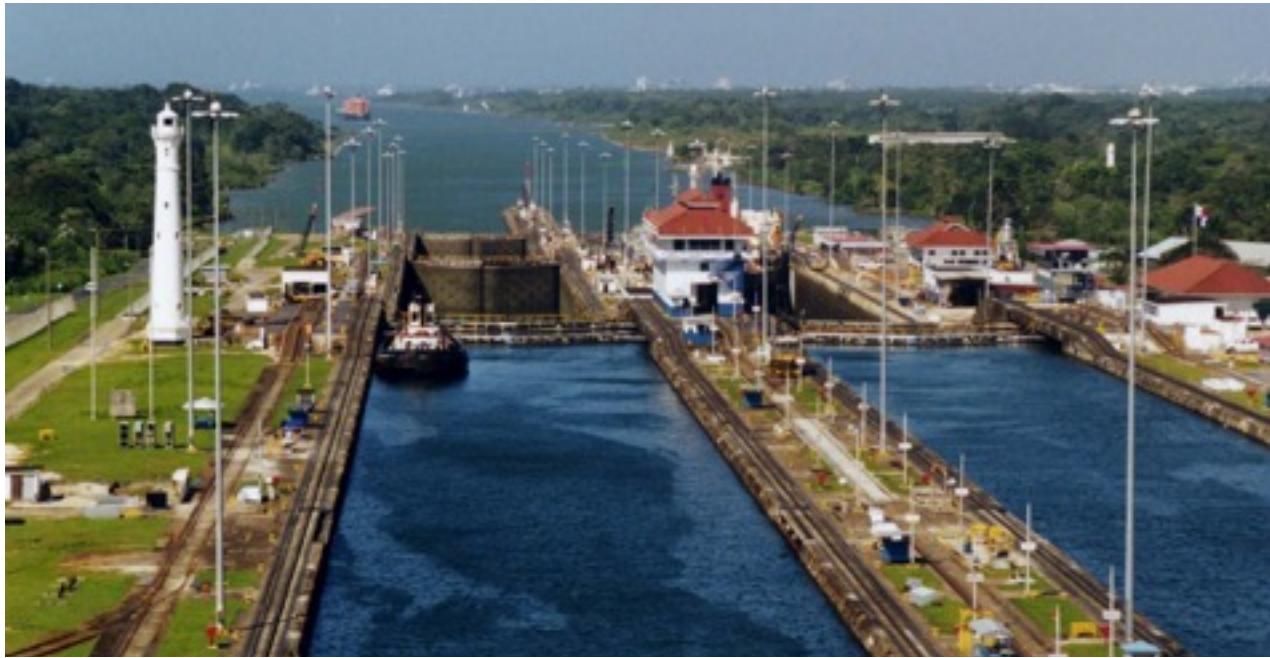


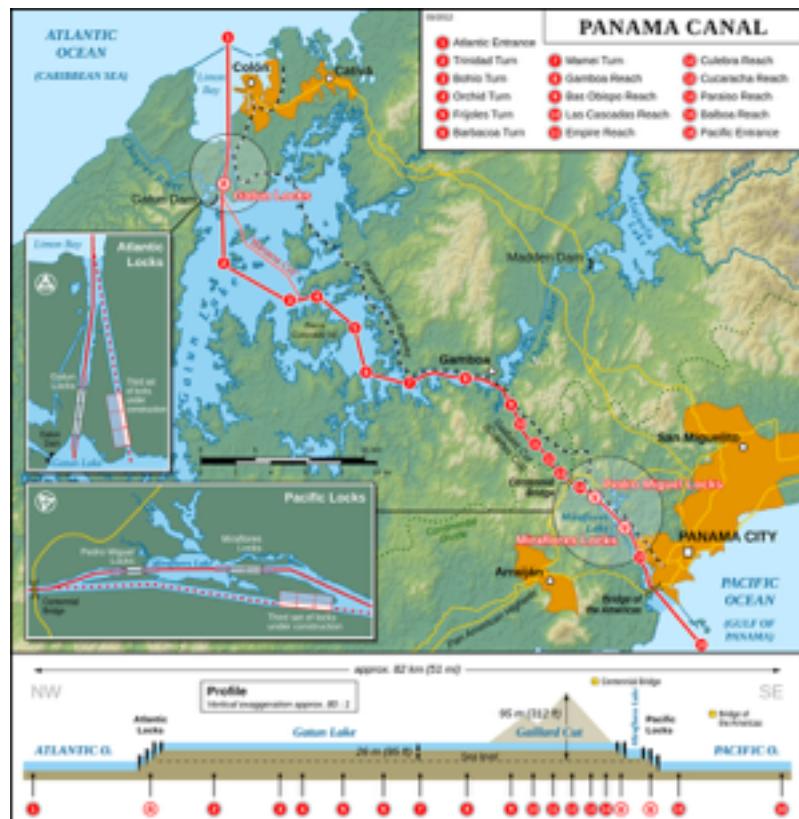
WHAT IS IMPACT OF PANAMA CANAL WIDENING?



Introduction

One hundred years ago, in 1914, the Panama canal was opened. At the time it was the biggest American engineering project. Ever since it has played a major role in world trade (about three percent global cargo pass through the canal¹). The major widening project (5.4 billion US\$) commenced in 2008 and is expected to be completed in 2015. This would enable larger vessels to transit the canal, up to three times size.

The Panama Canal Authority has come up with requirements for the vessels to transit the canal. This paper outlines the need and the process for undertaking such modification and preparing the booklet for submission and approval prior vessel calling.



¹ Panama Canal Authority. 2014 Annual Report. Available at: <http://www.pancanal.com/eng/general/reportes-anuales/2014/pdf/annual-report-2014.pdf>

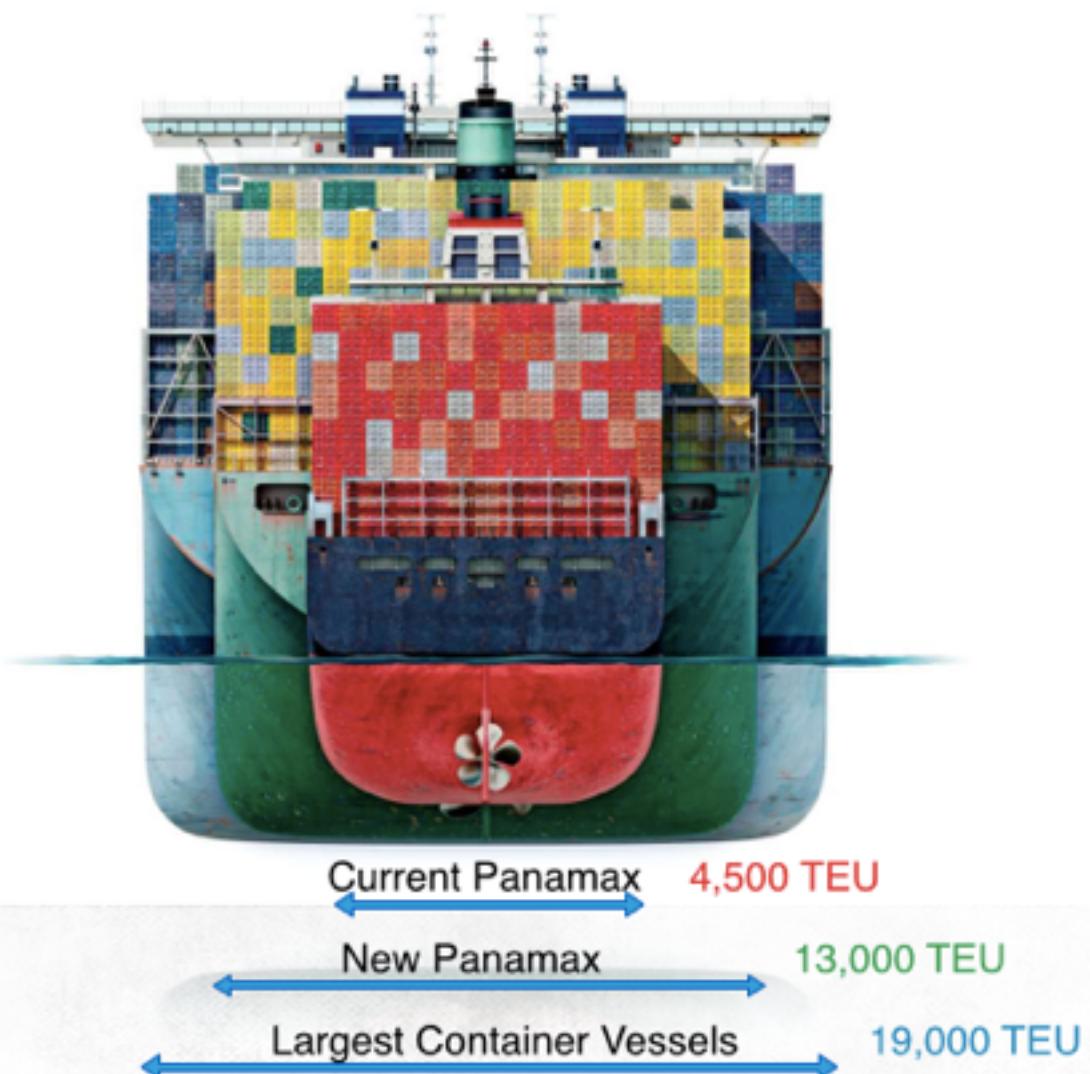
Value Creation

SHORTER ROUTE FOR US EAST COAST

The biggest benefit of the canal is for US east coast bound cargo (mainly from East Asia) which instead of going around the Cape of Good Hope or westward via Suez Canal can now go through the Panama Canal.

As seen in the figure below, the current size limit of Panama canal (vessel in red) is about 4500 TEU. Vessels of up to three times the current size can pass through. This opens a wide range of possibility for the trade pattern.

Refer Appendix 1 for understanding the impact on the various types of ships.



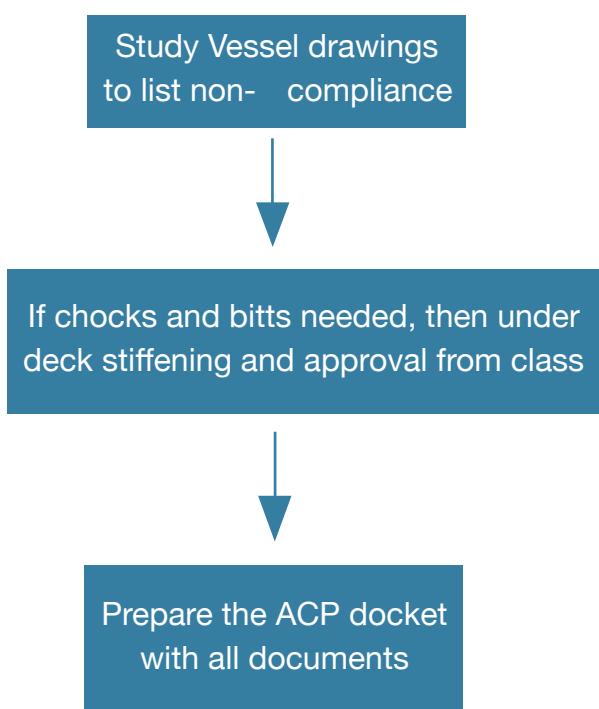
Procedure

The dimension limitation of the old and new Panamax vessel is shown below.

Size	Existing Panamax	New Panamax
Length (m)	294.13	366
Beam (m)	32.31	49
Draft TFW (m)	12.04	15.2
TEU	4,500	13,000

FLOW CHART

The summary is given below.



PROCESS

The first step is to identify the additional requirements to meet compliance. The list of requirements are as follows:

1. Pilot Platforms and Shelters

Pilot platform and shelters with dimensions 1.5 x 1.5 area and headroom of 2.1/2.25 m to be provided on bridge wings.



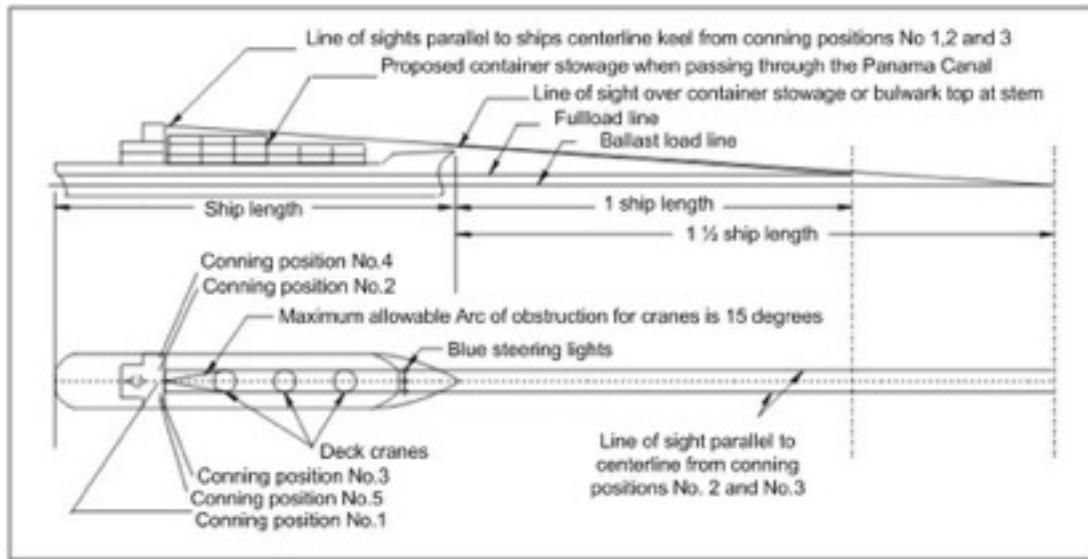
2. Protrusion

Protrusions - cargo or extensions beyond the ship's side located 16.4 m or less above the waterline is not permitted.



3. Visibility requirements

The requirement are clearly spelt out in the rules - 1 ship length in loaded and 1.5 ship length in ballast condition (See figure) for all vessels. For container vessels this is 2 ship lengths or 500 m, whichever is lesser.



3. Mooring Arrangements

The requirements for bollards and chocks are specified based on the vessels size. Chocks that are specified as single chock shall have SWL of 45.36 T and double chocks shall have SWL of 64 T.

For a vessel that is over 173.74 m length or 22.86 m width, the following chocks are required:

- ❑ Bow centerline (double), stern centreline (double)
- ❑ Two double (of centreline not provided)
- ❑ Set 1 (Double 12-16 m abaft of stem)
- ❑ Set 2 (Single 24-28 m abaft of stem)
- ❑ Set 3 (Single 24-28 m forward of stern)
- ❑ Set 4 (Double 12-16 m forward of stern)

4. Mooring Lines, Anchor

Vessels are required to have on deck six manila or synthetic mooring lines forward and six aft in good conditions. Each line shall be 75 meters in length and have an eye of 1.5 meters spliced in one end.

Mooring winches shall be capable of retrieving the lines at 37 meters per minute. Anchors shall be retrieved at rate of 9 meters per minute.

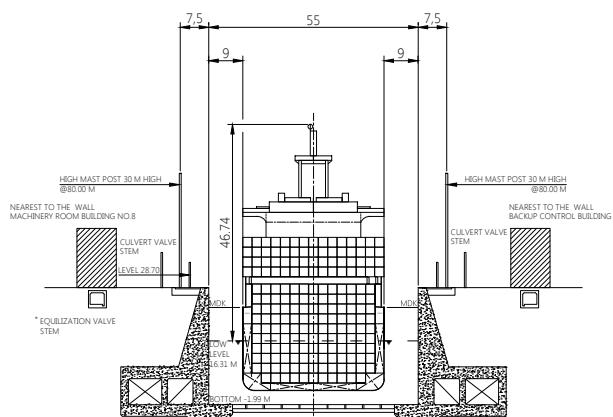


5. Wheelhouse

The wheelhouse and bridge wings are required to have a list of equipments and facilities like clear safety glass, rudder angle indicators, rpm indicator, VHF trans-receiver. Usually most of these requirements would be met, except some of the devices not being there in bridge wing.

6. Vessel Section

The section of the vessel in the canal with all clearance need to be made for both locks.



Case Study of 4,743 TEU Container Vessel

Mission

To analyse the requirements to comply with ACP regulations and make modifications if any.

Study

The vessel was a 1995 built, 4,743 TEU container vessel with a length of 299.95 m and breadth of 37.1 m.

Initial study identified modifications in many areas.

1. Pilot Platform and Shelter

The vessel did not have a pilot platform and shelter. This need to be added.

2. Visibility

For each condition of operation (standard draft and trim) the list of container to be removed from the vessel to meet the visibility requirements was identified and listed.

3. Mooring

Additional chocks - 6 single and 6 double were needed to be added in aft and forward part of the vessel. Four number of bollards were also needed to be added.

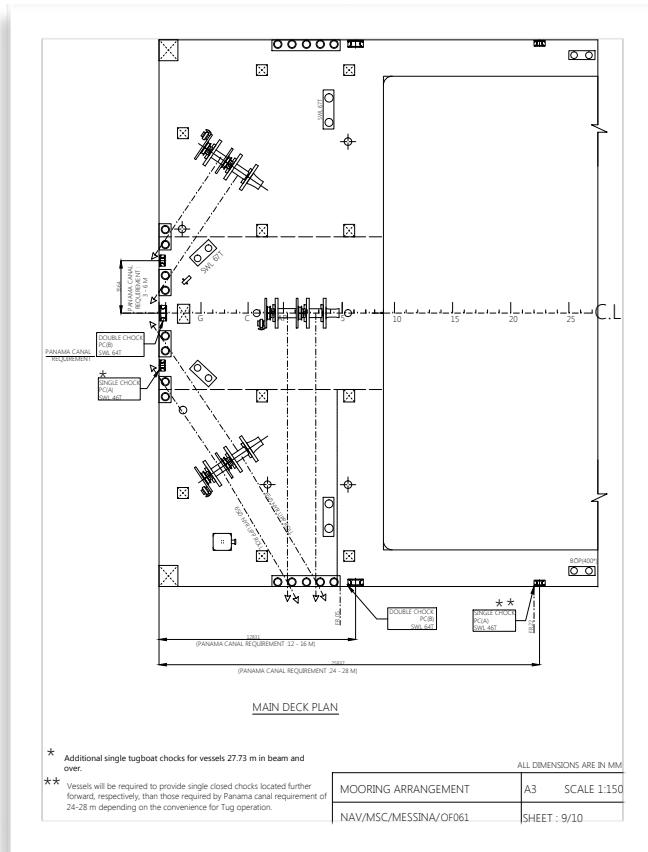
The additional chocks and bollards needed to be installed on deck with additional stiffening under-deck. These stiffening were designed for the worst operating conditions and approved by class (BV).

4. Wheelhouse

Few equipments were missing in the vessel bridge wings that needed to be added. These include rudder angle indicators, RPM indicators.

5. Vessel Section

The section of the vessel with the Atlantic and Pacific side locks were drawn to see the clearances.



About Navgathi

Navgathi is a marine design and construction firm with extensive experience in ship design, repair and conversion. They have done new building project management of large oil tankers, container vessels, bulk carriers. Navgathi assists shipowner in all design related requirements from small modifications like Panama canal compliance to major design projects like bow optimisation and vessel widening. Navgathi was founded in 2008 and is based in Kochi, India.

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Appendix - 1

Container Fleet

From the container world fleet list it is clear that the amount of TEU capacity in vessels that can now pass through the Panama canal will double once this is opened.

Vessel Category	TEU	No. of Vessel	% of Fleet	% of TEU
Feedermax	<1,000	1,035	21%	4%
Handymax	1,000-1,999	1,294	26%	11%
Sub-Panamax	2,000-3,999	1,037	21%	18%
Panamax	4,000-5,000	641	13%	21%
Post-Panamax (New Panamax)	5,001-13,000	862	17%	39%
Ultra-large Container Ships	13,001+	69	2%	6%

Source: Alpha Liner (2011 Fleet)

Bulk Fleet

Many of the small capes can now pass through the expanded canal.

Vessel Category	DWT	Constrained by Existing Canal Dimensions	Constrained by Expanded Canal
Handysize	24,000-39,999		
Handymax	40,000-62,999		
Panamax	63,000-89,999	some vessels	
Small Capes	90,000-139,999	yes	some vessels
Capesize	140,000-189,999	yes	yes
VLOC	190,000+	yes	yes

Source: Mercator

Liquid Bulk Fleet

All the current Panamax, Aframax and some of the Suezmax vessels can now pass through the expanded canal.

Vessel Category	DWT	Constrained by Existing Canal Dimensions	Constrained by Expanded Canal
Product Tanker	10,000-60,000		
Panamax	60,000-79,999	some vessels	
Aframax	80,000-119,999	yes	
Suezmax	120,000-199,999	yes	some vessels
VLCC	200,000-319,999	yes	yes
ULCC	320,000+	yes	yes

Source: Mercator

The major impact on the widened canal will be in the container segment where the widening can help most of the vessels to transit.