

**BEFORE THE GUAM PUBLIC UTILITIES COMMISSION**

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The Port Authority of Guam )  
[PAG] Request for PUC Investigation )  
of Purchase of Cranes )

Port Docket 12-01

Report of the Tariff Investigation for the Port  
Authority of Guam

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For Guam Public Utilities Commission  
Port Docket 12-01

**August 27, 2012**

**Revision History**

<i>Version</i>	<i>Changed By</i>	<i>Date</i>	<i>Revision Description</i>
Draft		09 August, 2012	
Final report	SNC team	25 August, 2012	Updated to reflect comments from PAG

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## 1.0 EXECUTIVE SUMMARY

### SUMMARY OF REVIEW

Pursuant to Public Law 31-145, the Port Authority of Guam (PAG) is authorized to enter into negotiations with Matson & Horizon for the specific purpose of acquiring or leasing-to-own one or more of their marine gantry cranes. The cranes, which were purchased by Matson & Horizon from the Port of Los Angeles (POLA), are referred to as the POLA cranes in this report.

The requirements of the agreement stipulated that PAG complete the following tasks:

- The PAG Board of Directors (BOD) is to appoint a negotiation team with no conflict of interests.
- The PAG engage an independent crane expert to conduct an assessment of the material condition and life expectancy of the POLA cranes and an "as is" valuation assessment to determine the range of fair and reasonable value and provide reports to the Governor and Legislative Speaker.
- The BOD review the acquisition terms and ratify them by a majority vote. If the majority vote is to ratify, the terms of the acquisition will be transmitted to the Public Utilities Commission (PUC) for review and disposition.
- The PUC is to complete its review in a timely manner.
- While the PUC is conducting its review, the crane owners will continue to maintain the cranes.
- Along with procuring cranes, PAG is to acquire a Performance Management Contract (PMC) for the performance operation and maintenance of the acquired cranes pursuant to the Guam Procurement Act.

As noted in the tasks above, the PUC is tasked to review the acquisition. To this end, the PUC directed its consultants for matters related to PAG, Slater, Nakamura & Co, LLC, to review the proposed acquisition of the cranes.

The review consisted of the following elements:

- Reviewed the proposed purchase of the three POLA cranes from Matson/Horizon and also the acquisition of the American President Lines and Sea-Land Services, Inc. crane on Gantry 3 to determine if the price is fair, just, and reasonable.
- Projected the cargo throughput requirements for the Port and assessed the capacity of the selected number of cranes to meet these requirements.
- Evaluated alternatives to the purchase of the existing cranes to include:
  - Cost of purchasing new cranes with similar capabilities to meet the throughput requirements for PAG.

- Cost of purchasing refurbished, certified cranes from another source with similar capabilities to meet the throughput requirements for PAG.
- Determined the Total Cost of Ownership (TCO) for 15 years for:
  - Three cranes proposed to be purchased by PAG.
  - New cranes.
  - Refurbished and certified cranes from another source.

The review identified the following:

### Capacity Analysis

Based upon the analysis of PAG's capacity requirements,

- Three operational cranes will give PAG excess capacity ranging from 190% in FY13 to 153% in FY27.
- Four operational cranes will give PAG excess capacity ranging from 280% in FY13 to 230% in FY27.

### Total Cost of Ownership

The lowest total cost of ownership over a 15 year period is to purchase the three POLA cranes

In the figure below is a summary of the Total Cost of Ownership (TCO) analysis for acquisition of three cranes. There are only 2 Hitachi cranes currently available from the Port of Los Angeles. The numbers below reflect the costs for two cranes from the POLA. The complete analysis is contained in Appendix B of the report.

**Figure 1: Summary of Estimated Total Cost of Ownership**

Crane Option	Total Acquisition Cost including maintenance upgrades	Total Operating Costs	Total Cost of Operation
New ZPMC Cranes	\$27,587,220	\$50,209,373	\$77,796,593
New Kalmar Cranes	\$30,587,220	\$52,576,923	\$83,164,143
POLA cranes 14,16,17	\$12,350,000	\$56,084,095	\$68,434,095
VPA used ZPMC Cranes	\$23,750,000	\$45,977,399	\$70,321,925



Crane Option	Total Acquisition Cost including maintenance upgrades	Total Operating Costs	Total Cost of Operation
VPA used Kone Cranes	\$21,350,000	\$59,961,163	\$81,311,163
POLA Hitachi Cranes (only 2 available)	\$15,750,000	\$37,955,134	\$53,705,134

## Findings

- PAG finances:
  - PAG has allocated \$14.5M for the purchase of cranes.
  - Purchasing the three POLA cranes and deferring needed maintenance to future years will meet the PAG budget of \$14.5M.
    - PAG needs to include the cost of demolition of Crane 2 in its costs. Based upon historical numbers, this could be as much as \$500K.
- Capacity throughput requirements:
  - Acquisition of two POLA cranes (three cranes total) can meet the annual capacity demands for PAG.
  - Acquisition of three cranes will provide substantial excess capacity. This could result in a need to increase fees per container to cover operational and acquisition costs.
  - There is no known plan to bring larger ships to Guam which would drive the need for larger cranes.
- Total cost of ownership:
  - The lowest Total Cost of Ownership (TCO) is for the acquisition of the POLA cranes 14, 16 and 17.
    - The TCO for the acquisition of the VPA's ZPMC cranes is slightly more than the TCO for the POLA cranes – but these cranes are 20 years newer than the POLA cranes.
  - The acquisition of new or newer used cranes will result in lower long-term operational costs and will provide more flexibility for servicing larger vessels in the future.

**Other considerations**

- The value of used cranes in the marine industry appears to be an asking price with the caveat "or best offer". As noted in the acquisition of the POLA cranes by Matson / Horizon, the cranes actually sold for \$50K per crane. Given that the VPA cranes may fall into the same category, if they could be acquired for \$100K, the TCO for this option would be less than acquiring the POLA cranes 14, 16 and 17.
- It was noted in another report that Crane 3 is in better material condition than the three POLA cranes.
- Only by deferring maintenance on the three POLA cranes is it possible to acquire the cranes within the PAG's budget.

**Recommendations**

- The PUC authorize the PAG's acquisition of POLA cranes 14, 16 and 17.
- The PUC direct the PAG to repair POLA cranes 14, 16 and 17 and Crane 3 to meet the recommendations called for in the PAG crane consultant report.
- The PUC authorize the PAG to fund the demolition for Crane 2 out of the \$14.5 M in funding.
- The PUC direct the PAG to develop a tariff recommendation, based upon the estimated throughput, that will fully fund the acquisition, financing, maintenance and ultimate replacement of POLA cranes 16 and 17 and Crane 3 within 15 years.
- PAG develop a more accurate projection for cargo throughput that can be used to forecast revenues from tariffs.
- PAG consider placing one crane in layup status pending an increase in cargo throughput demand.

## 2.0 BACKGROUND

*In this section is presented information related to the purchase of the cranes*

The Port Authority of Guam (PAG) is a proprietary department under the Government of Guam.

In September, 2009; the Guam Legislature enacted Public Law 30-57 which approved PAG's Master Plan 2007 update. The legislation raised the debt ceiling for PAG to \$54.5 M to allow the Master Plan to be implemented. Additionally, the law directed that PAG acquire two marine ship-to-shore gantry cranes no later than December 31, 2012.

PAG developed and issued a Request for Proposal (RFP) to acquire new cranes for the Port. After reviewing the responses, it was determined that the cost of the new cranes exceeded the budget set aside for the purchase of the cranes.

Public Law 31-145, which was enacted in November 2011, amended PL 30-57, and authorized PAG to enter into negotiations with Matson / Horizon for the specific purpose of acquiring or leasing-to-own one or more of the Port of Los Angeles (POLA) marine gantry cranes. The cranes referred to in the Public Law were already in operation at the PAG facilities.

The cranes, which were purchased by Matson / Horizon from the Port of Los Angeles, are referred to as the POLA cranes. These cranes were purchased by Matson / Horizon and brought to Guam in anticipation of the military buildup that was projected to occur as a result of the closure of U.S. bases on the island of Okinawa. As part of the agreement to purchase the cranes, Matson / Horizon entered into a license agreement with PAG that allowed for the installation of the cranes and the use of the cranes for Matson or Horizon vessels. To offset the costs of purchasing the cranes and installing them in Guam, Matson / Horizon implemented a container surcharge of \$125 for each inbound and outbound loaded container that was moved.

Since the purchase and installation of the POLA cranes, the strategy related to the closure of the Okinawa bases has changed. The planned build up will be substantially less than originally forecasted. Due to this, Matson / Horizon approached PAG and offered to sell the cranes. With the lack of increase in the cargo throughput, Horizon is no longer servicing the Port of Guam. Their support for Guam ended in late 2011.

The date for PAG to complete the acquisition was not changed by the new legislation and is still required to be completed by December 31, 2012.

Under the authority of Public Law 31-145, PAG has declared its intent to purchase POLA cranes 14, 16 and 17 for a total of \$12 M. Through the purchase of these gantry cranes, PAG will have a total of four marine gantry



cranes along with other floating and mobile cranes. PAG is proposing to utilize its newly acquired and existing cranes in the following manner:

Figure 2: Proposed Crane Disposition

Crane No. / Name	Current owner	Status after acquisition
Crane No. 2	PAG	To be removed from service. Note: There will likely be a cost to PAG for the demolition and removal of this crane.
Crane No. 3	Matson / Horizon	In accordance with a 1992 Relocation Agreement, Crane #3 is to be transferred to PAG at no cost once a similar Marine gantry crane is acquired regardless of the source.
POLA Crane 14	Matson / Horizon	Proposed to be acquired by PAG from Matson / Horizon.
POLA Crane 16	Matson / Horizon	Proposed to be acquired by PAG from Matson / Horizon.
POLA Crane 17	Matson / Horizon	Proposed to be acquired by PAG from Matson / Horizon.

- PAG has a budget of \$14.5M for the purchase of cranes.
- The requirements of the agreement stipulated that PAG complete the following tasks:
- The PAG Board of Directors (BOD) is to appoint a negotiation team with no conflict of interests.
  - The PAG engage an independent crane expert to conduct an assessment of the material condition and life expectancy of the POLA cranes and an “as is” valuation assessment to determine the range of fair and reasonable value and provide reports to the Governor and Legislative Speaker.
  - The BOD review the acquisition terms and ratify them by a majority vote. If the majority vote is to ratify, the terms of the acquisition will be transmitted to the Public Utilities Commission (PUC) for review and disposition.
  - The PUC is to complete its review in a timely manner.

- While the PUC is conducting its review, the crane owners will continue to maintain the cranes.
- Along with procuring cranes, PAG is to acquire a Performance Management Contract (PMC) for the performance operation and maintenance of the acquired cranes pursuant to the Guam Procurement Act.

The PAG engaged the engineering firm of Casper, Phillips and Associates to conduct the condition assessment of the cranes and to provide a valuation assessment. Casper, Phillips recommended that PAG only purchase POLA cranes 16 and 17.<sup>1</sup> Casper, Phillips also recommended that PAG pay no more than \$8.5M for POLA cranes 16 and 17, in order to have sufficient funds to meet the repair requirements for the two cranes which they estimated to be approximately \$5.5M. Repair costs for all three POLA cranes were projected to be \$9M.

The PAG Negotiation Team met regularly for several months which resulted in the Final Sales Agreement and Final Interim Maintenance Agreement. During these meetings, the Negotiation Team gathered and reviewed data, records, and information from several sources, including financials from Matson/Horizon, investment records, data from previous solicitations, and condition reports from experts. The Negotiation Team analyzed numerous factors and considerations, including but not limited to:

- Price comparisons of new cranes (at \$9.7M each) and used cranes (at \$4.5M)
- Limited financial resources (\$14M approved loan)
- Debt-ceiling mandate (\$54.5M)
- Operational impacts and wharf space requirements
- Owner's operation and maintenance cost
- PAG's operation and maintenance cost upon acquisition
- Reconciliation of Owner's initial investment records
- Owner's crane surcharge of \$125 per container
- Investment recovery and debt service payments

On May 15, 2012, the PAG Board of Directors, at a special board meeting, ratified the terms set forth in the *Agreement for the Sale of Guam Cranes and Spare Parts*, and the *Interim Agreement for Crane Maintenance*. The Board likewise approved the proposed crane surcharge fee recommended

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<sup>1</sup> Casper, Phillips and Associates *Draft Final Crane Valuation Report for Potential Direct Purchase of Matson-Horizon POLA Cranes #16 and #17* dated December 15, 2011. CP&A #09011

by management to fund the debt service, repairs and maintenance of POLA cranes and establish a sinking fund to properly plan for a replacement crane down the line. The proposed crane surcharge fee may be up to \$125.00 for loaded containers and \$5.00 per ton for non-containerized cargos. Subsequent to this petition, there will be a request for PUC approval of PAG authority to assess such a surcharge.

On May 18, 2012 PAG petitioned the PUC<sup>2</sup>, pursuant to the PUC approved Contract Review Protocol for the Port Authority of Guam, to review and approve the Agreement for the Sale of Guam Cranes and Spare Parts, and the Interim Agreement for Crane Maintenance.

Based upon this request from PAG, the PUC Chairman contacted Slater, Nakamura and Co, LLC to perform a review of the request. The authority to proceed with the investigation was provided on or about June 26, 2012. The specifics of the Statement of Work (SOW) are provided in the next section.

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<sup>2</sup> Port Authority of Guam Petition of Sales Agreement dated May 18, 2012



### 3.0 DISCUSSION OF THE INVESTIGATION APPROACH

*This section discusses the approach that was used to conduct the investigation.*

#### INVESTIGATION BACKGROUND

As part of the steps performed in the review of the request by PAG to purchase the three POLA cranes, the Guam Public Utilities Commission (PUC) in its oversight role for the Government of Guam is required to review and dispose of PAG’s request to purchase two or more cranes in a timely manner.

Based upon the direction provided by the PUC Chairman, a Statement of Work (SOW) was developed to reflect the tasks and sub-tasks required to execute this investigation.

There were three areas that drove the decision for a more comprehensive review by the PUC regarding the request. These were: the cost of the purchase and refurbishment of the cranes exceeds the budget, the capacity requirements were not understood and the Total Cost of Ownership (TCO) was not considered as part of the analysis by the PAG investigation committee.

#### The cost appears to exceed the budget

The proposed purchase of the three POLA cranes, along with the maintenance needs identified by Casper, Phillips and Associates exceed the \$14.5 M PAG budget for the procurement. The full cost of the purchase of the three POLA cranes from Matson/Horizon, including the recommended required immediate maintenance and painting costs, would be:

**Figure 3: Summary of the total acquisition and repair costs for POLA cranes 14, 16 and 17**

	Acquisition costs	Critical repairs	Initial repair parts	Paint crane	Total
Crane 14	\$4,000,000	\$21,000	\$200,000	\$1,300,000	\$5,521,000
Crane 16	\$4,000,000	\$25,600	\$200,000	\$1,300,000	\$5,525,600
Crane 17	\$4,000,000	\$21,000	\$200,000	\$1,300,000	\$5,521,000
<b>Total cost</b>					<b>\$16,567,600</b>

The PAG crane consultant, Casper Phillips, stated that the \$1 M painting job plus a \$300,000 roll back cost for each crane is required to be performed within the next two years<sup>3</sup>. They further stated that the other items listed in

<sup>3</sup> Email from PAG CFO dated July 7, 2012

their report can be completed as part of the ongoing maintenance cycle for the three cranes.

The analysis of the potential purchase did not discuss the throughput requirements of the port. Given that the projected military buildup will occur at a slower pace and in a smaller scope than originally forecast, the purchase of two cranes may be sufficient to service the projected throughput requirements.

#### **The cargo capacity requirements are not understood**

Matson / Horizon purchased the POLA cranes in anticipation of a marked increase in the cargo throughput on Guam due to the anticipated planned military buildup. By agreement with PAG, Matson / Horizon restricted the use of these cranes to Matson/ Horizon vessels only. The purchase gave Matson / Horizon a business advantage over other shipping lines if the plan military build-up had occurred. Given that the three cranes were purchased to meet increased throughput caused by the planned military buildup and that the buildup will not occur at the previously anticipated level, the question of how many cranes PAG needs to support its current and projected demands should to be analyzed, evaluated and considered.

#### **The Total Cost of Ownership is not reflected in the review**

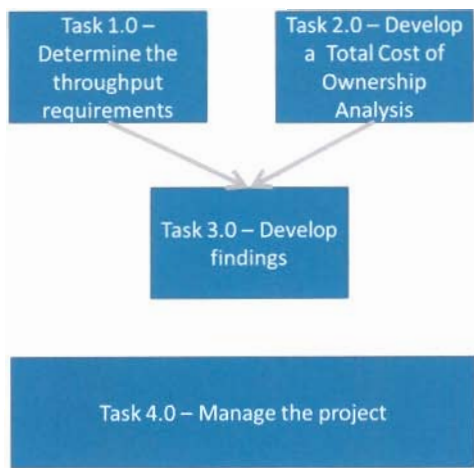
The analysis did not review the Total Cost of Ownership (TCO). TCO is a financial estimate intended to help managers determine direct and indirect costs of a product or system. TCO, when incorporated in any financial benefit analysis, provides a cost basis for determining the total economic value of an investment. A TCO analysis includes the total cost of acquisition and operating costs over a period of time. TCO directly relates to an enterprise's asset and/or related system's total costs across all projects and processes, thus giving a clear picture of the project costs over time and an "apples to apples" comparison of alternatives.

Given these planning parameters, a Statement of Work (SOW) was developed. The relationship between the elements of the SOW is shown in the figure below:



STATEMENT OF WORK

Figure 4: SOW elements relationship map



**Task 1.0 - Determine the required throughput capacity for the PAG**

The purpose of this task is to determine the number of cranes required by the PAG to meet its current and projected throughput requirements. The challenge in this task will be to determine the number of cranes that will be required to meet the surge, represented by the military build-up in Guam, while not creating excess capacity that will incur unnecessary costs in the non-surge years.

The subtasks within this task are:

**Subtask 1.1 - Determine the required throughput capacity based upon the budget projections from PAG.** There are a number of studies that were conducted by Parsons-Brinkerhoff related to the throughput capacity for the PAG. These studies were the basis for the development of the current Port tariff. The review of the documentation will be used to develop a model for capacity requirements.

**Subtask 1.2 - Determine the capabilities of the cranes to offload cargo.** The current cranes have a capacity to offload cargo. This capacity will be compared to the requirements to determine if the proposed purchase will meet the throughput capacity requirements.



**Subtask 1.3 - Model options (normal work day, extended work day, extended work week) to create a high/low crane capacity model.** In this subtask, an analysis will be conducted to determine if changes to the business rules for the PAG will be able to increase capacity thus limiting the number of cranes that are required to meet the throughput capacity requirements.

## **Task 2.0 - Develop a Total Cost of Ownership (TCO) for crane purchases**

In this task, we will examine, for a 15 year period, the TCO for three options:

- Purchase the existing Matson / Horizon (POLA) cranes
- Purchase other used cranes
- Purchase new cranes

**Subtask 2.1 – Conduct market research.** In this subtask, we will draw upon a marine crane expert to define the availability and costs of cranes that will meet the capabilities of the POLA cranes. The market research will examine both new and used cranes. Along with the cost of procuring the cranes, other costs, such as transportation, and commissioning will be included.

**Subtask 2.2 - Determine cost of POLA cranes including upgrades.** In this subtask, we will determine the cost of restoring the POLA cranes to the status recommended by the PAG's crane consultants.

**Subtask 2.3 – Determine the TCO for the POLA cranes.** This will include regular maintenance, upgrades based upon the age of the cranes and an estimate of the life expectancy of the cranes once the upgrades are completed.

**Subtask 2.4 – Determine the TCO for other used cranes.** In this comparison, we will conduct research with 3 potential crane vendors to determine if two or more cranes with the same capacity / capability of the POLA cranes are available. If suitable cranes are identified, the cost of transportation and upgrades will be included in the TCO analysis along with the other TCO factors in Subtask 2.3.

**Subtask 2.5 – Determine the TCO for new cranes.** In this subtask, we will conduct research with 3 potential crane vendors to determine the cost of two new cranes with the same capacity / capability of the POLA cranes. If suitable cranes are identified, the cost of transportation and commissioning will be included in the TCO analysis along with the other TCO factors in Subtask 2.3.

### **Task 3.0 – Develop findings**

The purpose of this task will be to compile and present the report to the PUC. The report will present draft findings to the PUC for review and approval. Once approved, the report will be considered final. The report will recommend the crane replacement order that has the lowest TCO.

### **Task 4.0 – Manage the project**

This task includes the review of the materials provided by the PUC, development of clarification questions after the review of the documentation, participation of the team members in weekly status calls, development of documentation related to project management such as hours and billing, coordination with the PUC ALJ and, execution of other project related tasks.

## 4.0 CAPACITY REQUIREMENTS ANALYSIS SECTION

*This section presents the results of the analysis directed by the SOW for capacity requirements.*

### PAG CAPACITY REQUIREMENTS ANALYSIS

The PAG capacity requirements analysis will be used to estimate the number of cranes that are required to support the projected requirements of PAG. Given the expense of maintaining a gantry crane on an annual basis, estimated by the PAG’s consulting engineers to be in excess of \$600,000 per crane per year, a greater number of cranes than those required to meet capacity will result in an adverse business-cost impact.

The four cranes that could, potentially, be acquired by PAG (the three POLA cranes from Matson / Horizon and Crane 3 from American President Lines and Sea-Land Services, Inc.) are:

- POLA crane 14
- POLA crane 16
- POLA crane 17
- Crane 3. This crane will become property of PAG once two or more gantry cranes are acquired, regardless of the source.

The questions addressed by this analysis were:

- What is the number of container lifts, per year, for inbound and outbound loaded container traffic?
- What are the Service Level Agreements (SLA’s) for PAG to offload or onload containers for the shipping lines that service Guam?
- How many containers must be offloaded per hour to achieve the SLA’s?
- What is the offload / on load capacity of each crane?
- Are there periods where multiple container ships are pier side, thereby stretching the capacity of the cranes?

PAG provided documentation on the number of containers that were handled by the port from FY03 to FY12. This table is presented in Appendix A.

With regards to the other questions:

**Figure 5: Capacity requirements questions and PAG response**

Capacity Question	PAG response
What are the Service Level Agreements (SLA’s) for PAG to offload or on load containers for the shipping lines that service Guam?	There is no established SLA. This means that the Port does not have a requirement to meet for cargo on-loads / off-loads. The basic requirement is “as fast as possible”



Capacity Question	PAG response
How many containers must be offloaded per hour to achieve the SLA’s?	There is no established SLA. See above
What is the offload / on load capacity of each crane?	There is no established capacity. The limiting factors for the number of containers that can be moved per crane are a function of the crane’s capacity, the crane operator’s skill level and weather conditions. To achieve an estimated number, we used the PAG scorecard for crane operators. This scorecard provides the most current data for container movements at PAG.
Are there periods where multiple container ships are pier side, thereby stretching the capacity of the cranes?	Based upon an analysis of the reported ship arrivals and departures data from the PAG website for the period January 2012 to June 2012, there was one incident where two container ships were pier side at the same time.

ASSUMPTIONS

Capacity requirements

- The capacity analysis will not consider break-bulk cargo requirements since the cranes being considered for purchase do not support break-bulk operations.
- The through-put projections will be based upon the numbers provided by PAG and are reflected in Appendix A. For sensitivity analysis, the baseline will be evaluated using standard deviations. For this study, two standard deviations were used.
- The numbers provided for gantry crane container moves per hour by the manufacturer will be considered correct.
- Cargo demand will grow at a rate of 1% per year. This is based upon the growth of cargo over the period from FY03 to FY12 as reported by PAG.
- The classes of vessels that will be offloading cargo at PAG will remain consistent for 15 years.
- Crane operations, during normal periods, will be available for 22 hours of operations per day, 5 days per week.<sup>4</sup>

<sup>4</sup> Data provided by PAG via email dated July 18, 2012

- Cranes will be in maintenance and not available for operation one week of each quarter for a total of four weeks per year.
- There is a sufficient pool of qualified crane operators to allow continuous operations.
- The design of cargo ships that may call on Guam in the future, such as ships that are both container and roll on / roll off (RO / RO), will not be considered.
- The number of ship visits will remain at the same level as documented during the period January 2012 to June 2012.<sup>5</sup>

## ANALYSIS APPROACH

The steps in the analysis were:

- Determined the average number of containers that were moved from FY03 to FY12. The average or mean was 90,803 containers per year.
- Determined the standard deviation for the population of containers that were moved from FY03 to FY12. The standard deviation was 7,536 containers per year.
- Created a chart that showed the projected number of container moves assuming the mean as the starting point and an increase of 1% of containers per year. See Appendix A.
- Included the standard deviation above and below this mean to provide a range of potential cargo moves. These numbers were also accelerated by 1% per year. See Appendix A.
- Determined the average number of containers that could be moved in one hour based upon the PAG container scorecard. This was 22 containers per hour.
- Analyzed the number of containers that can be moved using PAG's current work schedule. This is 19.5 hours of crane operations per day (two shifts, 11 hours per shift minus 1 hour for lunch and 15 minutes for a break), 5 days per week.
- Analyzed options for crane operations to include:
  - 4 cranes operating at 4,485 hours per year per crane. This number was derived by taking 52 weeks per year, 5 days per week, 19.5 hours per day and then subtracting out 195 hours for GovGuam holidays and 600<sup>67</sup> hours for maintenance.

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<sup>5</sup> Data of ship visits was based upon a review of the ship arrivals and departures on the PAG website. The data is shown in Appendix A.

<sup>6</sup> Port of Miami Crane management uses a planning factor of .5% to 1% crane downtime. These hours represent an 8% per annum crane down time. [www.cranemgt.com](http://www.cranemgt.com)

- 3 cranes operating at 4,485 hours per year per crane. This number was derived by taking 52 weeks per year, 5 days per week, 19.5 hours per day and then subtracting out 195 hours for GovGuam holidays and 600 hours for maintenance.
- Evaluated the number of ships calling on Guam to determine if there were frequent periods of overlap that would justify additional cranes.

### Capacity Analysis

As noted above, the capacity analysis, which is evaluated using an aggregate model, was conducted to determine if the number of lifts that either three or four cranes achieved the required throughput to meet the projected PAG cargo needs.

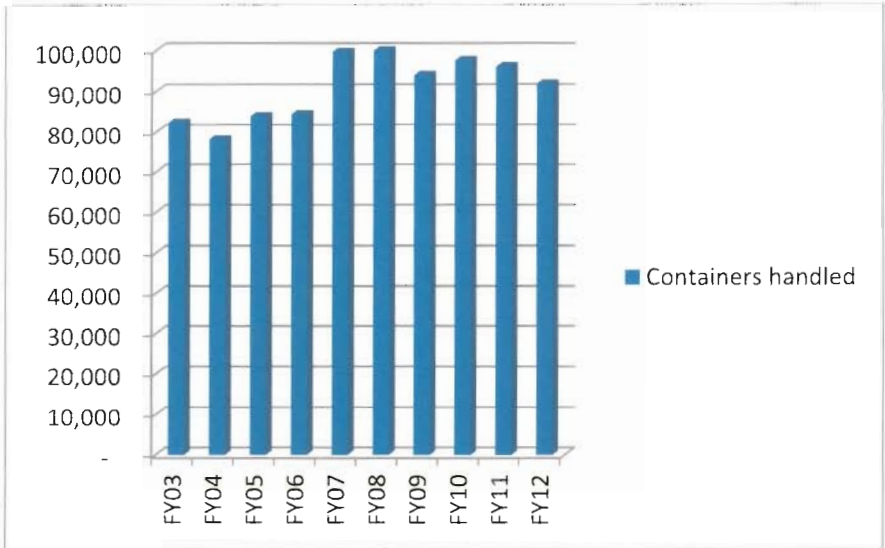
Based upon an analysis of the historical throughput of containers through PAG from FY03 to FY12, a model can be created to forecast the projected growth and to create a range of potential outcomes. This model is shown in Appendix A.

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<sup>7</sup> The draft Parsons-Brinkerhoff report on crane maintenance assumed 526 hours per crane per year

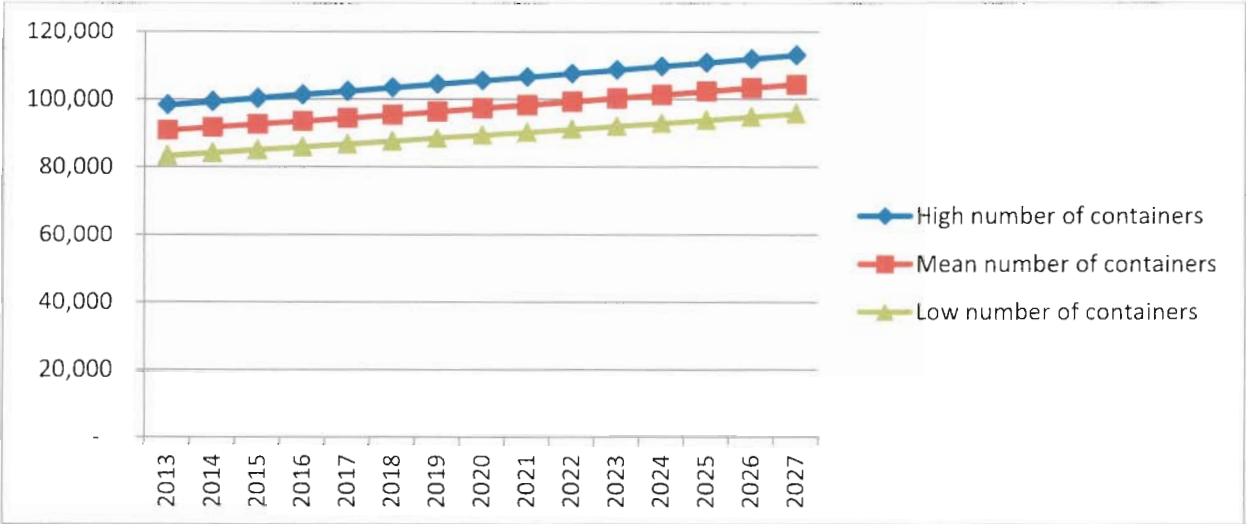


Figure 6: Containers handled by PAG from FY03 to FY12



Using this as a basis for defining the population, the standard deviation can be developed. Using this standard deviation and assuming a growth of cargo throughput of 1% per year, a model for the high, mean and low number of containers that will be handled by PAG can be created. See Appendix A for more details.

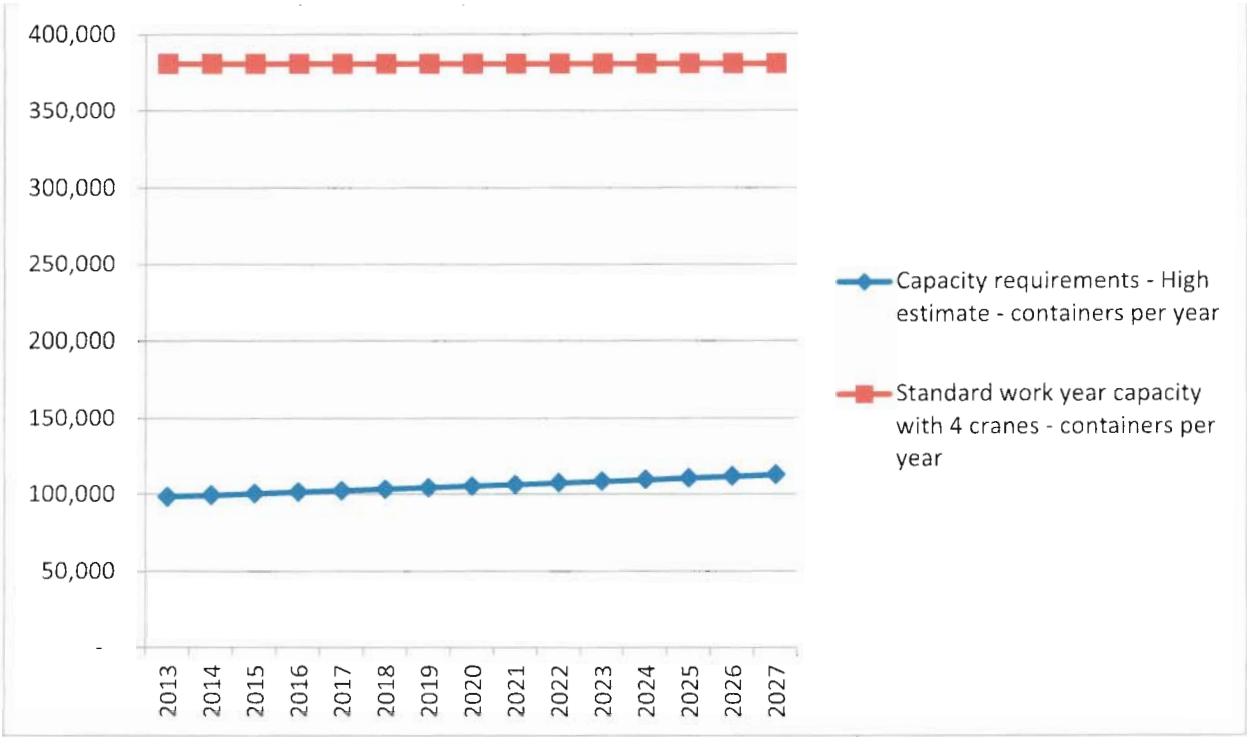
Figure 7: Forecast for the number of containers for FY13 to FY27



The available capacity versus demand for four cranes, assuming the capacity requirements are one standard deviation above the mean, shows that there

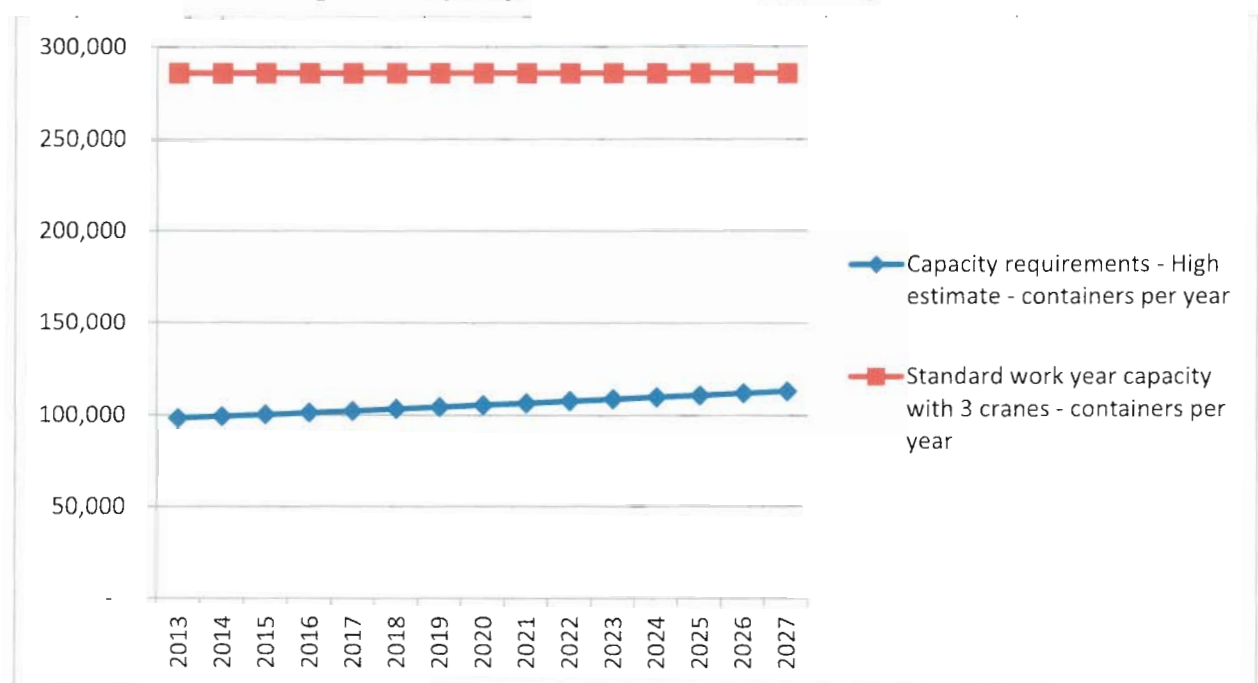
is excess capacity ranging from 287% in FY13 to 237% in FY27. See Appendix A and Figure 8.

Figure 8: Capacity versus demand – 4 crane operations



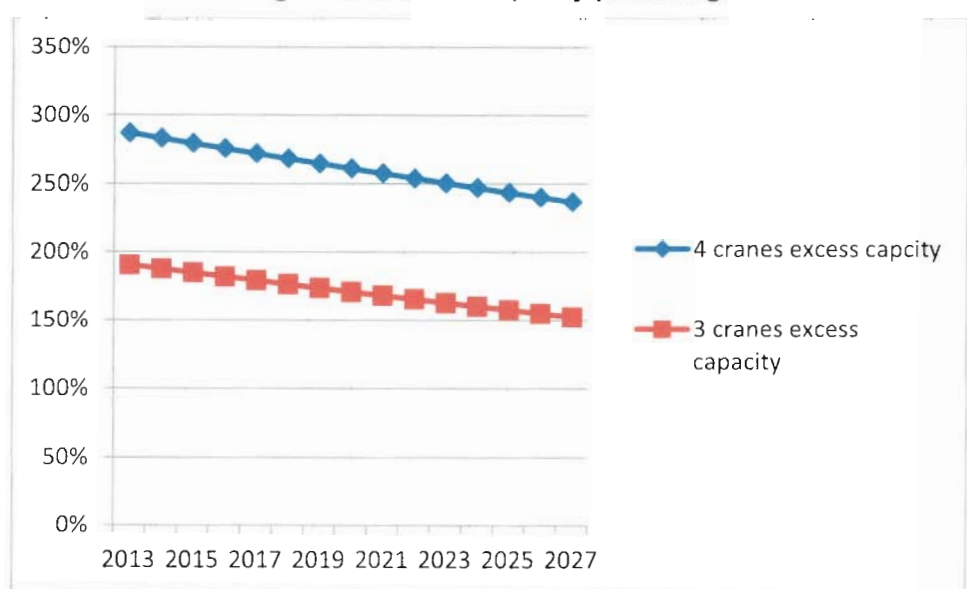
Using the second alternative, the available capacity versus demand for three cranes, assuming the capacity requirements are one standard deviation above the mean, shows that there is excess capacity ranging from 190% in FY13 to 153% in FY27. See Appendix A and Figure 9.

Figure 9: Capacity versus demand – 3 crane operations



A comparison of the excess capacity of both the three and four crane options is shown below. In the most basic view, PAG has the ability to double or triple its throughput of containers.

Figure 10: Excess capacity percentage



There is no known rule related to the recommended crane capacity a port should maintain.

As a real world test, when Matson / Horizon purchased and installed the three POLA cranes at PAG, it was assumed that there would be a significant increase in the cargo throughput in the harbor. If three cranes could have handled the projected throughput requirements for the military buildup, common sense would indicate that three cranes can also handle the reduced cargo demands.

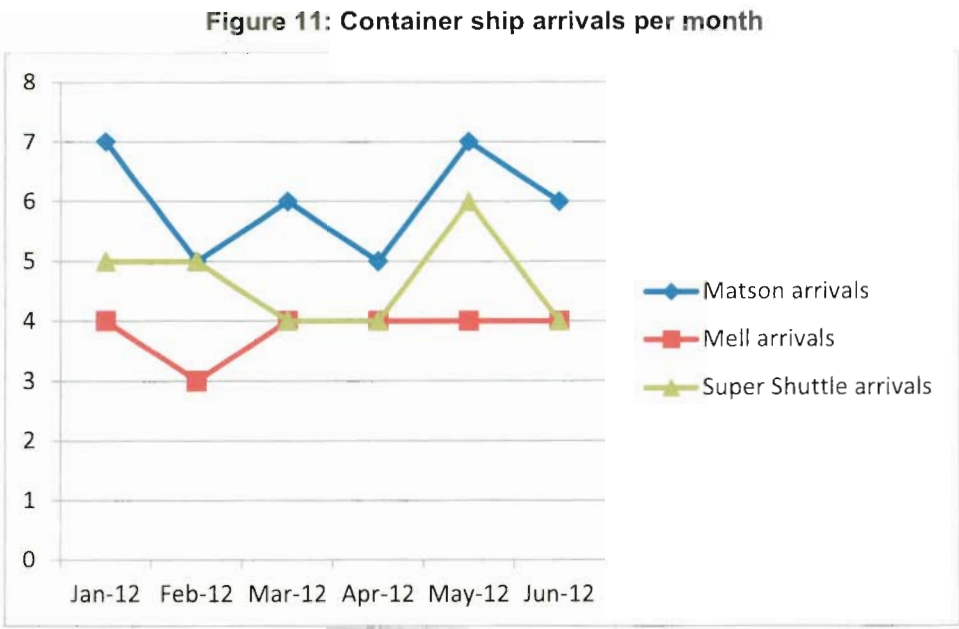
### **Impact on Port Operations**

Since the number of cranes could impact the amount of time vessels stay in port, evaluating the number of cranes that are available based upon the number of vessels that are in port is important.

During the period of January 2012 to June 2012, PAG had a total of 58 container ships call on Guam. This period was chosen for evaluation since it reflects the first six months since Horizon quit servicing Guam. Some facts during this period include:

- 59 container ships called at the Port of which 36 were Matson owned ships. The other 23 vessels are operated by the Mariana Express Shipping Line (MELL)
- Container vessels were planned to be pier side a total of 1,677 hours.
- The inter-island vessel, Super Shuttle, received and transferred cargo 27 times during the same six month period. The average in port stay for the Super Shuttle was 15 hours. The median stay was 11 hours.

The number of container ships that visited, by month, is shown in the following figure:



Crane load

Parsons-Brinkerhoff collected data related to the hours of operations, on average, per month, for each crane in use for container operations. These are shown in the figure below.

Figure 12: Crane engine hours and hoist hours per month<sup>8</sup>

Crane	Engine hours	Hoist hours
Typical crane	468	208
Crane 14	128	27
Crane 16	283	89
Crane 17	287	81
Crane 3	135	35

In the aggregate, the table shows that the cranes are being lightly used, which can lead to the conclusion that, despite their age, they will continue to

<sup>8</sup> Parsons-Brinkerhoff Draft report on crane maintenance costs



meet the needs of PAG until replacement is necessitated by changes in the maritime industry.

The table also can be used to confirm that three, not four, cranes would meet the needs of PAG. By only using three cranes, PAG will be able to reduce its overall operating expenses.

### **SUMMARY OF ANALYSIS**

As part of their business planning, PAG must decide if it requires and can afford to operate four cranes based upon the forecast demand.

By not purchasing one of the POLA cranes, PAG will still acquire Crane 3 and will save \$4M in acquisition costs alone. This savings will allow PAG to address the maintenance requirements in the two POLA cranes that it does purchase without exceeding the budget.

Based upon the analysis, it is determined that:

- Three operational cranes will give PAG excess capacity ranging from 190% in FY13 to 153% in FY27.
- Four operational cranes will give PAG excess capacity ranging from 280% in FY13 to 230% in FY27.



## 5.0 TOTAL COST OF OWNERSHIP ANALYSIS SECTION

*The Analysis Section presents the results of the analysis directed by the SOW.*

### TCO ANALYSIS OVERVIEW

The Total Cost of Ownership analysis was used to determine the estimated costs to acquire, operate and maintain capital investments for their projected life.

TCO is a financial estimate intended to help managers determine direct and indirect costs of a product or system. TCO, when incorporated in any financial benefit analysis, provides a cost basis for determining the total economic value of an investment. TCO directly relates to an enterprise's asset and/or related system's total costs across all projects and processes, thus giving a picture of the acquisition and operating costs over time.

The analysis sheets are shown in Appendix B. Given the nature of the TCO analysis, some assumptions of costs were made which were based upon industry best practices or rules of thumb.

### OVERVIEW OF CRANE OPTIONS

As part of the SOW, market research was conducted for both new and available used cranes that would meet or exceed the current capability of the POLA cranes in Guam.

The firm, Liftech, was added to the team to support this review. Liftech is a recognized firm with deep expertise in the area of marine cranes. In fact, they have conducted studies related to the POLA cranes in the past.

#### Used cranes market research

##### Background

The existing rail gage at Guam is 50 ft. The terminal has no high voltage power for cranes. The three existing Hitachi cranes at Guam were originally built in 1983-84 and moved to Guam in 2009.

The following used cranes are available or may be available for sale soon:

- Virginia Port Authority (VPA) has up to three 1987 vintage Kone cranes (VPA Kone) at a \$1M per crane asking price, and up to three 2004 vintage ZPMC truss boom cranes (VPA ZPMC) at a \$2M per crane asking price. These cranes have a 50 foot gage. See Figure 13 for dimensions.
- Port of Los Angeles (POLA) has two 1983-84 vintage Hitachi cranes (POLA Hitachi), although the sale is contingent upon YTI releasing the cranes. POLA has not named the crane price but appears to be motivated. These cranes also have a 50 foot gage. See Figure 13 for dimensions.

There may be other used cranes available in Asia. Some of them are 70’s vintage. Information on other cranes is not readily available. Many of these cranes are reportedly worn and not appropriate for consideration. The limited useful life and high maintenance costs would likely not justify the purchase.

**Geometry**

The available POLA Hitachi cranes are nearly identical to the 1983 vintage Guam existing Hitachi cranes (Matson / Horizon) except they are reported to have relatively new drives. The VPA cranes are bigger and heavier than the existing Hitachi cranes (see Figure 13). The VPA Kone cranes are quite a bit taller and both the VPA Kone and VPA ZPMC cranes have significantly longer outreaches, so wheel loads will likely be an issue, especially for the stowed wind. Liftech did not compare the wheel loads, nor check the wharf capacity for the heavier cranes.

The POLA Hitachi cranes are powered by high voltage cables in the wharf and are assumed nearly identical to the Matson / Horizon cranes prior to the 2009 modifications and relocation. The VPA cranes are powered by diesel. Any crane brought to Guam will require diesel generators on board.

Figure 13: Comparable used cranes

		Comparable used cranes		
	Guam existing Hitachi 1983	POLA Hitachi 1983	VPA Kone 1987	VPA ZPMC 2004
Outreach (ft)	120	120	151	157
Gage (ft)	50	50	50	50
Back reach (ft)	50	50	64	50
Lift height (ft)	93	93	114	98
Rated load (LT)	40	40	40	40

From a structural standpoint, the comparable used cranes would need reinforcing for the Guam winds. Although the VPA cranes are designed for higher storm wind loads than POLA winds, they are larger and the extent of reinforcing is expected to be in the same ballpark as what was done for the Matson / Horizon cranes. Although Virginia has a hurricane coastline, the



design wind speed is much closer to that at POLA than that at Guam. Liftech did not confirm costs with a contractor.

The potential used cranes will need to be modified at the existing locations. The modification costs do not include possible port usage fees.

Greg Nordholm, a crane transport contractor, estimates that the cost for relocating two cranes from VPA to Guam, through the Panama Canal will be \$6 M to \$7 M—we have assumed \$6.6M. Similarly, Mr. Nordholm estimates the cost of relocating two cranes from POLA to Guam will be \$5 M to \$5.5 M—we have assumed \$5.2 M. Engineering costs are usually for a project, independent of the number of cranes, so the cost per crane is higher for fewer cranes. Liftech expects that the engineering for the POLA cranes in Guam may be largely re-used for the POLA Hitachi cranes, unless changes due to the passage of time, such as for new codes, are required—as such, we have assumed 40% of what was used previously. The costs may be higher or lower, depending on the condition and what needs to be done structurally, mechanically, and electrically.

### **Other Considerations**

The VPA Kone cranes are nearly the same vintage (1987) as the Matson / Horizon Hitachi cranes (1983), so without a condition survey to rely on, we have assumed the condition to be similar to that of the POLA Hitachi cranes except for the retrofit. These cranes may require maintenance and other expenditures in the near future similar to those projected for the Matson / Horizon Hitachi cranes. These costs are likely in addition to the costs shown above. The VPA ZPMC cranes (\$2 M each) are much newer (2004) and may have lower initial maintenance costs. Staff costs and day-to-day maintenance for the ZPMC cranes is assumed to be the same as the PAG projections for the POLA cranes. However, for the ZPMC cranes upgrades and major maintenance costs are assumed to be approximately 50% of what is projected by Parsons Brinckerhoff for the POLA cranes.

The YTI Hitachi cranes are the same vintage as the POLA Hitachi cranes. Based upon this, Liftech expects that most upcoming retrofit costs needed for POLA Hitachi cranes will also be required for the YTI Hitachi cranes except for the drives.

It is possible that the existing diesel engines on the VPA cranes may not meet current EPA Tier requirements, which may add costs. Liftech did not confirm the EPA Tier requirements or if they would need to be met in Guam for a relocated crane.

Costs for possible wharf reinforcement associated with the VPA cranes are unknown, but could be significant if the crane wheel loads exceed the wharf allowable loads. A wheel load study will be required. Liftech also suggested



a wheel load study for the YTI Hitachi cranes if Guam has adopted a new ASCE 7 wind standard, from what was used for the earlier purchase.

### New cranes

Liftech provided a technical specification for new cranes to the Port Authority of Guam (PAG) in 2006. The port received bids for one or two cranes from three suppliers. The low price was over \$10 M per crane, including spare parts. The specified cranes were larger than the Existing Hitachi cranes. We have made adjustments accordingly.

Liftech received correspondence from John Limtiaco, of Far East Equipment Co., an agent for ZPMC and from Kalmar (Cargotec) related to the costs of the purchase of new cranes.

For new cranes, the wharf girders will likely not need reinforcement, since the crane size and design can often be selected to meet the existing allowable loads. Minor costs for crane-wharf interface hardware may be needed.

## ASSUMPTIONS

### TCO analysis overall

- The Total Cost of Ownership will extend for a 15 year period.
- TCO calculations will not include Net Present Value calculations.
- Estimates for maintenance and repair costs from third party sources will be considered to be accurate.
- Estimates for operating costs from third party sources will be considered to be accurate.
- Scrap value for cranes at the end of their service will not be considered in the TCO calculations nor will any cost of demolition.
- Future operating costs, aside from financing costs, will accelerate at the rate of 3.1% as established by PAG in its TCO analysis.
- Insurance costs for the new and other used cranes are based on their cost in proportion to the PAG's projected insurance cost the Matson/Horizon cranes.
- The financing cost interest rate is 6.52% per annum fully amortized over a 15 year period.
- Fuel consumption is based on figures provided by PAG for POLA cranes.
- All 3 cranes can be transported on one vessel.
- Installation and minor pier retrofits can be accomplished for \$512,407 per crane.

- New cranes and the 2004 ZPMC cranes will require similar day-to-day maintenance but significantly less major maintenance and upgrades over the 15 year period than the older cranes.
- Other used cranes will require upgrades for Guam wind loads.

#### **TCO analysis – Matson / Horizon POLA cranes (Crane 14, 16 & 17)**

- Acquisition costs – Negotiated price is \$4,000,000 each including existing spare parts. Parsons had recommended purchasing \$200,000 in additional spare parts and investing \$150,000 in setting up the parts room. With the addition of the \$350,000 for the parts and parts room modification, total acquisition cost is \$12,350,000.
- Repair costs – Repair costs were estimated at \$9 million by Casper, Phillips & Associates. Parsons Brinckerhoff (PB) has prepared a draft maintenance program which includes funds for immediate repairs and long-term maintenance. PB has indicated that the maintenance program will address the repairs identified by Casper, Phillips that are necessary.
- Shipping costs – None, cranes are currently located at PAG.
- Pier upgrades / repairs to support crane – None required.
- Training costs – None, the port staff is already trained on these cranes.
- Operating expenses – Over a 15 year period, operating costs are estimated to be \$63,072,545 for the three cranes.

#### **TCO analysis – New cranes manufactured by ZPMC**

- These cranes will be built, as close as possible, to the current characteristics of the existing POLA cranes.
- The acquisition cost of the ZPMC cranes is \$8,000,000 each as quoted by ZPMC's Guam representative.
- Repair costs – No repair costs are required since the cranes are new.
- Shipping costs are included in the cost of the ZPMC cranes.
- Pier upgrades / repairs to support crane – An estimated \$512,407 would be required per crane for installation. The cost of other pier upgrades is unknown.
- Initial requirements costs – Includes an initial spare parts inventory in the amount of \$133,333 per crane, 1/3rd of the cost of building and outfitting a spare parts room, procurement costs which include one FTE including travel based upon the GovGuam rates which would be required to support the construction of the crane and the training of the team for a period of two years. We assumed monthly trips for one person.
- Fuel expenses – Fuel costs are the same as those used by PAG in their TCO analysis.



- Annual maintenance – Costs are assumed to be ½ (because the cranes are new) of the annual maintenance costs specified in Section 1.3 of the draft Parsons Brinckerhoff Initial Maintenance Budget report for STS Cranes for July 30 PUC Hearing, plus the \$10 K specified for lubricants in Section 1.2 of the report, plus \$112,500 (1/4th of the \$450,000 project maintenance cost specified in Section 1.5 of the report.
- Upgrades and major maintenance – No major maintenance would be required for five years due to the warranty on the new cranes and the fact that the cranes are new. After five years, the cost of routine maintenance would be 20% of the cost of the annual maintenance of the new cranes.
- Financing costs – Financing costs are based on 6.52% annual interest, full amortization of the loan in 15 years and the financing of 100% of the total acquisition costs.
- Insurance – Will be prorated to match the costs of insurance for the POLA cranes.

### **TCO analysis – New cranes manufactured by Kalmar**

- These cranes will be built, as close as possible, to the current characteristics of the existing POLA cranes.
- The acquisition cost of the Kalmar cranes is \$8,500,000 each as quoted by Cargotec to Liftech.
- Repair costs – No repair costs are required since the cranes are new.
- Shipping costs of the Kalmar cranes are an additional \$500,000 per crane.
- Pier upgrades / repairs to support crane – An estimated \$512,407 would be required per crane for installation. The costs of other pier upgrades are unknown.
- Initial requirements costs – Includes an initial spare parts inventory in the amount of \$133,333 per crane, 1/3rd of the cost of building and outfitting a spare parts a parts room, procurement costs which include one FTE including travel based upon the GovGuam rates which would be required to support the construction of the crane and the training of the team for a period of two years. We assumed monthly trips for one person.
- Fuel expenses – Fuel costs are the same as was used by PAG in their TCO analysis.
- Annual maintenance – Costs are assumed to be ½ (because the cranes are new) of the annual maintenance costs specified in Section 1.3 of the draft Parsons Brinckerhoff Initial Maintenance Budget report for STS Cranes for July 30 PUC Hearing, plus the \$10 K specified for lubricants in Section 1.2 of the report, plus \$112,500 (1/4th of the \$450,000 project maintenance cost specified in Section 1.5 of the report.
- Upgrades and major maintenance – No major maintenance would be required for five years due to the warranty on the new cranes and the fact



that the cranes are new. After five years, the cost of routine maintenance would be 20% of the cost of the annual maintenance of the new cranes.

- **Financing costs** – Financing costs are based on 6.52% annual interest, full amortization of the loan in 15 years and the financing of 100% of the total acquisition costs.
- **Insurance** – Will be prorated to match the costs of insurance for the POLA cranes.

#### **TCO analysis – Used cranes manufactured by ZPMC available from Virginia Port Authority (VPA)**

- **Acquisition costs** – Acquisition costs including retrofits (wind reinforcing, painting and engineering), transportation, installation, parts and training is estimated to be \$23,750,000.
- **Repair costs** – The ZPMC cranes were built in 2004. It is assumed that they will require day-to-day maintenance at the same level proposed for the existing cranes. However, since these are relatively new cranes, it is assumed that major maintenance and upgrades will not occur on the same schedule as the Matson / Horizon POLA cranes.
- **Shipping costs** – Cost estimates for shipping these cranes from Virginia are \$6.6 million. This estimate assumes that three cranes can be shipped on one vessel.
- **Pier upgrades / repairs to support crane** – The ZPMC cranes are taller and heavier than the POLA cranes. Some pier modification may be required. Costs for pier modifications are unknown at this time. Installation and minor retrofits are estimated at \$600,000 per crane.
- **Training costs** – Training, spare parts and other costs to bring the cranes into service are estimated at \$800,000. It is assumed that prior to installation staff will need to travel to Virginia and obtain training for operation and maintenance.
- **Operating expenses** - Over a 15 year period, operating costs (including maintenance) are estimated to be \$45,977,399 for the three cranes.

#### **TCO analysis – Used cranes manufactured by Kone available from the Virginia Port Authority)**

- **Acquisition costs** – Acquisition costs including retrofits (wind reinforcing, painting and engineering), transportation, installation, parts and training is estimated to be \$21,350,000.
- **Repair costs** – The Kone cranes were built in 1987 and are assumed to be in roughly the same condition as the existing POLA cranes. Day-to-day and long-term maintenance are estimated to be the same as those projected by Parsons Brinckerhoff for the POLA cranes.

- Shipping costs – Cost estimates for shipping these cranes from Virginia are \$6.6 million. This estimate assumes that three cranes can be shipped on one vessel.
- Pier upgrades / repairs to support crane – The Kone cranes are taller and heavier than the POLA cranes. Some pier modification may be required. Costs for pier modifications are unknown at this time. Installation and minor retrofits are estimated at \$600,000 per crane.
- Training costs – Training, spare parts and other costs to bring the cranes into service are estimated at \$800,000. It is assumed that prior to installation staff will need to travel to Virginia and obtain training for operation and maintenance.
- Operating expenses - Over a 15 year period, operating costs (including maintenance) are estimated to be \$59,961,163 for the three cranes.

**TCO analysis – Used cranes manufactured by Hitachi Available from Port of Los Angeles (Only 2 cranes available)**

- Acquisition costs – Acquisition costs including retrofits (wind reinforcing, painting and engineering), transportation, installation, parts and training is estimated to be \$15,750,000.
- Repair costs – These cranes are virtually identical to the POLA cranes and would likely require similar maintenance and repairs.
- Shipping costs – Cost estimates for shipping these cranes from Los Angeles are \$5.2 million.
- Pier upgrades / repairs to support crane – none anticipated.
- Training costs – No training should be required.
- Operating expenses - Over a 15 year period, operating costs (including maintenance) are estimated to be \$37,955,134 for the two cranes.

**TCO ANALYSIS FOR ACQUIRING THE MATSON / HORIZON POLA CRANES 14, 16 AND 17**

The TCO analysis for the acquisition of the Matson / Horizon cranes 14, 16 and 17 is based on an acquisition cost of \$4,000,000 per crane plus \$350,000 for additional spare parts and part room setup. The total acquisition cost is comprised of the following costs:

Figure 14: Summary of Acquisition Costs for POLA Cranes

Costs title	Estimated cost
Negotiated cost	\$4,000,000
Inventory of spare parts& Parts room	\$350,000



setup	
Total acquisition costs	\$4,350,000

The total acquisition cost for cranes 14, 16 and 17 is \$12,350,000 which assumes that needed maintenance is deferred.

The total operating costs developed for the TCO period for each of the POLA cranes is \$18,694,698 as is detailed in Appendix B and below:

Figure 15: Summary of Operating Costs for POLA Cranes

Operations cost title	Estimated cost for 15 years per crane
Fuel	\$1,413,038
Annual maintenance	\$6,993,258
Insurance	\$953,561
Upgrades and major maintenance	\$6,988,469
Financing expenses	\$2,346,372
Total operating cost per POLA crane for 15 years	\$18,694,698

The total operating costs for the Matson / Horizon used POLA cranes is, therefore \$56,084,095.

The TCO for the Matson / Horizon used POLA cranes is the total of the acquisition costs, \$12,350,000 plus the total operating costs for the TCO period, \$56,084,095, for a TCO of \$68,434,095.

TCO ANALYSIS FOR ACQUIRING THREE NEW CRANES – ZPMC CRANES

There are operational advantages to purchasing new cranes for PAG. The cranes will be built to PAG specifications, the cranes will comply with local OSHA requirements and the need to modify the cranes to meet Guam’s unique environmental conditions will be part of the cost of manufacturing. Finally, the cost to operate the cranes in their early years will be less than operating used cranes regardless of the source.

However, there are also disadvantages to buying new cranes. The delivery schedule is approximately 2 years. Once the cranes arrive in Guam, there would be a large number of cranes on the pier which could cause management issues. The initial cost is substantially higher than a used crane.



The TCO analysis for the acquisition of new cranes is based on an acquisition cost of \$9,195,740 per crane. This total acquisition cost is comprised of the following costs:

Figure 16: Summary of acquisition costs for new ZPMC cranes

Costs title	Estimated cost
Acquisition costs	\$24,000,000
Shipping (incl. in acquisition costs)	\$0
Initial requirements costs (procurement costs, spare parts and training)	\$2,049,999
Installation including pier improvements	\$1,537,221
Upgrades / maintenance required prior to acquisition	\$0
Total acquisition costs	\$27,587,220

The total acquisition cost for three new ZPMC cranes is \$27,587,220.

The total 15 year operating costs developed for the TCO period for each of the proposed new ZPMC cranes is \$16,736,458 as is detailed in Appendix B and below:

Figure 17: Summary of operating costs for ZPMC cranes

Operations cost title	Estimated operating expenses
Fuel	\$1,413,038
Annual maintenance	\$6,993,258
Insurance	\$2,118,087
Upgrades and major maintenance	\$970,752
Financing expenses	\$5,241,322
Total operating cost per POLA crane for 15 years	\$16,736,458

The total operating costs for the three new ZPMC cranes is therefore, \$50,209,373.

TCO ANALYSIS FOR ACQUIRING THREE NEW CRANES – KALMAR  
CRANES

Figure 18: Summary of acquisition costs for Kalmar cranes	
Costs title	Estimated cost
Acquisition costs	\$25,500,000
Shipping	\$1,500,000
Initial requirements costs (procurement costs, spare parts inventory, and training)	\$2,049,999
Installation including pier improvements	\$1,537,221
Upgrades / maintenance required prior to acquisition	\$0
Total acquisition costs	\$30,587,220

The total acquisition cost for three new Kalmar cranes is \$30,587,220. The total 15 year operating costs developed for the TCO period for each of the proposed new Kalmar cranes is \$17,525,641 as detailed in Appendix B and below:

Figure 19: Summary of operating costs for Kalmar cranes	
Operations cost title	Estimated operating expenses
Fuel	\$1,413,038
Annual maintenance	\$6,993,258
Insurance	\$2,337,296
Upgrades and major maintenance	\$970,752
Financing expenses	\$5,811,296
Total operating cost per POLA crane for 15 years	\$17,525,641

The total operating costs for all three of the new Kalmar cranes is, therefore \$52,576,923

TCO ANALYSIS FOR ACQUIRING THREE USED CRANES –ZPMC CRANES – VPA

The price of used cranes can vary widely based upon the needs of the buyer. Given the cost of procuring used cranes, they provide a reasonable alternative to the procurement of either the existing POLA cranes or new cranes.

However, used cranes will have substantial costs in modifications to comply with Guam environmental requirements along with the cost of shipping cranes to Guam.

As part of our review, we identified used cranes that are available at Virginia Port Authority (VPA). VPA has three ZPMC cranes and three Kone cranes available.

The characteristics of the ZPMC cranes are:

Figure 20: Summary of used crane characteristics

Crane characteristics	
Manufacturer	ZPMC
Year built	2004
Includes initial spare parts	None
Current status	Available
Location	VPA (Newport News)
Number of cranes available	3
Rail size	50 ‘gage

The advantages of these cranes to PAG are:

- Cranes are significantly newer than POLA cranes (2004 vs. 1984)
- Larger than PAG cranes – capable of working larger vessels
- Likely to have lower major maintenance costs

The disadvantages of these cranes to PAG are:

- Higher initial acquisition and retrofit costs.
- Will require some pier modifications for additional weight and load differentials.
- Will required time to acquire, retrofit and ship.
- Will result in additional cranes at PAG until 2014 when the Matson/Horizon agreement expires.



- May result in operational challenges during the transition from POLA cranes to the ZPMC cranes.

The TCO analysis for the acquisition of the ZPMC used cranes is based on an acquisition cost of \$2,000,000 per crane. The total acquisition cost for three cranes is comprised of the following costs:

Figure 21: Summary of acquisition costs for used cranes

Costs title	Estimated cost
Acquisition costs	\$6,000,000
Shipping	\$6,600,000
Initial logistics requirements (parts and training)	\$800,000
Installation including pier improvements	\$1,800,000
Upgrades / maintenance required prior to acquisition	\$8,550,000
Total acquisition costs	\$23,750,000

The total acquisition cost for three used cranes is \$23,750,000.

The total operating costs developed for the TCO period for each of the used cranes is \$15,523,975 as is detailed in Appendix B and below:

Figure 22: Summary of operating costs for used cranes

Operations cost title	Estimated cost for 15 years per crane
Fuel	\$4,239,114
Annual maintenance	\$20,979,775
Insurance	\$3,852,295
Upgrades and major maintenance	\$3,849,934
Financing expenses	\$13,650,807
Total operating cost	\$46,571,925

The total operating costs for the ZPMC cranes is, therefore \$46,571,925.

**TCO ANALYSIS FOR ACQUIRING THREE USED CRANES –KONE CRANES – VPA**

The characteristics of the Kone cranes which are also available at VPA are as follows:

Figure 23: Summary of used crane characteristics

Crane characteristics	
Manufacturer	Kone
Type of crane	Gantry
Year built	1987
Includes initial spare parts	Unknown
Current status	Available
Location	VPA – Newport News
Number of cranes available	3
Rail Size	50’ gage

The advantages of these cranes to PAG are:

- Crane is larger than the POLA cranes and would provide more flexibility in servicing larger vessels in the future.

The disadvantages of these cranes to PAG are:

- Higher retrofit costs.
- Will require some pier modifications for additional weight and load differentials.
- Will required time to acquire, retrofit and ship.
- Will result in additional cranes at PAG until 2014 when the Matson/Horizon agreement expires.
- May result in operational challenges during the transition from POLA cranes to the ZPMC cranes.

The TCO analysis for the acquisition of these used cranes is based on an acquisition cost of \$1,000,000 per crane. This total acquisition cost is comprised of the following costs:

Figure 24: Summary of acquisition costs for used cranes

Costs title	Estimated cost
Acquisition costs	\$3,000,000
Shipping	\$6,600,000
Initial logistics requirements (parts and training)	\$800,000
Installation including pier improvements	\$1,800,000
Upgrades / maintenance required prior to acquisition	\$9,150,000
Total acquisition costs	\$21,350,000

The total acquisition cost for three used cranes is \$21,350,000.

The total operating costs developed for the TCO period for each of the used cranes is \$19,987,054. The total estimated operating cost for the three Kone cranes is detailed in Appendix B and below:

Figure 25: Summary of operating costs for used cranes

Operations cost title	Estimated cost for 15 years per crane
Fuel	\$4,239,114
Annual maintenance	\$20,979,775
Insurance	\$3,209,731
Upgrades and major maintenance	\$19,249,668
Financing expenses	\$12,282,875
Total operating cost for 15 years	\$59,961,163

TCO ANALYSIS FOR ACQUIRING TWO USED CRANES –HITACHI CRANES – POLA

The characteristics of the Hitachi cranes are:



Figure 26: Summary of used crane characteristics

Crane characteristics	
Manufacturer	Hitachi
Type of crane	Gantry
Year built	1983/84
Includes initial spare parts	Unknown
Current status	Available (with release from YTI)
Location	Los Angeles
Number of cranes available	2
Rail Size	Identical to existing POLA cranes

The advantages of these cranes to PAG are:

- Cranes are identical to existing POLA cranes, therefore:
  - Parts are interchangeable.
  - No training is required for operation or maintenance.

The disadvantages of these cranes to PAG are:

- Will required time to acquire, retrofit and ship.
- Will result in additional cranes at PAG until 2014 when the Matson/Horizon agreement expires.
- May result in operational challenges during the transition from POLA cranes to the Hitachi cranes.

The TCO analysis for the acquisition of these used cranes is based on an acquisition cost of \$200,000 per crane. This total acquisition cost is comprised of the following costs:

Figure 27: Summary of acquisition costs for used cranes

Costs title	Estimated cost
Acquisition costs	\$400,000
Shipping	\$5,200,000
Initial logistics requirements (parts and training)	\$550,000
Installation including pier improvements	\$1,200,000
Upgrades / maintenance required prior	\$8,400,000

Costs title	Estimated cost
to acquisition	
Total acquisition costs	\$15,750,000

The total acquisition cost for two used cranes is \$15,750,000.

The total operating costs developed for the TCO period for each of the used cranes is \$18,977,567. The total estimated operating cost for the two Hitachi cranes is detailed in Appendix B and below:

Figure 28: Summary of operating costs for used cranes

Operations cost title	Estimated cost for 15 years per crane
Fuel	\$2,826,076
Annual maintenance	\$13,986,517
Insurance	\$2,324,743
Upgrades and major maintenance	\$12,833,112
Financing expenses	\$5,984,686
Total operating cost for 15 years	\$37,955,134

SUMMARY OF ANALYSIS

In the following table is the cost of acquisition and TCO for the various options:

Figure 29: Summary of TCO by crane options

Crane option	Acquisition costs	Operating costs	TCO for 15 years
POLA cranes 14,16,17	\$12,350,000	\$56,084,095	\$68,434,095
VPA used ZPMC Cranes <sup>9</sup>	\$23,750,000	\$46,571,925	\$70,321,925
New ZPMC Cranes* <sup>10</sup>	\$27,587,220	\$50,209,373	\$77,796,593
POLA Hitachi Cranes (only 2 available) <sup>11</sup>	\$15,750,000	\$37,955,134	**\$53,705,134
VPA used Kone Cranes*	\$21,350,000	\$59,961,163	\$81,311,163
New Kalmar Cranes*	\$30,587,220	\$52,576,923	\$83,164,143

The PAG has a number of factors which appear to limit their options in the acquisition of cranes.

- They have a budget of \$14.5 M and a lending cap established by the legislature which limits their ability to spend significant dollars up front.
- PAG has current agreements with Matson/Horizon relative to the POLA cranes which do not expire until 2014. These agreements will make the transition to cranes other than the POLA cranes more difficult. Under these agreements Matson/Horizon are entitled to use the existing POLA cranes and collect the crane fees through 2014. PAG would potentially be paying for the acquisition of other cranes without having the ability to use them on the Matson ships.
- New cranes will take two years for delivery so the timing might work well with the terms of the Matson/Horizon agreement. PAG also has piers which may not support heavier and taller cranes. Therefore, additional engineering analysis is required and additional costs may be incurred in the installation of other cranes. Pier renovation costs, if any, have not been included in the TCO analysis.

<sup>9</sup> Costs for pier modifications, if any, are unknown at this time and would increase the total cost for these cranes if modifications are required.

<sup>10</sup> Costs for pier modifications, if any, are unknown at this time and would increase the total cost for these cranes if modifications are required.

<sup>11</sup> This TCO is \$26,852,567 per crane. As a comparison to the other options, three of these cranes would result in a TCO of \$80,557,701.



Operational cost data was requested from the Virginia Port Authority for the used cranes they have available. At the time of the writing of this report, that data was not available. Therefore, the cost estimates which are most reliable are likely those provided by the PAG for the POLA cranes. Those cost estimates were relied on by the consultants in formulating the cost estimates for the other crane acquisition options.

Based upon the analysis, it is determined that:

- The only option which meets the PAG's budget of \$14.5 M for upfront costs is the acquisition of the POLA cranes which can only be achieved if required maintenance is deferred.
- The lowest TCO is also the acquisition of the existing POLA cranes.
  - However, the TCO for the used ZPMC cranes is relatively close to the POLA cranes and the ZPMC cranes are substantially newer (20 years) and would have fewer mechanical and maintenance issues and a longer life expectancy.
- Acquiring newer cranes would result in lower long-term operational costs.

## 6.0 FINDINGS

*The Findings section discusses the facts that can be derived from the analysis.*

Based upon the analysis in Sections 4 and 5, we reached the following findings:

### Findings

- PAG finances
  - PAG has allocated \$14.5 M for the purchase of cranes.
  - Purchasing the three POLA cranes and deferring needed maintenance to future years will meet the PAG budget of \$14.5 M.
    - PAG needs to include the cost of demolition of Crane 2 in its costs. Based upon historical numbers, this could be as much as \$500 K.
- Capacity throughput requirements
  - Acquisition of two POLA cranes (three cranes total) can meet the annual capacity demands for PAG.
  - Acquisition of three cranes will provide substantial excess capacity. This could result in a need to increase fees per container to cover operational and acquisition costs.
  - There is no known plan to bring larger ships to Guam which would drive the need for larger cranes.
- Total cost of ownership
  - The lowest acquisition cost identified is for the purchase of the POLA cranes 14, 16 and 17.
  - The lowest Total Cost of Ownership (TCO) is for the acquisition of the POLA cranes 14, 16 and 17.
    - The TCO for the acquisition of the VPA's ZPMC cranes is slightly more than the TCO for the POLA cranes – but these cranes are 20 years newer than the POLA cranes.
  - The acquisition of new or newer cranes will result in lower long-term operational costs and will provide more flexibility for servicing larger vessels in the future.

### Other considerations:

- The value of the used cranes in the marine industry appears to be an asking price with the caveat "or best offer". As noted in the acquisition of the POLA cranes by Matson / Horizon, the cranes actually sold for \$50 K per crane. Given that the VPA cranes may fall into the same category, if they could be

acquired for \$100 K, the TCO for this option would be less than acquiring the POLA cranes 14, 16 and 17.

- It was noted in another report that Crane 3 is in better material condition than the three POLA cranes.
- Only by deferring maintenance on the three POLA cranes is it possible to acquire the cranes within the PAG's budget
- Although the capacity analysis clearly indicates that PAG could support the volume of goods with a total of 3 cranes (2 POLA cranes plus Crane #3), the PAG has indicated that four cranes are needed. They have stated that they need 3 cranes to offload the Matson vessels and a fourth crane to service inter-island vessels when the Matson vessel is in port. Although there is no requirement to use three cranes on the Matson vessel, the use of more cranes allows the vessel to be unloaded more quickly. Since the daily costs of operation on large container vessels are extremely high (\$100 K - \$200 K/day depending on the vessel) it is clear why Matson would prefer to use three cranes. If PAG acquires three cranes it will be absorbing the cost of additional idle cranes and will need to adjust rates appropriately to recover those costs. If PAG acquires only two cranes, Matson will likely pass on costs for the additional time spent in port to the shippers (and ultimately Guam consumers).



## 7.0 RECOMMENDATIONS

*The Recommendations section provides the recommendations to the Guam PUC related to the purchase of the POLA cranes.*

Based upon the investigation of the supporting documents, we recommend that:

### Recommendations

- The PUC authorize the PAG's acquisition of POLA cranes 14, 16 and 17.
- The PUC direct the PAG to repair POLA cranes 14, 16 and 17 and Crane 3 to meet the recommendations called for in the PAG crane consultant report.
- The PUC authorize the PAG to fund the demolition for Crane 2 out of the \$14.5 M in funding.
- The PUC direct the PAG to develop a tariff recommendation, based upon the estimated throughput, that will fully fund the acquisition, financing, maintenance and ultimate replacement of POLA cranes 14, 16 and 17 and Crane 3 within 15 years.
- PAG develop a more accurate projection for cargo throughput that can be used to forecast revenues from tariffs.
- PAG consider placing one crane in layup pending an increase in cargo throughput demand.

8.0 ADDITIONAL ITEMS / AREAS OF RISK

*This section discusses other items that were reviewed as part of the investigation along with areas of risk for PAG in the execution of the recommendations.*

This section consists of two parts. The first is the comments regarding the justification that was used by the Negotiation Team to support the purchase of three cranes from Matson / Horizon. The second is a table of risks for the proposed acquisition along with proposed mitigation steps.

Comments on Investigation Team conclusions

It is not the intent of this investigation to be critical of the work that was performed by others in developing the justification for the acquisition of cranes as directed by the Guam Legislature. However, the factors that were used in the development of the justification should be reviewed to reflect an outside opinion as part of oversight by the PUC.

Figure 30: Review of PAG Investigation Team conclusions

PAG Investigation Team determination	PUC Consultants comments
NEW cranes at approximately \$9.7 M each will exceed the expected loan proceeds of \$14 M	The cost of new cranes that was referenced was based upon prior crane replacement solicitations. The specifications for the cranes in the solicitation exceeded the current specifications for POLA #14, #16 and #17. As a result, this figure does not represent a like basis comparison. As part of this review, market research was conducted based upon the current specifications of the POLA cranes.
USED cranes at approximately \$4.5 M each does not seem logical since the cranes currently in place are valued at \$4 M	The existing POLA cranes also have a considerable amount of required maintenance that was neglected during the Matson / Horizon ownership. This maintenance, which is part of the Total Cost of Ownership assessment, was considered as part of the review.

PAG Investigation Team determination	PUC Consultants comments
NEW or USED cranes will require additional cost for installation of new tie-downs or retrofitting the existing tie-downs and additional inventory requirement of parts and materials	This additional cost is as a result of a code change. Given that the POLA cranes are already in operation on Guam, they have been granted an exemption from the code change. This exemption may be removed in the future.
Purchasing two (2) new cranes will result in operational impact and management challenges to available wharf space and structural integrity. The additional new cranes would result in having seven (7) cranes at the wharf for a certain period while transitioning, commissioning and during the demolition process.	No comment
Matson / Horizon initial investment totaled approximately \$19 M. It was expected that the owner's investment would retire during the 5-year rail lease period, factored with forecast increased cargo volume from military buildup and surcharge recovery fees.	The success of the Matson / Horizon investment should not be the concern of the Government of Guam.
Matson / Horizon’s annual cost of operations and maintenance of the POLA Cranes and the unexpected decrease in cargo volumes due to the slowdown of the military buildup have resulted in annual deficits.	The success of the Matson / Horizon investment should not be the concern of the Government of Guam. It should not be a factor in contract negotiations.
Upon acquisition of the POLA cranes, PAG enables the ability to utilize such cranes to service	No comment



PAG Investigation Team determination	PUC Consultants comments
international vessels.	
Upon acquisition of the POLA cranes, the Matson / Horizon current surcharge of \$125 to consumers will cease; thus, allowing PAG to make tariff adjustments for crane investment recovery.	While this is true, PAG has requested that the tariff continue in order to support the cost of purchasing and maintaining the cranes.
The negotiated price of \$12 M for the three POLA cranes is \$7 M less than the initial investment made by Matson / Horizon and includes ownership of the existing Gantry 3.	<p>The success of the Matson / Horizon investment should not be the concern of the Government of Guam.</p> <p>Regardless of which cranes are purchased, Gantry Crane 3 will become the property of PAG upon the completion of the purchase</p>

### High Level Risk Assessment

With any acquisition, there is risk to the organization that is making the purchase. Some of the high level risks for this purchase are:

Figure 31: High level Risk Assessment

Risk	Discussion	Risk Level
The cargo throughput will be less than the forecast amount	<p>This will result in even greater excess crane capacity for the Port and less revenues to support the crane acquisitions.</p> <p>Given the unpredictability of the cargo throughput requirements, PAG will need to monitor this closely. Using historical data and the standard deviation for the population of containers; the PAG container handling requirements vary by almost 16,000 containers per year.</p>	High

Risk	Discussion	Risk Level
	<p>Assuming 100,000 containers per year; this represents almost two months of work that would either be required or that might not be required.</p> <p>While it is possible to work overtime to compensate for more work than was forecast; it is challenging under Civil service laws to rapidly adapt a workforce to periods of demand decline.</p>	
The cranes will require greater than forecast maintenance	<p>During a call with the PAG crane consultant staff, it was noted that the environmental conditions on Guam are some of the harshest in the world for cranes.</p> <p>Given that the cranes have not been properly maintained during their time on Guam, as documented by the PAG crane consultant, it is imperative that a preventative maintenance program be fully funded and executed.</p> <p>The cost of maintenance should be reviewed annually and forecasted out for at least two years to determine if the tariff in place will fulfill the funding requirements</p>	Medium
The cargo throughput may exceed the forecasted amount	<p>Given the excess capacity based upon the forecast, the impact on PAG should be minimal even if the number of vessels calling on Guam doubles over the next 15 years</p>	Low
PAG is not able to fully fund the debt and maintain the cranes	<p>PAG will need to create a tariff funding model that will fund the debt, replacement costs for the cranes and the ongoing</p>	Medium

Risk	Discussion	Risk Level
	<p>maintenance.</p> <p>This will need to be reviewed annually to determine if adjustments to the tariff are required.</p>	



APPENDIX A – THROUGHPUT REQUIREMENTS

This appendix compares the projected throughput for PAG for the 15 years of performance of the cranes.

Figure 32 illustrates the data on the number of containers that were offloaded or on loaded onto ships within the Port’s facilities from FY03 to FY12.

Figure 32: Containers handled – FY03 to FY12<sup>12</sup>

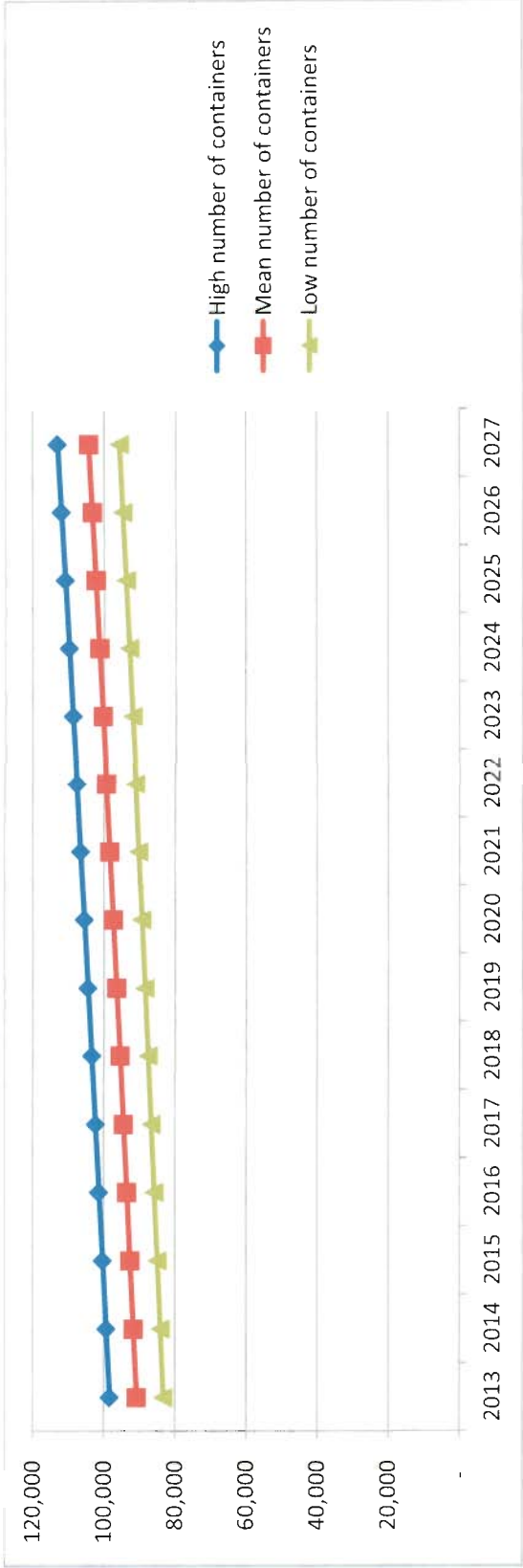


<sup>12</sup> Data was provided by PAG

Figure 33 depicts the forecast container capacity requirements. This figure was created using the following calculations and assumptions:

- Determining the average number of containers that were moved from FY03 to FY12. The average or mean was 90,803 containers.
- Determining the standard deviation for population of containers that were moved from FY03 to FY12. The standard deviation was 7,536 containers.
- Creating a chart that showed the projected number of container moves assuming the mean as the starting point and an increase of 1% of containers per year.
- Including the standard deviation above and below this mean to provide a range of potential cargo moves. These numbers were also accelerated by 1% per year.

Figure 33: Forecasted containers to be handled – FY13 to FY27



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
High number of containers	98,339	99,322	100,315	101,318	102,332	103,355	104,389	105,432	106,487	107,552	108,627	109,713	110,811	111,919	113,038
Mean number of containers	90,803	91,711	92,628	93,554	94,490	95,435	96,389	97,353	98,327	99,310	100,303	101,306	102,319	103,342	104,376
Low number of containers	83,267	84,100	84,941	85,790	86,648	87,515	88,390	89,274	90,167	91,068	91,979	92,899	93,828	94,766	95,714

Using the requirements in the previous figure, we then calculated the number of containers that could be moved using four cranes or three cranes while working a normal workday for PAG. We did this through the following steps

- Determined the average number of containers that could be moved in one hour based upon the PAG container scorecard. This was 22 containers per hour<sup>13</sup>.
- Analyzed the number of containers that can be moved using PAG's current work schedule. This is 19.5 hours of crane operations per day (two shifts, 11 hours per shift minus 1 hour for lunch and 15 minutes for a break), 5 days per week.
- Analyzed options for crane operations to include:
  - 4 cranes operating at 4,485 hours per year per crane. This number was derived by taking 52 weeks per year, 5 days per week, 19.5 hours per day and then subtracting out 195 hours for GovGuam holidays and 390<sup>14</sup> hours for maintenance (5 days of maintenance per quarter).
  - 3 cranes operating at 4,485 hours per year per crane. This number was derived by taking 52 weeks per year, 5 days per week, 19.5 hours per day and then subtracting out 195 hours for GovGuam holidays and 390 hours for maintenance (5 days of maintenance per quarter).

Figure 34 presents the estimated capacity associated with the operation of four cranes.

<sup>13</sup> Based upon the PAG Top Gun statistics for FY11

<sup>14</sup> Port of Miami Crane management uses a planning factor of .5% to 1% crane downtime. These hours represent an 8% per annum crane down time. [www.cranemgt.com](http://www.cranemgt.com)



Figure 34: Crane handling capacity – Four crane operations

	Hours			No of cranes	Avg no of containers per hour	Total lifts per year
	Potential hours of operation	Assumed maintenance hours	Total available hours			
<b>POLA 14,16,17 and Crane 3</b>						
Total potential hours - two 11 hour shifts - 5 days per week - discounting Gov Guam holidays and maintenance	4,485	160	4,325	4	22	380,600

Figure 35 presents the estimated capacity associated with the operation of three cranes.

Figure 35: Crane handling capacity – Three crane operations

	Hours			No of cranes	Avg no of containers per hour	Total lifts per year
	Potential hours of operation	Assumed maintenance hours	Total available hours			
<b>POLA 16,17 and Crane 3</b>						
Total potential hours - two 11 hour shifts - 5 days per week - discounting Gov Guam holidays and maintenance	4,485	160	4,325	3	22	285,450

Using this data, we calculated the crane capacity needed to handle the forecast number of containers for two options.

In creating the forecast, we assumed that the required number of moves would be equal to the forecast “high container” moves estimate. This assumption was used to provide a maximum demand scenario. Based on those assumptions and calculations, Figure 36 shows the range of the potential number of containers that could be moved in a year versus the projected demand for a four crane operation.

Figure 36: Crane handling capacity – Four crane operations

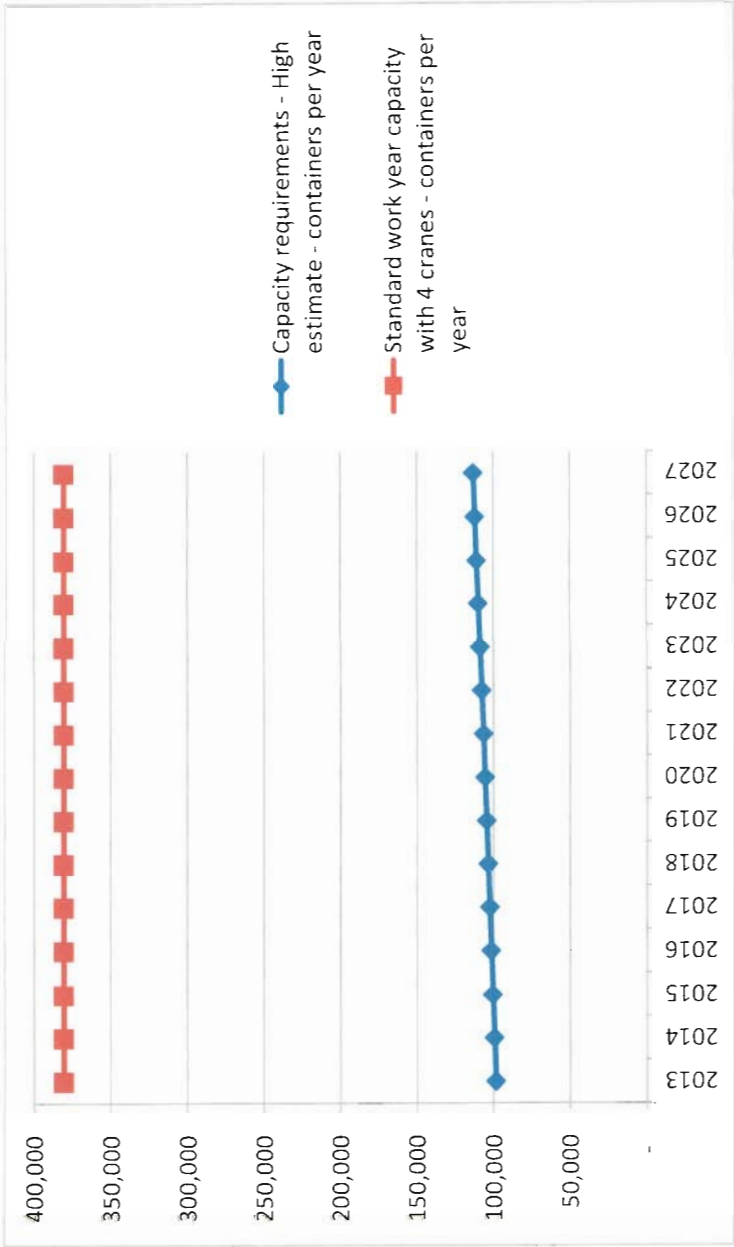


Figure 37: Excess capacity with four cranes

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capacity requirements - High estimate - containers per year	98,339	99,322	100,315	101,318	102,332	103,355	104,389	105,432	106,487	107,552	108,627	109,713	110,811	111,919	113,038
Standard work year capacity with 4 cranes - containers per year	380,600	380,600	380,600	380,600	380,600	380,600	380,600	380,600	380,600	380,600	380,600	380,600	380,600	380,600	380,600
Excess capacity	387%	383%	379%	376%	372%	368%	365%	361%	357%	354%	350%	347%	343%	340%	337%

Figure 38 shows the range of the potential number of containers that could be moved in a year versus the projected demand for a three crane operation.



Figure 38: Crane handling capacity – Three crane operations

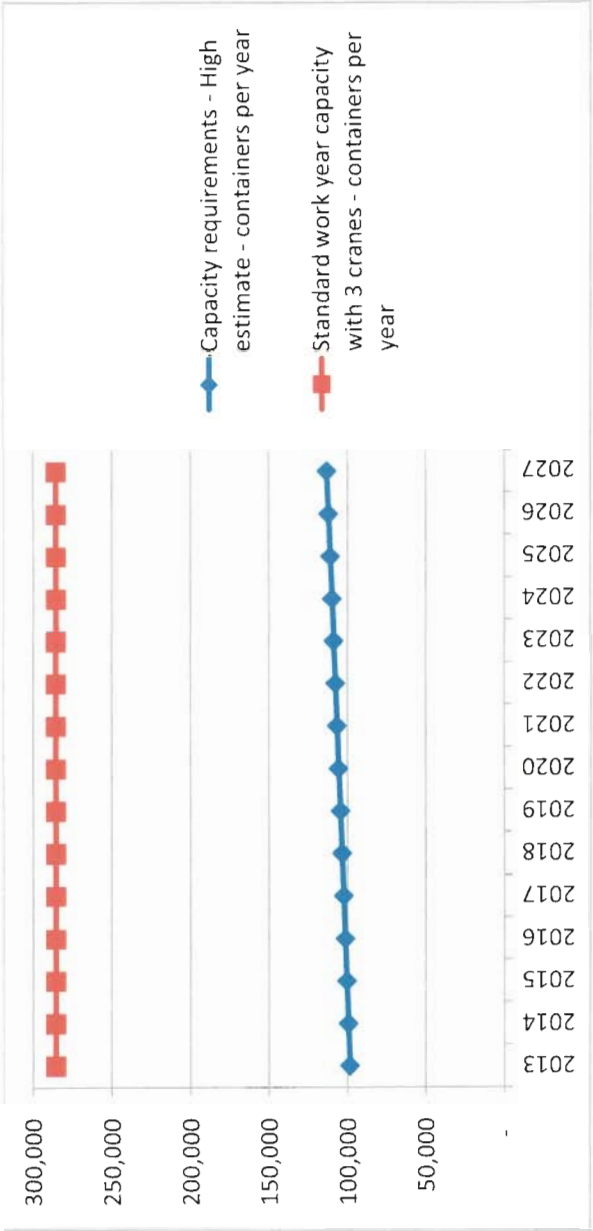
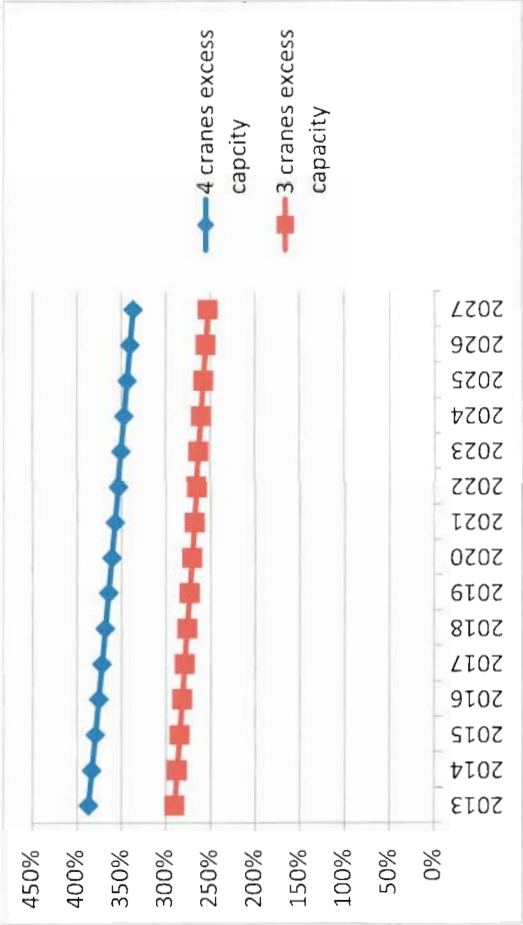


Figure 39: Crane handling capacity – Three crane operations

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capacity requirements - High estimate - containers per year	98,339	99,322	100,315	101,318	102,332	103,355	104,389	105,432	106,487	107,552	108,627	109,713	110,811	111,919	113,038
Standard work year capacity with 3 cranes - containers per year	285,450	285,450	285,450	285,450	285,450	285,450	285,450	285,450	285,450	285,450	285,450	285,450	285,450	285,450	285,450
Excess capacity	290%	287%	285%	282%	279%	276%	273%	271%	268%	265%	263%	260%	258%	255%	253%

A comparison of the excess capacity of both the three and four crane option is shown below. In the most basic view, PAG has the ability to double or triple its throughput of containers.

Figure 40: Excess capacity percentage



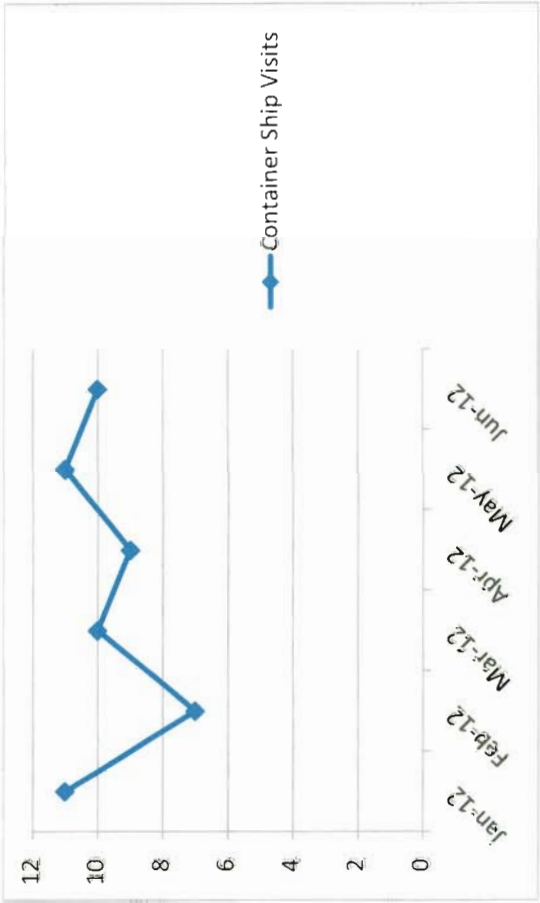
Since the number of cranes could impact the amount of time vessels stay in port, evaluating the number of cranes that are available based upon the number of vessels that are in port is important.

During the period of January 2012 to June 2012, PAG had a total of 58 container ships call on Guam. This period was chosen for evaluation since it reflects the first six months since Horizon quit servicing Guam. Some facts during this period include:

- 58 container ships called at the Port, 35 were Matson owned ships. The other 23 vessels are operated by the Mariana Express Shipping Line (MELL)
- Only on one occasion were two container ships pier side at the same time.
- Container vessels were planned to be pier side a total of 1,167 hours. This represents approximately 44% of the available time that vessels could be pier side.

The number of container ships that visited, by month, is shown in the following figure:

Figure 41: Container ship arrivals per month





APPENDIX B– TCO ANALYSIS

TCO FOR ACQUIRING POLA CRANES 14, 16 AND 17

Figure 42: Summary of POLA Cranes 14, 16, and 17 acquisition costs

	Costs to place in service						Sub-total
	Acquisition costs	Shipping	Initial logistics requirements (parts and training)	Installation including pier improvements	Upgrades / maintenance required prior to acquisition (1)		
MH Cranes (POLA Cranes)							
Crane 14	\$4,000,000				\$350,000		\$4,350,000
Crane 16	\$4,000,000						\$4,000,000
Crane 17	\$4,000,000						\$4,000,000

Figure 43: Summary of POLA Cranes 14, 16, and 17 lifecycle costs

Summary of Lifecycle Costs							Sub -total
	Fuel	Annual maintenance	Insurance	Upgrades / major maintenance	Financing expenses		
MH Cranes (POLA Cranes)							
Crane 14	\$1,413,038	\$6,993,258	\$953,561	\$6,988,469	\$2,346,372		\$18,694,698
Crane 16	\$1,413,038	\$6,993,258	\$953,561	\$6,988,469	\$2,346,372		\$18,694,698
Crane 17	\$1,413,038	\$6,993,258	\$953,561	\$6,988,469	\$2,346,372		\$18,694,698

Figure 44: Summary of POLA Cranes 14, 16, and 17 TCO costs

	Total Acquisition Cost (\$K)	Total Operating Costs (\$K)	TCO total (\$K)
MH Cranes	\$12,350,000	\$56,084,095	\$68,434,095

### TCO FOR ACQUIRING THREE NEW CRANES– ZPMC CRANES

Figure 45: Summary of ZPMC New Crane acquisition costs

Options	Costs to place in service				
	Acquisition costs (1)	Shipping (1)	Initial requirements costs (procurement costs, spare parts and training) (2)	Installation including pier improvements (3)	Upgrades / maintenance required prior to acquisition (4)
New crane: ZPMC					
New Crane 1	\$8,000,000	Included	\$683,333	\$512,407	\$0
New Crane 2	\$8,000,000	Included	\$683,333	\$512,407	\$0
New Crane 3	\$8,000,000	Included	\$683,333	\$512,407	\$0
					\$9,195,740
					\$9,195,740
					\$9,195,740

(1) For ZPMC - Based on the price specified in the July 18, 2012 quotation from the ZPMC representative in Guam. Shipping costs are included in the ZPMC quotation. For Kalmar - Based on costs cited by Liftech in their July 31, 2012 Findings Summary which also cited shipping costs of \$500,000 per crane.

(2) Spare parts in the amount of \$133,333 plus a \$50,000 (1/3rd of \$150,000) cost of building and outfitting a parts room as was mentioned in the Parsons Brinkerhoff Initial Maintenance Budget Report for STS Cranes for 30 July PUC Hearing. Included

in this cost is also \$500,000 of acquisition costs which also cover the cost of on-site construction inspection by PAG personnel (includes salary costs, per-diem, and travel costs). The \$500,000 procurement costs are specified by Liftech in their July 31, 2012 Findings Summary at 5% of the acquisition cost which has been rounded up to \$500,000.

- (3) This cost was specified in PAG's TCO analysis.
- (4) There are no such costs because these are new cranes.

Figure 46: Summary of ZPMC New Crane lifecycle costs

Options	Lifecycle Costs					
	Fuel	Annual maintenance	Insurance	Upgrades / major maintenance	Financing expenses	Sub -total
New crane: ZPMC						
New Crane 1	\$1,413,038	\$6,993,258	\$2,118,087	\$1,000,834	\$5,241,322	\$16,766,540
New Crane 2	\$1,413,038	\$6,993,258	\$2,118,087	\$1,000,834	\$5,241,322	\$16,766,540
New Crane 3	\$1,413,038	\$6,993,258	\$2,118,087	\$1,000,834	\$5,241,322	\$16,766,540

Figure 47: Summary of ZPMC New Crane TCO costs

	Total Acquisition Cost	Total Operating Costs	TCO total
New cranes ZPMC	\$27,587,220	\$50,299,619	\$77,886,839



### TCO FOR ACQUIRING THREE NEW CRANES – KALMAR CRANES

Figure 48: Summary of Kalmar New Crane acquisition costs

	Costs to place in service						
	Acquisition costs (1)	Shipping (1)	Initial requirements costs (procurement costs, spare parts and training) (2)	Installation including pier improvements (3)	Upgrades / maintenance required prior to acquisition (4)	Sub-total	
New Crane: Kalmar							
New Crane 1	\$8,500,000	\$500,000	\$683,333	\$512,407	\$0	\$10,195,740	
New Crane 2	\$8,500,000	\$500,000	\$683,333	\$512,407	\$0	\$10,195,740	
New Crane 3	\$8,500,000	\$500,000	\$683,333	\$512,407	\$0	\$10,195,740	

Figure 49: Summary of Kalmar New Crane lifecycle costs

Lifecycle Costs						Sub -total
	Fuel	Annual maintenance	Insurance	Upgrades / major maintenance	Financing expenses	
New Crane: Kalmar						
New Crane 1	\$1,413,038	\$6,993,258	\$2,337,296	\$1,000,834	\$5,811,296	\$17,555,723
New Crane 2	\$1,413,038	\$6,993,258	\$2,337,296	\$1,000,834	\$5,811,296	\$17,555,723
New Crane 3	\$1,413,038	\$6,993,258	\$2,337,296	\$1,000,834	\$5,811,296	\$17,555,723

Figure 50: Summary of Kalmar New Crane TCO costs

	Total Acquisition Cost	Total Operating Costs	TCO total
New cranes Kalmar	\$30,587,220	\$52,667,169	\$83,254,389

### TCO FOR ACQUIRING THREE USED CRANES – ZPMC CRANES - VPA

Figure 51: Summary of ZPMC Used Crane – VPA - acquisition costs

	Costs to place in service					Sub-total
	Acquisition costs (1)	Shipping (2)	Initial logistics requirements (parts and training) (3)	Installation including pier improvements (4)	Upgrades / maintenance required prior to acquisition	
Used Crane: VPA ZPMC						
ZPMC Crane 1	\$2,000,000	\$6,600,000	\$800,000	\$600,000	\$2,850,000	\$12,850,000
ZPMC Crane 2	\$2,000,000	Inc. Above	Inc. above	\$600,000	\$2,850,000	\$5,450,000
ZPMC Crane 3	\$2,000,000	Inc. Above	Inc. Above	\$600,000	\$2,850,000	\$5,450,000

Figure 52: Summary of ZPMC Used Crane – VPA - lifecycle costs

	Fuel	Annual maintenance	Insurance	Upgrades / major maintenance	Financing expenses	Sub -total
Used Crane: VPA ZPMC						
ZPMC Crane 1	\$1,413,038	\$6,993,258	\$1,284,098	\$1,283,311	\$4,550,269	\$15,523,975
ZPMC Crane 2	\$1,413,038	\$6,993,258	\$1,284,098	\$1,283,311	\$4,550,269	\$15,523,975
ZPMC Crane 3	\$1,413,038	\$6,993,258	\$1,284,098	\$1,283,311	\$4,550,269	\$15,523,975

Figure 53: Summary of ZPMC Used Crane – VPA - TCO costs

	Total Acquisition Cost (\$K)	Total Operating Costs (\$K)	TCO total (\$K)
VPA ZPMC	\$23,750,000	\$46,571,925	\$70,321,925



TCO FOR ACQUIRING THREE USED CRANES – KONE CRANES - VPA

Figure 54: Summary of Kone Used Crane – VPA - acquisition costs

	Costs to place in service					Sub-total
	Acquisition costs (1)	Shipping (2)	Initial logistics requirements (parts and training) (3)	Installation including pier improvements (4)	Upgrades / maintenance required prior to acquisition	
Used Cranes: VPA Kone						
Kone Crane 1	\$1,000,000	\$6,600,000	\$800,000	\$600,000	\$3,050,000	\$12,050,000
Kone Crane 2	\$1,000,000	Inc. Above	Inc. above	\$600,000	\$3,050,000	\$4,650,000
Kone Crane 3	\$1,000,000	Inc. Above	Inc. Above	\$600,000	\$3,050,000	\$4,650,000

Figure 55: Summary of Kone Used Crane – VPA - lifecycle costs

						Sub-total
	Fuel	Annual maintenance	Insurance	Upgrades / major maintenance	Financing expenses	
Used Cranes: VPA Kone						
Kone Crane 1	\$1,413,038	\$6,993,258	\$1,069,910	\$6,416,556	\$4,094,292	\$19,987,054
Kone Crane 2	\$1,413,038	\$6,993,258	\$1,069,910	\$6,416,556	\$4,094,292	\$19,987,054
Kone Crane 3	\$1,413,038	\$6,993,258	\$1,069,910	\$6,416,556	\$4,094,292	\$19,987,054

Figure 56: Summary of Kone Used Crane – VPA - TCO costs

	Total Acquisition Cost (\$K)	Total Operating Costs (\$K)	TCO total (\$K)
VPA Kone		\$21,350,000	\$59,961,163
			\$81,311,163

TCO FOR ACQUIRING THREE USED CRANES – HITACHI CRANES – POLA

Figure 57: Summary of Hitachi Used Crane – POLA - acquisition costs

	Costs to place in service					
	Acquisition costs (1)	Shipping (2)	Initial logistics requirements (parts and training) (3)	Installation including pier improvements (4)	Upgrades / maintenance required prior to acquisition	Sub-total
Used Cranes: POLA Hitachi						
Hitachi 1	\$200,000	\$5,200,000	\$550,000	\$600,000	\$4,200,000	\$10,750,000
Hitachi 2	\$200,000	Inc. Above	Inc. Above	\$600,000	\$4,200,000	\$5,000,000

Figure 58: Summary of Hitachi Used Crane – POLA - lifecycle costs

	Fuel	Annual maintenance	Insurance	Upgrades / major maintenance	Financing expenses	Sub-total
Used Cranes: POLA Hitachi						
Hitachi 1	\$1,413,038	\$6,993,258	\$1,162,372	\$6,416,556	\$2,992,343	\$18,977,567
Hitachi 2	\$1,413,038	\$6,993,258	\$1,162,372	\$6,416,556	\$2,992,343	\$18,977,567

Figure 59: Summary of Hitachi Used Crane – POLA - TCO costs

	Total Acquisition Cost (\$K)	Total Operating Costs (\$K)	TCO total (\$K)
POLA Hitachi ( <b>only 2 cranes</b> )	\$15,750,000	\$37,955,134	\$53,705,134



SUMMARY OF TCO ANALYSIS

Figure 60: Summary of TCO by crane options

Crane option	Acquisition costs	Operating costs	TCO for 15 years
POLA cranes 14,16,17	\$12,350,000	\$56,084,095	\$68,434,095
VPA used ZPMC Cranes <sup>15</sup>	\$23,750,000	\$46,571,925	\$70,321,925
New ZPMC Cranes* <sup>16</sup>	\$27,587,220	\$50,209,373	\$77,796,593
POLA Hitachi Cranes (only 2 available) <sup>17</sup>	\$15,750,000	\$37,955,134	**\$53,705,134
VPA used Kone Cranes*	\$21,350,000	\$59,961,163	\$81,311,163
New Kalmar Cranes*	\$30,587,220	\$52,576,923	\$83,164,143

<sup>15</sup> Costs for pier modifications, if any, are unknown at this time and would increase the total cost for these cranes if modifications are required.

<sup>16</sup> Costs for pier modifications, if any, are unknown at this time and would increase the total cost for these cranes if modifications are required.

<sup>17</sup> This TCO is \$26,852,567 per crane. As a comparison to the other options, three of these cranes would result in a TCO of \$80,557,701.

**APPENDIX C – PAG RESPONSE TO REPORT**

In this section, we have included the PAG response to the draft report. We have discussed the PAG’s concerns with their leadership.

**PUC Consultant’s comments**

In the following table is a summary of PAG’s concerns with the PUC Consultant’s report.

As we stated in our discussions with PAG leadership, we do not presume to comment on operational decisions related to the Port. Since our analysis was based upon information provided by PAG, we believe the numbers are accurate. Where we differ is in the analysis of these numbers.

Figure 61: Summary of PAG issues with PUC Consultant’s Findings and Recommendations

PAG Issue	Response
<p>Providing for sustainable operations that address island organic growth and expanded military presence on Guam requires:</p> <ul style="list-style-type: none"><li>• Off loading two ships simultaneously</li><li>• Offloading cargo within a reasonable timeframe consistent with industry and carrier expectations</li><li>• Capacity to deal with container and break-bulk volumes two to three times current</li><li>• Response capability if crane casualty occurs</li><li>• Crane downtime maintenance capability</li></ul>	<ul style="list-style-type: none"><li>• Records indicate that there have been only a few occasions in recent years where two vessels were berthed simultaneously. Working with carriers on scheduling can usually resolve this issue. PAG assumes that another carrier may service Guam (since Horizon has ceased operations) however, the throughput would not likely increase due to the addition of another carrier, thus it would not likely increase the number of time two ships are in port.</li><li>• The PAG does not currently have SLAs with carriers for offloading times.</li><li>• Requires further throughput analysis to support this contention</li><li>• Mothballing the fourth crane would provide this emergency capability.</li><li>• Most maintenance can be planned for days when there are no ship calls. Emergency repairs requiring substantial down time could justify removing the fourth crane from its mothball status.</li></ul>
<p>...the legislature recognized that there is “unique value” to acquiring the POLA cranes provided that they are in good condition and being transferred to PAG at a fair and reasonable price.</p>	<p>The Casper report indicated that cranes 14, 16 &amp; 17 had not been well maintained and required \$9 million in repairs and upgrades. The Consultant’s research indicates that the acquisition of these cranes is the lowest cost alternative, but that there are substantially newer cranes available for reasonable costs. The POLA cranes do not have any significant market value – the highest value of these cranes is “in place” since they are already retrofitted for wind loads and require no transportation.</p>
<p>PAG would not be in a position to negotiate on a sole source basis for other cranes.</p>	<p>PAG is not currently authorized to negotiate for other cranes, but it appears that the legislature has the power to authorize sole source negotiations.</p>



PAG Issue	Response
The early transfer of ownership to PAG results in lower overall cost of cranes to Guam.	Currently Matson/Horizon are responsible for acquisition, maintenance and operational costs of the cranes. The value to Guam depends on the ability of the PAG to generate sufficient revenue from the cranes to support the debt service and maintenance/operational costs once the cranes are transferred to PAG.
A 2-year acquisition process would allow Matson to accumulate additional crane surcharge revenue and PAG would have to find alternative revenue stream to support the acquisition of the cranes until the rail lease is terminated potentially impacting borrowing capacity for other projects.	The Matson "rail lease" agreement expires in 2014. PAG has an opportunity to negotiate new terms of this agreement. PAG can work with lenders to modify payment schedules for projects to correspond with timing on revenue generation.
There is no operational disruption if the transaction only involves transfer of ownership.	This is true. Other alternatives will require more coordination and effort.
Total Cost of Operation (TCO): PAG indicates that the operational costs for the POLA cranes should be lower based on figures generated by PAG	<p>The Consultant used figures provided in the Draft Maintenance Plan. Since these numbers were used as a basis for analyzing all of the acquisition options providing an apples-to-apples comparison, the TCO's have not been modified based on PAG's budgetary estimates. It is recognized that the TCO's may vary from PAG's financial estimates.</p> <p>Also, there is some concern that the Parson's and PAG estimates are low given the historical maintenance costs of the cranes and repair needs identified in the Casper report. To further reduce the estimated costs of ownership from those proposed in the Draft Maintenance Plan does not seem reasonable.</p>

**PAG's response to the PUC Consultant's findings and  
recommendations**



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Eddie Baza Calvo  
Governor of Guam

Ray Tenorio  
Lieutenant Governor

August 16, 2012

Mr. Roger D. Slater  
Managing Partner  
Slater, Nakamura & Co, LLC  
790 S Marine Corps Dr., Ste. 204  
Tamuning, Guam USA 96913

**Re: Draft Report of the Tariff Investigation for the Port Authority of Guam For Guam  
Public Utilities Commission / Port Docket 12-01 dated August 9, 2012**

Dear Mr. Slater:

Thank you for providing PAG with an opportunity to review your draft report before finalizing it for transmission to the PUC. We appreciate the independent due-diligence check you have made on behalf of the PUC and ultimately the people of Guam.

We would like to address your report at two levels:

- one being to share higher level perspective on operational requirements, the means available to acquire additional cranes, the unique value of the POLA crane acquisition, and what we believe to be the all or nothing unsolicited offer received from Matson/Horizon; and
- the second being to address your specific FINDINGS as relates to PAG Finances, Capacity Throughput Requirements, Total Cost of Ownership, and Other Considerations.

\*\*\*\*\*

### **Higher Level Perspective**

**Operational Requirement:** The Port is operating under the assumption that we are preparing for sustainable operations, operations that address island organic growth, and operations that support an expanded military presence on Guam. Meeting these requirements boils down to the following sub-requirements:

- Handle cargo being off-loaded by at least two ships at berth simultaneously
- Offload cargo within reasonable timeframe consistent with Industry and carrier expectations

- Have capacity to deal with container and break-bulk cargo volumes with peaks that reach two to three times the current steady state volume levels
- Have response capability where if a crane casualty occurs during critical operations, a standby crane can be deployed
- Have crane downtime maintenance capability to promote efficient and sustainable major maintenance

These requirements were analyzed within the context of the approved Master Plan and subsequent Terminal Operations Planning with the outcome of both calling for 4 Operational Gantry Cranes. Until such time as a military buildup or replacement service for departed Horizon are both ruled out, our operational premise remains as proposed to, and subsequently authorized by, the Legislature. Note: while the Legislature mandated the acquisition of 2 cranes when it was focused on assuring capability to meet organic growth requirements in the face of uncertain federal support for the military buildup, it did not thereby trump the previously approved Master Plan requirements. Instead, it focused on failsafe near-term action that elevated attention to the larger issues.

**Means To The Desired End:** The reason why there is special legislation to enable sole source negotiation and potential purchase of the POLA cranes is because the Legislature recognized that there is "unique value" to acquiring the POLA cranes provided that they are in good condition and being transferred to PAG at a fair and reasonable price. It is worth pointing out here, that one of the indirect "unique value" issues discussed below deals with the impracticality of pursuing purchasing for alternative "used" cranes. Our key assumptions are as follows:

- The means for acquiring alternative "used" cranes by a process consistent with the requirements of the GAR would mandate:
  - Open solicitation to acquire used cranes as initiated by PAG
  - Receipt of a "unsolicited" sole source proposal followed by an open solicitation knowing that other used cranes are out there that can meet PAG requirements
- In pursuing an open solicitation under the GAR the choices would be:
  - One solicitation whereby an "offeror" submits a turnkey proposal to acquire, retrofit, ship, and commission the desired number of cranes
  - Multiple solicitations whereby PAG buys cranes "as is" and "where is" and then issues follow-on solicitations to address remaining requirements (retrofit in place, retrofit at alternate site, ship, and commission)
  - Note: Under no circumstances would PAG be in a legal position to negotiate (on a sole source basis) for the direct purchase of cranes from VPA or POLA for example without a determination (that would be challengeable) that one of those Port Authorities is the only one that can meet PAG requirements



- Any used crane purchase would come with the complication that Matson/Horizon have cranes on the rails, "ready to go" with great competitive advantage over anyone trying to bring cranes to the island. Any effort to try to discount or quantify the advantage would be subject to judgment call and likely protest. The existence of this advantage would likely deter many prospective bidders from entering the competition.

**Unique Value of POLAs:** The unique value associated with purchasing the POLA Cranes is as follows:

- The cranes are on the rails and are a proven commodity. They have commonality that leads to establishing a standardized parts inventory and a structured maintenance program applicable to all.
- The early transfer of ownership to PAG at a fair and reasonable price results in lower overall cost of cranes to Guam, not just PAG. If PAG were to pursue the purchase of new cranes, there is a 2-year timeline associated with the solicitation, fabrication, and commissioning of the cranes assuming no protests. During that 2 or more year timeframe, the following happens:
  - Matson gets to accumulate additional crane surcharge revenue toward retiring its initial investment. If there is a protest during the alternative procurement action, PAG could face having to entertain extending the rail lease and timeframe for Matson to continue to accrue this crane surcharge revenue, resulting in more cost to the people of Guam. Said differently, acquiring the POLAs results in several \$ M of cost avoidance to Guam.
  - PAG has to find an alternative revenue stream to service a loan to support the acquisition of other cranes until such time as the POLA cranes leave the rails and the rail lease is terminated. This revenue requirement would result in a temporary increase in tariffs while the crane surcharge accrued by Matson also continues.
  - Port borrowing power in support of the Modernization Program is somewhat compromised at the beginning of the program at precisely the same time as military cargo flow is uncertain. Dedicating this borrowing to alternative crane purchase limits the ability to get out in front of the buildup with certain uplands improvements during this first 2+ year window.
- There is no operational disruption if the acquisition involves just a transfer of ownership. If on the other hand, alternative cranes are brought in, there would be an overlap of service between the departing POLAs and the new arrivals. Without the overlap, PAG would be faced with a crane deficiency. With the overlap the rails

will be cluttered with as many as 7 (with purchase of 2) or 8 (with purchase of 3) cranes at one time.

- The crane surcharge issue becomes somewhat transparent without impact to consumers: if the Port enacts a surcharge associated with the transfer, Matson maintains that level of expense to its consignees and transfers that revenue to PAG to pay the tariff. For Matson consignees and Guam consumers the cost of goods need not rise. If on the other hand, Matson uses their surcharge to retire their debt because the Port is pursuing alternate acquisition, the cost to Matson consignees and consumers goes up with compounding tariffs.
- The cost to Matson of bringing the cranes to Guam was \$ 19 M. In a period of a few years, the discounted price is now \$ 12 M assuming they don't have the cost of removing any cranes from the island. This is a much greater discount than would arise from normal depreciation of assets in three years. There is no reason to believe that bringing in outside cranes would not come with a price tag of \$ 19M or more three years later, especially given that the initial acquisition price for the POLAs prior to retrofit, shipping, and commissioning was \$ 150 K. It is likely to be several million more than that and come with the procurement challenges mentioned above.
- With the discounted price available to us, we have the opportunity to get the fourth required crane and the flexibility to deal with buildup spikes, casualty response, and structured maintenance at an initial purchase price of \$ 4 M. This unique opportunity will not come our way again.

#### All or Nothing Deal

- There is little incentive for Matson to sell less than 3 cranes
- Retaining one and selling two nets Matson/Horizon \$ 8-9 M depending on Port valuation or Matson/Horizon valuation. This leaves unretired debt that they can't recover unless they stay on the rails with the one crane and retain access to their crane surcharge. This is further compounded by the need to now remove and pay for the removal of the remaining crane at some point. This will factor into their valuation whereas now both sides are overlooking that issue when all cranes stay on the rails.
- Selling two cranes results in rail lease adjustment
- If they push to stay on the rails with one crane, there could be two surcharges in place, one for Matson and one for PAG. How that gets applied to cargo would be very complicated.
- Retaining less than two cranes reduces their operational control over cranes needed to service their ship. While likely manageable, it does give rise to the theoretical



possibility that in the event of a dispute, they are forced to using just one crane with greater turnaround time for the ship. With this outside possibility of losing money, they might opt to avoid this by keeping two cranes.

- We have in fact been advised that this is an "all or nothing" offer.

### Response To Specific FINDINGS

#### PAG finances:

- PAG has allocated \$14.5M for the purchase of cranes.
- Purchasing the three POLA cranes and deferring needed maintenance to future years will meet the PAG budget of \$14.5M.
- *f* PAG needs to include the cost of demolition of Crane 2 in its costs. Based upon historical numbers, this could be as much as \$500K.

#### *PAG Response:*

Subsequent to the Board approving the recommendation of the Negotiating Committee to purchase the 3 POLA Cranes and Gantry 3, the Port issued a task order to Parsons Brinkerhoff and subconsultant Sarandipity, LLC to develop a Structured Maintenance Program for all Gantry Cranes. This program will include budget estimates for the cost of maintaining the four ship to shore (STS) cranes over the next 15 years. The estimate will include the cost of scheduled "preventative maintenance" and "planned corrective maintenance" and unscheduled (but: likely to occur) "unplanned corrective maintenance". The unplanned corrective maintenance will include catch-up maintenance to correct deficiencies observed during our recent crane inspections. On the top of this list is arresting corrosion and getting the structural painting to a place where it becomes routine scheduled maintenance. Attached is the draft Maintenance Budget Report prepared in support of the Structured Maintenance Program for the four STS Cranes.

PAG intends to use \$12 million loan to purchase the cranes and implement a \$105 surcharge on loaded containers and \$5 on break bulk cargos to service this loan and address all other crane-related expenses.

Attached are the revenue/expense and cash flow projections on the crane surcharge and related expenditures. The financial model reflects a total crane surcharge revenue of \$4.9 million annually to fund debt service of \$1.3 million per year, cost of the Structured Maintenance Program (PM, PC, UC), demolition of Gantry 2 at \$500K, setup and stocking of a spare parts room at \$350K and a establishment of a reserve fund for the purpose of crane replacement after 15 years. The cash flow is expected to be positive once the Structured Maintenance Program is in place and savings from current Gantry 2 and Gantry 3 maintenance budgets are realized.

The implementation of the crane surcharge and the resulting accumulation of funds in the reserve fund should put the Port in position to react to the unexpected loss of a crane in the event of an extraordinary typhoon, earthquake or operational accident, and also fulfill the PUC Consultant's recommendation to procure crane placement as early as 15 years into the future.

**Capacity throughput requirements:**

- Acquisition of two POLA cranes (three cranes total) can meet the annual capacity demands for PAG.
- Acquisition of three cranes will provide substantial excess capacity. This could result in a need to increase fees per container to cover operational and acquisition costs.
- There is no known plan to bring larger ships to Guam which would drive the need for larger cranes.

*PAG Response:*

The Port has always maintained that 4 gantry cranes is the right composition to support the service needed in its operations. It would need 3 cranes working on vessels and 1 crane to be down for maintenance at any one time, and for Port operations to have the flexibility to move vessels in other berths when there is construction on the wharf. The Port would usually have 2 vessels at berth, especially during Matson operations. The Super Shuttle and the Matson Islander brings in and picks up transshipment cargo that will be transported to the outer islands. Super Shuttle comes to Guam weekly, while the Matson Islander visits every 2 weeks. From an Operational standpoint, the Operations Manager plans on the number of cranes needed in a vessel to get it out of the Port within the expectation of the shipping agent or the time it is allocated. The traditional operation assigns 2 cranes to the Matson vessel and 1 or 2 cranes to the connecting or feeder vessels. There are occasions when one of the cranes breaks down and the Operations Manager would need to pull other cranes being used on another vessel or in interruptible maintenance status to be able to continuously work on the domestic carrier vessel to meet the productivity needed to complete the operations. Limiting the number of cranes to three would reduce the Port's capability to efficiently work on the vessels and complete its operations in a timely manner. In other words, crane deployment, flexibility to deal with casualties and scheduled major maintenance, flexibility to work around construction, and capacity to deal with cargo volume spikes double and triple normal volumes all trump the individual crane capacity analysis measured against normal or organic growth cargo projections.

Note: One of the assumptions indicated in the draft report was based on a limited snapshot of ship arrivals for the period of January 2012 to June 2012, affirming that container ships were in the pier side one at a time. As mentioned earlier, it has historically been a normal operation that there are 2 vessels in the docks. There is also the assumption based on the current situation that there is only one domestic vessel (Matson) to arrive in the port every week, ever



since Horizon ceased its operations. There is still the possibility that another domestic vessel that will be servicing Guam and other foreign vessels that may be added to the current number of foreign vessels. When Horizon was still servicing Guam as the second domestic vessels, there would be 2 vessels in the docks that Operations need to work on. There are times that Super Shuttle would do two trips to deliver and pick up cargos for both Matson and Horizon.

**Total cost of ownership:**

- The lowest acquisition cost identified is for the purchase of the POLA cranes 14, 16 and 17.
- The lowest Total Cost of Ownership (TCO) is for the acquisition of the POLA cranes 14, 16 and 17.
- The TCO for the acquisition of the VPA's ZPMC cranes is slightly more than the TCO for the POLA cranes – but these cranes are 20 years newer than the POLA cranes.
- The acquisition of new or newer cranes will result in lower long-term operational costs and will provide more flexibility for servicing larger vessels in the future.

*PAG Response:*

We are not in position to challenge your projected costs for acquiring, retrofitting, shipping, and commissioning alternative cranes to Guam without doing our own planning checks and without knowledge of the ultimate procurement scenario. Similarly, without supporting structural calculations, we are also not in position to evaluate the structural impacts that higher and extended reach cranes would have on wharf rails and tie-down structures.

We are moving toward establishing a very well defined Structured Maintenance Program for the three POLA Cranes and Gantry 3 with the assumption that all will remain on the Port's rails and operate with a life-expectancy of at least 20 years. In connection with that effort we have a projection of Total Cost of Ownership that is somewhat different than is contained in your report. This is addressed below.

Based on the draft Crane Maintenance Budget produced for the Structured Maintenance Program, PAG has estimated the cost for fuel, insurance, salaries and benefits of crane mechanics, welders and preventive maintenance employees. The PAG breakdown for total cost of operations for each of the POLA cranes are as follows:

Operations cost	Estimated cumulative cost for 15 years per crane
Fuel	\$1,413,038
Annual maintenance	\$5,714,781
Insurance	\$655,754

Upgrades and Major Maintenance	\$4,148,614
Financing expenses	\$2,303,681
PMC Cost, Additional PAG personnel & training cost	\$1,937,500
Total operating cost per POLA crane for 15 years	\$16,173,369

Acquisition	Actual Cost
Negotiated Sale Price For 3 Cranes	\$12,000,000
Inventory of spare parts & Parts room setup	\$350,000
Total acquisition costs	\$12,350,000

**TOTAL COST OF OWNERSHIP FOR 3 USED POLA CRANES**

Cost of Ownership	Estimated cost
Operating Cost	\$48,520,106
Acquisition Cost	\$12,350,000
Total	\$60,870,106

**SUMMARY OF COMPARISONS OF ESTIMATED TOTAL COST OF OWNERSHIP**

Crane Option	Total Acquisition Cost including maintenance upgrades	Total Operating Costs	Total Cost of Ownership
New ZPMC Cranes	\$27,587,220	\$50,209,373	\$77,796,593
New Kalmar Cranes	\$30,587,220	\$52,576,923	\$83,164,143
POLA cranes 14,16,17	\$12,350,000	\$48,520,106	\$60,870,106
VPA used ZPMC Cranes	\$23,750,000	\$45,977,399	\$69,727,399
VPA used Kone Cranes	\$21,350,000	\$59,961,163	\$81,311,163
POLA Hitachi Cranes (only 2 available)	\$15,750,000	\$37,955,134	\$53,705,134



The total cost of operation for the 3 M/H POLA Cranes is \$48.5 million which is \$7.6 million lower than your draft report total of \$56,084,095. The Total Cost of Ownership is \$60.9 million. Using your figures, the total Cost of Ownership of M/H Cranes is \$22.3 million lower than the New Kalmar Cranes and \$16.9 million lower than the New ZPMC cranes. If the TCO of MH POLA cranes is compared with VPA used ZPMC Cranes, the MH cranes TCO is lower by \$8.9 million. Note: the used crane comparison assumes you could acquire the used cranes at these prices competitively as opposed to on a sole source basis which is not feasible under current procurement guidelines.

Having worked with your numbers above, we would like to point out that your alternative crane TCO figures are considered a little low since the budget for a properly structured program of Preventative Maintenance and Planned Corrective Maintenance for cranes is approximately the same for differing used cranes regardless of age and even new cranes.

CIP investment would be different if there were desired upgrades to pursue such as was mentioned in the Casper Phillips & Associates condition assessment report on the POLA cranes. We note however that these upgrades to the POLA cranes are optional and not mandatory. They have therefore been excluded from our calculations.

The wild card for all cranes would be Unplanned Correctives (UC) that result from systems casualty that was unexpected due to accident, weather event, neglected maintenance, etc. It is reasonable to expect that once PM and PC and personnel training are under control, that UC resulting from all but Acts of God drops significantly and would be the same for used and new cranes.

**Other considerations:**

- The value of the used cranes in the marine industry appears to be an asking price with the caveat "or best offer". As noted in the acquisition of the POLA cranes by Matson / Horizon, the cranes actually sold for \$50K per crane. Given that the VPA cranes may fall into the same category, if they could be acquired for \$100 K, the TCO for this option would be less than acquiring the POLA cranes 14, 16 and 17.

*PAG Response:*

PAG has no legal authority to do sole source alternative purchases. Therefore, one has to consider that brokers attempting to answer a PAG solicitation for used cranes would all approach VPA or POLA to baseline their "as is", "where is" cost of acquiring the cranes before they figure the remaining costs to retrofit, ship, and commission them. If multiple brokers approach these Ports, they drive the price up, not down.



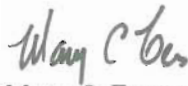
M/H remains in picture as competitor for any used purchase. Combine this with rising acquisition costs for the brokers, and you find the advantage for Matson climbing.

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With the aforementioned guiding our thinking, we (the Port Management and Board of Directors) remain convinced that moving forward with the purchase of all three POLA cranes is the best course for the PAG and the people of Guam. We appreciate the opportunity to engage in dialogue with you and your consultants and to provide our verbal and written comments to the draft report and trust that the comments put forth by the Port authority will be given your utmost attention and consideration.

Thank you.

Very Respectfully,



Mary C. Torres  
General Manager

Attachments: Revenue/expense and cash flow projections on the crane surcharge and related expenditures  
Draft Maintenance Budget Report prepared in support of the Structured Maintenance Program for the four STS Cranes.  
CD with Draft Report containing Port's Comments

Cc: PAG Board of Directors

TOTAL COST OF OWNERSHIP TABLES

Crane Option	Total Acquisition Cost including maintenance upgrades	Total Operating Costs	Total Cost of Operation
New ZPMC Cranes	\$27,587,220	\$50,209,373	\$77,796,593
New Kalmar Cranes	\$30,587,220	\$52,576,923	\$83,164,143
POLA cranes 14,16,17	\$12,350,000	\$48,520,106	\$60,870,106
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POLA Hitachi Cranes (only 2 available)	\$15,750,000	\$37,955,134	\$53,705,134

Costs title	Estimated cost
Negotiated cost	\$4,000,000
Inventory of spare parts & Parts room setup	\$350,000
Total acquisition costs	\$4,350,000

Operations cost title	Estimated cost for 15 years per crane
Fuel	\$1,413,038
Annual maintenance	\$5,714,781
Insurance	\$655,754
Upgrades and major maintenance	\$4,148,614
Financing expenses	\$2,303,681
PMC Cost, Additional PAG personnel & training cost	\$1,937,500
Total operating cost per POLA crane for 15 years	\$16,173,369

Cost of Operation	Estimated cost
Total Operating Cost	\$48,520,106
Total Acquisition Cost	\$12,350,000
Total Cost of Operation	\$60,870,106