



**Technical Analysis of
Gaillard Cut Widening
1-way Post-Panamax Traffic**

**Análisis técnico del ensanche del
Corte Culebra para tráfico
Pospanamax de 1 vía**

ACP

Julio del 2003

**Descripción y Resumen
(No existe Resumen Ejecutivo)**

Technical Analysis of Gaillard Cut Widening 1-way Post-Panamax Traffic

Autoridad del Canal de Panamá

Department of Engineering and Projects

July 2003

GAILLARD CUT WIDENING

1-way Post-Panamax Traffic

1 GENERAL DESCRIPTION OF THE STUDY

The construction of new Post-Panamax locks at the Panama Canal would require improvements to existing Canal navigation channels, which involves deepening and widening work to guarantee the safe and expedite transit of Post-Panamax vessels through the Canal. According to Canal operations preliminary analyses, the currently used semi-convoy traffic mode proved to be more efficient in terms of Post-Panamax and Panamax throughput capacity; therefore, it is foreseen that Gaillard Cut and both Canal entrances would require a 1-way Post-Panamax channel layout, while Gatun Lake would call for a 2-way Post-Panamax configuration.

This study covers the technical analysis to widen Canal internal waterways for 1-way Post-Panamax traffic from the north end of Gamboa Reach to the south end of Paraiso Reach. Although the new locks approach channel intersects the southern area of Cucaracha Reach, it is assumed that Post-Panamax widening would extend to Paraiso Reach, which complies with 2-way Panamax traffic requirements. The 1-way Post-Panamax widening is focused mainly in Gaillard Cut, which represents the Canal's most restricted and narrowest navigation channel, and the greatest challenge to Canal navigation.

As of today, a decision has not been reached for a Post-Panamax draft phase scenario. One of the scenarios contemplates the transit of Post-Panamax traffic at lake elevation of 25.9m (85') PLD; therefore, no additional dredging would be required in Gatun Lake and Gaillard Cut at a channel bottom elevation of 10.4 m (34') PLD. However, if the decision is to augment Gatun Lake water capacity or availability by lowering the lake's minimum operation level to elevation 23.9 m (78.5') PLD, then dredging would be required to reach to a design channel bottom of 8.4 m (27.5') PLD or 9.3 m (30.5') PLD, depending on lake minimum operation level selection. At this conceptual stage, a design channel bottom of elevation 10.4 m PLD for 1-way Post-Panamax widening in Gaillard Cut is being assumed as a first phase. The 2nd phase would be additional dredging to lower the design channel bottom to 8.4 (27.5') PLD.

Gaillard Cut widening for 1-way Post-Panamax traffic calls for massive dry excavation and dredging as well as land and wet drilling and blasting. After several widening layout evaluations, 2 options were selected to optimize Gaillard Cut's existing configuration to the proposed 1-way Post-Panamax layout: Option Contractor's, and Option Gold Hill; each option depicting Gaillard Cut's critical excavation operations.

2 SUMMARY

- The following table shows a summary of excavation, dredging, and drilling and blasting volumes, duration, and cost estimates without contingencies for proposed Gaillard Cut widening for 1-way Post-Panamax traffic assuming the existing Gaillard Cut configuration after its widening to 192 m:

GAILLARD CUT WIDENING FOR PROPOSED 1-WAY POST-PANAMAX NAVIGATION CHANNEL						
Summary of volume, duration, and cost estimates						
Phase	Option Contractor Hill			Option Contractor Hill		
	Volume (m ³)	Duration (y-m years months)	Cost (\$)	Volume (m ³)	Duration (y-m years months)	Cost (\$)
Dry Excavation	29,139,174	4 y - 9 m	131,936,284	23,215,243	4 y - 4 m	104,468,595
Land D&B	17,121,979	4 y - 8 m	77,048,906	15,277,699	4 y - 3 m	68,749,646
Land dredging	3,265,474	2 y - 5 m	27,756,525	3,690,689	3 y - 1 m	31,370,858
Underwater D&B	3,261,329	2 y - 10 m	24,786,103	2,910,038	2 y - 2 m	22,116,288
Dredging	12,837,712	4 y - 5 m	141,214,832	10,605,627	3 y - 6 m	116,661,897
TOTAL to elev. 10.4 m PLD		6 y - 3 m	402,742,650		5 y - 5 m	343,367,284
Additional Dredging Cost to 8.38 m PLD			41,127,867			38,256,350
TOTAL COST			443,870,517			381,623,634
Notes:						
1. The volume, duration, and costs were estimated assuming Gaillard Cut existing configuration of 192 m wide in straight legs, and a maximum of 222 m in the bends.						

- As of today, the ACP is planning to execute the Gaillard Cut straightening program for 2-way Panamax traffic during fiscal year 2004 to meet SOLAS ship visibility requirements and improve ship maneuverability, especially at the bends. Dredging, excavation, and drilling and blasting volume, duration, and cost estimate for 2-way Panamax traffic at a design channel bottom elevation of 10.4 m PLD with no contingency are as follow:

**GAILLARD CUT PROPOSED 2-WAY PANAMAX NAVIGATION
CHANNEL AT ELEVATION 10.4 M PLD**

Summary of volume, duration, and cost estimates

Phase	Volume (m ³)	Duration (y. m years months)	Cost (\$)
Dry Excavation	9,141,355	2 y - 3 m	41,136,098
Land D&B	4,997,350	2 y - 5 m	22,488,073
Land dredging	942,356	2 y - 3 m	8,010,022
Underwater D&B	951,876	2 y - 2 m	7,234,258
Dredging	2,477,289	2 y - 8 m	27,250,174
TOTAL		4 y - 3 m	106,118,625

- Therefore, Gaillard Cut 1-way Post-Panamax layout costs should be as follows after its 2-way Panamax straightening implementation:

**GAILLARD CUT WIDENING FOR 1-WAY POST-PANAMAX TRAFFIC AFTER
STRAIGHTENING FOR 2-WAY PANAMAX TRAFFIC**

Gaillard Cut layout	Options	
	Contracto Hill	Gold Hill
1-way Post-Panamax traffic	402,742,650	343,367,284
2-way Post-Panamax traffic	106,118,625	106,118,625
NET COST to elev. 10.4 m PLD	296,624,025	237,248,659
Additional Dredging Cost to 8.38 m PLD	41,127,867	38,256,350
TOTAL COST	337,751,892	275,505,009