a collapsing agricultural system (Ming Dynasty, n.d.). Although the Ming Dynasty did not shrink from undertaking

several ambitious projects, including large-scale renovation and expansion of the Great Wall and expeditions by the famed Islamic-Chinese sailor Zheng He to eastern Africa, India, Sri Lanka, Thailand, and Malaysia, paradoxically, the emperor Rengzong ordered all Chinese maritime exploration to be immediately halted in 1424 (Maritime Silk Road, n.d.). Though these tribute missions were briefly resumed during the 1430's, a policy of *mare clausum*, refusing entry of foreign vessels and eschewing exploration in favor of internal development, would remain essentially unchanged in China until well into the 16<sup>th</sup> Century. This effectively marked the end of China's 'Golden Age' of deep sea maritime exploration.

### 2.1.2 Maritime Activity in Hong Kong

Hong Kong's Victoria Harbour has served as a central port for maritime exploration, trade, and naval operations and warfare since the city's founding as a fishing village some 40,000 years ago (Davies, 2008). Hong Kong, which encompasses 235 islands in the South China Sea as well as Kowloon peninsula and the New Territories, is blessed with natural sea access that greatly lends itself to maritime activity. Beginning with the shipping industry of Hong Kong in the 1840's and 50's following the Treaty of Nanking, which ceded Hong Kong Island to the British, Hong Kong waterways were primarily characterized by the use of "junks". Visually distinct, and intrinsically tied to Asia in the public mind, the "junk" is loosely defined to be a flat-bottomed (e.g. keelless) vessel made of softwood, with a distinct non-square rigging style, and sails which can be turned into the wind, aligned with the "long" axis of the vessel (Van Hilburg, 11). Within this style however, there is tremendous room for experimentation and displays of individual ingenuity, depending on the type of cargo, available building materials, intended sea routes, and myriad other factors. Concerning an absence of standardization in the development of these vessels as a shipping fleet, and perhaps more significantly, documentation of the junk building process, Van Hilburg notes, "Most [sources] contribute little, though, by way of real information on the actual construction process of the junk itself. The basic reasons for this are common to cultures far

beyond China's borders. Traditional vessels of seafaring people were never built by plans or documents, but by "eye", the knowledge being passed from person to person within a closed guild or community of shipwrights...few people ever recorded details before there seemed a reason to intentionally and carefully record such things."

The fleet of junk vessels built by Hong Kong fisherman and shipwrights were initially relatively small, limiting growth in the shipping industry in Hong Kong and making the city a provincial player in maritime trade immediately following colonization. However, the collapse of Guangzhou as a rival port and ship maintenance center following the destruction of several "mud docks" in 1857, combined with a population migration away from the region of Whampoa (which contained Guangzhou), provided Hong Kong with the opportunity to rise to prominence (Davies, 2008). Thereafter, Hong Kong's small and very crude ship construction and docking facilities began a rapid development that within a decade had made Hong Kong the center for ship maintenance services for the entire South China Sea, including repair facilities for modern steamers. The ability to construct and repair ships made Victoria Harbour an essential port for the surrounding areas, as this dominance and "critical mass of knowledge" would continue without rival until the 20<sup>th</sup> Century.

Regarding more recent history, it is notable that Hong Kong avoided a wide variety of the threats of imperialist dismemberment from the Western powers that the rest of China faced (Davies, 2008). The British Royal Navy's presence in Victoria Harbour established the port as a naval base and provided the port with two distinct advantages. First, it helped in the suppression of piracy, which for centuries had caused mayhem and trade disruptions over China's seas. Second, the Royal Navy's presence made it possible for the world's premier hydrographic surveyors to study China's coast and rivers. Surveying in the 1860's led to the creation of medium scale charts for Chinese waters that were of a quality and accuracy unknown at that time (see Figure 1).



*Figure 1. Pacifying the South China Seas. (Hong Kong Maritime Museum, 2010)*

Hong Kong's entire shipping industry and marine activity during World War II flourished due to the high demand for resource and ammunition transportation. The harbour's importance in Southeast Asia's transportation industry meant that nearly all of China's important goods came through Hong Kong Harbour. As Dr. Stephen Davies (2008) stated, "Effectively we can say that for Hong Kong – as for China in general – until the post Second World War period, coastal shipping was overwhelmingly the most important part not just of shipping, but of the entire transport system" (p. 6). In the post-war years, Hong Kong's shipping industry has continued to grow and expand. When Hong Kong was returned to China's rule in 1997, it was the world's eighth largest trading economy (Ember, 2001)

### **2.1.3 Harbour's Impact on Daily Life in Hong Kong**

Victoria Harbour, one of the world's most beautiful natural harbours, was instrumental in Hong Kong's growth from a small fishing village to an international trading centre (Designing Victoria Harbour, 2010). Hong Kong is blessed with an expansive shoreline that lends itself well to a variety of maritime activities. In understanding the relationship of Hong Kong residents to the harbour, one need only consider the words of the Waterfront Centre, tasked with helping to maintain the harbour: "For communities and areas near a body of water, the waterfront is often the unifying element that defines

them and serves as the source of their beginnings, their heritage, and the reason for their existence...”  
(The Waterfront Centre, 2007, Home Page). Figure 2 provides an expansive overview of Hong Kong and Victoria Harbour.



*Figure 2. View of Hong Kong from Victoria Peak. (Famous Wonders, 2009)*

Victoria Harbour currently serves as a trade hub not only for China, but for Asia as a whole. In 2009, the Harbour registered 33,160 sea-going vessels registering at one of nine container terminals along 7,649 meters (approximately 4.75 miles) of sea frontage, accounting for an estimated 19 million tons of freight. In addition, the Hong Kong Ferry terminal, which serves as home base to over 100 ferry vessels from over a dozen companies, saw 21.9 million passengers in completing 17.5 million trips, an average of 60,000 passengers per day (Information Services Dept., HKMD, 2009). Figure 3 depicts a Princess cruise ship in Victoria Harbour.



*Figure 3. A Princess cruise ship in Victoria Harbour. (Rogers, 2008)*

Recently, however, the harbour has been suffering from overcrowding due to urban development. As expressed in a recent harbour evaluation, “The residents of Hong Kong identify with and feel closely related to Victoria Harbour, but extensive land reclamation and drastic transformations have deteriorated this feeling of belonging.” (Rosendahl et al., 2010, p. 44). The harbour front is currently undergoing an extensive reconstruction project to restore its beauty and enhance its accessibility, with the intention of promoting the harbour as a worldwide tourist attraction. The renovated waterfront will be enjoyable, with open air promenade activities, shelters along the promenade, and a greener outlet for leisure. The result will be a “must-see” destination in terms of restaurants, commercial shops, entertainment, and cultural activity, for both the residents of Hong Kong and tourists (Aedas Limited Planning Department, 2008, p.2).

Organizations throughout Hong Kong are working to make leisure and tourism the main focus of Victoria Harbour (Rosendahl et al., 2010). In contrast to other harbours throughout the world, Victoria Harbour has a lack of water based recreation facilities for public use, an aspect generally sought by locals and tourists alike. The extensive use of the waterfront for commercial use has left little room for recreational facilities. The expansion of urban development has led to poor accessibility, lack of parking, and a poor land/water interface. There are very few boat launch ramps available for the general public and no dedicated space for locals or visitors to dock pleasure craft. These particular problems are only a handful of the challenging issues Hong Kong planners are currently facing, as the Hong Kong government is also proposing several harbour reclamation projects (see Figure 4).

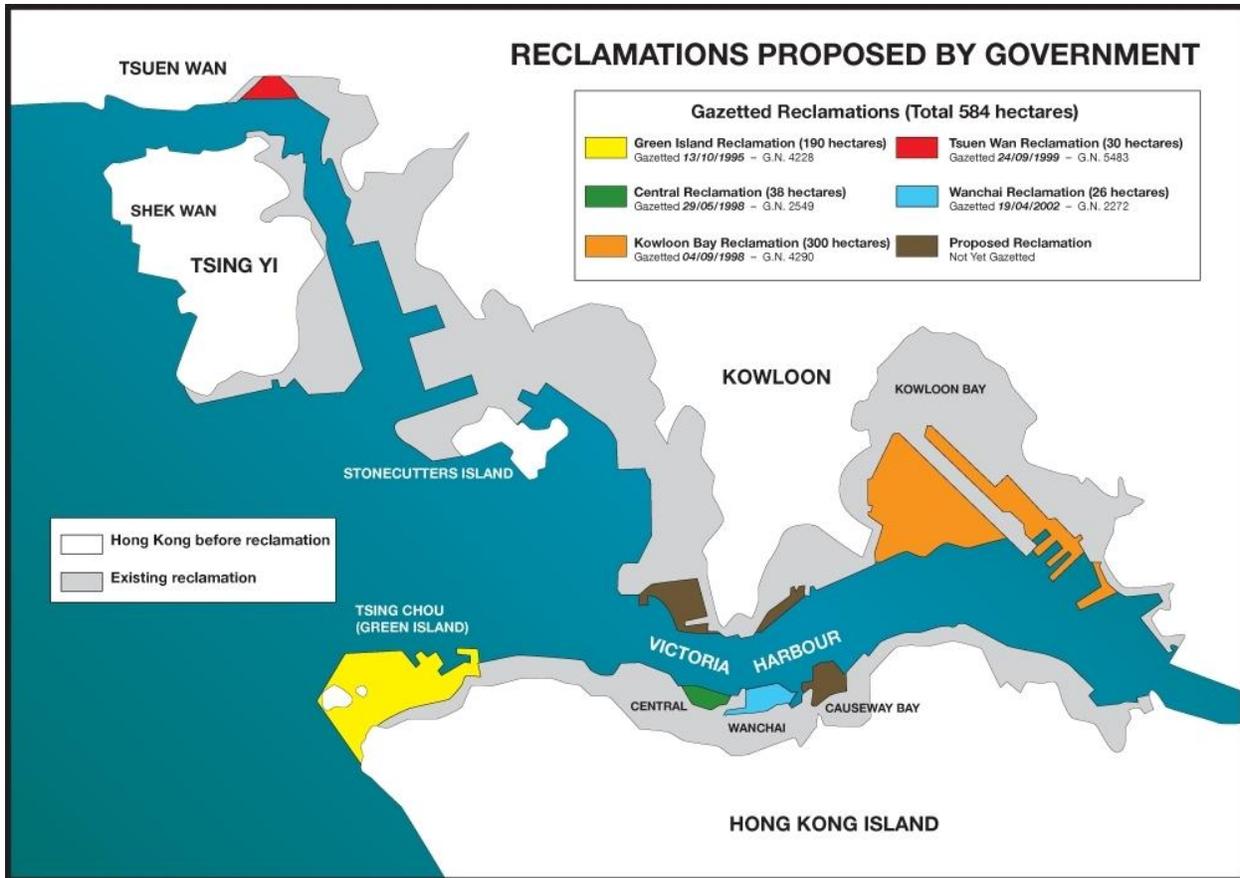


Figure 4. Harbour reclamations proposed by the government. (Society for Protection of the Harbour Ltd., 2008)

It is theorized that marine users are often forgotten or neglected during project planning because of their relatively minuscule economic impact relative to industry (Rosendahl et al., 2010). This oversight, as applied specifically to Hong Kong, may in part be attributed to the decline of the native industrial fishing industry. Approximately 800 fishermen in Hong Kong are currently facing unemployment and need to seek alternative livelihoods due to overfishing within local waters (Rosendahl et. al, 2010). This trend has led to a decrease in income level amongst fisherman, which only compounds the historic belief that fishermen represent the lowest level of Chinese society. Hong Kong, as well as mainland China, has a very hierarchical society consisting of distinct social and economic classes. The gap between rich and poor is extremely large. The only caste-like group is the portion of the population living on boats. This occupational group of fishermen was traditionally marginalized and

ritually humiliated (Ember, 2001). Recently, the majority of these fishermen have moved onto land and integrated themselves with the rest of the Hong Kong's population. Although this is considered by many to be a positive trend, it is counterintuitive for a society formed around maritime activity. Historically, many fishermen lived on their boats in the harbour and earned their living from the trade. However, the cultural history of China does not value maritime history, making it uninteresting to the average person. One of the most important values in Chinese society is family. Since a man must leave his family for days at a time when making a living from the sea, he cannot protect or be with his family; therefore this behavior is frowned upon by the rest of society.

A problem exists in asserting that fishermen have played a vital role in the region's maritime history and still serve a vital role in society today. The Hong Kong Maritime Museum (HKMM) in particular is faced with the challenge of promoting maritime history. As a result of the cultural stigma fishermen face, it is extremely difficult to attract museum visitors to see exhibits perceived as honoring this segment of the population. Addressing this issue is an important part of preserving the cultural history that continues to shape the region.

## **2.2 Technical Background**

In order to develop a museum exhibit that will be an asset to the Hong Kong harbour front, one needs to consider the conditions that any proposed vessel set in the harbour will face. Accordingly, this section provides a study of the natural phenomena affecting the harbour, as well as of the operations performed in moving and maintaining a vessel.

### **2.2.1 Harbour Overview**

A harbour is a location where ships and other watercraft seek shelter from inclement weather, waves, and tides. The terrain of the surrounding landscape serves as protection for a natural harbour, while an artificial harbour requires man-made breakwaters, sea walls, or jetties for protection from

inclement weather. Harbours and ports are easily confused; while a harbour refers to the actual location, a port refers to an artificial sea coast, a common sight in a harbour. Ports consist of piers, docks, machinery, and other structures that facilitate the loading or unloading of people and resources for all types of watercraft. Usually located in close proximity to ports, warehouses and ground transportation systems promote the storage and distribution of various goods. With the extraordinary volume of goods being transported in today's world, ports have become bustling sites with dynamic atmospheres. Currently, the world's busiest port, in terms of total shipping tonnage, is the Port of Singapore (see Figure 6). "[Singapore] handled more than 25.8 million [containers] last year . . . the 2.4 million containers shipped that month are still below the port's monthly record of 2.7 million [containers]..." (Olsen, 2010, p. 2).



*Figure 5. Port of Singapore. (Olsen, 2010, Port of Singapore).*

### **2.2.2 Tide and Current**

Like all ocean coastlines, harbours are continuously subjected to the changing tides. Cooley (2010) asserts that tides can be classified into four distinct stages: flood tide, ebb tide, high tide, and

low tide. The transition from low to high tide is called the flood tide, while the transition from high to low is referred to as the ebb tide. Both transitional periods last for varying lengths of time depending on features like coast orientation or water body dimensions. The other two stages are the high and low tides, which is when the water has reached its highest and lowest points, respectively. Tides are either diurnal or semidiurnal; that is, there are either one or two high and low tides per day.

Tidal constituents include phenomena that influence tidal changes. Two occurrences, spring and neap tides, occur in roughly seven day intervals and serve to further characterize the four tidal stages. According to Cooley (2002), the spring tide refers to the point in time when the tide's range is at a maximum and occurs when the sun, moon, and Earth become aligned in a straight line (a syzygy). Conversely, a neap tide describes the time when the tide's range is at a minimum, occurring when the Sun and Moon are at right angles relative to the Earth (see Figure 6). A secondary tidal constituent is the lunar altitude. The Proxigean Spring Tide, occurring every one and a half years, is an unusually large high tide that develops only when the Moon is in its New Moon phase at the point where its path brings it closest to Earth.

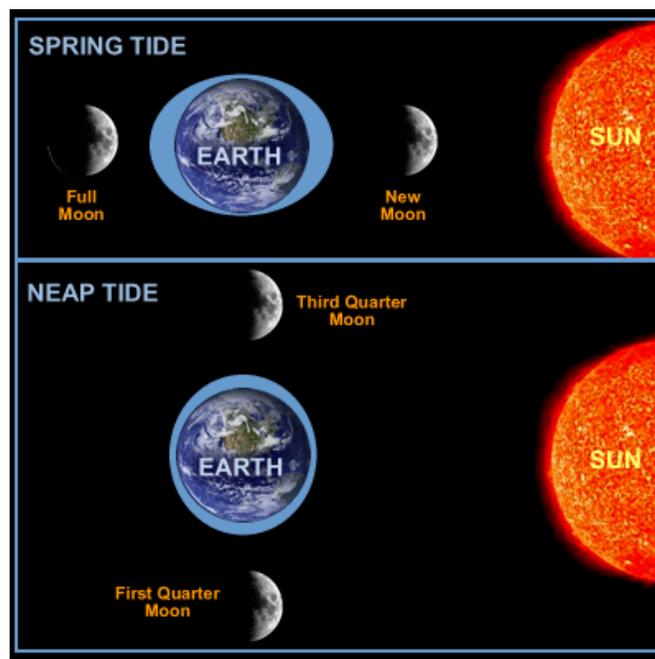


Figure 6. Visual depiction of spring and neap tides. (Gardiner, 2008)

Tides are just one of many causes of ocean current throughout the world. Wind, temperature, waves, and water salinity are other factors that influence ocean currents. Chapman (2010) notes the influence of solar heating on the pattern of ocean current. In essence, when the atmosphere becomes heated, the wind that is created blows over the surface of the ocean and pulls on the water surface due to friction, causing tidal movement. Additionally, solar heat affects the density of the ocean water by changing its salinity, as cooler, saltier water is denser than warmer water, which results in current flow based on differences in water density. The Earth's rotation also affects ocean currents through the process known as the Coriolis Effect.

Chapman (2010) defines two distinct types of ocean current, namely, surface currents and deep currents. Surface currents are largely dictated by wind and the Coriolis Effect and can become very dynamic. For example, the East Australian Current flows at up to 6 miles per hour and the Agulhas Current off the eastern coast of Africa carries up to 80 Sverdrups of water. A Sverdrup (Sv) measures total volume transport rate and is equivalent to one million cubic meters per second, or 264 million US gallons per second. Deep currents are primarily controlled by water density and salinity. While there is not a standard defining deep currents, any current a mile or more below the ocean surface is generally factored into a deep current analysis. An additional factor in the development of deep currents is ice formation at the ocean surface. Surface water that freezes in locations at high latitude, as seen in Greenland or Labrador Sea, becomes denser than the surrounding water. Consequently, the denser water will flow to a place of similar density in an attempt to equalize with the surrounding water. This continuous cycle of water movement leads to the formation of deep water currents.

According to the Hong Kong Observatory's webpage on tidal characteristics, <http://www.hko.gov.hk/tide/enotes.htm>, tides in Hong Kong are mixed and mainly semi-diurnal, meaning there are two high and low tides occurring every 24 hours. The two high tides are generally

unequal in height, with the higher tide occurring during the day in summer and overnight in the winter. Hong Kong tides only become diurnal during the neap tides, or when the moon is at its first or last quarter.

Due to its geographic location, Hong Kong experiences gradual tidal changes going from the southeast to the northwest. Waglan Island is usually the first to experience tidal changes while Tsim Bei Tsui is usually the last. Between these two locations, high tide delay is approximately one and a half hours, while low tide delay is approximately two and a half hours. Mean tidal range at Tsim Bei Tsui is around 1.4 meters, while Waglan Island and Victoria Harbour have mean tidal ranges of about one meter.

### **2.2.3 Typhoon Overview**

Hong Kong's harbour front faces typhoons on a regular basis. Typhoons, also known as tropical cyclones, are storms that develop in the northwest Pacific which bring strong winds, heavy rain, and severe flooding (Boland, 2011). Essentially, typhoons are analogous to hurricanes, which occur specifically in the northeast Pacific. In Cantonese, typhoons are referred to as "tai fung" literally meaning "big wind" (Hong Kong Typhoons, 2011). The typhoon season in Hong Kong takes place during the summer months, running from May to late September, with late September seeing an increase in both frequency and severity (Boland, 2011). Historically, typhoons fluctuate drastically in terms of size and severity, making it crucial to have a system in place for dealing with them. Fortunately, Hong Kong has a very successful, structured system for such events.

A typhoon's severity is rated using a variation on the Saffir-Simpson Hurricane Scale known as the T-Scale (Boland, 2011). The T-Scale has four levels, with the first level known as T1, meaning that a typhoon has been spotted, but is at least two days from making landfall. This level may or may not result in any severe weather, as conditions may dissipate or push the still-gathering storm away from populated areas. The second level is T3, signifying that conditions have worsened from T1, with winds

gusting at a minimum of 110km/hr. In this scenario, citizens are advised to tie down any objects they may have on their balconies, but otherwise to carry on as usual unless conditions worsen. The third warning level is T8, meaning that winds in excess of 180km/hr are expected. At this level, it is urged that citizens remain indoors and away from any windows. Additionally, when a storm is given a T8 rating, all public transportation systems are taken offline, all public events are cancelled, and all offices, public or private, are expected to close. The highest rating is referred to as T10, which indicates that the eye of the storm will pass directly over Hong Kong. At this level, citizens are advised to follow the instructions at the T8 level, and quite simply, to prepare for the worst. All television stations broadcast warnings as soon as they are made available, while radio stations issue warnings at regular intervals in place of programming. Additionally, all large buildings post warnings on their signs for the public to see (see Figure 7). While this rating is given extremely infrequently, typhoons in this category are by far the most damaging and deadly.



Figure 7. Typhoon warning from the MTR. (Hong Kong Experience, 2010)

#### 2.2.4 Ship Berthing

Ship berthing refers to the process of securing a ship at a port. “The Art and Science of Ship Berthing” (2009) describes berthing as a very complex process, usually involving the participation of various specialized maritime engineers. Any ships trying to berth are commonly required by port authorities to have an expert pilot aboard, since ship staff may be unfamiliar with harbour navigation in that particular area. The pilot is required to maneuver the ship to its berth to help minimize the possibility of any type of accident. There is no right way to berth; the process can be safely and successfully completed using a variety of techniques. “However, like a car driver, each pilot has his own method of berthing. And someone very truly said, ‘It is more of art than science’” (The Art & Science of Ship Berthing, 2009, p. 1).

“The Art & Science of Ship Berthing” (2009) identifies several significant factors to consider when berthing a ship. One of the more visible aspects is the size of the ship. Larger vessels generally have unresponsive handling and are not as agile as smaller watercraft. Large ships also require more time and distance to accelerate and decelerate and therefore must be delicately handled in confined areas like harbours.

Vessel displacement is defined as “the total volume occupied by underwater part of vessel multiplied by the density of water” (The Art & Science of Ship Berthing, 2009, p. 1). This displacement is measured in metric tons and is used to measure the mass of the ship when fully loaded. Various measurements of displacements include full, standard, and light displacements, which are used in circumstances such as when a ship is completely full or empty. More force is required to move a ship with a larger displacement.

Furthermore, wind can have an adverse effect on ship berthing especially for large ships, since their surface areas are comparatively larger. As a case in point, more force will be required to berth a

large ship if the wind is blowing out to sea (offshore wind). The additional force required may come from sources such as tugboats or ship thrusters. According to “The Art and Science of Ship Berthing” (2009), onshore wind is generally favorable for berthing conditions; however, too much onshore wind increases the risk of causing damage to the ship and port structures. With onshore wind it becomes considerably easier to mistakenly apply too much berthing force, which may result in the ship colliding with other port structures.

Sea current affects a ship’s overall ability to move and make directional changes and, like wind, can have an adverse effect on the amount of force required to berth a ship. “In tidal port with currents, berths are designed in such a way that current will be flowing at 15 to 30 degrees to the berth” (The Art and Science of Ship Berthing, 2009, p. 1). This characteristic limits the impact of sea current on a ship in berth. The speed at which vessels are berthed in normal conditions is usually 0.2 meters per second.

Depending on the size of the ship, tugboats may be necessary for berthing procedures. Tugboats, as their name implies, are extremely powerful vessels that can either push or pull ships to maneuver them into their berths. Horsepower output for tugboat engines vary widely, but most generate between 1200 to 3200 horsepower. “How Can a Tugboat Pull a Large Ship?” (2009) observed three different classes of tugboats. Seagoing tugs operate in the open ocean and are tasked with a wide variety of duties such as salvaging or towing disabled watercraft. These types of tugboats are generally not used as transportation services. Escort tugs are used to help large vessels navigate in confined areas and are reserved for situations where the ship in question is incapable of providing itself with adequate maneuverability (see Figure 8). Harbour tugs are used to assist all types of ships going in and out of ports and other inland waterways. They also serve port logistical purposes, providing aid in a wide variety of situations such as fire-fighting and ice breaking.



*Figure 8. USS Missouri being berthed. (Fry, 1998)*

Fenders are used in ship berthing to avoid costly damage to either the ship or port structures. Their typical construction is a rubber or plastic structure containing air or foam and is designed to absorb the energy of berthing impacts. “Fenders are used to avoid damage and [are] designed to absorb the energy of the berthing impact at around 25% deflection” (The Art and Science of Ship Berthing, 2009, p. 1). The actual shape of fenders varies greatly depending on the type of vessel. Owners of smaller and recreational watercraft are usually able to choose from different kinds of fenders, while large, commercial vessels naturally have more stringent guidelines.

### **2.2.5 Berthing Energy**

Berthing energy is the energy that a vessel imparts on the structure to which it is mooring. (Gaythwaite 2004). While some of this energy will be absorbed by a fendering system (if one is in place), the remainder will create a force that acts on the pier or dock. Piers are only built to withstand a certain load. When the load placed on the pier is greater than the load for which it was designed, permanent damage can be done to both the pier and berthing vessel. Increasing the load on the pier in any direction reduces the maximum berthing load.

A fendering system is a group of strategically placed energy absorbent materials (Gaythwaite 2004). Depending upon the fender design and berthing conditions, a well-made fender will typically absorb 40-70% of the total berthing energy. One common and cheap fendering system is a used car or truck tire. These can be seen tied to smaller boats individually, or “ganged” along a log (acting as a common axle) tied to a pier to absorb the load of a larger vessel. The rubber material which forms the tire allows the tire to bend when impacted, thereby absorbing energy without transferring it to the dock. However, this material is also stiff enough to avoid permanent deformation.

### 2.2.5.1 Berthing Energy Calculation

In order to calculate the force on the pier when a vessel berths, the total berthing energy must first be calculated (Gaythwaite 2004). Once the total energy is known, a graph of the fendering system’s energy absorbance and reaction force can be used to find the force on the pier. Equation 1, shown below, is used to calculate the berthing energy.

$$E_F = \frac{\Delta}{2g} C_e C_m C_c C_s V_n^2 \quad (1)$$

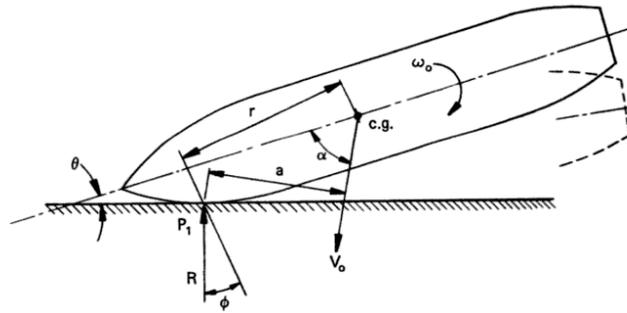


Figure 9. Visual reference for berthing energy calculations. (Gaythwaite, 2004)

Here,  $\Delta$  is the vessel displacement, as previously defined,  $g$  is the acceleration of gravity (9.8 m/s/s),  $C_e$  is the eccentricity coefficient,  $C_m$  is the hydrodynamic mass coefficient,  $C_c$  is the configuration coefficient,  $C_s$  is the softness coefficient, and  $V_n$  is the component of the vessels velocity normal to the

pier. Figure 9 shows several of the measurements used in this calculation and where they are taken on a vessel.

The eccentricity coefficient ( $C_e$ ) is the amount of rotation of the vessel relative to a fixed point at ocean-level, and depends on both the approach angle and first point of contact between the ship and the pier (Gaythwaite 2004). This coefficient typically ranges in value from 0.5 to 0.8, with 1.0 representing a maximum value, describing a vessel approaching the pier head-on. Standard engineering practice often assumes a value of 0.5 in preliminary calculations, though this must be checked from case to case. The equation for  $C_e$  is defined to be:

$$C_e = \frac{K^2 + r^2 \cos^2 \alpha}{K^2 + r^2} \quad (2)$$

In this equation, the variable  $r$  is the distance from the center of gravity of the vessel to the point of impact, often taken to be  $\frac{1}{4}$  of the total length, while  $\alpha$  is the angle of approach.  $K$  is the gyroscopic radius of the mass of the ship around its center of gravity; typically it is between 0.20 and 0.29 times the total length of the ship. The gyroscopic radius is also proportional to the block coefficient ( $C_B$ ). To calculate  $K$ , one may use Equation 3, as shown below.

$$K = (0.19 * C_B + 0.11) * L \quad (3)$$

The block coefficient,  $C_B$ , is related to the shape of the vessel (Gaythwaite 2004). It is calculated by dividing the volume of the water displaced by the ship by the volume of water it would displace if the ship were perfectly rectangular, shown in Figure 10. The block coefficient may be found using Equation 4,

$$C_B = \frac{V}{LWL * BWL * D} \quad (4)$$

where LWL ( $L$  in Figure 10) is the length of the longest part of the boat at the water line, BWL ( $B$  in Figure 10) is the width of the widest part of the boat at the waterline,  $V$  is the volume of water the vessel displaces, and  $D$  is the draught (see Figure 10).

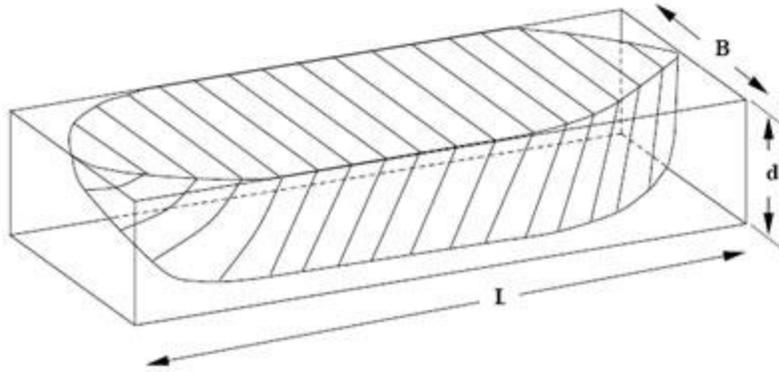


Figure 10. Visual reference for block coefficient calculations. (Transport Canada, 2010)

The hydrodynamic mass coefficient takes into account the additional mass of the water that is moving with the ship (Gaythwaite 2004). The value of the hydrodynamic mass coefficient typically ranges from 1.3 to 1.8. The hydrodynamic mass coefficient can be calculated using the equation

$$C_m = 1 + 2 * D/B \quad (5)$$

where D is the draught and B is the beam, the width of the ship at its widest point. This coefficient is related to the volume of water displaced by the ship.

The configuration coefficient accounts for the various shapes of a pier, namely closed, semisolid, and open (Gaythwaite 2004). The distinction between pier type estimates differs in the flow of water around the pier. In the case of a closed pier, the water is intended to be trapped in the immediate vicinity of the ship. An example of a closed pier would be a bulk-head or boat garage where there are walls that extend beyond the water level. In contrast, an open pier does not seek to impede the flow of water. These usually consist of a platform raised on pilings. A semi-solid pier splits the difference between closed and open piers, trapping a specific volume of water, while allowing the remainder to flow freely. For calculating purposes, the value of a closed or solid pier is taken to be 0.8, for a semisolid pier, 0.9, for an open pier, 1.0.

The softness coefficient is a comparison of the relative stiffness of the ship and the fenders (Gaythwaite 2004). It is assumed that the softness coefficient is 1.0 for soft fenders and 0.9 for hard fenders. A soft fender will deflect a minimum of 6 inches when the berthing load is applied, whereas a hard fender will deflect less.

### **2.2.5.2 Berthing Energy Calculation Example**

The Star Ferry Company that runs out of the Central Piers in Hong Kong Harbour has 10 identical ships (Wang 2009). The dimensions of these ships are shown below and a sample calculation for the berthing force is completed. The structural report assumes a berthing angle of 20 degrees at a speed of 0.3 m/s normal to the berth. Since the Central Piers are open structures, the configuration coefficient ( $C_c$ ) is 1.0. The softness coefficient is also 1.0, and the block coefficient for the Star Ferry was estimated to be 0.5. An example calculation is shown below.

Assume:

Length = 33.8m

Beam = 8.6m

Drought or Draft = 2.4m

Displacement = 287 Tons

From this, one can determine:

Hydrodynamic Mass Coefficient:  $1+2*2.4/8.6 = 1.56$

Eccentricity coefficient:

$$r=1/4*33.8m= 8.45 \text{ m}$$

$$K=(0.19*0.5+0.11)*65=6.929m$$

$$C_e = \frac{6.929^2+8.45^2 \cos 20^2}{6.929^2+8.45^2} = 0.472$$

Thus:

Berthing Energy (without safety factor):

$$E_F = \frac{287}{2*9.8} * 0.472 * 1.558 * 1.0 * 1.0 * 0.3^2 = 0.950 \text{ Ton-m}$$

Applying a safety factor of 1.5, the total berthing energy is found to be **1.425 Ton-m**.

Using the graph in Figure 11, it is found that the berthing load for a Star Ferry at a Central Pier is 120kN.

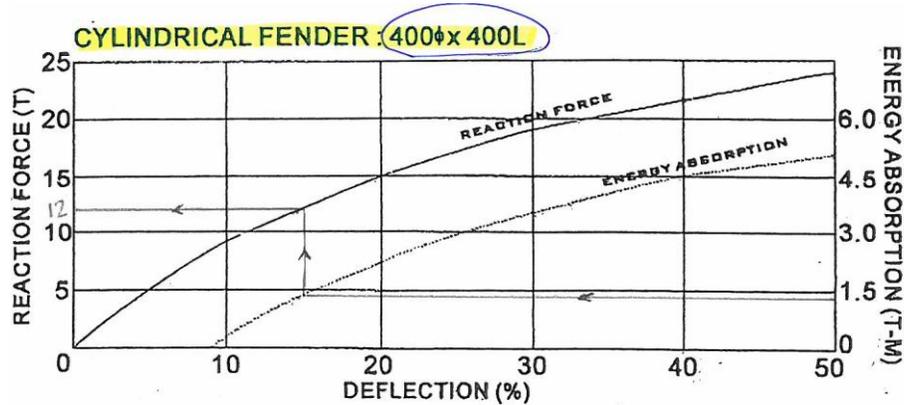


Figure 11. Visual reference for berthing force calculation. (Wang, 2009)

## 2.2.6 Ship Mooring

Once a ship is berthed, the next step in adequately securing the vessel is to moor it either to a port structure or by anchoring. Mooring to a port structure such as a pier requires tying mooring lines that connect strategic areas of a ship to a bollard, or vertical post, on a pier. Not surprisingly, mooring schematics vary widely for each type of vessel, but they should follow common sense rules, e.g., by definition, mooring lines should keep the vessel reasonably close to the port structure while restricting forward and backward movement. See Figure 12 for a typical mooring scheme.

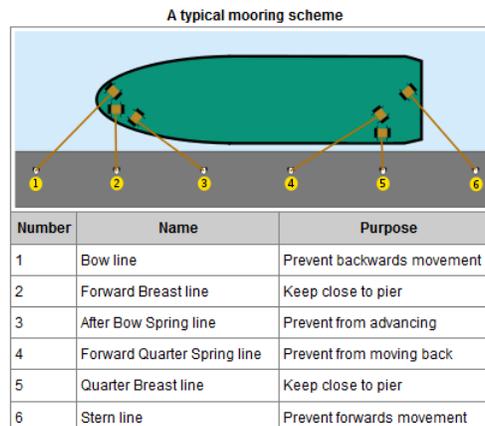


Figure 12. A typical mooring scheme. (Wikipedia, 2011)

Anchoring a ship requires knowledge of the characteristics of the seabed. Sorum (2007) reports that modern anchors can be classified into distinct designs depending on how the anchor sets on the bottom. Hook, Kedge, or Navy designs are used to deeply penetrate into a variety of problematic surfaces such as rocks, thick grass, and hard sand. Grapnel anchors are lighter versions of the hook designs and are used more commonly on small boats. Plough designs work well in surfaces ranging from soft mud to rocks and work by burying themselves deeper into the seabed as more force is applied to them, much like a farm plough. Lightweight or Danforth anchors, a specific type of plough design, are best utilized in firm sand, gravel, or mud. Claw and Bruce anchors are essentially light plough designs that are purposely designed to reset, meaning these anchors will break off from the seabed and reset in a different position if sufficient force is applied. Sea anchors, instead of actually clinging onto the seabed, use water itself as a weight by dragging large volumes of water along as a ship moves. Mushroom anchors usually serve as permanent mooring, as they typically weigh several thousand pounds and their shapes facilitate their settling firmly into soft ground.

### **2.2.7 Ship Maintenance and Repair**

Ships and vessels that remain in the water full time require nearly constant maintenance. Although some maintenance and repair can be done while a ship is berthed and moored, most ships will require regular visits to a drydock (see Figure 13). Putting a ship into drydock gives workers the ability to perform essential repairs that would have been impossible to perform otherwise. “These tasks could be from major overhauls such as changing the piston of the marine diesel engine of the main propulsion plant to moderate tasks like cleaning the centrifuges and purifiers or minor tasks such as cleaning a small filter of say the bilge pump” (What are the Different Types of Repairs Necessary for a Ship?, 2009, p. 1). Another example is the replacement of sacrificial anodes. These items are metallic anodes used to protect other metallic components from corrosion. These anodes help to preserve a ship’s hull and

other submerged equipment when out in the water for long periods of time, and accordingly, require regular replacement, which can only be performed in a drydock. In addition to completing maintenance and repair on existing watercraft, drydocks are used for the construction of new vessels.



*Figure 13. A ship in drydock. (Wikipedia, 2010)*

### **2.2.8 Ship Access from a Port Structure**

A wide variety of methods are used to provide a safe means of pedestrian access between a moored vessel and a place on land. According to the Marine Industrial Safety Section (2005), “[an] accommodation ladder or gangway appropriate to the deck layout, size, shape, and maximum freeboard of a vessel is generally used as a means of access between vessel and shore (p. 8)”. Freeboard refers to the distance between a ship’s waterline and its upper deck level, measured at the lowest point where water may enter the ship. Lines, portable, or fixed ladders may be used in the event that the use of an accommodation ladder or gangway becomes impractical.

In nautical terms, a gangway refers to a passageway or narrow walkway used to safely access a vessel (see Figure 14 for a typical ship's gangway). "There are many kinds of gangways including aluminum, steel, and wood gangways. In addition, gangways can be fixed at both ends, fixed at the top and roll at the bottom, or be self lifting" (IP Consulting, 2009, p. 1). Aluminum gangways are very strong and light and are resistant to rust. They are generally used as pedestrian gangways and can be designed for a wide variety of climates and load restrictions. Steel gangways are also very strong and durable but unlike aluminum, steel is prone to corrosion. Moreover, steel gangways are typically more expensive due to their size and complexity of installation. Nevertheless, steel gangways are commonly used in the transportation industry due to steel's ability to support considerable loads, specifically vehicles. Wooden gangways are much less common due to their poor load capacity and short lifespan in comparison to steel or aluminum structures. Because wooden gangways are much cheaper, they are usually used to minimize cost in light loading situations.



*Figure 14. A typical ship gangway. (Clow Group Ltd., 2011)*

According to the International Maritime Organization (2008), there are a multitude of issues to consider when installing and maintaining a gangway system (p. 2). Gangways must be situated in places

clear of working areas and cannot be placed where any suspended load can pass overhead. The gangway and surrounding area on both ends must be properly illuminated in low light conditions. A lifebuoy should be made readily available in the immediate vicinity of the gangway while in use. Gangways must be clearly marked on both ends with safety restrictions including maximum and minimum angles of inclination, design load, etc. As a rule, the angle of inclination for gangways should not exceed 30 degrees from the horizontal unless specifically designed for use at higher angles. After all installation prerequisites are met, testing may commence to verify proper operation and condition of the gangway. Gangways require regular maintenance, with close attention paid to distortion, cracks, and corrosion. Finally, according to the International Maritime Organization, “The following items should be thoroughly examined during annual surveys... / 1. treads; / 2. side stringers, cross members, decking, deck plates, etc.; / 3. all support points such as wheel, roller, etc.; / 4. stanchions, rigid handrails, hand ropes; and / 5. any other relevant provisions stated in these guidelines” (International Maritime Organization, 2008, p. 5).

### **2.2.9 Secondary Effects of Vessel Movement and Berthing**

An additional concern with respect to the feasibility of berthing a large historic ship alongside a public museum is the vessel’s impact not only on the structural elements of the pier on which the museum will rest, but also on the museum’s decorum (vise-a-vise viewing), as well as any artifacts on display. In seeking to provide an enjoyable experience to members of the public, assuring not only their physical safety, but also their physical comfort, is prerequisite. Furthermore, in presenting artifacts dating back to before the Common Era (CE), ensuring their preservation is both financially necessary to the life of the museum and a historic and cultural imperative.

Though naturally any vessel procured by the HKMM would occupy a space outside of the walled exhibition space (remaining in the adjacent waters of Victoria Harbour), it is essential to ensure that the forces, vibrations, sounds, lighting, and other byproducts of operating the ship are not unduly

transferred to objects and persons within the exhibition space. In the absence of controls which account for the byproducts of the ship's operation, the continuity and focus of a visitor's viewing may be broken, thereby negatively impacting the overall visitor experience. Additionally, failure to consider these effects may result in damage to artifacts, hurting the museum's finances and prestige.

#### **2.2.10 Ambiance and Microclimate**

According to the Manual of Museum Exhibitions, the three primary climate factors that a museum must control are temperature, relative humidity, and air movement (Frost, 2001). In considering the procedure for embarking and disembarking from a historic vessel, visitors attempting to leave the gallery directly for the ship-board experience will be forced to open doors so as to enter the outside world. This opening will allow air from outside the museum to enter, which will attempt to come into equilibrium with the controlled temperature inside the exhibit space, thereby raising or lowering the otherwise controlled inside temperature. Per the HKMM's internal operating procedures, there is a five degree Celsius range for the inside temperature of the exhibition space; however, in the event that the museum is operating at either the upper or lower bound of this range, the influence of the outside temperature could cause the inside temperature to become unacceptable by this standard. Additionally, though the HKMM's display cases utilize UV filtering and fire-resistant glass paneling, any additional sunlight or humidity from outside air may be transferred as heat to the carefully regulated "microclimates" of the various artifact display cases, thereby causing or accelerating artifact decay.

With respect to the issue of noise, the motion of patrons leaving the gallery and boarding the ship must be mitigated, so as not to conflict with spoken dialogue presented in the movies and interactive games presented in the gallery. This unwanted ambient noise includes the foot traffic along exit corridors and gangways, any verbal commands from the ship's captain, and any conversations taking place aboard the ship, namely questions asked by patrons of the museum curators and docents, all of which are natural byproducts of operating a historic vessel. It should be noted however that this

mitigation must not be absolute, so as to allow sufficient forewarning in the case of an emergency, as for example, a fire onboard the ship, which would necessitate an evacuation of both the ship and gallery.

Finally, concerning the issue of vibration, an assessment of both Victoria Harbour's wave conditions and the force transfer distribution of a given ship's berthing load must be completed when determining artifact placement and fixturing. To achieve this, an estimation of the transferred load at each point in the gallery may be measured using a variety of off-the-shelf devices, including ShockWatch® stickers. While these devices differ in application, the intent is to receive an indication at specific accelerations corresponding to specific deflections, thereby allowing force to be extrapolated. If these forces exceed the limit in which the artifact and case can experience before becoming damaged, then it becomes necessary to alter either the placement of the artifact, or the manner in which force is transferred through the environment.

## **2.3 Safety and Legality**

In studying the intended purpose of a museum, namely the transfer of information to its guests, any institution developing a new exhibition must first concern itself with the safety of its visitors during the exhibition viewing. Hence, a thorough review of the legal framework in which the museum operates, in combination with careful study and implementation of the best practices concerning exhibit design and operation are essential to the success or failure of an exhibition, and of the museum itself. This section provides a preliminary outline of this legal framework, discusses several practical safety considerations, and explores limiting cases affecting exhibition operation.

### **2.3.1 Regulations**

In beginning a study of the legal framework under which an exhibition ship owned by the HKMM would operate, Victoria Harbour's maritime regulations must be thoroughly investigated. Per the Hong

Kong Maritime Law Association (HKMLA) (2008), all maritime ordinances are issued by the Hong Kong legislature. These ordinances are then enforced by the Hong Kong Marine Department, as overseen by the Hong Kong Dept. of Justice. Of the twenty-six ordinances listed by the HKMLA regarding harbour activity, the most directly applicable to the HKMM is the Ferry Services Ordinance (1997), which defines “ferry service” as “a service provided by means of vessel, other than exclusively powered by oars, for the conveyance by water of passengers, baggage, goods or vehicles, for a reward, between two or more points within Hong Kong waters, whether or not such points are varied in time, or whether or not service is operated to a fixed timetable” (p. 1). By this definition, even in the absence of conventional commercial cargo, any vessel operated by the HKMM which moves within the harbour would be considered a commercial vessel and is therefore subject to all Hong Kong Harbour regulations. A legal distinction may be made here for a vessel which is intended to be stationary, but as this is an exceptional case with regard to common harbour traffic, this is not directly addressed in the above ordinance. Regarding this distinction elsewhere in maritime law, in the United States, the designation of “substantially a land structure” as applied by the Coast Guard, may be used when the vessel is not intended to travel, but does have this capability, as in the case of the *Mayflower II* (Peter Aranstan, personal communication, December 3, 2010). To earn this designation, the emergency services network of any stationary vessel must be primarily land-based, and a means of communicating with this network while on board must be operational at all times. As an illustration of this rule, in the event of a fire aboard the *Mayflower II*, the acting captain would contact the Plymouth Fire Department, not the Coast Guard or the Plymouth harbormaster (Peter Arenstan, personal communication, December 3, 2010).

Chief among the ordinances with which any moving HKMM vessel would need to comply is the Merchant and Shipping Safety Ordinance (1997), which lists requirements in areas including but not limited to passenger capacity, access to life-saving devices, fire-fighting devices, lighting, color and shape pertaining to visibility, navigational equipment, and communication/radio equipment. Given the

historical absence of several of these technologies during the 18<sup>th</sup>, 19<sup>th</sup> and early 20<sup>th</sup> centuries, it is reasonable to presume that any genuine historic vessel acquired by the HKMM would require extensive retrofitting to be compliant with the modern regulations, with all costs of this retrofitting being borne by the HKMM. Though not explicitly discussed in either ordinance (perhaps understandably given the rarity of the case), the potential for the “grandfathering” of a historic vessel expressly based on its age, thereby exempting it from some or all of these regulations, may exist. However, a final clause included in both ordinances grants authority to the Chief Executive of Hong Kong (the functional equivalent of a mayor or governor in the American government) to exempt any vessel from any portion of any maritime regulation.

### **2.3.2 Limiting Cases and Best Practices**

In examining the feasibility of the HKMM operating a ship within Victoria Harbour, as with a number of complex engineering problems, it is necessary to consider the limiting cases which constrain the system. In this instance, a primary constraint is striking a balance between the museum’s desire to reach the largest possible audience and the logistics of accommodating those interested in touring the vessel, but who may not be physically able. In examining the first-hand accounts of New York Times columnist Joyce Hor-Chung Lau (2007), it is noted that Hong Kong has a mixed reputation internationally with respect to accessibility. These mixed reviews stem in part from the difficulty of providing accommodation up and down the steep hills prevalent in several parts of Hong Kong, but also arise from the absence of regulation enforcement with respect to commercial buildings. To combat this perception, the Hong Kong Tourism Board has established a website (Accessible Hong Kong) devoted specifically to promoting accessible accommodations and attractions, including the ability to create a travel itinerary with links to businesses and organizations that offer accommodating services.

With respect to maritime exhibitions, unfortunately the problem of wheelchair access remains largely unsolved, as neither the USS Constitution nor the Mayflower II provide wheelchair access to

disabled patrons (The Travelling Wheelchair, 2010). This inaccessibility is based in part on the simple height of both ships, as well as the grade of ramp required even for able-bodied patrons to access the ship's main and half decks. Moreover, though use of both stationary and personal mobile hydraulic wheelchair lifts is quite common in the United States, this is not presently the case in Hong Kong.

In maintaining the safety of passengers while aboard any vessel operated by the HKMM, several additional procedural points merit consideration. First, concerning the number of persons aboard a ship at any given time, it is often preferable to limit the number of patrons to a figure below the maximum legal occupancy, so as to allow the operating staff to more closely monitor a given group, as well as to limit the number of cases where disoriented or inattentive passengers may bump into fellow passengers or staff (Peter Arenstam, personal communication, December 3, 2010). Though always filling to the maximum occupancy increases museum revenue for a given unit of time, the ability of a given passenger to explore the vessel unhindered, or to ask questions of the available staff is diminished when dealing with larger crowds, thereby hurting the overall exhibition experience, and decreasing the likelihood of a repeat visit.

Secondly, when performing vessel maintenance during visitor hours, as is often required, special care must be taken to assure passenger safety when staff are working above the average passenger height, or when working with materials including but not limited to paint, tar, and linseed oil. To inform the passengers of increased dangers in the area, it is advisable to have maintenance staff inform either the tour guides or members of the museum staff who interface directly with guests, who may, in turn, inform guests prior to boarding the ship (Peter Arenstam, personal communication, December 3, 2010). Additionally, the use of signage or the physical cordoning off of certain areas, while not ideal, may be employed to ensure visitor safety. Finally, to ensure the safe and efficient embarking and disembarking of passengers, it is highly recommended to have a staff member monitoring the ship's gangway ramps during visitor hours (Peter Arenstam, personal communication, December 3, 2010). In addition to

offering assistance to anyone having difficulty embarking, this staff member may also serve as a ship's "gatekeeper", monitoring both occupancy and passenger behavior, as well as alerting the appropriate ship or museum staff in the case of any incident without distracting from an on-going passenger tour.

## **2.4 Market Research**

For a museum exhibit to achieve widespread acceptance, care must be taken to understand and acknowledge the cultural mores and sensitivities of likely visitors. To achieve this understanding, the museum must complete a systematic study of museum culture of the proposed exhibition site, with particular attention paid to the development and presentation of content in accordance with local custom and preference.

### **2.4.1 Attitudes Towards Museums**

People around the world have a variety of expectations for a museum, entrenched in cultural attitudes, concerning both a museum's specialty and preferred presentation style. Furthermore, groups will differ in their decision to visit a particular museum based on the same marketing pitch, as museum visits are considered leisure activity, and are therefore subject to differences in taste. Falk and Dierking (2000) said that one of the main results of a visit to a museum is gaining new knowledge. More importantly, when a group of people visit a museum, visitors often learn for the sake of learning and not out of obligation. This means that a person may in fact learn about a topic at a museum but not realize they have learned it until that knowledge is used. Furthermore, this phenomenon means that people who do not enjoy education in a more rigid school setting may learn better at a museum and will therefore enjoy the visit.

### **2.4.2 Museum Experience: China and Hong Kong versus the West**

Museum experiences are different in China than in the West. First, on the whole, there are more museums in the West (Stephen Davies, personal communication, November 9, 2010). The number of

museums in China has increased recently, but given the large population of China, the number of museums is not comparable to the number of museums in the West.

Museums are much more popular in the West than in China. This is illustrated in Table 1, which compares the attendance at different maritime museums around the world. One of the reasons for this may be the relative rarity of maritime museums in China. According to the Hong Kong Maritime Museum in a document submitted to the Hong Kong legislature (2008), “Maritime museums are a new departure in mainland port cities in China” (p. 25).

An additional dissimilarity between the compared museums is that the less popular museums have admission fees. Falk and Dierking (1992) stated that although admission fees may not explicitly make a museum less popular, they may prevent people with lower incomes from visiting. This can most clearly be seen in the comparison between the Mayflower II and Plymouth Rock. Although the two museums are in close geographic proximity to one another, Plymouth Rock garners five times as many visitors per year.

Table 1: Comparison of Museum Visitation (Sources listed)

Museum	Visitors per year	Admission price	Source
National Maritime Museum, London	2,367,904	Free	ALVA, 2009
Mayflower II, Plymouth, MA, USA	200,000	\$10 USD	Arenstam, P. Personal Communication, December 3, 2010
Plymouth Rock, USA	1,000,000	Free	America’s Best History , 2009
Hong Kong Maritime Museum, Hong Kong	130,000	\$10 HK (\$1.29 USD)	Depot et al, 2010, p. XV; Hong Kong Maritime Museum, Location
Hong Kong Museum of History, Hong Kong	688,743	\$20 HK (\$1.29 USD)	Depot et al, 2010, p. 20; Hong Kong Museum of History, Admissions

The more likely cause for the disparity in popularity between museums in Hong Kong and elsewhere is “an as yet largely 'non-museum' culture” (Stephen Davies, personal communication, November 9, 2010). In a ‘museum culture’, families and other social groups will visit museums multiple times over the course of a year. Falk and Dierking (2002) stated that visitors often come from the more highly educated, more affluent part of society. In contrast, Hong Kong residents are not very affluent, with the average visitor to the Hong Kong Maritime Museum currently earning less than \$20,000 Hong Kong (\$2,580 US) a month (Stephen Davies, personal communication, November 9, 2010). This is the standard income for a middle class Hong Kong resident, but it is much lower than monthly income of a middle class American.

### **2.4.3 Museum Setup**

There are four different methods that museums can use to encourage visitor understanding of an exhibit (Lord, 2001). These styles are contemplation, comprehension, discovery, and interaction. These methods are typically easier to implement in specific situations. However, a museum will ideally utilize all four modes.

Contemplation is when a visitor takes the time to try to discern the meaning of the display to themselves (Lord, 2001). This mode is very common in art museums and can be facilitated by providing benches in the gallery and minimal descriptions. The labels on displays meant to be contemplated are often minimalistic so as not to define the piece in any way.

Comprehension is correlating one artifact to other displays in the museum. This is accomplished with themed exhibits. Comprehension style exhibits are common in history museums where exhibitions from the same time period or culture can be displayed in a thematic setting.

Discovery, much like comprehension, has the visitors making connections between the artifacts. Discovery is often used in larger museums “with systematic specimen collection ... all types of museums

that have adapted visible storage mean of display” (Lord, 2001, p. 21). An example of this storage style is drawers in the exhibit wall that can be opened to allow visitors to see additional displays.

Interaction is, as the name implies, when the visitors actively interact with the museum. This could be anything from a live demonstration to a virtual game or even asking museum staff questions. Interactive exhibits are found in all museums, but are most common in children’s museums. Museums that implement exhibits encouraging visitors to use all these modes of exploring presented materials, have the highest likelihood of success.

Falk and Dierking (2002) claimed that not only do museums need to assess the style of their exhibits, but must also consider the sorts of tours visitors will take. There are three primary styles of tours, namely solo tours, group tours, and audio tours. In a solo tour, the guest explores the museum at his/her own pace and in an order that suits the individual. This allows visitors to spend the most time at exhibits that particularly interest them, while spending less time at exhibits they find less compelling. A group tour is when a staff member brings groups of visitors around the museum. The advantage of this style of tour is the staff member explains the exhibits and answers questions; however, this prevents the visitors from spending extra time at exhibits that particularly interest them. The audio tour is a combination of the two previous tour styles. For an audio tour, a tour guide records their description of the different exhibits for visitors to listen to as they view the exhibition. This tour style combines the ability of visitors to move at their own pace while still allowing an expert to explain the exhibits.

Falk and Dierking (2002), state that for most museum visitors, going to a museum is an activity done for fun during free time. Moreover, people who spend their leisure time engaging in intellectual activities like reading are more likely to go to museums than people who tend to spend their leisure time participating in group activities. Falk and Dierking suggest that this is due to the challenge of having a large group of people to go to a museum together and having all the members enjoy the time without

the group splitting up. Intellectual pursuits are often followed in smaller groups or alone, making it easy for these people to enjoy themselves without the group having to split up.

Falk and Dierking (2002) wrote that many of the groups that go to visit a museum are family groups. Quite naturally, both children and parents must both be able to enjoy the museum for a shared trip to be a success. Often a child will go into a museum setting with little or no knowledge of the subject, while a parent may have a particular interest in the subject. This disparity in knowledge often adversely affects the child's museum going experience. Children also have shorter attention spans, meaning steps must be taken to ensure they do not become bored. Children typically enjoy interactive exhibits, although there is a potential danger in the child using the materials in ways not intended by the museum staff. Adults often want to see more complex exhibits and are not necessarily as interested in the interactive elements of the exhibits. According to Lord (2001) one style of exhibit that both adults and children enjoy are interactive creative exhibits. An example of this exhibit would be a coloring station or a place to put on your own puppet show. To reiterate, it is essential to arrange a museum such that all members of the party will enjoy the visit, even when there are differences in perspective.

#### **2.4.4 Hong Kong Maritime Museum: History and Purpose**

Hong Kong, as a worldwide business center and trade-based society, is a bustling city that embodies a fast paced style of living. This lifestyle is partly a result of the rise of technology, urban development, and public leisure activities. This movement toward Western modernity has led to a decrease in museum visitation due to the lack of interest and public visibility of history, art, and culture. To alleviate this problem, museums must firmly grasp the characteristics of their target audience by tailoring exhibits to their visitors' interests. Currently, a worldwide effort is being placed on creating interactive exhibits that draw visitors into museums and encourage them to return. A primary tactic in this effort is to frequently change exhibits such that visitors always expect to see something new and exciting.

The Hong Kong Maritime Museum (2010) is a privately funded educational institution that focuses on maritime history (Corporate). As a result of the HKMM's funding structure, it is extremely difficult for the museum to afford upgrades for their exhibits. Ultimately, a museum is a business, and its priority is to generate enough income to maintain itself and expand by drawing in as many visitors as possible. The HKMM expects to attract more visitors by moving the museum from Stanley, Hong Kong, to Central Pier No. 8 in 2012. This location will provide a new and exciting atmosphere for museum visitors and maritime enthusiasts alike. Moreover, this new location will enable the HKMM to display a larger percentage of their exhibits due to an increase in available floor space. The HKMM is also investigating the feasibility of increasing its visitor base by introducing an interactive exhibit in the form of a historic ship berthed alongside Central Pier 8. This would advance the museum's primary purpose in providing an enlightening and interactive experience that stimulates interest in the subject matter. This historic ship could be an elaborate exhibit that would appeal to many visitors and serve as a visual reminder of Hong Kong's and China's rich maritime history.

#### **2.4.5 Benefits of Central Pier 8**

The previous research team from WPI investigated the benefits of the museum's future location at Central Pier No. 8 (see Figure 15) and determined the best approach to maximize the new location's potential (Depot, et al., 2010). Additionally, they analyzed the expected visitor base at the new location and found that it would be approximately 2.5 times the current annual visitor base. Although this estimate carries considerable uncertainty, the previous project team gathered a large data sample to support their conclusion. After collecting data by surveying travelers utilizing the Star Ferry Piers, the group offered a conservative estimate, a mid-range estimate, and an optimistic estimate of the number of people who would annually visit the HKMM at its new location. The mid-range estimate, considered to be the most likely number, is 135,000 people. However, this group's estimate is based solely on the responses of travelers coming through the Star Ferry Piers, and does not consider the potential visitors

coming from other modes of transportation. This ferry traffic is only approximately 10% of the annual ferry traffic through the area, and approximately 0.1% of the total public transportation in Hong Kong (Depot, et al., 2010).



*Figure 15. An Artist's Rendering of the HKMM at Central Pier 8. (Hong Kong Maritime Museum, 2010)*

The previous group made several recommendations for the museum including the need for a centerpiece exhibit outside the museum to catch people's attention and subsequently increase the likelihood that they would visit the museum. They proposed that this exhibit be a large anchor or a historic ship. The HKMM is currently planning to use a large anchor in front of Central Pier No. 8 in the center of a designated park area to draw visitors to the museum. In addition, the HKMM has decided to evaluate the feasibility of berthing a ship alongside Central Pier No. 8 to bring further attention to the museum. This ship could also serve as a potentially interactive exhibit to attract visitors with a desire to explore a historic maritime vessel.

## 2.5 Summary

The Hong Kong Maritime Museum is faced with a significant number of issues concerning the feasibility of berthing a historic ship at Central Pier 8. These concerns span a multitude of engineering, safety, and market research disciplines, and the information presented in this section provides a solid

background on all of these issues. Each field plays a vital role in determining the overall feasibility of integrating such an exhibit into the existing museum experience. The goal of our Interactive Qualifying Project is to determine the engineering, safety, and market criteria, and propose recommendations as to the feasibility of berthing a ship at Central Pier 8. The next chapter discusses the project team's approach to gathering the information needed to address the issue of feasibility.

### **3. Methodology**

The goal of this project is to determine and make recommendations as to the feasibility of berthing a historic ship at Central Pier 8 in support of the pending relocation of the HKMM. Several factors describing aspects of the overall feasibility of this proposal have been thoroughly examined in order to make these recommendations.

First, a public survey comparing possible museum exhibitions and pricing was undertaken to assess the conditions of the market with particular respect paid to ship selection and exhibition pricing. Second, several technical aspects of berthing a historic ship alongside the existing Pier 8 structure were evaluated by examining existing engineering reports and completing detailed academic research. This was done to preserve the integrity of the exhibits housed within the museum, as well as to quantify and evaluate the ability of the pier to support the load created by the ship. Finally, in order to ensure the safety of museum visitors and the compliance of the vessel with all relevant maritime regulations, our team completed a detailed review of existing maritime law, in consultation with local authorities and experts.

Each of these areas was addressed by employing the methods described in the following sections. In brief, the primary methods employed by our team included a public survey, a compilation of currently available technical data supplemented by team observations, and interviews with local experts.

#### **3.1 Assessment of Market Conditions**

As with any new business venture, a thorough market analysis must take place in order to determine the demand for a new product. In this case, a historic ship is being proposed as a new exhibit at the HKMM alongside the museum's new location at Central Pier 8. The public must accept this proposed historic ship if the HKMM hopes to increase visitation and have this new exhibit be a success.

Accordingly, quantifying the public's interest with particular respect to museum recognition, likelihood of visitation, vessel selection, and pricing is critical to museum planning.

### **3.1.1 Survey Creation and Administration**

To gauge public opinion in the areas outlined above, the project team developed and administered a multiple-choice questionnaire (see Appendix E) on behalf of the museum. Comprised of five content-seeking questions and three demographic questions presented in both English and Cantonese, the questionnaire was designed as a linear exercise. The survey began with whether or not the respondent was previously aware of the museum and culminated in the respondent's preferred admission fee given their choice of historic ship. This linearity was intended to develop a profile of the respondent, whereby the effect of each choice could be measured directly by asking if the respondent was more likely to visit the museum given a change in the museum's current operations (i.e. the HKMM's move from Stanley to Pier 8, and the theoretical acquisition of the respondent's preferred historic vessel). The issue of the maximum admission fee addressed in Question 5 was saved for last in an effort to avoid jarring the respondent, thereby diminishing his/her concentration and/or willingness to provide candid answers. It was hypothesized that when presented with a survey taker in a public setting that any mention of the exchange of money would evoke a visceral and largely negative reaction on the part of the public, particularly Hong Kong natives who have grown accustomed to pedestrian "hawkers".

Concerning the preparation of supplemental questionnaire materials, this investigation employed several tactics to induce potential respondents while maintaining a professional demeanor. Chief among these was a coupon (see Appendix G) designed by our team in collaboration with Carlie Au Yeung, a graphics specialist and Assistant Curator for the HKMM), offering free admission to the museum upon completion of the survey. In designing this coupon, our team believed that without a small but nevertheless relevant incentive to answer a series of questions, potential respondents would

be unwilling to devote any length of time to completing the questionnaire. Specifically, in considering the rather pressed schedule of the typical Hong Kong resident, it was believed that offering a reward for completing the questionnaire would aid us in meeting our overall response target.



*Figure 16. Promotional museum banners for survey; at left, an English version; at right, Chinese.*

In seeking to represent both WPI and the HKMM with the utmost professionalism during the survey solicitation process, the HKMM agreed with a project request to commission a pair of banners describing the history and current operations of the museum (see Figure 16). The banners featured text presented in both English and traditional Chinese paired with high-resolution photographs of several museum artifacts. These banners served both to provide a meaningful context to the survey (in avoiding the appearance of tawdry salesmanship) and to create a visual focal point to attract potential respondents. In addition, the banners served to promote the museum among pedestrians who elected not to answer the questionnaire simply by informing passersby of the museum's purpose and impending move to Central Pier 8.

The administering of the questionnaire took place over three days, beginning Wednesday January 26, 2011 and concluding Friday January 28<sup>th</sup>. Working each day from 9:00 AM to 3:00 PM, our

team administered the questionnaire on the public “Skywalk” between the Central MTR Station and the Tsim Sha Tsui Ferry Pier (better known as Central Pier 7), adjacent to future location of the Hong Kong Maritime Museum at Central Pier 8. This location had several advantages including the high volume of foot traffic, comprised of both Hong Kong natives commuting to work via the Star Ferry and tourists looking to enjoy a view of the Harbour. The constant activity spurred by both the MTR and ferry schedules created a large and diverse pool of potential respondents, a fact reflected and discussed in the Results section of this report. In addition, the ability of our team to answer questions about the relative advantages and disadvantages of the HKMM’s relocation was greatly enhanced by informing potential survey takers that the future location of the HKMM could be seen from the Skywalk. Moreover, an indirect effect of selecting the Skywalk location for data collection is that the Hong Kong public was provided with a visual connection between the HKMM and Central Pier 8. This was seen by museum staff as potentially advantageous in attempting to increase future museum visitation.

When administering the survey, all members of the team were dressed in formal business attire, as well as wearing nametags provided by the museum identifying ourselves as volunteers. Each member acted individually in approaching potential respondents, mindful of using a calm, professional tone of voice, while ensuring that no one was approached by multiple team members or in any manner that could be perceived as hostile. Simply stated, when approaching a potential respondent, the team member asked if the individual had a moment to take a brief survey for the Hong Kong Maritime Museum, always making sure to address the individual using an honorary Sir or Madam. Following this initial approach, once a potential respondent either verbally or non-verbally declined to participate, the team member would not ask again and would politely stand aside.

The project group positioned themselves such that two members were responsible for approaching potential respondents moving in one direction (e.g. from the MTR Station to the pier), while the remaining two members were responsible for the other direction. The questionnaire was

single-sided and professionally printed to ensure image quality. Each respondent was provided with a single questionnaire, a writing implement, and a clipboard on which to write. In the course of a respondent filling out a questionnaire, a team member answered any procedural questions posed by the individual, but did not answer any questions about the questionnaire's contents, beyond identifying the current location of the HKMM and the location of Central Pier 8. As a guide, in the course of filling out a questionnaire, the team member overseeing the respondent would attempt to speak as little as possible so as not to influence the questionnaire results.

### **3.1.2 Drawing Comparisons to Similar Exhibitions**

Prior to our arrival in Hong Kong, members of the Pier 8 Engineering team had the opportunity to interview Mr. Peter Arenstam, Director of Artisans of the Mayflower II at Plimoth Plantation in Plymouth, Massachusetts, USA (see Appendix C for an abridged transcript of this interview). We also visited the Gloucester Maritime Heritage Museum in Gloucester, Massachusetts, which does not have a floating exhibition but shares in the study of maritime history. This created a familiarity with the technical practices employed by respected maritime museums while enabling team members to experience examining historic ships not as mere tourists or even maritime enthusiasts, but from the perspective of a museum curator.

This preparation was put into practice by the team in visiting the *Bounty III*, a replica European tall ship commissioned in Sydney and currently operating as a private touring vessel in Hong Kong (see Figure 17). This meeting was arranged by contacting the Bounty's operating company, Hong Kong Resort Limited, through their Marketing Manager, Ms. Charlotte Ho. Following an exchange of e-mails between members of the team and Ms. Ho, a meeting between representatives of the museum, the project group, and the Bounty III management was held at the Hong Kong Resort Ltd. Offices at the Chinese Merchant's Building in Central. The primary purpose of this meeting was to discuss the potential for future collaboration between the Bounty III and the Hong Kong Maritime Museum, specifically

berthing the Bounty III at Central Pier 8 as an exhibition. Though this meeting addressed several issues, one important outcome was an additional meeting held after the Chinese New year which enabled team members to tour the Bounty III at its maintenance facility in Discovery Bay.



*Figure 17. The Bounty III (HMS Bounty Organization, 2010)*

### **3.1.3 Museum Capacity and Operations Management**

To better understand how a relatively small privately-funded specialty-subject museum approaches its operations management, an interview was conducted with Dr. Jeffrey Forgeng, Professor of History at Worcester Polytechnic Institute, and curator of the Higgins Armory, a museum located in Worcester, Massachusetts. A transcript of this interview, completed prior to our arrival in Hong Kong, may be found in Appendix C. Additionally, a case study detailing the operational methodologies of the Mayflower is presented in Appendix D. This information was used to compare operational models between institutions with a focus on the intersection of funding, promotion, and large-scale museum expansion.

In addition to a survey of the environmental and business externalities affecting exhibition development, this investigation examined the HKMM's internal operating capacity, paying particular respect to issues of museum promotion and staffing. This informal review included a complete tour of the museum facilities and a series of candid discussions with the Museum Director Richard Wesley and Senior Research Fellow and museum founder Dr. Stephen Davies.

## **3.2 Technical Considerations**

This section describes the set of investigative steps taken to study the technical considerations of developing a floating exhibition, with a focus on the berthing and mooring of a historic vessel. The methods presented were selected to explore several eventualities in operating this type of exhibition, including the need for transportation, docking, and future repairs.

### **3.2.1 Analysis of Structural Engineering Report**

In beginning an examination of the problem of docking a vessel at Central Pier 8, the first step was to review the structural engineering report for the pier provided by the Hong Kong Maritime Museum. This report, submitted to the museum by Atkins Engineering in March of 2009, includes information regarding maximum berthing loads for Central Pier 8, estimates of the berthing energy of a Star Ferry, and information about commercial fendering systems. However, due to ambiguity concerning the maximum berthing load the pier could sustain, a letter was sent to Atkins to clarify these calculations. The results of this correspondence are addressed in Section 4.3.2. The formulas provided in the report were entered into an Excel spreadsheet so that different dimensions reflecting the various types of vessels could be substituted into the equations, thereby creating a berthing energy calculator. Using this calculator, one may assess the ability of different vessels to berth at Central Pier 8.

### **3.2.2 Contacting the Star Ferry Company**

Since its founding in 1888, the Star Ferry Company has transported millions of passengers across the waterways of Victoria Harbour, an invaluable service to the people of Hong Kong. Given this pedigree, an attempt was made to arrange a meeting with one of the ferry captains to gain a better understanding of ship logistics, specifically the berthing and mooring procedures for a Star Ferry vessel. However, following an initial correspondence with a Star Ferry public relations representative, it was brought to our attention that the ship captains did not speak English, and would thus be unable to answer our questions directly. Undeterred, the project team submitted a list of questions via email in lieu of a face to face meeting. This correspondence is detailed in Section 4.3.4.

### **3.2.3 Contacting the Hong Kong Observatory**

The Hong Kong Observatory is responsible for the collection and storage of all meteorological data for Hong Kong, including the documentation of tides and currents for several of the major waterways. Intending to use this information in our engineering analysis, a records request was sent to the observatory in the hopes of obtaining the most recent yearly tide and current measurements for the Quarry Bay station, the closest observatory station to Central Pier 8. In addition, an interview was conducted with WT Wong, a senior member of the Observatory Science Team. This interview is discussed in Section 4.3.5.

### **3.2.4 Contacting the Hong Kong Hydrographic Office**

The Hong Kong Hydrographic Office handles all information concerning the depth of various waterways around Victoria Harbour. An email was sent to its public address to obtain information about the topography of the sea floor around Central Pier 8. Additionally, this inquiry included a request for tidal and current records, to be used in conjunction with any information obtained from the Hong Kong Observatory.

### **3.2.5 Study of Typhoons and Typhoon Shelters**

Since typhoons are a regular occurrence in Hong Kong, the next task was to research the Hong Kong typhoon warning system, local typhoon shelters, and the process of securing a ship in the event of a typhoon striking Hong Kong. In addition, the group inquired about various typhoon shelters and the ship securing process during our meetings with the Hong Kong Marine Department and the Bounty III.

### **3.2.6 Gangway Systems Research**

There are many different types of pedestrian gangways available on the market today. This investigation looked into several possible gangway structures and suppliers, in the event that the Hong Kong Maritime Museum would need to provide its own gangway system onto a ship being berthed at Central Pier 8. This knowledge was supplemented both by team observations in boarding the Star and First Ferries, and through an interview with Marine Department Director Mr. Roger Tupper (discussed in Section 3.3), whose extensive sailing experience and background in harbour management yielded several insights. Finally, to better understand the ship-structure interface as it exists today at Pier 8 (as of February 2011), the project team was provided access to the pier and presented with several professional architectural renderings of proposed changes to the pier's floor layout following the museum's arrival. These renderings provided context and useful spatial dimensions when envisioning the process of boarding and disembarking a historic ship of unknown size.

## **3.3 Legal and Regulatory Framework**

Prior to arriving in Hong Kong, project preparatory work included extensive background research into the legal and regulatory framework of a potential HKMM exhibit. This resulted in a list of relevant ordinances and questions concerning issues of legal interpretation, particularly the distinction made in US maritime law between a "primarily land-based structure" and a passenger vessel, which is subject to a higher degree of legal scrutiny. Naturally, from an exhibition operations standpoint, it was

of interest to determine if any such distinction existed for vessels subject to jurisdiction in Hong Kong. In addition, an interest in exploring possible legal exemptions specifically applicable to historic vessels was also at the forefront of this legal research.

Seeking to clarify issues of legal interpretation identified in the course of research as pertinent to exhibition development, e-mail inquiries were directed to both the Hong Kong Marine Department and the Hong Kong Maritime Law Association. As a result of these inquiries, a meeting was scheduled with Deputy Marine Department Director Mr. Roger Tupper, a longtime HKMM supporter and an expert in Hong Kong maritime law. This meeting took place at the Marine Department Offices in Central, and is discussed in Section 4.3.1 of this document.

### **3.3.1 Ensuring Safety and Accessibility**

The primary concerns of this research with respect to safety and accessibility were the embarking and disembarking of patrons to and from the exhibition via a gangway or ramp system, with particular attention paid to the experience of disabled patrons, who are traditionally unaccounted for by maritime museums. This research into the problem of basic accessibility extended to concerns with possible ship configurations and the movement of passengers between decks and around impediments like rigging, but also to non-technical aspects of exhibition planning including the training of shipboard personnel and regulatory requirements as applied to marine structures.

## **3.4 Promotion and Outreach**

A critical facet of the exhibition development process is seeking the opinion and support of the public. To enlighten and entertain a heterogeneous population, spanning ethnicity, gender, age, educational attainment, and an array of other factors, it is both natural and advisable to contact a large assortment of institutions and organizations, each with a unique vantage and set of interests. In an effort to gather a diverse body of knowledge and utilize all available resources, a master contact list was

developed using information available online as well as a directory developed by the maritime museum in the course of its years of operation. This list was frequently updated, and grew to include a number of private contacts provided by our sponsors, Mr. Richard Wesley and Dr. Stephen Davies. These personal contacts, spanning industry, academia, and government, proved invaluable when confronted with the rather rigidly hierarchical business climate of Hong Kong.

Our preferred method of contact was an e-mail alias created solely for the purpose of this research, Pier8Engineering@hkmaritimemuseum.org. This address was chosen in lieu of an academic or personal e-mail as it provided potential contacts with the name of an immediately recognizable Hong Kong institution, as well as centralizing our correspondence through the museum's existing web mail client. By centralizing any ongoing correspondence through this client, our research efforts could be monitored by the museum staff, who could in turn offer guidance and any necessary material support. The collective expertise of the museum staff naturally served to focus and improve the writing and image quality presented to potential contacts.

An example of this material is a company newsletter drafted for the HKMM (shown in Appendix F) which includes information on the Hong Kong government's Central Pier reclamation project, the HKMM's move to Central Pier 8, and a brief description of this project. Developing this newsletter provided an introduction of the museum to potential contacts, tailored toward the efforts of this research rather than the museum's contents or daily operations.

In this instance, drawing both on the graphics expertise of the museum and the anecdotal experience of several staff members who routinely receive these types of letters, a small library of example letters was generated. This library was in turn used to identify the accepted form and preferred formatting of corporate newsletters, providing a template for use in generating similar documents.

### **3.4.1. Promotional Opportunities: Touring Companies**

A chief promotional interest of the museum is to assess the interest of bus touring companies and cruise lines in establishing joint promotional and ticketing ventures following the museum's relocation. Though the contractual terms of any agreement between the HKMM and any other organization are beyond the scope of this study and must be protected as the intellectual property of the museum, discussion of the potential for such an agreement is relevant to an overall analysis of feasibility. Indeed, this aspect of promotion was essential in determining if the scale of expansion of the museum, and with it, any increase in museum revenue, could justify the substantial purchase, staffing, and upkeep costs of acquiring a historic ship.

To this end, the team made inquiries with four prominent international cruise lines (Star Cruises, Royal Caribbean, Voyages of Discovery, and Princess Cruises) and a leading tour bus operator, the Big Bus Company. Discussion of the correspondence and meetings stemming from these inquiries is presented in Sections 4.2.1 and 4.2.2.

### **3.4.2 Reaching out to School Groups**

A growing concern among the museum staff was the relative absence of school groups touring the museum in the course of their studies, particularly students in primary or secondary schools. As cultural preservation and education are inextricably linked by the passing of knowledge from one generation to the next, it falls within the museum's purview to ensure students are given the chance to discover and explore a vein of history integral to the cultural development not only of their city, but of the region as a whole.

Accordingly, the first step to address the museum's concern was to create a list of local schools using both Internet research and listed museum contacts. Due to the large number of schools in Hong Kong, it was not possible to contact every school in the city or surrounding areas. However, information packages were sent via email to approximately 30 schools' respective administrations and district

offices. These packages included our newsletter, information about group rates and discounts, and a link to materials developed by the HKMM intended for use in a classroom setting. These materials provide instructors the ability to integrate a museum field trip within their current history or social studies curriculum.

### **3.5 Summary**

In summation, the investigative methodology used in this project utilized a multi-step process to evaluate the feasibility of the HKMM berthing a ship as a floating exhibition at Central Pier No. 8. This investigation employed a wide variety of methods, including but not limited to public surveying, personal interviews, consultation with experts, and additional independent research and observations. The process of data gathering and analysis was largely completed in parallel, adapting both to institutional needs and practical constraints. Using data collected in a number of areas, this research will serve to resolve planning dependencies and provide objective information influencing overall feasibility.

## **4. Results**

This chapter details the findings of the project team in assessing the feasibility of creating a floating exhibition for the Hong Kong Maritime Museum at Central Pier 8. In addition to serving as a complete written record of the information garnered in the course of this investigation, this chapter provides preliminary recommendations in answer to the question of feasibility.

In presenting these recommendations, a distinction must be made between the information acquired directly from relevant parties and reputable academic sources and the interpretation and analysis of this information subsequently undertaken by this study. This interpretation spans a number of scenarios of varying degrees of probability, each with implicit assumptions concerning operational variables including mechanisms of ownership, museum attendance, cost, future business partnerships, and museum development. As previously stated, the notion of feasibility encompasses dependencies in engineering, business, law, and a variety of other disciplines. Each of these dependencies is assessed in turn in this chapter.

### **4.1 Survey Results**

In order to gauge public opinion on whether or not a ship should be berthed at Central Pier 8, our team collected 350 questionnaires which we have termed the WPI-HKMM Survey or WHS for short. Of the 350 questionnaires collected, 304 were useable. The criteria for usability consisted primarily of the respondent's answering each of the five presented content questions in full, following the written survey directions. No data was disregarded due to undeclared demographics or chosen responses. These questionnaires (see Appendix E) were collected on the MTR Skywalk between Central Pier 7 and the IFC Mall. In these questionnaires the respondent selected the one ship they preferred to learn about, how much they would be willing to pay to board the vessel, and their level of agreement with the statement that a ship would increase their interest in the museum. Basic demographic data was also

collected so that the population of respondents could be compared to the population of current museum visitors using data collected by the HKMM for comparison (Please see Section 4.1.1 for further description). Each questionnaire was numbered for analysis purposes, though individual respondents were not identified. This section discusses the results of this analysis.

**4.1.1 Demographic Comparison to Internal Museum Data**

Over the last five years the museum has regularly collected visitor demographics by surveying patrons following their visit. The HKMM conducts this type of survey three times per year. Each survey period lasts approximately three weeks and gathers roughly 100 responses. Based on data compiled over the last five years, current museum visitor demographics are 52% male and 48% female (Davies, personal communication 11/10/2010).

While the three demographic questions presented in our survey were optional 98% of respondents elected to answer all three. As can be seen in Figure 18, a gender differential closely matching the museum’s previous demographic distribution was obtained in conducting this survey. From this data, the survey gender demographics appear to be representative of the average museum visitor.

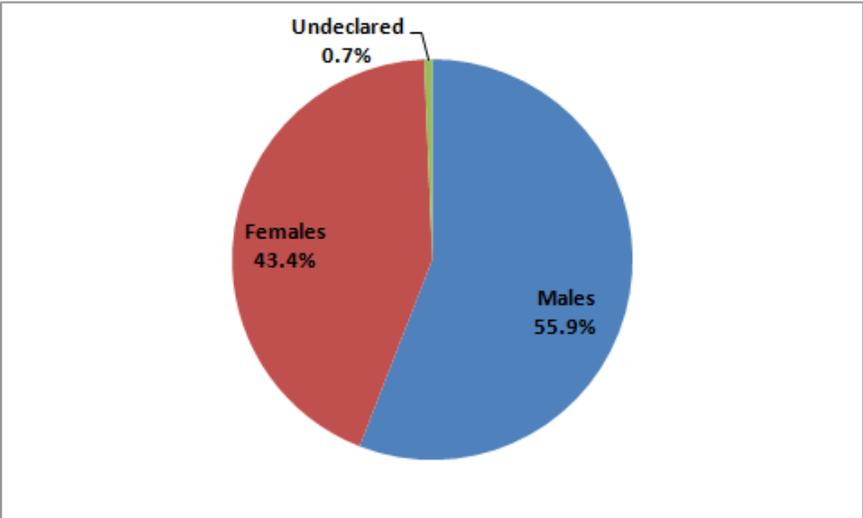


Figure 18. WPI-HKMM Survey Respondent gender distribution.

From their internal review, the museum found that 50% of their visitors were between 18 and 40 years of age (Davies, personal communication 11/10/2010). Figure 19 shows the age distribution of the WPI-HKMM Survey. Interestingly, this analysis found that 39% of respondents were between the ages of 21 and 40, while 38% were between the ages of 41 and 60. This indicates the average survey respondent is slightly older than the typical museum visitor.

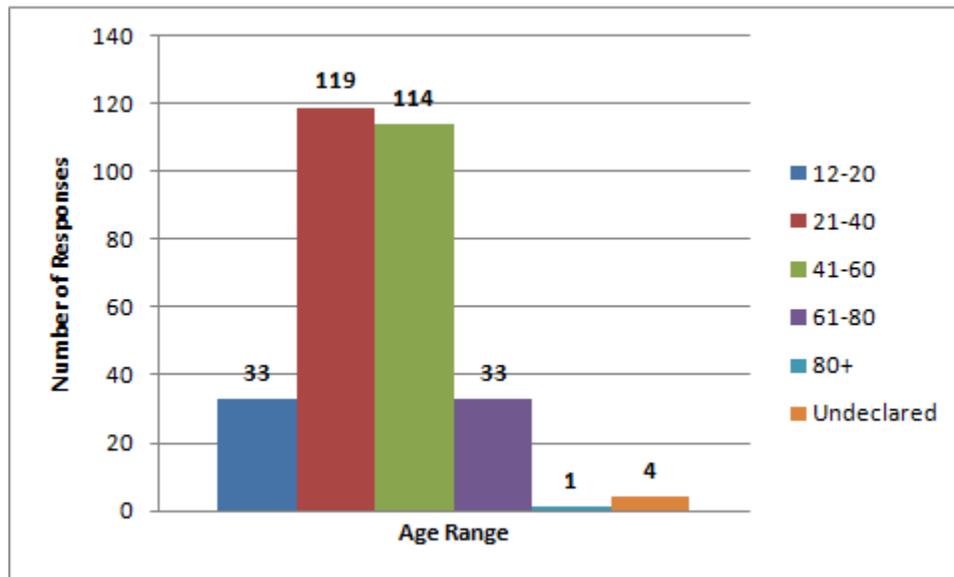


Figure 19. WPI-HKMM Survey age distribution.

The final piece of demographic data collected by the survey (see Figure 20) was the respondent's reason for being in Hong Kong, with possible responses limited to 'Resident', 'Tourist', 'Business', 'Visiting Family and Friends' and 'Other'.

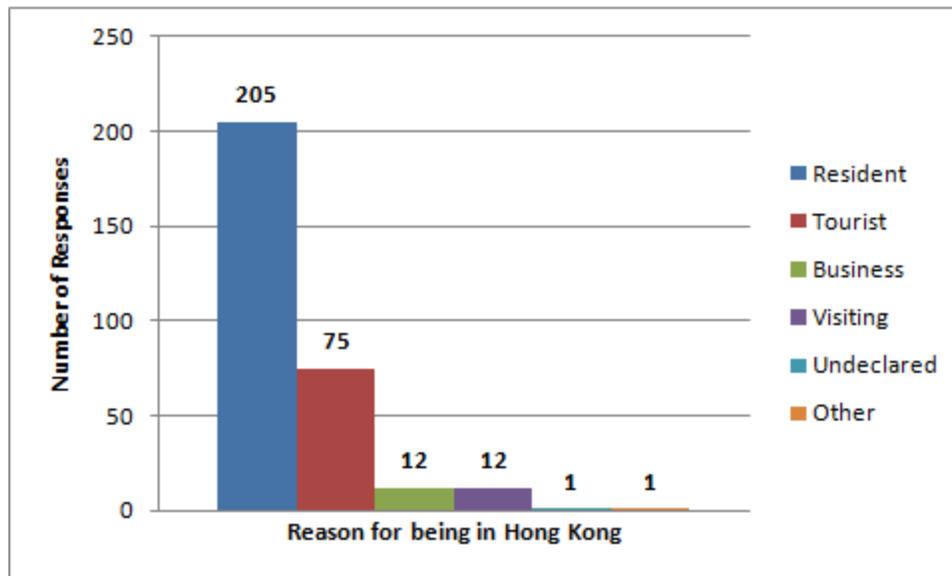


Figure 20. WHS reason for travel distribution.

Two-hundred and five (67%) of the people who filled out our survey were residents, while seventy-five (25%) were tourists. This is highly similar to the current museum demographics, as 70% of the visitors identify themselves as locals (Davies, personal communication 11/10/2010). The demographics presented in this survey are, in general, highly similar to the demographics of current museum visitors. Given the similarity between current museum visitors and survey respondents, the data presented in this analysis may be seen as a reasonable predictor of the opinions of potential future visitors.

#### 4.1.2 Response to Question #1

The first question presented in the survey was “*Were you previously aware of the Hong Kong Maritime Museum?*” In answer to this question, the survey found that 60% of the population had indeed heard of the museum. This percentage stands in rather stark contrast to the museum’s internal data, which suggests less than 30% of visitors were aware of the museum prior to visiting. One possible explanation for this discrepancy is a raised public profile for the museum brought about by prior activity

on the Central Piers. Specifically, in the past 18 months, the HKMM has drafted a petition and collected signatures from the public in an effort to gain access to Central Pier 8 as a future exhibition site. A large number of these signatures were gathered by museum volunteers in close proximity to the Central Pier complex. These events most likely raised awareness of the museum among regular pier visitors, the population being examined in this survey.

To understand differences in awareness between groups, the project team analyzed this question based on respondent age, gender, and reason for being in Hong Kong. Figure 21 shows this difference as a function of age. As can be seen in this figure, somewhat unsurprisingly, 41-60 year-olds are the most likely to have heard of the museum, while 61-80 year-olds are the least likely. As a function of gender, our survey revealed that 62% of males and 60% of females recognize the museum. This similarity in response suggests that museum awareness is largely unaffected by gender.

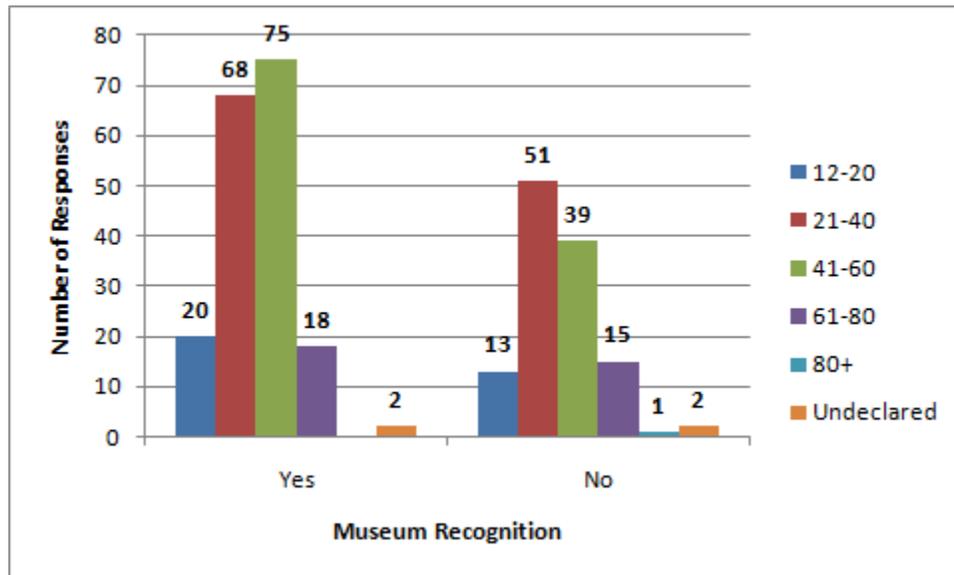


Figure 21. WHS Question #1: Overall HKMM recognition by age.

Finally the respondent's reason for being in Hong Kong was correlated with whether or not they recognized the museum. A summary of this data is presented in Figure 22. This sub-category found the

largest discrepancy between the overall results and the results in various sub-categories. In total, 73% of residents have heard of the museum, while conversely, only 30% of tourists have heard of the museum. Based on this finding, one of the methods the museum could use to increase visitation is to raise awareness of the museum among tourists through additional promotion and strategic business partnerships. While increased awareness through promotion may not in and of itself result in increased visitation, such a discrepancy between locals and tourists strongly suggests that this vital market segment is being underserved. As such, the tourist population is underrepresented among potential museum visitors.

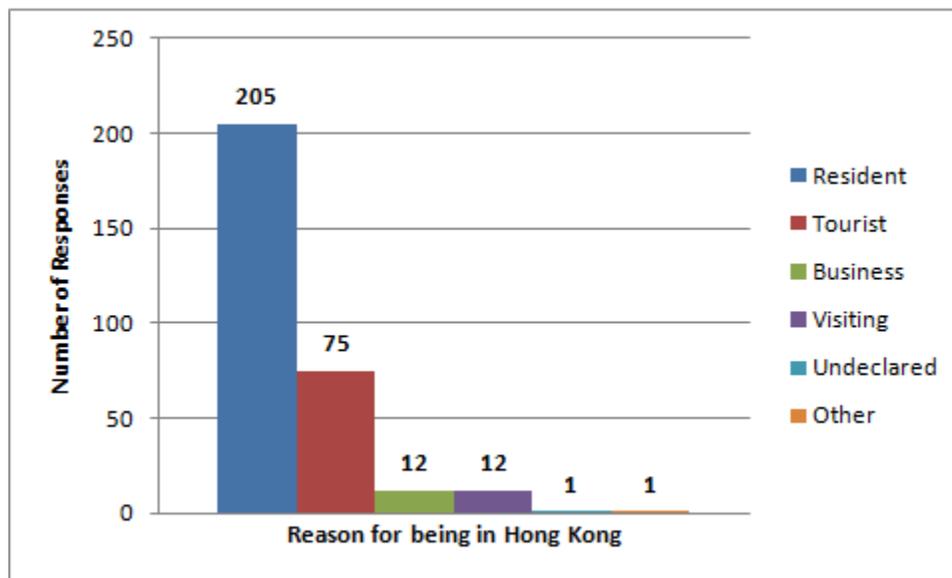
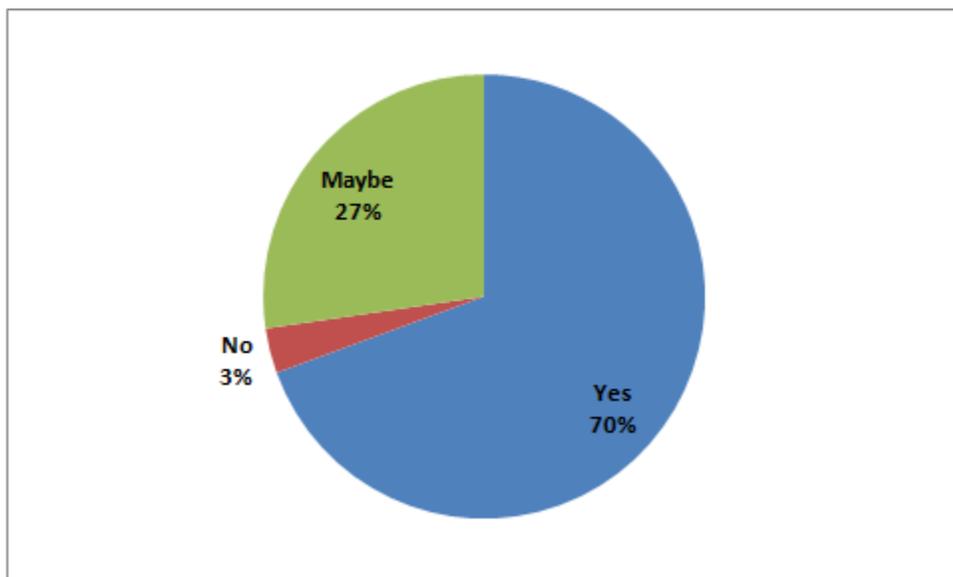


Figure 22. WHS Question #2: HKMM recognition by reason for being in Hong Kong.

#### 4.1.3 Response to Question #2

The next survey question was “Would you visit the Hong Kong Maritime Museum if it were located at Central Pier 8?” In answering this question, it was assumed that all respondents answering ‘Yes’, half of those answering ‘Maybe’, and none of those answering ‘No’ would visit the museum at its new location. These assumptions are based on the belief that an answer of ‘No’ suggests either a

disinterest in the subject matter, or that the new location would inconvenience the respondent, thereby diminishing overall willingness. Equally, an answer of 'Yes' is taken to mean the respondent is certain to visit. This assumption is justified by noting that the 'Maybe' option, which was not chosen, would indicate a greater level of uncertainty in the response. Using these assumptions, it was calculated that roughly 83% of respondents would be inclined to visit the HKMM at its new location. Figure 23 shows the distribution of answers to this question.



*Figure 23. WHS Question #2 response distribution.*

In addition to examining the overall willingness of a respondent to come to the museum at its new location, this willingness was further quantified by demographic. First, in assessing gender, as with overall museum recognition, Figure 24 demonstrates that there was no significant difference between the likelihood of men and women surveyed in visiting the museum. It should be noted that this finding runs contrary to the common perception of specialty history museums appealing primarily to men. This assumption is not borne out by either the visitation seen in collected museum data or in the degree of awareness displayed in the WHS.

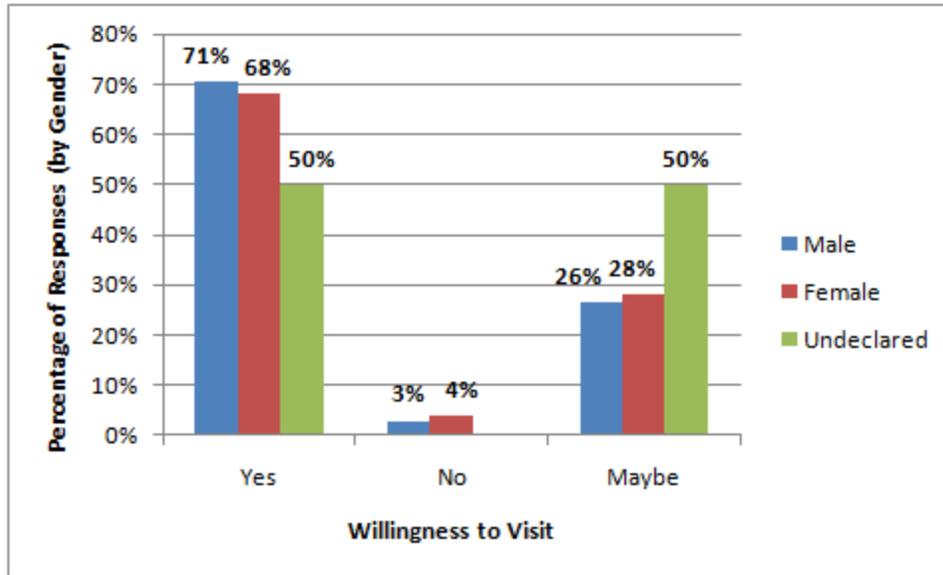


Figure 24. WHS Question #2: Willingness to visit the HKMM at Central Pier 8 by gender.

In Figure 25, as seen below, the willingness of people to tour the museum is correlated with their reasons for being in Hong Kong. Respondents visiting family or friends are the least likely to visit the museum, followed by tourists, residents, and finally business travelers. It should be noted given their high rates of willingness to visit (88%) that business travelers, typically presumed to be otherwise occupied, are an underserved demographic in museum promotion. Though business travelers only account for twelve responses to the WHS, these rates of willingness present an opportunity for growth in overall museum attendance through expanded promotion, given the same caveats presented in the preceding pages (e.g. Hong Kong visiting frequency).

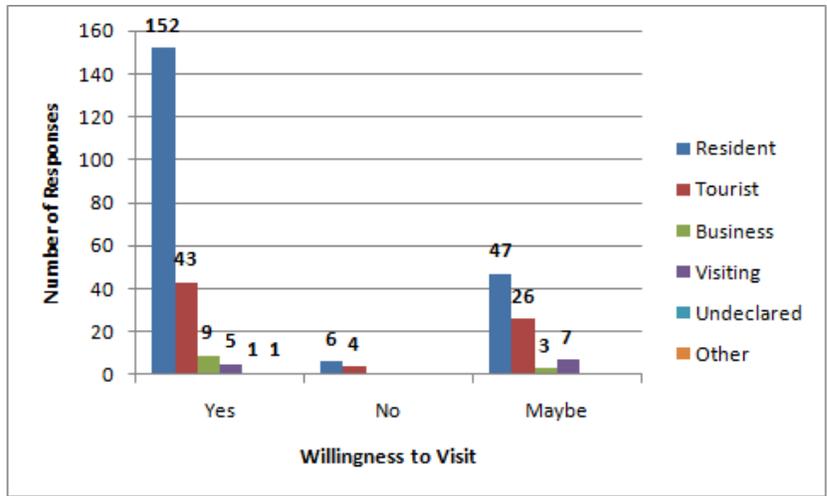


Figure 25. WHS Question #2: Willingness to visit the HKMM at Central Pier 8 by respondents' reasons for being in Hong Kong.

Next, the overall likelihood of visitation was correlated by age, as shown in Figure 26. Broadly speaking, it was uncovered that the older a person is, the more likely they are to visit the museum. While 12-20 year-olds were only 73% likely to visit the museum, 61-80 year-olds showed a 91% likely to visit. This may be due in part to the instant access to information afforded to today's youth. However, it is worth noting that in seeking to expand its visitor base and support the preservation of Hong Kong's maritime heritage, the HKMM should consider this demographic in future exhibition planning.

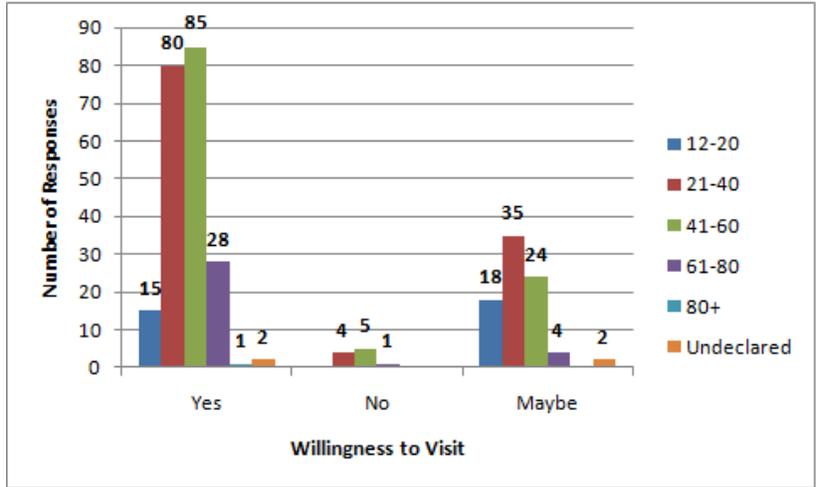


Figure 26. Willingness to visit the HKMM at Central Pier 8 by age of survey respondents.

In summation, the WHS shows that tourists are not likely to have heard of the museum and are less likely than residents to visit the museum. The survey results also show that gender does not play any significant role in willingness to visit. Finally, concerning age, while older patrons show the greatest likelihood of visiting, all demographics were reasonably enthusiastic, suggesting future exhibitions should account for a wide range of potential visitors.

#### 4.1.4 Response to Question #3

To determine the preferred ship type of potential museum patrons, Question 3 asked “Which type of historic vessel would you be most interested in learning about?” Figure 27 presents the distribution of responses to this question. As can be seen, junks and tall ships received a significant majority of these responses.

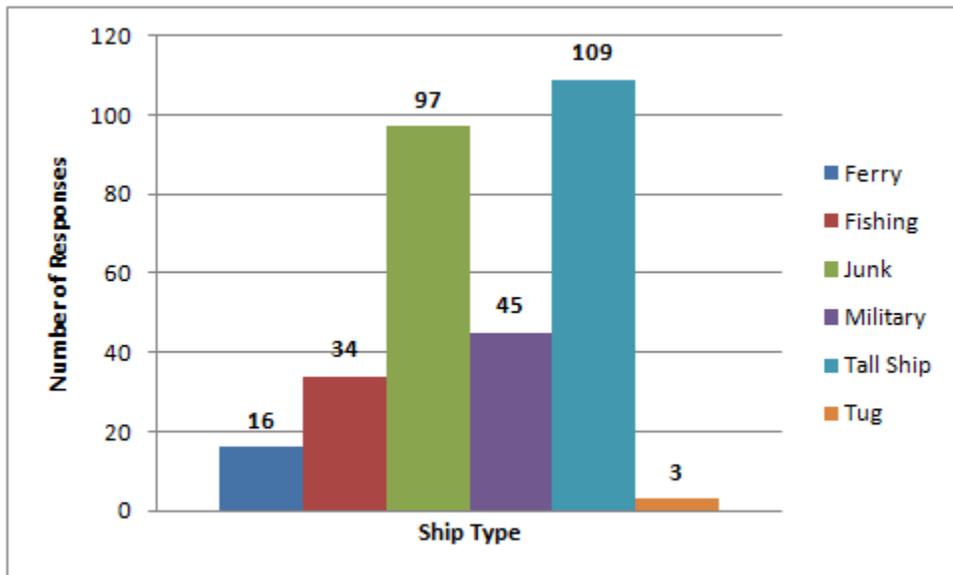


Figure 27. WHS Question #3: Ship preference.

A significant finding of this survey is that the two most desirable ships among all demographics (excluding 12-20 year-olds) were junks and tall ships. The near unanimity of this finding is perhaps the clearest indication of public sentiment uncovered by our survey.

Although military vessels were third most popular, totaling approximately 15% of all responses, further research has revealed that unlike in the US, military surplus is not available in Hong Kong, as any retired vessels are sold for scrap by the Central Government in Beijing to reduce operating costs and raise government revenue (Stephen Davies, personal communication, February 14, 2011).

Considering differences in ship type preference along gender lines, there is a slight difference in ship preference between men and women, as expressed in Figure 28. Tall ships and junks are nearly equally popular among women (a difference of 0.7%), while men prefer tall ships over junks by a margin of 7%. Males also appear more interested than females in a military style vessel by a margin of 7%. Males also appear more interested than females in a military style vessel by a margin of 5.6%. Though this preference was in part anticipated, and falls within a common Western paradigm of masculine versus feminine, the observed responses show a noticeable difference.

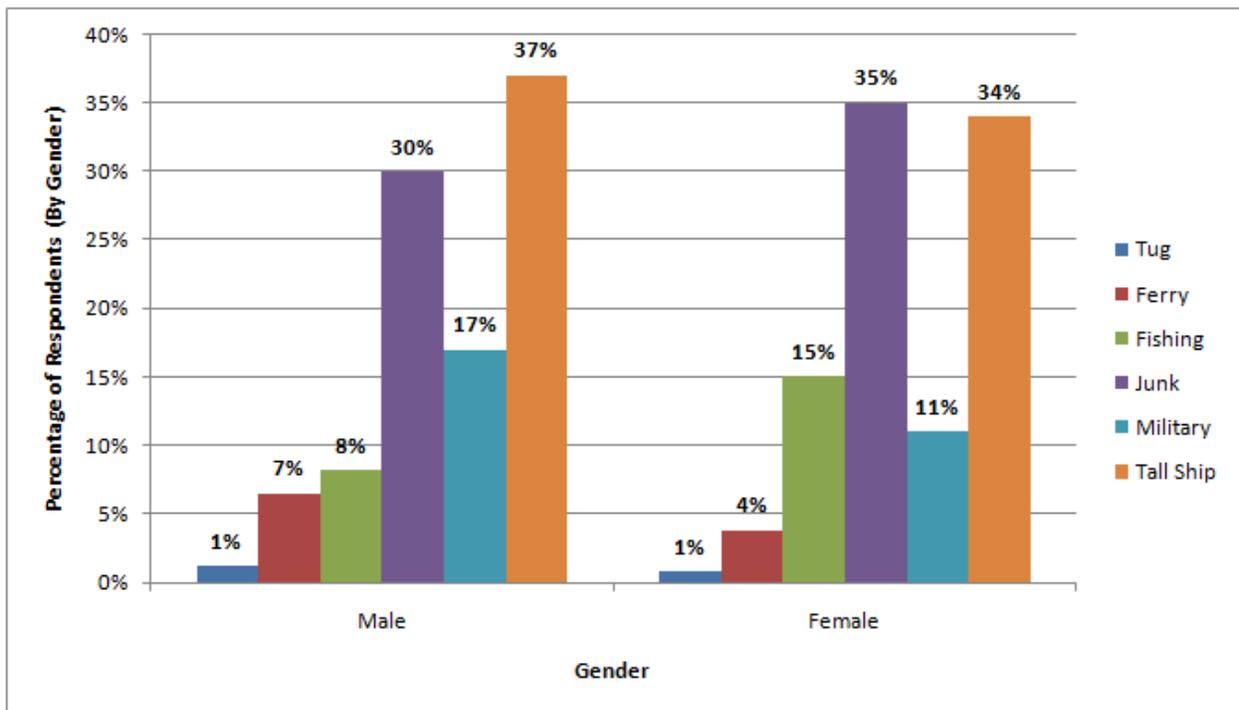


Figure 28. WHS Question #3: Ship preference by gender.

When examining ship selection by age, one statistical anomaly was found. Unlike all other demographics, 12-20 year-olds did not pick a junk or a tall ship as their top choice. Instead, the top choice was a military vessel with 39%, with junk and tall ship at 21% and 30%, respectively. This trend was not found in any other age group.

The last set of demographic data assessed for this question was the respondents' reason for being in Hong Kong, as displayed in Figure 29. From this correlation, several interesting conclusions can be drawn. First, residents were more interested in seeing a tall ship (35%) than a junk (27%). Also, tourists were slightly more interested in seeing a junk than a tall ship, but only by 4%. Although no group in this analysis had a strong interest in seeing a military vessel, residents (19%) were much more interested than any other group (all less than 8.3%).

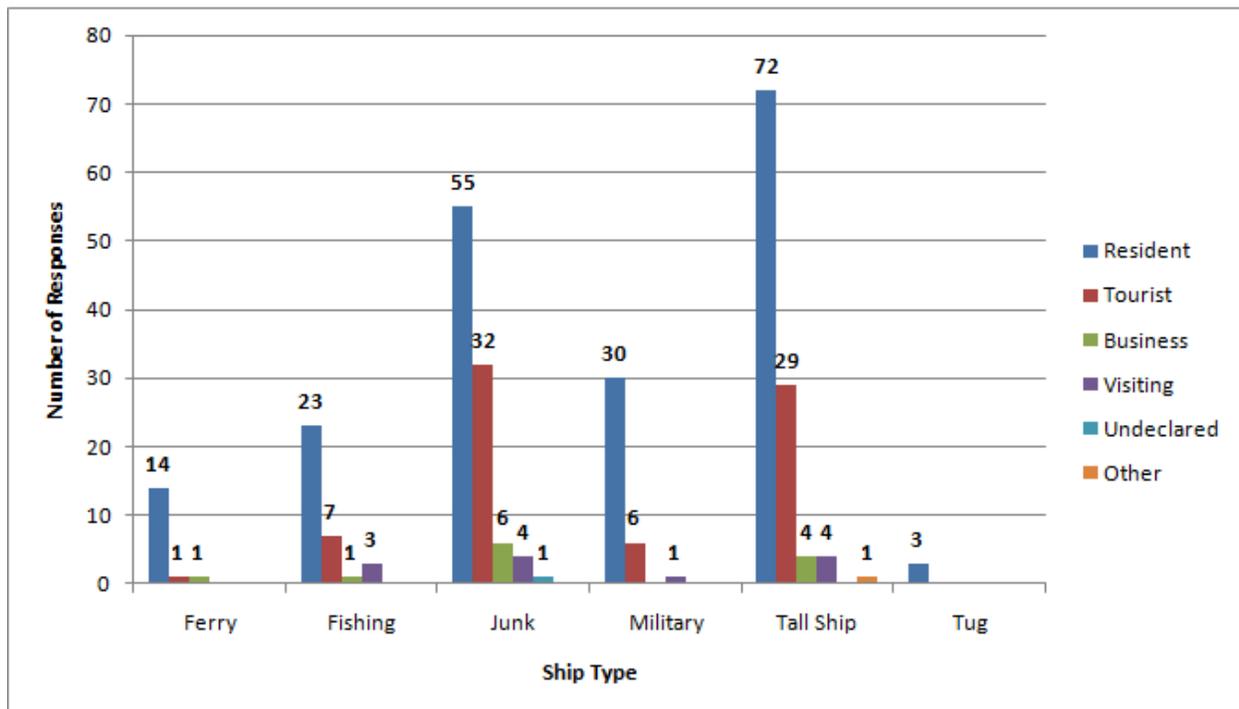


Figure 29. WHS Question #3: Ship preference by respondents' reasons for being in Hong Kong.

The final piece of data regarding ship selection is the willingness of a person to visit their chosen ship, as shown in Figure 30. This question was asked as a popular ship could still have a low visitor draw if the majority of the people who picked the ship would not be willing to come to the museum. We found that for the tall ship, junk, and military ships, the likelihood of respondents to come was similar to the overall likelihood (83%) at 84%, 83%, and 82% respectively. Although respondents who selected ferries had the greatest willingness to visit (90.6%), this only considers 16 respondents and is therefore an unacceptable sample size. In considering this willingness as a whole, the same trend observed in general ship preference is also observed in the respondent identifying and replying to their chosen ship. This implies that there is no significant difference affecting patrons' willingness having selected a single type of ship, but rather that the qualitative difference lies in the exhibition itself. This hypothesis can naturally only be validated or refuted by proceeding with the exhibit, which encompasses a number of other dependencies.

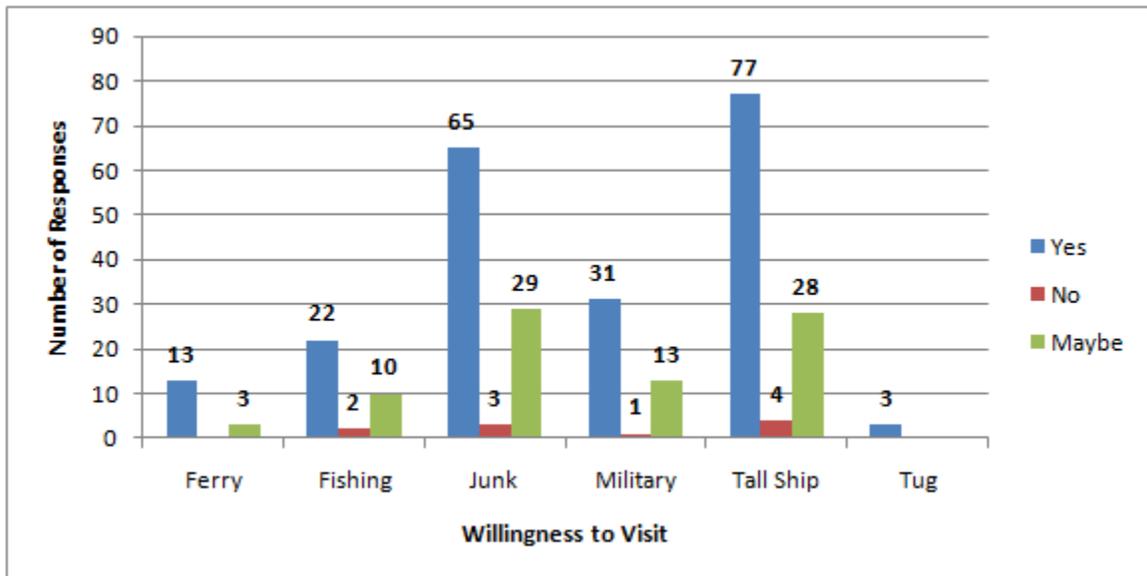


Figure 30. Willingness to visit the HKMM at Central Pier 8 if a ship exhibit existed.

Overall, the two categories of ships that could be considered as viable museum displays are junks and tall ships. These ships had by far the most interest in them and there is no significant difference between the willingness of persons selecting either ship. Both ships will attract the two primary museum visitor groups, tourists and residents, though a tall ship is slightly more likely to attract residents, while a junk is more likely to attract tourists.

#### 4.1.5 Response to Question #4

Next, this investigation examined the likelihood of people visiting the museum if a historic ship was berthed alongside the pier, independent of ship type. The distribution of the population's agreement level with Question 4, stated as *"I would be more likely to visit the Hong Kong Maritime Museum if I could examine the type of Vessel I selected. To what degree do you agree with this statement?"*, is shown in Figure 31.

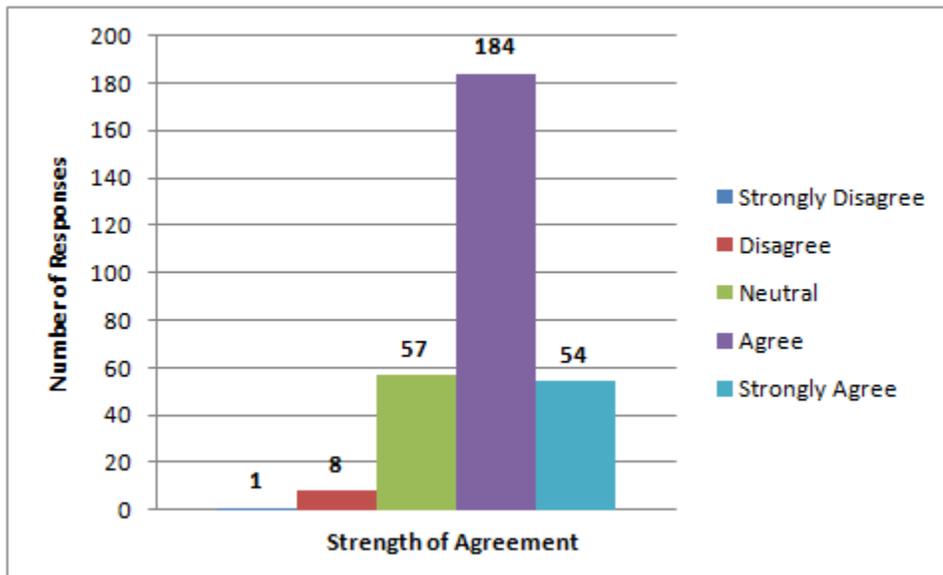


Figure 31. WHS Question #4: Level of agreement with the statement.

The WHS found that the respondent's likelihood of visiting the museum was increased if a historic ship exhibition was presented. To do a simple numeric analysis of these responses, a scale of

values was devised. In this scale, ‘Strongly Disagree’ was set to -2, ‘Disagree’ was set to -1, ‘Neutral’ to 0, ‘Agree’ to 1, and ‘Strongly Agree’ to 2. This mapping was created to parallel the choices provided on the survey form, and will be utilized throughout this section.

As shown in Table 2, the agreement with this statement was first compared by gender. This question displayed the biggest difference between men and women. Men averaged a 0.98 on the defined agreement scale, while women averaged only a 0.86. The average value was 0.93 for the entire data set.

Table 2: WHS Question #4: Level of agreement with the statement by gender.

Gender	Level of Agreement					Numeric
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Male	0	2	31	105	32	0.98
Female	1	6	26	77	22	0.86
Undeclared	0	0	0	2	0	1.00

Next, agreement with the previous statement was analyzed according to the respondents’ reasons for being in Hong Kong as shown in Table 3. It was determined that business travelers most strongly agreed with the statement. The numeric value for this group was 1.08, suggesting that a business traveler is also more likely to visit the museum if it had a historic ship exhibit. Residents and tourists had agreements of 0.95 and 0.94, respectively. Finally, the respondents that are in Hong Kong visiting family or friends showed by far the least enthusiasm in visiting the museum if it had a historic ship exhibit. The numeric agreement for that group was only 0.08. This suggests that these respondents were neutral with regard to the statement and proposed exhibition. The agreement a respondent had with the statement was also evaluated by age, as seen in Table 4.

Table 3: WHS Question #4: Level of agreement with the statement by respondents' reasons for being in Hong Kong.

Reason	Level of Agreement					Numeric
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Resident	0	2	39	130	34	0.96
Tourist	0	3	13	42	15	0.95
Business	0	1	1	6	4	1.08
Visiting	1	2	4	5	0	0.08
Undeclared	0	0	0	1	0	1.00
Other	0	0	0	0	1	2.00

Taken as a group, respondents under the age of 40 are less motivated by the potential presence of a ship than respondents over 40. Additionally it was found that the agreement value in the age range of 61-80 years was the highest at 1.12. This value, in conjunction with the data provided in Table 4 suggests that as age increases the desire to examine a ship also increases.

Table 4: WHS question #4: Level of agreement with statement evaluated by age range.

Age	Level of Agreement					Numeric
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
12-20	0	0	9	22	2	0.79
21-40	1	7	21	72	18	0.83
41-60	0	1	22	66	25	1.01
61-80	0	0	4	21	8	1.12
80+	0	0	1	0	0	0.00
Undeclared	0	0	0	3	1	1.25

In addition, the willingness of a respondent to visit the museum based on location was compared to their agreement with the statement regarding a ship exhibition. The intersection of these responses is shown in Figure 32.

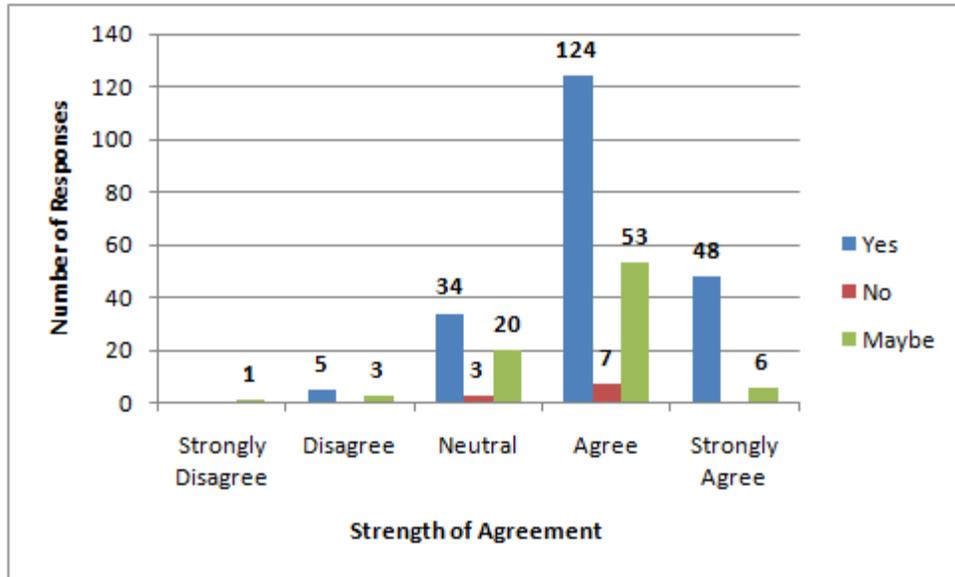


Figure 32. WHS Question #4: Level of agreement by willingness to visit the HKMM at Central Pier 8.

The data implies persons who would visit the museum given its new location are also more likely to visit the museum if it had a ship exhibit. The agreement value for this group is 1.02. Respondents who might or would not go to the museum based on its location (i.e. those who answered 'Maybe' or 'No' to question 2) are less motivated by the presence of a ship, suggesting an overall disinterest in the museum subject matter and services. The agreement values for these two groups are 0.72 and 0.70, respectively.

The type of ship was also compared to the general agreement of the respondent to the previous statement. The response distribution by ship type is shown in Figure 33.

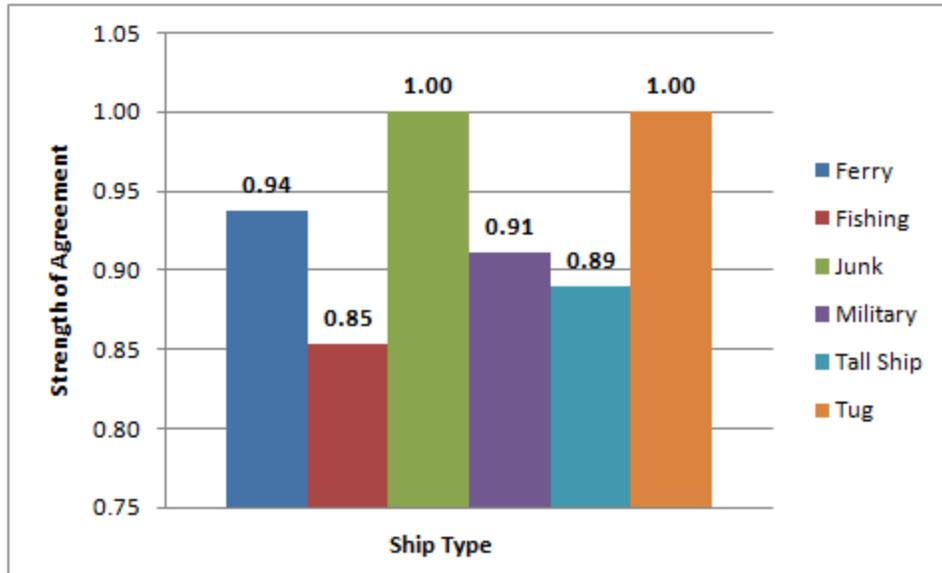


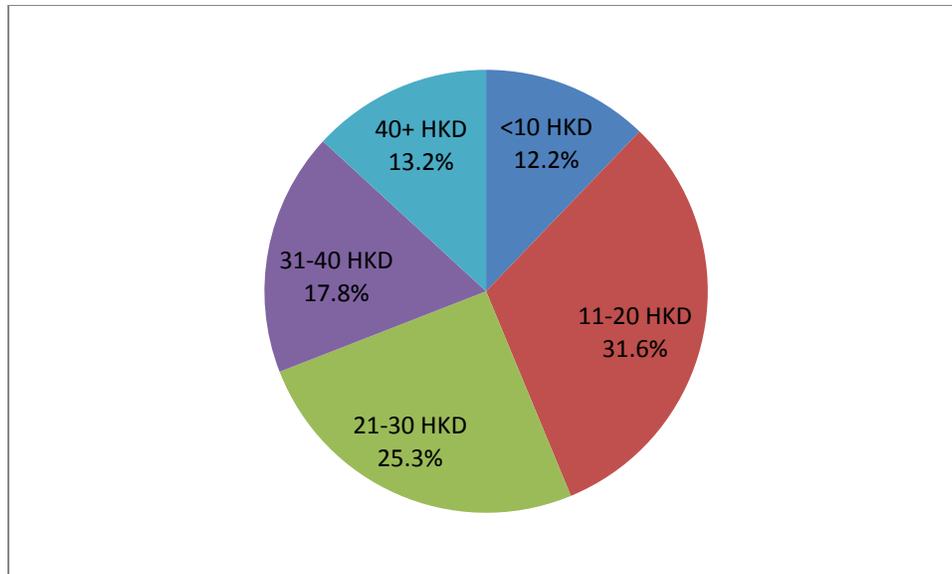
Figure 33. WHS Question #4: Agreement values by preferred type of ship.

The vessel type with the strongest agreement among the sample population is the junk. The junk has a numeric agreement of exactly 1.00. The Tall Ship, the most popular vessel choice in Question 3 had an agreement value of 0.89, significantly lower than the value for the junk, the second most popular. This indicates that a junk, even though slightly less popular in the WHS sample, may be a larger drawing exhibit in comparison to a tall ship.

#### 4.1.6 Response to Question #5

**What is the maximum admission fee you would be willing to pay to tour the vessel you selected?**

The fifth and final question of the WHS asked respondents to select the price range containing the maximum price they would be willing to pay to tour the vessel of their choosing. Figure 34 shows the distribution of answers to this question.



**Figure 34. WHS Question #5: Maximum price range respondents would be willing to pay to tour preferred ship.**

To evaluate an average admission price, the middle of each range was chosen to represent the maximum price in that range a respondent would be willing to pay. In considering the top range (40+), a value of \$45 Hong Kong Dollars (HKD) was used. The average ticket price using this method was found to be \$24.2 HKD, with the majority of respondents (96) selecting the \$11-20 HKD range.

First, the admission price was evaluated based on gender. The average price for males was \$26.5 HKD, while females had an average of \$21.2 HKD. This difference is larger than the margin of error, indicating that males are willing to pay more than females.

Second, the question of pricing was subdivided by the respondents' reasons for being in Hong Kong. This correlation is shown in Table 5. Tourists were only willing to pay slightly more than residents, with the average tourist price being \$25.0 HKD, compared to \$23.5 HKD for a resident. Accordingly, the most common price range for tourists was \$21-30 HKD, in comparison with the price range of \$11-20 HKD for residents. This is a smaller differential than anticipated because tourists are perceived to have a desire to visit cultural sights and therefore are willing to pay more to see them.

Table 5: WHS Question #5: Respondents' maximum price ranges by reason for being in Hong Kong.

Price Range (HKD)	Reason for Being in Hong Kong					
	Resident	Tourist	Business	Visiting	Undeclared	Other
<10	30	6	0	1	0	0
11-20	67	21	3	3	1	1
21-30	47	25	3	3	0	0
31-40	33	16	3	3	0	0
40+	28	7	3	2	0	0
Average Price (HKD):	\$23.5	\$25.0	\$30.4	\$27.0	\$15.5	\$15.5

The price that people were willing to pay was then further examined relative to age as shown in Table 6. People under the age of 40 were willing to pay the least, an average of \$21.8 HKD. 41-60 year-olds were willing to pay the most, with an average acceptable price of \$27.5 HKD. However, it should be noted that there were 29 respondents that selected \$21-30 HKD and 28 that selected more than \$40 HKD, strongly suggesting a bimodal distribution. The 61-80 age bracket has a nearly even distribution across all price brackets. This result may be attributed in part to sample size, but would require further study to fully understand.

Table 6: WHS question #5: Respondents' maximum price ranges evaluated by age range.

Price Range (HKD)	Age Range					
	12-20	21-40	41-60	61-80	80+	Undeclared
<10	1	14	14	7	0	1
11-20	17	47	23	7	1	1
21-30	8	32	29	7	0	1
31-40	7	22	20	4	0	1
40+	0	4	28	8	0	0
Average Price (HKD):	\$21.8	\$21.6	\$27.5	\$25.0	\$15.5	\$20.4

Lastly we looked at the price respondents were willing to pay as a function of ship type. This data is presented in Table 7.

Table 7: WHS Question #5: Respondents' maximum price ranges by preferred ship type.

Price Range	Ship Type					
	Ferry	Fishing	Junk	Military	Tall Ship	Tug
<10	2	5	12	7	10	1
11-20	6	15	30	17	26	2
21-30	4	8	24	10	31	0
31-40	1	4	18	6	25	0
40+	3	2	13	5	17	0
Average Price (HKD)	\$23.47	\$20.40	\$24.34	\$22.03	\$26.57	\$12.00

All vessel choices offered in the survey had an average acceptable price of at least \$20 HKD, with the exception of the tug. Of these vessels, the two with the maximum average selected admission were the junk with an average of \$24.3 HKD, and the tall ship with an average \$26.6 HKD. It should be noted that the ferry and the military vessels had the next highest averages which are within the margin of error. Accordingly, these rankings cannot be deemed representative of the whole population of Hong Kong with statistical confidence. As shown in Table 7, the junk was the most popular ship type in the less than \$10 HKD and the \$11-20 HKD price ranges, but the tall ship was the most popular in all others. From this, we can infer that a tall ship is likely to attract customers willing to pay higher prices.

Finally, agreement with the statement presented in WHS Question #4 was subcategorized by the price the respondent was willing to pay. The breakdown of agreement by price is shown in Figure 34. Respondents who were not willing to pay more than \$10 HKD have an agreement value of 0.97. This means that they roughly agree with the previous statement and would be more likely to visit if there was a ship but are not willing to pay much to tour the vessel. The \$31-40 HKD group has the highest agreement value of 1.02. This is within tolerance of the less than \$10 HKD group, but shows the greatest

level of agreement with boarding the ship at a potentially feasible price. Finally the more than \$40 HKD group has an agreement value of exactly 1.00. This is within tolerance of the \$31-40 HKD, and less than \$10 HKD groups, but also shows a willingness to pay a feasible exhibition price.

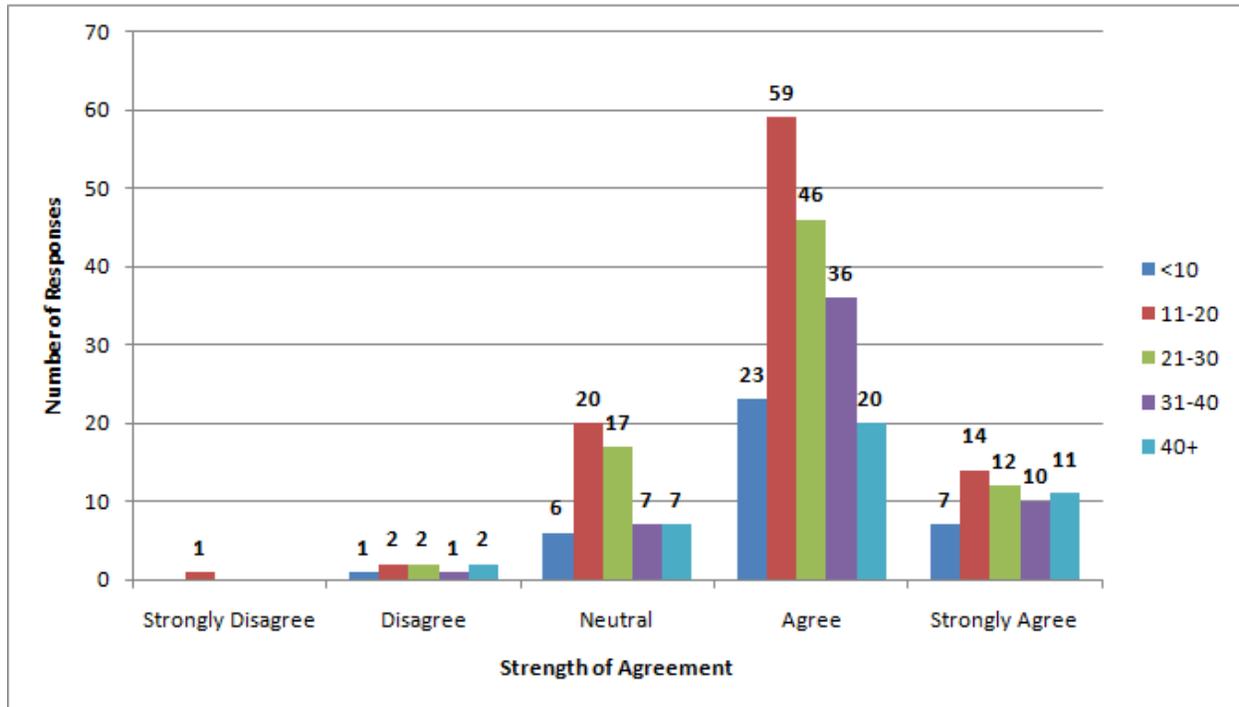


Figure 35. WHS Question #5: Level of agreement by price range to tour preferred ship.

Overall, it is recommended that the admission price for the ship be set between \$20 and \$25 HKD. However, if a ship does not fall into the junk or tall ship categories, a price of approximately \$18-22 HKD is suggested. If a lower admission price is selected, this would likely result in an increase in visitation rates to the ship, while a higher price will generate more income per visitor to the HKMM, but most likely will lower the visitation rate. It is the conclusion of the project team that the optimum price for a historic ship exhibition, based on public response (independent of operating costs), falls in the recommended range.

#### 4.1.7 Survey Results Summary

Based on all the survey data collected, our project team has drawn the following conclusions. First, the demographics presented in the WPI-HKMM Survey (WHS) are roughly representative of the demographics of current museum visitors. This strongly implies that the data presented in the preceding pages coincides with the results that would be achieved by surveying visitors to the museum at its current location.

Second, it was determined that 83% of the respondents would be interested in visiting the museum at Central Pier 8. This suggests that the museum should expect an increase in visitation following their move. This investigation also found that 60% of respondents were previously aware of the Hong Kong Maritime Museum, suggesting the outreach methods of the museum have met with some success and should be continued in pursuit of the remaining 40%.

The three questions considered key to the market feasibility of a historic ship exhibit are the ship type, exhibition pricing, and the enthusiasm of the respondents. For the type of ship, analysis of the WHS shows that the tall ship and junk were significantly more popular than any other ship across all demographic lines with one notable exception. Ultimately, a tall ship is slightly more popular than a junk; however, either style would be a good choice as a ship exhibit. This investigation also found that respondents willing to pay more were more interested in seeing a tall ship, while respondents who were not willing to pay as much were more interested in touring a junk.

Overall, analysis of the WHS found that an admission fee of \$20-25 HKD solely for admission to the ship was most likely to maximize profit. The average admission fee for every questionnaire collected was \$24 HKD. However, despite this average, most respondents picked the \$11-20 HKD range as the maximum admission price they were willing to pay. This analysis also found that persons aged 41-60 were willing to pay the most to visit a ship, and there was no significant different between the amount

tourists and residents were willing to pay. Finally, this investigation determined that men were willing to pay more to visit a ship than women.

The final key question was whether or not a historic ship exhibit would increase the public's interest in the museum. The preceding analysis shows that a historic ship exhibition should increase interest in the museum; however, it will most likely increase interest in those who would go to the museum regardless.

A correlation was found between advanced age and a historic ship exhibit. These results show that young people were less likely to be additionally intrigued by a ship and that respondents aged 41-80 generally agreed with the statement presented in Question 4.

In conclusion, if a ship were to be berthed alongside Central Pier 8, said ship should be either a junk or a tall ship, and the admission price to board the vessel should be \$20-25 HKD. This ship should generally attract more visitors to the museum, particularly visitors that would be willing to spend more money to see the ship.

## **4.2 Promotional Activities**

In addition to providing data regarding preferred ship type and pricing, another key component of this investigation was to assess the promotional feasibility of an historic ship exhibition. This aspect of feasibility hinges on the requisite number of patrons coming to visit the exhibition, a dependence best studied and remedied by exploring new avenues of museum promotion. To this end, the project team contacted and discussed possible promotions with several organizations. This section presents the results of these correspondences.

### **4.2.1 Big Bus Company**

The Big Bus Company is a very prominent company with regard to tourism in Hong Kong, and is in fact the world's largest open-top tour bus company. To explore the feasibility of cross-promotion

between the Big Bus Company and the Hong Kong Maritime Museum, the project team met with several Big Bus executive officers at their main office. At this meeting, multiple facets of promotional advertising by which the museum could gain exposure and increase attendance were discussed. As the Central district is currently in the last phase of a government reclamation project, it was the project team's intent to convey the benefit of the museum's move to Pier 8 to the Central area itself. More specifically, in attracting people to Central with the museum as a premiere destination, the team intended to demonstrate that both the museum and tour operators like the Big Bus Company would benefit from the museum's move.

Operating within a framework of expanded tourism and neighborhood revitalization, this meeting included a discussion of the potential for a business partnership in which both organizations could profit, using cross-promotional advertisement and combined ticket packages. Specifically, the idea of having Big Bus drivers make announcements about the museum while on their routes was discussed. Our group further suggested posting flyers developed by both organizations at both the museum and Big Bus offices and ticketing venues.

The Big Bus Company agreed that this type of promotion was feasible, and further agreed to implement each of the project team's suggestions, as well as requesting additional promotional materials. A follow up meeting in which the museum director, Mr. Richard Wesley, could discuss the details of such agreements, was arranged.

Moving forward, based on these positive interactions, it is recommended that the HKMM continue negotiations with the Big Bus Company and reach an agreement on promotional terms which will be beneficial to both organizations.

#### **4.2.2 Cruise Lines**

This investigation included contacting several international cruise lines with operations in Hong Kong to explore the feasibility of future business and promotional relationships. These discussions were

to explore the concept of adding a trip to the HKMM to current cruise excursion services and/or the addition of the HKMM to any promotional literature given to cruise patrons. However, despite multiple attempts through email, our team received no positive replies to these inquiries (see Section 3.4.1). The resultant recommendation is that the HKMM contact the cruise lines by other means including by phone or using personal contacts.

#### **4.2.3 School Groups**

The HKMM wants to increase the number of school groups visiting the museum on a yearly basis. To address this concern, emails accompanied by an HKMM newsletter and additional promotional material, were sent to approximately two dozen schools throughout the Hong Kong area. These emails explained the nature of the museum's outreach efforts and the reasons their respective schools had been chosen to receive the attached materials, with the intention of convincing the appropriate authorities that a trip to the museum would be a worthwhile experience for their students.

Despite multiple email attempts, this communication strategy yielded no responses. Therefore, the museum should try to contact these schools either through personal channels or by phone using a sufficiently skilled Cantonese speaker.

#### **4.2.4 Bounty Meeting**

Having offered the option of a European Tall Ship as a possible vessel in the WHS, and hearing mention of the Bounty III in discussions with Dr. Davies, the student team met with representatives of the Bounty's management company, Hong Kong Resort Ltd on February 1st. In attendance were the Museum Director, Mr. Richard Wesley, Hong Kong Resort Ltd. Marketing Manager Ms. Charlotte Ho, and representing our team, Jessica Holmes and Mitchel Wilkinson.

Following Mr. Wesley's brief description of the rationale for projected timing of the HKMM's move to Pier 8, the business model of the Bounty III and the potential for a joint venture with the

museum was discussed in detail. In essence, the Bounty III is purely a chartered ship used for customized private functions, with a maximum capacity of 72 passengers, including the captain and ship's crew. The ship itself is rented on an hourly basis, with a minimum deposit of \$15000 HKD for two hours, and a fee ranging from \$3000 to 5000 HKD for each hour thereafter. As described by Ms. Ho, the clientele of the Bounty III are primarily multi-national corporations or other private parties interested in using the Bounty III for wining and dining prospective clients, or to celebrate recent business successes. This class of consumers has the means to pay for both the vessel's staff and maintenance as well as additional accommodations including but not limited to meals prepared on board the ship by a professional catering staff, an open bar, and/or team building exercises utilizing the ship's rigging and navigation systems conducted by the ship's captain.

An additional point of discussion was the frequency of the Bounty's booking, which, per Ms. Ho, can range from several bookings per week in the summer months (given favorable weather) to extended stretches in drydock without any perspective clients in the winter. When it was suggested that berthing alongside the museum could provide revenue on a daily basis, circumventing the "hit or miss" nature of charter bookings, Ms. Ho noted that the costs of travelling from Discovery Bay to the Central Piers, a journey of approximately two hours given the Bounty III's top speed of 7 knots, would be applied to any fee charged to the museum in addition to staffing costs and the standard hourly fees. This overhead also severely cuts into the Bounty III's profit margins, even when paid in advance by institutions like the museum. Thus, to ensure the Bounty III would generate adequate revenues to cover its operating costs, the museum would be forced to guarantee a certain number of patrons per day, a guarantee the HKMM cannot reasonably offer.

Given the "high-status" reputation the Bounty III currently enjoys, Ms. Ho expressed concern regarding diminishing the exclusivity of the Bounty III by offering public tours at a price estimated to be between \$10 and 40 HKD. This fear of tarnishing the Bounty III's brand image had led the ownership of

the Bounty III to reject a proposal proffered by the Hong Kong Tourism Board for the Bounty III to serve as a touring vessel for the city of Hong Kong. Though concerns as to maintaining the esteem of high society were in part counterbalanced by the idea of the “free promotion” the Bounty III would accrue due to its visibility in the harbour, this point remained a source of tension. In addition, the difference between earning a small daily income and earning income through private booking was a primary theme of this meeting. In addition, Ms. Ho mentioned the development of a luxury hotel (currently under construction) to which the Bounty III would be attached as an attraction, thereby diminishing its availability.

Following a brief discussion of the need to further understand several technical aspects of berthing and mooring, Ms. Ho agreed to arrange a meeting for our project team with the Bounty’s captain. This meeting is discussed in the next section.

#### **4.2.5 Bounty Touring**

Stemming from the meeting with the Hong Kong Resort Limited, the owners of the Bounty III, offered a tour of the Bounty III to the project team, an invitation readily accepted. All members of the team met with the maintenance personnel of the Bounty III on February 8, 2011 for a complete tour of the vessel. By using this opportunity to ask questions about the ship’s maintenance schedule, typhoon sheltering, and day to day operations, this investigation garnered the following useful information.

The Bounty III has its own maintenance facility in Discovery Bay, which makes day to day repairs much easier. In the event of a typhoon, the Bounty III remains docked at this facility, as Discovery Bay does not experience particularly severe typhoon effects due to both its location and topography. In the rare instance that a typhoon does threaten Discovery Bay directly, the crew simply adds additional mooring lines to the surrounding land structures, thereby preventing unwanted ship movement and increasing overall ship stability.

Additionally, the crew elaborated on the day to day operations and staffing necessary to sail the Bounty III including the issues they most commonly face when in operation. The staff explained that a minimum of ten individuals are needed to operate the sails on any given expedition, with some voyages demanding a crew of 12. The crew explained that it was possible for the Bounty III to dock at Pier 8, but that this would require a full staff of 12. Furthermore, based on their experiences docking at Pier 9, a public pier of largely similar construction and dimensions, the crew emphasized that significant preparation and work would be required to rotate the yards prior to berthing. To prevent damage to the vessel and the museum alike, it would be necessary for the Bounty III to rotate their yards when docking at Pier 8 due to the yard's overall span and the wall structure of the pier. One consequence of this issue is that while docked at any of the Central Piers, the Bounty III's sails cannot be fully deployed. This would dramatically limit the "visual" impact of the ship's presence at Pier 8. Additional rigging lines are also required to perform the procedure of turning the yards, which would hinder visitor movement.

Even with the Bounty's fendering system (comprised of four foam buoys of similar construction to those discussed in section 4.10) and mooring lines, the crew reported previous instances of tidal movements affecting the Bounty III such that both the yards and ship's hull were damaged due to a forceful collision between the Bounty III and Pier 9. . Though this damage was relatively minor, sailing with a damaged yard or keel is, at a minimum not recommended, and at worst, highly dangerous.

Using the information provided by the Bounty III crew, two issues were brought to light. First, purely from a technical standpoint, it is indeed possible for the Bounty III to be berthed alongside the HKMM at Pier 8. However, among the several operating conditions that would need to be met, there were several key operational necessities that would diminish the overall visitor experience. In addition, there is the potential for damage to both structures, which would expose the museum to additional financial risks.

Second, in leasing the Bounty III on a per hour or per annum basis, it would cost the museum a significant sum in both money and labor to have the vessel brought to and from the pier. While the option of leasing a vessel defrays a number of the costs associated with vessel ownership (e.g. insurance, typhoon sheltering, maintenance, etc.), the high costs of labor and travel largely serve to negate these advantages. A sample calculation presented below illustrates this point.

First, assume 135,000 people visit the HKMM in a given year (an estimate provided by Depot et al (2010)) and that there is a uniform distribution of visitors across the museum's 300 operational days. (It should be noted that assuming this type of even distribution is largely incorrect, and is undertaken here purely for demonstrative purposes. In actuality, per museum data, visitation increases on weekends and during public holidays, with corresponding decreases during the work week.) Given these assumptions, it can be estimated that the HKMM will see an average of 450 visitors per day.

Further, assume two-thirds of these daily visitors would pay to tour the Bounty III, a "conversion rate" consistent with the data collected in the WHS. Finally, assume these patrons would be willing to pay a \$30 HKD admission fee to tour the Bounty III, a fee slightly above the admission advised in this report, (raising the combined admission fee for the vessel and museum to \$60 HKD). Note that this represents an admission cost exceeding that of any other museum in Hong Kong. Given these assumptions, the HKMM would earn a total of \$22,500 HKD per day, comprised of \$13,500 HKD in museum admission fees and \$9000 HKD in vessel exhibition fees.

Now, in order to calculate overall profit, one must subtract the costs of leasing the Bounty III, namely the required minimum deposit, travel costs, and hourly rental fees. The Bounty's minimum is \$15000 HKD, which rents the vessel for two hours. In order to reach the Central Pier, the Bounty must travel two hours Discovery Bay, also at a cost of \$15000 HKD. This results in a combined cost of \$30000 HKD to berth the Bounty III at Central Pier 8 for two hours. This unfortunately means that even if a day's worth of HKMM visitors were to be given tours in these two hours, the museum would be operating at a

net loss per day of \$7500 HKD (\$30000 HKD cost-22,500 combined ticketing revenue). Simply stated, this is neither advisable nor sustainable. A table showing this calculation, as well as the structure of all such calculations is shown below.

	A	B	C
1	<b>Vessel Leasing Calculator</b>		
2			
3	<b>Step 1: Determining Revenue</b>		
4			
5	Estimate of Yearly Museum Attendance (# Persons)		# of Visitors Per Day (300 Operational Days)
6	135,000		450
7			
8			
9	Cost of Admission to Museum (HKD)		Cost of Admission to Vessel (HKD)
10	30		30
11			
12	Conversion Rate of Patrons (Museum+Vessel)		Number of Patrons Touring Vessel Per Day
13	0.667		300.15
14			
15	Net Revenue (HKD)		
16	22504.5		
17			
18			
19	<b>Step 2: Determining Costs</b>		
20			
21	Mimimum Deposit (HKD)		
22	15000		
23			
24	Vessel Rental Rate (HKD/hr)		Hours Rented
25	15000		1
26			
27	Total Rental Cost (Per Day)		
28	30000		
29			
30			
31	<b>Step 3: Determining Profit/Loss</b>		
32			
33	-7495.5		

Figure 36. Vessel Leasing Calculator showing profit and loss for the Bounty III.

In order to make this model feasible, again given a conversion rate of 2/3 of patrons agreeing to pay \$30 HKD in addition to the museum entrance fee in order to tour the vessel, the Bounty III would need to see 400 patrons in its two hours docked at Pier 8 in order for the museum to break even, an average of 200 patrons per hour. Assuming an even distribution of visitors across the eight operating hours the museum is open, this would require a 355% increase in per hour visitation (200 patrons per hour vs. 56 patrons per hour) from the expected average of 450 patrons per day. While it is reasonable

to assume a greater number of patrons would visit on weekends, and would be more likely to visit a ship with a limited availability, this differential simply cannot be overcome without raising the vessel admission price, or raising the “conversion rate” of visitors. Raising this price cannot be advised, and a greater conversion cannot be reasonably assumed.

These facts, in combination with what this investigation uncovered from the initial meeting with Hong Kong Resort Limited, leads our group to the conclusion that the idea of docking the Bounty III alongside Pier 8 as a permanent or semi-permanent exhibition is not a practical option for the HKMM at this time.

### **4.3 Technical and Safety**

When considering the feasibility of any project, it is necessary to determine the present state and adequacy of the anticipated facilities. This adequacy is determined not only by factors in nature and engineering, but also in terms of the legal and business climate. A thorough understanding of each of these factors is necessary for any project to be successful.

Accordingly, this section presents findings of the technical and safety factors as applied to the HKMM and the proposed exhibition at Central Pier 8.

#### **4.3.1 Legality and Interpretation**

Given the questions of legality and interpretation of various shipping statutes developed in the background research, Stephen Lee and Mitchel Wilkinson attended a meeting with the Director of the Hong Kong Marine Department, Mr. Roger Tupper. This meeting addressed differences between ships used in industry or private touring and a potential museum exhibition vessel, which would be considered a “primarily a land based structure” under US maritime law.

Mr. Tupper observed the case of the Jumbo, a floating restaurant vessel in Aberdeen, which despite remaining in a fixed location for purposes other than transit or the carrying of goods or

passengers, is considered by the Marine Department to be a Class 1 Vessel. Therefore, the Jumbo is subject to a yearly dry docking and complete technical inspection by a Marine Department representative (at cost to the Jumbo owners) and is required to carry collision and passenger insurance to cover any costs incurred by the HKSAR in mounting a rescue or salvage operation of the vessel and personnel. These concerns apply to any potential museum ship moored at the Central Pier complex. Specifically, in taking aboard passengers even without travel between specified points in the harbour, the museum would nevertheless need to be indemnified against claims of injury, maintain a craft considered seaworthy, and when piloted to drydock or a typhoon shelter, have a captain with the proper seamanship rating.

In addition, standards set forth by the Marine Department concerning lighting, fire safety, emergency communications, and gangway structures must be satisfied, even in vessels designed without such amenities in mind. Finally, when staffed, such a vessel must have an evacuation plan, a mooring and equipment plan, and alarm system for typhoons (see <http://www.mardep.gov.hk/en/msnote/pdf/msin0932anx2.pdf> for a PDF file of the Marine Department Application for a Minimum Safe Manning Certificate).

In summation, due to the risks posed to the public given a floating exhibition, even when operating a stationary vessel, any Maritime Museum exhibition would need to comply with the highest standards of law and practices of safety. This adds substantial cost and oversight to the development of this exhibition.

#### **4.3.2 Analysis of the Structural Engineering Report**

Atkins Engineering was the engineering company responsible for completing Central Pier 8's structural engineering report. Two emails sent to the engineer listed in this report went unanswered before receiving a reply from Mr. Li Wang, a senior engineer at Atkins. Mr. Wang, who had in fact worked on the HKMM project which produced this report, requested that we email him our specific

structural report questions. Thereafter, Mr. Wang provided clarifications on a number of points including that each side of the pier should be treated individually in terms of berthing load capacity. Therefore, each side of the pier has a maximum berthing limit of 260 kN, a vital figure in determining the feasibility of berthing a given ship at Pier 8. Given this loading standard, the three ships investigated in the berthing calculator, namely the Star Ferry, Bounty III, and Pinisi junk, would be able to berth successfully at Central Pier 8. Further study would be necessary to determine strengthening techniques for the slab, beams, and columns if this 260 kN load were to be exceeded. However, this is a practice that this report would emphatically advise against. Exceeding this berthing load would likely cause damage to both the pier and vessel.

Our project team also recommends that the HKMM contact Mr. Li Wang directly at [li.wang2@atkinglobal.com](mailto:li.wang2@atkinglobal.com) should they have future inquiries about Central Pier 8's structural characteristics.

### **4.3.3 Ship Availability**

In selecting a feasible vessel for an historic ship exhibition, it is necessary to determine the availability and pricing of currently constructed and potential custom replica vessels. The project team identified two private marine brokers, based in Hong Kong, specializing in the sale and maintenance of historic vessels. The first of these companies, Saffron Marina Ltd, is also a harbour touring company, and is therefore intimately familiar with the challenges a replica vessel would face in Hong Kong waterways. The Saffron Marina's stock of vessels is in constant flux. However, at the time of this writing, their website featured 11 replica junks for sale, ranging in length from 42 to over 100 feet in length, and ranging in price from \$300,000 to \$7M HKD. The first three-masted junk vessel of an appropriate size listed, the QuMing, has a purchase price of \$1.38M HKD, and is currently both licensed and insured through Saffron Marina, eliminating the issue of first applying for a license. Additionally, to receive this licensure, the QuMing has all the appropriate navigational, fire, and lighting systems in place,

eliminating the costs of retrofitting. Other junks listed include the Hong Kong Jockey Club's "Marine Teak" (\$2.65M), the Michelangelo (\$6M) and June Hong Chian (\$7M).

The second marine broker, Apollo Duck, is an international marine classifieds service, with a local presence in Hong Kong. At the time of this writing, a search for "junk" yields seven vessels, of which three are in Hong Kong. The three vessels listed vary a great deal in design intent, material, and general stylistic considerations, but are all well maintained and considered seaworthy by their owners.

Finally, concerning the possibility of the museum commissioning the construction of a replica historic ship to specifications, it was uncovered in the course of conversation that Dr. Davies maintains a private correspondence with one Capt. Thomas Colvin, widely regarded to be one of the premier junk boat designers in the world, with his steel vessel series a particular favorite among marine enthusiasts. Though as Dr. Davies correctly notes, Capt. Colvin has not produced a commercial design in over a decade, plans as to how to build a Colvin design are distributed through his personal webpage, and Capt. Colvin does continue to build both experimental craft and pieces for museums. Having the expertise of such an eminent designer, who is also naturally connected to fellow sailors and junk enthusiasts, is of tremendous value to the museum. While the costs of any vessel build to HKMM specifications cannot be adequately determined, by just considering dimension, material, the yard employed to do the work, and an assumed large degree of customization, one can see that the cost of building a replica vessel would well exceed the cost of simply purchasing an existing and seaworthy vessel. However, in the final weighing of options, having a Colvin vessel draws both on decades of expertise and adds an instant notoriety to this vessels exhibition.

In brief, though at a purchase price likely exceeding \$1M HKD, the point stands that museum quality vessels are available for immediate purchase in Hong Kong, or in seeking a customized alternative, the HKMM is already in contact with highly skilled potential architects and builders.

#### 4.3.4 Star Ferry

An introduction email to the Star Ferry Company was sent on January 21, 2011 and a reply, drafted by Ms. Elim Wong, Operations Manager for the Star Ferry Company was received on January 26, 2011. Informed that communication via email would be most efficient, a response with detailed questions concerning berthing and mooring procedures was sent out that same day. On January 31<sup>st</sup> Ms. Wong sent a reply containing invaluable information on a number of topics important to this study. For example, the breaking stress of the mooring lines used by the Star Ferry is, at a minimum, 117 kN, a rating which exceeded prior group expectations. The process of berthing a Star Ferry is as follows: at 150 meters away from the pier, the captain tests the functionality of the stern propeller. The ferry then approaches the berthing point at a sharp angle with a speed no greater than 3 knots. Once parallel to the pier, the captain applies reversing propulsion to halt the ferry and then maneuver the ferry's stern towards the pier. In all cases, the ferry's stern is secured by mooring lines before the bow. It is worth noting that a Star Ferry captain has an average employment length of 21 years, and is able to monitor prevailing weather conditions by consulting with an onboard barometer and the Hong Kong Observatory's weather forecasts, as well as relying on their own experience and judgment.

During the data gathering process, our group rode on the Star Ferry between Central and Tsim Sha Tsui to acquire firsthand experience concerning the Star Ferry's process of berthing, mooring, and other aspects of ship operation at or near a pier. The ferries come with their own gangways, one for the upper deck and another for the lower deck. The gangways are fixed in length but can be mechanically raised and lowered as needed. At least one crew member mans the gangway during the embarking and disembarking of passengers. One staff member at each end of the ship is also required to toss mooring lines, with additional workers on the pier ready to receive and secure these lines to the pier's bollards. From firsthand observation, the berthing and mooring of a Star Ferry proved to be an involved process.

The Star Ferry Company is a well recognized and established organization in Hong Kong, and it would be in the best interest of the Hong Kong Maritime Museum to maintain good relations with them following the move to Central Pier 8. In addition, both the HKMM and Star Ferry Company must cooperate to ensure that the berthing limits of Central Pier 8 are not exceeded.

#### **4.3.5 Hong Kong Observatory**

The Hong Kong Observatory was contacted by email on January 21, 2011. The project group received a reply from CW Wu on January 24, 2011, articulating the legal issues and costs associated with our request for sea condition information from the Quarry Bay station. Subsequently, although an additional email was sent, emphasizing that the requested information would be used solely for academic purposes, by February 14, 2011, no reply had been received. Another attempt to reach the Observatory staff was undertaken on February 14, 2011 by contacting WM Leung, a Senior Science Officer with the Observatory. His email, [wMLEUNG@hko.gov.hk](mailto:wMLEUNG@hko.gov.hk), was provided by Professor Kinicki, to alleviate the problem of the Observatory's lack of response. Mr. Leung replied later that day, informing us that he would get in touch with colleagues who were better suited to handle our concerns. An email reply from Senior Science Officer WT Wong was received a day later. Through email correspondence, our group negotiated a meeting with the Observatory that was held on Monday, February 21<sup>st</sup> at their offices in Tsim Sha Tsui. Stephen Lee and Mitchel Wilkinson were in attendance for this meeting.

The meeting with Mr. Wong covered the topic of tidal information around the Central Pier complex. He seemed very enthusiastic about the museum's move and was very accommodating of our group's needs. The two group members were able to view a copy of the 2009 Summary of Meteorological and Tidal Observations in Hong Kong, which contained useful monthly tidal information pertinent to our feasibility research. Mr. Wong provided us with a link to the Observatory web page containing the PDFs of past observation reports, as an alternative to paying \$72 HKD for a paper copy of the 2009 version. However, he noted that this price could be waived should the HKMM wish to publicly

display such a document in their museum. In addition to monthly tidal information, Mr. Wong supplied us with a two page document containing hourly tidal information for the month of January 2011 free of charge. The two group members were also able to secure a similar document for the month of December 2010, at a cost of \$2 HKD. These records showed that the average tidal range observed at the Quarry Bay station was between 0.88m below sea level and 1.12 meters above sea level.

The Hong Kong Observatory handles all meteorological data for Hong Kong and it would be beneficial for the Hong Kong Maritime Museum to continue correspondence with this organization, specifically Senior Science Officer WT Wong. In addition, our project team recommends continuing to observe information collected by the Observatory from the Quarry Bay station, pursuant to the development of a historic ship exhibition.

#### **4.3.6 Hong Kong Hydrographic Office**

An email to the Hong Kong Hydrographic Office concerning the sea floor topography and water depth in the vicinity of Central Pier 8 was first sent on January 21, 2011. Our project team received a reply on January 25, 2011 from the Deputy Hydrographer, CK Yeung. Although the Hydrographic Office could not provide a topography map of the sea floor, they indicated that the average water depth at the requested locations near Central Pier 8 was 11.2 meters. This figure provided assurances that there is currently no danger of underwater obstructions for any of the ships examined in the course of this investigation. Moreover, it is likely that any ship in danger of colliding with underwater obstructions in the vicinity of Central Pier 8 would be too large for the pier to handle from a structural perspective.

Therefore, in considering overall feasibility, the matters of water depth and underwater obstructions are non-issues.

#### 4.3.7 Typhoons and Typhoon Shelters

There are several typhoon shelters located in the waters around Hong Kong. However, the Marine Department noted that many urban typhoon shelters in the vicinity of Central Pier 8 had limited space and did not accept vessels over 30 meters in length. The cost of securing a larger ship in a typhoon shelter is also significantly higher than that of smaller vessels. According to the Marine Department website on fees and charges, [http://www.mardep.gov.hk/en/pub\\_services/fees.html](http://www.mardep.gov.hk/en/pub_services/fees.html), securing a ship over 11 meters long in the Causeway Bay or Aberdeen typhoon shelters costs \$670 HKD plus \$210 HKD for every additional 3 meters, per month. For all other typhoon shelters, the monthly cost is \$405 HKD for ships up to 11 meters in length, plus \$140 HKD for every additional 3 meters.

Regardless of ship type, a typhoon shelter would be necessary for any potential vessel being berthed at Central Pier 8. Although the price of berthing a sizable vessel is significantly higher than that of smaller vessels, utilizing a typhoon shelter would ensure that vessel damage would be mitigated during periods of inclement weather. Whether or not the Hong Kong Maritime Museum purchases a ship or leases one from another company, it is recommended that the museum formulate a written document detailing typhoon procedures for any vessel which would berth at Pier 8.

#### 4.3.8 Gangways

While investigating possible gangway structures and manufacturers to recommend to the HKMM, the project team discovered there are currently no existing gangway manufacturers in Hong Kong. The closest companies offering gangway manufacturing services are located in Shenzhen and Guangzhou, in mainland China. Each gangway is manufactured based on its intended location and placement, making it a challenge, in the absence of a definite ship type and dimensions, to determine exact gangway costs for feasibility analysis purposes. The Draft Code of Practice for Safe Means of Access to Vessels, accessed from the Marine Department PDF file at [http://www.mardep.gov.hk/en/aboutus/pdf/plvacp7\\_05.pdf](http://www.mardep.gov.hk/en/aboutus/pdf/plvacp7_05.pdf), also mentions that when a vessel has a

freeboard higher than the shore level (or point of access from a pier), it is the responsibility of the ship's crew to provide its own gangway for ship access. This, in turn, provides the HKMM with the possibility of not having to be responsible for maintaining a gangway system on Central Pier 8. Ultimately, the entire topic of gangways largely depends on the actual ship being berthed at Central Pier 8. Thus, more in depth research cannot be completed without determining a definite vessel type.

Whether or not the Hong Kong Maritime Museum has to outfit their section of Central Pier 8 with a gangway system, it is recommended that the HKMM become familiar with the aforementioned Draft Code of Practice for Safe Means of Access to Vessels, which provides information concerning gangway usage and related guidelines in Victoria Harbour. From the material obtained in the course of this research, it is noted that an aluminum gangway would be preferable, as neither steel nor wooden gangways are of ideal use in this situation. Unfortunately, in the absence of a definite vessel type, a specific gangway type cannot be recommended to the museum.

#### **4.3.9 Fendering Systems**

There are a wide variety of fendering systems available in the commercial marine industry. From the tour of the Bounty III, our project team learned that the ship would need to use four especially wide fenders if an historic ship of similar dimensions were to berth at one of the Central Piers. This is due in large measure to the fact that that several parts of the vessel such as the rigging and masts protrude further than the hull width. The wide fenders, although the explicit make and manufacturer were not known by the vessel's crew members, look especially similar to the Taylor Made Tuff End Inflatable Vinyl Buoys. These buoys can be viewed by searching for the 'Tuff End Buoy' link located in the 'Fenders and Accessories' section of Taylor Made Product's online catalog (<http://www.taylormadeproducts.com/catalog/>). These particular types of buoys are only manufactured and distributed by US-based companies, but several of these companies offer international shipping. Lange Group, a manufacturer specializing in automotive and marine equipment

and based in Chongqing, China, is one of the few Asian companies that manufactures similar buoys. However, online specifications are insufficient to compare the performance of these buoys with those manufactured by US companies. The largest of the American buoys, close to three feet in diameter, are currently priced in the vicinity of \$300 USD.

Fendering systems depend largely on a vessel's dimensions, making it difficult to determine the effectiveness of various fender strategies without having a definite ship. However, it is recommended that the Hong Kong Maritime Museum not be daunted by choosing a fendering system when performing their own exhibition feasibility assessment. Relative to other factors in this feasibility study, fendering is a minor and rather straightforward element with rather modest costs and adequate fender availability in the commercial market.

#### **4.4 Summary of Results**

This chapter details the issue of feasibility in berthing a historic vessel at Central Pier 8, including a market analysis, structural and vessel engineering information, legal review, and proposed avenues for partnership and promotion. The recommendations presented provide context and information which can serve as the basis for future actions by the Hong Kong Maritime Museum.

## 5. Conclusions

The Hong Kong Maritime Museum (HKMM) is a non-profit education institution founded in 2005. The museum, which is privately funded and operated, strives to “...stimulate public interest in the world of ships and the sea with particular reference to the South China coast...” (Hong Kong Maritime Museum, About Us, 2010). Since its founding, the museum has expanded both its facilities and labor force to meet market needs. Currently, the HKMM is located at Murray House in Stanley and is focused on its impending move to Central Pier 8 in 2012. This new location will provide the HKMM with five times the amount of floor space for exhibits; however, the HKMM has encountered several logistical issues with the new location.

Due to this rapid growth and large-scale move, the museum lacks available personnel to investigate additional avenues of promotion and expansion. One of these developmental avenues is the concept of adding a floating exhibition alongside their new location at Central Pier 8. This “floating exhibition” is proposed to be a historic ship which would serve as a landmark not only for the museum, but for Victoria Harbour and the city of Hong Kong. With regard to this proposal, the HKMM does not have sufficient information concerning the engineering, safety, and market research criteria to determine the feasibility of berthing a ship at Central Pier 8. Our WPI project team was given the opportunity to work directly with the HKMM to investigate the feasibility of this “floating exhibition”.

Our research included three primary components. The first component involved studying all the technical considerations, including engineering and safety. This included the structural strength of the pier, relevant tidal movements, and compliance with pertinent maritime laws and regulations. The second research phase was comprised primarily of a survey to determine the local and tourist demand for types of vessels, their opinions about a historic ship exhibit, and the corresponding admission price they would be willing to pay. The third and final component of our research was centered on exploring avenues of museum promotion, with particular focus on school and touring groups. These avenues are

intended to increase museum visitation and awareness among the Hong Kong public, with the goal of generating income to be used in creating and maintaining a historic ship exhibit.

Concerning the engineering and safety constraints in our project, this investigation first sought to determine whether or not Central Pier 8 was structurally sufficient to bear the load of berthing a historic ship on the east side of the pier. From Atkins Engineering, the firm that drafted the structural engineering report of Central Pier 8 in 2009, we determined that the east side of Central Pier 8 can handle a maximum berthing load of 260kN. For purposes of comparison, the berthing load of a Star Ferry is 120kN and the Bounty III has a berthing load of 160kN. This means that either vessel could safely berth on the east side of Central Pier 8. Next, our research determined that fendering systems as simple as inflatable buoys or used car tires and are both adequate and relatively inexpensive. Therefore, our project group feels that both berthing load and fendering do not diminish the overall feasibility of a historic ship exhibition at Central Pier 8.

These findings naturally led our group to investigate potential gangway systems and applicable maritime laws. From our readings and interviews, we infer that any ship capable of berthing at Pier 8 would be required to provide its own gangway system by law (due to height differences between the ship's main deck and point of access from the pier). Depending on the dimensions and systems onboard a historic ship, the museum may not need to provide its own gangway system. In the case that the museum is required to provide its own gangway, there are a wide variety of systems readily available in the market at reasonable prices. Hence gangways, like fendering, are not a significant deterrent in to the overall feasibility of a historic ship exhibit.

With regard to tidal movements and sea height, our team needed to determine the maximum and minimum water heights, as well as the depth of the water around Central Pier 8, to make sure there would be no danger of underwater obstructions for any vessel berthing at Central Pier 8. After contacting the Hong Kong Observatory and receiving tidal information from the Quarry Bay station, it

was revealed that typically, low tide is about 0.88m below sea level and high tide is approximately 1.12m above sea level. We also learned from the Hong Kong Hydrographic Office that the average sea depth around Central Pier 8 is 11.2m. Given these figures, it is our conclusion that there is no danger of underwater obstructions in the area around Central Pier 8. In the case of inclement weather, such as typhoons or other storms, it is required by law for the museum to have a document containing detailed typhoon procedures for any owned ships. These aspects do not significantly hinder the prospect of establishing a floating historic ship exhibit, as there are a number of typhoon shelters in the area which charge reasonable sheltering fees.

In establishing that a historic ship exhibit was indeed technically feasible given a set of constraints, it was then logical to examine the market demand for such an exhibit. In gauging public interest, the team developed and administered a survey to determine the public's demand for particular vessel types and also the maximum admission price individuals would be willing to pay to tour the vessel. We conducted this survey over a span of three days on the Skywalk between Central Pier 7 and the IFC Mall and received 304 usable responses.

Several useful conclusions were drawn from the results of this survey. First, 60% of all respondents were previously aware of the museum, whereas only 30% of tourists were previously aware of the museum. This shows that promotion to tourists is an area in which the museum can improve. Secondly, this survey demonstrated clearly that tall ships and junks are the two most popular vessel types among the public. The junk was the most popular ship type among respondents for the 'Less than \$10 HKD' and '\$11-20 HKD' price groups, and the tall ship was the most popular for the '\$21-30 HKD', '\$31-40 HKD', and 'Over \$40 HKD' price ranges. Additionally, the average maximum admission price respondents are willing to pay is approximately \$24 HKD, while the most popular price range is \$11-20 HKD. As such, our project group recommends that in considering a future exhibit, the museum obtain either a tall ship or junk and charge an admission price of \$20-25 HKD to tour either vessel.

The third essential component of this research was to explore additional avenues of museum promotion. In doing so, our team contacted the Big Bus Company, the world's largest open-top tour bus company. Our group explored several possible promotional methods including ticket packages and pamphlet distribution. These possibilities were met with extreme enthusiasm by both Big Bus Company representatives and the HKMM.

In addition to the Big Bus Company, our project group also contacted several international cruise lines as well as two dozen schools throughout the Hong Kong area. However, despite our efforts, these correspondences went unanswered. These avenues of promotion remain open to the HKMM.

In closing, this investigation has shown that the concept of having a floating historic ship exhibition at Central Pier 8 in conjunction with the Hong Kong Maritime Museum is feasible from an engineering perspective given a set of constraints, most importantly the berthing load limit and compliance with maritime law. Our survey revealed a reasonable demand among the general public for such an exhibit, specifically a junk or tall ship exhibit. Finally, from a promotional standpoint, it is clear that several options are open to the HKMM in promoting a historic ship exhibit.

Simply stated, the feasibility of this exhibition is contingent on several key assumptions. The first of these assumptions is visitation. Per HKMM estimates, 120,000 people are expected to visit at Central Pier 8. According to Depot et al. (2010), 135,000 visitors are expected. This difference in visitation, assuming a \$25 HKD vessel admission fee in addition to the \$30 HKD museum admission fee, represents \$700,000 per year in potential revenue. Moreover, this difference only demands an additional 50 visitors per day. Given this disparity and the potential profit represented by this increased visitation, monitoring the actual museum visitation is vital to determining the financial feasibility of this exhibition.

At this point in time, using the Bounty III as an exhibition ship is not financially feasible. However, these conditions are subject to change and not all possible ships have been investigated. Therefore, periodic reassessment and further study is warranted. Moving forward, our group would

suggest that the HKMM continue planning this exhibition while maintaining the pier infrastructure and monitoring these assumptions carefully. Our team believes that the deciding factor concerning the feasibility of this exhibition will depend on whether or not the assumptions contained in this investigation prove to be factual. If proved to be reasonable in the eyes of museum leadership, it is the recommendation of our group that the establishment of a historic ship exhibition proceed. If these assumptions are proven incorrect, the museum is best served by disregarding this potential exhibit.

Given these facts, our team would recommend that the HKMM take a “hold and observe” approach concerning this exhibit. This strategy specifies continuing the planning process to keep an exhibition of this type within the realm of possibility, by keeping all options open.

## References

- Aedas Limited Planning Department. (2008, January 31). Urban Design Study for the New Central Harbourfront. *Design Responses to Public Views on the New Central Harbourfront*. Unpublished study conducted for Harbour-front Enhancement Committee Task Group, Hong Kong.
- ALVA. (2009). *Visits made in 2009 to visitor attractions in membership with ALVA*. Retrieved November 21, 2010, from [http://www.alva.org.uk/visitor\\_statistics/](http://www.alva.org.uk/visitor_statistics/)
- America's Best History. (2009). *Plymouth rock*. Retrieved November 21, 2010, from <http://americasbesthistory.com/abh-plymouthrock.html>
- Ancient Gallery, Hong Kong Maritime Museum, G/F Murray House, Stanley Plaza, Stanley, Hong Kong, Visited January 17, 2011
- Berard, B. Scotta, L. Fallon, J. Rosendahl, E. Lora, S. Wong, A.,...Yang, B. (2010). *Designing Victoria Harbour - integrating, improving, and facilitating marine activities*. Unpublished IQP Report. Worcester: WPI.
- Biemer, P.P., Lyberg, L., & Wiley, J. (2003). *Introduction to survey quality*. Hoboken: Wiley Online Library.
- Carroll, J. M. (2007). *A Concise History of Hong Kong*. Lanham, Maryland: Rowman & Littlefield Publishers.
- Chapman, P. (2010). *Ocean currents*. Retrieved November 19, 2010, from <http://www.waterencyclopedia.com/Mi-Oc/Ocean-Currents.html>
- Cieplik, K. (2009, July 12). The traveling wheelchair: USS constitution. Retrieved November 27, 2010 from <http://thetravelingwheelchair.com/uss-constitution/>

- Cooley, K. (2002). *Moon tides*. Retrieved November 19, 2010, from <http://home.hiwaay.net/~krcool/Astro/moon/moontides/>
- Deng, G. (1997). *Chinese maritime activities and socioeconomic development, c. 2100 BC-1900 AD*. Westport: Greenwood Press.
- Depot, J., Goldberg B., Nadeau E., & Rodriguez B. (2010). *Hong Kong Maritime Museum Relocation Project*. Unpublished IQP Report. Worcester: WPI.
- Davies, Stephen, Dr. (2008). *A short History of Shipping in Hong Kong*. Unpublished manuscript.
- Ember, M., & Ember, C. R. (2001). *Countries and their cultures*. New York: Macmillan Reference.
- Falk, J. H., & Dierking, L. D. (2000). *Learning from museums: Visitor experiences and the making of meaning*. Walnut Creek: AltaMira Press.
- Falk, J.H. & Dierking, L.D. (2002). *The museum experience*. Washington DC: Left Coast Press.
- Hong Kong Legislative Council. (1997) Ferry Services Ordinance 104, Maritime Ordinance. DOI: June 30, 1997
- Hong Kong Legislative Council. (1997) Merchant Shipping Safety Ordinance 369. DOI: June 30, 1997
- Hong Kong Maritime Museum. (2008). *Submission by the Hong Kong Maritime Museum to The Home Affairs Panel of The Legislative Council of The HKSAR No. CB(2)737/07-08(01)*
- Hong Kong Maritime Museum. (2010a). *About Us*. Retrieved November 21, 2010, from <http://www.hkmaritimemuseum.org/index.php>

Hong Kong Maritime Museum. (2010b). *Corporate*. Retrieved November 21, 2010, from  
<http://www.hkmaritimemuseum.org/index.php>

Hong Kong Museum of History. (2007). *Admissions*. Retrieved November 21, 2010, from  
<http://hk.history.museum/en/admissions.php>

Hong Kong Observatory. (2010) *Predicted tides*. Retrieved November 10, 2010, from  
[http://www.hko.gov.hk/tide/estation\\_select.htm](http://www.hko.gov.hk/tide/estation_select.htm)

Hong Kong Tourism Board (2010, August 6). *Accessible Hong Kong*. Retrieved November 21, 2010, from  
<http://www.discoverhongkong.com/eng/trip-planner/accessible-hk.html>

Hor-Chung Lau, J. (2007, July 19, 2007). In transit: Accessible travel in Hong Kong. *New York Times*, p. 3.

How Can a Tugboat Pull a Large Ship? (2009). Retrieved November 19, 2010, from  
<http://www.brighthub.com/engineering/marine/articles/35004.aspx>

Ingham, M. (2007). *Hong Kong: A cultural history*. New York: Oxford University Press.

Kidder, L. M. (2007). *Hong Kong*. New York: Fodor's.

Levathes, L. (1996). *When China Ruled The Seas: The treasure fleet of the dragon throne, 1405-1433*.  
New York: Oxford University Press.

Lo, J. (1955). The Emergence of China as a Sea Power During The Late Sung and Early Yuan Periods. *Far Eastern Quarterly*, 14(4), 489-503.

Magoun, F. A. (1977). *The frigate constitution and other historic ships*. Massachusetts: Bonanza Books.

Malmberg, L. (2003). Management planning for historic ships. Paper presented at the *First International Conference on Maritime Heritage, Maritime Heritage 2003, March 24, 2003 - March 26, 167-174.*

Maritime Silk Road. (n.d.). Cultural China. Retrieved January 17, 2011

McConnell, K., Allsop, W., & Cruickshank, I. (2004). *Piers, jetties, and related structures exposed to waves: Guidelines for hydraulic loadings.* London: Thomas Telford.

Ming Dynasty. (n.d.). *EMuseum at Minnesota State University.* Retrieved January 17, 2011

Olsen, R. (2009). *The world's busiest ports.* Retrieved November 19, 2010, from <http://www.forbes.com/2010/06/07/containers-ports-trade-business-logistics-shipping.html>

Sorum, A. (2007). *Common Types of Boat Anchors.* Retrieved November 19, 2010, from <http://www.myboatsgear.com/newsletter/200788.asp>

The Art of Science and Ship Berthing (2009). Retrieved November 19, 2010, from <http://www.brighthub.com/engineering/marine/articles/47742.aspx>

The Waterfront Center. (2007). *Champions of Waterfront Excellence.* Retrieved November 11, 2009, from <http://www.waterfrontcenter.org/>

What are the Different Types of Repairs Necessary for a Ship? (2009). Retrieved November 19, 2010, from <http://www.brighthub.com/engineering/marine/articles/32481.aspx>

Woods, D. (2009). *Handbook for interactive qualifying project advisors and students.* Worcester: WPI.

Yip, T. L. (2008). Port traffic risks – A study of accidents in Hong Kong waters. *Transportation Research Part E: Logistics and Transportation Review, 44(5), 921-931.*

## Appendix A: Sponsor Description

The Hong Kong Maritime Museum (2010) is a non-profit educational institution that serves to preserve Hong Kong's unique and vibrant maritime history through exciting, interactive exhibits. The HKMM is an "independently operated, public museum for the people of Hong Kong dedicated to THEIR maritime heritage and focused on the people, the harbour, and the ships that have created THEIR home – one of the world's greatest port cities" (Corporate). The HKMM was established in 2005 and was opened to the public on September 9, 2005 (Chiu, 2005, p. 1).

The HKMM is in the midst of a relocating to Central Pier 8, which was undertaken with the hope of sparking wider interest in maritime history as well as appealing to a wider variety of Hong Kong visitors. Currently, the HKMM (2010) is located in Stanley Plaza on the ground floor of the historic Murray House, a nineteenth-century building situated on the Stanley Bay waterfront. The HKMM is a part of the well-known retail complex in Stanley Plaza that is accessible by most bus services. The museum exhibits are both interactive and innovative, displaying Hong Kong's rich history of maritime exploration, trade, and naval warfare. The mission statement of the Hong Kong Maritime Museum (2010) is as follows:

*"The mission of the Hong Kong Maritime Museum is to stimulate public interest in the world of ships and the sea with particular reference to the South China coast and adjacent seas and to the growth of Hong Kong as a major port and international maritime centre, and in doing so highlight the major developments in and cross-fertilization between Chinese, Asian and western maritime tradition" (About Us).*

The Hong Kong Maritime Museum (2010, About Us) has a very simple, yet solid organizational structure. The HKMM has one Chair, Mr. C.C. Tung, who oversees twelve trustees. The Board of Directors led by Chairman Anthony J. Hardy, is composed of Mr. Y.K. Chan, Mr. Andrew Yee Chen, Mr. Kenneth Koo, Mr. M.H. Liang, Prof. Qian Qiang, and Mr. William Waung. Serving as the Museum Director

and our project team's liaison is Dr. Stephen Davies, who oversees the day to day operations and external affairs of the museum. Working with Dr. Davies is Ms. Catalina Chor, who serves as the Executive Director and Curator of the museum. Ms. Chor oversees the rest of the museum staff, consisting of the Curatorial Department and the Operational Staff. The Curatorial Department is comprised of three employees - Ms. Moody Tang (Assistant Curator), Ms. Dorothy Kwong (Assistant Curator of Public Relations), and Ms. Elisa Pang (Assistant Curator of Design). The operational staff is also composed of three employees - Ms. Jesse Chan (Executive Secretary), Ms. Louisa Leung (Accounts Supervisor), and Ms. Kendi Tong (Shop Adviser).

The museum is funded primarily by individuals and organizations within the shipping community (HKMM, 2010, About Us). They include COSCO, one of the world's largest container shipping lines ("Donor Board"). The museum generates income based upon their annual visitation rate. The museum charges a general admission price of HK\$20.00 for adults and HK\$10.00 for children under 18, senior citizens, full time students, and people with disabilities ("Location and Information"). The visitor base of the HKMM is comprised equally of both males and females of varying age. The majority of these visitors are from Hong Kong, with very few coming from mainland China. The museum's average annual visitation is estimated to be somewhere between 35,000-40,000 since its opening in 2005.

## Appendix B: What is an IQP?

According to the IQP handbook (2009), an Interactive Qualifying Project (IQP) is a project that examines the intersection of technology and society (Woods, p. 8). The objectives of a successful IQP are to create awareness of the social impact of an engineering decision, cause students to question and evaluate society's beliefs, and to aid in the students understanding of society. These objectives do not set standards for the results presented at the end of a project, or even set tight limitations as to topic of the problem, but rather define what a student should learn in the course of completing the project.

For our IQP, we are attempting to determine the feasibility of berthing a ship for HKMM at Central Pier 8 in Hong Kong Harbour. The technological component of the project is focuses on the sea conditions that the vessel will have to brave. The sociological component is centered on determining what variety of ship should be presented at the museum based on cultural attitudes held by Hong Kong's citizens. These are not the only parts of the problem; however, they offer examples of the spectrum of topics our IQP will attempt to span.

This project is an IQP because it encompasses both technological and sociological components. Not only does our project include both aspects, but each affects the ability to fully understand and act upon the other. For example, if the team does not understand which type of vessel the public wishes to view, it will not matter if said vessel can weather the elements, as too few visitors will be attracted to sustain the exhibit financially. Equally, the project is doomed if an appealing vessel is selected, but is unable to withstand the abuses of being in the harbor. In this case, it would not matter how popular the exhibit became, as it would require repairs so frequently that the exhibit would rarely be open. There is even a possibility that if the analysis is done incorrectly, the boat could sink. As this project contains both sociological and technological components, and forces our group to understand the myriad ways in which the two interrelate, it is by definition an IQP.

## Appendix C: Interview Transcripts

**Interview with WPI Prof. Forgeng (Museum Curator)**

**November 29, 2010**

**Interviewers: Codie Keene and Stephen Lee**

**Location: Higgins Armory Museum**

### **Higgins Armory Museum Interview: WPI Prof. Forgeng (Museum Curator)**

**How many years and months have you served your current position as curator?**

11-12 years

**How many years experience with the Higgins Armory Museum?**

11-12 years. Prior to that I served as an independent contractor for several museums, and then I served as an interpreter for the Plimoth Plantation.

**Generally, what are your current museum demographics?**

Our demographics are primarily composed of school groups and families.

**What kind of exhibits do visitors like to see?**

**-Preferred medium or presentation style?**

There is no one preferred presentation style. It is important to capture a breadth of different approaches in exhibits. You want to have something to offer to different developmental levels and interests.

**-How do you manage movement within the museum?**

Some individuals prefer a guided tour, while others prefer to move at their own pace.

**-How do you ensure an exhibit is making the best use of the available space?**

Typically, one objective is dwell time. It is important to observe how long the visitors stay at a particular exhibit as a factor related to space. This is a ratio of time versus square footage.

**Are you facing a decline in visitors over the years? If so what have you done to reverse this trend and attract not only new visitors, but also retain your current visitors?**

The current economic state is a real challenge for small to mid-sized institutions. The biggest issue is the decline in school visitation due to educational cuts. A good museum is always reinventing itself. The bottom line is if you don't change, you're going to go extinct.

### **How are exhibits organized with third parties?**

There are different needs depending on whether it is a school group or a family. Students are driven by curriculums. School curriculum dictates what students need to learn based on state regulations and MCAT's. School groups require guided tours and activities such as written scavenger hunts to engage the students. A structured, programmatic museum experience is necessary.

### **How are travelling exhibits advertised?**

Temporary exhibit space is limited therefore we don't have room to accommodate travelling exhibits. However, we do send exhibits out. These exhibits are market driven and controlled by an outside agency. These outside agencies have a knowledge of market demand and help choose which exhibits would be worth sending out.

#### **-Is one type of advertisement more effective than another for a given exhibition?**

Print, web, billboards, and occasional radio and TV advertisements are used. As far as effectiveness goes, I would guess that web based advertisements are the most cost beneficial due to their very low cost.

#### **-Average advertising costs?**

Cost varies greatly but TV and radio are of the most expensive forms of advertisement, while the internet is extremely inexpensive and readily available. The best marketing of all is word of mouth. The word spreading brings people in.

### **Do you think a permanent "signature" exhibit would be helpful to your museum?**

Branding is really important. A signature exhibit really captures people's interest, which is very important. We have three main exhibits that visitors typically enjoy. The first is the Knight and Dog

Armor in the front lobby. The second is the jousting armor which is set up as a full scale scene. This is a very compelling exhibit. The third is the Knights exhibit which was created on a shoe-string budget. This is a very successful exhibit that was created with a very limited budget of a few thousand dollars. A major factor preventing us from having a signature, blockbuster exhibit is our threshold of size. Such an exhibit requires a large staff and floor space. Our small area makes it difficult to mount an exhibit with that much pulling power. A shortage of staff also makes such an exhibit nearly impossible. One has to draw in outside sponsorship to make it happen.

**How is your museum funded?**

Our museum is partly earned income, partly donated money and grants, and partly endowment.

**If private, how do you maintain quality exhibits while managing expenses?**

It is important to gain sponsorship for exhibits by marketing. Without such sponsorship it is very difficult to accumulate the necessary funds for a successful exhibit.

**Has your museum ever moved location, and if so, what kinds of challenges did you face?**

We have been at our current location since 1930. However, we did contemplate moving downtown. In debating on whether or not to move there were several factors, the most obvious of which were logistical issues. Less noticeable are issues such as branding. It is important to brand your new location so that people think of you in a different way at a new location. People are attached to your current location and a move may cause upset for them. Location is a challenge for us. We are isolated from the central core of Worcester and we are difficult to find.

**Do you have any suggestions for the HKMM and its current situation?**

Buy in from the community is very important and is analogous to our current travelling exhibits. What would make the exhibit worthwhile if the community wasn't truly invested in it? The Board of Trustees represent those invested in the museum. Success depends on the trustees as they must believe in the exhibit and be enthusiastic about it. They are the ones with connections in the business world. This

exhibit must connect the past to the future as a symbol of how Hong Kong can consolidate its pride and history. Sell it as a way to consolidate the community and promote identity. This ship needs to be a hallmark for Hong Kong and a representation of maritime activity. This exhibit can also be used to install confidence in what Hong Kong firms can provide.

**Thank you very much for your time today. We very much appreciate it.**

If you have any follow up questions do not hesitate to call me or email me as I am glad to help.

## **Interview with Peter Arenstam of the Mayflower II**

Date: 12/3/2010

Time: 1-3 PM

Location: Plymouth, MA

Interviewers: Codie Keene and Mitchel Wilkinson

*Note: This is not a verbatim transcript, due in part to the limitations of the recording device used to conduct the interview, and the nature of the interview itself, which included a walking tour of the Mayflower II following a formal question and answer session. This is in accordance with our request, and in pursuit of additional experiential knowledge. We truly thank Mr. Arenstam for his time, and for his generosity in the sharing of his expertise. Any errors or omissions made in this transcript are solely the fault of our team.*

*Legend: PA-Peter Arenstam*

*CK-Codie Keene*

*MW-Mitchel Wilkinson*

CK: What is your current position, and for how long have you held the position?

PA: I've been at Plimoth Plantation for just about 20 years now, and my title is Manager of the Maritime Artisans. We are the department that maintains and restores the Mayflower II, is responsible for sailing the ship, as well as training new crew and volunteers. We also produce maritime programming.

CK: What challenges are faced when moving a ship of this size?

PA: Mayflower does not have an engine, so we have to contract with a tugboat, which is the first issue. We've used the same tugboat for the last 30 years. Also, she's a large wooden 17<sup>th</sup> century style vessel that's not designed to be towed per se, so turning and maneuvering is difficult. She (Mayflower) is very forward, has a bluff bow and a high stern cap with a long, straight keel, so she'll turn in to the wind and go in a straight line forever, but turning and maneuvering can be a challenge. Another issue for us is that, since Mayflower II is a very well known, locally, nationally, internationally known vessel, anytime we move the Mayflower from the pier, and away from view, we disappoint a lot of people.

MW: On the technical side, if you were able to retrofit the Mayflower to make it easier to tug, not considering the aesthetics, in what way would you go about that? What devices or methods might you use?

PA: I would not consider putting an engine in, if that's what you're thinking, because moving with a tug, while awkward, is easier than moving her on her own. One thing I would consider is an auxiliary motor boat to help maneuver. We actually have a 17' motor boat, a work boat, which we built here a few years ago with volunteer help, which we sometimes use as a push boat. We turn Mayflower twice a year during the season here at the pier, so every four months or so, to keep her weathering evenly, so we use that work boat when we cast off lines, to push and to maneuver, and to sort of act as a guide.

CK: What can you tell us about the berthing and mooring logistics?

PA: Mayflower was sailed to this pier from England, where she was built, in 1957, and has essentially been on this pier since then. We have two gangways to allow access for visitors (per Coast Guard regulations), and floating in the water, we have a camel, which is a floating fender to keep the ship from moving into the pier. Ours is a log, maybe 18" in diameter, 50-60 feet long, with old car and truck tires on it for floatation and absorbing shock. This isn't an ideal fendering system, but it does work. We've looked into using a camel like the Navy uses, which is a large inflatable device, which can be moved more easily. Also, outboard of the ship are two sets of dolphin pilings, so large, anchored pilings, basically a cluster of logs, one fore and one aft, which help keep the ship stationary. We have a set of 2.25 inch diameter mooring lines, permanent mooring lines, made of nylon, which are shackled to pier and to the ship. These are pretty specific lengths to keep the ship from moving fore and aft in her berth. One thing to bear in mind about the security of the ship is the tidal range, so the difference between low and high tide, and the slack in those lines, is a part of the equation. Our range difference is between 8-10 feet, which is significant, so you have to consider that.

MW: To follow up, regarding those regulations about embarking and disembarking, what more can you tell us?

PA: Mayflower is certified for up to 49 passengers, and is classified as "substantially a land structure", meaning your ship doesn't travel, though we are able to travel. To do be classified this way, you need a land line and a fire system that connects to the local fire department, essentially a local safety network, so that in an emergency, the fire department comes, not the Coast Guard or the harbormaster. We have to follow the safety requirements of a structure you would find on land, including occupancy, entrances and exits, firefighting equipment, lighting, and those sorts of things, to let people on board.

CK: What type of maintenance is required?

PA: Ha! Ongoing and relentless....I would say a wooden vessel is the most labor intensive, particularly a period ship, a 17<sup>th</sup> Century ship, but the material type will determine the maintenance schedule and type. There is a staff of 3 that work here year-round on maintenance, but we could easily use 5. There's painting, caulking, framing, planking, sails which rot on the yards (ours are linen canvas), etc. But depending on the type of exhibit and the material types, anything exposed to the weather, constantly, has to be protected. And we have to consider the visitors, who we welcome, but by being on the ship, can do damage to it. It's one more impediment

MW: What can you say about dry-docking the Mayflower II, or the procedure when work needs to be done under the water line?

PA: We dry dock every other year, which is a six hour tow down to Fairhaven, which also relates to our Coast Guard inspection. This year is one of those years, and this all happens after the season, but requires down rigging and preparing to travel, which can be a long process before disembarking. We dry docked every year for six years or so, to catch up on some maintenance issues, but it's currently every other year.

CK: What are the costs related to maintaining the ship?

PA: A dry dock bill minimum, with hauling, cleaning, painting, and re-launching, is probably \$20,000. The most we've ever spent, per dry docking, to my knowledge, is around \$80,000. Again, bear in mind, these costs are for an older wooden vessel and for the labor market here in the Northeast.

MW: How do you screen outside contractors to do work? Also, how do you screen and train volunteers?

PA: For dry docking and maintenance, there is a bid process, where we contact two or three local shipyards which are capable of docking us (most yards are not), all of which we visit, just to get a good bid. Over the years we've visited a number of yards and have found different yards that are better at different types of work, so we on the staff can usually agree which dock would be best based on the job. We do have a long-standing relationship with one yard which has a strong carpentry and shipwright division, and who know our techniques and our needs well.

We will use volunteers of any skill level. As a trained shipwright for 20 years, or more like 30 now, one of my roles is teaching, as well as using any rigging or carpentry background the volunteers may have to make them the most useful to the Mayflower. For background, I have a degree in philosophy from Bates College, and went to boat building school after that, so there is an emphasis in teaching these skills, and expanding any abilities the volunteers already have.

MW: How many volunteers do you get per season?

We get 4-6 volunteers regularly, I would say on a weekly basis, during the season, but when we sailed last, in 2007 we sent out a call for volunteers had 65 volunteers show up and go through a training program.

CK: How are your tours conducted?

PA: We have a first person program during the seasons, which has actors serving as passengers or other roles, and then third-person interpreters, either tour guides or docents to answer questions from a modern perspective. Another part of that is the Maritime Trades program, so as we work, we answer questions. All of the tours are self-directed, and we encourage people to ask questions. Someone from guest services will give a brief orientation of who is on board, but otherwise experience varies based on the questions, and their visit is really as good as they make it. A person who just wants to look and leave may be done in ten minutes, while a person who asks good questions will usually stay between 30-45 minutes. Visitors who stop and engage generally have a better experience. We also have an on-dock exhibit which emphasizes the three things I mentioned, the immersion, the modern view and then the trades, and an exhibit after leaving the ship, which is currently about provisioning a 17<sup>th</sup> Century ship, but which can vary during the season.

MW: In your experience, what is the ideal group size? Is it the more the merrier?

PA: Definitely not. We let 20-30 people on a time, and when dealing with school groups, it has to be staggered. When it just families who come and go in small groups, there is a much more fluid interaction than when it's done on a school kind of schedule. During group season, when there are bus-loads of kids, we'll have one group start on the half deck and one on the main deck, and then have them trade once both groups get a good look around, then have those kids get off to let the next bus load on, but that can be rushed, and not as meaningful.

MW: Is there an average duration? Does that vary with any other factor, like age or gender?

PA: Every other factor, to be honest with you. If you have someone who is focused on history, they may stay half a day, where if you have someone with a little kid tugging at their arm, they'll stay for 20 minutes. An author has stayed for two days before. We estimate the average is 30-45 minutes.

CK: What is the cost of the tour?

PA: Ten for an adult, seven for children, for the single site, good for two days.

MW: What percentage of revenue comes from ticket sales?

PA: About 80%, with the rest coming from a combination of donations to Plimoth Plantation from groups or individuals, government grants, and some other sales within the Plantation itself.

CK: Have you ever considered taking passengers out?

PA: No, not generally, in that we do well here at the pier, and the added cost of getting underway is difficult to recoup with just 49 passengers, as well as the geography of the harbor. We can also only travel on a high tide, so we are very limited in that way.

MW: What provisions are there in the case of inclement weather?

PA: We've had hurricanes in the past, and in that case, we add a second set of mooring lines, as well as what we call on-shore mooring lines to concrete blocks so we can haul the boat up if we have to,

though this isn't usually necessary. We also add extra camels and fenders to protect the dock. That in my experience is enough to keep the boat in place and keep everything secure.

CK: While visitors are on board the ship, what safety considerations are there?

PA: With regard to maintenance, we try to let people know what's going on if we're going to be working overhead or if we're going to be working with paint or tar or something like that, and to get that information to Guest Services. We also will rope off areas that are simply too dangerous to be, though we try and keep that to a minimum during the season.

*This concluded the portion of the question and answer session that we could record via tape (30 minutes). What follows is taken from written notes.*

CK: How do you market your ship to the public?

PA: Number one is word of mouth; people visiting and telling their friends about it. We also do a lot of print advertisement, particularly around the holidays. We also get a fair bit of media coverage around the holidays, which is handled and coordinated by our PR manager, who may reach out to various news outlets. For example, the Boston Globe has said this week they may be interested in following the Mayflower the next time it is in dry dock, so all of that is transferred to her. We also have a website with a research center which has information on visiting us. I would say within the organization, PR doesn't get the financial backing or the attention it deserves.

CK: What are your current visitor demographics?

PA: Speaking very broadly, the larger the greater the distance away from Massachusetts, the smaller the visitor base tends to be. The largest groups tend to be school groups with third and fourth graders studying colonial history. We have as a part of our outreach efforts groups of actors who go to classrooms in costume to teach colonial history. We can also supply teachers with materials, which naturally encourage them to visit us, particularly if they have come before and had that be something their students have enjoyed and learned from. There are also arranged groups, done through the main office, which include a lot of foreign visitors. Within that I would say we get the largest number of Brits, then Japanese, then other countries, but truly all over the world.

CK: How do visitors give feedback?

PA: We use comment cards, which we keep and display by the ticket office, which people can fill and out, and which we do read on a regular basis. Also, we get letters and e-mails from people who have come, both positive and negative, which we keep and review. In the last few years, we have really put a re-emphasis on visitor service, which I think has been very good.

MW: What is the one thing you are proudest of, and, inversely, what is the one thing you would change if cost/authority were no object?

PA: What I am proudest of is keeping a 57 year old ship safe, boardable, and seaworthy, through our maintenance. What I would change is the infrastructure of the site. Having the service facilities and repair shop 2.5 miles from the ship itself just doesn't make any sense. Also, the Mayflower, as opposed

to Plymouth Plantation, should have its own internal staff structure rather than having to communicate through a group that has their own exhibit and concerns. The communication can sometimes be awkward.

*This concluded the formal question and answer session.*

## Appendix D: Mayflower II Case Study

In considering the feasibility and development of a new “floating” maritime exhibition for the HKMM, it seems prescient to consider other similar exhibitions elsewhere in the world, so as to establish a working model for our group to emulate. Having recently completed its 53<sup>rd</sup> year of operation, and enlightening an average of 200,000 annual visitors, our group could conceive of no more successful a candidate to study than the Mayflower II, docked at the Plimoth Plantation in Plymouth, MA. Our group was fortunate enough to tour the vessel in December 2010, following the close of the Mayflower’s visiting season, and to interview the Mayflower II’s Director of Artisans, Mr. Peter Arenstam, whom we wish to thank for the privilege.

In reflecting upon this experience, and in order to establish a working model, several key points merit consideration. The first and perhaps most significant of these is the organizational challenge presented by the continuous monitoring and upkeep of an historic vessel. To this end, the Mayflower employs three highly skilled craftsmen on a full-time, year-round basis to maintain the vessel, though Mr. Arenstam notes that this number could easily be five. Though in part this is reflective of the labor intensive nature of a wooden vessel, particularly a vessel more than a half-century old intended to reflect the shipbuilding practices of the 17<sup>th</sup> Century, this also speaks to the necessity of maintaining the ship during the viewing season, when wear is accelerated by the increased deck traffic. In combating the challenge of completing necessary maintenance work without significantly hindering the freedom of movement of the Mayflower’s guests, the routine maintenance of the Mayflower has been incorporated into the visiting experience itself, as guests are encouraged to ask questions of the servicing crew, who are trained not only in the technical trades, but also by museum staff as to how to interact with guests. Moreover, as an extension of this, the Mayflower II operates a volunteer program, where interested persons may learn rigging, carpentry, and other shipboard skills, and can contribute directly to the

maintenance of the vessel, provided a member of the staff supervises. This, it is worth noting, helps to offset the great cost of maintaining an historic vessel, while simultaneously advancing knowledge of maritime history within the general public. While a program of this type demands a particularly knowledgeable and gregarious maintenance staff, it is the experience of Mr. Arenstam that often, tradesmen are more than willing to share their experience and skills, stemming from their love of the craft of shipbuilding itself.

Further regarding the finances of the Mayflower II, it must be noted that the admission price for the vessel experience (\$10 for adults, \$7 for children age 13 and under, with possible discounts for seniors) is not tied to that of the Plimoth Plantation, and in point of fact, falls under a different internal command structure. While Mr. Arenstam noted some difficulties in the communication between those working at the Plantation and those working with the Mayflower II, it is also significant to observe the revenue generated by the Mayflower II is distributed between both exhibits. While this may be advantageous to the Plymouth operation as whole, naturally the diversion of resources from the ship itself (given a minimum dry docking cost of \$20,000, incurred on a biyearly basis) is the cause of some consternation, and additionally muddles the question of long-term exhibit solvency. Similar to the HKMM, the Plimoth Plantation depends both on admission fees and private donations to remain open, though in contrast, the Mayflower II does receive several government grants, renewed as necessary. This government funding, but not on an exclusive basis, would be one path to explore with an historic vessel housed and operated by the HKMM.

In accounting for visitor experience while onboard a stationary vessel, several factors play into the overall feel and flow of the exhibition. First, and perhaps most notably, is the time in which the material is presented. In the case of the Mayflower II, actors dressed in period garb are trained to go

about the daily activities of their historic counterparts, and to answer questions in a manner similar to their character so as to enhance the realism of the viewing experience, and to transfer knowledge from what appears to be a first hand source. While this often has a more dramatic effect on schoolchildren than adults, in terms of the experience, the concept of presenting material from a first person vantage point, rather than viewing the vessel and contents purely as supplanting an historic artifact, is one well worth considering. In support of this type of period immersion, Mr. Arenstam notes that in addition to the vessel itself, the objects contained on the vessel are of paramount importance, as in their absence, the vessel is more a shell than a piece of living history. Second, the order in which visitors view items can have a significant effect on the overall impact of the exhibition. While a visitor's experience aboard the Mayflower II is largely self-directed (e.g. there are no formal tour guides leading groups, and visitors may chose to remain in one area for a greater length of time than another), Mr. Arenstam has noted that by beginning on the Mayflower's half-deck, then advancing to the main deck, and finally proceeding to the galleys and cabins below deck, visitors are more keenly aware of the structure of the ship in relation to its function, and in re-visiting areas upon their departure, have an enhanced appreciation of the ship's design. Moreover, by suggesting this viewing order to guests and limiting the number of persons on the ship to below the maximum legal occupancy, a visitor's feeling of crowding is minimized, thereby enhancing the overall experience. Finally, Mr. Arenstam notes that in considering the average visit length (between 30-45 minutes for the Mayflower II), ultimately, factors beyond the museum's control, as for example a crying child or poor weather conditions, often determine this duration, rendering it a meaningless statistic with regard to information transfer and overall experience. In combination, these factors must be considered in developing a new exhibition, as well as maintaining the quality of experience for a repeat visitor.

In discussing issues of safety and legality, Mr. Arenstam noted that there is a distinction in US maritime law between a touring vessel (e.g. a vessel operating under a fixed schedule between points,

and moving under its own power) and a vessel which is “substantially a land based structure”. The essence of this difference in definition lies in whether the emergency network employed by the vessel exists primarily at sea or on land. For instance, in the case of a fire aboard the Mayflower II, the relevant authority for the acting captain to contact would be the Plymouth Fire Dept., not the Plymouth Harbourmaster or the Coast Guard. This definition extends to other areas of law, including lighting and accessibility compliance, but primarily concerns emergencies and the type of mooring and fendering system employed. Depending on the preferred experience of patrons (e.g. stationary or touring), it is significant to be aware of these distinctions, and to comply with established regulations.

In sum, our group’s time at the Mayflower was both a wonderful historic experience, and a boon in developing a model for comparison to any exhibits proposed or implemented by the HKMM. While it is impossible to determine if any vessel experience designed and/or recommended by our group will stand the test of 50 years while continuing to thrive, as the Mayflower II has, this certainly seems a worthy goal.

**Appendix E: Questionnaire**

The information given in this survey is confidential as defined by law. Your participation is strictly voluntary. No individually identifying data will be collected or reported. This survey is being conducted on behalf of the Hong Kong Maritime Museum to gauge interest in possible museum exhibits. Please circle your responses below.

您所參加的這次問卷調查是完全自願的，同時您所提供的資料是受法律保護的。您的任何個人資料都不會被收集或者報導。此調查代表香港海事博物館。本組織的目的是為了更好地瞭解群眾對博物館展覽的興趣。下面請在你覺得適合的答案前打圈。

- Were you previously aware of the Hong Kong Maritime Museum?  
 你曾否聽說過香港海事博物館?  
 YES有                      NO否
- Would you visit the Hong Kong Maritime Museum if it were located at Central Pier 8?  
 如果香港海事博物館將搬至中環八號碼頭，你會否參觀呢?  
 YES會                      NO否                      MAYBE 可能
- Which type of historic vessel would you be most interested in learning about? Please circle only one below.  
 請從下列圖片中，圈出一種你最想學習的船隻類型。



Fishing  
漁船



Ferry  
渡輪



Military  
軍艦



Tug  
拖輪



Junk  
中國帆船



Tall Ship  
高桅橫帆船

- I would be more likely to visit the Hong Kong Maritime Museum if I could examine the type of vessel I selected. Please circle to what degree you agree with this statement.  
 如果我能有此機會去參觀我所選擇的船隻類型，我會更樂意去參觀海事博物館。

Strongly Disagree      Disagree      Neutral      Agree      Strongly Agree  
 強烈反對                  反對                  中性                  同意                  強烈同意

- For the type of vessel you selected above, what is the maximum admission fee you would be willing to pay to tour the vessel? (Note: This **does not** include the museum admission fee of 30 HK)

對於以上你所選擇的船隻類型，您認為最合理的遊覽費為？（請注意：這**不包括**博物館入場費30港幣）

Under 10 HK 低於10港幣	11-20 HK 11-20港幣	21-30 HK 21-30港幣	31-40 HK 31-40港幣	Over 40 HK 超過40港幣
-----------------------	---------------------	---------------------	---------------------	----------------------

Please circle your responses below:

請圈出下面你覺得適合的答案

Please specify your gender: 性別

Male 男 / Female 女

Please specify your age range: 年齡

12-20    21-40    41-60    61-80    Over 80    超過80歲

Please specify why you are in Hong Kong:

請說明你在港原因:

Resident  
香港居民

Visiting Family/Friends  
探親朋戚友

Tourist/Vacation  
遊客

Business Trip  
商業合作

Other: \_\_\_\_\_  
其他:



## Central Reclamation Project

The Hong Kong government is nearing completion of a decades-long land reclamation project at Victoria Harbour in Central. Part of a multi-billion dollar plan to develop the harbour front into a more welcoming area, the district seems poised to take its place as a premiere travel and leisure destination. This project is set to be completed in 2013.



On Site: A new Central in the making

## HKMM Move to Central Pier No 8.

In keeping with the times, and in seizing upon the fine work done by the HKSAR in their restoration of Hong Kong's Central District, The Hong Kong Maritime Museum (HKMM) will be moving from its current location at Murray House in Stanley to the famed waters of Victoria Harbour at Central Pier 8.



Architectural rendering of the future location of the HKMM at Pier 8, January 2011

In addition to a breathtaking view of the harbour, this new location will have more than six times the exhibit space available at our current facility. This new real estate will allow the HKMM to create additional exhibits, displaying hundreds more artifacts from all eras and corners of the globe. Located on scenic Victoria Harbour, the museum will serve as both a repository of ancient maritime knowledge and a proud cultural landmark amid the hustle and bustle of modern Hong Kong.



The Modern Gallery at the HKMM

## WPI Students Looking Into Historic Ship Exhibition

Four University students from Worcester, Massachusetts, United States are currently working with the HKMM to determine the feasibility of adding a 'floating' museum exhibition to the HKMM collection. Completed in cooperation with the Worcester Polytechnic Institute the interdisciplinary team aims to answer engineering, safety, and market research questions typically beyond the purview of daily museum operations.

Having reviewed the building plans for the new HKMM completed by Atkins Engineering (<http://www.atkinsglobal.com>), the team will examine additional engineering issues including *fendering*, *berthing load*, *vessel size and the effects of tidal movements*, as well as issues of *market research* and *public awareness*. It is the hope of the team that with these questions answered, the HKMM flagship will soon be coming into port!



A traditional Chinese Junk in Victoria Harbour

## Contact Information

WPI Student Team (Jessica Holmes, Codie Keene, Stephen Lee and Mitchel Wilkinson)

[Pier8Engineering@hkmaritimemuseum.org](mailto:Pier8Engineering@hkmaritimemuseum.org)

The Hong Kong Maritime Museum

[info@hkmaritimemuseum.org](mailto:info@hkmaritimemuseum.org)

## Appendix G: HKMM Coupon

Opening hours: Tuesday to Sunday and public holidays 10am to 6pm  
 Closed on Mondays and first two days of Lunar New Year  
 開放時間：星期二至日及公眾假期 上午十時至下午六時  
 逢星期一、農曆年初一及二休館



**由香港島前往：**

- 在中環交易廣場乘坐6, 6X, 66, 260號巴士
- 在北角(碼頭)乘坐63或65號巴士
- 在西灣河港鐵站(太古街)乘坐14號巴士
- 在柴灣小西灣南端半島乘坐314號巴士
- 在香港仔翠富乘坐73號巴士
- 在銅鑼灣港鐵站B出口步行至登龍街乘坐40號小巴
- 在柴灣(港鐵站外)乘坐16M號小巴
- 在香港仔石排灣乘坐52號小巴

**From Hong Kong Island:**

- Bus Nos. 6, 6X, 66, 260 from Exchange Square, Central
- Bus No. 63/65 from North Point (Ferry Pier)
- Bus No. 14 from Sai Wan Ho MTR Station (Tai On Street)
- Bus No. 314 from Island Resort, Sui Sai Wan, Chai Wan
- Bus No. 73 from Wah Fu, Aberdeen
- Minibus No. 40 from Causeway Bay MTR Station Exit B (Tang Lung Street)
- Minibus No. 16M from Chai Wan MTR Station
- Minibus No. 52 from Shek Pai Wan, Aberdeen

**由九龍前往(尖沙咀東)：**

- 在新世界中心乘坐973號巴士

**From Kowloon (Tsim Sha Tsui East):**

- Bus No. 973 from New World Centre

Valid Until March 31, 2011  
 有效期至2011年3月31日

# 免費入場券乙張 Free Admission Ticket

**Nº 0774**

香港海事博物館有限公司  
 香港赤柱赤柱廣場美利樓地下  
 Hong Kong Maritime Museum Ltd.  
 G/F, Murray House, Stanley Plaza,  
 Stanley, Hong Kong  
 Tel/電話：(852) 2813 2322  
[www.hkmaritimemuseum.org](http://www.hkmaritimemuseum.org)

