Final Report of the Commission for the Study of Alternatives to the Panama Canal

Volume X

Commodity and Traffic Projections Phase II (1)

1993

COMISION DE ESTUDIO DE LAS ALTERNATIVAS AL CANAL DE PANAMA
CENTRO DE INFORMACION

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Comisión de Estudio
de las Alternativas
al Canal de Panamá
CENTRO DE INFORMACION

FINAL REPORT

COMMODITY AND TRAFFIC PROJECTIONS STUDY

VOLUME I

PANAMA CANAL POTENTIAL AND PROJECTED TRADE

To:

The Commission for the Study of Alternatives

to the Panama Canal

Prepared by:

The WEFA Group

Richardson Lawrie Associates

BST Associates

May 7, 1993

THE WEFA GROUP

May 7, 1993

Mr. Joseph A. Byrne
Executive Director
Commission for the Study of Alternatives to the Panama Canal
P. O. Box 2094
Balboa, Ancon Panama
Republic of Panama

Dear Mr. Byrne:

WEFA is pleased to submit this Final Report of the Commodity and Traffic Projections Component Study. The report is contained in four volumes.

- Volume 1 contains the main text of the report and is complete in itself, covering every element of the project and summarizing the results.
- Volume 2 contains the maritime transportation cost for each Panama route and the least cost alternative route and the approach that we used in determining these costs.
- Volume 3 presents the Panama Canal commodity flow projections. It includes the base-year (1990) bilateral and potential trade analysis, the world economic outlook, the forecasts of bilateral and potential trade, and the route by route commodity flows for each Panama Canal Alternative. Finally, this volume contains the tables for allocation of commodities to ship cargoes.
- Volume 4 provides the Panama Canal vessel transit projections by ship type and size range for each route and for each Canal Alternative.

Sincerely yours,

Bradley W. Perry, Ph.D.
Senior Vice President
Consulting Services

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BACKGROUND

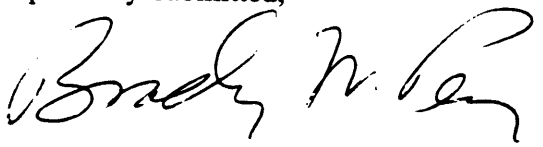
The Commission for the Study of Alternatives to the Panama Canal (CAS) engaged The WEFA Group, with subcontract support from Richardson Lawrie Associates (RLA) and BST Associates, to perform the Commodity and Traffic Projections (CTP) Study for the Panama Canal Alternatives Study Program. This program is a result of the 1979 agreement under the Panama Canal Treaty that the United States and Panama would implement a feasibility study on a sea-level canal by the year 2000. Subsequently, Japan joined the United States and Panama to form CAS, which has operating offices in Panama City, Panama.

The CTP is one of a series of component studies performed by selected contractors. In Phase I of the CTP, CAS requested WEFA, and its subcontractors, RLA and BST, to provide initial projections of future demand for trans-Isthmian commerce as a function of time for the prescreening and selection of canal alternatives for full study.

In Phase II of the project, the projections were refined using additional data and taking into account the capacity of the existing Canal as measured by the Operating Characteristics and Capacity Evaluation (OCCE) Component Contractor as well as the North American landbridge. These refined projections were applied to the set of prescreened alternative Canals for both no-tolls and with tolls scenarios to be used by the Economics Component Contractor and the Financing Scheme, Financial Analysis, and Management Arrangements Component Contractor, along with additional cost data.

This report contains the results of that study.

Respectfully submitted,



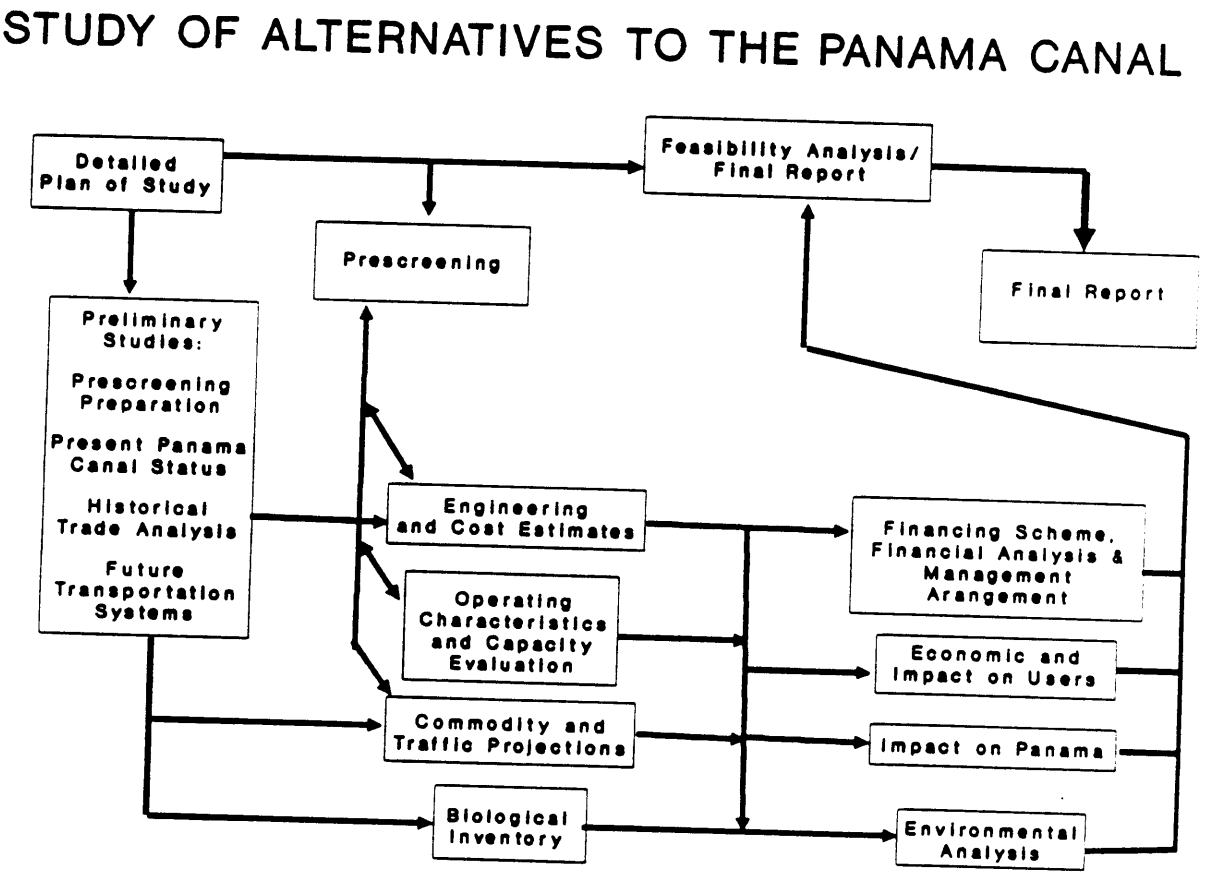
Bradley W. Perry, Ph.D.

1.0 EXECUTIVE SUMMARY

1.1 Introduction

In August, 1991 the Commission for the Study of Alternatives to the Panama Canal(CAS) engaged The WEFA Group, with subcontract support from Richardson Lawrie Associates (RLA) and BST Associates, to develop preliminary projections for the years 2020 and 2060 of commodity flows and ship traffic for the existing Panama Canal and for four alternative Canals through Panama. Known as the Commodity and Traffic Projections (CTP) Study, this is part of a group of studies designed to provide sufficient economic, engineering, and financial information to determine the feasibility of a range of alternatives to the existing Canal (see Fig. 1).

Figure 1



Those of relevance to the CTP Study and their relationship to it are as follows:

- The operating Characteristics and Capacity Evaluation (OCCE) Study used preliminary traffic flow data to determine the annual capacity of each alternative;
- the Economic Analysis and Impact on Users (EAIU) Study determined the benefits of each alternative based on traffic, cargo, and cost data provided to them by WEFA;
- the Financing Scheme, Financial Analysis, and Management Arrangements Study (FFMS) determined the maximum revenue each alternative Canal could generate based on traffic, cargo and cost data provided by WEFA.

For the EAIU and FFMS contractors, a forecast with zero Panama Canal tolls was developed as a baseline for their work, which involves no tolls in the case of the EAIU contractor and different toll strategies in the case of the FFMS contractor.

After prescreening of other alternatives based on initial CTP results, the alternative Canals for the purposes of the CTP Study were defined as follows in terms of maximum design ship size.

65,000 DWT	(Status Quo)
150,000 DWT	(Case 2)
200,000 DWT	(Case 3)
250,000 DWT	(Case 4)

The scope of the CTP Study excluded several issues, both from necessity and from the limited needs of the process. The study explicitly did not take into account the following issues:

- The effect of an enlarged or alternative Canal on the world economy, on global trade in aggregate, and on patterns of world trade;
- The effects of projected improvements in infrastructure in Panama, such as the Centerport project;
- Alternative assumptions to those which define our baseline scenario.

The study has taken into account the capacity of the Canal, as determined by the OCCE Study, and the capacity of North American ports and rail links, as determined and reported in this study.

The base year for the study is 1990 and the forecast periods are the years 2020 and 2060.

The WEFA team first reviewed the available data and previous approaches. Then, the following steps were carried out:

- We forecast world trade for 2020 and 2060 in sufficient detail to project the world vessel fleet by ship type and size category for 2020 and 2060;
- We projected the world vessel fleet for each of the alternative Canals;
- We estimated comparative costs of shipping each type of cargo by each type of ship in each ship size range through the Panama Canal and on bypass routes, including routes which include surface transport across the United States, the so-called "landbridge";
- We determined the present and future capacity of North American seaports, port facilities, intermodal facilities and mainline railroads as they affect goods on routes competitive with the Canal;
- We developed commodity and transit databases from data provided via CAS by the Panama Canal Commission (PCC) for calendar years 1986 - 90;
- We determined that part of the bilateral trade among nations on a route and commodity basis that represents the maximum "potential" commodity flows through the Isthmus in the absence of any physical, economic or other impediment;
- We forecast potential Panama Canal trade for 2020 and 2060 from the world trade forecasts.

The fundamental approach of the study was to develop forecasts of commodity and traffic flows by combining:

- the potential trade projections;
- the world fleet projections;
- the comparative shipping and landbridge economics;
- the base year PCC data on the commodity composition of ship cargoes by ship type, the loadings of cargoes by ship type and size range, and the size distribution by ship type of Canal shipping.

The overall flow chart of the project is shown in Figure 2.

1.2 Approach

The microeconomic approach used throughout the transportation analysis of this study is a point of departure for Panama Canal studies. Prior studies shifted trade based on trends or on judgement. In this study, we determined the least cost mode of transportation and shifted cargoes to those least-cost modes and routes.

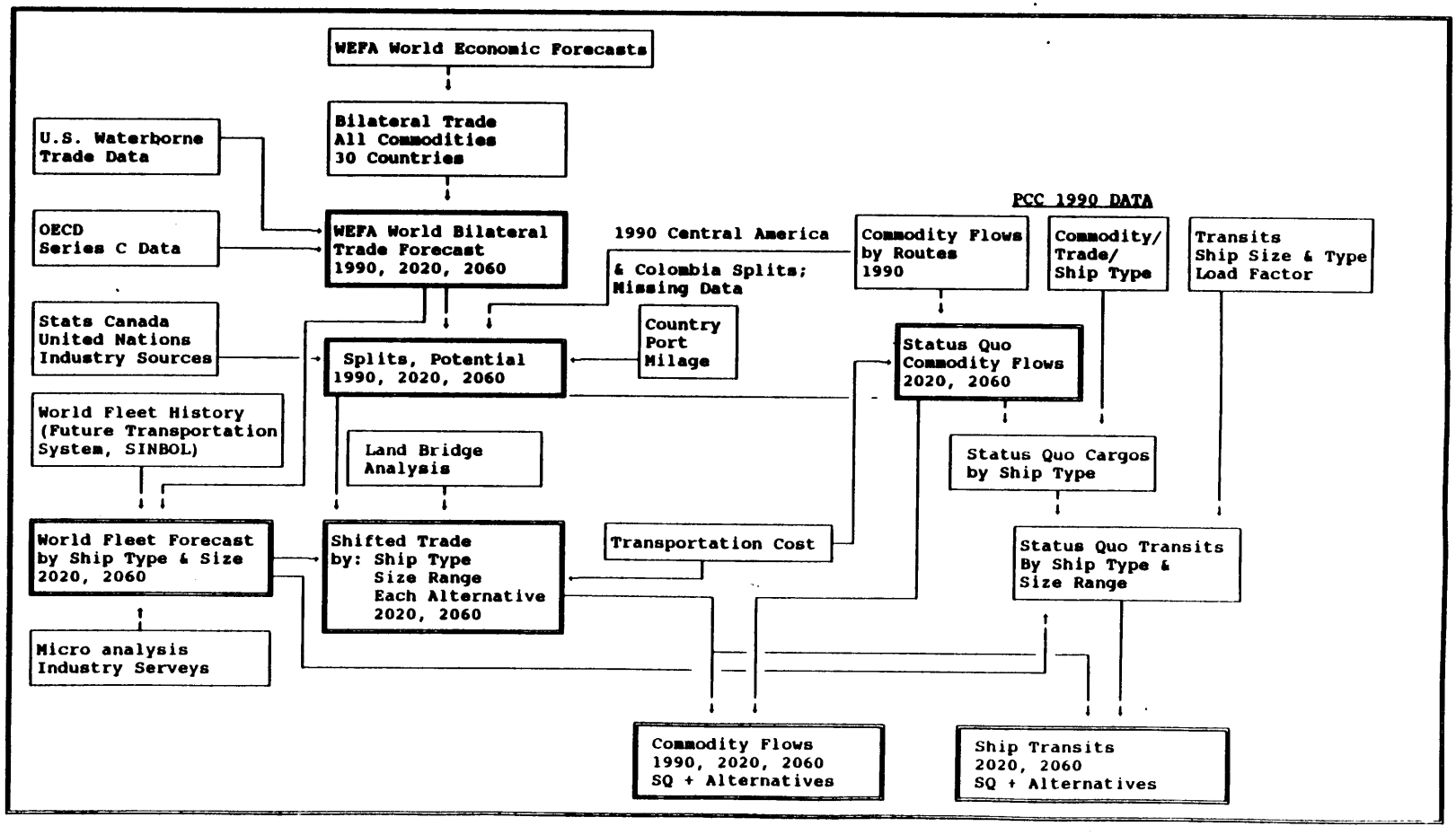
The final commodity flow projections were a result of the vessel transit projections, rather than the other way round. This approach was the consequence of incorporating transport economics into analysis, a factor which previous projections had not taken into account. The surprising nature of some of the results stem from this approach as well as of the use of top-down, bottom-up approaches to the projections of both world trade and the world vessel fleet.

The top-down, bottom-up approach in the context of the trade and fleet applications is equivalent to a supply/demand equilibration. In the case of trade, the WEFA World Model provided the top-down or demand part of the approach. This Model solves 30 country and regional macroeconomic models simultaneously with an allocation of import demand bilaterally to all of the exporting countries. The resulting trade matrix is broken into three commodities groupings: energy, non-energy primary, and manufactured goods. This matrix of trade among thirty countries and three commodities is then divided into the detail required for the study by using stochastic share equations.

This top-down approach to commodity forecasting is combined with WEFA's special world models for various industries: agriculture including bulk grains and fertilizer, energy, and steel. These cover the greater part of the commodity flows. These bottom-up forecasts use WEFA's World Model forecasts as economic drivers but focus on the supply relationships involved with renewable and non-renewable resources and the location of each part of the chain from extraction to finished goods manufacture.

Figure 2

Flow Chart of the Commodity and Traffic Projections Study



The top-down, bottom-up approach to the world fleet forecasts is similar. The forecasts of world trade provide demand for shipping. Combining this with scrappage forecasts results in demand for ships to carry the forecast trade. This is the top-down part of the forecast. Then, combining this with changes in technology and vessel economics, provides the required supply of new ships each year. This is the bottom-up part of the vessel forecast.

Because of the very long term nature of this study, several departures from and additions to our normal methods had to be incorporated. In the case of the economic and trade forecasts, we shifted from the stochastically based, that is, based on historical relationships, WEFA World Model[1] to a judgmental approach to the forecasts beyond the year 2010 of the key top-down variables: population, productivity, and the relation of trade to output. In the bottom-up part of the approach, allowance had to be made for the exhaustion of significant amounts of the world's total resource base. This was particularly true of oil, but important for the other resources which we tracked, namely, coal, natural gas, bauxite, and iron ore. We estimate that approximately half of the total remaining world coal reserves, two-thirds of the remaining world oil resources and 85% of estimated natural gas resources are consumed in the 1990-2060 period.

On the vessel side, extensive research was carried out as to the technical innovations planned and possible during the course of the study. In light of this research, it was decided to adopt the following principles in developing, for particular ship types, a scenario of techno-economic changes likely to be achieved during the forecast period:

- remembering that some ships on order in 1991 will still be operational in the year 2020, we assume that the levels of technology incorporated in the newest ships of 1991 will be the average level of technology in the year 2020;

- Between 2020 and 2060, it is assumed that the 2020 level of technology will persist, excepting only cases where it is now apparent that change will be made. This includes, however, continuing trends in vessel propulsion and manning efficiencies. A particular conclusion in this regard will be the requirement for skilled crew leading to the eventual disappearance of cheap labor from the global fleet.

After consultation with CAS, the specific assumption was made that the Jones Act, the U.S. regulation that requires intra-United States maritime trade to move in U.S. ships, would remain in force.

[1] The WEFA World Model is a traditional structural econometric model consisting of a system of deterministic and stochastic equations which are currently used to generate projections until the year 2010.

Because there is only one world economic scenario underlying our projections in Phase I, we have made what we consider "conservative" assumptions. This should not be taken to imply that they are either pessimistic or optimistic. We believe the assumption that global warming does not become a serious policy issue to be conservative; that is, we believe that alternative assumptions would be speculative. However, this assumption leads to higher consumption of oil and coal worldwide and thus to higher levels of world trade than would be the case in a scenario where emissions of carbon dioxide and other "greenhouse gases" were limited to 1990 values, for example.

1.3 World Economic and Trade Projections

The following are other important assumptions on which we have based the study.

- Geopolitical Factors:

  We assume continued world stability, that is, no major wars or political instability in the major countries of the world.

- Environmental Policy

  WEFA assumes that the current environmental policy of each nation, such as the United States or Korea, or group of nations, such as the European Community or the Commonwealth of Independent States, is maintained and are made neither more stringent nor eased. This implies, for example, that a carbon tax to reduce greenhouse emissions is not enacted.

- Population, Labor Force and Employment

  The population figures through 2025 are from the United Nations. WEFA has extended the U.N. fertility and mortality assumptions to 2060 in a manner consistent with our projections of GDP per capita in each region.

  A long term forecast such as we have undertaken focuses on the supply side, namely the growth in labor productivity due to technological progress. Short term fluctuations in unemployment and labor force participation are ignored; rather, the equilibrium levels of these variables are assumed. That is to say, our scenario has no business cycle behavior. It is not our belief that business cycles will never occur. Rather, we do not know when they will occur this far into the future. Taking only two points into the future requires that the scenario not involve any cyclical behavior.

- Technological Innovation and Transfer

  We assume that the long-term trends toward greater efficiency in production and toward a greater services share of consumption will continue. An important assumption in this area is the diffusion of technology now on the drawing boards to even the most undeveloped countries, allowing for a convergence of per capita GDP without an accelerated strain on the earth's resources.

- Productivity by Region

  Per capita GDP is assumed to continue on the historical trajectories and those of our short-term model based forecasts. In the most industrialized countries it is assumed to rise at slightly lower rates than historically.

  A basic assumption underlying the work is that the ranking of countries/regions in terms of per capita GDP remains fixed over the period, but that there is some convergence toward the standard of living of the most developed countries.

  As a result of these considerations, we expect total output in the developing world to rise considerably more rapidly than that in the developed world, but to still remain behind on a per capita basis. The relative levels within the groupings have more to do with the size of the countries/regions than anything else.

- Transportation Costs

  In terms of the various components of ship operating costs, between 1990 and 2020, increases in real terms are assumed for wage rates, repairs and maintenance, insurance and fuel costs. There is also likely to be a cost push effect in shipping market rates as a result of technological change. Nevertheless in the calculation of freight costs there are offsetting factors, in particular with regard to vessel efficiency and manning levels. Between 2020 and 2060 only fuel costs and labor rates rise in real terms.

We assume that over the long term real world labor costs rise at a rate of one percent per year. Oil prices are assumed to rise more rapidly as world reserves are depleted to an expected 30 percent of their 1990 level, and to reach $55 per barrel in 1990 dollars by 2060. Note that labor compensation is related to labor cost by labor productivity. That is, real labor compensation will rise faster than real labor cost by just the increase in labor productivity. Thus, if labor productivity were rising at one percent per year, the growth in labor compensation would be one percent higher than the rise in labor cost.

Panama Canal tolls are grown with average transportation costs, as there are no basis for speculating on another growth trajectory. These were also part of the terms of reference.

In addition to transportation costs, inventory carrying costs are computed as well, based on average value per ton, differences in origin to destination trips, and interest rates.

- Structural Change

Possibly the most important factor in the relation of merchandise trade to World GDP is the structural change which world economies are undergoing, namely, the shift away from goods and toward services. The gradual depletion of non-renewable resources means that new deposits are of lower quality, harder to reach, and more expensive to extract and refine. This results in gradually rising real costs for these resources.

These structural change considerations lead to a continuation of the long-term trend in the shift from goods toward services which produces a downward curvature in the ratio of total world trade to world GDP.

- Terms of Trade:

By terms of trade we mean the trade barriers or lack of them between countries. These can be unilateral, such as the barriers to agricultural products; bilateral, such as the U.S.-Canada free trade agreement; and multilateral, such at the EC common market and the General Agreement on Trade and Tariffs (GATT). In a recent review of the economics of trade policy[2], Professor Baldwin of the University of Wisconson and the National Bureau of Economic Research states as follows: "The new [economic] trade theorists ... believe that, as a rule of thumb, free trade is

[2] Robert E. Baldwin, "Are Economists' Traditional Trade Policy Views Still Valid?", **Journal of Economic Literature XXX** (June 1992), pp.804-829.

the best policy for countries to follow". We assume, therefore, that the emerging world trading blocs continue the post World War trend toward freer trade, specifically toward a continued lowering of tariff and non-tariff barriers.

Because the country for which there is the greatest degree of understanding in terms of the dynamics of growth is the United States, the analysis begins there. At present, per capita U.S. GDP is growing at slightly less than 2%. This is composed of two parts: productivity is growing at about 1% and labor force relative to population is growing at less than 1%. Eventually, we expect labor force and population to grow in tandem, with the result that the growth of per capita GDP drops to the 1% we continue to assume for productivity growth. The average per capita U.S. GDP growth over the 70 year period is slightly less than 1.5% per year.

This is not to suggest that the total tons of goods produced, or any such physical measure, grows at this rate. The trend in industrialized societies has been toward a saturation in physical goods and a relative shift to services. We expect this to continue, such that eventually most of the increase in output is in ever more efficiently provided services. These services will continue to require electric power and other energy forms, and other physical goods associated with them. Thus, trade in physical goods among the developed countries can be expected to grow, but at a decreasing rate. Finally, services are assumed to take greater and greater advantage of efficiencies to be gained from electronic advances, as is the case in the U.S. at present, and which we are seeing in Europe, Japan and elsewhere: automatic teller machines, home shopping, etc.

In general, we assume continued movement toward free markets in goods and most services. This underlies both the assumption of per capita GDP convergence and continued improvement in productivity. It also has the implication of freer trade, since trade barriers are merely another form of government interference in the free functioning of markets.

The growth of energy consumption is expected to slow in the industrialized countries and level off after 2020. Passive solar heating of homes, greater energy efficiency and cogeneration in buildings, the aforementioned shifts away from heavy industry, and growth in non-fossil fuel sources of power are all expected to contribute. The ratio of energy consumption to GDP is expected to continue to fall at a 1.9% annual average rate worldwide over the period.

In this forecast, global warming is assumed not to be an issue affecting fuel choice. Nor do we assume that nuclear power growth slows, outside of the U.S. and those European countries where opposition is strong. The major sources of energy are expected to be coal and natural gas.

Many countries such as the states of the former Soviet Union lag significantly behind developed nations in agricultural productivity. We assume that, as a result of technology transfer and the shift to a market economy, food imports into these countries will decline sharply. At the same time we believe that productivity growth in agriculture will slow in the next 70 years compared to the last 70. For both of these reasons we expect the growth in exports from current producers to slow significantly.

In general, we expect countries to become more self-sufficient in goods as the technological and labor cost advantages of the newly industrialized countries wanes. However, one of the principal engines of growth in newly industrialized countries is the newer plant and equipment and the lower wages paid. Thus, it is principally as per capita GDP converges that this advantage declines.

Steel production is an example of this trend. As a result of both lower unit demand for steel, due to the substitution of other materials, and increased self sufficiency, trade in steel products is expected to grow at less than 1% per year.

In the case of energy, oil trade must clearly fall off during this period because resources will be declining markedly worldwide, falling to 30% of their 1990 value. Coal and natural gas will come into their own during the first part of the next century. Even so, by 2060 coal reserves are expected to be depleted by 50% and natural gas resources by 85% from their present published estimated values[3]. Natural gas resource estimates are more uncertain that coal or oil, and, as a result, we have assumed that methane resources will be higher than published estimates. So long as extensive reserves of coal and natural gas remain to be exploited, it can be expected that it will be cheaper to transform these into sources of clean energy than to develop more costly technologies.

Therefore, coal trade is expected to become increasingly important during the first half of the next century as oil reserves fall. Natural gas trade, primarily by pipeline but also in liquified natural gas (LNG) tankers is also expected to be significant. However, these LNG tankers would not be using the Canal to any great extent as we expect most of this trade to be concentrated in the Far East while the Americas and Eurasia would depend primarily on pipelines.

[3] **BP Statistical Review of World Energy** (June 1991), and C.D. Masters, D.H. Root, and E.D. Attanasi, "World Oil and Gas Resources - Future Production Realities", **Annual Review of Energy, Vol. 15**, 1990, pp. 23-51.

1.4 North American Port and Landbridge Capacity Analysis

Mini-landbridge and micro-bridge transport services are a major source of competition for Panama Canal all-water movements to and from North America for container, fully assembled automobile and grain traffic. The question remains, however, whether these advantages will continue in the future as rail cargo grows or will congestion or some other form of constraint impact North America port and/or rail systems that could reverse the advantage to using all water Canal transportation systems? The following section summarizes the constraints to port and rail systems in North America.

U.S. & Canadian Port Trends

North American ports are facing substantial challenges in attempts to redevelop or expand port facilities. Ports can no longer predict resolution of improvement projects with any degree of certainty. Exposure to potential environmental liabilities has increased dramatically as has the length of time to gain environmental permits. This has had a dramatic upward influence on development costs. In addition, in several port areas, competition for scarce waterfront land has forced out port/industrial users as land values have increased and conflicts with adjacent neighboring uses increasing.

All of these impacts may cloud the ability to respond with additional capacity and increased water depth as market opportunities warrant. It is by no means assured that deepening projects currently under consideration in Hampton Roads, Mobile Bay and the Mississippi River or deeper drafts required to service larger vessels will reach fruition. As a result, improvements to the Panama Canal may be constrained because North American ports do not gain the ability to fully load the largest vessels transiting the improved Panama Canal (i.e. 300,000 DWT vessels). However, a comparison of the economic benefits with the estimated costs of dredging selected ports appears to confirm that deepening projects could meet federal benefit/cost criteria. As a result, it is assumed that North American ports could be deepened to accommodate vessels going through the improved Canal.

Regarding terminal capacity, it should be emphasized that most ports typically have a 20 to 30 year planning horizon. Growth beyond this time period (i.e. 2020 to 2060) will require ports to plan additional facilities in response to positive market opportunities. Hence, apparent capacity constraints beyond the year 2020 may not materialize. With these provisos, North American port facility constraints do not appear to be insurmountable for coal, grain or containers which represent the largest potential North American bypass trade components.

Coal Terminals

U.S. and Canadian coal terminals appear to be capable of handling the forecasted volumes expected in 2020 and 2060 from a terminal perspective (i.e. storage and loading capabilities). However, U.S. East Coast coal exports to Asia typically move in larger vessels which are topped off in South Africa. As indicated above, deepening projects appear to meet federal benefit/cost requirement.

Grain Terminals

Grain elevator capacity is not considered a constraint to exports during the study period. PNW and Gulf Terminals are currently under-utilized (especially elevators in Longview, Seattle and Tacoma in the PNW). In addition, elevators are often worked only one shift per day. The use of additional shifts is the simplest way to improve capacity at the elevators. Existing facilities may also be improved by provision of faster loading equipment. Construction of new "state of the art" terminals is a last resort to improving regional capacity. Because of the existing over-capacity no new grain terminals are being planned in the U.S. at the present time.

Canal bypass traffic is located in those states not well served by the Mississippi River barge system (most notably Nebraska, Iowa, North Dakota and Colorado). Evaluation of relative transportation rates via the PNW or Gulf terminals indicates that exports to Asia from these states will continue to move via the PNW throughout the study period.

Grain exports are typically transported in smaller vessels (i.e. 55,000 dwt with a draft of 40 feet) due to the water depth constraints of exporting and importing elevators, the preferred shipment size of importers and the number of grades of grain in each vessel. Water depth and shipping conditions are virtually identical in the Gulf and PNW grain export elevators at the present time (i.e. same size vessels at 53,000 to 55,000 dwt drawing the same water depth).

However, over the study period, variations in water depth at major U.S. export facilities could shift cargoes from one region to another. For example, full utilization of Panamax vessels requires water depth of 42 to 43 feet. Currently, this vessel draft is restricted in both the Columbia River (due to navigation channel limitations) and in the Gulf (due to both navigation channel limitations and the Panama Canal restrictions for grain exports to Asia). However, water depth variations are unlikely to shift cargo from the PNW to the Gulf in the above mentioned inland regions. If the PNW is improved and the Gulf is not, more grain could be diverted to the PNW.

Container Terminals

Storage area capacity is the major constraint for container terminals. Existing terminals with average productivity rates (i.e. 3,000 TEUs per acre per year) are nearing capacity. With improved throughput rates (i.e. 6,000 TEUs per acre per year) and new planned capacity coming on-line, forecasted 2020 volumes will reach 56% and 37% of terminal capacity in West Coast and East Coast facilities respectively. By 2060, capacity limits will be nearly exceeded assuming additional planned capacity comes on line at higher throughput rates.
After the year 2020, it is likely that new plans will be formulated to handle additional cargo flows at existing or new container ports. Container terminal capacity at North American ports is not expected to be a determinant in shifting cargo back to the all water (i.e. Panama Canal) routes. U.S. container throughput will also be positively impacted by planned improvements in Mexican ports. In addition, numerous smaller West Coast ports are also interested in container terminal development and could become important if capacities are reached in load center ports.

North American Rail Transportation Trends

Eastern railroad traffic (which includes all major carriers east of the Mississippi River) has fallen from 872 million tons in 1929 to approximately 750 million tons in the late 1980s. Western railroads have increased from 466 million tons in 1929 to 677 million tons in 1990. Over the entire 1929 to 1990 time period, traffic increased at 0.6% per year. However, during the decade of the 1980s, traffic grew much slower at only 0.2% per year. Western railroads have experienced growth in coal, chemical, grain, auto and container traffic. Other traffic has decreased substantially. The result has been virtually no growth in the overall rail traffic base. Between 1929 and 1990, tonnage increased from 1.3 billion tons to 1.4 billion tons or at an average annual rate of growth of 0.1%.

Future rail traffic will continue to grow slowly as a result of continued improvements in productivity such as : technological improvements which allow greater loading per car, growth in utilization of unit trains which also improves mainline productivity, improvements to traffic control systems allowing more trains to use the system, faster speeds on mainline systems and improvements to tunnel ventilation systems to allow more trains to use the (primarily mountain) tunnels among other potential improvements.

What growth does occur in railroad traffic will most likely continue to focus on movements of TOFC/COFC, grain, coal, chemicals and autos on high volume mainline corridors. Of particular importance in this study, growth of grain and container traffic may begin to impact system capacity.

Grain

West Coast grain exports are expected to increase from 25.9 million tons in 1990 to 53.1 million tons in 2060. Rail grain traffic will increase from 21.4 million tons to 45.1 million tons during the period (i.e. 85% of total exports). This amounts to an average annual growth rate of approximately 1% per year. This level of demand could lead to congestion on western railroads.

Containers

West Coast Asian traffic will generate approximately 29 import and 17 export doublestack equivalent trains per day by 2060 as forecasted. Likewise, European traffic on the East Coast will generate 8 import and 11 export DST equivalents per day. Efficient and price sensitive intermodal rail service has become mandatory for container operations to maintain opportunity cost savings over all water alternatives. However, steamship line arrivals currently peak from Thursday through Saturday at west coast ports. The level of throughput indicated above will strain peak day loadings on intermodal systems and mainlines. The result of the peaking problem could be to create additional delays in shipments.
Intermodal trains depends upon the following factors :

- Vessel arrival schedules (and potential multiple vessel calls)
- Port berth and equipment availability
- Transit from vessel to upland storage point in port terminal
- Fast delivery from port terminal to rail intermodal yard (accelerated if on-dock or near dock rail is available)
- Train loading and departure schedules
- Rail line-haul schedules
- Destination terminal handling
- Destination drayage

Lack of reliability at any component of the intermodal will tear the fabric of the "seamless" intermodal movement. In order to provide reliability of 95% or better, each step must function at 99% or better reliability. If peak day loadings are not smoothed out, the time advantage provided by mini-landbridge may erode. This could tend to shift cargo back to all water movements but only for Transpacific containers bound for the eastern seaboard or Transatlantic

containers bound for the west coast.

Conclusions - Railroad Capacity

Congestion problems currently occur along several parts of the mainline system, particularly in the western mountain areas and where two mainline routes meet. However, these problems have not typically reached the stage where the addition of additional mainline track is being constructed. Examples of bottlenecks include the Burlington Northern (BN) corridor between Spokane, Washington and Sandpoint, Idaho where two busy single-track mainline segments come together into one track, and the Union Pacific (UP) line over the Blue Mountains of eastern Oregon, where steep grades are an impediment.

In California the major congestion occurs in the Los Angeles basin, where a joint effort between the railroads and the ports is now underway to allow for joint use of tracks via the Alameda corridor. The Southern Pacific (SP) has heavy traffic on the single-track mainline between Tucson, Arizona and El Paso, Texas but is not encountering major delays at this time. The Santa Fe mainline is double-tracked from Los Angeles to central New Mexico, where it splits into two single-track mains. The Santa Fe line is very under-utilized.

The Canadian carriers, Canadian National (CN) and Canadian Pacific (CP) have few capacity constraints. The CN, primarily a natural resource carrier, has seen its business drop off with the decline of its client industries, and currently has traffic densities lower than any other western railroad. The CP recently completed the new Rogers Pass tunnel through the mountains of eastern British Columbia, which eliminated the major bottleneck in the CP system.

All carriers report they can handle increased volumes even with these reported problem areas. The average east-west mainline trackage is currently only 27% utilized. The railroads have focussed on improving traffic control systems and EDI as the optimal means of improving system capacity.

Railroad capacity constraints in 2020 and 2060 are very difficult to quantify. However, peak movements of container traffic may begin to constrain the system without substantial new trackage. The likely source of the constraint will be a scheduling constraint. Peaking problems could appear at port terminals, port intermodal yards, stretches of the mainline system, inland intermodal yards and inland highway systems. As this occurs, the time savings advantage of intermodal shipments could decline for containers moving from the West Coast to the Eastern Seaboard. This could result in a shift of some containers back to all water service.

1.5 Bilateral and Potential Trade Relative to the Panamanian Isthmus

The analysis of world bilateral trade relative to the Panamanian Isthmus is the pivotal exercise in this study. The purpose of this analysis is to determine the level of **Panama potential trade**, namely the flow of commodities that would transit the Isthmus of Panama in the absence of any physical, economic or other impediment.

The term **bilateral trade** refers to the total trade between two countries. **Potential trade**, in this study, refers to that part of bilateral trade that represents the maximum possible commodity flow through the Isthmus. Potential trade, therefore, is that part of the bilateral trade that might have gone or may, in the future, go through the Isthmus in the absence of any impediment.

The approach of this study has been to determine potential trade on a mileage basis. That is, we examined the historical 1990 bilateral trade in sufficient detail to make possible country-to-country and port-to-port mileage comparisons between each Panama Canal route and the shortest alternative route.

Beyond the scope of this study were estimates of changes that would occur in **bilateral trade** if there were no physical, economic or other impediment to maritime traffic across the Panamanian Isthmus. Both the historical and forecast bilateral trade, that is the total trade between pairs of countries, were estimated assuming the existing Panama Canal to be in place.

If we had taken it into consideration in the Potential Trade Analysis, the effect of removing the Isthmus as an impediment to world trade would be two-fold. First, the reduced cost of the Isthmus route and its availability to ships larger than can now transit the Panama Canal would shift patterns of bilateral trade. To name one example, the share of Colombian coal going to Asian markets would probably rise relative to the share going to European markets.

Secondly, the reduced overall costs of transportation would have the effect of increasing consumption, production, or, more probably, both. As we have noted, neither of these effects have been addressed in this study because they are judged to be small overall. However, for some trades, such as the Colombian example, they might not be.

Using the mileage basis alone ignores another factor in world trade. Most general cargo ships operate on regular routes, picking up cargo at any one port along the route and dropping it at another. The economics of this "liner trade" are such that shipping rates may not be a simple function of mileage. A relatively small cargo may cost less to ship on a longer route through the Canal than on a shorter route that is not regularly travelled.

For this reason, we observe a small amount of trade on routes whose mileage **is longer** through the Canal. This is shown in Table 1, where we summarize the results of the analysis by route table for the aggregate routes in the study.

TABLE 1 BILATERAL AND POTENTIAL TRADE ANALYSIS FOR 1990, TOTALS EACH ROUTE, THOUSAND TONNES

ORIGIN	DESTINATION	BILATERAL TRADE	PANAMA CANAL TRADE	POTENTIAL TRADE	NON-POTENTIAL TRADE	RATIO: POTENTIAL TO BILATERAL
Routes for which all mileages through the Canal are greater						
AFRICA	ASIA	18,330	1	0	18,330	0.0%
AFRICA	OCEANIA	835	127	0	835	0.0%
ASIA	EUROPE	43,767	368	0	43,767	0.0%
EUROPE	ASIA	51,865	494	0	51,865	0.0%
TOTAL		114,797	990	0	114,797	0.0%
PERCENT OF GRAND TOTAL		28.7%	0.6%	0.0%	56.0%	
TOTAL NON-POTENTIAL AS A PERCENT OF GRAND TOTAL BILATERAL					28.7%	
Routes for which most mileages through the Canal are greater						
OCEANIA	EUROPE	45,590	758	729	44,862	1.6%
S. AMERICA E.C.	OCEANIA	768	4	87	681	11.3%
MIDDLE EAST	U.S. W.C., HAWAII	574	73	73	501	12.8%
OCEANIA	S. AMERICA E.C.	2,302	534	561	1,741	24.4%
EUROPE	OCEANIA	3,023	1,045	942	2,081	31.2%
S. AMERICA E.C.	ASIA	49,440	1,954	20,657	28,782	41.8%
TOTAL		101,697	4,367	23,049	78,648	22.7%
PERCENT OF GRAND TOTAL		25.4%	2.8%	11.8%	38.4%	
TOTAL NON-POTENTIAL AS A PERCENT OF GRAND TOTAL BILATERAL					19.6%	
Routes for which some mileages through the Canal are greater						
OCEANIA	U.S. EAST COAST	4,899	3,704	3,940	959	80.4%
ASIA	U.S. EAST COAST	16,387	12,894	13,304	3,084	81.2%
ASIA	S. AMERICA E.C.	270	252	229	42	84.6%
AFRICA	U.S. W.C., HAWAII	162	124	144	17	89.4%
U.S. EAST COAST	ASIA	73,474	53,976	66,247	7,227	90.2%
S. AMERICA E.C.	U.S. W.C., HAWAII	1,872	2,238	1,808	64	96.6%
U.S. EAST COAST	OCEANIA	3,140	2,790	3,107	33	98.9%
S. AMERICA E.C.	CANADA WEST COAST	111	158	110	1	99.0%
U.S. W.C., HAWAII	AFRICA	1,669	1,452	1,663	6	99.6%
TOTAL		101,983	77,587	90,550	11,433	88.8%
PERCENT OF GRAND TOTAL		25.5%	49.2%	46.3%	5.6%	
TOTAL NON-POTENTIAL AS A PERCENT OF GRAND TOTAL BILATERAL					2.9%	
Routes for which no mileages through the Canal are greater						
U.S. W.C., HAWAII	S. AMERICA E.C.	350	344	350	0	100.0%
AFRICA	C. AMERICA W.C.	239	239	239	0	100.0%
AFRICA	CANADA WEST COAST	811	788	811	0	100.0%
AFRICA	S. AMERICA W.C.	81	81	81	0	100.0%
ASIA	CANADA EAST COAST	510	534	510	0	100.0%
ASIA	CENTRAL AMERICA E.C.,	1,548	1,642	1,548	0	100.0%
C. AMERICA W.C.	AFRICA	107	107	107	0	100.0%
C. AMERICA W.C.	CENTRAL AMERICA E.C.,	705	705	705	0	100.0%

TABLE 1 BILATERAL AND POTENTIAL TRADE ANALYSIS FOR 1990, TOTALS EACH ROUTE, THOUSAND TONNES (Continued)

ORIGIN	DESTINATION	BILATERAL TRADE	PANAMA CANAL TRADE	POTENTIAL TRADE	NON-POTENTIAL TRADE	RATIO: POTENTIAL TO BILATERAL
C. AMERICA W.C.	EUROPE	1,057	1,057	1,057	0	100.0%
C. AMERICA W.C.	S. AMERICA E.C.	160	160	160	0	100.0%
C. AMERICA W.C.	U.S. EAST COAST	3,716	1,669	3,716	0	100.0%
CANADA EAST COAST	ASIA	4,969	1,718	4,969	0	100.0%
CANADA EAST COAST	C. AMERICA W.C.	31	32	31	0	100.0%
CANADA EAST COAST	OCEANIA	175	140	175	0	100.0%
CANADA EAST COAST	S. AMERICA W.C.	334	236	334	0	100.0%
CANADA EAST COAST	U.S. W.C., HAWAII	10	52	10	0	100.0%
CANADA WEST COAST	AFRICA	1,292	1,716	1,292	0	100.0%
CANADA WEST COAST	CENTRAL AMERICA E.C.,	83	96	83	0	100.0%
CANADA WEST COAST	EUROPE	8,658	7,260	8,658	0	100.0%
CANADA WEST COAST	MIDDLE EAST	263	263	263	0	100.0%
CANADA WEST COAST	S. AMERICA E.C.	1,302	552	1,302	0	100.0%
CANADA WEST COAST	U.S. EAST COAST	1,052	1,054	1,052	0	100.0%
CENTRAL AMERICA E.C.,	ASIA	1,825	2,071	1,825	0	100.0%
CENTRAL AMERICA E.C.,	C. AMERICA W.C.	1,004	1,004	1,004	0	100.0%
CENTRAL AMERICA E.C.,	OCEANIA	24	24	24	0	100.0%
CENTRAL AMERICA E.C.,	S. AMERICA W.C.	804	804	804	0	100.0%
CENTRAL AMERICA E.C.,	U.S. W.C., HAWAII	1,232	1,232	1,232	0	100.0%
EUROPE	CANADA WEST COAST	250	463	250	0	100.0%
EUROPE	S. AMERICA W.C.	1,176	1,973	1,176	0	100.0%
EUROPE	U.S. W.C., HAWAII	3,393	3,500	3,393	0	100.0%
EUROPE	C. AMERICA W.C.	756	848	756	0	100.0%
OCEANIA	CANADA EAST COAST	158	521	158	0	100.0%
OCEANIA	CENTRAL AMERICA E.C.,	311	312	311	0	100.0%
S. AMERICA E.C.	C. AMERICA W.C.	1,868	1,868	1,868	0	100.0%
S. AMERICA E.C.	S. AMERICA W.C.	2,098	2,098	2,098	0	100.0%
S. AMERICA W.C.	AFRICA	137	137	137	0	100.0%
S. AMERICA W.C.	CANADA EAST COAST	481	41	481	0	100.0%
S. AMERICA W.C.	CENTRAL AMERICA E.C.,	5,627	5,627	5,627	0	100.0%
S. AMERICA W.C.	EUROPE	7,443	6,383	7,443	0	100.0%
S. AMERICA W.C.	S. AMERICA E.C.	485	229	485	0	100.0%
S. AMERICA W.C.	U.S. EAST COAST	8,250	7,993	8,250	0	100.0%
U.S. EAST COAST	C. AMERICA W.C.	4,170	4,332	4,170	0	100.0%
U.S. EAST COAST	CANADA WEST COAST	121	210	121	0	100.0%
U.S. EAST COAST	S. AMERICA W.C.	4,378	4,053	4,378	0	100.0%
U.S. EAST COAST	U.S. W.C., HAWAII	1,422	1,422	1,422	0	100.0%
U.S. W.C., HAWAII	CANADA EAST COAST	212	190	212	0	100.0%
U.S. W.C., HAWAII	CENTRAL AMERICA E.C.,	392	392	392	0	100.0%
U.S. W.C., HAWAII	EUROPE	5,475	5,626	5,475	0	100.0%
U.S. W.C., HAWAII	U.S. EAST COAST	996	996	996	0	100.0%
TOTAL		81,941	74,795	81,941	0	100.0%
PERCENT OF GRAND TOTAL		20.5%	47.4%	41.9%	0.0%	
GRAND TOTAL		400,418	157,739	195,541	204,878	48.8%

In this study, the term **bilateral trade** normally refers to the trade on the Canal routes shown in Table 1, rather than the global total of bilateral trade. In the data used in this study, the global world trade total in 1990 was 2.59 billion tonnes, but this excludes non-OECD, non-OECD trade on non-Canal routes. According to OECD estimates (**Maritime Transport 1990**) total 1990 world seaborne trade was 4.06 billion tonnes.

As shown in Table 1, in 1990 that part of total bilateral trade that flows on the Canal routes amounts to 0.40 billion tonnes, just 10% of the world total, the potential Panama trade amounts to 0.20 billion tonnes or 5% of world trade, and the actual trade through the Canal is 3.9% of world trade. The potential trade for the Canal is relatively small in world terms because the Canal is not in an advantageous geographical location for the bulk of world trade.

In our measurement of total potential trade from the 1990 data, we obtained a figure less than half of the total bilateral trade over routes for which trade is observed through the Canal. As shown in Table 1, this is the result of the following situation.

There are routes on which Canal commodity flows are observed, but for which the Canal is **not the shortest route**. A conspicuous example is trade between Europe and Asia. For no pair of countries or ports in the Europe-Asia trade is the mileage through the Canal shorter. In terms of bilateral trade, this is a very large number. In terms of potential trade it is zero. The trade between Europe and Asia alone accounts for 24% of the total of bilateral trade over all Canal routes.

A second factor is that bilateral trade is always reported on a country-to-country basis. To determine potential trade, bilateral trade for many countries must be split between coasts or ports of individual countries. For example, Canada, Mexico, Central America and Colombia all have east and west coasts with respect to the Canal. Canada is particularly important in this regard as nearly all trade between Canada and Asia is from the west coast of Canada, and nearly all to Europe from the east coast.

The detailed results of this analysis are presented in Volume III of this study. Figures 3 and 4 present the comparison of potential trade and Panama Canal commodity flows for all commodities and for major bulks, respectively. As can be seen from these charts, major bulks are the sole bypass commodity.

Figure 3

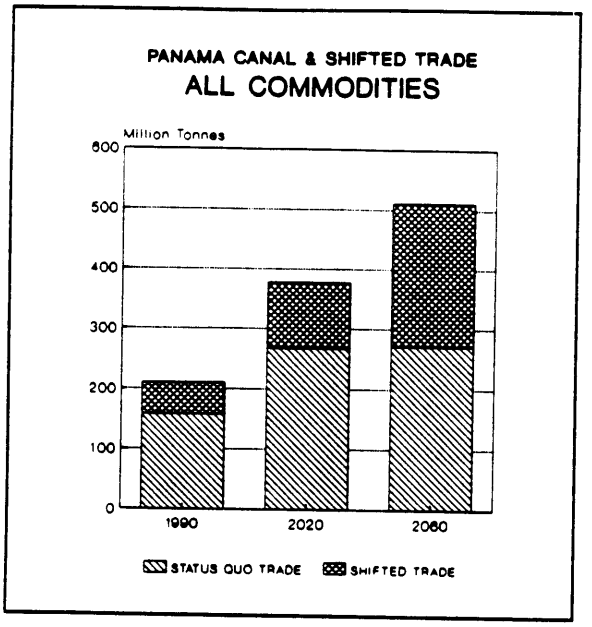
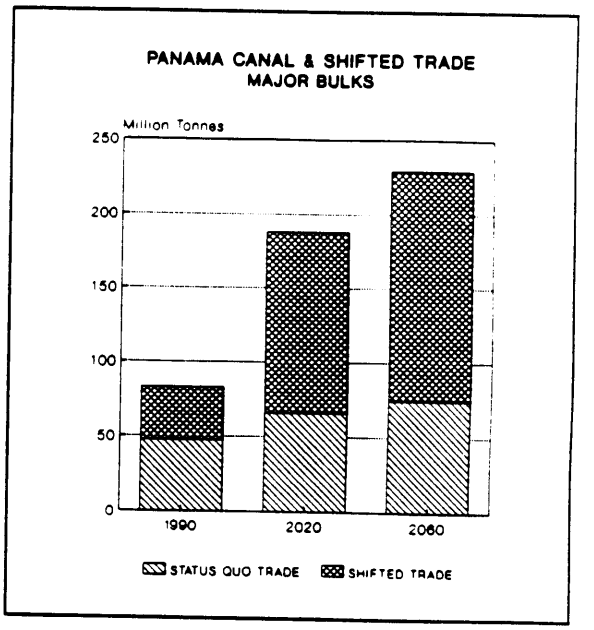


Figure 4



In Table 2, we give the aggregate results of the analysis by commodity. For all of those commodities that travel in ships that can transit the present Canal, potential trade and Panama Canal trade should be identical, except for the effects of liner trade. Unfortunately, this is not the case because of differences between the PCC data and the country, OECD, and U.N. sources that we have used.

TABLE 2 BYPASS TRADE ANALYSIS

	TOTAL BILATERAL TRADE			NON-POTENTIAL TRADE			POTENTIAL TRADE			PANAMA CANAL TRADE		
COMMODITY	1990	2020	2060	1990	2020	2060	1990	2020	2060	1990	2020	2060
IRON ORE	74,827	198,428	216,752	54,771	147,545	159,350	20,056	50,883	57,401	581	1,362	202
BAUXITE/ALUMINA	7,123	18,188	13,276	4,217	8,700	7,869	2,906	9,489	5,407	2,906	9,489	281
CRUDE PETROLEUM	12,540	25,244	24,692	2,918	6,236	8,144	9,621	19,008	16,548	9,621	5,008	459
COAL & COKE	66,990	144,336	190,271	40,233	80,539	107,527	26,757	63,796	82,743	10,978	5,507	3,419
BULK GRAINS	28,560	49,524	78,304	5,032	5,167	11,401	23,528	44,356	66,903	23,528	44,356	56,607
FERTILIZERS	19,801	20,431	41,906	6,360	12,734	23,172	13,440	7,697	18,735	13,009	8,229	8,595
BULK CHEMICALS	13,136	38,582	59,939	5,575	16,097	26,265	7,561	22,486	33,674	6,967	22,920	32,161
PETROLEUM PRODUCTS	24,122	32,429	30,023	7,980	15,109	20,808	16,142	17,320	9,215	12,490	16,995	4,140
OILS AND FATS	4,622	9,519	16,510	3,623	7,725	13,010	999	1,794	3,500	729	1,449	1,996
REFRIGERATED CARGO	7,805	18,607	29,674	2,091	4,753	7,477	5,713	13,854	22,197	5,389	13,614	18,496
VEHICLES	4,336	6,866	6,344	2,599	4,454	3,745	1,737	2,413	2,598	1,647	2,317	1,807
MINOR BULKS	77,341	120,147	199,917	33,712	50,442	85,243	43,628	69,705	114,674	36,806	57,404	49,802
CONTAINERIZED CARGO	56,795	134,673	218,295	35,201	86,401	148,981	21,594	48,272	69,314	20,840	46,835	54,313
GENERAL CARGO	3,084	7,351	13,742	564	1,364	2,315	2,520	5,987	11,426	11,980	30,477	44,251
TOTAL	401,080	829,520	1,139,644	204,877	447,267	625,307	196,203	377,060	514,337	157,472	265,962	276,529
MAJOR BULKS	190,039	435,720	523,295	107,171	248,187	294,289	82,868	187,533	229,003	47,615	65,722	60,968
CONTAINERS	56,795	134,673	218,295	35,201	86,401	148,981	21,594	48,272	69,314	20,840	46,835	54,313
OTHER	154,246	259,127	398,054	62,505	112,679	182,038	91,741	141,255	216,020	89,018	153,406	161,247

The difficulty is that as soon as one gets away from the bulk trades the PCC data show sharp differences from the international data used in the bilateral trade analysis. These differences have four sources:

1. Containerization - WEFA estimated the containerization of general cargo in the historical data based on surveys and other information. In general, containerization of internationally traded commodities is not given in the data. On the other hand, the PCC provides data on total tonnes containerized, without indicating what specific goods are in the containers.

2. Definitional differences - the PCC has its own unique definitions of commodities. Under the leadership of the United Nations, the country data that form the basis for the bilateral trade forecasts, have moved toward a "harmonized" commodity code. This allows trade data from one country to be compared in a unique way with those from any other. As the PCC has not shifted to an internationally accepted commodity coding basis, significant differences can be expected to arise for many of the commodities.

3. Assignment differences - We have assigned Panama cargoes to major categories based in large part on the type of ship in which the PCC shows the cargo being carried. In assigning the cargoes in the bilateral trade data, we have made every effort to be consistent with the PCC, but differences inevitably arise.

4. Differences in data sources - No two data sources ever agree, in part for the two reasons just noted, and differences always arise. The bilateral trade data are, at base, derived from customs data of the individual countries. The PCC is an entirely separate entity and cannot be expected to use the same definitions, etc., and the individual countries.

These issues are important for the forecasting process. The base data for the commodity forecasts have to be the PCC data to be consistent with data on cargoes and ship transits. However, the data show large differences in definition between the bilateral trade data and the PCC data. For this reason, we use growth rates rather than the levels of the potential trade forecasts for other than bulk trades.

1.6 Commodity and Transit Projections

The projections for a no-tolls scenario, taking into account capacity considerations for the North American landbridge and the Status Quo Canal, are as shown in the following tables. As expected, except for the constrained 2060 Status Quo canal, the results are not significantly different in total from Phase I.

However, there are significant differences in ship size distribution. These arise from the following considerations.

- The ship size distribution in the actual PCC data used in Phase II is different in many respects from that in the synthetic ship transit distribution developed in Phase I.

- The conclusions of our analysis for the constrained 2060 Status Quo Canal are that the vessels re-routed are concentrated where alternative routes represent least additional miles and in the larger size ranges.

- As already noted, the exclusion of Panama Canal tolls from consideration in Phase II leads to greater switching of bypass traffic carried in very large vessels on to the Canal.

Table 3

ANNUAL CARGO FLOWS BY COMMODITY AND ROUTE
NORTHBOUND AND SOUTHBOUND
THOUSAND TONNES

COMMODITY	1990	2020	2060	ANNUAL GROWTH RATE 1990-2020	2020-2060	1990-2060
IRON ORE	581	1,362	202	2.88%	-4.66%	-1.50%
BAUXITE/ALUMINA	2,906	9,489	281	4.02%	-8.42%	-3.28%
CRUDE PETROLEUM	9,621	5,008	459	-2.15%	-5.80%	-4.25%
COAL & COKE	10,978	5,507	3,419	-2.27%	-1.18%	-1.65%
BULK GRAINS	23,528	44,356	56,607	2.14%	0.61%	1.26%
FERTILIZERS	13,009	8,229	8,595	-1.52%	0.11%	-0.59%
BULK CHEMICALS	6,967	22,920	32,161	4.05%	0.85%	2.21%
PETROLEUM PRODUCTS	12,490	16,995	4,140	1.03%	-3.47%	-1.56%
OILS AND FATS	729	1,449	1,996	2.32%	0.80%	1.45%
REFRIGERATED CARGO	5,389	13,614	18,496	3.14%	0.77%	1.78%
VEHICLES	1,647	2,317	1,807	1.14%	-0.62%	0.13%
MINOR BULKS	36,806	57,404	49,802	1.49%	-0.35%	0.43%
CONTAINERIZED CARGO	20,840	46,835	54,313	2.74%	0.37%	1.38%
GENERAL CARGO	11,980	30,477	44,251	3.16%	0.94%	1.88%
TOTAL	157,472	265,962	276,529	1.76%	0.10%	0.81%
150,000 DWT						
IRON ORE	581	20,302	11,071	12.57%	-1.50%	4.30%
BAUXITE/ALUMINA	2,906	9,489	5,407	4.02%	-1.40%	0.89%
CRUDE PETROLEUM	9,621	19,008	16,548	2.30%	-0.35%	0.78%
COAL & COKE	10,978	63,818	82,772	6.04%	0.65%	2.93%
BULK GRAINS	23,528	44,356	66,902	2.14%	1.03%	1.50%
FERTILIZERS	13,009	8,229	19,674	-1.52%	2.20%	0.59%
BULK CHEMICALS	6,967	22,920	33,857	4.05%	0.98%	2.28%
PETROLEUM PRODUCTS	12,490	16,995	8,311	1.03%	-1.77%	-0.58%
OILS AND FATS	729	1,449	2,549	2.32%	1.42%	1.80%
REFRIGERATED CARGO	5,389	13,614	21,223	3.14%	1.12%	1.98%
VEHICLES	1,647	2,317	1,829	1.14%	-0.59%	0.15%
MINOR BULKS	36,806	57,404	96,078	1.49%	1.30%	1.38%
CONTAINERIZED CARGO	20,840	50,611	67,180	3.00%	0.71%	1.69%
GENERAL CARGO	11,980	30,477	57,245	3.16%	1.59%	2.26%
TOTAL	157,472	360,990	490,647	2.80%	0.77%	1.64%
200,000 DWT						
IRON ORE	581	22,624	15,150	12.98%	-1.00%	4.77%
BAUXITE/ALUMINA	2,906	9,489	5,407	4.02%	-1.40%	0.89%
CRUDE PETROLEUM	9,621	19,008	16,548	2.30%	-0.35%	0.78%
COAL & COKE	10,978	63,818	82,772	6.04%	0.65%	2.93%
BULK GRAINS	23,528	44,356	66,902	2.14%	1.03%	1.50%
FERTILIZERS	13,009	8,229	19,674	-1.52%	2.20%	0.59%
BULK CHEMICALS	6,967	22,920	33,857	4.05%	0.98%	2.28%
PETROLEUM PRODUCTS	12,490	16,995	8,311	1.03%	-1.77%	-0.58%
OILS AND FATS	729	1,449	2,549	2.32%	1.42%	1.80%
REFRIGERATED CARGO	5,389	13,614	21,223	3.14%	1.12%	1.98%
VEHICLES	1,647	2,317	1,829	1.14%	-0.59%	0.15%
MINOR BULKS	36,806	57,404	96,078	1.49%	1.30%	1.38%
CONTAINERIZED CARGO	20,840	50,611	67,180	3.00%	0.71%	1.69%
GENERAL CARGO	11,980	30,477	57,245	3.16%	1.59%	2.26%
TOTAL	157,472	363,312	494,726	2.83%	0.77%	1.65%

Table 3

ANNUAL CARGO FLOWS BY COMMODITY AND ROUTE
NORTHBOUND AND SOUTHBOUND
THOUSAND TONNES (Continued)

COMMODITY	1990	2020	2060	ANNUAL GROWTH RATE 1990-2020	2020-2060	1990-2060
250,000 DWT						
IRON ORE	581	29,145	28,951	13.94%	-0.02%	5.74%
BAUXITE/ALUMINA	2,906	9,489	5,407	4.02%	-1.40%	0.89%
CRUDE PETROLEUM	9,621	19,008	16,548	2.30%	-0.35%	0.78%
COAL & COKE	10,978	63,818	82,772	6.04%	0.65%	2.93%
BULK GRAINS	23,528	44,356	66,902	2.14%	1.03%	1.50%
FERTILIZERS	13,009	8,229	19,674	-1.52%	2.20%	0.59%
BULK CHEMICALS	6,967	22,920	33,857	4.05%	0.98%	2.28%
PETROLEUM PRODUCTS	12,490	16,995	8,311	1.03%	-1.77%	-0.58%
OILS AND FATS	729	1,449	2,549	2.32%	1.42%	1.80%
REFRIGERATED CARGO	5,389	13,614	21,223	3.14%	1.12%	1.98%
VEHICLES	1,647	2,317	1,829	1.14%	-0.59%	0.15%
MINOR BULKS	36,806	57,404	96,078	1.49%	1.30%	1.38%
CONTAINERIZED CARGO	20,840	50,611	67,180	3.00%	0.71%	1.69%
GENERAL CARGO	11,980	30,477	57,245	3.16%	1.59%	2.26%
TOTAL	157,472	369,833	508,527	2.89%	0.80%	1.69%

Table 4 SUMMARY OF BALLAST AND LADEN TRANSITS FOR ALL CASES

STATUS QUO CANAL

1990	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL
Container-Breakbulk	14	13	552	554	566	567	1,133
Dry Bulk Carriers	316	28	1,136	1,612	1,452	1,640	3,092
Chemical Tankers	36	4	143	301	179	305	484
Full Container Ships	3	2	553	517	556	519	1,075
General Cargo Ships	72	54	364	419	436	473	909
Liquid Gas Carriers	68	1	8	102	76	103	179
Refrigerated Ships	24	498	1,119	598	1,143	1,096	2,239
Roll-on Roll-off	16	4	90	96	106	100	206
Oil Tankers	158	148	292	369	450	517	967
Vehicle Carriers	1	279	325	125	326	404	730
Passenger Ships	1	3	49	99	50	102	152
Total Ships	708	1,031	4,631	4,792	5,339	5,823	11,162

2020	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2020
Container-Breakbulk	29	12	794	826	823	841	1,664	1.29%
Dry Bulk Carriers	363	13	1642	1964	2,011	2,005	4,016	0.88%
Chemical Tankers	77	4	266	795	343	799	1,142	2.90%
Full Container Ships	5	4	1160	1,220	1,165	1,224	2,390	2.70%
General Cargo Ships	79	61	420	473	499	534	1,033	0.43%
Liquid Gas Carriers	126	2	10	211	136	213	349	2.25%
Refrigerated Ships	24	909	2,200	882	2,224	1,792	4,016	1.97%
Roll-on Roll-off	27	4	106	157	132	162	294	1.19%
Oil Tankers	234	97	185	568	419	666	1,085	0.39%
Vehicle Carriers	2	381	443	197	445	578	1,023	1.13%
Passenger Ships	2	9	154	183	155	192	348	2.80%
Total Ships	967	1497	7379	7479	8,352	9,007	17,359	1.48%

2060	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2060
Container-Breakbulk	37	21	1289	1039	1,326	1,060	2,386	1.07%
Dry Bulk Carriers	314	4	629	1976	944	1,977	2,920	-0.08%
Chemical Tankers	89	5	298	906	387	912	1,299	1.42%
Full Container Ships	1	4	1091	1181	1,092	1,185	2,277	1.08%
General Cargo Ships	126	97	681	713	807	810	1,616	0.83%
Liquid Gas Carriers	60	5	14	91	74	96	169	-0.08%
Refrigerated Ships	20	933	2500	1438	2,520	2,371	4,891	1.12%
Roll-on Roll-off	47	8	182	223	229	231	460	1.15%
Oil Tankers	96	29	62	205	158	233	391	-1.29%
Vehicle Carriers	2	438	510	233	512	671	1,183	0.69%
Passenger Ships	39	12	197	238	236	250	485	1.67%
Total Ships	831	1556	7451	8243	8,283	9,795	18,078	0.69%

Table 4 SUMMARY OF BALLAST AND LADEN TRANSITS FOR ALL CASES (continued)

150,000 DWT

1990	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL
Container-Breakbulk	14	13	552	554	566	567	1,133
Dry Bulk Carriers	316	28	1,136	1,612	1,452	1,640	3,092
Chemical Tankers	36	4	143	301	179	305	484
Full Container Ships	3	2	553	517	556	519	1,075
General Cargo Ships	72	54	364	419	436	473	909
Liquid Gas Carriers	68	1	8	102	76	103	179
Refrigerated Ships	24	498	1,119	598	1,143	1,096	2,239
Roll-on Roll-off	16	4	90	96	106	100	206
Oil Tankers	158	148	292	369	450	517	967
Vehicle Carriers	1	279	325	125	326	404	730
Passenger Ships	1	3	49	99	50	102	152
Total Ships	708	1,031	4,631	4,792	5,339	5,823	11,162

2020	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2020
Container-Breakbulk	29	12	794	826	823	841	1,664	1.29%
Dry Bulk Carriers	389	12	1536	2581	1,930	2,620	4,549	1.30%
Chemical Tankers	77	4	266	795	343	799	1,142	2.90%
Full Container Ships	5	4	1127	1115	1,132	1,119	2,251	2.49%
General Cargo Ships	79	61	420	473	499	534	1,033	0.43%
Liquid Gas Carriers	126	2	10	211	136	213	349	2.25%
Refrigerated Ships	24	909	2199	882	2,223	1,792	4,015	1.97%
Roll-on Roll-off	27	4	106	157	132	162	294	1.19%
Oil Tankers	329	98	181	521	510	619	1,128	0.52%
Vehicle Carriers	2	381	443	197	445	578	1,023	1.13%
Passenger Ships	2	9	154	183	155	192	348	2.80%
Total Ships	1087	1495	7235	8043	8,327	9,469	17,796	1.57%

2060	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2060
Container-Breakbulk	47	21	1429	1481	1,476	1,502	2,978	1.39%
Dry Bulk Carriers	317	26	2105	3168	2,421	3,188	5,610	0.85%
Chemical Tankers	117	10	366	946	483	956	1,439	1.57%
Full Container Ships	2	4	1259	1314	1,261	1,318	2,579	1.26%
General Cargo Ships	156	119	794	906	950	1,025	1,975	1.11%
Liquid Gas Carriers	952	5	14	124	966	129	1,095	2.62%
Refrigerated Ships	23	1046	2783	1493	2,806	2,539	5,345	1.25%
Roll-on Roll-off	49	9	187	299	236	308	544	1.40%
Oil Tankers	247	58	135	485	382	543	926	-0.06%
Vehicle Carriers	2	439	511	234	513	673	1,186	0.70%
Passenger Ships	0	12	9	238	9	250	259	0.76%
Total Ships	1913	1749	9592	10686	11,504	12,431	23,934	1.10%

Table 4 SUMMARY OF BALLAST AND LADEN TRANSITS FOR ALL CASES (continued)

200,000 DWT

1990	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL
Container-Breakbulk	14	13	552	554	566	567	1,133
Dry Bulk Carriers	316	28	1,136	1,612	1,452	1,640	3,092
Chemical Tankers	36	4	143	301	179	305	484
Full Container Ships	3	2	553	517	556	519	1,075
General Cargo Ships	72	54	364	419	436	473	909
Liquid Gas Carriers	68	1	8	102	76	103	179
Refrigerated Ships	24	498	1,119	598	1,143	1,096	2,239
Roll-on Roll-off	16	4	90	96	106	100	206
Oil Tankers	158	148	292	369	450	517	967
Vehicle Carriers	1	279	325	125	326	404	730
Passenger Ships	1	3	49	99	50	102	152
Total Ships	708	1,031	4,631	4,792	5,339	5,823	11,162

2020	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2020
Container-Breakbulk	29	12	794	826	823	841	1,664	1.29%
Dry Bulk Carriers	398	20	1545	2559	1,948	2,605	4,553	1.30%
Chemical Tankers	77	4	266	795	343	799	1,142	2.90%
Full Container Ships	5	4	1127	1115	1,132	1,119	2,251	2.49%
General Cargo Ships	79	61	420	473	499	534	1,033	0.43%
Liquid Gas Carriers	126	2	10	211	136	213	349	2.25%
Refrigerated Ships	24	909	2199	882	2,223	1,792	4,015	1.97%
Roll-on Roll-off	27	4	106	157	132	162	294	1.19%
Oil Tankers	303	89	181	599	484	688	1,172	0.64%
Vehicle Carriers	2	381	443	197	445	578	1,023	1.13%
Passenger Ships	2	9	154	183	155	192	348	2.80%
Total Ships	1071	1495	7244	7998	8,320	9,524	17,844	1.58%

2060	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2060
Container-Breakbulk	47	21	1429	1481	1,476	1,502	2,978	1.39%
Dry Bulk Carriers	384	26	2114	3044	2,497	3,064	5,562	0.84%
Chemical Tankers	117	10	366	946	483	956	1,439	1.57%
Full Container Ships	2	4	1259	1314	1,261	1,318	2,579	1.26%
General Cargo Ships	156	119	794	906	950	1,025	1,975	1.11%
Liquid Gas Carriers	952	5	14	124	966	129	1,095	2.62%
Refrigerated Ships	23	1,046	2783	1493	2,806	2,539	5,345	1.25%
Roll-on Roll-off	49	9	187	299	236	308	544	1.40%
Oil Tankers	231	58	135	462	366	520	886	-0.12%
Vehicle Carriers	2	439	511	234	513	673	1,186	0.70%
Passenger Ships	39	12	197	238	236	250	486	1.67%
Total Ships	2003	1749	9789	10544	11,791	12,283	24,074	1.10%

Table 4 SUMMARY OF BALLAST AND LADEN TRANSITS FOR ALL CASES (continued)

250,000 DWT

1990	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL
Container-Breakbulk	14	13	552	554	566	567	1,133
Dry Bulk Carriers	316	28	1,136	1,612	1,452	1,640	3,092
Chemical Tankers	36	4	143	301	179	305	484
Full Container Ships	3	2	553	517	556	519	1,075
General Cargo Ships	72	54	364	419	436	473	909
Liquid Gas Carriers	68	1	8	102	76	103	179
Refrigerated Ships	24	498	1,119	598	1,143	1,096	2,239
Roll-on Roll-off	16	4	90	96	106	100	206
Oil Tankers	158	148	292	369	450	517	967
Vehicle Carriers	1	279	325	125	326	404	730
Passenger Ships	1	3	49	99	50	102	152
Total Ships	708	1,031	4,631	4,792	5,339	5,823	11,162

2020	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2020
Container-Breakbulk	29	12	794	826	823	841	1,664	1.29%
Dry Bulk Carriers	400	20	1545	2594	1,950	2,640	4,590	1.33%
Chemical Tankers	77	4	266	795	343	799	1,142	2.90%
Full Container Ships	5	4	1127	1115	1,132	1,119	2,251	2.49%
General Cargo Ships	79	61	420	473	499	534	1,033	0.43%
Liquid Gas Carriers	126	2	10	211	136	213	349	2.25%
Refrigerated Ships	24	909	2199	882	2,223	1,792	4,015	1.97%
Roll-on Roll-off	27	4	106	157	132	162	294	1.19%
Oil Tankers	293	89	181	585	474	674	1,148	0.57%
Vehicle Carriers	2	381	443	197	445	578	1,023	1.13%
Passenger Ships	2	9	154	183	155	192	348	2.80%
Total Ships	1063	1495	7244	8020	8,312	9,545	17,856	1.58%

2060	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2060
Container-Breakbulk	47	21	1429	1481	1,476	1,502	2,978	1.39%
Dry Bulk Carriers	317	26	2124	3103	2,440	3,124	5,564	0.84%
Chemical Tankers	117	10	366	946	483	956	1,439	1.57%
Full Container Ships	2	4	1259	1314	1,261	1,318	2,579	1.26%
General Cargo Ships	156	119	794	906	950	1,025	1,975	1.11%
Liquid Gas Carriers	952	5	14	124	966	129	1,095	2.62%
Refrigerated Ships	23	1,046	2783	1493	2,806	2,539	5,345	1.25%
Roll-on Roll-off	49	9	186	299	235	308	543	1.39%
Oil Tankers	221	58	135	449	356	507	863	-0.16%
Vehicle Carriers	2	439	511	234	513	673	1,186	0.70%
Passenger Ships	39	12	197	238	236	250	486	1.67%
Total Ships	1926	1749	9798	10587	11,723	12,330	24,053	1.10%

2.0 WORLD ECONOMIC AND TRADE FORECASTS

2.1 World Economic Forecasts to 2060

Developing a view of the world thirty to sixty years into the future is an extraordinarily difficult exercise. This is not a world whose characteristics we can develop based on simple increments of current trends - one must construct a completely new scenario to have a picture which is at all realistic.

For the near-term period, namely the next 20 years, the labor force has already been born, the major technical changes are already on the drawing board, and we do not expect any surprises in terms of how countries and their foreign trade would develop. This is the reason that econometric models, models which are calibrated on current economic data, can be useful tools for developing a picture of economic development over this period.

For the longer term, structural econometric models are not adequate because they do not provide sufficient insight into constructing a picture of the world thirty and seventy years in the future. The approach one is forced to take is to make careful estimates of key factors judgmentally and combine them to form a complete scenario. The key variables become:

- geopolitical factors
- population and labor force by region
- productivity by region
- structural change
- technological innovation
- transportation costs
- the terms of trade
- environmental policy

In producing long-term forecasts, one must keep in mind the potential for the accumulation of small deviations in each iteration. In compiling long-term projections, WEFA produces high and low growth scenarios to provide an envelope covering what we believe to be the set of reasonable alternatives. The following table provides the long-term average divergence between these outlooks. To understand the table, recall that the rate of economic growth is just the product of the growth in the total number of hours worked by employed labor and the growth rate in labor productivity.

- Demographic projections - 0.2% per year;
- Labor force participation - 0.2% per year;
- Hours worked - 0.1% per year;
- Output per hour - 0.4% per year;
- GDP (sum of the above) - 0.9% per year;
- Exports - 1.3% per year;
- Imports - 1.5% per year;

If we take the average trade uncertainty expressed in the WEFA scenarios as 1.4% per year, this would imply +/- 0.7% per year. Then:

- in five years, this produces +/- 3.5% uncertainty;
- in ten years, this produces +7.2%/-6.8% uncertainty;
- in twenty years, this produces +15.0%/-13.1% uncertainty;
- in thirty years, this produces +23.3%/-19.0% uncertainty;
- in seventy years, this produces +63.0/-38.8% uncertainty.

Clearly, the level of uncertainty one gets from trend analysis for seventy years and even thirty years is unacceptable. It is just this level of uncertainty which one can expect from even the best type of forecasting model based solely on econometric analysis of recent trends. The inescapable conclusion is that one must use another method.

The method which we have used is as follows.

Steps for long-term forecasting

- We begin with a demographic forecast. Populations generally change slowly. For example, as already noted the labor force which will be available for the next fifteen to twenty years has already been born.
- We assume that labor force participation rates level out, at least in the industrialized countries. This is happening already and is a result of the increasing value of leisure time with increasing per-capita income.

- As populations approach equilibrium, the relationship between the working age population and the total population becomes stable. If this is the case and if labor force participation rates level out, as we have already assumed, the rate of growth of employment is the same as that of population. **Note that short-term econometric models forecast demand and produce forecasts of unemployment. Long-term models take full employment as an assumption and forecast production and the share of that production which is consumed in the current period (consumer goods), the share which goes into goods which last more than three years (investment goods), the share which is used up in the production process (intermediate goods) and the share which is services.**

- Likewise, we assume stability in hours worked. With this added assumption, the growth rate of hours worked and population will be the same. To the extent that all of these assumptions hold, we can have a high level of confidence in projections of the labor input to economic growth, namely, the growth rate in total hours worked, which is based on assumptions as to population growth.

- We examine the trends in labor productivity in the industrial economies. These are leveling off, as one might expect, as the great gains in efficiency have already been reached in the most industrialized areas. Further, significant output is being diverted to the production of benefit streams which are not included in the GDP concept, such as a cleaner environment.

- These trends are used to develop projections of GDP/capita for all countries over time. This GDP/capita projection is carefully examined for the sense it makes. Clearly, a great deal of judgement must be used at this point.

- We also examine trends in imports and exports as a ratio to GDP. The growth curve in these ratios is also expected to flatten out for two reasons:

  - the shift to services

  - the declining resource base.

- The sum total of this analysis provides a "top-down" forecast of world trade, that is, trade flows which are developed from a view of economic growth.

- At the same time, we develop a "bottom-up" view of bilateral trade in those specific commodities covered by the various WEFA commodity services - agriculture, energy, and industry. These cover all of bulk trade, both liquid and dry, and trade in motor vehicles, motor vehicle parts, and primary steel products.

- Finally, we subject the long-term trade projections to the scrutiny of our experts in the WEFA energy, steel, auto, and agriculture departments for their adjustments. We also have compared them to other forecasts, including those of the PCC.

This is the procedure which we have used in developing the projections for 2020 and 2060.

For forecasts to 2010, WEFA uses its World Model System that is diagrammed in Figure 1.2. The system consists of 30 macroeconomic models, a model for each of the 25 developed countries, namely the 24 members of the Organization for Economic Cooperation and Development (OECD) and South Africa, and for each of the following developing regions: Latin America, the Gulf Four, Africa (excluding South Africa), the Pacific Basin, Other Asia, and the current and former Centrally Planned Economies.

The 30 models are tied together in the following way: each country's imports are divided into three categories - energy goods, primary non-energy goods, and manufactured goods. Then each of these values is divided into 29 parts: the imports from each of the other countries/regions. When this process is carried out for all 30 countries/regions and the price markups due to trade added in, a summation can be performed for each of the exporting countries to identically determine exports by these three aggregate commodities.

These export calculations come at the end of the solution for a given period and produce a different value from the value exports are given at the beginning of the solution. Therefore, the solution for each period must be repeated until the starting and ending export values are the same within some predetermined level of precision. In this way, we use this system of models to produce 20-year forecasts. This study is based on the January, 1991 WEFA World Economic Forecast, carried out to 2010.

To examine the period from 2010 to 2060, we constructed a new model: a simplified version of the WEFA World Model System and of the WEFA trade forecasting system. In this model, behavioral variables, which are based on stochastic equations values for the period 1990-2010, are projected judgementally.

We begin the forecasts with U.N. population forecasts which are carried out through 2025. As noted above, under suitable assumptions, the growth in population is just the growth in employment.

The second step is to extend the short-term assumptions concerning labor productivity which are implicit in our short-term forecasts. As already discussed, this process involves assumptions as to the rate of technological progress in the industrialized world and the rate of diffusion of technological information from the industrial countries both to the emerging market economies and to the industrializing economies of the "third world".

We then extend the U.N. fertility and longevity assumptions consistent with the per capita GDP results. Finally, the total real GDP forecasts are just the product of the population and GDP per capita projections.

Economic Forecasts for 2020 and 2060

The economic analysis was carried out at several levels of detail. The major headings in Table A.4 (Appendix A) correspond to the country and regional detail for which most of the analysis was done. When applied to the Panama Canal, the regions in Table A.8 are the ones used. As discussed in the last section, we are limited to these regions by the origin/destination regions in the published PCC bilateral trade data.

For purposes of presentation in this section, we combine the East and West Coasts of the Western Hemispheric regions, and we combine Central and South America. On the other hand we have separated Asia into Far East Asia, which is the region of Asia of greatest importance to the Canal, and Other Asia. Far East Asia includes Japan, China, Korea, Taiwan, and Hong Kong. Trade with the countries in Other Asia, which includes the countries of the Indian subcontinent, of Southeast Asia, the Philippines, and Indonesia, does not in general use the Canal.

The following are the assumptions on which we have based our economic, commodity and transit forecasts. A more detailed exposition of this material appears in Volume III of this study.

- Geopolitical Factors:

  We assume continued world stability, that is, no major wars or political instability in the major countries of the world.

- Environmental Policy

  WEFA assumes that the current environmental policy of each nation, such as the United States or Korea, or group of nations, such as the European Community or the Commonwealth of Independent States, is maintained and made neither more stringent nor eased. This implies, for example, that a carbon tax to reduce greenhouse emissions is not enacted.

- Population and Labor Force by Region

  The population figures through 2025 are from the United Nations. WEFA has extended the U.N. fertility and mortality assumptions to 2060 in a manner consistent with our projections of GDP per capita in each region, which are discussed below.

Among all regions considered in this study, Africa is the one whose population is expected to grow at the fastest rate until the year 2060. Within the OECD area, Europe will experience the slowest rate of expansion, with six countries namely Austria, Belgium, Denmark, Germany, Italy, Sweden and Switzerland expected to register an absolute decline in population over the forecast period.

- Technological Innovation and Transfer

  We assume that the long-term trend toward greater efficiency in production and consumption of services will continue. The major assumption in this area is the diffusion of technology now on the drawing boards to even the most undeveloped countries, allowing for a convergence of per capita GDP without an accelerated strain on the earth's resources. The former centrally planned economies of Europe and Other Asia, as well as India and the Asean countries, are expected to benefit the most from technology transfer, Africa the least because of the extreme difficulties with infrastructure, education and health.

- Productivity by Region

  We expect the productivity of the most industrialized regions rise at slightly lower rates than historically. The exception is Far East Asia, where we expect China to slow the growth somewhat in the next century. In the developing world, GDP per capita is expected to rise more rapidly in the Middle East and Other Asia than in Latin America or Africa. In the case of the Middle East this is associated with the rising real price of crude oil. Other Asia is expected to continue to benefit from the economic engines of Western and Japanese investment relative to Africa.

- Transportation Costs

  Real wage rates and fuel costs should rise in real terms, that is, corrected for inflation. We assume that all other components of transportation costs do not change in real terms.

- Structural Change

  Possibly the most important factor in the relation of merchandise trade to World GDP is the structural change which world economies are undergoing, namely, the shift away from goods, in relative terms, and toward services. The gradual depletion of non-renewable resources means that new deposits are of lower quality, harder to reach, and more expensive to extract and refine. This results in gradually rising real costs for these resources.

These rising real price curves for natural resources lead to a gradual process of substitution of the consumption of services for the consumption of goods. This process is also affected by rising incomes, for example in the consumption of meals away from home rather than preparing them in the home.

These structural change considerations lead to a continuation of the long-term trend in the shift from goods toward services which produces a downward curvature in the ratio of total world trade to world GDP.

- Terms of Trade:

  By terms of Trade we mean the trade barriers or lack of them between countries or regions. We assume that the emerging world trading blocks continue the post World War II trend toward freer trade, specifically toward a continued lowering of tariff and non-tariff barriers.

3.0 WORLD VESSEL FLEET PROJECTIONS AND MARITIME TRANSPORT COSTS

3.1 Introduction

This section on world vessel fleet projections provides the basis for future estimates of vessel mix by ship type and size for Panama Canal transits and the evaluation of shipping economics on Canal and alternative by pass routes, as required in the Analyses od Shifted Cargoes (Sections 5.3 and 5.6), the determination of constrained commodity flows for the 2060 Status Quo Canal (Section 5.4) and as input to the work being undertaken by the Financing Scheme, Financial Analysis and Management Arrangements Component Contractor, Nathan Associates Inc. This section therefore covers **ship technology, global fleet forecasts** and **projections of vessel operating costs and earnings.**

The following is based largely on the work undertaken as part of the Phase I 'Commodity and Traffic Projections Study' prepared during 1991/1992 by WEFA, RLA and BST. Nevertheless changes have been made in accordance with the terms of reference for this, Phase II, study and to reflect new information, for example, actual PCC data on 1990 ship sizes and mixes.

3.2 Ship Technology Developments to the Year 2060

3.2.1 Introduction

The following sections describe the approach to and the conclusions drawn from the evaluation of future technological and size developments for the various ship types under study. While the focus is on technical aspects, these cannot be entirely divorced from commercial considerations and, for some sectors in particular, rising concerns over environmental and safety issues. These factors therefore have been taken into account where relevant.

3.2.2 Approach

The initial material gathered for this part of the study is based on a literature search of technical, academic and commercial material through two main international maritime data bases (TRIS and MARNA). Relevant articles are referenced in the bibliography included at the end of section 3. However it will be seen that the articles are relatively few in number simply because most of the material found proved to give little perspective beyond

5-10 years. The literature search therefore has been supplemented through a series of interviews[1], including an extensive meeting with senior design and propulsion technology experts from Lloyd's Register of Shipping, one of the world's foremost classification societies.

3.2.3 Shipping and Technology

Shipping is an industry with a long history. It is economically, socially and technologically mature. Change occurs, but it is the selective adoption of appropriate, and commercially viable, technology rather than the rapid, technology-driven change which characterizes a new industry, such as those of computers or of aeronautics. The risk to an individual shipowner contemplating investment in new technology can be substantial. As a result it is fair to say that in terms of mechanical engineering developments, the marine sector lags general industry by around 5 to 10 years.

The rate of change in shipping is also constrained by the life of ships, which under normal circumstances is at least twenty years. At any given time, the average level of technology of the fleet is usually at least ten years old. Some of the ships on the current order book will still be afloat in the year 2020. In the earlier part of the study period, the availability of shipyard capacity itself may place additional constraints on the system, particularly as there are likely to be fairly large scale requirements to replace much of the existing tanker and dry bulk carrier fleet within this time frame. These are also the ship types which seem the least likely to undergo dramatic technological change within the initial time frame.

At any given time the shipping industry is saturated with new technological ideas, most of which are technically possible, and few of which win through to adoption by commercial shipowners. In postulating a "scenario" for the long term future of shipping one might chose to be imaginative, adopting dramatic concepts being expounded by their proponents, but which might nevertheless find themselves relegated to fringe technology in the future. Alternatively, one might choose to take a more measured view, adopting only concepts which appear today to have a reasonable chance of being economically viable, and therefore of being adopted by shipowners. The latter approach has been chosen, partly because only one

[1] The following are some of the companies with whom interviews were held:
Lloyds Register of Shipping, London (Technical Planning and Development Department. Propulsion, Performance and Environmental Technology Group); Burmeister & Wain Skibsvaert A/S, Copenhagen; BIMCO, Copenhagen; Lauritzen Reefers A/S, Copenhagen; Leif Hoegh & Co. A/S, Oslo; Precious Associates, UK (for discussions on the conclusions of the BIMCO manning study in which they were involved); The East Asiatic Company Ltd, Copenhagen (Bulk shipping and liner departments).

scenario is to be developed, partly because it is felt that in so doing the assumptions will be less wrong than if one adopts an overly imaginative approach.

3.2.4 The Potential for New Technology

To reach firm conclusions on ship technology thirty and seventy years' hence is intrinsically impossible. The achievement of massive economies of scale in the 1960s and 1970s in the wet and dry bulk trades, the adoption of containerization for the liner trades in the 1970s, and developments in propulsion efficiency and labor- substituting automation under the influence of the oil price rises of 1973 and 1978 together amount to a far-reaching technological revolution in shipping in just 30 years. Shipowners themselves are pragmatic commercial people. They tend not to look ahead more than one vessel generation. The general impression is that those technological changes which have recently been made have largely exhausted those possibilities which are economically viable. The shipping industry generally does not appear to be on the threshold of dramatic new developments.

On the basis of current research there could be significant changes, however, in propulsion in the period after 2020. The near term is in for a period of consolidation, of progressive improvements to the latest ideas which have already been implemented on the newest ships, and their more widespread adoption as old ships are scrapped, and replaced by new buildings.

This scenario is not inconsistent with changes in specific sectors of the industry. Possible changes include fast ferries (catamaran or SWATH) for short distance routes or, with the modification of existing but still new technology, a second generation of ISO standards for containers. In general, however, the view of the future adopted here is one without changes as dramatic as those implemented in the industry in the 1960s and 1970s.

3.2.5 Size and Speed

The growth in ship sizes to attain ever-increasing economies of scale which characterized the 1960s and 1970s for some ship types -in particular tankers and dry bulk carriers - has been halted, or even reversed, by changes in sourcing patterns and in the structure of costs which have occurred in the past twenty years.

It is in the containerized sector that it is envisaged that developments of the Panama Canal could have the most fundamental impact on size in that without existing constraints there remains considerable scope for achieving further economies of scale with these ships. It is envisaged that a larger Panama Canal could precipitate a step increase in the size of the largest container ships from the present Panamax size of 3,700 to 4,400 TEU (approximately 47,000 to 55,000 DWT) to ships able to carry 6,000+ TEU (about 90,000+ DWT). In fact since this view was first expressed in the Phase I study, the Peninsular and Oriental Steamship Co. (P&O) has announced that it has plans on the drawing board for future container ships of 6,000 TEU.

It is anticipated that as vessels become larger, length to beam ratios broadly will be maintained. Changes to canal dimensions will also impact significantly on the size composition of the world dry bulk fleet although not on maximum vessel sizes.

Changes in the size and speed of ships depend more on the commercial requirements of the shippers of cargo than on marine technology. At most periods in the history of power driven vessels, the technology has existed to drive ships faster than the speed actually chosen by shipowners for their new buildings. At the same time technology is important, but it shows itself more in determining an optimal speed in relation to the size and other design parameters specified by the shipowner, than in selecting a speed in the first place.

Size and speed are considered together in relation to facts which they have in common. Change in each is of two types:

- First, there is a tendency for each ship type for successive generations of ships to be larger and faster than their predecessor. Change of this type is relatively modest. Until the 1960s, it had been the received wisdom of port authorities worldwide that their dredging programs should provide about an extra foot of depth every 25 years or so. It is not considered that port developments in the years 2020 and 2060 will represent constraints to ship size per se as it is envisaged that both port capacities and ship sizes will change as a function of commercial trade considerations and shipping economics. Successive generations of the same ship type in the past were typically about one knot faster.

- Secondly, there is change arising from market forces which ultimately reflects the wishes of shippers. This has frequently been dramatic. The growth in tanker sizes is the best example. Prior to the 1974 oil price rises, tankers of

500,000 DWT had been ordered. Subsequent market events have reversed the trend, with future new buildings likely to be typically of a maximum size of about 300,000 DWT. High fuel costs precipitated the adoption of low speed diesel engines and the phase out of steam turbine driven vessels. In the liner or general cargo sector, speeds were increasing dramatically in the early phase of containerization, but again the trend was reversed in the era of high oil prices.

3.2.6 Hull Forms

No changes are envisaged with respect to bulk ship types as mono-hulls are considered to be the most serviceable. With regard to containerships, it is possible to envisage the development of multi-hull vessels as dimensions widen and given the need also for higher speeds than in the bulk sector. The trend in vessels such as passenger ships is towards higher superstructures and faster multi-hull craft. The development of SWATH (small water plane twin hull) ships is particularly relevant to ferries and ships designed for naval purposes where stability is a particular requirement.

However such vessels are not very fast (around 15 knots) and not suitable for container ships. Neither is the design appropriate for bulk ship types. There is seen to be a rising trend in the employment of fast semi-displacement type craft, for example on short haul ferry routes. However, currently these operate successfully only in calm seas and vessels will need deeper hulls and more power to operate in the deep sea. It is not believed that this type of design could replace, for example, small conventional general cargo ships. The latter retain all the advantages of low costs, simplicity and reliability.

3.2.7 Size of Ships and Number of Crew

Technology must be economically and/or commercially viable before it is adopted by practical shipowners. The size of ships and the number of the crew are two decisions which are based on these criteria. They also have important technical aspects, and are considered in this study.

Reduction in crew numbers has been universal, but the current size of crew on new ships depends on the ship type and the particular shipowner's policy on the trade-off between crew cost and the cost of the automation which replaces crew members. Even in a conservative scenario, it is important to address the question of whether, in the long time-scale to 2020 and 2060, it is likely that the process will be taken to its ultimate, and crewless

ships will make their appearance. The assumption, for the purposes of this single scenario, is that they will not. While there are already, for example, large reefers operating with 6 crew it is likely to be a long time before manning levels generally fall below 10-12. Further out in time crew sizes of around 5-6 people may become the norm. However, difficulties currently experienced in the automation of main propulsion machinery and the psychological problems associated with crew leading an isolated existence at sea for long periods make it doubtful that crews realistically could be reduced below this number.

With respect to full automation, the critical point is whether the marine collision avoidance function can be automated with 100% certainty of there being no accidents. There is also the question of whether the concept will be politically acceptable.

Aircraft and submarines are able to manoeuver in three dimensions, because each operates within a fluid environment. Ships operate at the interface of two fluids, air and water, which constrains their manoeuvering to two dimensions. In narrow seas, and even occasionally in the open ocean, multiple collision risks must be dealt with at any one moment. Indications are that the collision avoidance function at sea is nowhere near being automated to the degree of security which a safety- and pollution- conscious public demands.

It might be argued that existing technology could be used to bring about crewless ships if the regulatory environment of shipping were to be replaced by a new system which imposed rigorous traffic separation and control on ships at sea. This is, however, a political and economic question, for traffic separation and control require international agreement and impose cost penalties. There is no indication that governments are willing to change the traditional freedom of the high seas in the interest of creating an environment in which crewless ships would be possible, nor is there any indication that such an attempt would be successful. Neither is there any indication that shipowners or their customers are ready, or will be ready in the future, to accept the implied cost penalties.

3.2.8 Environmental Impact and Safety Issues

This is one important area in which governments and public opinion are ready to force technological change on shipowners - that is, change in the interests of preserving the environment from damage and, to a lesser extent be it said, in the interests of the safety of life at sea. Currently, attention focuses, in particular, on the US Oil Pollution Act of 1990 and on other anti-pollution measures being enforced unilaterally by State governments in the United States. These measures are already affecting the world tanker fleet, and a version of them is likely to be adopted by all the economically advanced nations well before 2020.

Controls on emissions from ship stacks both within port areas and at sea also can be envisaged, particularly in view of the generally high sulphur content of main engine marine fuels.

One of the major safety issues is the high number of losses of dry bulk carriers recorded in recent years. While the findings of investigations to date may result in a tightening up of loading and ship inspection procedures and possible changes in the design of larger dry bulk carriers, it is difficult to envisage the adoption of measures having sufficient international support to significantly impact on the phase out with age of the existing fleet. In the tanker sector, larger and older vessels do not represent a greater environmental/safety risk per se and this can be supported by the results of investigations into collisions and other incidents. However, over and above the requirements of the US Oil Pollution Act (OPA), and similar legislation likely to be enacted elsewhere - recent tanker accidents will result in the progressive introduction of more stringent inspection and operating procedures.

3.2.9 Marine Fuels

The availability and cost of present marine fuels must be considered in this general discussion. The assumptions of this report on the future energy scenario are discussed in the context of the trade forecasts. Increasing scarcity of liquid hydrocarbons will lead to higher prices for marine fuel oil and marine diesel, to the point where alternative sources of propulsive power are substituted for them. Wind power and nuclear power are two possible alternatives, the technological viability of both being well-proven. Wind power however has insuperable disadvantages for modern shipping. Its contribution will be marginal at most. Nuclear power is not trusted by a public opinion which will in future be more, not less, environmentally conscious. Given the advances that are being made in automobile engine technology it is conceivable that the long term will see the development of hydrogen powered marine propulsion units. However, it is too early to assess realistically what this will mean in terms of speeds, fuel consumption and costs.

The remaining alternative to oil fuels is coal. The coal is there. The technology is practically identical to that used by coal-fired power stations. Several coal fired ships have in fact been built, for specific services in which the advantages of coal made themselves felt, since the oil price rises of 1973-4 and 1978-9. Any return to coal-firing would not amount to dramatic technological change. The infrastructure is not in place, but if the relative costs of oil and coal for marine propulsion were right its creation would not be a particularly demanding task.

The cost of a coal burner will always be higher - up to 30% - than the diesel engined ship because of coal handling, ash handling and loss in deadweight earnings due to heavier and more spacious bunkers. Under the energy scenario utilized in this study it is not envisaged that there will be an economic incentive for coal fired vessels. For this reason, although intrinsically interesting, it is not a significant consideration with respect to the development of an alternative Panama Canal.

3.2.10 Speed and Propulsion

The effects of the oil prices rises of 1973-74 and 1978-9 were far-reaching, affecting national economies in many ways, leading to changes in world-wide sourcing patterns for fuels, and to other, more general effects on the pattern of world seaborne trade. From the point of view of the shipping industry, the key facts about the price rises were their magnitude - a step increase each time - and their suddenness. Between 1978 and 1984, many separate measures were taken to achieve significant propulsion cost savings in commercial ships. In the cases of some ship types, it is possible to say that ships built before about 1984 have an element of economic obsolescence, which is reflected in their second-hand prices. In the tanker sector, there has been a progressive phase out of turbine powered vessels in favor of motor ships.

It is believed that the dramatic changes in propulsion economics which have been embodied in the most modern ships now being built embrace all that is easily possible. From now on, some progressive improvements are foreseen, but no step increase in propulsion efficiency such as distinguishes ships designed before 1984 from those designed after that year.

It is predicted, for example that the development of further energy saving devices, associated with vessel hydrodynamics, in bulk ship types could improve fuel efficiency by something of the order of 13%. For higher speed vessels with a conventional hull form, such as reefers, the potential savings might be in the region of 5-6%. For passenger ships this figure is likely to be as low as 1 or 2%. Potential improvements in engine room efficiency may be limited as current technology is be-devilled by high implementation and maintenance costs, and savings may be relatively small unless there are significant fuel price increases.

In considering alternative propulsion systems, for bulk ship types there is as yet no serious competition to the slow speed diesel. For high speed ship types where weight is a consideration, the development of gas turbines with their improved power to weight ratios may offer an alternative to medium speed diesels. Emerging technologies such as super-conducting electro-magnetic propulsion - also known as magneto hydro dynamic propulsion -

are not expected to have any significant impact until at least after 2030. In the meantime the very significant problem of how to screen crews and marine life from the effects of the magnetic waves remains to be solved.

Provided future changes to oil prices are gradual and progressive, it is thought for general cargo ship types that the trend of ship speed increasing moderately as generations of ship types succeed each other will be resumed, but starting from the new base. This is defined by assuming that the ships on order in 1991 will represent the average technology of the commercial fleet in the year 2020. Thereafter, it is assumed that, other things being equal, average speeds increase by one knot every twenty years. Between 2020 and 2060 this trend in speeds of general cargo ships is expected to be continued accompanied by further savings in fuel consumption rates. Significant changes in the speeds of bulk ship types, for which vessel transit times are of lesser importance, are not envisaged although on-going improvements in full consumption efficiencies are envisaged.

3.2.11 Fundamental Principles of our Scenario

In light of the above discussion, it has been decided to adopt the following principles in developing, for particular ship types, a scenario on technical, or, to be more exact, techno-economic, changes likely to be achieved during the period for which we are developing forecasts allowing for reductions in fuel consumption and increases in vessels speeds where relevant;

- remembering that some ships on order in 1991 will still be operational in the year 2020, we assume that the levels of technology incorporated in the newest ships of 1991 will be the average level of technology in the year 2020 allowing for reductions in fuel consumption and increases in vessel speeds where relevant;

- Between 2020 and 2060, it is assumed that the 2020 level of technology will persist, excepting only cases where good reasons can be seen, now, to assume that change will be made or continue. One thing that can be said now is that there is likely to be a continuing change in the area of crew costs for all ship types through a combination of rising economic standards in developing countries, an increasing level of technical training required for crews and a reduction of crew sizes. This will see the eventual disappearance of cheap, third world labor from the global fleet. There may not be a return to employing nationals aboard national ships, but there will no longer be good reasons for not employing them.

3.3 Global Fleet Forecasts

3.3.1 Introduction

In this section we describe the potential development of the global fleet by ship type and size and likely influences which worldwide developments will have on the size and type of ship using the Panama Canal, both for the status quo and alternative cases. In addition, consideration is given to the extent to which the development of the Canal under 150,000 dwt, 200,000 dwt and 250,000 dwt design cases could influence the size and composition of the world fleet, although it is thought that this will only be significant in the case on dry bulk carriers and full container ships. The results of this work are used to determine also the vessel sizes for which estimated freight costs are required for Panama and alternative by pass routes.

The results of the RLA analysis for Panama-specific and World fleet projections are presented in Tables 3.1 to 3.21. For each ship type and alternative case, fleet projections, average vessel sizes and vessel size distributions for 2020 and 2060 are shown by DWT size range. Projections of vessel size distribution by ship type in the global fleet, where relevant, are based on estimated commodity flows taking into account Canal tolls. This is consistent with Phase I and represents the most realistic way of projecting future world ship supply by size. Nevertheless projections of vessel size distributions shown for the Panama Canal are based on the no tolls scenario.

The following sections provide descriptions of anticipated developments by ship type. However, for each ship type a general approach has been taken to the development of 2020 and 2060 scenarios for vessel supply which is summarized below:

- A detailed analysis of the 1990 fleet has been undertaken for each of the cargo carrying ship types defined in this study in order to determine the composition of the global fleet in terms of average deadweight and deadweight distribution by size range and year of build. For most ship types analyses have been compiled from individual ship listings. For container/breakbulk vessels in particular this has been essential as published aggregated data for this ship type vary significantly by source dependent on the exact definition adopted. For the purpose of this study container/breakbulk or 'semi-container' ships are defined as vessels with or without fixed cell guides which according to their owners or operators have rated TEU capacities. Individual ship data have also been used to determine relationships between deadweight and, variously,

Panama Canal Net Tonnage, Gross Registered Tonnage, Net Registered Tonnage, TEU capacity, speed and consumption by age range.

- Global trade data have been organized into groupings that broadly match ship type definitions and vessel movements data.

- Global trade estimates for 1990, 2020 and 2060, by ship type, size and route have been multiplied by representative mileages for each trade and vessel size to determine estimates of ship demand by size expressed in ton-miles. The results have been used to project the growth in global vessel supply for each of the cases considered.

- For general cargo ship types, consideration has been given in the development of supply projections to the extent to which certain vessels - such as full container and container/breakbulk ships - will continue to displace others, for example RoRo and conventional general cargo ships.

- Historical trends in vessel size distributions and changes in average deadweights within size ranges have been analyzed to determine potential future developments. Analyses have been based on the composition of the existing world fleet, the new construction order book and historical time series data provided by the Japanese delegation to CAS which is understood to be based on information provided by Lloyds. In some instances it has been necessary to amend and supplement this information with other data from RLA.

- Because simple trend analysis does not adequately capture structural changes in the shipping industry, consideration has also been given to future changes in the components of trade flows which would impact upon future vessel size distributions and changes in average deadweights within size ranges. The results of the analyses of vessel size distributions are input into both the projections of global ship demand by route and size and Panama Canal transit forecasts, as are the conclusions relating to average deadweights within size ranges.

* Actual data on average ship sizes by size range and vessel size distributions by ship type, derived from the analyses of the 1990 PCC tapes, were used as the starting point for projections of potential fleet mixes through the Panama Canal in future years.

3.3.2 General Cargo Ship Types

The term general cargo ship types as defined here covers container/break bulk ships, full container ships, conventional general cargo vessels, refrigerated ships (reefers), roll-on roll-off (roro) ships and vehicle carriers. These vessels are considered as a group since there is a degree of interchangeability between these ship types. Taking into account the relative merits of each ship type and the potential for further substitution of one vessel type for another, anticipated trends may be summarized as follows:

- continuing penetration of containerization;
- a relative decline for RoRo ships which, on long international voyages, have failed to live up to the original expectations of operators once the special circumstances for which they were best suited, such as port congestion, had been ended;
- continuing development of larger container ships as trade volumes increase and as economic factors allow. In 1990, the largest container ship could carry about 4,400 TEU. There are technical reasons why a gradual development beyond this size is unlikely and the industry expects the next development to be a step increase to ships of about 6,000 TEU when conditions are right;
- a continuing role for smaller ships. As trade on particular routes grows, it is tempting to postulate trade moving to ever larger ship sizes, with a decline in the role of the smaller ones. It is our view that as today's routes develop, so economic growth will lead to a new set of lesser ports and routes joining international trade. These ports and routes will continue to offer employment to the smaller classes of ship.

Projections of global supply were determined on the basis of estimates of future demand growth as described in section 3.3.1 initially applying global trade growth rates for 1990-2020 and 2020-2060 for a given commodity and pair of trading partners to that commodity and origin/destination pair in the FY 1990 Panama Canal data.

These market shares were then adjusted in line with the above assumptions with the result that some demand for conventional general cargo ships and roro's was transferred to container/break bulk and full container ships. The net result, after adjusting for different vessel efficiency factors is summarized below:

Global Fleet Development of General Cargo Ship Types

million DWT

Ship Type	CB	F*	G	R	RO	V
1990	23.3	31.1	30.3	7.4	5.2	2.7
2020	91.8	79.1	58.5	13.5	5.8	4.6
2060	149.8	147.5	80.6	21.1	5.9	5.0
			% per annum			
1990-2020	4.7	3.2	2.2	2.0	0.4	1.8
2020-2060	1.2	1.6	0.8	1.1	"	0.2
1990-2060	2.7	2.2	1.4	1.5	0.2	0.9

* status quo Canal
" less than 0.05% per annum

Container/Break Bulk Ships

Container breakbulk, or semi-container ships, are one of the two beneficiaries of our assumptions of a relative decline in the roro and conventional general cargo ships in the period to 2020 and 2060. We envisage them as the future general purpose or residual ship. In spite of the assumed increase in their importance, we envisage no dramatic increase in size. This is because of the following factors:

- a major role for these ships is that of feeder vessels to the major containerized trades. Being largely intra-regional, this role does not show up significantly in our inter-regional trade statistics. Relative smallness is implied in this role. As volumes increase, the answer is not bigger container/breakbulk ships but a switch to full container ships;

Table 3.1

ANALYSIS AND PROJECTIONS FOR THE GLOBAL CONTAINER/BREAK-BULK FLEET

Fleet as at 1990

Size (DWT) / Year of Build	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Pre-1965	30172	407157	0	0	0	0	437329
1965 to 1969	188087	719742	25503	0	0	0	933332
1970 to 1974	587215	2763366	111892	0	0	0	3462473
1975 to 1979	1162893	8192376	81576	166666	0	0	9603511
1980 to 1984	866943	4534793	226125	123951	0	0	5751812
1985 to 1989	929953	1411430	28386	0	0	0	2369769
1990	271229	327092	0	0	0	0	598321
Total	4036492	18355956	473482	290617	0	0	23156547
% Distribution	17.4%	79.3%	2.0%	1.3%	0.0%	0.0%	100.0%
Average Age (Years)	11	13	13	12	0	0	12
Fleet Projections							
Year							
2020	15998231	72758447	1872426	1156499	0	0	91785603
% Distribution	17.4%	79.3%	2.0%	1.3%	0.0%	0.0%	100.0%
2060	26110029	118745953	3055907	1887472	0	0	149799361
% Distribution	17.4%	79.3%	2.0%	1.3%	0.0%	0.0%	100.0%

Source: RLA

Table 3.2

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: CONTAINER/BREAKBULK

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 100,000	
AVERAGE DWT						
All Maximum Ship Design Sizes						
GLOBAL FLEET						
1990	4989	16316	27852	41517		
2020	5071	23500	28385	41690		
2060	5130	23500	28470	41810		
PANAMA CANAL						
1990	7807	16844	31423	41670		
2020	7940	23500	28385	41690		
2060	8030	23500	28470	41810		

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 100,000	
% DISTRIBUTION						
All Maximum Ship Design Sizes						
GLOBAL FLEET						
1990	17.4	79.3	2.0	1.3		
2020	17.4	79.3	2.0	1.3		
2060	17.4	79.3	2.0	1.3		
PANAMA CANAL						
1990 N	3.4	63.8	12.6	20.3		
1990 S	3.0	70.2	12.7	14.1		
2020 N	0.0	51.5	19.4	29.2		
2020 S	0.0	51.8	17.8	30.4		
2060 N	0.0	53.6	19.6	26.8		(unconstrained)
2060 S	0.0	53.0	18.1	28.8		(unconstrained)

Source: RLA

- the ships are designed to carry a mixture of containerized and conventional cargo. Similar constraints to those described in relation to conventional general cargo ships (see below) apply to the container/breakbulk ships in so far as they are laden or part laden with conventional cargo.

Full Container Ships

In the last twenty to twenty five years, containerization has become the normal method of transporting high value general cargo by sea. Considerable quantities of low value or otherwise apparently unsuitable goods are also carried in containers, depending on the circumstances of particular trades. We do not foresee any new development in deep sea general cargo shipping in the period to 2060 which may reasonably be postulated to have an impact equivalent to that of the container revolution which is still in progress.

The original container ships were conversions. Since purpose designed container ships began to be built, there has been a steady evolution in size to the present 4400 TEU 'post Panamax' vessels. (There are also Panamax designs with this rated capacity but it is uncertain the extent to which these are able to transit the Canal fully laden). At the same time, a wide spread of sizes of vessels is deployed by operators on the world's major routes. This to some extent is a function of supply and the existence of modern smaller vessels since the full container ship fleet is relatively young and very few purpose built container ships have been scrapped. It is also likely that the major trade routes offer opportunities for different sized vessels to pursue different market segments.

The present largest class of vessels, and there are not many of them, appear to stand at a break point of size evolution. Any significant increase in size would require a switch to twin screw propulsion, the extra cost of which could not be recouped without a step increase in capacity. The expectation in the industry is that the next generation of full container ships above 4400 TEU will be about 6000TEU.

For our forecast of the future fleet of full container ships we have carefully considered technical factors and the potential development of future trade, paying particular attention to the world's top twenty routes. In summary, we envisage:

- full container ships of 6000 TEU will be at sea by 2020, and of 9000 TEU capacity by 2060;

Table 3.3

ANALYSIS AND PROJECTIONS FOR THE GLOBAL FULL CONTAINERSHIP FLEET

Fleet as at 1990

Vessel Size (DWT) / Year of Build	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
pre-1965	23659	176231	0	0	0	0	199890
1965 to 1969	70651	554707	416692	0	0	0	1042050
1970 to 1974	468204	1477874	1870603	850792	0	0	4667473
1975 to 1979	778875	2124031	1548716	934616	0	0	5386238
1980 to 1984	861020	1438003	3520213	1723662	0	0	7542898
1985 to 1989	427844	1315880	2454343	5019481	0	0	9217548
1990	61763	754568	526831	1616286	132960	0	3092408
Total	2692016	7841294	10337398	10144837	132960	0	31148505
% Distribution	8.6%	25.2%	33.2%	32.6%	0.4%	0.0%	100.0%
Average Age (Years)	13	12	11	7	1	0	11

Fleet Projections

Year							
Status Quo Canal							
2020	6269098	18246001	24056578	23613867	6869920	0	79055464
% Distribution	7.9%	23.1%	30.4%	29.9%	8.7%	0.0%	100.0%
2060	10445466	30406928	40085213	39332785	15564924	11699512	147534829
% Distribution	7.1%	20.6%	27.2%	26.7%	10.5%	7.9%	100.0%
150,000 DWT Maximum Design Canal							
2020	6269098	18246001	16987588	16588697	20867920	0	78959304
% Distribution	7.9%	23.1%	21.5%	21.0%	26.4%	0.0%	100.0%
2060	10445466	30406928	26742163	29193835	33834924	16879512	147502828
% Distribution	7.1%	20.6%	18.1%	19.8%	22.9%	11.4%	100.0%

Source: RLA

Table 3.4
DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: FULL CONTAINERSHIPS

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
AVERAGE DWT						
Status Quo Canal						
GLOBAL FLEET						
1990	5764	17158	31231	48080	66480	0
2020	6620	19340	31230	48080	90000	0
2060	7160	19370	36400	56000	90000	148000
PANAMA CANAL						
1990	4796	20666	32697	47929		
2020	5510	20700	32700	48080		
2060	0	20700	36400	56000		
150,000 DWT, 200,000 DWT and 250,000 DWT Maximum Design Cases						
GLOBAL FLEET						
2020	6620	19340	31230	48080	90000	0
2060	7160	19370	36400	56000	90000	148000
PANAMA CANAL						
2020	5510	20700	32700	48080	90000	0
2060	0	20700	36400	56000	90000	148000

Table 3.4 (Cont'd)

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: FULLY CONTAINERISED

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
% DISTRIBUTION						
Status Quo Canal						
GLOBAL FLEET						
1990	8.6	25.2	33.2	32.6	0.4	0.0
2020	7.9	23.1	30.4	29.9	8.7	0.0
2060	7.1	20.6	27.2	26.7	10.5	7.9
PANAMA CANAL						
1990 N	0.1	12.3	37.3	50.3		
1990 S	0.1	14.2	40.3	45.3		
2020 N	0.1	9.6	25.5	64.9		
2020 S	0.1	11.6	23.7	64.5		
2060 N	0.0	11.6	25.6	62.8	(unconstrained)	
2060 S	0.0	14.5	22.8	62.7	(unconstrained)	
150,000 DWT, 200,000 DWT and 250,000 Maximum Design Cases						
GLOBAL FLEET						
2020	7.9	23.1	21.5	21.0	26.4	0.0
2060	7.1	20.6	18.1	19.8	22.9	11.4
PANAMA CANAL						
2020 N	0.1	8.6	20.4	39.6	31.4	0.0
2020 S	0.1	10.2	19.2	39.6	30.9	0.0
2060 N	0.0	9.9	20.3	33.1	22.8	13.9
2060 S	0.0	12.6	18.6	31.7	22.6	14.5

Source: RLA

- in 2020, the 6000 TEU ships will be carrying cargo equivalent to 30% of the annual cargo on the top twenty global routes, excluding those which transit the Panama Canal. This assumption is consistent with the share which the current largest class of ship has on these routes in 1990.

- in 2060, forty years' experience of larger vessels will lead to their having a larger market share, 60%, again calculated by reference to the top twenty routes excluding those which pass through Panama. Containerships of 9000 TEU will be at sea before 2060, but their activities will be confined to the busiest routes. We assume that in 2060 the participation of 6,000 TEU ships in the carriage of containers will be equal to 35% of 60% of the cargo on the top twenty routes excluding those which transit Panama, and that 25% of 60% will be taken by the 9,000 teu ships.

Within size classes, excluding those which contain the postulated new, very large sizes, we in general assume little change in the average deadweight. This is because containerships 'cluster' around certain popular size classes expressed in teu's. These size classes relate to the sizing of berth and terminal facilities, and in particular to the dimensions of gantry container cranes. Such factors are likely to be fairly static, and we expect future world containership fleets to compromise a mixture of sizes, as is the case in 1990.

Globally, the variables which determine the future demand and supply of Full Container ships are trade volumes on major routes, the extent to which there will be further switches from other general cargo ship types to Full Container vessels in the future and techno-economic changes. There are a few major general cargo routes which involve substantial Panama Canal transits for Full Container vessels. On these major routes however, consideration has been given to the effects of Panama Canal constraints on the global fleet in the status quo case together with the further switching of cargo from the Canal routes to by-pass routes because of a further deterioration in the competitive position of the Panama Canal. For the 150,000 dwt maximum design case, consideration has been given to the extent to which cargo may be revert to all water routes through the Canal through changes in relative transportation economics between the Canal and by-pass routes. In this instance, the global vessel supply forecasts reflect the changes in vessel demand that result from changes in the vessel size distribution of Full Container transits through the Canal.

Conventional General Cargo Ships

Conventional general cargo ships are difficult to deal with in this, or any other, forecast. They take part in a number of markets. They may be used on a liner operation, or at the other extreme they may carry homogeneous cargoes of bulk commodities on a voyage charter basis. They may be thought of as a residual, in that they carry what is not carried by the other ship types. The type is disproportionately important within some regions. This applies for example in the intra-regional trades of the Far East, SE Asia and the Mediterranean, but the inter-regional statistics used in this study do not bring out this role. World-wide, there is a current surplus of such tonnage, one specialized container ship is able to do the work of eight to fifteen conventional ships. The ships are old by world standards, three quarters of them being over 10 years of age in 1990. The demise of the type has been predicted for years.

It is our view that the ship has a future. As the ports and regions taking part in world trade in the 1990's expand under the influence of economic growth, new ports and regions will begin taking part in world trade, so that the demand for non-specialized ships to trade to smaller and less well equipped ports will always be there. Similarly, there will be a need for ships for intrinsically or commercially uncontainerizable cargoes. We do postulate, however, increasing penetration by containerships, and it follows that the role in 2020 and 2060 of conventional general cargo ships will be relatively less than in 1990.

In 1990, well over 99% of general cargo ships were in the two lower categories of deadweight, and we see no reason to make different assumptions for the future. Within those deadweight classes, we postulate slow growth of the average deadweight of the smallest class, and an average deadweight in 2020 in the 10,000 to 24,999 deadweight class, equal to that of the larger such ships being built in recent years. This is because of the economic constraints on the size of this ship type arising from the time in port needed for loading and discharging by conventional handling methods. This constraint on general cargo ships will not disappear. Insofar as a particular trade is released from the constraint, it will be because the commodities have switched to unitised packaging, such as containers, and a different ship type will be in use.

Table 3.5

ANALYSIS AND PROJECTIONS FOR THE GLOBAL CONVENTIONAL GENERAL CARGO FLEET

Fleet as at 1990

Vessel Size (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Year of Build							
pre-1965	1513915	1165614	0	0	0	0	2679529
1965 to 1969	2999620	3125276	0	0	0	0	6124896
1970 to 1974	4128777	4551636	0	0	0	0	8680413
1975 to 1979	4058233	2777942	80917	0	0	0	6917092
1980 to 1984	3606254	39210	0	0	0	0	3645464
1985 to 1989	1577708	193910	116531	0	0	0	1888149
1990	329440	23000	0	0	0	0	352440
Total	18213947	11876588	197448	0	0	0	30287983
% Distribution	60.1%	39.2%	0.7%	0.0%	0.0%	0.0%	100.0%
Average Age (Years)	15	19	8	0	0	0	16

Fleet Projections

Year							
2020	35206633	22953975	380517.3	0	0	0	58541125
% Distribution	60.1%	39.2%	0.7%	0.0%	0.0%	0.0%	100.0%
2060	48467261	31599622	523839.7	0	0	0	80590723
% Distribution	60.1%	39.2%	0.7%	0.0%	0.0%	0.0%	100.0%

Source: RLA

Table 3.6

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: CONVENTIONAL GENERAL CARGO

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
AVERAGE DWT						
All Maximum Ship Design Sizes						
GLOBAL FLEET						
1990	3725	14005	32908			
2020	3835	22000	36230			
2060	3915	22000	36230			
PANAMA CANAL						
1990	4654	15244	25472			
2020	4650	22000	28040			
2060	4750	22000	31871			

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
% DISTRIBUTION						
All Maximum Ship Design Sizes						
GLOBAL FLEET						
1990	60.1	39.2	0.7			
2020	60.1	39.2	0.7			
2060	60.1	39.2	0.7			
PANAMA CANAL						
1990 N	13.2	86.2	0.6			
1990 S	14.2	84.2	1.6			
2020 N	9.7	84.8	5.5			
2020 S	9.9	83.7	6.4			
2060 N	10.6	83.9	5.5	(unconstrained)		
2060 S	10.7	83.1	6.3	(unconstrained)		

Source: RLA

Refrigerated (Reefer) Ships

The world fleet of reefer ships in 1990 was confined to the two smaller size classes used in our analysis. This relatively small size for the ship type is the result of the need for many types of refrigerated produce to be loaded at relatively small ports with small quantities of accumulated exports, of the quantity of perishable foodstuffs which are demanded at any one time at the point of destination, and of refrigeration technology both on the ship and ashore. These factors have limited the expansion of ship size in the past and, with some movement from the smaller to the larger size range, are expected to continue in the future. Average deadweights are also expected to increase slightly over the period under review.

Of current concern in the industry is the extent to which refrigerated containers will take over some of the role of dedicated reefer ships in the future. The mass transport of bananas in containers for example could drastically alter the quantity of reefer ships demanded in the future. We note that reefer ships are already being built to carry a significant number of containers, and that containerization cannot be expected ever totally to replace dedicated reefer vessels. Our assumptions on tonnages available to reefer ships allows for some increase in reefer containers carried by container ships, but our general view is conservative in retaining a large role for reefers in the future.

Table 3.7

ANALYSIS AND PROJECTIONS FOR THE GLOBAL REFRIGERATED SHIPS (REEFERS)

Fleet as at 1990

Vessel Size (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Year of Build							
pre-1965	274317	10014	0	0	0	0	284331
1965 to 1969	775047	152739	0	0	0	0	927786
1970 to 1974	853812	521555	0	0	0	0	1375367
1975 to 1979	915363	391284	0	0	0	0	1306647
1980 to 1984	1209577	517670	0	0	0	0	1727247
1985 to 1989	996340	418862	0	0	0	0	1415202
1990	262460	147823	0	0	0	0	410283
Total	5286916	2159947	0	0	0	0	7446863
% Distribution	71.0%	29.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Average Age (Years)	13	11	0	0	0	0	13
Fleet Projections							
Year							
2020	6878802	6609046	0	0	0	0	13487848
% Distribution	51.0%	49.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2060	8221896	12859888	0	0	0	0	21081784
% Distribution	39.0%	61.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Source: RLA

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Table 3.8

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: REEFERS

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
AVERAGE DWT						
All Maximum Ship Design Sizes						
GLOBAL FLEET						
1990	4789	11868				
2020	5545	13730				
2060	6130	15540				
PANAMA CANAL						
1990	7443	11701				
2020	8620	13540				
2060	9530	15320				

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
% DISTRIBUTION						
All Maximum Ship Design Sizes						
GLOBAL FLEET						
1990	71.0	29.0				
2020	51.0	49.0				
2060	39.0	61.0				
PANAMA CANAL						
1990 N	51.6	48.0	0.0	0.4		
1990 S	45.5	54.5	0.0	0.0		
2020 N	32.6	66.9	0.0	0.5		
2020 S	23.9	76.1	0.0	0.0		
2060 N	13.5	85.7	0.0	0.8	(unconstrained)	
2060 S	8.9	91.1	0.0	0.0	(unconstrained)	

Source: RLA

RoRo Ships

The deep-sea - as opposed to the short-sea - roro ship is an expensive ship type, able to carry containers and other cargo as well as vehicles and trailers. In the 1970's the ship type became popular in trades, such as those of the Arabian Gulf countries, where high volumes of high value goods were being imported at a time of congested ports. It competes with container ships for high-value cargoes, and is able to carry uncontainerizable project cargo. However, we note that:

- the whole concept of containerisable and non-containerisable cargo has evolved in a manner different from that foreseen in the early days of containerization. Whether a particular commodity is containerized or not is in practice dependent on the particular circumstances of a trade route rather that the inherent properties of a commodity. The roro's claimed advantage for non-containerisable cargo is not of overwhelming importance for the future.

- there is a near-consensus in the industry that, now that port congestion has been ended, roro ships for long international voyages are too capital intensive to compete satisfactorily with other ship types.

We therefore postulate a relative decline for these ships in the future, as noted above. For the smallest size class we foresee some increase in average size, but for the larger size classes in which roro's are represented, we postulate a near static picture of the average DWT by size class.

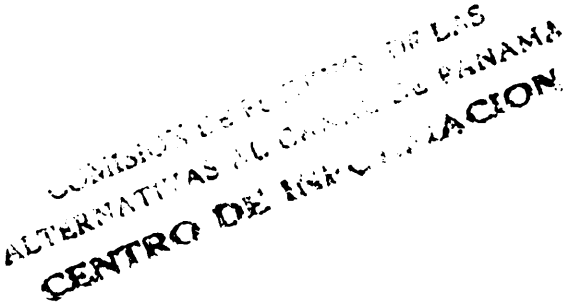
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Table 3.9

ANALYSIS AND PROJECTIONS FOR THE GLOBAL RORO FLEET

Fleet as at 1990

Vessel Size (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Year of Build							
pre-1965	5283	0	0	0	0	0	5283
1965 to 1969	77738	0	0	0	0	0	77738
1970 to 1974	395142	221519	0	0	0	0	616661
1975 to 1979	921481	885059	434745	0	0	0	2241285
1980 to 1984	518181	553588	105731	302479	0	0	1479979
1985 to 1989	348308	249344	26523	0	0	0	624175
1990	71754	40912	0	0	0	0	112666
Total	2337887	1950422	566999	302479	0	0	5157787
% Distribution	45.3%	37.8%	11.0%	5.9%	0.0%	0.0%	100.0%
Average Age (Years)	13	11	13	9	0	0	13

Fleet Projections

Year							
2020	2452882	2219274	350142	817627	0	0	5840195
% Distribution	42.0%	38.0%	6.0%	14.0%	0.0%	0.0%	100.0%
2060	2498210	2260285	356887	832737	0	0	5948118
% Distribution	42.0%	38.0%	6.0%	14.0%	0.0%	0.0%	100.0%

Source: RLA

Table 3.10

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: RORO5

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
AVERAGE DWT						
All Maximum Ship Design Sizes						
GLOBAL FLEET						
1990	4362	16529	31500	43211		
2020	5785	16550	31115	44190		
2060	6990	16550	31120	44190		
PANAMA CANAL						
1990	8442	17277	30948	43324		
2020	8440	17280	31115	44190		
2060	8440	17280	31120	44190		

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
% DISTRIBUTION						
All Maximum Ship Design Cases						
GLOBAL FLEET						
1990	45.3	37.8	11.0	5.9		
2020	42.0	38.0	6.0	14.0		
2060	42.0	38.0	6.0	14.0		
PANAMA CANAL						
1990 N	27.9	19.7	29.4	23.0		
1990 S	27.3	22.2	39.4	11.3		
2020 N	8.1	19.8	34.9	37.2		
2020 S	23.6	24.7	35.6	16.2		
2060 N	8.9	24.4	32.1	34.7	(unconstrained)	
2060 S	25.8	27.9	31.5	14.8	(unconstrained)	

Source: RLA

Vehicle Carriers

The world trade in motor vehicles is expected to change dramatically in the longer term. Regional production and distribution is expected to replace the 1990 pattern of trans-global trade. In these circumstances, we expect a continuing role for this ship type, but with much reduced average voyage lengths. This will not encourage significant increases in the average size of vehicle carrier, and we therefore assume no increase in the average size within DWT classes, nor any movement to larger size classes between now and 2060.

3.3.3 Dry Bulk Carriers and Combined Carriers in Dry Bulk

As it is intrinsically impossible to determine for such long term forecasts, the split in the global fleet between custom built drybulk carriers and combined carriers operating in the dry bulk trades, RLA have amalgamated the 1990 dry bulk carrier fleet with those combined carriers estimated to be operating in dry bulk during 1990 and have forecast developments in future global supply of these vessels together. It was calculated that, on average during 1990, 63% of the combined carrier fleet was trading in dry bulk. This compares to an annual average of 61% in the period from 1977 to 1990 which varied between 44% as a minimum to 72% as a maximum. The snapshot analysis of the 1990 fleet therefore represents a reasonable average in this respect.

Similarly, it is calculated that, in 1990, there was broadly a 16% surplus in vessel supply in this sector. This compares to an average of 18%, which varied between a minimum of 10% to a maximum of 24%, in the time period from 1977 to 1990. Again therefore, the 1990 average data represent a reasonable starting point for long term global fleet forecasts.

In order to determine future supply in total and by size range, the major routes from the WEFA trade data were amalgamated with data on laden dry bulk carrier and combined carrier sailings in dry by size range on a route by route basis. The data are predominantly a combination of proprietary information from Fearnley's database and RLA data.

Table 3.11

ANALYSIS AND PROJECTIONS FOR THE GLOBAL VEHICLE CARRIERS FLEET

Fleet as at 1990

Vessel Size (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Year of Build							
pre-1965	1400	0	0	0	0	0	1400
1965 to 1969	4656	0	0	0	0	0	4656
1970 to 1974	58844	47774	0	0	0	0	106618
1975 to 1979	212678	643119	30400	40999	0	0	927196
1980 to 1984	126524	914988	84373	0	0	0	1125885
1985 to 1989	87309	426290	28070	0	0	0	541669
1990	9654	17914	0	0	0	0	27568
Total	501065	2050085	142843	40999	0	0	2734992
% Distribution	18.3%	75.0%	5.2%	1.5%	0.0%	0.0%	100.0%
Average Age (Years)	11	10	9	14	0	0	10
Fleet Projections							
Year							
2020	883101	3532406	232395	0	0	0	4647902
% Distribution	19.0%	76.0%	5.0%	0.0%	0.0%	0.0%	100.0%
2060	944780	3779121	248626	0	0	0	4972527
% Distribution	19.0%	76.0%	5.0%	0.0%	0.0%	0.0%	100.0%

Source: RLA

Table 3.12

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: VEHICLE CARRIERS

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
AVERAGE DWT						
All Maximum Ship Design Cases						
GLOBAL FLEET						
1990	4074	13579	28569	40999		
2020	4070	13760	28570	0		
2060	4070	13760	28570	0		
PANAMA CANAL						
1990	8290	14501	27677			
2020	8290	14500	28570			
2060	8290	14500	28570			

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 24,999	25,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999
% DISTRIBUTION						
All Maximum Ship Design Sizes						
GLOBAL FLEET						
1990	18.3	75.0	5.2	1.5		
2020	19.0	76.0	5.0	0.0		
2060	19.0	76.0	5.0	0.0		
PANAMA CANAL						
1990 N	6.7	93.3	0.0			
1990 S	1.3	73.4	25.4			
2020 N	4.8	95.2	0.0			
2020 S	1.2	74.5	24.2			
2060 N	4.9	95.1	0.0	(unconstrained)		
2060 S	1.1	75.8	23.1	(unconstrained)		

Source: RLA

Table 3.13

ANALYSIS AND PROJECTIONS FOR THE GLOBAL DRY BULK CARRIER FLEET
INCLUDING COMBINED CARRIERS IN DRY BULK TRADES

Fleet as at 1990

Vessel Size (DWT) / Year of Build	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+	Total
pre-1965	2554144	83603	0	0	0	0	0	0	2637747
1965 to 1969	5992114	2844302	1760588	642412	160242	0	0	0	11399658
1970 to 1974	18290154	7435104	4188869	10374246	5086764	2484820	1888339	0	49748296
1975 to 1979	23968835	10609164	5124391	9362745	1744505	377147	270384	0	51457171
1980 to 1984	20877854	17365762	6444520	8616436	2849074	852893	519143	0	57525682
1985 to 1989	12367096	10824730	4985990	3791313	8454913	2821629	228798	1342055	44816524
1990	742661	1387240	1851623	3983010	713298	816743	256858	0	9751433
Total	84792858	50549905	24355981	36770162	19008796	7353232	3163522	1342055	227336511
% Distribution	37.3%	22.2%	10.7%	16.2%	8.4%	3.2%	1.4%	0.6%	100.0%
Average Age (Years)	13	10	10	11	9	8	12	3	12

Fleet Projections

Status Quo Canal

Year

2020	133413083	135271546	41772943	98102792	49871477	19291477	13947652	9371033	501042466
% Distribution	26.6%	27.0%	8.3%	19.6%	10.0%	3.8%	2.8%	1.9%	100.0%
2060	146407517	163408027	125510985	83652251	81674518	31594409	17518251	12744605	662510564
% Distribution	22.1%	24.7%	18.9%	12.6%	12.3%	4.8%	2.6%	1.9%	100.0%

Table 3.13 (Cont'd)

ANALYSIS AND PROJECTIONS FOR THE GLOBAL DRY BULK CARRIER FLEET
INCLUDING COMBINED CARRIERS IN DRY BULK TRADES

Vessel Size (DWT)	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+	Total
150,000 DWT Maximum Design Case									
Year									
2020	119897101	102580922	67965365	101029697	46157158	17855118	13857492	9285142	478627995
% Distribution	25.1%	21.4%	14.2%	21.1%	9.7%	3.7%	2.9%	1.9%	100.0%
2060	139260483	112120948	150719993	97251186	70223501	27164776	17328793	12590652	626660334
% Distribution	22.2%	17.9%	24.1%	15.5%	11.2%	4.3%	2.8%	2.0%	100.0%
250,000 DWT Maximum Design Case									
Year									
2020	119591847	102580922	67941009	100702443	46617171	18033066	13832816	9261656	478560930
% Distribution	25.0%	21.4%	14.2%	21.0%	9.7%	3.8%	2.9%	1.9%	100.0%
2060	138917889	112120948	150679570	73835031	86978318	33646095	17299320	12568067	626045238
% Distribution	22.2%	17.9%	24.1%	11.8%	13.9%	5.4%	2.8%	2.0%	100.0%

Source: RLA

Table 3.14

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: DRY BULK CARRIERS AND COMBINED CARRIERS IN DRY BULK TRADES.

VESSEL SIZE RANGE (DWT)	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+
AVERAGE DWT								
Status Quo Canal								
GLOBAL FLEET								
1990	26235	51955	72525	126484	171080	219300	266740	316527
2020	32000	51955	68745	134700	172110	220620	268345	318425
2060	36500	59275	68745	140475	172800	221500	269420	319705
PANAMA CANAL								
1990	28731	53545	69085					
2020	32000	53550	68745					
2060	36500	59275	68745					
150,000 DWT Maximum Design Case								
GLOBAL FLEET								
2020	32000	51955	82120	134700	172110	220620	268345	318425
2060	36500	59275	93685	140475	172800	221500	269420	319705
PANAMA CANAL								
2020	32000	53550	82120	134700				
2060	36500	59275	93685	140475				

Table 3.14 (Cont'd)

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: DRY BULK CARRIERS AND COMBINED CARRIERS IN DRY BULK TRADES.

VESSEL SIZE RANGE (DWT)	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+
AVERAGE DWT								
250,000 DWT Maximum Design Case								
GLOBAL FLEET								
2020	32000	51955	82120	134700	172110	220620	268345	318425
2060	36500	59275	93685	140475	172800	221500	269420	319705
PANAMA CANAL								
2020	32000	53550	82120	134700	172110	220620		
2060	36500	59275	93685	140475	172800	221500		

Table 3.14 (Cont'd)

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: DRY BULK CARRIERS AND COMBINED CARRIERS IN DRY BULK TRADES.

VESSEL SIZE RANGE (DWT)	10,000 to 40,000	40,000 to 65,000	65,000 to 100,000	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+
% DISTRIBUTION								
Status Quo Canal								
GLOBAL FLEET								
1990	37.3	22.2	10.7	16.2	8.4	3.2	1.4	0.6
2020	26.6	27.0	8.3	19.6	10.0	3.8	2.8	1.9
2060	22.1	24.7	18.9	12.6	12.3	4.8	2.6	1.9
PANAMA CANAL								
1990 N	55.7	32.9	10.6					
1990 S	36.4	44.3	18.7					
2020 N	44.6	44.0	11.4					
2020 S	32.3	55.7	12.0					
2060 N	35.0	43.1	21.9	(unconstrained)				
2060 S	27.4	43.5	29.1	(unconstrained)				
150,000 DWT Maximum Design Case								
GLOBAL FLEET								
2020	25.1	21.4	14.2	21.1	9.7	3.7	2.9	1.9
2060	22.2	17.9	24.1	15.5	11.2	4.3	2.8	2.0
PANAMA CANAL								
2020 N	37.5	30.2	24.8	7.5				
2020 S	15.3	26.6	7.7	50.4				
2060 N	34.2	36.6	26.1	3.0				
2060 S	14.7	20.6	22.1	42.6				

Note: In 1990 PCC also reported transits by dry bulk carriers less than 10,000 dwt, amounting to less than 1% of the total in either direction.

Table 3.14 (Cont'd)

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: DRY BULK CARRIERS AND COMBINED CARRIERS IN DRY BULK TRADES.

VESSEL SIZE RANGE (DWT)	10,000 to 40,000	40,000 to 65,000	65,000 to 100,000	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+
% DISTRIBUTION								
250,000 DWT Maximum Design Case								
GLOBAL FLEET								
2020	25.0	21.4	14.2	21.0	9.7	3.8	2.9	1.9
2060	22.2	17.9	24.1	11.8	13.9	5.4	2.8	2.0
PANAMA CANAL								
2020 N	36.3	29.3	24.1	3.6	6.6	0.0		
2020 S	14.6	25.4	7.4	39.9	8.3	4.4		
2060 N	32.9	35.2	25.1	0.0	4.9	2.0		
2060 S	13.8	19.4	20.9	0.0	39.8	6.0		

Source: RLA

Table 3.15

ANALYSIS OF THE GLOBAL COMBINED CARRIER FLEET

Fleet as at 1990

Vessel Size (DWT)	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+	Total
Year of Build										
pre-1965	0	0	0	0	0	0	0	0	0	0
1965 to 1969	0	0	123808	257531	0	0	0	0	0	381339
1970 to 1974	0	0	192895	1580463	4414493	3508168	2526961	1328165	0	13551145
1975 to 1979	0	55908	336956	635708	6096101	1155010	465614	0	0	8745297
1980 to 1984	0	13149	792658	1893219	1539705	0	0	0	0	4238731
1985 to 1989	0	0	586490	844697	149895	313837	0	282467	1213641	3391027
1990	0	0	0	0	0	0	0	0	0	0
Total	0	69057	2032807	5211618	12200194	4977015	2992575	1610632	1213641	30307539
% Distribution	0.0%	0.2%	6.7%	17.2%	40.3%	16.4%	9.9%	5.3%	4.0%	100.0%
Average Age (Years)	0	12	8	12	14	15	16	15	3	13

Source: RLA

These data were compared and combined with information on Panama Canal trades and vessel size distributions for 1990 and the status quo Canal trade forecasts for 2020 and 2060. Assuming a 'status quo' Panama Canal, changes in the proportions of vessel size ranges on a route by route basis were made with reference to historical trends in the proportions of size ranges in the world fleet and to trends in volumes of future trade. In particular, the large forecast increases in coal trades suggests that there will be a continuing trend towards the use of larger vessels. It is estimated that on the major intercontinental routes, approximately 33% of coal is transported in vessels of 65,000 to 100,000 DWT. By 2020, this percentage is expected to reduce to broadly 11 percent and by 2060 to be reduced to virtually nil. This shift in coal trades is expected to counterbalance a trend for minor bulk and grain cargoes to be moved in vessels in this size and is responsible for the reduced proportion of the total, fleet occupied by these vessels in 2020 compared to 1990. By 2060 however, it is expected that the proportion occupied by these vessels will again increase. By 2060 it is also expected that the majority of trade in coal on major routes will be carried in vessels of 150,000 to 250,000 DWT and that this trend will already be apparent by 2020. A more gradual upward trend is expected in the proportions of large vessels carrying iron ore intercontinentally because of the lower growth rates expected in these trades.

At the lower end of the scale, the trend for vessels of 10,000 to 40,000 DWT to occupy a reducing proportion of the total fleet is continued. It is expected that this trend will not be so pronounced over the long term thirty year and seventy year forecasts as is apparent over, say, the past ten years. This is in part because of the substantial shift away of grain cargoes that has already taken place. It is also because experience from other shipping sectors suggests that while smaller vessels may decline as a proportion of the total fleet, continuing new demand arising from combinations of new products and new sub routes tends to support a continuing supply of smaller ships.

The proportion of vessels in the 40,000 to 65,000 DWT size range in the world fleet is expected to increase to 2020, assuming a status quo Canal but to decline marginally thereafter in response to the continuing shift of minor bulks and grains cargoes from this size range to vessels of 65,000 to 100,000 DWT.

Panama Canal trades occupy a small proportion of demand for vessels below 100,000. It is estimated that in 1990, on a laden tonne mile basis, demand from dry bulk trades which involved Canal transits represented the following percentages of global demand on main routes which encompass over 90% of dry bulk trade:

Table 3.15

ANALYSIS OF THE GLOBAL COMBINED CARRIER FLEET

Fleet as at 1990

Vessel Size (DWT)	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+	Total
Year of Build										
pre-1965	0	0	0	0	0	0	0	0	0	0
1965 to 1969	0	0	123808	257531	0	0	0	0	0	381339
1970 to 1974	0	0	192895	1580463	4414493	3508168	2526961	1328165	0	13551145
1975 to 1979	0	55908	336956	635708	6096101	1155010	465614	0	0	8745297
1980 to 1984	0	13149	792658	1893219	1539705	0	0	0	0	4238731
1985 to 1989	0	0	586490	844697	149895	313837	0	282467	1213641	3391027
1990	0	0	0	0	0	0	0	0	0	0
Total	0	69057	2032807	5211618	12200194	4977015	2992575	1610632	1213641	30307539
% Distribution	0.0%	0.2%	6.7%	17.2%	40.3%	16.4%	9.9%	5.3%	4.0%	100.0%
Average Age (Years)	0	12	8	12	14	15	16	15	3	13

Source: RLA

These data were compared and combined with information on Panama Canal trades and vessel size distributions for 1990 and the status quo Canal trade forecasts for 2020 and 2060. Assuming a 'status quo' Panama Canal, changes in the proportions of vessel size ranges on a route by route basis were made with reference to historical trends in the proportions of size ranges in the world fleet and to trends in volumes of future trade. In particular, the large forecast increases in coal trades suggests that there will be a continuing trend towards the use of larger vessels. It is estimated that on the major intercontinental routes, approximately 33% of coal is transported in vessels of 65,000 to 100,000 DWT. By 2020, this percentage is expected to reduce to broadly 11 percent and by 2060 to be reduced to virtually nil. This shift in coal trades is expected to counterbalance a trend for minor bulk and grain cargoes to be moved in vessels in this size and is responsible for the reduced proportion of the total, fleet occupied by these vessels in 2020 compared to 1990. By 2060 however, it is expected that the proportion occupied by these vessels will again increase. By 2060 it is also expected that the majority of trade in coal on major routes will be carried in vessels of 150,000 to 250,000 DWT and that this trend will already be apparent by 2020. A more gradual upward trend is expected in the proportions of large vessels carrying iron ore intercontinentally because of the lower growth rates expected in these trades.

At the lower end of the scale, the trend for vessels of 10,000 to 40,000 DWT to occupy a reducing proportion of the total fleet is continued. It is expected that this trend will not be so pronounced over the long term thirty year and seventy year forecasts as is apparent over, say, the past ten years. This is in part because of the substantial shift away of grain cargoes that has already taken place. It is also because experience from other shipping sectors suggests that while smaller vessels may decline as a proportion of the total fleet, continuing new demand arising from combinations of new products and new sub routes tends to support a continuing supply of smaller ships.

The proportion of vessels in the 40,000 to 65,000 DWT size range in the world fleet is expected to increase to 2020, assuming a status quo Canal but to decline marginally thereafter in response to the continuing shift of minor bulks and grains cargoes from this size range to vessels of 65,000 to 100,000 DWT.

Panama Canal trades occupy a small proportion of demand for vessels below 100,000. It is estimated that in 1990, on a laden tonne mile basis, demand from dry bulk trades which involved Canal transits represented the following percentages of global demand on main routes which encompass over 90% of dry bulk trade:

Size Range (DWT)	Percentage
10,000 - 40,000	14.5
40,000 - 65,000	30.0
65,000 - 100,000	17.0
Total	**19.0**

From the table above it can be seen that, for dry bulk carriers and combined carriers in dry bulk trades within the size ranges 10,000 to 100,000 DWT inclusive, the total ton miles of routes which transit the Canal represent 19% in total of the global tonne miles demand of vessels in this size range.

Nevertheless the Canal has an impact on average deadweights in the world fleet. As a result there is little discernible trend in the average deadweight of dry bulk carriers in the 40,000 - 65,000 DWT range globally and the deadweight of vessels in the 65,000 - 100,000 DWT size range has declined slightly in order to reflect more closely maximum Canal dimensions. Over the period to 2020 therefore, it is assumed that there will be little shift in the average deadweight of either of these size ranges of vessel in the global fleet. For the period 2020 to 2060, it has been assumed that there would be some, albeit slow, increase in the average deadweight of vessels in the 40,000 - 65,000 DWT size range.

With the introduction of the 150,000dwt maximum Canal design size, and also for the larger Canal designs, there is likely to be an impact on the average deadweight of vessels in the global fleet in the 65,000 - 100,000 DWT size range. This would also be likely to shift some demand from 40,000 - 65,000 DWT ships into this size range.

For vessels in excess of 100,000 DWT, where major bulk demand and vessel supply is, as previously discussed, already established, the potential development of the Panama Canal is unlikely to have any significant impact on average deadweights. Based on historical analyses we do consider it likely that average deadweights in these larger size ranges will be subject to a secular drift upwards rather than be subject to dynamic change.

Variations in the fleet forecasts are therefore largely a function of the extent to which by pass traffic is routed through the Canal in each succeeding case and the subsequent impact on ton-mile demand.

3.3.4 Chemical Carriers

WEFA trade data and forecasts on major routes have been analyzed and converted to global tonne miles in order to determine the overall percentage increases in demand for these vessels over the time period. On this basis, demand is likely to increase by 200% between 1990 and 2020 and by 70% between 2020 and 2060.

There appears to be little discernible historical trend in changes in average deadweights or distribution shifts between size ranges in this fleet. However, within the size range 10,000 - 40,000 DWT in particular there is a multiplicity of vessel designs and sizes that reflect commercial requirements in specific geographical and product sectors. On specific routes, we expect that there will be a distribution shift from vessels towards the upper end of this size range to vessels in the range of 40,000 to 65,000 DWT. In particular, this is likely to occur on routes where there is a high incidence of lower value commodity chemicals carriage rather than specialty products.

The global distribution shift away from vessels of under 10,000 DWT is largely caused by the pattern of trade increases although demand for these vessels is underpinned by continuing commercial requirement for smaller vessels to carry higher value products.

There is no discernible trend in the average deadweight of vessels of 5,000 to 10,000 DWT. The increase in average deadweight of vessels in the 10,000 to 40,000 DWT range is based on the long term trend in the tanker sector to 2020 because of the interchangeability of these ship types at the margin, with continuing strong growth thereafter.

For the large vessels there is no trend and too few observations to develop a historical analysis. In addition, structural differences between the chemicals and oil tanker sectors are such that trends from the oil tanker sector cannot be applied. For 2020, an average deadweight of 45,250 tons has been assumed, which is the average of vessels delivered in this size range since 1980. Between 2020 and 2060, the same growth rates are assumed as for the 10,000 to 40,000 DWT vessels.

3.3.5 Gas Carriers

Gas carrier trade which encompass a wide range of commodities - liquified natural gas (LNG), liquified petroleum gas (LPG), petrochemical gases and ammonia - are relatively insignificant in the context of Panama Canal Traffic and this is expected to remain the case in future. Developments in LPG trade, the predominant component, are expected to follow the same trend apparent in the oil trades while it is not envisaged that any LNG trades will be attracted through the Canal. There is one LNG project under construction in Venezuela being developed jointly by Lagoven, Shell, Exxon and Mitsubishi. However the natural market for this gas is the Atlantic Basin with Far East markets seemingly well provided for by developments in the Middle and South East Asia. Moreover in discussions with Shell it became apparent that even to consider shipping LNG through the Canal would require some assurances with regard to the political and economic (toll charges) stability. As LNG projects are intrinsically long term (20 years) but require a large amount of front end investment they need stable environments in which to ensure a pay back.

For the above reasons and in the context of the study overall it is not considered to be justified to undertake detailed analyses of global developments in gas carrier demand and supply. It is considered sufficient to consider only potential developments in the average size of gas carriers in the global fleet and on Panama routes together with the distribution of deadweight by size range for Canal transits.

Size developments in the global fleet are not an appropriate model. Evaluation of historical time series data from 1977 - 1990, indicate substantial growth in the size ranges above 40,000 deadweight due to the growth of long haul LPG trades out of the Arabian Gulf and the development of LNG trades. Thus, above 10,000 deadweight the distribution of gas carriers by size range globally bears little resemblance to the percentage distribution for Canal trades.

Standard sizes of LPG and LNG carriers for certain types of business have become fairly well established globally and - particularly in the case of LPG vessels for which a downturn in trade in line with the oil sector in envisaged between 2020 and 2060 - no major developments on ship sizes are contemplated. Therefore for Panama routes, little or no change in average deadweights by size range or percentage distribution by size range are envisaged.

Table 3.18

ANALYSIS OF THE GLOBAL GAS CARRIER FLEET

Fleet as at 1990

Vessel Size (DWT)	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	Total
Year of Build					
pre-1965	25324	68819	0	0	94143
1965 to 1969	181437	371487	0	0	552924
1970 to 1974	184414	545663	641803	0	1371880
1975 to 1979	301462	307386	2240627	1268494	4117969
1980 to 1984	402959	503387	976073	1312085	3194504
1985 to 1989	228819	206074	379986	269398	1084277
1990	85754	169223	298637	220656	774270
Total	1410169	2172039	4537126	3070633	11189967
% Distribution	12.6%	19.4%	40.5%	27.4%	100.0%
Average Age (Years)	13	13	11	9	12

Source: RLA

Table 3.19

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: GAS CARRIERS

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000- to 39,999	40,000- to 64,999	65,000 to 99,999	
AVERAGE DWT					
All Maximum Ship Design Cases					
GLOBAL FLEET					
1990	2518	20299	51558	71410	
2020	4300	18900	51560	71410	
2060	4300	18900	51560	71410	
PANAMA CANAL					
1990	5269	20228	45120		
2020	5270	18900	45120		
2060	5270	18900	45120		

VESSEL SIZE RANGE (DWT)	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	
% DISTRIBUTION					
All Maximum Ship Design Sizes					
GLOBAL FLEET					
1990	12.6	19.4	40.5	27.4	
PANAMA CANAL					
1990 N	2.2	14.5	83.3	0.0	
1990 S	6.9	70.5	22.6	0.0	
2020 N	13.7	48.2	38.1	0.0	
2020 S	7.9	74.2	17.9	0.0	
2060 N	37.1	35.2	27.8	0.0	(unconstrained)
2060 S	9.6	71.8	18.6	0.0	(unconstrained)

Source: RLA

3.3.6 Crude Oil and Petroleum Products Tankers including Combined Carriers in Oil Trades

For reasons described in section 3.3.3, the projection of the global fleet for oil tankers includes combined carriers trading in oil. As background, the existing world fleet of combined carriers is analyzed is Table 3.15. It is assumed that those combined carriers not employed in the dry bulk trades are actively employed in the carriage of oil.

The methodology employed in determining the potential future development of the global oil tanker fleet is the same as that adopted for dry bulk carriers although it is unlikely that the expansion of the Panama Canal will impact significantly on the size and composition of the global fleet. It is estimated that tanker demand on Canal routes represents between 1% and 2% of total world tanker demand. Therefore only one projection of the global tanker fleet for 2020 and 2060 has been made to cover all cases.

As with dry bulk carriers, 1990 is a representative year in terms of the balance in the market and is therefore a good reference point from which to project future developments. Based on global demand for tankers and combined carriers in oil trades alone, the surplus in this sector was equivalent to about 18% of supply. However, in overall market terms the surplus was slightly less due to the utilization of a portion of the fleet for floating storage. This is considered broadly representative of the average surplus that could be expected in the long term.

As the starting point in determining future supply, in total and by size range, RLA oil trade data for major routes were amalgamated with data on laden tanker and combined carrier sailings in oil by size range and on a route by route basis. Again, these data are predominantly a combination of proprietary information from Fearnleys and RLA databases. Trade forecasts for 2020 and 2060 were then sub-divided by ship size route by route on the basis of the 1990 tanker size distributions, adjusted for potential changes in future size distribution. These changes, in turn, were determined by evaluating time series data on the size and composition of the global fleet, the structure of the existing fleet and the new construction order book as well changes in the trade volumes.

Table 3.20

ANALYSIS AND PROJECTIONS FOR THE GLOBAL OIL TANKER FLEET
INCLUDING COMBINED CARRIERS IN OIL TRADE

Fleet as at 1990

Vessel Size (DWT)	5,000 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+	Total
Year of Build										
pre-1965	126815	3467325	1440713	147002	0	0	0	0	0	5181855
1965 to 1969	187422	2774679	912729	3990903	2064875	175534	206972	0	0	10313114
1970 to 1974	681339	5973471	730428	6191707	10974212	1173925	12129033	23869851	2262118	63986084
1975 to 1979	496985	8039753	2524658	10667814	18175282	6223180	9343851	25928070	25166597	106566190
1980 to 1984	441340	4798831	7801521	9946898	2462751	857290	455921	1372339	1027851	29164742
1985 to 1989	300599	4631582	3562893	8670211	4814757	210705	6186947	4494316	547946	33419956
1990	87888	588391	309310	2503468	1701730	0	714986	2960435	0	8866208
Total	2322388	30274032	17282252	42118003	40193607	8640634	29037710	58625011	29004512	257498149
% Distribution	0.9%	11.8%	6.7%	16.4%	15.6%	3.3%	11.3%	22.8%	11.3%	100.0%
Average Age (Years)	13	15	10	11	13	13	12	13	14	13

Fleet Projections

Year										
2020	3753786	44302070	25553326	62917539	55036294	8369848	28127705	108349409	80677395	417087372
% Distribution	0.9%	10.6%	6.1%	15.1%	13.2%	2.0%	6.8%	26.0%	19.3%	100.0%
2060	1645059	23050367	14120768	32540951	24160933	5868100	19720335	44477433	17200421	182784367
% Distribution	0.9%	12.6%	7.7%	17.8%	13.2%	3.2%	10.8	24.3%	9.4%	100.0%

Note: Changes to Panama trades under 150,000 DWT, 200,000 DWT and 250,000 DWT maximum ship design cases do not have a significant impact on global fleet projections.

Source: RLA

Table 3.21

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: TANKERS

	VESSEL SIZE RANGE (DWT)								
	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+
AVERAGE DWT									
Status Quo Canal									
GLOBAL FLEET									
1990	6433	26463	52849	82880	125884	163370	231430	266308	368264
2020	6430	31710	52850	89730	131000	151000	238000	269000	368300
2060	6430	31710	52850	89730	131000	151000	238000	269000	368300
PANAMA CANAL									
1990	4309	30305	56667	73004					
2020	4310	31710	56670	73000					
2060	4310	31710	56670	73000					
150,000 DWT Maximum Ship Design Case									
GLOBAL FLEET									
2020	6430	31710	52850	89730	131000	151000	238000	269000	368300
2060	6430	31710	52850	89730	131000	151000	238000	269000	368300
PANAMA CANAL									
2020	4310	31710	56670	89730	149999				
2060	4310	31710	56670	89730	149999				
250,000 DWT Maximum Ship Design Case									
GLOBAL FLEET									
2020	6430	31710	52850	89730	131000	151000	238000	269000	368300
2060	6430	31710	52850	89730	131000	151000	238000	269000	368300
PANAMA CANAL									
2020	5630	31710	54300	89730	149999	195000			
2060	5630	31710	54300	89730	149999	195000			

Table 3.21 (Cont'd)

DEVELOPMENT OF VESSEL SIZE DISTRIBUTION AND AVERAGE DEADWEIGHT
SHIP TYPE: TANKERS

% DISTRIBUTION

	VESSEL SIZE RANGE (DWT)							
	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	150,000 to 199,999	200,000 to 249,999	250,000 to 299,999	300,000+
Status Quo Canal									
GLOBAL FLEET									
1990	0.9	11.8	6.7	16.4	15.6	3.3	11.3	22.8	11.3
2020	0.9	10.6	6.1	15.1	13.2	2.0	6.8	26.0	19.3
2060	0.9	12.6	7.7	17.8	13.2	3.2	10.8	24.3	9.4
PANAMA CANAL									
1990 N	0.8	20.8	70.7	7.6					
1990 S	1.8	39.7	52.6	5.9					
2020 N	2.6	35.8	50.8	10.8					
2020 S	1.8	28.2	64.8	5.2					
2060 N	5.8	42.2	35.8	16.2					
2060 S	2.1	32.0	59.3	6.6					
150,000 DWT Maximum Design Case									
GLOBAL FLEET									
2020	0.9	10.6	6.1	15.1	13.2	2.0	6.8	26.0	19.3
2060	0.9	12.6	7.7	17.8	13.2	3.2	10.8	24.3	9.4
PANAMA CANAL									
2020 N	2.6	35.7	42.0	19.8	0.0				
2020 S	1.1	17.1	21.4	21.0	39.5				
2060 N	5.8	42.2	35.8	16.2	0.0				
2060 S	1.1	16.4	21.1	12.6	48.8				
250,000 DWT Maximum Design Case									
GLOBAL FLEET									
2020	0.9	10.6	6.1	15.1	13.2	2.0	6.8	26.0	19.3
2060	0.9	12.6	7.7	17.8	13.2	3.2	10.8	24.3	9.4
PANAMA CANAL									
2020 N	2.6	35.7	42.0	19.8	0.0	0.0	0.0		
2020 S	1.1	17.1	21.4	21.5	0.0	0.0	39.5		
2060 N	5.8	42.2	35.8	16.2	0.0	0.0	0.0		
2060 S	1.1	16.4	21.1	12.6	0.0	0.0	48.8		

Source: RLA

Tanker demand by size range, expressed in terms of tonne-miles, was determined for 1990, 2020 and 2060 for both these major global routes and the Canal trades previously identified in the transit database. The results were amalgamated to obtain total estimates of world tanker demand by size range. As described in section XXX these estimates have been used to determine tanker demand by size which have then been applied to actual 1990 tanker demand as determined by RLA's top down model. Global tanker supply projections are based on the resulting demand figures, allowing for a 15% market surplus.

Between 1990 and 2020 growth in Middle East oil exports and in imports into the developed and newly industrialized countries is projected to result in an increase in the proportion of tankers in the world fleet in excess of 250,000 deadweight from 34% to 45%. Between 65,000 deadweight and 250,000 deadweight the proportion is expected to fall from 47% to 37% with the decline particularly apparent at the upper end of this broad size band. Below 65,000 deadweight, it is anticipated that there will be only a marginal decline to about 18% in 2020. These trends are expected to be reversed in the period between 2020 and 2060 as the predominance of long haul trades between the Middle East and the developed countries - in particular those West of Suez - is eroded.

For tankers below 100,000 deadweight, future projections of average vessel size, by size range, have been determined largely from historical trends identified from the time series data provided by CAS. This means no expected change in the below 10,000 deadweight size range, but further growth in the sizes of tanker in the 10,000-39,999 and 65,000 - 99,999 deadweight size ranges. For vessels between 40,000 and 64,999 deadweight there are conflicting indicators. Historical data suggest a further increase in size but the new tankers in this size range are being built smaller than the 1990 average. Therefore no change has been assumed. For the larger vessel size ranges, historical data are less of a guide due to the rapid evolution of the fleet over the past twenty years. Above 250,000 deadweight little or no change is envisaged. Between 100,000 and 250,000 deadweight some increase in size is assumed based on observations of more modern ships and new construction orders.

3.4 Development of Ship Operating Costs and Seaborne Freight Costs

3.4.1 Introduction

The development of estimates of future seaborne freight costs on routes relevant to the Panama Canal serves a number of purposes:

- the determination of optimum routing patterns and ship sizes for trades relevant to the Canal;
- transportation costs;
- comparisons of costs for different competing ship types within certain trades;
- in combination with land based transportation costs, the determination of the economics of utilizing the Canal versus alternative landbridge options;
- to provide a basis from which to determine those commodity trade flows that would be switched from the Canal due to capacity constraints under status quo conditions;
- to provide the Financing Scheme, Financial Analysis and Management Arrangement Components (FSFAMAC) Contractor with the means to determine those commodity flows that would be progressively lost to the Canal as tolls are increased from a no tolls base.

The results of this work are used in the economic evaluations of shifted cargoes in Sections 5.3 and 5.6. The calculated freight costs for 2020 and 2060 for all Panama plus alternative routes as used in the determination of the constrained 2060 status quo Canal commodity flows and transits and the FSFAMAC Contractor are shown in XXXXXX.

3.4.2 Approach

Following is a re-statement of the philosophy behind the adopted approach, as originally employed in Phase I of this study, and a more detailed description of the work that has been done in the development of the necessary operating cost data.

The approach is based on the fact that, where choice exists, decisions on whether or not to use the Canal are based on marginal economics - i.e. from the perspective of seaborne transportation costs they reflect market rates rather than owners' actual fully built up operating costs.

Ship market rates are of course related to operating cost structures. However, a review of market rates versus fully built up costs, including capital costs based on prevailing new construction costs as a yard stick, reveals that rates seldom represent full recovery of costs at the time. Over time, average market rates for all ship types are at a discount to full operating costs.

Therefore the approach that has been adopted is based in the first instance on the estimation and projection of ship operating costs for the years 1990, 2020 and 2060. These estimates were adjusted to reflect 'market' rates. For bulk ship types (for example, tankers and dry bulk carriers) the basis for this adjustment were the historical relationships between market rates and operating costs for a representative operator by ship type and size. In order to take into account the inevitable peaks and troughs in these markets, data has been assembled for the period 1978 to date in order to establish these relationships. A description of the RLA models used to develop long term freight costs is provided below.

For the general cargo ship types market rate data are not as readily available and certainly not amenable to the construction of consistent time series data. Therefore an alternative methodology has been adopted but one that still is based on the premise that market rates do not equate to fully built up costs for new buildings. Wherever possible this approach has been validated by comparison with market data such as is available.

In the absence of comprehensive rate data it is argued that market levels reflect the operating costs of the representative vessel for each size range - in terms of age and operating characteristics - within each sector. Capital costs for these ships in 1990 are calculated on the basis of the vessels' second hand values taking into account the vessels' remaining lives. For future time periods account was taken of potential changes in the nature of these representative vessels. Future second hand values (and therefore capital costs) were projected with reference to forecast new building prices using the results of regression analyses that have already been undertaken to establish the relationship between second hand values and new building prices for given vessel ages.

Throughout the development of freight costs, consideration is also given to the phasing out of existing vessels and the introduction of ship types involving new technology and changed average sizes.

3.4.3 Development of Costs Estimates

In the course of analyzing the 1990 fleet, weighted average ships for each ship type/size range and age group have been determined. The mid point of each age range was weighted by number of ships and deadweight, and the average of averages was taken. These averages were examined to ensure that they were not obviously in disagreement with what may be called representative ships. For the container carrying ship types, the average TEU's and the relationship between TEU's and deadweights were calculated.

In summary therefore, for each size range of each ship type, the statistical average ship (age/size) is calculated. Cost estimates are for this average ship, unless it is obviously unrepresentative, in which case common sense selection of a representative ship has been made.

The classification of shipping costs is virtually standardized world-wide but:

- liner operations incur a different pattern of costs from that of the tramp or bulk trades; and

- the distribution of responsibility for individual cost categories varies depending on the nature of the charter arrangements if any.

A standardized approach is presented below.

Capital costs

Where appropriate these are based on secondhand values. The life of the ship (for financial purposes only) is assumed to be 20 years. Ships older than 20 years are represented by their 1990 scrap value.

The annual capital cost is entered for X years where X = [20 - age of ship]. The annual capital cost is the secondhand value * Annuity Factor * years at a discount rate of Y%. Y is determined as follows:

	Libor Rate	OECD Inflation	Real Interest Rate (Rounded)
1990	8.2	5.3	3.0
2020	5.9	3.4	2.5
2060	5.9	3.4	2.5

For all time periods, in addition to the real interest rate, the capital cost will have an additional 1.5% spread and a 5% profit margin. Therefore for 1990, the rate is 9.5% and for both 2020 and 2060 the rate is 9%.

The fleet in 2020 and 2060 has a different vessel mix from 1990. Current and historical newbuilding prices are regressed against secondhand prices to derive a relationship for use in forecasting future real second hand prices. An active second-hand market exists for most ship types, and usually sufficient prices are reported for them to be analyzed for study purposes. However, for the general cargo ship types, relevant data are not so readily available and additional statistical analyses were carried out. Reported prices of sales of vessels for further trading were subject to regression analysis, with scrap prices being taken as a 'floor' at and after the 20th year of the ship's life. Use was also made of a theoretical model of the way in which a new ship's price might be expected to decline to scrap value in year 20. This model took account of ships built since about 1984 being at a premium due to their improved propulsion and other efficiency.

Future newbuilding prices in real terms in the absence of technological changes could be expected to be as 1990 on the basis that:

- there will be a continuing shift of shipbuilding facilities to developing countries with relative low income per capita;
- no real price increases are forecast in shipbuilding raw materials;
- real increases in energy prices will be at least offset by production efficiency increases, for example, through the use of computer aided technology.

There will be additional newbuilding costs associated with the development of new shipboard technology. This is a small part of ship costs and, on a 1990 basis, is unlikely to exceed 5% of the capital cost of the vessel. Potential changes in tanker construction costs from the real 1990$ level (based on double hull construction) on the possible basis of additional steel for the hull structure and other effects of environmental legislation have also been taken into account.

Operating Costs

For purposes of this study, these are summarized into 4 main categories:

Manning
Repairs and Maintenance, Stores and Supplies
Insurance
Other and Overheads

(i) **Manning (includes wages, overtime, social security, leave, subsistence, training and catering costs).**

Unit costs are linked into assumptions on developments in ship technology and manning levels. Unit costs are forecast to increase in real terms to 2020 by 2% pa on average. This reflects decreases in manning levels caused by increasing levels of automation on board ship, an associated lack of availability of trained personnel and significant real salary increases over the shorter term above this average level already under negotiation. There will be a narrowing of the gap between developed and developing country crew costs but developed country crew costs will not remain the same in real terms for the reasons discussed above. Social security requirements for developing country crew wills be increased.

Between 2020 and 2060, manning costs are expected to increase by a further 1% pa in real terms.

Developments in manning levels are derived from the Bimco/International Shipping Federation report of 1990 entitled 'The Demand for and Supply of Seafarers'. Manning levels in 2020 for the average ship are assumed to decrease in line with changes in the 'standard' crewing assumptions for officers and ratings separately as provided for a range of existing ships and vessels built up to and around 2000. The level of decrease varies between

ship type and size range. RLA have applied changes in costs for officers and ratings to assumptions on changes in manning levels to develop overall manning costs for each ship type/size range.

Between 2020 and 2060, it is assumed that there will be no further reductions in manning levels. This may well be a conservative assumption. However, this assumption is again linked to the assumption on the costs of changes in ship technology.

(ii) Repairs and Maintenance, Stores and Supplies

This includes drydocking on an annualized 2.5 year cycle, maintenance carried out by the crew, engine room and other spares.

Significant real increases are expected in this costs element over each of the next five years due to both cutbacks in maintenance expenditure by owners over the second half of the 1980s and due to real increases in costs of shiprepair work as the shiprepair yards seek to recover from previous low income levels. On an annualized basis, these costs are forecast to increase by 1% pa in real terms between 1990 and 2020 and to remain constant in real terms thereafter.

(iii) Insurance

Hull and machinery and protection and indemnity insurance are included here. The extent of P&I cover taken depends on the individual shipping company's policy but liner operators typically need more cover than do bulk operators. Shipowners practices on insured vessel value vary widely. Premia in all cases vary with the casualty record of the individual operator. As with other ship operating cost elements, 1990 values derive from RLA databases on ship operating costs which are themselves derived from empirical market research with a wide range of operators. Large increases in both H&M and P&I insurance premia have been and continue to be experienced in the early 1990s assuming no policy changes on 'deductible' items. These large increases are translated into an assumption of 2% pa real increases between 1990 and 2020 and constant insurance costs in real terms thereafter.

(iv) Other and Overheads

Liner companies have a large commercial department, considerable port terminal expenditure, marketing and related expenses on and their overheads are much higher than those of bulk or tramp operators. Overhead cost levels for 1990 are derived from empirical market research with individual owners. Overhead costs for bulk or tramp operators are based on a combination of management fees and costs assuming a medium sized shipping company of around 8 vessels. It is assumed that cost items under this heading remain constant in real terms throughout the forecast period.

Voyage Costs

(i) Bunkers

Fuel oil and diesel oil costs for 1990 are a calculated average from monthly spot prices for 8 major bunkering ports worldwide. For 2020 and 2060, bunker prices are calculated from a combination of WEFA forecasts of crude oil prices and an RLA regression model which relates crude oil prices to bunker prices. For simplicity, it has been assumed that all vessels will burn one grade of main propulsion fuel oil, that is, 380cst. Values are as follows:

$1990/ton	1990	2020	2060
380cst	111.8	149.0	257.0
MDO	223.3	268.0	438.0

Over the forecast period it is assumed that there will be changes in fuel efficiency. Based on current technological research, for bulk vessels ie those vessels with low relative speeds, fuel efficiency is expected to improve by +/- 13% between vessels built in 1990 and the average vessel in 2020. For higher speed vessels such as container vessels a +/- 6% fuel efficiency is expected and for passenger vessels a +/- 2% improvement is expected. By the year 2060, a further 20% improvement in fuel efficiency across all ship types is expected due to engine room and other changes.

For container vessels, it is assumed that there will be a 2 knot increase in average speeds between 1990 and 2020 and a further increase in average speeds of 2 knots between 2020 and 2060.

(ii) **Port Costs**

1990 port costs have been derived from individual operator's experience in relevant areas. These costs are assumed to remain the same in real terms over the forecast period. For liner vessels operations, stevedoring costs are for the account of the line operator. For relevant vessels with a container capability and vehicle carriers, at import ports, delivery to the stack is a ship cost, inland costs are from the stack onwards. For exporting ports, this procedure works in reverse. For bulk vessels, all port costs are for the ship operator, landside delivery or collection to/from the port are inland costs.

(iii) **Cargo Claims and Commissions.**

The cost to a liner operator of cargo claims and commissions is too high to be ignored. They are difficult to estimate, because there is a trade-off between commissions and the shipowner conducting his own sales/marketing with higher overheads. We take a notional percentage of revenue of 9% in total.

System Costs

(i) **Container Acquisition (purchase or leasing) and Maintenance.**

For the liner operator, the total cost of acquiring and maintaining containers is significant, and it cannot be left out of a cost estimate. In reality, an operator acquires his containers from a mix of sources, one of them being short term leasing in order to be able to vary his costs under this item at short notice. Owners may operate their container fleet(s) as a whole for the company, or by route or service. We have assumed that the liner companies operate their container fleet in relation to the service, and treat it as a system cost allocated to the individual ship.

The cost assumptions are:

- all the containers are leased;

_ 90% of the containers are dry cargo, general purpose boxes, and 10% are reefers;

- the daily cost (leasing and operating including insurance) is taken at US$3 per day for the dry cargo, and US$15 per day for the reefer containers. These costs have been pitched between the actuals for 20 ft and 40 ft boxes, to make some arbitrary allowance for a mixture of sizes being used in practice.

Costs for 2020 and 2060 are assumed to be stable in real terms.

Inventory Costs

Where the Panama Canal offers a potentially shorter route for the transportation of commodities, this has a value to the shipper in the sense that the cargo is in transit for a lesser time and the capital tied up in the cargo also is for a shorter period. This is a particularly important consideration in the case of high value containerised cargoes and one of the reasons why the US landbridge can offer significant advantages as an alternative to the Canal. Inventory costs are calculated using the following formula:

I = V * T/365 * C, where:

I is the inventory cost expressed in $/cargo tonne;
V is the cargo value expressed in $/tonne;
T is the transit time in days between the points of cargo origin and destination;
C is the cost of capital.

The following generalised cargo values have been used in the calculations of inventory costs. However, for specific commodities examined in the analyses of shifted cargoes (Sections 5.3 and 5.6) trade specific values have been used, for example, in the case of iron ore, coal, Orimulsion and containerised cargoes.

(i) 1990 Cargo Values by Ship Type

	$/tonne
Container/breakbulk	1,390
Dry Bulk	[illegible]
Chemical Carriers	443
Container Ships	2,947
General Cargo Vessels	741
LP Gas Carriers	211
Reefers	898
RoRo's	2,227
Tankers	[illegible]
Vehicle Carriers	8,486

(ii) 1990 Cargo Values for Specific Commodities

Containerized:	
Asia to USA	7,682
Europe to USA	3,483
Coal and Coke	53
Iron Ore	29
Orimulsion	52

For the development of seaborne freight costs as required to estimate transits lost to the Canal, either as a result of capacity, constraints or through progressive increases in tolls, and where comparisons of the savings offered by transitting the Canal have to be made versus ship types, voyage-days have been based on laden passages only. This ensures that all ship types are compared on the same basis. However, in the analysis of shifted cargoes, in particular with respect to dry bulk carriers, calculations of freight costs have been undertaken on the basis of single voyages, round voyages and triangulated voyages to insure comparisons of freight costs via the Canal and via alternative routes accurately reflect actual vessel trading patterns.

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4.0 NORTH AMERICAN PORT AND LANDBRIDGE CAPACITY ANALYSIS

4.1 Introduction

A major source of competition for Panama Canal all-water movements to North America is landbridge (actually landbridge variant) movements across North America. Landbridge consists of a movement of a product such as containers from the Far East to the West Coast of the U.S. which is then railed to the East Coast and placed on another vessel for a Trans-Atlantic destination. True landbridge movements are very uncommon. However, landbridge variants are very common. Mini-landbridge is the term for cargo moving from the Far East through a West Coast port with service stopping at the Eastern seaboard. Micro-bridge service connects ocean traffic with an inland origin or destination. An example is container service from the Far East to Chicago. Mini-landbridge and micro-landbridge are especially effective for North American movements of containers, automobiles and grain. One of the primary reasons that landbridge is preferred to all water movements is the reduction in cost relative to all water routes.

In the case of grain exports from the Midwest to Asia, the increased costs of inland transportation to the West Coast over the Gulf Coast has been compensated for some shippers by the lower ocean rates from the PNW to North Asia as compared with ocean rates from the Gulf to North Asia. This, of course, has only occurred for midwestern points that are not well served by barge service (i.e. discussed in greater detail below). Lower valued cargoes such as grain and coal are greatly impacted by a small relative change in overall transportation costs.

Containers and automobiles are typically very high value products (especially imports from Asia and Europe). The speed of service from point of origin to final destination is much greater using mini-landbridge and micro-landbridge services than using all water services. This speedier service decreases the cost of carrying inventory (i.e. opportunity costs).

The question remains, however, whether these advantages will continue into the future as rail cargo grows. Specifically, will congestion or some other form of constraint impact North America port and/or rail systems that could reverse the advantage to using all water Canal transportation systems?

This issue is explored in great detail below. There are three primary areas of concern related to port development :

- Facility capacity (addresses terminal capacity including the speed of loading/unloading, number of berths, availability of open and covered storage facilities and like considerations)

- Water depth capability at the berth and navigation channels (addresses the ability of ports to take advantage of larger vessels which require deeper water depths)

- Inland transportation capacity (addresses the capacity and operating characteristics of mainly rail transfer systems)

Section Two briefly reviews recent legislation impacting US and Canadian transportation systems.

Section Three briefly identifies some overall constraints faced by all ports in North America. It is intended to set the stage for future discussion of constraints.

Section Four evaluates the capacity of terminal facilities for coal, grain and containers.

Section Five evaluates water depth issues related to coal and container vessels.

Section Six evaluates the capacity and operating characteristics of the US rail system as it relates to major port intermodal movements including grain and containers.

4.2 Relevant Legislation

During the past decade several laws have been enacted to improve railroad and shipper productivity and financial performance. Most notably, the Staggers Act of 1980 and the Shipping Act of 1984 assisted U.S. railroads and ocean carriers serving the United States. Likewise, in Canada, the National Transportation Act provided similar deregulatory benefits. These acts which have had significant impact on the productivity of transportation systems are reviewed briefly below.

Staggers Act The Staggers Act of 1980 was enacted to improve the financial status of U.S. railroads. To a large extent, this has been accomplished. However, railroads still generally suffer from inadequate revenues and have experienced a decline in market share of inter-city freight carriage. Some shippers have been harmed by the Staggers Act deregulation because they do not qualify for contract rates and/or because branchline abandonments have negatively impacted their transport alternatives.

Prior to 1980, the railroads' profitability was very poor, with several Class I railroads teetering on the edge of bankruptcy. This in turn was leading to deferred maintenance which ultimately would lead to higher capital costs. Several factors were responsible for the railroad's plight:

- **Demographic Changes.** Growth of the U.S. population base in the west and south as opposed to the east and north central areas rendered extensive trackage inefficient.

- **Growing Reliance on Imports.** The major impact of increased reliance on imports was to decrease the level of inter-industry freight carriage which had been a standby of the railroad industry.

- **Growth of the Interstate System.** As the interstate system grew, firms chose to relocate nearer prime highway locations rather than on rail trackage. In addition, trucking's market share of inter-city freight movements has increased dramatically and continues to increase at the expense of railroads.

- **Improvements to the Waterway System.** Improvements to the waterway system gave a comparative advantage to the barge industry especially in carriage of high weight, low value cargoes such as coal, grain and chemicals.

Much of the financial deterioration was caused by the inefficient method in which railroads were forced to set rates. Prior to 1976, rates were set using a cumbersome and lengthy process. Railroads were not able to market their services in a tailor-made way and rates were inflexible. In 1976, Congress passed the Railroad Revitalization and Regulatory Reform Act (4R Act) which sought to improve profitability of the railroads through rate-making and regulatory reform. However, the reforms were not great enough and return on investment hovered at 2.5 percent while manufacturing companies and utilities earned rates of approximately 15 and 12 percent respectively. In 1976, one third of Class I railroads were earning a negative return on investment and increased bankruptcies were imminent.

The Staggers Act of 1980 was intended to alleviate much of this stress by:

- **Allowing Quicker Rate Increases.** This permitted railroads to automatically change rates without challenge in accordance with a rail cost adjustment factor. Revenue inadequate railroads could increase rates an additional 4 percent per year above these rates.

- **Easing Entry into Contracts.** The Act allowed the railroads to negotiate contracts with shippers with confidential terms and conditions.

- **Facilitating Branchline Abandonments.** The time period for branchline abandonments was limited to 45 days for uncontested and 255 days for contested abandonments. This was much quicker than previously available to the railroads.

The Staggers Act has had a varied impact on railroads and shippers. For railroads, the ability to set rates and enter into contracts quickly in response to market changes coupled with the ability to cut costs has improved railroads financial viability. The five largest railroads average return on investment has increased from 5.23% in 1980 to 6.71% in 1988 (Source: U.S. Government Accounting Office **Railroad Regulation - Economic and Financial Impacts of the Staggers Act of 1980** dated May 1990). However, the average cost of capital has increased from 11.2 percent in 1980 to 11.7 percent in 1988. The result is that railroads are still generally revenue inadequate.

In addition, railroad profitability lags behind that of both the trucking and gas pipeline industries. Trucking firms averaged return on investment from 8 percent to 17 percent between 1980 and 1988 and gas pipelines between 9.8% and 13.2% during the same period.

Railroads market share of inter-city ton-miles has decreased slightly but is stabilizing.

Table 4.1

Tonnages and Market Shares of Selected Transportation Modes

Transportation Mode	Average Annual Growth rate in freight tonnage (%) 1970-79	1980-88 (b)	Market Share (%) 1970-79	1980-88
Railroads	0.3%	0.3%	37.3%	36.7%
Trucks (c)	2.5%	2.8%	22.9%	24.0%
Oil Pipelines	2.5%	1.0%	23.3%	23.2%
Barges (d)	1.4%	1.5%	11.4%	12.7%
Great Lakes Shipping (e)	-0.1%	0.4%	5.0%	3.1%
Airplanes	3.0%	6.2%	0.2%	0.3%

a). Average percentage of intercity revenue ton-miles during the period. Market share numbers may not add up to 100 because of rounding
b). 1988 numbers are preliminary
c). Includes regulated and unregulated motor carriers of freight
d). Includes all river and canal water carriers of freight
e). Domestic and foreign U.S. traffic moving on the Great Lakes

The effects of the railroad revenue inadequacy are as follows:

- Insufficient profits make it difficult to attract capital funds for needed improvements
- Insufficient funds make it difficult to cover operating and capital costs.

The railroads ability to improve profitability is complicated by the fact that it is a very capital intensive industry with relatively high labor costs as well. Efforts to improve profitability have included the following:

- Branchline abandonments
- Deferred maintenance on low density lines
- Reductions in fleet size (i.e. especially boxcars among other equipment)
- Efforts to reduce crew size
- Efforts to enter into new business opportunities such as hauling garbage carriage and establishment passenger commuter service
- Sale of property and other assets

Deregulation has had a positive impact on most shippers. As shown in the accompanying table, rail rates for most products have decreased in real terms. From 1980 to 1987, coal rates decreased by 10% and grain by 44%. Large shippers have been able to obtain lower rates through negotiated contracts in return for predictable volumes. Typically, the larger the volume, the greater the discount. Smaller shippers can be shut out by this process and forced into higher rates or alternative (and generally more expensive) modes of transportation.

Table 4.2

Average Real Rail Rate Changes

Category	1978-80	1980-87	1978-87
Farm Products	14.2%	-44.0%	-36.1%
Coal	9.4%	-10.2%	-1.8%
Food and Kindred	14.1%	-37.8%	-29.1%
Lumber and wood	-0.7%	-1.0%	0.3%
Pulp and paper	9.1%	-19.4%	-12.1%
Chemicals	4.5%	-20.1%	-16.5%
Transportation equipment	5.6%	3.8%	9.6%
Intermodal (a)	13.9%	-25.4%	-15.1%
All others	8.2%	-33.1%	-27.7%
Average Rate Change (b)	8.6%	-22.4%	-15.7%

a). TOFC and COFC

b). Annual rate changes for each category weighted by their share of revenue

Source: ICC

Perhaps, the greatest problem for rural shippers has been branchline abandonment. This has occurred primarily in areas where highway and/or waterway improvements have eroded the rail traffic base or where the traffic base has dwindled due to business downturns. Through deferred maintenance, trackage reaches a state where it is neither feasible nor prudent for the railroad to rehabilitate the line which leads to the abandonment process.

Rail service though improving is still not as favorably perceived as truck service by shippers. A recent survey of shippers rated trucks higher than railroads in both price and service attributes. This will limit the ability of the railroads to compete in movement of higher valued time sensitive goods in major (i.e. mainline) freight corridors.

Railroads have responded to this competitive disadvantage by entering into contracts with trucking firms (i.e. J.B. Hunt Company contracts with Sante Fe Railroad) or contracts with other railroads to try to attract niche cargoes away from trucks (i.e. BNRR and CNR for heavy cross border traffic).

The Staggers Act has improved the financial performance of the railroads. However, most railroads are still revenue inadequate. Needed capital improvements may go unfunded unless profits increase. This could impact the competitive advantage of intermodal shippers and ports.

Shipping Act of 1984. Like the Staggers Act, the Shipping Act of 1984 was another attempt to create a more efficient and economical transportation system (i.e. for the ocean liner industry) through an improved regulatory environment. The 1984 Act was an effort to create a balance between unconstrained competition and the conference system. The Act has been recently reviewed by the Federal Maritime Commission (FMC), the Department of Transportation (DOT), the Department of Justice (DOJ) and the Federal Trade Commission (FTC) due to shipper concerns about antitrust immunity provisions and limitations on contracting rights.

The following section reviews the debate over the merits of the Act, the performance of ocean carriers since passage and shippers concerns.

The advent of containerization and intermodalism in the early 1980s fundamentally changed the ocean liner industry. The large investment required for ships, terminals, containers and information services in combination with excess capacity began to exert intense price competition. Exacerbating this situation, most liner routes are subject to both directional and seasonal variations in cargo volumes. Throughout the 1980s, eastbound (import) cargoes from Asia to the United States were substantially greater than westbound (export) cargo volumes (i.e. a directional imbalance). Seasonal imbalances are caused by carriage of agricultural commodities which move in greatest volumes during and immediately after harvest and by

consumer products moving for the Christmas season. Because of these factors of imbalance, the ocean liner industry is heavily prone to overcapacity.

The U.S. Congress realized this originally in 1916, when the Alexander Committee advocated that antitrust immunity of the conference system under governmental control best met the needs of the public and the ocean carriers.

Again in 1961, Congress reaffirmed support for antitrust immunity, citing six specific economic factors that made it the optimal solution for the carriers:

- Ease of market entry
- The industry's rigid fixed and operating cost structure
- Absence of and governmental control over the level of ocean freight rates
- Difference in operating costs of similar vessels flying different flags
- Imbalances between inbound and outbound cargo
- Overtonnaging

With the advent of containerization and intermodalism, Congress decided to clarify and expand antitrust immunity for ocean carriers. There were several specific purposes intended by the Act:

- to establish a nondiscriminatory regulatory process for the common carriage of goods by water in the foreign commerce of the United States with a minimum of governmental intervention and regulatory costs
- to provide an efficient and economic transportation system in the ocean commerce of the United States that is, insofar as possible, in harmony with, and responsive to, international shipping practices; and
- to encourage the development of an economically sound and efficient United States-flag liner fleet capable of meeting national security needs [See **A Review of the Section 18 Study of the 1984 Shipping Act** by Booz-Allen & Hamilton Inc, May 29, 1991]

The 1984 Act clarified the antitrust immunity provisions and has placed the burden on the FMC to identify when the "general standard" has been breached. This new standard

specifically avoids the "public interest" test that is typically applied in antitrust procedures. It also requires that the impact on service or rates must be due to a reduction in competition and the impact must be "**unreasonable**".

Due in large part to the antitrust provisions of the 1984 Act, efficiency enhancing agreements such as vessel sharing, joint service, pooling, sailing and cooperative work agreements were developed. These enhancements have improved asset utilization and have positively impacted carriers' financial performance. The FMC reports that these efficiency enhancement agreements have been increasing at a very fast pace - 329 were filed between 1985 and 1987 as opposed to 86 between 1981 and 1983.

As a result, ocean carrier costs decreased dramatically. In the Pacific, costs decreased 27 percent and in the Atlantic costs decreased 14 percent in real terms between 1984 and 1988. As a result of more stable prices and cargo volumes, conference carriers such as APL introduced new larger vessels (i.e. C-10 class containerships). In addition, the service provided by carriers improved in terms of capacity, frequency, port selection, transit time, through carriage from origin to destination and information availability. Carriers point out that the antitrust immunity is the basis to the conference system throughout the world and not just in the United States. They further contend that this system leads to a system with price stability and dependable service.

However, despite the increased flexibility of the Act, carriers have achieved a meager financial performance with return on investment (as measured by return on assets and return on revenue) of between 2.3% and 2.7% in 1989. As mentioned in the preceding section on the Staggers Act, this is far below the financial performance of almost all other U.S. institutions. Carriers would nevertheless choose to maintain the present system because it reduces uncertainty.

For the most part, shippers are satisfied with the benefits provided by the 1984 Act. According to Booz-Allen & Hamilton (see above citation), of 398 shippers surveyed in 1988 by the FMC, 58% indicated that the overall impact to their firm was of a positive or very positive nature. Approximately 35% indicated there was no impact. Only 8% indicated that they were negatively or very negatively impacted by the Act.

However, large shippers such as 3M, Alcoa, Corning, Dow Chemical, Du Pont, Excel, General Electric, Genseco, Grolsch, Heineken, Kaiser, May Department Stores, Melville, Weyerheuser among others are very concerned about independent pricing and confidentiality.

Prior to the 1984 Act, conferences had an ability to stringently control member's pricing actions. However, the 1984 Act liberalized the process by allowing conference members to break ranks and offer a discount from the tariff price. The 1984 Act revisions prevented conferences from penalizing members from entering into special "service contracts". These

special volume-rate agreements became very popular with shippers but very unpopular with carriers.

At the present time, some conferences restrict contracts completely while others do not permit independent contracts. As a result, shippers often rely on non-conference carriers with whom they can enter into a contract.

Shippers also want not only to expand these contracts but also to do so with total confidentiality in rate contracts. Shippers argue that setting contract rates are an important part of overall pricing strategies in international competition.

However, carriers are concerned that this would be making rates in a vacuum and would lead to unstable price competition and continued instability.

A 17-member Advisory Commission on Conferences in Ocean Shipping composed of both carrier and shipper representatives worked on revisions to the Act but ultimately few changes were made. Carriers argued for technical and administrative changes while shippers argued for substantial changes. The changes under discussion included :

- Reduced antitrust immunity for carriers by eliminating immunity for rate and discussion agreements among conferences and non-conference, or independent carriers in the same trade.

- An end to carrier rate filing and enforcement at the FMC with a possible option to continue filing through private companies.

- Confidentiality in shipper-carrier rate discount agreements, known as service contracts rather than public disclosure of contract terms.

- Authority for ocean freight consolidators to negotiate service contracts with shippers.

The implications of future potential changes to the Act are unclear. However, there are two primary areas of interest. First, although antitrust immunity has applied to pricing of terminals by ports in the U.S., this procedure has rarely been used. Joint determination of tariffs could assist ports in assuring that they are not whipsawed by carriers.

Secondly, and most importantly, the combined changes to the Shipping Act of 1984 coupled with increased growth in intermodalism have spawned substantial increases in vessel sharing agreements (VSAs). VSAs now exist among several large carriers such as Sealand/Maersk, APL/OOCL, NOL/NYK among others. The 1984 Act assisted in VSAs by making it easier

for lines to compete on price, cooperate on joint service and offer new intermodal rates. VSAs are examined in greater detail below.

An indirect result of the VSA has been the need for mega-terminals. New terminal requirements must now include space for two or more mega-carriers. The average size of the required container terminal is now exceeding 100 acres. In fact, the Port of Los Angeles is planning a 200 acre terminal. APL's new terminal in Seattle will consist of 180 acres at full buildout. It has also meant a reshuffling of carriers from one terminal to another. In Tacoma, Maersk will probably join Sealand. In Seattle, OOCL has recently joined APL. This will strain existing facilities and cause ports to concentrate on expansion of existing facilities as much as development of new facilities. This will obviously be of benefit to the ports that have large parcels of undeveloped or easily redeveloped permittable land.

Another implication of VSA concentration is the development of complete intermodal systems in which the carriers control vessels, terminals (including stevedores), doublestack train service, inland hubs, information systems and other service aspects of container traffic.

As this concentration continues, more carriers will also start (or enhance) their own privately owned stevedore companies which will gradually replace the private stevedore companies (such as SSA). The consolidation will be the basis for a "seamless" intermodal system.

Canadian Transportation Legislation. In 1987, three important transportation laws were adopted in Canada to improve the efficiency of the Canadian transportation system.

- **National Transportation Act of 1987** which expanded the policy statement of the 1967 National Transportation Act of 1967. The revisions changed the regulatory body and its duties and revised controls on transport firms to increase competition. Specifically the act added four conditions to guide it, including that economic regulation would occur only in regions and for services where necessary to serve shipper or traveler interests, competition and market forces are prime agents in determining direction, transportation is a key to regional economic development with commercial viability of transportation links balanced with development and fares and conditions not to be an undue obstacle to mobility of persons.

- **Motor Vehicle Transport Act of 1987** which delegated control of most extra-provincial truck/bus carriers to the provinces with a specific process for control.

- **Shipping Conferences Exemption Act of 1987** which continues to permit ocean carriers in conferences to make certain agreements which are exempt from the Competition Act with some new restrictions.

Predatory pricing is strictly prohibited. Conferences must allow individual members to take independent action. Conference members may enter into "service contracts".

In addition to these general changes, one of the more important changes relates to the treatment of captive shippers. If a shipper is served exclusively by one railroad, he can apply to the National Transportation Agency (NTA) to set a rate for a railway to move his traffic to the nearest interchange on shipper-designated routes and transfer the cargo to a competing railroad. For example, if a potash shipper located near the border is served by only one Canadian railway at a high rate, he can work with a U.S. railroad to set a different (lower) rate then petition the NTA to force the Canadian railroad to provide the carriage to the U.S. interchange point.

The Canadians are very concerned about the transit of Canadian cargoes via U.S. infrastructure and ports. They are developing a strategy to counter further diversions. Of particular concern, approximately 150,000 TEUs of containers filled with cargo originating in or destined for Canadian points moves through U.S. West Coast ports (i.e. especially Tacoma and Seattle). The Canadian Government has developed a strategy to win these cargoes back as well as to attract a share of U.S. originating/destined containers.

First, Canadian railroads are seeking to lower rail taxes. If Canadian National Railway and Canadian Pacific Railway operated in the U.S., according to the Canadian sources, they would be subject to $254 million (Cd) less in taxes due to lower U.S. taxes on property and fuel and sales. This would be a reduction of nearly 35% of the Canadian tax load. According to the Roundtable on Transportation through the Greater Vancouver Gateway, reduced taxes would increase competitiveness as well as increase the amount of earnings available for improvements. Approximately 30 trainloads of cargo arrive or depart from Greater Vancouver's waterfront daily handling 4 out of 5 tons of the Gateways international traffic.

Second, incentive rates for use of Canadian terminals and reduced rail rates are being offered to recapture lost cargo traffic as well as to maintain the existing base. The Canadian railroads are becoming especially competitive for Canadian and U.S. international container traffic.

Conclusions on Legislative Issues. Recent deregulatory legislation in the U.S. and Canada has significantly improved rail and ocean carrier productivity.

While future changes are uncertain, it is clear that the number of companies engaged in ocean carriage and rail transport has and will continue to decrease. There have been continuing discussions of a merger between the Canadian National and Canadian Pacific Railways. Union Pacific Railroad is seeking to exert greater control over the Chicago and Northwestern Railroad. Likewise, the number of ocean carriers is decreasing. More emphasis will be

placed on high traffic volume routes with an adequate return on investment to allow for capital improvements.

4.3 General Constraints to Port Development

North American ports on all coasts are facing substantial challenges in attempts to redevelop or expand port facilities. This is well documented in a survey conducted by the American Association of Port Authorities (AAPA) in March 1992 with its members which sought to identify the key issues impacting port development. Most public port authorities in the United States, Canada and Mexico are members of the AAPA.

Responding ports reported that environmental issues were the primary constraint to existing operations and future development. The ability or capability to expand facilities was a close second. The ability to further dredge port facilities was ranked third. The ability to finance port development was fourth. In addition, rail/highway access constraints (issue number 5), marketing opportunities/capabilities (issue number 6) and gentrification of the urban waterfront (issue number 7) were also of concern to ports.

Environmental issues slowing or preventing the improvement of port facilities by filling water areas, dredging access channels or improving access corridors in combination with increased competition for scarce waterfront land by non-industrial uses (i.e. residential, commercial, recreational and public access) have combined to put substantial constraints on terminal development. The ability to develop new facilities or to deepen existing facilities in response to market conditions is, therefore, by no means guaranteed.

Table 4.3

Ranking of Port Issues

Issue	Ranking
Environment	1
Facility Expansion	2
Dredging	3
Financing	4
Rail/Highway Access	5
Marketing	6
Gentrification	7

Source: American Association of Port Authorities

Environmental Issues. The following trends affect North American port development :

- "Options for channel dredging and ocean disposal are more restricted;
- "Port development projects are subject to time-consuming environmental assessments, delays and increased costs; and
- "Federal, state and local Government regulatory agencies have increased in number, slowing down the decision-making process." [**A Report to Congress on the Status of the Public Ports of the United States 1990-1991**, December 1992, U.S. Department of Transportation Maritime Administration]

Dredging Issues. Of particular relevance to future improvements to the Panama Canal, the ability of U.S. ports to increase water depth as required by larger vessels is becoming increasingly constrained. If North American ports are unable to allow transit by larger vessels (container vessels, coal colliers, crude oil tankers and other larger vessels), the benefits of an expanded Panama Canal will be greatly reduced for commodities originating in or destined for U.S. ports.

It is not uncommon for major Federal improvement dredging projects to require more than 20 years of effort to study alternatives, secure permits and complete work. The permit procedure and the disposal of dredged materials are key factors in this issue. Approximately 53% of the ports surveyed indicated that time delays and cost increases were the major impact of increased environmental regulations. The "fast tracking" procedures in the Water Resources Development Act have clearly been ineffective.

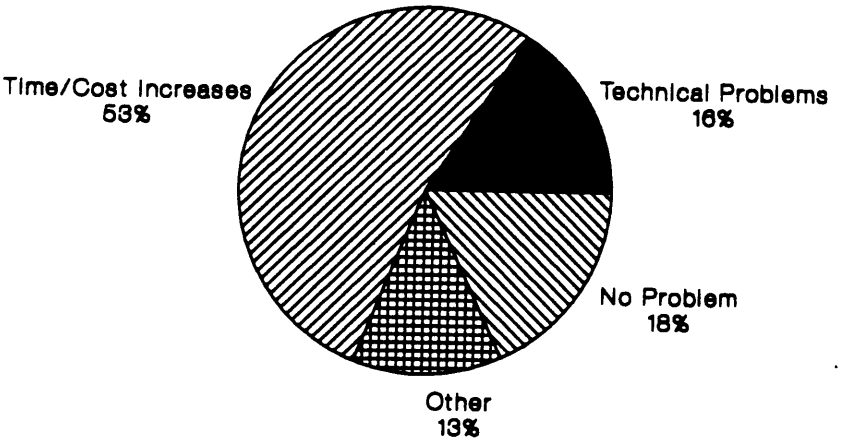
One of the most difficult problems faced by the Port industry is the disposal of dredge sediments. There are a declining number of approved sites. There are also added pressures to dispose of dredge tailings in upland sites depending on the characteristics of the dredged spoils (i.e. existence of contaminants) which dramatically increases costs. This is impacting several ports on all coasts at the present time.

In the Port of New York/New Jersey, dredging of the channel in Newark Bay was halted by the EPA after the presence of dioxins was detected in the dredge sediments. This project has experienced delays of three additional years thus far as well as cost increases from $1 million to nearly $6.5 million.

Upland disposal (of existing maintenance and future dredge spoils) can increase costs by a factor of five or more. Under current U.S. navigation improvement funding procedures, the cost of improving channel depth is split equally between the federal government and the local sponsor if the improvement meets all regulatory requirements. Time delays and cost increases on dredging projects are impacting all ports.

Figure 4.1

Effect of Environmental Permits



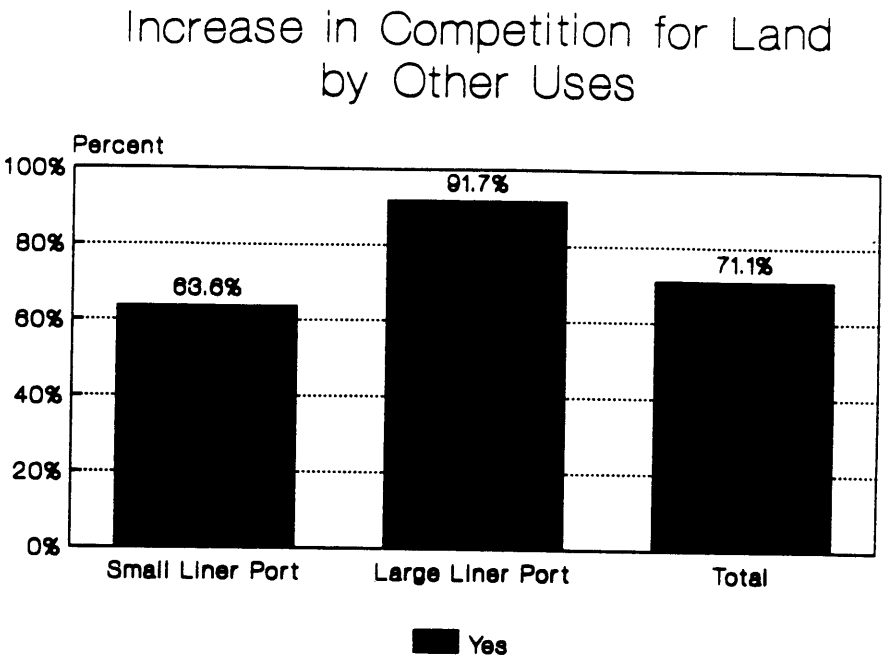
Source: Marad

Existing Land Use Conflicts. In addition, conflicts with existing land uses are becoming more prevalent in urbanized port areas throughout North America. According to the AAPA's recent survey, 92 percent of larger liner ports and 64% of smaller liner ports have experienced an increase in the competition for scarce waterfront lands.

Most of the above conflicts occur with existing adjacent land uses because ports are often located in the center of well developed urban industrial areas. As other development occurs in the waterfront industrial areas, the potential for conflicts with existing uses increased due to traffic, noise, odor, nighttime activities and other reasons. In addition, land values typically increase as non-industrial uses are developed which can force out industrial uses (including ports) that cannot afford to pay the rent.

Especially troublesome is the growing conflict between port rail and truck traffic with adjacent users on access and mainline corridors. Daytime operations can be curtailed due to conflicts between peak hour passenger (commuter) traffic and truck and rail traffic especially with at-grade rail crossings. In addition, as nighttime rail and truck operations increase to alleviate the impact on peak hour commuters, the potential for light and noise impacts on adjacent communities can constrain port operations.

Figure 4.2



Source: AAPA

Table 4.4

U.S. Port Capital Expenditures for 1946 - 1990 (Thousands of Dollars)

Region	Expenditures	Percent
North Atlantic	$2,798,460	25.0%
South Atlantic	$1,477,818	13.2%
Gulf	$2,246,106	20.1%
South Pacific	$2,460,394	22.0%
North Pacific	$1,241,146	11.1%
Great Lakes	$487,425	4.4%
Other *.	$342,102	3.1%
Guam	$122,457	1.1%
TOTAL	$11,175,908	100.0%

* Alaska, Hawaii, Puerto Rico, Virgin Is.
Source: American Association of Port Authorities

Table 4.5

Proposed U.S. Port Capital Expenditures for 1992-1997
(Thousands of Dollars)

Region	Expenditures	Percent
North Atlantic	$650,744	12.2%
South Atlantic	$938,862	17.5%
Gulf	$511,174	9.5%
South Pacific	$2,206,036	41.2%
North Pacific	$712,786	13.3%
Great Lakes	$71,600	1.3%
Other *	$263,929	4.9%
TOTAL	$5,355,131	100.0%

* Alaska, Hawaii, Puerto Rico, Virgin Is.
Source: American Association of Port Authorities

The Ports of Los Angeles and Long Beach are attempting to develop a truck/rail corridor (i.e. the Alameda Corridor) to enhance port access. The cost of this project is anticipated to be $1.5 to $2 billion. There are concerns that without this corridor the cost of operating in San Pedro Bay may force firms to establish other load centers. However, the project has not cleared all of the hurdles in its way.

From 1946 to 1990, U.S. ports spent $11 billion on port development projects. In 1990 alone, approximately $668 million was spent. During the five years from 1992 to 1997, approximately $5.4 billion are planned to be spent. Of this total, $2.9 billion are planned for the West Coast ports. While individual ports may experience financial difficulties (especially in those cases where fierce competition leads to increased subsidies of port construction), there has been a concerted effort by governments at all levels in conjunction with the private sector to finance needed port improvements. Lack of financing is not expected to derail needed port improvements.

Ports in North America can no longer predict resolution of improvement projects with any degree of certainty. Exposure to potential environmental liabilities has increased dramatically as has the length of time to gain environmental permits. This has had a dramatic upward influence on development costs. In addition, in several port areas, competition for scarce waterfront land has forced out port/industrial users as land values have increased and conflicts with adjacent neighboring uses increasing.

All of these impacts cloud the ability to respond with additional capacity and increased water depth as market opportunities warrant. This discussion applies to all ports in North America and could have a notable impact on proposed plans to improve the Panama Canal.

These issues are discussed in greater detail in the following sections.

4.4 Terminal Capacity

The ability for North American ports to meet future throughput depends upon the capacity of existing facilities and proposed port development projects. The following section evaluates the capacity of existing and planned coal, grain and container terminals.

Coal Terminals

Current Utilization. U.S. coal export facilities are considerably over built at the present time. Total U.S. export capacity is estimated to be 325 million metric tons compared with only 105 million metric tons of exports (coal, coke and petroleum coke). This represents a utilization factor of less than 30%.

U.S. Expansion Plans. Even with this low level of utilization there are several planned expansions. The Dominion Terminal in Newport News is adding capacity at the present time (i.e. 2.3 million tons). In the Gulf, there are two major expansions planned for Lake Charles and Plaquemines Parish (approximately 10 million tons of additional capacity at each facility) and in Corpus Christi there are plans to expand capacity by 7.5 million tons at BMD3 facility.

On the west coast, the Port of Los Angeles is planning to build Pier 400 which will add 11 to 20 million short tons of capacity. The Port of Long Beach is also discussing plans to expand bulk facility capacity.

Table 4.6

Summary of U.S. Coal Loading Terminals in 1990
(Existing, Underway, and Planned)
(in million short tons)

Coast	Existing	Underway	Planned	Total
East Coast	107.5	2.3	0.0	109.8
Great Lakes	63.9	0.0	0.0	63.9
Sub-Total East Coast	171.4	2.3	0.0	173.6
Gulf Coast	138.3	0.0	25.9	164.2
West Coast	15.0	0.0	10.0	24.9
TOTAL U.S.	324.9	2.3	35.9	362.9

Source: U.S. Department of Transportation, Maritime Administration, Existing and Potential U.S. Coal Export Loading Terminals, January 1992

Future Utilization Assessment. The above mentioned terminal expansion plans will increase U.S. port capacity to approximately 362 million tons. Using the forecasts prepared by WEFA for coal, coke and petroleum coke exports, utilization will reach 88% by the year 2020 and remain at that level through 2060.

Capacity could become constrained at individual East coast and West coast facilities but will remain substantially below capacity in the Gulf.

Table 4.7

US Export Demand
Coal and Coke Forecasts

	1990	2020	2060
U.S. East Coast *	73.28	240.90	232.42
U.S. Gulf Coast	27.66	89.28	94.32
U.S. West Coast	4.19	21.87	25.31
U.S. Total	105.13	352.06	352.05
Percent of Capacity			
U.S. East Coast *	42.8%	138.7%	133.9%
U.S. Gulf Coast	20.0%	54.4%	57.4%
U.S. West Coast	28.0%	87.7%	101.5%
U.S. Total	29.4%	88.0%	88.0%

* Includes Great Lake Terminals
Source : The WEFA Group

However, as export demand loads become constraining, it is likely that additional port expansion plans could be developed. It should be emphasized that the estimates of expansions at U.S. facilities are low at the present time because there is currently such an overcapacity in the system.

Canadian Facilities. Approximately 95% of Canadian coal and coke exports leave via West Coast ports (i.e. 29.4 million tons out of 31.1 million tons total). Of this export traffic, approximately 82% goes to Asia.

Coal exports from British Columbia ports are almost exclusively metallurgical coal mined in BC or western Alberta bound for Japan. In recent months, strikes at the mines, decreased Japanese exports of steel products and high production costs have significantly reduced coal exports.

There are four primary West Coast coal export facilities. The Vancouver Port Corporation exported 25 million tons in 1990. Of this total, 20 million left via the Westshore Terminal at Roberts Bank. The remaining traffic was exported through Neptune Terminals in Burrard

Inlet. At the present time, Westshore Terminals (at Roberts Bank) has an estimated capacity of 22 million tons. The facility has a water depth of 75 feet.

Neptune Terminal is estimated to have a capacity of 14 million tons with unused capacity of approximately 6 million tons. Neptune Terminal which also handles potash and other bulk products has a water depth of 50 feet.

Texada Island just north of Vancouver has a practical annual capacity of 1 million tons and water depth of 45 feet. Prince Rupert's Ridley Terminal which has a practical annual capacity of 13 million tons has water depth of 66 feet.

The total BC coal export capacity is approximately 41 million tons with existing equipment. WEFA forecasts call for exports of less than 25 million tons from Canada. There are no terminal capacity constraints on the West Coast of Canada.

In addition, the excess capacity at Westshore Terminals may be utilized to handle greater amounts of U.S. steam coal from the Powder River Basin (i.e. Montana, Wyoming) bound for Asian utilities. This could alleviate some of the constraints that may be faced at west coast U.S. terminals.

Conclusions. U.S. and Canadian coal terminals appear capable of handling the forecasted volumes expected in 2020 and 2060 from a terminal perspective (i.e. storage and loading capabilities).

Grain Terminals

Grain movements from the Midwest to Asia via U.S. West Coast ports are limited to shipments from areas that are not well served by Mississippi River barge systems. The growth of this potential bypass traffic is further documented below. In addition, the capacity of the existing U.S. grain export facilities is evaluated.

Grain exports move primarily by barge and rail to port facilities. Barge transportation which is far less costly than rail transportation is the means of choice for shippers within a reasonable distance of the river system. In 1989, according to the U.S. Army Corps of Engineers, approximately 52 million metric tons were transported via the Mississippi River System to Gulf ports and approximately 4 million metric tons via the Columbia/Snake River system to Columbia River ports. [Source: U.S. Army Corps of Engineers **Public Domain Database**; 1990 data is not yet available from the Corps]. Shippers with good access to the River system are expected to continue to use barge transport due to its reduced costs relative to rail transportation.

Competition between the PNW and Gulf ports centers on those shippers that are less well served by the barge systems and must rely on rail shipments. Rail shipments to the Gulf totalled approximately 18 million metric tons while rail shipments to the PNW totalled 30 million metric tons in 1990 according to the Interstate Commerce Commission. For many shippers, the distance by rail to the PNW is significantly less than rail to the Gulf so that all exports leave via the PNW. In this case, the PNW has a primary (non-competitive) hinterland. These states include Washington, Oregon, Idaho and Montana which are primarily wheat and barley producers. Likewise for the Gulf ports, the primary hinterland (relative to the PNW) consists of Ohio, Oklahoma, Arizona, South Dakota, Missouri, California, Illinois, Indiana, Kansas and other Central Plains states. Primary hinterlands were defined as occurring when 100% of the shipments from a state moved to either the PNW or the Gulf exporting areas.

Some shippers have a choice to ship via either the PNW or the Gulf to specific destinations. For example, the additional inland transportation costs to ship via the PNW have been historically offset by the lower ocean vessel costs for grain exported to Asia during the 1980s. [Transportation costs are described in greater detail below]. The choice by shippers to export to Asia via PNW elevators is driven entirely by relative transportation costs. Shippers export via Gulf ports for shipments to Asia, Europe as well other destinations (i.e. Africa, South America etc).

Table 4.8

Assessment of Competitive Hinterlands
Rail Hinterlands - All Grains

HINTERLAND	Production	PNW	GULF	Total	PNW	GULF
NEBRASKA	31,169,427	5,634,706	1,470,959	7,105,665	79.3%	20.7%
MINNESOTA	1,187,265	33,203	2,046,660	2,079,864	1.6%	98.4%
N DAKOTA	11,084,682	824,835	958,594	1,783,430	46.2%	53.8%
KANSAS	13,585,192	148,247	1,340,225	1,488,473	10.0%	90.0%
IOWA	48,609,407	1,155,140	306,041	1,461,182	79.1%	20.9%
COLORADO	2,504,740	404,236	322,245	726,481	55.6%	44.4%
TEXAS	3,314,853	3,330	10,922	14,252	23.4%	76.6%
TOTAL	111,455,570	8,203,699	6,455,649	14,659,349	56.0%	44.0%

Source: BST Associates using data from ICC public use waybill

In 1990, 8.2 million tons of grain products (including wheat, corn, soybeans and sorghum) were exported from the PNW from U.S. states located in the competitive hinterland of both the PNW and Gulf ports. The states in this competitive hinterland region include Nebraska, Iowa, Minnesota, Colorado, North Dakota, Kansas and Texas. These shipments represent the

potential bypass that could be shipped via the Gulf if transportation costs changed in favor of the Gulf or if PNW infrastructure reached a constraint vis a vis Gulf port and inland transportation infrastructure.

Of this total potential bypass, 69% came from Nebraska alone (i.e. 5,634,706 metric tons). Iowa and North Dakota were the next two largest states in the competitive hinterland (i.e. 1.1 million tons of mainly corn from Iowa and 824,835 tons of wheat from North Dakota). Corn from Nebraska and Iowa exported to Asia accounted for 5.5 million metric tons. Wheat (primarily from North Dakota, Nebraska and Colorado) accounted for 1.9 million tons. Soybeans and sorghum (again primarily from Nebraska) accounted for 669,000 tons.

Table 4.9

Assessment of Competitive Hinterlands
Rail Hinterlands
By Specific Grain Commodity

HINTERLAND	Production	PNW	GULF	Total	PNW	GULF
WHEAT						
COLORADO	2,504,740	404,236	322,245	726,481	55.6%	44.4%
NEBRASKA	2,460,877	554,859	504,177	1,059,037	52.4%	47.6%
N DAKOTA	11,084,682	824,835	958,594	1,783,430	46.2%	53.8%
KANSAS	13,585,192	148,247	1,340,225	1,488,473	10.0%	90.0%
MINNESOTA	1,187,265	33,203	2,046,660	2,079,864	1.6%	98.4%
SUB-TOTAL	30,822,758	1,965,382	5,171,903	7,137,286	27.5%	72.5%
CORN						
NEBRASKA	23,734,855	4,437,543	734,485	5,172,029	85.8%	14.2%
IOWA	39,686,792	1,127,427	239,722	1,367,149	82.5%	17.5%
TEXAS	3,314,853	3,330	10,922	14,252	23.4%	76.6%
SUB-TOTAL	66,736,501	5,568,301	985,130	6,553,431		
SOYBEANS						
NEBRASKA	2,215,889	81,412	55,491	136,903	59.5%	40.5%
IOWA	8,922,615	27,712	66,319	94,032	29.5%	70.5%
SUB-TOTAL	11,138,505	109,125	121,810	230,936	47.3%	52.7%
SORGHUM						
NEBRASKA	2,757,805	560,890	176,804	737,695	24.0%	76.0%
SUB-TOTAL	2,757,805	560,890	176,804	737,695	76.0%	24.0%

Source: BST Associates using data from ICC public use waybill

Forecasts. Forecasts of potential grain exports were developed based on the growth of production by commodity by state, an export percentage by commodity and state, and an estimate of export share by region. Using forecast growth rates for grain commodity exports,

the potential bypass product defined above will grow from 8.2 million tons in 1990 to 13.3 million tons in 2020 and 15.8 million tons in 2060.

Table 4.10

PNW Competitive Hinterland Potential Bypass Forecasts

GRAIN TYPE	PNW 1990	PNW 2020	PNW 2060	Annual % 2020	% 2060
WHEAT	1,965,382	3,013,221	3,384,842	1.4%	0.4%
CORN	5,568,301	9,470,913	11,765,520	1.8%	0.7%
SOYBEANS	109,125	160,484	177,874	1.3%	0.3%
SORGHUM	560,890	1,028,282	1,197,674	2.0%	0.5%
TOTAL	8,203,699	13,339,558	15,850,670	1.6%	0.6%

ADDITIONAL GRAIN TYPE	PNW 2020	PNW 2060
WHEAT	1,047,838	1,419,460
CORN	3,902,612	6,197,218
SOYBEANS	51,358	68,748
SORGHUM	467,392	636,784
TOTAL	5,135,858	7,646,970

Source: BST Associates

Relative Transportation Costs. As discussed above, there has been a relative advantage in shipping grain to Asia via PNW ports of approximately $5.70 per ton (i.e. inland transportation and ocean vessel costs) for Midwest areas not well served by barge service.

Two scenarios are presented in Table 4.11 below that indicate the cost advantage to the PNW is expected to continue through 2020 and 2060 for all vessel size scenarios.

Grain Elevator Capacity. Grain elevator capacity is primarily a function of the rate of transport of the product, the storage capacity of the elevator (i.e. silos and rail track storage) and the number of shifts worked per day. [Inland transportation capacity is further evaluated below]. The controlling factor in PNW grain export elevators is the number of shifts worked per day. Typically, grain elevators are worked during one shift per day. Night shifts are uncommon because of the increased costs required by longshoremen and often reduced visibility and productivity.

Table 4.11

Grain Transportation Economics (1990 $) - Scenarios base on vessel size

Scenario One

Route U.S. Gulf to N Pacific	Average DWT	Sea Costs	Land Costs	Total Costs
1990	52,370	23.3	21.7	45.0
2020	51,953	25.2	23.1	48.3
2060	59,275	26.6	27.5	54.1
Route U.S. W Coast to N Pacific	**Average DWT**	**Sea Costs**	**Land Costs**	**Total Costs**
1990	52,370	12.2	27.1	39.3
2020	51,953	13.1	28.9	42.0
2060	59,275	13.7	34.4	48.1
Advantage to WCOAST	**Average DWT**	**Sea Costs**	**Land Costs**	**Total Costs**
1990	52,370	-11.1	5.4	-5.7
2020	51,953	-12.1	5.8	-6.3
2060	59,275	-12.9	6.9	-6.0

Scenario Two

Route U.S. Gulf to N Pacific	Average DWT	Sea Costs	Land Costs	Total Costs
1990	69,275	20.5	21.7	42.2
2020	68,745	22.0	23.1	45.1
2060	68,745	24.7	27.5	52.2
Route U.S. W Coast to N Pacific	**Average DWT**	**Sea Costs**	**Land Costs**	**Total Costs**
1990	69,275	10.7	27.1	37.8
2020	68,745	11.5	28.9	40.4
2060	68,745	12.8	34.4	47.2
Advantage to WCOAST	**Average DWT**	**Sea Costs**	**Land Costs**	**Total Costs**
1990	69,275	-9.8	5.4	-4.4
2020	68,745	-10.5	5.8	-4.7
2060	68,745	-11.9	6.9	-5.0

Source: WEFA, RLA, BST Associates

Given the cargo volumes forecasted to move through U.S. export grain elevators, the Gulf and PNW elevators will experience a capacity limitation if only one shift is worked which is typically the case. However, if two shifts are worked, the forecasted amounts of grain are capable of being handled. It should be noted that the existing grain elevators have substantial capacity in all coastal regions.

When capacity becomes constrained, the individual elevator operator will either add a shift or improve the loading speed of the terminal by provision of faster dumping systems, conveyor belts and spouts. Discussions with grain elevator operators indicate that the least expensive means of improving capacity is to work an additional shift followed by provision of new faster loading equipment.

Table 4.12

U.S. Grain Export - Elevator Capacity

	Gulf	West	Other East	Total
Number of Elevators	31	13	30	74
Storage Capacity (Bushels)	106.66	40.05	190.80	337.51
Loading Capacity (Bu/hr)	2,184,500	822,866	1,566,000	4,573,366
Loading Capacity (Tons/hr)	56,740	21,373	40,675	118,788
Capacity One Shift	119,154,545	44,883,600	85,418,181	249,456,327
Capacity Two Shifts	238,309,090	89,767,200	170,836,363	498,912,654
Forecast 2020	123,005,000	42,221,000	13,102,000	178,328,000
Utilization - One Shift	103.2%	94.1%	15.3%	71.5%
Utilization - Two Shifts	51.6%	47.0%	7.7%	35.7%
Forecast 2020	155,333,000	42,221,000	26,883,000	224,437,000
Utilization - One Shift	130.4%	94.1%	31.5%	90.0%
Utilization - Two Shifts	65.2%	47.0%	15.7%	45.0%

1). Number of elevators, storage capacity and loading capacity comes from Export Elevator Directory published by U.S.D.A. Federal Grain Inspection Service July 1991

2). The average export mixture of grain consists of wheat, corn and soybeans at 38.5 bushels per metric ton according to the AAR

3). One shift consists of 8 hours, two shifts of 14 hours

Source: BST Associates, American Association of Railroads, U.S.D.A.

After a certain threshold has been reached, capacity can only be increased by building a new facility. The only new facility being considered on the West Coast at the present time is at Prince Rupert in British Columbia. Canadian elevators are often owned and operated by grain cooperatives. In this case, the Saskatchewan Grain Pool is contemplating building a new elevator in Prince Rupert as opposed to rehabilitating their facility in Vancouver. The Port of

Longview, Washington has an idle grain terminal which has been recently evaluated for substantial improvements. The Port has determined that rehabilitation is warranted and is seeking potential users/investors for the improvements.

Conclusions. For the most part, grain elevators, like coal terminals are substantially under utilized. Grain elevator capacity is not considered a constraint to export product movement.

Canadian West Coast Grain Terminals. Most of the grain exported from Canada to Asia goes through the Vancouver Port Corporation terminals. VPC's five grain elevators handled 10.7 million tons of grain in 1990. In addition, Prince Rupert's grain elevator handled approximately 4.0 million tons of wheat and barley.

Wheat accounted for approximately 70% of the West Coast grain exports followed by roughly equal amounts of barley and canola. The Vancouver Port Corporation has five grain elevators.

- United Grain Terminal, Pacific Elevators and the Alberta Wheat Pool which are located on the south side of Burrard Inlet.

- Pioneer Grain Terminal and the Saskatchewan Wheat Pool are located on the north side of the Inlet.

Some of these grain terminals have approached 60% to 70% of their estimated capacity and several improvements are proposed or underway. United Grain Growers is planning a $42 million (Cnd) improvement over the next several years to increase railcar unloading rates and improve overall terminal productivity. The Alberta Wheat Pool is proceeding with $40 to $50 million (Cnd) improvements to overhaul the entire elevator system.

The Ridley Island terminal in Prince Rupert is not experiencing any capacity problems. However, one of the grain pools is considering building another grain elevator in Prince Rupert.

Virtually all of the Canadian grain exports to Asia are exported via BC grain elevators. This pattern occurs because grain is grown in the prairies of Manitoba, Saskatchewan and Alberta. Likewise, the great majority of grain exported to Europe and Africa leaves via the St Lawrence Seaway in Eastern Canada. Potential bypass traffic through the Panama Canal is accordingly quite small.

Canadian transportation laws have restricted Canadian grains from being exported by non-Canadian ports. However, this may be changed in the future which could create an opportunity for U.S. ports but not for Panama Canal routings.

Container Terminals

Container growth in the U.S. West Coast has proceeded at a very quick pace over the past decade as mini- and micro-landbridge services have diverted containers from all water Panama Canal service. The following section evaluates whether North American ports will experience constraints in handling future trade volumes.

Container Terminal Operations. Terminal capacity is generally evaluated in detail during master plans at the following locations:

- Vessel arrival and berth availability
- Cargo Transfer at apron
- Apron and storage transfer
- Storage yard dwell
- Storage and off-site inland transfer
- Off-site inland vehicle processing

Capacity is typically measured as a "maximum practical utilization" to evaluate the high end of a realistic operating throughput. Storage capacity is the greatest constraint facing container terminal operators.

There are several planning methods that can be used by ports to convert container forecasts into marine terminal demand. One method is to calculate the number of "average" new terminals that would be required to meet the trade forecasts. This is known as the "module" approach, with a fifty acre module being a suitable size for a majority of container lines. This method works reasonably well when planning for a new terminal since individual terminals can be identified and not only is container yard area calculated, but also berthing, access, and inland connections.

A second approach for converting trade forecasts to container terminal requirements is the "acreage" method, as measured by a common denominator (i.e. number of containers handled). In this method, the average number of containers handled per acre per year is calculated and then divided into the forecast to obtain an acreage requirement. The acreage planning method works well for port planning when acreage is being added to existing terminals, instead of adding new terminals.

An advantage for using the overall acreage planning method is that it avoids calculation of the "average" module size variable. With the flux of today's container shipping line mergers, it is becoming more difficult to determine what the average size of a container terminal should be. In recent times, 50 acres would meet the needs of nearly all major container lines, and one hundred acres met even the largest. Now a terminal of up to one hundred fifty acres is not an unheard of request from a container line.

A caution on the total acreage methodology, however, is that it is dependent upon calculating overall container terminal productivity in terms of the number of containers handled per acre per year. While a strong case can be made for the usability of a per acre productivity "average," it is a widely fluctuating variable, though the larger the universe, the greater the accuracy. This methodology should be used as a general planning guideline, and one that is more accurate than other guidelines commonly used, but not used as the only determinant.

Container Forecasts and Capacity Assessment - West Coast U.S. and Canadian Facilities. West Foreign containerized trade is expected to grow from a present level of 7.5 million twenty foot equivalent units (TEUs) to 17.1 million TEUs by 2020 and 27.0 million TEUs by 2060. This includes international and domestic (both full and empty) containers.

Table 4.13

West Coast U.S. & Canadian Port Container Forecasts

Direction	1990	2020	2060
Imports (tons)	17,694,769	49,347,704	77,613,597
Exports (tons)	19,950,480	41,343,396	68,926,632
World (tons)	37,645,249	90,691,100	146,540,229
Total West Coast (TEUs)	7,545,600	17,119,815	27,414,266
Full Foreign (TEUs)	5,035,768	12,131,659	19,602,542
Empty Foreign (TEUs)	1,258,942	3,032,914	4,900,635
Domestic Total (TEUs)	1,250,890	1,955,241	2,911,088

Source: The WEFA Group and BST Associates

Port capacity must be compared in terms of total number of boxes (full or empty) since all boxes require storage and loading facilities.

- Foreign containers are expected to grow at annual rates of approximately 4% per year from 1990 to 2020 slowing to 1.7% per year from 2020 to 2060.

- Empty foreign containers are assumed to remain at the present level (i.e 25% of full international containers).

- Domestic containers are expected to grow at slower rates (i.e. 1.5% to 2020 and 1% per year beyond).

Presently on the West Coast, there are 2,633 acres of container terminal facilities. Average coastwise throughput was 2,619 TEUs per acre per year in 1990. However, some terminals are operating at substantially less than the average (i.e. San Francisco and Portland). In most recent Port plans, the average existing throughput is estimated at approximately 3,000 to 3,200 TEUs per acre per year.

Table 4.14

West Coast Container Ports
Existing Throughput - 1990

Port	Acres	TEUs	TEUS/Acre
Vancouver BC	127.0	322.6	2,540.2
Seattle	378.2	1,100.0	2,908.5
Tacoma	273.8	945.0	3,451.4
Portland	85.0	162.0	1,905.9
Oakland	419.0	1,124.0	2,682.6
San Francisco	145.0	140.0	965.5
Los Angeles	587.0	2,116.0	3,604.8
Long Beach	618.0	1,636.0	2,647.2
Total	2,633.0	7,545.6	2,865.8
Average			2,619.1

Source: Individual Ports, BST Associates

Container Terminal Expansion Plans. There are also numerous plans to expand container terminal acreage up and down the coast. The net increase will be approximately 2,440 acres bringing the total to 5,073 acres.

Vancouver Port Corporation terminals are expected to reach capacity in 1995. The Port has plans to build a 90 acre terminal at Roberts Bank to alleviate future constraints.

Seattle has recently completed its Container Terminal Development Plan which proposes to add approximately 300 acres by the year 2010. The recent decision by APL to expand its intermodal base at Seattle will accelerate these plans.

Tacoma is completing the removal of the Blair Bridge which will free up approximately 500 acres of land for container terminal development. In addition, projects outside of the Blair Waterway could add another 100 acres. It is possible that the Port could add even more acreage to container operations but this would significantly impact other cargo uses.

Portland is currently heavily underutilized. Terminal 6 which is the main container terminal is operating at substantially less than 50% of capacity. In addition, Terminals 2 and 4 are used for containers. The expansion noted below refers to greater utilization of these three terminals.

San Francisco has some land available for expansion adjacent to its two container terminals. This expansion could occur immediately.

Oakland is currently negotiating with the U.S. Navy regarding acquisition of the Oakland Naval Base (200 acres) which is being released from active service by the military. This expansion could also occur in the very near future.

Los Angeles and Long Beach have plans to develop a 2,400 acre island called the 2020 project. These plans call for development of 5 container terminals at Los Angeles and 6 container terminals at Long Beach (i.e. each terminal is planned at 100 acres). Los Angeles is currently developing a 200 acre terminal as part of the 2020 plan. Long Beach is negotiating to buy 600 acres from Union Pacific Resources.

Table 4.15

West Coast Container Ports
Planned Expansions

Port	Existing Acres	Planned Acres	Total Acres
Vancouver BC	127.0	100.0	227.0
Seattle	378.2	300.0	678.2
Tacoma	273.8	600.0	873.8
Portland	85.0	100.0	185.0
Oakland	419.0	200.0	619.0
San Francisco	145.0	40.0	185.0
Los Angeles	587.0	500.0	1,087.0
Long Beach	618.0	600.0	1,218.0
Total	2,633.0	2,440.0	5,073.0

Source: Individual Ports, BST Associates

The terminal expansion plans range from the next few months to the year 2020. As additional land is required, other plans will be developed at these ports as well as at other smaller ports with the appropriate physical characteristics.

Container Terminal Capacity Assessment. Productivity at existing terminals can be increased significantly in the future as land becomes more scarce and land prices increase. In some west coast terminals, productivity of 6,000 to 7,000 TEUs per acre per year are being experienced at the present time.

These productivities can be attained by adding more longshore shifts, working weekends, staggering breaks and lunches, and adding additional equipment including ship and yard cranes and on-dock intermodal yards. These changes are, however, only worth undertaking at very high volume facilities. In the forecast presented below, volumes will pass the required threshold and warrant terminal improvements.

The following improved productivity estimates assume an average throughput of 6,000 TEUs per acre per year. In 2020 or 2060, productivity levels may exceed this. Specifically, as land values increase, vertical computerized storage areas such as those in Hong Kong may be built.

Table 4.16

West Coast Container Terminal Storage Capacity Assessment

Category	1990	2020	2060
Existing Acreage	2,633		
Existing Productivity	7,899,000		
Improved Productivity	15,798,000		
Existing & Planned Acreage		5,073	5,073
Improved Productivity		30,438,000	30,438,000
West Coast Container Terminal Capacity Assessment			
Existing Acreage			
Existing Productivity	95.5%	216.7%	347.1%
Improved Productivity	47.8%	108.4%	173.5%
Existing & Planned Acreage			
Improved Productivity		56.2%	90.1%

Source: Individual Ports, BST Associates

Based upon the expansion plans at individual container ports and improved productivity, existing terminal space at existing productivity rates (I.e. 3,000 TEUs per acre per year) are nearing capacity. With improved throughput, the existing 1990 throughput is estimated to be less than 50% of capacity.

With the planned improvements listed above, 2020 volumes will reach 56% of capacity. By 2060, capacity limits will be exceeded (i.e. 90% of capacity) assuming additional planned capacity comes on line at higher throughput rates. It should be emphasized that the planned capacity is defined to meet or exceed the year 2020 year requirements. Ports typically do not plan beyond a 20 to 30 year horizon.

After the year 2020, it is likely that new plans will be formulated to handle additional cargo flows at existing or new container ports. BST does not believe that port capacity will be a determinant in shifting cargo back to the all water (i.e. Panama Canal) routes.

West Coast U.S. container throughput could be impacted by improvements in Mexican West Coast ports. These potential improvements are discussed below. In addition, numerous U.S. smaller ports are also interested in container terminal development and could become important if capacities are reached in load center ports.

Container Forecasts and Capacity Assessment - East/Gulf Coast U.S. and Canadian Facilities. Foreign containerized trade is expected to grow from a present level of 8.1 million twenty foot equivalent units (TEUs) to 20.6 million TEUs by 2020 and 34.8 million TEUs by 2060. This includes international and domestic (both full and empty) containers.

Table 4.17

East Coast U.S. & Canadian Port Container Forecasts

Direction	1990	2020	2060
Imports (tons)	24,927,680	57,457,295	90,840,932
Exports (tons)	28,320,371	78,317,632	138,562,983
World (tons)	53,248,051	135,774,927	229,403,915
Total East/Gulf Coast (TEUs)	8,085,000	20,615,595	34,831,897

Source: The WEFA Group and BST Associates

In the North Atlantic region, the major container ports include New York/New Jersey, Hampton Roads, Montreal, Baltimore and Halifax all of which had throughput exceeding 465,000 TEUs in 1990. Average productivity in the region was less than 1,200 TEUs per acre per year. This was primarily the result of substantial recent construction of container facilities

(i.e. SeaGirt at Baltimore) and a relative decrease in container throughput via New York/New Jersey.

In the South Atlantic region, the major container ports include Charleston, Savannah, Miami, Port Everglades and Jacksonville all of which exceeded 275,000 TEUs in 1990. Throughput in the South Atlantic region is also quite low (1,180 TEUs per acre per year) as a result of recent construction throughout the region.

In the Gulf, Houston and New Orleans dominate container trade. Productivity is 1,900 TEUs per acre per year.

The terminal expansion plans in the region will add approximately 2,777 acres bringing the total acreage to 9,250 in the East and Gulf Coast.

Table 4.18

East Coast Container Ports
Existing Throughput - 1990

Port	TEUs	Acres	TEUS/Acre
North Atlantic			
Baltimore	474.4	377.6	1,256.4
Boston	141.8	67.7	2,094.5
Halifax	465.0	114.3	4,070.0
Hampton Roads	788.8	371.3	2,124.4
New York/New Jersey	1,898.4	2,509.0	756.6
Philadelphia	79.5	73.0	1,089.0
Richmond	36.4	49.0	742.9
St John (NB)	15.7	50.0	314.0
St Johns (Newf)	89.5	14.0	6,392.9
Wilmington (Del)	91.6	98.0	934.7
Montreal	568.1	173.8	3,269.6
Subtotal	4,649.2	3,897.6	1,192.8
South Atlantic			
Charleston	785.7	469.5	1,673.5
Jacksonville	278.1	157.0	1,771.3
Fernandina Beach	29.2	30.0	973.3
Miami	373.9	607.3	615.7
Palm Beach	118.6	30.3	3,920.7
Port Everglades	285.5	50.0	5,710.0
Savannah	422.6	273.3	1,546.6
Wilmington (NC)	92.8	405.0	229.1
Subtotal	2,386.4	2,022.3	1,180.1
Gulf Coast			
Freeport	29.9	3.5	8,542.9
Galveston	72.3	130.0	556.2
Gulfport	55.9	10.0	5,590.0
Houston	504.9	201.0	2,511.9
Mobile	29.7	11.0	2,700.0
New Orleans	352.5	191.3	1,843.1
Tampa	4.2	6.0	700.0
Subtotal	1,049.4	552.8	1,898.5
Grand Total	8,085.0	6,472.6	1,249.1

Source: Individual Ports, BST Associates

Table 4.19

East Coast Container Planned Expansions

Port	Existing Acres	Planned Acres	Total Acres
North Atlantic			
Baltimore	377.6	0.0	377.6
Boston	67.7	25.0	92.7
Halifax	114.3	0.0	114.3
Hampton Roads	371.3	200.0	571.3
New York/New Jersey	2,509.0	0.0	2,509.0
Philadelphia	73.0	0.0	73.0
Richmond	49.0	0.0	49.0
St John (NB)	50.0	0.0	50.0
St Johns (Newf)	14.0	0.0	14.0
Wilmington (Del)	98.0	0.0	98.0
Montreal	173.8	375.0	548.8
Subtotal	3,897.6	600.0	4,497.6
South Atlantic			
Charleston	469.5	827.0	1,296.5
Jacksonville	157.0	1,000.0	1,157.0
Fernandina Beach	30.0	0.0	30.0
Miami	607.3	100.0	707.3
Palm Beach	30.3	0.0	30.3
Port Everglades	50.0	150.0	200.0
Savannah	273.3	100.0	373.3
Wilmington (NC)	405.0	0.0	405.0
Subtotal	2,022.3	2,177.0	4,199.3
Gulf Coast			
Freeport	3.5	0.0	3.5
Galveston	130.0	0.0	130.0
Gulfport	10.0	0.0	10.0
Houston	201.0	0.0	201.0
Mobile	11.0	0.0	11.0
New Orleans	191.3	0.0	191.3
Tampa	6.0	0.0	6.0
Subtotal	552.8	0.0	552.8
Grand Total	6,472.6	2,777.0	9,249.6

Source: Individual Ports, BST Associates

Container Terminal Capacity Assessment. As with West Coast container terminals, productivity at existing East Coast terminals can be increased significantly in the future as land becomes more scarce and land prices increase.

Higher productivities (i.e. 6,000 TEUs per acre per year) can be attained by adding more longshore shifts, working weekends, staggering breaks and lunches, and adding additional equipment including ship and yard cranes and on-dock intermodal yards.

Table 4.20

East Coast Container Terminal Storage Capacity

Origin	1990	2020	2060
Existing Acreage	6,472		
Existing Productivity	19,417,800		
Improved Productivity	38,835,600		
Existing & Planned Acreage		9,249	9,249
Improved Productivity		55,497,600	55,497,600
West Coast Container Terminal Capacity Assessment			
Existing Acreage			
Existing Productivity	41.6%	106.2%	179.4%
Improved Productivity	20.8%	53.1%	89.7%
Existing & Planned Acreage			
Improved Productivity		37.1%	62.8%

Source: Individual Ports, BST Associates

With the planned improvements listed above, 2020 volumes will reach 37% of capacity. By 2060, capacity limits will still be adequate (i.e. 63% of capacity) assuming additional planned capacity comes on line at higher throughput rates.

Mexican Port Development. The ports of Veracruz and Tampico/Altamira, and to a lesser degree, Coatzacoalcos, in the state of Veracruz, and Progreso, in the state of Yucatan, connecting Mexico with the U.S. Gulf and East coast, serve as the main gateways for Mexico's trade with the U.S., Europe, the Caribbean, the east coast of Latin America and the Middle East. Atlantic Coast ports account for slightly less than two thirds of Mexico's international container trade as shown the in following table.

On the Pacific, the main gateway ports are Lázaro Cárdenas, in the State of Michoacán, and Manzanillo in the state of Colima. To a lesser degree, Acapulco, Guerrero and Salina Cruz, Oaxaca, provide waterborne services for Mexico's trade with U.S. west coast cities, the Far East and the west coast of Latin America. Pacific ports account for slightly more than one third of Mexican international waterborne container trade.

Table 4.21

Mexican Container Port Traffic - 1991
(TEUs)

PORT	TEUs	% Total
Manzanillo	41,895	12.1%
Lazaro Cardenas	39,192	11.3%
Salina Cruz	16,738	4.8%
Ensenada	13,042	3.8%
Acapulco	5,429	1.6%
Mazatlan	2,717	0.8%
sub-total	119,013	34.4%
Vera Cruz	119,478	34.5%
Altamira	36,475	10.5%
Tampico	33,056	9.6%
Tuxpan	32,896	9.5%
Progreso	2,682	0.8%
Morelos	2,054	0.6%
Coatzacoalcos	371	0.1%
sub-total	227,012	65.6%
Total	346,025	

Source: BST using Puertos Mexicanos data

The ports of Guaymas, in the State of Sonora, Pichilingue, near La Paz, Baja California Sur and Ensenada, in the State of Baja California provide waterborne services to Mexico's northwestern states. Of these three ports, only Ensenada currently enjoys direct liner service with the Far East and the U.S. West coast.

Given a) the marked concentration of Mexico's industrial manufacturing activities around the main cities of Guadalajara, Monterrey, Puebla and Mexico City; b) the settlement of maquiladora manufacturing and assembly facilities across the Southwest border of the United States: c) the availability of relatively cost-efficient motor transportation services and the road and highway infrastructure network built around the main population centers; and d) the fact

the over two thirds of Mexico's trade is with the U.S., it is to no surprise that rail and port infrastructure in Mexico has not traditionally been given the priority it deserves. Trucking continues to dominate these flows.

However, to keep up with the economic globalization forces taking place and the likely signature of the North American Free Trade Agreement (NAFTA) in the near future, Mexico's President Salinas de Gortari's administration has begun to improve and expand Mexico's current port and railroad infrastructure.

Several Mexican ports, such as Veracruz, Tampico/Altamira and Progreso on Mexico's east coast, and Manzanillo, Lázaro Cárdenas, and very recently Ensenada, in the Pacific, have been identified as priority ports within the Mexican Port system (Puertos Mexicanos), to become Mexico's waterborne gateways to the rest of the world. With this designation, they have become eligible to receive the necessary Federal financial support to improve and expand their capabilities. Improvements to these ports could divert cargoes from U.S. ports for Mexican cargoes as well as potentially for U.S. South and Southwest cargoes.

In addition to Port terminal operations, it is instructive to review recent trends in container line operations and the growth of domestic containerization. These subjects are addressed below.

Container Lines. Consolidation of the ocean carriers is decreasing the number of potential port users. The number of container carriers involved in each trade route is being consolidated as small carriers drop out or are merged with larger firms. Presently, there are approximately 23 major liner services in the transpacific trade. However, fourteen of these lines handled over 92 percent of the total transpacific market in 1991. The number of lines involved in container service is shrinking which has profound impact on terminal operations.

In addition, the larger carriers are now entering into vessel service agreements (VSAs) to improve service to their customers, as mentioned briefly above. Nine of the fourteen lines have entered into vessel sharing agreements or were bought by another line.

Rationalization is not new to the marine industry or the liner service. It is a response to inherent uncertainties in the industry to offset the risk in a capital intense service business.

Vessel sharing agreements allow the individual shipping line to protect their investments, increase their rate of return and provide a higher level of service to their customers.

This is accomplished through increased utilization of vessels, which both improves rates and reduces chronic overcapacity.

The natural progression from the vessel rationalization will be the sharing of terminal facilities and other assets. This will lead to the development of even larger load centers, better

utilization of port facilities and will require ever larger terminals. APL is currently evaluating a need for a terminal 200 acres in size with future expansion capacity of an additional 50 to 100 acres, major on-dock rail facilities and 4 to 5 berths. There are very few areas where such a terminal can be developed. These requirements can only be met in Los Angeles (Berth 300), Long Beach and Tacoma. Other ports do not have the combination of assets required.

Table 4.22

Top 23 Liner Services
In The Transpacific Trade
(TEUS in 1991)

SHIPPING LINE	IMPORT	EXPORT	TOTAL	PERCENT
American President Lines	407,129	221,864	628,993	14.2%
Evergreen Line	254,529	201,653	456,182	10.3%
Sea-Land Service	279,727	147,322	427,049	9.7%
K Line	196,521	161,827	358,348	8.1%
NYK Line	170,491	163,208	333,699	7.6%
Mitsui OSK Line	155,366	144,244	299,610	6.8%
Hanjin	160,246	132,742	292,988	6.6%
Maersk	161,372	114,624	275,996	6.3%
Hyundai	150,059	120,175	270,234	6.1%
COSCO	120,730	93,671	214,401	4.9%
OOCL	133,622	80,685	214,307	4.9%
Yangming Shipping Line	67,601	53,693	121,294	2.7%
Neptune Orient Line	63,843	40,619	104,462	2.4%
Nippon Liner Service	46,431	45,528	91,959	2.1%
Westwood Shipping	34,743	29,885	64,628	1.5%
EAC Line	23,090	22,726	45,816	1.0%
Senator Line	27,229	18,477	45,706	1.0%
Nedlloyd	28,683	15,059	43,742	1.0%
Mexican Line	17,203	19,386	36,589	0.8%
Zim Container	16,502	18,520	35,022	0.8%
Cho Yang Line	20,486	8,784	29,270	0.7%
Natl Shipping Line	11,996	8,967	20,963	0.5%
Gear Bulk	2,081	1,109	3,190	0.1%
Total	2,549,680	1,864,768	4,414,448	
TOP 23 Lines	2,367,667	1,721,855	4,089,522	92.6%

SOURCE: Journal of Commerce and U.S. Liner Trade Review by Port Imports and Exports Service, BST Associates

In the trans-pacific trade, four VSAs have been consummated in the last year which account for approximately 54 percent of the cargo base. These VSAs include: American President

Line (APL) and Orient Overseas Container Line (OOCL) with 19.4 percent of the market; Kawasaki Kisen Kaisha Ltd (K Line) and Mitsui O.S.K. Lines (MOL) having a market share of 13.2 percent; Nippon Yusen Kaisha (NYK) and Neptune Orient Lines (NOL), [in addition NYK purchased Nippon Liner System (NLS) in late 1991 and now controls 10.4 percent of the market alone]; and Sea-Land Services (S-L) and Maersk Lines with 11.2 percent of the market. These lines have already started to realize benefits from these partnerships and are looking to rationalize other aspects of their operations.

Table 4.23

Review of Transpacific Partners In VSAs And Their Volumes

SHIPPING LINE	TEUs 1991 IMPORT	EXPORT	TOTAL	PERCENT
APL/OOCL				
AMERICAN PRESIDENT LINE	407,129	221,864	628,993	
OOCL	133,622	93,671	227,293	
APL/OOCL TOTAL	540,751	315,535	856,286	19.38%
K LINE/MOL				
K LINE	161,372	144,244	305,616	
MITSUI OSK LINE	155,366	120,175	275,541	
K LINE/MOL TOTAL	316,738	264,419	581,157	13.15%
NYK/NOL				
NYK LINE	150,059	114,624	264,683	
NIPPON LINER SERVICES *	46,431	45,528	91,959	
NEPTUNE ORIENT LINES	63,843	40,619	104,462	
NYK/NOL TOTAL	260,333	200,771	461,104	10.43%
S-L/MAERSK				
SEA-LAND	120,730	80,685	201,415	
MAERSK	160,246	132,742	292,988	
S-L/MAERSK TOTAL	280,976	213,427	494,403	11.19%
TOTAL CONTROLLED BY VSA	1,398,798	994,152	2,392,950	54.14%

SOURCE: Journal of Commerce and U.S. Liner Trade Review by Port Imports and Export Service, BST Associates

The effect of VSAs on liner operations will be to increase the frequencies of vessel calls; provide faster transit time (i.e. by eliminating secondary ports from their schedules and focus activities at load centers). This could reduce the requirement for the ultra-large container ship of 5,000 to 6,000 twenty foot equivalent units (TEUs) and promote better feeder connections.

In addition, as the container business becomes truly global, the container carriers are becoming complete logistics businesses offering stevedoring services, freight consolidation, sales forces at numerous inland points and other such resources to satisfy customer needs.

One of the impacts of this strategy is the increasing demand by container line stevedoring firms to handle smaller container carriers to fully utilize the large terminals leased from Port authorities. For example, APL's stevedoring subsidiary, Eagle Marine Services is providing stevedoring services for Westwood Shipping Lines on the West Coast. Company owned stevedore units are now competing with port multi-user terminals and independent stevedoring companies (such as SSA).

A profile of the typical existing container vessel which was built before 1991 is as follows:

- Length is 246.1 meters (807.4 feet)
- Beam of 32.28 meters (105.9 feet)
- Operating draft of 11.68 meters (38.3 feet).
- Deadweight tonnage of 41,869 long tons and
- Carrying capacity of 2,774 TEUs.

The container lines are now building new vessels for feeder and deepsea service to meet the projected demands. The deepsea vessels are in the 2600 to 4400 TEU size range which will be in operation for the next fifteen to twenty years. The newbuildings are being placed in primary trade routes, displacing smaller older vessels which are being redeployed into secondary trades. The net effect is an increase in TEU capacity in the primary and secondary trade routes. There is currently a 14% over capacity in the Pacific routes.

The newbuildings in the 2600 to 4400 TEU size range are beginning to replace container vessels in the 1500 to 2400 TEU size range. For example, Hyundai's new class of container vessels will have a capacity of 4400 TEU, will have a length over all (LOA) of 275 meters (902.2 feet), a beam of 37.1 meters (121.7 feet) and a draft of 13.6 meters (44.3 feet). Hyundai's smaller class vessels (i.e. "Hyundai Innovator") has a capacity of 2,641 TEU capacity and dimensions of the following - LOA of 244 meters (800.5 feet), a beam of 32.2 meters (105.6 feet) and a draft of 12.52 meters (41.1 feet).

Domestic Containers. Domestic containerization has taken longer to catch on than its international counterpart, but is now starting to see rapid increases in loading. The primary reasons for its growth is the need for shipping lines to reposition equipment at west coast ports

of entry. Because the flow of full containers is eastward from the West Coast, empty containers and railroad intermodal flatcars must be returned to the West. Originally, domestic containerization served as a means for shipping lines to offset the cost of returning equipment. Rather than moving the equipment empty, long-haul domestic goods could be carried to offset some of the cost of the DST movement. Now, however, specialized containers are being developed and pressed into service for the domestic long-haul market.

These new containers are larger than international boxes, and are not built to the same standards of strength. Purely domestic containers, according to Transamerica Leasing, are those that are 102 inches wide and 28, 45, 48 or 53 feet wide. They are not reinforced for stacking on ships. International containers are 96 inches wide, 20, 40 or 45 feet long, and are reinforced for stacking on ships.

One estimate for 1990 is that 500,000 domestic shipments were carried in international containers and 250,000 in purely domestic boxes. However, as the fleet of long-haul truck trailers ages, the likely replacement will be with purely domestic boxes.

Conclusion. BST does not believe that port capacity will be a determinant in shifting cargo back to the all water (i.e. Panama Canal) routes on either coast. U.S. and Canadian container throughput could be impacted by improvements in Mexican West and East Coast ports. Specifically, cargoes now moving through U.S. ports to Mexico could instead move via improved Mexican ports. In addition, Mexican ports could begin to service U.S. originating or destined cargo. Numerous smaller U.S. ports are also interested in container terminal development and could become important if capacities are reached in load center ports.

4.5 Water Depth Constraints

Coal, grain and container facilities are evaluated below to identify potential constraints from existing depth of navigation channels and/or terminals.

Coal Terminals

Major Ports. U.S. coal exports are dominated by a handful of ports, including Hampton Roads (Norfolk and Newport News) and Baltimore on the East Coast and New Orleans (mainly mid-stream operations) and Mobile in the Gulf.

West Coast ports have traditionally been marginal players in coal export operations. It is expected that with few exceptions (i.e, Los Angeles and Long Beach), the above ports will continue to dominate U.S. coal exports.

Deepening Projects. Several projects designed to increase water depth at U.S. coal export facilities are underway. The main ship channels in Baltimore and Hampton Roads have recently been deepened to 50 feet which can allow transit by a 100,000 dwt vessel. The

deepening of Hampton Roads to 55 feet has been authorized but budgeting has been deferred to the 1994-6 budget cycle.

Mobile has deepened its main channel to 45 feet and plans to further deepen the channel to 55 feet have been authorized but not budgeted. A 55 foot deep channel, if undertaken, would allow transit by vessels up to 130,000 dwt.

Table 4.24

US Coal Exports - 1991
By Port of Export
(Metric Tonnes)

U.S. PORT	TONNES *
NORTH ATLANTIC	
NORFOLK, VA.	30,878,504
NEWPORT NEWS, VA.	18,275,415
BALTIMORE, MD.	7,063,203
PHILADELPHIA, PA.	2,769,991
SUB-TOTAL *	59,182,869
SOUTH ATLANTIC	
CHARLESTON, S.C.	1,016,950
SUB-TOTAL *	1,168,197
GULF	
NEW ORLEANS, LA.	8,717,593
MOBILE, ALA.	6,919,279
BATON ROUGE, LA.	2,804,009
SUB-TOTAL *	18,765,085
PACIFIC SOUTH	
LOS ANGELES, CALIF.	975,145
LONG BEACH, CALIF.	833,762
RICHMOND, CALIF.	171,067
SUB-TOTAL *	1,979,975

* Small volume ports have been suppressed

Source: BST using Department of Commerce Data

Plans to develop a 60 foot deep channel at Plaquemines Parish at the Southwest Pass (near the mouth of the Mississippi River) are currently under study. This would allow transit by a vessel of up to 150,000 dwt, if undertaken.

The Los Angeles facility is currently under design with a channel of 72 feet which would allow vessels up to 250,000 dwt.

Canal Share of Exports. In 1990, the Panama Canal only handled 1.1 million tons of U.S. coal exports. Most U.S. coal exports to Asia moves in large (light-loaded) vessels transiting South Africa where vessels are filled to capacity. Full development of the Panama Canal would allow transit by vessels from 150,000 up to 250,000 dwt deepening upon the alternative under consideration. Under these larger canal alternatives, all U.S. coal exports to Asia would transit the canal.

Port Depth Requirements. Forecasts of vessel transits prepared by RLA indicate that under the 150,000 dwt canal alternative, coal vessels would average 134,700 dwt in 2020 and 140,475 dwt by 2060. This size vessel would require water depth of approximately 58.7 feet. Under the 200,000 and 250,000 dwt options, coal exports would move in vessels averaging 172,800 dwt which would require a draft of approximately 60 feet.

In order for U.S. ports to allow access to vessels of this size, water depths would have to be increased to approximately 60 feet of water. This is deeper than any of the existing U.S. coal export ports. Increasing water depth in U.S. navigation channels is evaluated by means of U.S. Army Corps of Engineers benefit/cost analysis.

While it is beyond the scope of work to provide a detailed assessment of each proposed harbor improvement, it is possible to compare the benefits to deepening with typical projects recently undertaken or in the planning stage. This is accomplished in the following tables. Table 4.25 indicates that 55 million tons of U.S. coal will be exported from the East/Gulf coasts to Asia on potential canal routes by the year 2020; increasing to 75 million tons in 2060. Under the status quo canal, only 1.1 million tons will move via the canal in 2020; disappearing by 2060 when all coal will move via competitive routes.

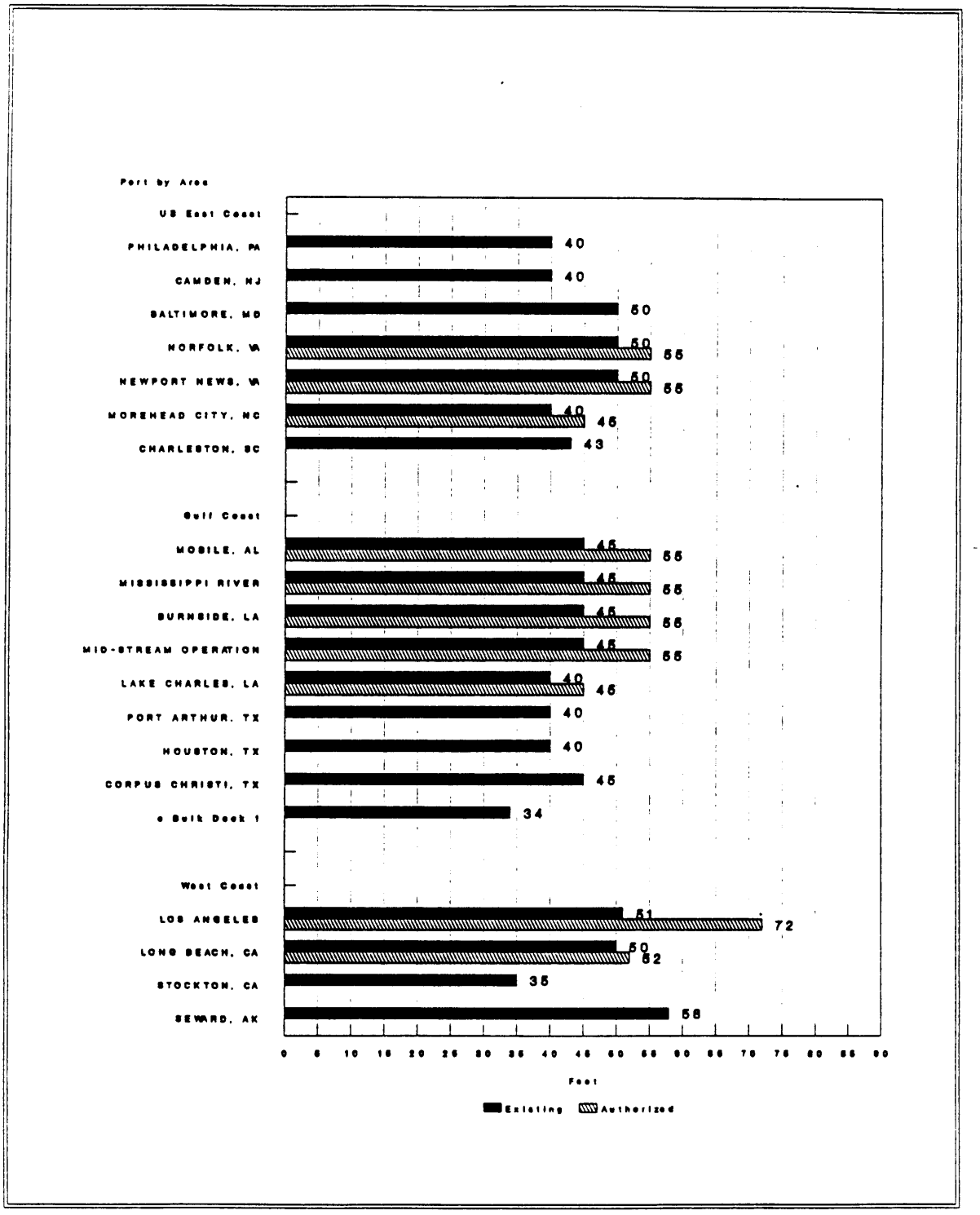


Figure 4.3
Coal Terminal Channel Drafts
Source: BST Associates, Marad Data

Table 4.25

Forecasts, Vessel Distribution and Cost per Ton of Coal Carriers Under Alternative Canal Improvements

Year	Vessel Size (Kdwt)	Status Quo	150,000 tonnes	200,000 tonnes	250,000 tonnes
Coal Forecasts - U.S. East/Gulf Coasts to Asia (tonnes)					
2020	40-65	0	0	0	0
	65-100	1,112,100	1,112,100	1,112,100	1,112,100
	100-150	37,730,841	55,855,323	55,855,323	55,855,323
	150-200	16,642,606	0	0	0
	200-250	1,481,876	0	0	0
	250+	0	0	0	0
	Total via Panama Canal	1,112,100	56,967,423	56,967,423	56,967,423
	Total on bypass route	55,855,323	0	0	0
	Total	56,967,423	56,967,423	56,967,423	56,967,423
2060	40-65	0	0	0	0
	65-100	0	0	0	0
	100-150	0	75,051,385	0	0
	150-200	75,051,385		75,051,385	75,051,385
	200-250	0	0	0	0
	250+	0	0	0	0
	Total via Panama Canal	0	75,051,385	75,051,385	75,051,385
	Total on bypass route	75,051,385	0	0	0
	Total	75,051,385	75,051,385	75,051,385	75,051,385

Cost Per Ton - by ship size and canal alternative

Year	Vessel Size (Kdwt)	Status Quo	150,000 tonnes	200,000 tonnes	250,000 tonnes
2020	40-65	NA	NA	NA	NA
	65-100	NA	NA	NA	NA
	100-150	10.5	10.1	13.6	13.9
	150-200	9.5	9.1	12.2	12.5
	200-250	8.2	7.2	10.5	10.8
	250+	NA	NA	9.3	9.6
2060	40-65	NA	NA	NA	NA
	65-100	NA	NA	NA	NA
	100-150	11.4	10.9	14.8	15.2
	150-200	10.4	10	13.4	13.7
	200-250	8.9	8.6	11.5	11.8
	250+	NA	NA	10.3	10.6

Source: RLA/WEFA

Table 4.26

Benefit Calculations
Larger Coal Vessels

Year	Description	Calculations
2020	**150,000 to 250,000 Canal Alternatives**	
	Tonnage on Alternative Route	55,855,323
	Weighted Cost/ton of Alternative Route	13.10
	Tonnage via Panama Canal	55,855,323
	Weighted Cost/ton of Panama Canal Routes	10.39
	Savings per ton (weighted average)	2.71
	Annual Benefits starting 2020	151,299,303
2060	**150,000 DWT Canal Alternative**	
	Tonnage on Alternative Route	75,051,385
	Weighted Cost of Alternative Route	14.92
	Tonnage via Panama Canal	75,051,385
	Weighted Cost/ton of Panama Canal Routes	11.26
	Savings per ton (weighted average)	3.66
	Annual Benefits starting 2020	274,673,276
2060	**200,000 & 250,000 DWT Canal Alternative**	
	Tonnage on Alternative Route	75,051,385
	Weighted Cost of Alternative Route	13.49
	Tonnage via Panama Canal	75,051,385
	Weighted Cost/ton of Panama Canal Routes	10.28
	Savings per ton (weighted average)	3.20
	Annual Benefits starting 2020	240,319,707

Assumptions :

Estimated USGC tonnage via Panama Canal	21,665,075
Estimated USEC tonnage via Panama Canal	53,386,309

Source: BST Associates using WEFA, RLA forecasts

Table 4.27

**Net Present Value of Benefits (1990 $)
of Deeper Draft Coal Vessels**

	150,000 DWT	200,000 DWT & 250,000 DWT
2020	$151,299,303	$151,299,303
2021	$153,571,779	$153,059,658
to	to	to
2058	$266,604,474	$234,823,611
2059	$270,608,803	$237,555,765
2060	$274,673,276	$240,319,707
Average Annual Growth Rate	1.5%	1.2%
NPV (10%) in millions	$1,714	$1,656

Source: BST Associates

Under the improved canal alternatives, all coal transits the canal. This is based on relative cost economics which indicate that it is less expensive to use the canal than alternative routes using larger vessels. As indicated below, the advantage per ton is $2.71 (i.e. $13.10/ton via alternative routes and $10.39/ton via the Panama Canal) in 2020. This cost advantage increases to $3.66 per ton in 2060 with a 150,000 dwt Canal and $3.20 under the 200,000 and 250,000 dwt Canal alternatives.

Dredging Project Costs. The cost of improving various harbors and port terminals (for a variety of cargoes) to accommodate larger vessels is presented below. Specifically for coal, improvements would be expected in Norfolk and Mobile since these are major coal export ports. The cost of deepening these 2 harbors to 60 feet is estimated to be approximately $1.25 billion (i.e. $700 million in Hampton Roads and $550 million in Mobile) based upon recent construction and cost estimates.

In Hampton Roads (Norfolk Harbor), the cost of deepening from 45 to 50 feet cost approximately $50 million in 1989. The cost of deepening Norfolk Harbor to 65 feet was estimated to be approximately $1 billion in 1980. The additional cost in Norfolk was caused by clearing tunnel obstructions. However, the 1980 cost estimates were reported to be very conservative which can be seen by comparing the 1980 estimated cost to deepen to 51 feet (i.e., $215.5 million) as compared with the actual cost of approximately $50 million. It is estimated that deepening to 60 feet would cost $700 million.

Table 4.28

Recent Dredging Projects
Cost Estimates

Port	Project Depth	Cost Estimate ($ millions)
Norfolk Harbor & Channels [1]		
Existing Depth	45	
Feasibility Study Estimates (1980$)	47	$85.5
	51	$215.5
	55	$333.2
	65	$1,050.0
Actual 50 Foot Project (1989$)	50	$50.0
Mobile Project [2]		
Existing Depth (1992$)	45	$37.9
Construction Cost Estimate	55	$359.1
Corpus Christi Channel [3]		
Existing Depth	40	
1989 Construction Cost (1989$)	45	$93.9
Safe Harbor Planning Estimate (1993$)	74	$320.0
Freeport Channel [3]		
Existing Depth	38-40	
1993/4 Construction Cost (1993$)	45	$91.4
Houston Channel [3]		
Existing Depth	40	
Construction Estimate (1993$)	45	$450.0
Construction Estimate (1993$)	50	$680.0
Morehead City Channel [4]		
Existing Depth	40	
1993/4 Construction Cost (1993$)	45	$11.4
Oakland Project [5]		
Existing Depth	35	
1993 Construction Costs (1993$)	38	$5.7
Phase 2 project	42	$74.0
Tacoma [6]		
Blair/Sitcum Project		
Existing Depth	39 to 40	
Cost Estimate (1993$)	45 to 48	$13.0

Sources:

1. Norfolk District Corps of Engineers
2. Mobile District Corps of Engineers
3. Galveston District Corps of Engineers
4. Wilmington NC District Corps of Engineers
5. San Francisco District Corps of Engineers
6. Port of Tacoma

In Mobile, the channel was deepened from 40 to 45 feet in 1992 at a cost of approximately $37.9 million. The cost estimate to improve the channel to 55 feet was estimated to be $359 million. It is estimated that deepening to 60 feet would cost $550 million.

Corpus Christi recently improved its navigation channel from 40 to 45 feet at a cost of $93.9 million. Plans to dredge a safe harbor to 74 feet have been estimated at $320 million. The Freeport channel was recently deepened from 38-40 feet to 45 feet at a cost of $91.4 million. Houston channel projects have been estimated to cost $450 million (45 feet) and $680 million (50 feet). A large portion of this cost includes relocation of existing pipelines. Morehead City channel is being deepened from 40 to 45 feet at a cost of $11.4 million.

Benefits. Annual benefits (i.e., cost savings for larger coal vessels) start at $151.3 million per year in 2020 and increase to approximately $274.6 million in 2060 (150,000 dwt Canal) and $240.3 million in 2060 (200,000 to 250,000 dwt Canal). It is assumed that alternative Canal improvements would be available for use by 2020. The benefits of the Canal for the period 2020 to 2060 are estimated to be a net present value of approximately $1.7 billion in 1990 dollars under either alternative (see Table 4.27 which assumes a project life of 40 years and a discount rate of 10%).

Conclusions. The benefit/cost ratio is estimated to be 1.36 (i.e. $1.7 billion in benefits divided by $1,25 billion in costs). It should be emphasized that the benefit calculation only accounts for exports to Asia and other Panama Canal routes. For example, exports to Europe are very substantial. As a result, benefits from the deepening project would be much greater than $1.7 billion listed above.

Using U.S. Army Corps of Engineers criteria, water depth at major U.S. coal export terminals should not act to constrain full utilization by larger vessels that call the Canal. As a result, water depth at major U.S. coal ports is not expected to be a deterrent to Canal improvements.

Grain Terminals

Vessel Size and Port Water Depth. Grain exports are typically transported in smaller vessels (i.e. 55,000 dwt with a draft of 40 feet) due to the water depth constraints of exporting and importing elevators, the preferred shipment size of importers and the number of grades of grain in each vessel.

Water depth and shipping conditions are virtually identical in the Gulf and PNW grain export elevators at the present time (i.e. same size vessels at 53,000 to 55,000 dwt drawing the same water depth). However, over the study period, variations in water depth at major U.S. export facilities could shift cargoes from one region to another. For example, full utilization of Panamax vessels requires water depth of 42 to 43 feet. Currently, this vessel draft is restricted

in both the Columbia River (due to navigation channel limitations) and in the Gulf (due to both navigation channel limitations and the Panama Canal restrictions for grain exports to Asia).

Conclusions. If one export area is improved to handle larger vessels while the other is not, it could divert grain exports. Regarding potential diversions of grain exports from the PNW to the Gulf, the calculated transportation cost rates indicate that smaller vessels (i.e. 59,275 dwt) via the PNW are still less costly than relatively larger vessels using the Gulf (i.e. 68,475 dwt) by a factor of $4.10 per ton (i.e. $48.1 per ton via PNW versus $52.2 per ton via the Gulf). As a result, water depth variations are unlikely to shift cargo from the PNW to the Gulf. If the PNW is improved and the Gulf is not, more grain could be diverted to the PNW.

Container Terminals

Major Ports. U.S. container imports and exports are handled at a number of load center ports including Los Angeles, Long Beach, Oakland, Tacoma and Seattle on the West Coast; in the North Atlantic region, the major container ports include New York/New Jersey, Hampton Roads, Montreal, Baltimore and Halifax; in the South Atlantic region, the major container ports include Charleston, Savannah, Miami, Port Everglades and Jacksonville; and in the Gulf, Houston and New Orleans dominate container trade.

As described in the following figure, most container ports have existing water depth at the terminals of 40 feet or less. However, there are some notable exceptions. In the North Atlantic, Baltimore, Halifax, New York/New Jersey and Hampton Roads have terminals ranging in water depth from 41 feet to 45 feet. Virtually all South Atlantic and Gulf port terminals are constrained to 40 feet - the exception is Houston with 42 feet available at Barbours Cut. Most West Coast ports have facilities deeper than 40 feet ranging from 42 to 55 feet of depth. The only exceptions on the West Coast are Oakland and Portland both of which are studying navigation channel improvements to 42 feet at the present time.

According to RLA forecasts, with improved Panama Canal alternatives (i.e. 150,000 dwt Canal produces the same fleet distribution as 200,000 and 250,000 dwt Canal alternatives), more vessels in the 65,000 to 100,000 dwt range (i.e. 6,000 TEU capacity) would carry containers in 2020 between Asia and the East Coast and between Europe and the West Coast of North America. These vessels would have a required depth of approximately 45 feet plus underkeel clearance of at least 2 feet - total water depth at MLW and MLLW conditions of approximately 47 feet. Unlike tramp or tanker vessels (i.e. dry bulks and liquid bulks), container liner operations cannot afford to wait for tides to maximize water depth.

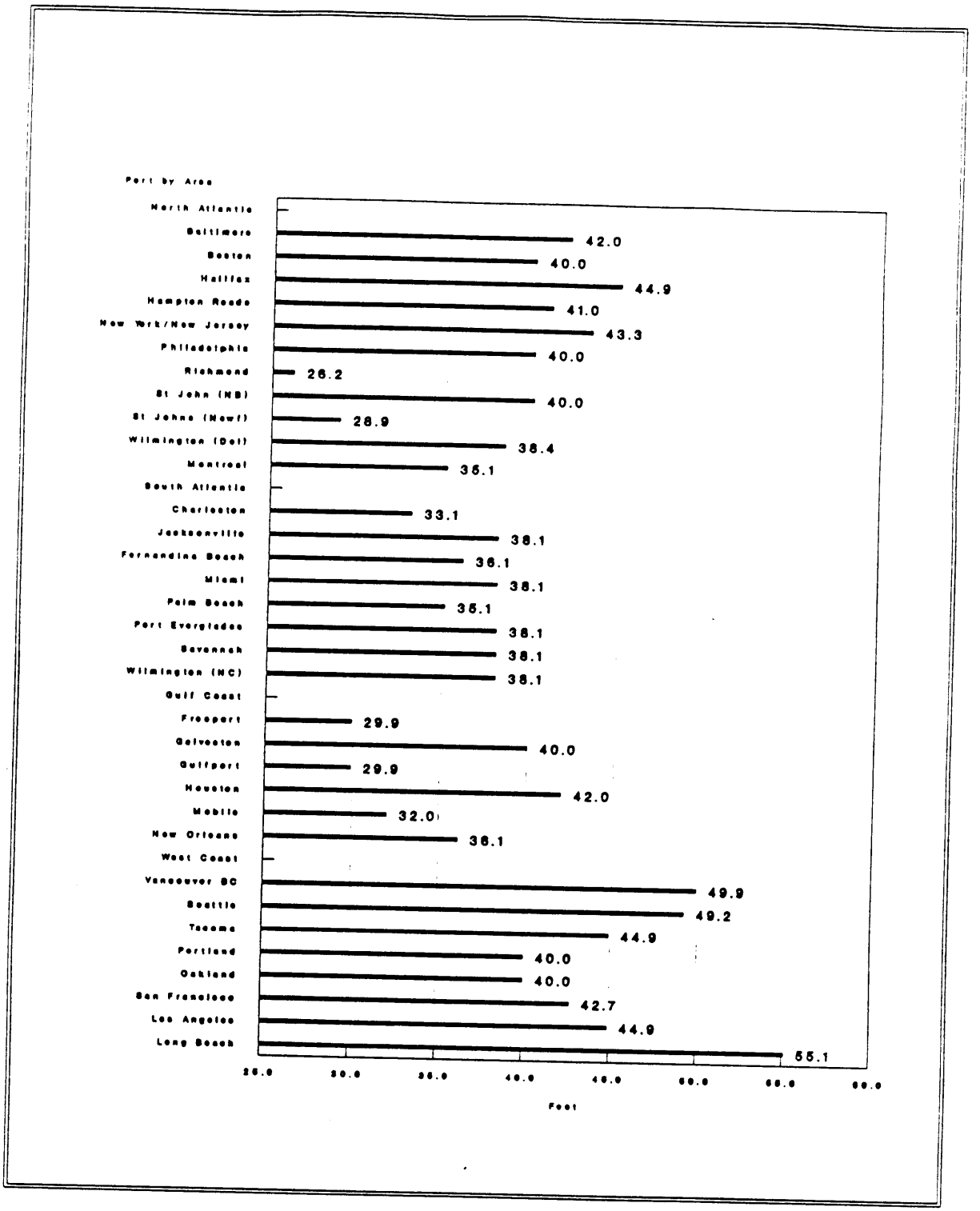


Figure 4.4
Container Terminal Maximum Reported Drafts
Source: BST Associates using Containerization Intl data

Table 4.29

Container Vessels Transits - 2020
Asia - U.S. East Coast

Year	Alternative	Origin	Destin	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Transits									
2020	Status Quo	Asia	USEC	0	80	490	0		570
		USEC	Asia		142	547			689
		sub-total		0	222	1,037	0	0	1,259
2020	150,000 +	Asia	USEC	0	46	316	152		514
		USEC	Asia		104	352	151		607
		sub-total		0	150	668	303	0	1,121
Cargo Tons (1,000s of metric tons)- Asia/USEC									
2020	Status Quo	Asia	USEC		1,050	8,662			9,713
		USEC	Asia		2,888	13,558			16,447
		sub-total		0	3,938	22,221	0	0	26,160
2020	150,000 +	Asia	USEC		609	5,580	5,022		11,213
		USEC	Asia		2,110	8,742	6,993		17,847
		sub-total		0	2,719	14,323	12,016	0	29,060
2020	Differences	Asia	USEC	0	-441	-3,081	5,022	0	1,500
		USEC	Asia	0	-777	-4,816	6,993	0	1,400
		sub-total		0	-1,219	-7,897	12,016	0	2,900
Costs/ton -Asia to USEC									
		All Water			289.67	285.07	266.18	260.14	
		Landbridge			279.67	276.03	260.36	255.16	
Benefits (Millions) from larger vessels for status quo cargo									
	Status Quo				1,141.0	6,334.6	0.0	0.0	7,475.6
	150,000 DWT				787.9	4,083.2	2,426.7	0.0	7,297.7
	Savings								177.8
Benefits (Millions) from diversion of landbridge *									
	150,000 DWT							0.6	0.6
Total Benefits (in millions)									**178.5**

Assumptions :

* Diversions compare 100,000 to 149,999 DWT vessel by all water with 65,000 to 99,999 DWT vessel on landbridge

Source: RLA, BST Associates

Table 4.30

Container Vessels Transits - 2020
Europe - U.S. West Coast

Year	Alternative	Origin	Destin	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Transits									
2020	Status Quo	USWC	Europe		114	57			171
		Europe	USWC		119	48			167
		sub-total		0	233	105	0	0	338
2020	150,000+	USWC	Europe		120	48	25		193
		Europe	USWC		97	29	19		145
		sub-total		0	217	77	44	0	338
Cargo Tons (1,000s of metric tons) - Europe/USWC									
2020	Status Quo	USWC	Europe		1,571	1,056			2,628
		Europe	USWC		1,514	1,220			2,735
		sub-total		0	3,085	2,277	0	0	5,363
2020	150,000 +	USWC	Europe		1,658	884	884		3,428
		Europe	USWC		1,232	737	884		2,855
		sub-total		0	2,891	1,622	1,769	0	6,283
		USWC	Europe	0	87	-172	884	0	800
		Europe	USWC	0	-281	-483	884	0	120
		sub-total		0	-194	-655	1,769	0	920
Cost/ton - Europe to USWC									
		All Water		NR	202.57	199.42	183.62	178.52	
		Landbridge		NR	216.51	214.11	202.01	199.16	
Benefits (Millions) from larger vessels for status quo cargo									
	Status Quo				625.1	454.1	0.0	0.0	1,079.2
	150,000 DWT				585.7	323.5	156.0	0.0	1,065.2
	Savings								14.0
Benefits (Millions) from diversion of landbridge *									
	150,000 DWT								21.6
Total Benefits (in millions)									35.6
Both Routes									**214.1**

Assumptions :

* Diversions compare 100,000 to 149,999 DWT vessel by all water with 65,000 to 99,999 DWT vessel on landbridge

Source: RLA, BST Associates

Table 4.31

Container Vessels Transits - 2060
Asia - U.S. East Coast

Year	Alternative	Origin	Destin	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Transits									
2060	Status Quo	Asia	USEC	0	55	472	0		527
		USEC	Asia		120	573			693
		sub-total		0	175	1,045	0	0	1,220
2060	150,000 +	Asia	USEC	0	24	252	128	60	464
		USEC	Asia		86	297	139	63	585
		sub-total		0	110	549	267	123	1,049
Cargo Tons (1,000s of metric tons) - Asia/USEC									
2060	Status Quo	Asia	USEC		798	9,722			10,521
		USEC	Asia		2,726	16,567			19,294
		sub-total		0	3,525	26,289	0	0	29,815
2060	150,000 +	Asia	USEC		354	5,196	4,222	3,247	13,020
		USEC	Asia		1,942	8,584	6,438	4,828	21,794
		sub-total		0	2,297	13,780	10,660	8,076	34,815
2060	Differences	Asia	USEC	0	-444	-4,525	4,222	3,247	2,499
		USEC	Asia	0	-784	-7,982	6,438	4,828	2,500
		sub-total		0	-1,228	-12,508	10,660	8,076	5,000
Cost/ton - Asia to USEC									
		All Water		NR	287.45	279.39	265.18	258.72	
		Landbridge		NR	278.58	270.86	259.93	251.59	
Benefits (Millions) from larger vessels for status quo cargo									
	Status Quo				1,013.5	7,344.9	0.0	0.0	8,358.4
	150,000 DWT				660.4	3,850.2	1,501.0	2,089.5	8,101.2
	Savings								257.3
Benefits (Millions) from diversion of landbridge *									
	150,000 DWT							6.0	6.0
Total Benefits (in millions)									263.3

Assumptions :
* Diversions compare 100,000 to 149,999 DWT vessel by all water with 65,000 to 99,999 DWT vessel on landbridge
Source: RLA, BST Associates

Table 4.32

Container Vessels Transits - 2060
Asia - U.S. East Coast

Year	Alternative	Origin	Destin	0 to 9,999	10,000 to 39,999	40,000 to 64,999	65,000 to 99,999	100,000 to 149,999	Total
Transits									
2060	Status Quo	USWC	Europe		108	56			164
		Europe	USWC		116	49			165
		sub-total		0	224	105	0	0	329
2060	150,000 +	USWC	Europe		115	47	34		196
		Europe	USWC		89	27	24		140
		sub-total		0	204	74	58	0	336
Cargo Tons (1,000s of metric tons) - Asia/USEC									
2060	Status Quo	USWC	Europe		1,531	1,203			2,735
		Europe	USWC		1,525	1,437			2,963
		sub-total		0	3,056	2,641	0	0	5,698
2060	150,000 +	USWC	Europe		1,652	1,007	1,175		3,835
		Europe	USWC		1,192	804	1,125		3,122
		sub-total		0	2,845	1,811	2,301	0	6,957
	Difference	USWC	Europe	0	121	-196	1,175	0	1,100
		Europe	USWC	0	-332	-633	1,125	0	159
		sub-total		0	-211	-829	2,301	0	1,259
Rates - Europe to USWC									
		All Water		NR	200.88	193.50	182.27	177.62	
		Landbridge		NR	216.16	211.06	202.51	198.36	
Benefits (Millions) from larger vessels for status quo cargo									
	Status Quo				614.0	511.2	0.0	0.0	1,125.1
	150,000 DWT				571.5	350.6	189.8	0.0	1,111.9
	Savings								13.3
Benefits (Millions) from diversion of landbridge *									
	150,000 DWT							31.4	31.4
Total Benefits (in millions)									
									44.6
Both Routes									**307.9**

Assumptions :

* Diversions compare 100,000 to 149,999 DWT vessel by all water with 65,000 to 99,999 DWT vessel on landbridge

Source: RLA, BST Associates

Table 4.33

Net Present Value
Larger Container Vessels

Year	Million $ Annual Savings
2020	214.1
2021	216.1
2022	218.0
to	to
2058	302.4
2059	305.2
2060	307.9
Average Annual Growth Rate	0.9%
NPV (10%) in millions	2,287.5

Source: BST Associates

This would require harbor deepening projects in several port areas. By 2060, RLA forecasts vessels in 100,000 to 149,999 dwt range (i.e. 9,000 TEU capacity). There are currently no such vessels on the drawing board, so the ultimate draft requirements are not known. However, RLA estimates that these vessels would require between 50 and 55 feet of water depth. Few ports currently have the capability of handling these vessels.

As shown in Table 4.28 above, the cost of deepening Norfolk Harbor to 55 feet was estimated to cost $333 million. The Oakland Inner Harbor was deepened from 35 to 38 feet in 1993 at a cost of $5.7 million. Plans to further deepen the Inner Harbor and portions of the Outer Harbor to 50 feet are expected to cost $74 million.

In Tacoma, a deepening project in the Blair/Sitcum waterways to 45 to 48 feet is underway. The cost of dredging (including extensive environmental mitigation) is anticipated to cost $13 million.

Benefits. The benefits of improving container ports for deeper draft vessels on Panama Canal trade routes are significant - $214.1 million in 2020 increasing to $307.9 million in 2060. The net present value of the improvements is $2.3 billion. Benefits are calculated separately for using larger vessels to carry status quo Canal cargo and for shifted cargo from landbridge to all-water Canal routes. Most of the benefit accrues from the Asia to U.S. East Coast route due to its relatively larger size and higher value of cargo compared with the Europe to West Coast route.

This estimate is also limited to Panama Canal trade routes and thus substantially underestimates the full benefits of deeper draft for container vessels. In addition, other cargoes may also benefit from deeper draft vessels at improved ports.

Conclusions. West Coast ports appear capable of handling additional draft requirements with the least required dredging. East Coast and Gulf Coast ports would need the largest improvement. However, because of their size, fewer transits are required by larger vessels. As a result, the introduction of larger vessels will occur at selected ports where the benefit to cost ratio is the largest. On the East and Gulf Coast, this could include Baltimore, Halifax, Hampton Roads, Mobile, Corpus Christi and other ports where water depth is deepest. This event could shift some cargo from larger ports to relatively smaller that can acquire needed depths.

The cost of deepening container harbors to meet these increased water depths (excluding Hampton Roads and Mobile which are addressed above) is not currently known. However, increasing selected ports to a water depth to 50 feet is not expected to be a constraint to container port development.

4.6 Inland Transportation

Inland transportation capability which is the final potential constraint to landbridge cargo movements is examined below. Specifically, the report addresses capacity and operating constraints that may impact the rail system due to cumulative increases in export and import traffic.

Rail Cargo Historical Trends. The traffic and commodity projections forecast for the Panama Canal under this study are extremely long term (i.e. 1990 to 2060). It is important that the assessment of railroad traffic historical trends be accomplished at a sufficiently distant historical range to allow relevant conclusions on future rail traffic trends.

The American Association of Railroads prepares an annual compilation of historical trends that illustrate the development of rail freight markets over the long run. The following trends are especially pertinent in exploring what the railroads have accomplished :

- originated tonnage of all commodities (1929 through 1990),
- movement of containers and trailers (1965 to 1990),
- tonnage by major commodity for the 1980s,
- freight car miles by train type for the 1980s

- loaded utilization of major railcars for the 1980s
- average number of freight car trips per year for the 1980s
- average tons per car for the 1980s

Originated Tonnage of All Commodities. Tonnage originating on U.S. railroads has increased very modestly during the past 60 years. Between 1929 and 1990, tonnage increased from 1.3 billion tons to 1.4 billion tons or at an average annual rate of growth of 0.1%. The high load factor was registered in 1947 when war time activities increased the load factor to 1.5 billion tons.

During the 1980s, tonnage fluctuated between 1.2 billion and 1.4 billion tons. Average annual growth during this period was negative (- 0.2%). The general decline of rail traffic throughout the historical period related mainly to improvements in other modes.

The completion of the Interstate highway system gave a substantial advantage to the trucking system, especially for inter-city and inter-state traffic. Rail still finds it difficult to outcompete truck movements for distances of less than 500 miles.

Likewise, the completion of the waterway system created a substantial cost reduction for bulk commodities such as coal, grain, chemicals, petroleum products and other general bulk commodities. Completion of vast pipeline systems in producing regions also lowered the cost of transporting liquid bulk petroleum products, natural gas and crude oil.

In addition, the freight basis of the North American rail system has undergone significant change as industries have changed. For example, many of the traditional industries that provided a substantial percentage of the railroad's traffic have been downsized due to obsolescence, resource constraints, environmental concerns and shifts in trading patterns.

Eastern railroad traffic (which includes all major carriers east of the Mississippi River) have fallen from 872 million tons in 1929 to approximately 750 million tons in the late 1980s. These railroads have experienced minimal growth. Tonnage consistently disappeared for both the long and short hauls on Eastern railroads.

Western railroads have increased from 466 million tons in 1929 to 677 million tons in 1990. Over the entire 1929 to 1990 time period, traffic increased at 0.6% per year. However, during the decade of the 1980s, traffic grew much slower at only 0.2% per year. There has been a very uneven pattern of development as some commodities decreased and others increased (examined below).

Table 4.34

Originated Tonnage
(1,000 short tons)

Year	United States	East	West
1929	1,339,091	872,186	466,905
1939	901,669	604,396	297,273
1944	1,491,491	963,561	527,930
1947	1,537,546	1,005,498	532,048
1955	1,396,339	877,935	518,404
1960	1,240,654	762,673	477,981
1965	1,387,423	875,765	511,658
1970	1,484,919	909,135	575,784
1975	1,395,055	816,279	578,776
1980	1,492,414	806,296	686,118
1981	1,453,022	784,899	668,123
1982	1,268,645	694,583	574,062
1983	1,292,607	694,940	597,667
1984	1,429,388	759,955	669,433
1985	1,319,794	723,250	596,544
1986	1,305,839	719,313	586,526
1987	1,372,262	745,636	626,626
1988	1,429,510	745,584	683,926
1989	1,402,621	742,409	660,212
1990	1,424,880	746,984	677,896
Annual Average Growth			
(1929-1990)	0.1%	-0.3%	0.6%
(1955-1990)	0.1%	-0.5%	0.8%
(1981-1990)	-0.2%	-0.5%	0.2%

Source: Association of American Railroads (AAR) Railroad Facts 1991 Edition

Movement of Containers and Trailers. One of the most consistent positive performers has been the development of TOFC/COFC traffic (i.e. trailers on flat car and containers on flat car). First introduced in the 1960s, TOFC/COFC traffic increased from 1.6 million units in 1965 to 6.2 million units in 1990 (preliminary estimate by the AAR).

Average annual growth registered 5.4% per year from 1965 to 1990. However, during the 1980s growth increased to 7.8% on an average annual basis. Much of this freight was related to imports and exports.

Western railroads have dominated the intermodal business primarily due to the demand by international steamship lines serving the West coast. The top four intermodal carriers (i.e. both containers and trailers) are western railroads led by Sante Fe with a 14.8% market share.

Table 4.35

Trailers and Containers

Year	Total
1965	1,664,929
1970	2,363,200
1975	2,238,117
1980	3,059,402
1981	3,150,522
1982	3,396,973
1983	4,090,078
1984	4,565,743
1985	4,590,952
1986	4,997,229
1987	5,503,819
1988	5,779,547
1989	5,987,355
1990	6,206,782
Annual Growth 1965 to 1990	5.4%
Annual Growth 1981 to 1990	7.8%

Source: Association of American Railroads (AAR) Railroad Facts 1991 Edition

However, there are some dramatic changes occurring in this market. Trailers are used almost exclusively in domestic service - that is traffic from one U.S. point to another U.S. point that does not include waterborne carriage.

Santa Fe dominates the trailer business followed by Conrail and Union Pacific Railroad (UPRR). The overall trend has been for railroads to leave the trailer business and build up the container business because doublestack service offers greatly reduced shipping costs when fully utilized. Doublestack railcars have five platforms which are able to carry two 40 foot long containers, one on the bottom and one stacked on top of each platform. Overall trailer usage fell 7% in 1991 but, for example, BNRR fell 26% indicating this firm's focus on the container business. These trends are further explored below.

Tonnage by Major Commodity. Other rail traffic has not fared as well. On a carload basis, other rail traffic has fallen 1.3% on an average annual basis from 1981 to 1990.

Rail traffic has generally ranged from 15.8 million to 18.7 million carloads with significant fluctuations on a year to year basis.

However, only 4 out of 13 products have shown growth.

Farm products (i.e. grain) ranged from 1.6 to 1.9 million carloads or at an average annual rate of 0.4%. Coal increased at an average annual rate of 0.1% per year from 1981 to 1990 but consistently ranged from 5.2 to 5.9 million carloads.

Table 4.36

Carloadings by Major - Commodity Group
(Thousands of Carloads Originated)

STCC	Commodity	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1981 to 1990
1	Farm Products	1,637	1,566	1,642	1,757	1,494	1,602	1,907	1,977	1,781	1,690	0.4%
10	MetallicOres	1,355	761	812	1,001	511	508	494	582	523	508	-10.3%
11	Coal	5,835	5,718	5,276	6,061	5,684	5,433	5,430	5,621	5,672	5,912	0.1%
14	NonmetallicMinerals	1,272	958	1,079	1,204	1,196	1,113	1,188	1,290	1,254	1,202	-0.6%
20	Food & Kindred Products	1,557	1,391	1,316	1,234	1,224	1,276	1,326	1,318	1,284	1,307	-1.9%
24	Lumber &Wood Products	1,254	1,002	1,075	1,051	948	965	986	910	843	780	-5.1%
26	Pulp, Paper & Allied Products	899	765	746	741	703	672	661	646	615	611	-4.2%
28	Chemicals & Allied Products	1,322	1,120	1,216	1,312	1,296	1,287	1,410	1,485	1,486	1,531	1.6%
29	Petroleum & Coal Products	607	467	495	529	492	477	520	568	561	573	-0.6%
32	Stone, Clay & Glass Products	690	516	543	576	551	530	560	577	565	539	-2.7%
33	Primary Metal Products	760	459	440	487	450	389	428	479	452	477	-5.0%
37	Transportation Equipment	939	801	954	1,141	1,202	1,148	1,085	1,160	1,141	1,091	1.7%
40	Waste and Scrap Material	610	409	417	480	429	402	440	471	444	439	-3.6%
	Total	18,737	15,933	16,011	17,574	16,180	15,802	16,435	17,084	16,621	16,660	-1.3%

Source: AAR - "Freight Commodity Statistics"

Chemicals increased at 1.4% per year on an average basis during this decade. Transportation equipment (i.e. autos and parts) increased 1.7% per year on average.

However, metallic ores, lumber and wood products, pulp, paper and allied products, and primary metal products all fell more than 5% per year during the decade.

Several trends during the decade of the 1980s also illustrate the railroads efforts to streamline and rationalize the freight traffic : greater use of unit trains, increases in average trips per year and increases in average tons per car.

Freight Car Miles by Train Type. First, railroads have made much greater use of dedicated unit trains for coal, grain, autos, containers and other high volume cargoes.

Table 4.37

Freight Car-miles by Train Type
(Millions of Car-Miles)

Year	Total Freight	Unit Train	Way Train	Thru Train
1981	27,968	3,722	2,136	22,110
1982	23,951	3,439	1,902	18,511
1983	24,358	3,618	2,036	18,705
1984	26,409	4,353	2,589	19,467
1985	24,920	4,201	1,779	18,940
1986	24,414	4,834	1,513	18,067
1987	25,627	5,457	1,834	18,336
1988	26,339	6,008	1,382	18,950
1989	26,196	6,357	1,215	18,624
1990	26,159	6,463	1,167	18,530
Annual Growth 1981 to 1990	-0.7%	6.3%	-6.5%	-1.9%

Total car-miles data were revised, but intermediate detail was not provided; therefore the Total column does not equal the sum of the Unit, Way and Thru columns.

The use of unit trains increased 6.3% per year on average in terms of millions of car miles from 1981 to 1990. At the same time, way trains and thru trains have decreased in number. Unit trains offer significant improvements to both railroad financial performance and customer satisfaction.

Average Number of Freight Car Trips Per Year. In addition, railroads have found a way to increase the utilization rates and turnaround times of all types of railcars. Overall, the average number of freight car trips per year increased from 15.1 in 1981 to 20.5 in 1990. Improved utilization occurred in all car types but was largest in flatcars, gondolas and open top hoppers. Improved traffic systems and mainline productivity will continue to improve car utilization.

Average Tons Per Car. With few exceptions, the average tons carried per car also increased. Notable exceptions were refrigerated cars and multi-level flat cars. Technological improvements increased loading of equipped gondolas from 88 tons in 1981 to 95 tons in 1991; covered hoppers from 94 to 98 tons and TOFC/COFC flat cars from 74 tons to 89 tons over the time period.

In the near future, provision of aluminum alloy cars will increase loadings of grain, coal and other bulks by 5 to 10 tons per car. This will further reduce the number of cars required to transport the same tonnage.

Table 4.38

Average Number of Freight Car Trips per Year

Year	Box Cars	Covered Hoppers	Refrig-erators	Gondolas	Open Top Hoppers	Flats	Tanks	All Cars
1981	9.7	11.8	8.9	17.8	25.3	21.0	7.3	15.1
1982	8.2	10.7	7.7	14.8	21.7	22.0	6.5	13.6
1983	8.8	11.9	7.4	16.2	21.7	26.6	7.0	14.7
1984	9.1	12.0	7.0	18.0	24.8	29.2	7.3	16.0
1985	9.4	11.1	7.0	19.1	24.8	30.9	7.4	16.2
1986	10.2	12.0	7.6	20.4	27.7	33.8	7.9	17.5
1987	11.3	14.4	8.9	22.8	30.2	36.1	8.7	19.4
1988	10.8	14.5	9.0	24.9	30.5	39.4	8.6	21.5
1989	10.3	13.5	9.2	26.1	32.0	37.2	8.3	19.8
1990	10.4	13.5	9.9	27.9	33.8	37.2	8.5	20.5
Annual Growth 1981 to 1990								
	0.8%	1.5%	1.2%	5.1%	3.3%	6.6%	1.7%	3.5%

Source: AAR - "Average Trips per Year"

Table 4.39

Average Tons Per Car

Car Types	1981	1982	1983	1984	1985	1986	1987	1988	1989	1991	Annual Growth 81/90
Box Cars											
Plain 40 FT	55	55	56	58	63	55	55	55	55	56	0.2%
Plain 50 FT	72	74	73	74	75	76	77	77	77	77	0.7%
Equipped	71	72	72	73	74	74	74	74	76	76	0.8%
Gondolas											
Plain	83	84	84	85	86	87	88	88	91	91	1.0%
Equipped	88	89	91	91	91	92	93	93	94	95	0.9%
Covered Hoppers	94	95	95	96	96	97	97	98	98	98	0.5%
Open Top Hoppers											
General Service	88	88	89	90	92	93	95	96	97	97	1.1%
Special Service	83	83	83	84	86	87	87	87	87	88	0.7%
Refrigerators											
Mechanical	67	67	67	66	66	67	66	66	66	66	-0.2%
Non-Mechanical	72	72	72	72	72	73	73	73	76	77	0.7%
Flat Cars - TOFC/COFC	74	74	72	66	64	63	65	70	75	89	2.1%
Multi-Level	50	46	46	45	40	42	42	40	38	38	-3.0%
General Service	69	70	71	71	71	72	73	69	73	74	0.8%
All Other	80	80	80	81	81	83	83	83	83	83	0.4%
Total	81	82	82	83	84	86	87	87	88	88	0.9%

Source: AAR

Covered hoppers (grain cars) remained stable. Growth in flat car loadings was 4.9% per year on average even taking into account the utilization of much more efficient equipment.

Overall, total carloadings fell from 14.6 million in 1980 to 12.7 million in 1990.

On a tonnage basis, the decline of non-TOFC/COFC freight averaged a negative 1.3% per year overall. Tonnage declines were registered for metallic ores, nonmetallic mineral, food & kindred products, lumber & wood products, pulp, paper and allied products, stone, clay & glass products, primary metal products and waste and scrap material.

Loaded Utilization of Major Railcars. Consistent with these trends, the types of railcar that carry lumber, pulp and other declining cargoes fell precipitously. Boxcar loadings decreased from 3.8 million to 1.6 million loads. Reefer cars fell from 1.0 million loadings to 0.5 million loadings. Tank cars, open top hoppers, gondolas and other miscellaneous car loads also fell.

Continued improvements to railroad productivity will likely occur as a result of :

- Technological improvements which allow greater loading per car
- Growth in utilization of unit trains which also improves mainline productivity
- Improvements to traffic control systems allowing more trains to use the system
- Faster speeds on mainline systems
- Improvements to tunnel ventilation systems and better access for higher profile cars (i.e. doublestack rail cars) to allow more efficient trains to use the rail system among other potential improvements

Growth of railroad mainline traffic will continue to focus on movements of TOFC/COFC, grain, coal, chemicals and autos on high volume mainline corridors. Much of this traffic moves as waterborne imports and exports.

Declines will continue to register in boxcar traffic, refrigerated car traffic and other speciality traffic. Railroads will continue to abandon lower density rail lines.

The net impact of these changes will be a minimal overall growth in total rail freight traffic. Increases in container, grain and other growth (mainly waterborne imports and exports) cargoes may be virtually offset by decreases in other traffic (i.e. most forms of domestic non containerized traffic). This will have significant impacts on overall mainline traffic utilization and congestion which is discussed in greater detail below.

Table 4.40
Loaded Freight Car-miles by Car type

Year	Box Cars	Covered Hoppers	Refrig-erators	Gondolas	Open Top Hoppers	Flats	Tanks	All Others	All Cars
1980	3,852,387	2,228,468	1,022,212	915,618	2,210,646	3,173,099	942,113	317,624	14,662,167
1981	3,347,777	1,961,203	876,095	817,481	2,251,397	3,222,146	917,939	359,675	13,753,713
1982	2,536,225	1,706,699	660,638	538,768	1,876,293	3,329,361	810,991	290,846	11,749,821
1983	2,426,073	1,868,584	571,148	471,738	1,749,941	4,068,655	850,402	181,945	12,188,486
1984	2,365,295	1,946,546	530,497	585,378	2,045,534	4,715,611	869,952	188,640	13,247,453
1985	2,172,266	1,684,535	479,273	512,079	1,935,928	4,624,129	838,612	188,353	12,435,175
1986	2,099,919	1,766,185	462,868	497,595	1,754,685	4,594,051	832,159	151,268	12,158,730
1987	2,039,320	1,897,487	485,662	604,900	1,905,441	4,954,063	909,885	136,337	12,933,095
1988	1,925,525	2,005,214	454,254	738,075	1,933,401	5,217,570	901,550	144,638	13,320,227
1989	1,807,891	1,979,085	449,582	688,539	1,886,283	5,175,666	856,309	183,259	13,026,614
1990	1,628,773	1,957,360	506,873	760,680	1,946,846	4,948,154	823,499	170,402	12,742,587
Annual Growth 1981 to 1990									
	-7.7%	0.0%	-5.9%	-0.8%	-1.6%	4.9%	-1.2%	-8.0%	-0.8%

Note: Excludes non-revenue car-miles.

Important Rail Commodities. In general terms, the western rail systems are relatively underutilized compared to eastern railroads in terms of freight density. As the map on the following page illustrates, the freight densities at major west coast load centers (i.e. Puget Sound, Columbia River, San Francisco Bay and San Pedro Bay) are less dense than other areas of the country. The question of whether mini- and micro-landbridge cargoes will reach capacity specifically focuses on western railroad systems because the great majority of international cargo originates in or is destined for Asian countries.

Rail traffic moving on western railroads is dominated by five main commodity groups: coal, chemicals, grain, and automobiles which together account for more than 60% of non-TOFC/COFC traffic. In addition, containers (not shown in the following table) are an important element of the western U.S. railroad traffic base. Together, these five commodities account for the great majority of western railroad growth.

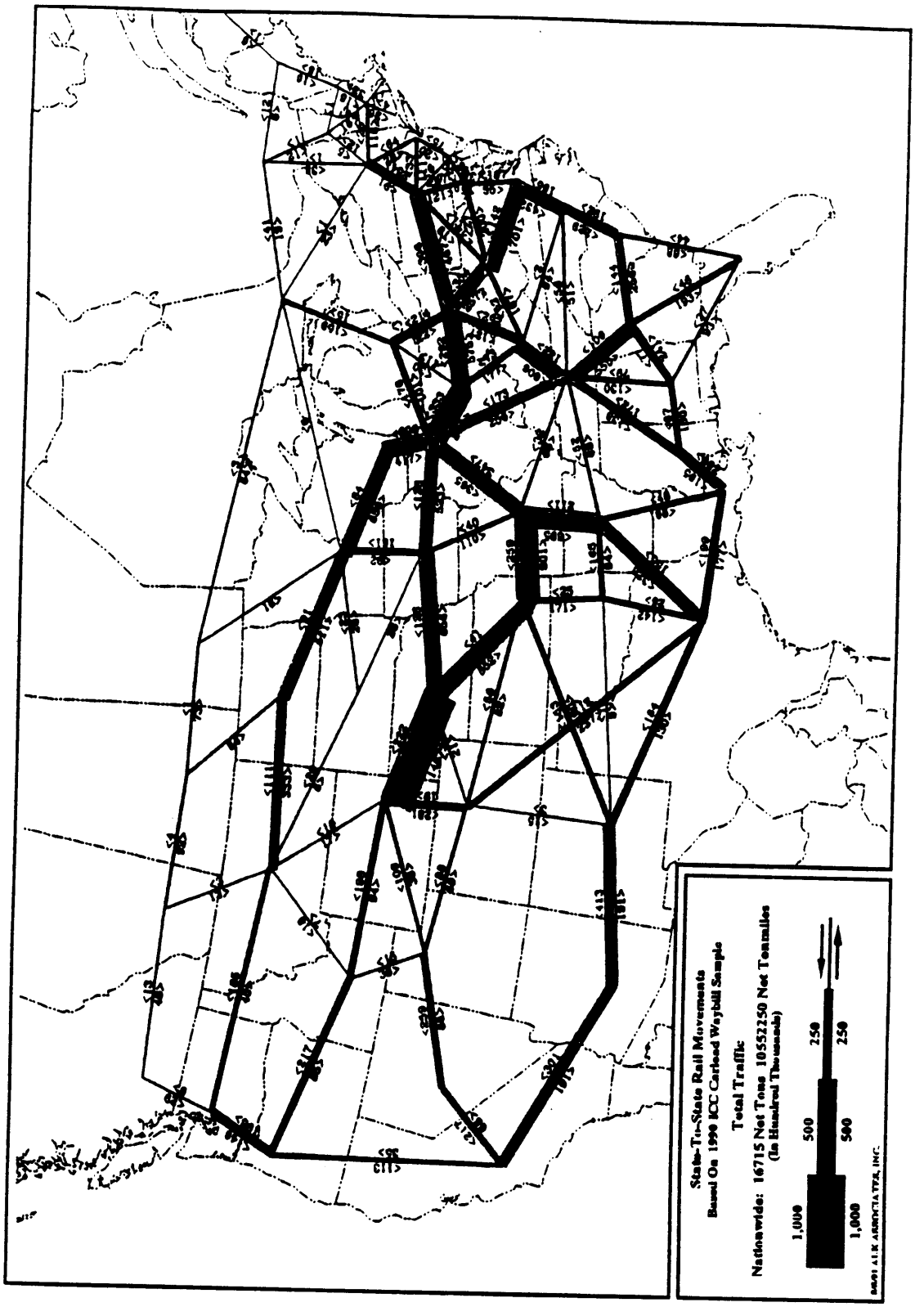
The Western railroads originated slightly more than 6 million carloads in 1990 and received an additional 2.6 million carloads for total carriage of 8.7 million cars.

Table 4.41

1990 Carload Traffic
Western U.S. Mainlines (BN, UP, SP, SF)

	COMMODITY	ORIGINATED		RECEIVED		TOTAL	
1	COAL	1,929,483	31.8%	999,339	37.5%	2,928,822	33.5%
3	CHEMICALS	770,114	12.7%	248,978	9.3%	1,019,092	11.7%
2	GRAIN	778,951	12.8%	90,609	3.4%	869,560	10.0%
9	MOTOR VEHICLES & EQUIPMENT	163,052	2.7%	322,366	12.1%	485,418	5.6%
4	FOOD & KINDRED PRODUCTS	270,669	4.5%	108,066	4.1%	378,735	4.3%
10	PULP, PAPER & ALLIED PRODUCTS	155,802	2.6%	179,322	6.7%	335,124	3.8%
5	CRUSHED STONE, SAND & GRAVEL	254,380	4.2%	77,054	2.9%	331,434	3.8%
7	STONE, CLAY & GLASS PRODUCTS	211,333	3.5%	74,720	2.8%	286,053	3.3%
11	METALS & PRODUCTS	146,213	2.4%	117,394	4.4%	263,607	3.0%
6	METALLIC ORES	217,722	3.6%	45,807	1.7%	263,529	3.0%
8	GRAIN MILL PRODUCTS	173,645	2.9%	58,775	2.2%	232,420	2.7%
12	ALL OTHER CARLOADS	144,358	2.4%	75,574	2.8%	219,932	2.5%
13	PETROLEUM PRODUCTS	143,972	2.4%	66,415	2.5%	210,387	2.4%
14	LUMBER & WOOD PRODUCTS	141,322	2.3%	49,301	1.8%	190,623	2.2%
	TOTAL	6,068,052	100.0%	2,666,539	100.0%	8,734,591	100.0%

Source: Association of American Railroads


State-To-State Rail Movements
Based On 1990 ICC Carload Waybill Sample
Total Traffic
Nationwide: 16715 Net Tons 10552250 Net Tonmiles
(In Hundred Thousands)
1,000
500
250
250
500
1,000

Coal. Coal is the single most important commodity carried by the Class I railroads, accounting for 40.7% of tonnage originated, 33.5% of carloads, and 23.4% of revenues.

Table 4.42

1991 Coal Movements by Western Class I Railroads
(Thousands of Short Tons)

Carrier	Originated	Received	Total
Burlington Northern	136,043.0	8,602.0	144,645.0
Union Pacific	29,166.6	63,704.1	92,870.7
Southern Pacific	15,655.7	79.5	15,735.2
Santa Fe	8,538.1	19,475.7	28,013.8
Total	189,403.4	91,861.3	281,264.7

Source: BST Associates, Fieldston Coal Transportation Manual

In the west, coal is mainly transported to domestic power plants with an eastbound movement, while in western Canada most coal transported by rail is destined for export with a westbound movement. As identified in a previous section, the only U.S. coal export facility on the West Coast is located in Los Angeles, which in 1990 only shipped 1,935,812 short tons of coal. As can be seen in the following table, the U.S. West Coast ports are not major players in the coal export business.

The map on the following page graphically illustrates coal movements by U.S. railroads. The vast majority of coal movements in the west originate in the Powder River Basin of Wyoming and Montana and terminate at midwest utilities. With the passage of the clean air act these shipments of low-sulphur coal will continue to increase.

However, these shipments should not greatly impact the capacity of the major transcontinental rail lines because most of the impacted mainline is double track which increases capacity substantially.

Rail market share of coal movements has been consistently 56% to 59% of total. Barge movements of coal which represent approximately 17% of total market occur mainly along the Mississippi River system, to Mobile Bay and along the Eastern seaboard. Recently slurry pipelines have gained market share increasing from 9% in 1980 to 13% in 1989.

As can be seen in the following table, CSX dominates coal shipments by Class I railroads followed distantly by BNRR and Norfolk Southern. BNRR's shipments move east from the Powder River basin. UPRR does not originate much coal but does receive substantial volumes from Chicago and North Western.

Table 4.43

Modal Market Shares - Coal - 1980-1989
(Thousands of Short Tons)

Year	US Total	Railroad Tons	Water Carrier Percent	Water Carrier Tons	Motor Carrier Percent	Motor Carrier Tons	Tramway, Conveyor & Slurry Pipeline Percent	Tramway, Conveyor & Slurry Pipeline Tons	Other Percent	Other Tons	Other Percent
1980	725,932	417,001	57.4	140,928	19.4	100,567	13.9	65,562	9.0	1875	0.3
1981	709,501	420,920	59.3	121,054	16.9	103,736	14.6	61,973	8.7	1819	0.3
1982	709,647	421,471	59.4	116,948	16.5	99,886	14.1	69,618	9.8	1725	0.2
1983	707,802	415,773	58.7	112,983	16.0	99,626	14.1	77,484	10.9	1935	0.3
1984	808,386	469,702	58.1	139,186	17.2	111,263	13.8	85,184	10.5	3051	0.4
1985	788,534	460,483	58.4	129,885	16.5	102,400	13.0	92,698	11.8	3069	0.4
1986	804,353	457,994	56.9	137,015	17.0	103,295	12.8	101,981	12.7	4069	0.5
1987	842,478	480,729	57.1	141,568	16.8	105,354	12.5	110,586	13.1	4241	0.5
1988	853,930	491,041	57.5	137,025	16.0	104,821	12.3	115,907	13.6	5136	0.6
1989	882,034	501,275	56.8	147,885	16.8	112,477	12.7	113,376	12.9	7021	0.8

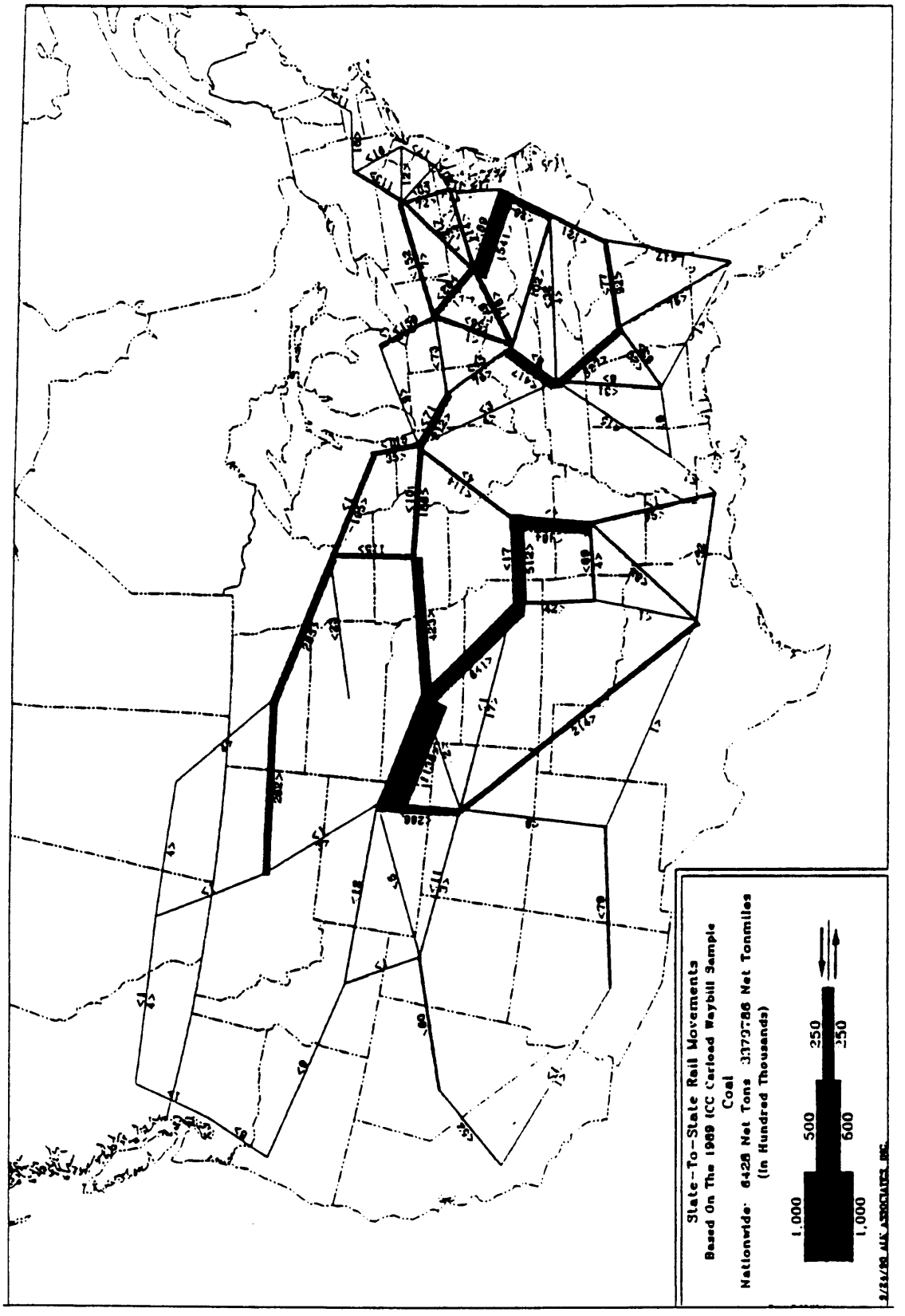
Source: Energy Information Administration, *Coal Distribution*

Table 4.44

CUMULATIVE CARLOADS BY RAILROAD : COAL
52 WEEKS ENDING DECEMBER 28, 1991
CLASS I RAILROADS

RAILROAD	ORIGINATED 1991	ORIGINATED 1990		RECEIVED 1991	RECEIVED 1990		TOTAL 1991	TOTAL 1990	
EAST									
Conrail	363,626	396,208	-8.2	374,785	362,005	3.5	738,411	758,213	-2.6
CSX Transportation	1,735,284	1,871,274	-7.3	73,466	72,258	1.7	1,808,750	1,943,532	-6.9
Grand Trunk Western	106	387	-72.6	75,505	77,613	-2.7	75,611	78,000	-3.1
Illinois Central	216,530	201,189	7.6	11,343	16,368	-30.7	227,873	217,557	4.7
Norfolk Southern	1,211,844	1,299,889	-6.8	67,306	70,077	4.0	1,279,150	1,369,966	-6.6
East Subtotal	3,527,457	3,768,948	-6.4	-	-	-			
WEST									
Atchison, Topeka & Santa Fe	100,673	94,680	6.3	203,129	197,148	3.0	303,802	291,828	4.1
Burlington Northern	1,394,615	1,380,604	1.0	52,025	59,480	-12.5	1,446,640	1,440,084	0.5
Chicago & North Western	587,231	500,963	17.2	69,145	70,587	-2.0	656,376	571,550	14.8
Kansas City Southern	18,574	21,684	-14.3	139,344	139,173	0.1	157,918	160,857	-1.8
Soo Line	83,672	75,222	11.2	70,894	62,283	13.8	154,566	137,505	12.4
Southern Pacific	188,342	181,816	3.6	16,131	17,017	-5.2	204,473	198,833	2.8
Union Pacific	236,565	272,383	-13.1	822,513	725,694	13.3	1,059,078	998,077	6.1
West Subtotal	2,609,672	2,527,352	3.3	-	-	-			

Source: AAR


State-To-State Rail Movements
Based On The 1989 ICC Carload Waybill Sample
Coal
Nationwide: 6428 Net Tons 3179786 Net Tonmiles
(In Hundred Thousands)
1,000
500
250
250
600
1,000

Chemicals. Chemicals represent a large share of UPRR's traffic base. UPRR is approximately as large as CSX Transportation with both handling approximately 450,000 carloads.

Rail market share of chemicals decreased by 31% relative to other modes during the 1980s. Chemical movements are primarily north and south movements from the Gulf due to the location of the petroleum chemical industrial base in the greater Houston and New Orleans areas. [See following figure]

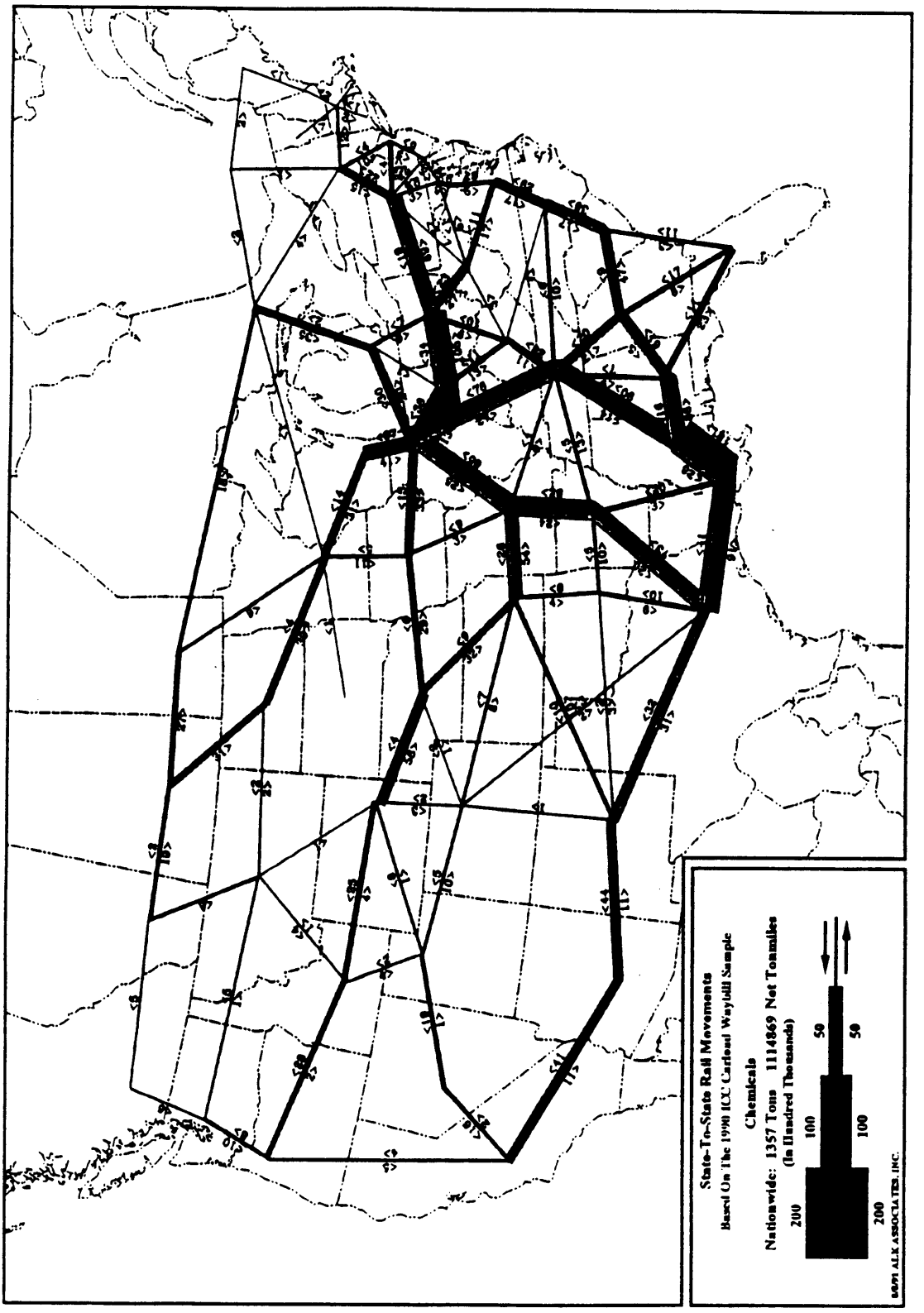
Very little chemical traffic moves east-west on western railroads. As a result, carriage of chemicals does not impede the capacity of western railroads.

Table 4.45

CUMULATIVE CARLOADS BY RAILROAD - CHEMICALS
52 WEEKS ENDING DECEMBER 28, 1991
CLASS I RAILROADS

RAILROAD	ORIGINATED 1991	ORIGINATED 1990		RECEIVED 1991	RECEIVED 1990		TOTAL 1991	TOTAL 1990	
EAST									
Conrail	71,808	76,536	-6.2	129,521	131,401	-1.4	201,329	207,937	-3.2
CSX Transportation	291,968	298,640	-2.2	158,920	165,243	-3.8	450,888	463,883	-2.8
Florida East Coast	211	124	70.2	3,815	3,912	-2.5	4,026	4,036	-0.2
Grand Trunk Western	3,014	3,418	-11.8	20,975	20,025	4.7	23,989	23,443	2.3
Illinois Central	75,493	77,982	-3.2	47,662	54,859	-13.1	123,155	132,841	-7.3
Norfolk Southern	102,274	105,999	-3.5	134,975	138,403	-2.5	237,249	244,402	-2.9
East Subtotal	544,768	562,699	-3.2	-	-	-			
WEST									
Atchison, Topeka & Santa Fe	120,007	124,135	-3.3	33,799	34,273	-1.4	153,806	158,408	-2.9
Burlington Northern	91,737	88,351	3.8	78,712	76,589	2.8	170,449	164,940	3.3
Chicago & North Western	27,958	27,381	2.1	56,192	56,821	-1.1	84,150	84,202	-0.1
Kansas City Southern	45,259	44,105	2.6	19,184	20,054	4.3	64,443	64,159	0.4
Soo Line	10,018	10,618	-5.7	73,037	71,119	2.7	83,055	81,737	1.6
Southern Pacific	179,054	176,843	1.3	73,435	70,065	4.8	252,489	246,908	2.3
Union Pacific	382,766	380,785	0.5	70,961	68,051	4.3	453,727	448,836	1.1
West Subtotal	856,799	852,218	0.5	-	-	-			

Source: AAR


State-To-State Rail Movements
Based On The 1990 ICC Carload Waybill Sample
Chemicals
Nationwide: 1357 Tons 1114869 Net Tonmiles
(In Hundred Thousands)
200
100
50
50
100
200
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Grain. Export flows of grain from the U.S. originate in the vast midwest and south west regions of the U.S. Export flows of grain from Canada originate in the plains of Alberta, Saskatchewan, and Manitoba.

The bulk of the U.S. flow is handled via the Mississippi River system. The major U.S. rail moves are from the midwest to the Pacific Northwest, the Gulf and the South Atlantic. In Canada, virtually all grain moves by rail.

In 1990 total U.S. grain volume moving through the PNW was 198,782 carloads. The busiest single elevator in the U.S. last year was Kalama, WA which handled over 77,000 carloads. The two major rail carriers, BN and UP estimate they can increase westbound grain moves by 50% with only minor improvements discussed in the next Section. These railroads are also willing to invest in new plant and rail cars as long as grain traffic remains a profitable and desirable business. Studies have been undertaken by grain interests in recent years to possibly add new elevator capacity on the west coast. [In fact, a new grain terminal is being planned in Prince Rupert, British Columbia, discussed above.]

In the interior U.S. producing areas approximately one-half to two thirds of the rail traffic now moves to the west with the remainder to the Gulf and Eastern seaboard.

Of the main commodity types carried by western U.S. railroads (coal, grain, autos, and containers) grain traffic has the greatest impact on track capacity in the northern corridors. Wheat and corn produced in Nebraska, North and South Dakota, Minnesota and Montana is exported to Asia through elevators located on the Columbia River and in Puget Sound, traveling to these locations on the Burlington Northern and Union Pacific Mainlines.

The following table shows that the BN and UP are the two largest grain-carrying railroads. Grain is not a major cargo for the Southern Pacific and the majority of grain moving on Santa Fe lines is destined for Gulf Coast export elevators.

As shown in the following map, export grain rail traffic uses the same rail corridors as import and export containers. These routes include two of the major capacity bottlenecks in the western system (Spokane, Washington to Sand Point, Idaho, and the Blue Mountains of Eastern Oregon). Substantial increases in either type of traffic could have negative impacts on other traffic. However, plans exist or are underway to increase capacity through these areas, through the extension of sidings or other means.

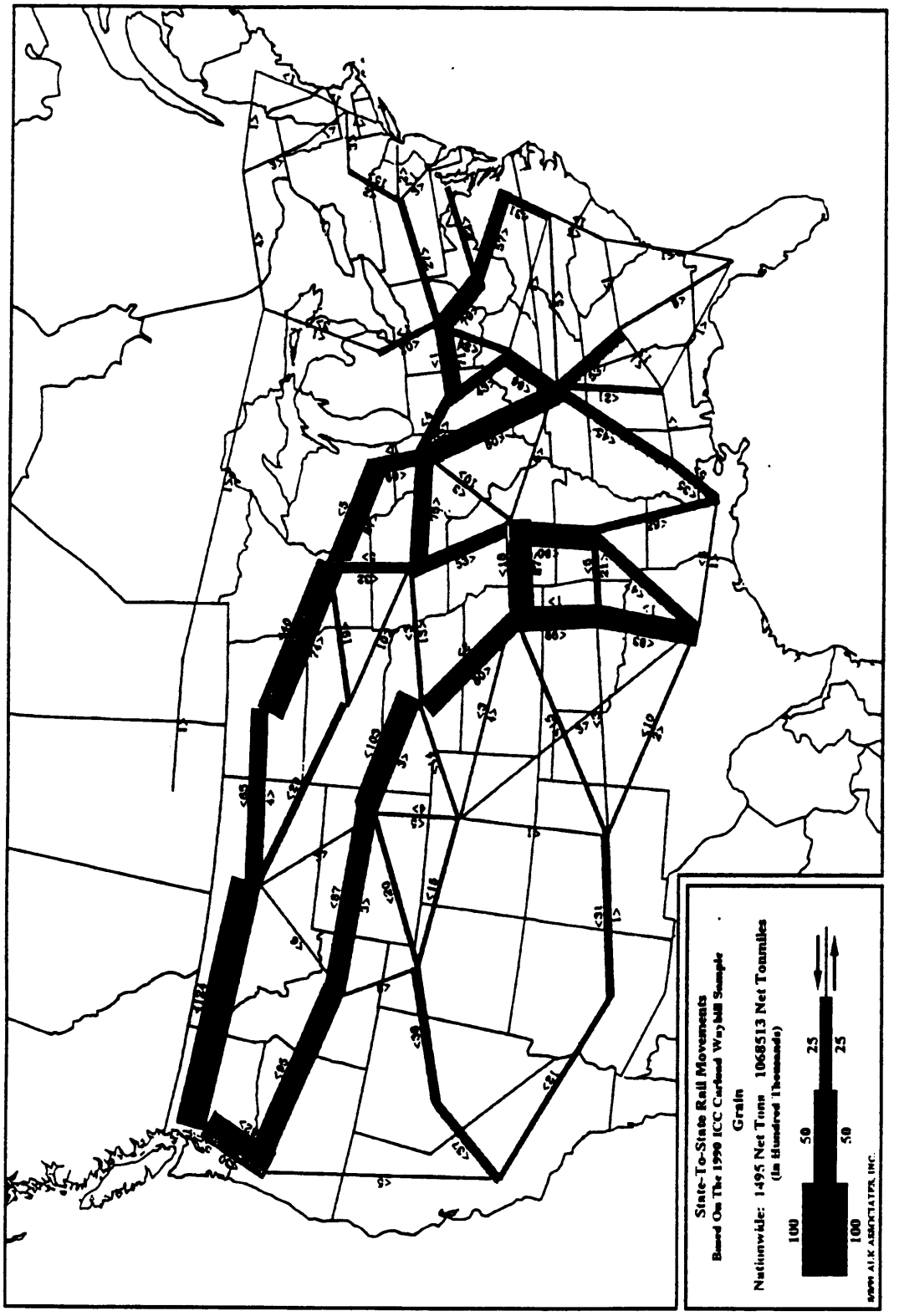

State-To-State Rail Movements
Based On The 1990 ICC Carload Waybill Sample
Grain
Nationwide: 1495 Net Tons 1068513 Net Tonmiles
(In Hundred Thousands)
100
50
25
25
50
100

Table 4.46

Cumulative Carloads by Railroad
Commodity: 1. Grain
52 Weeks Ending December 28, 1991
(Carloads)

RAILROAD	ORIGINATED 1991	ORIGINATED 1990		RECEIVED 1991	RECEIVED 1990		TOTAL 1991	TOTAL 1990	
EAST									
Conrail	45,574	47,793	-4.6	19,394	19,568	-0.9	64,968	67,361	-3.6
CSX Transportation	126,605	127,833	-1.0	20,414	28,694	-28.9	147,019	156,527	-6.1
Florida East Coast	0	0		266	68	291.2	266	68	291.2
Grand Trunk Western	9,775	9,208	6.2	1,593	5,295	-69.9	11,368	14,503	-21.6
Illinois Central	53,440	45,737	16.8	44,880	35,136	27.7	98,320	80,873	21.6
Norfolk Southern	115,438	112,209	2.9	24,994	25,632	-2.5	140,432	137,841	1.9
East Subtotal	350,832	342,780	2.3						
WEST									
Atchison, Topeka & Santa Fe	114,110	109,168	4.5	14,857	22,211	-33.1	128,967	131,379	-1.8
Burlington Northern	346,034	369,692	-6.4	15,039	12,208	23.2	361,073	381,900	-5.5
Chicago & North Western	118,192	137,456	-14.0	30,025	34,529	-13.0	148,217	171,985	-13.8
Kansas City Southern	21,963	20,381	7.8	3,917	5,687	-31.1	25,880	26,068	-0.7
Soo Line	146,327	149,019	-1.8	9,899	8,693	13.9	156,226	157,712	.9
Southern Pacific	24,151	29,707	-18.7	55,331	41,331	33.9	79,482	71,038	11.9
Union Pacific	252,669	270,384	-6.6	21,318	14,859	43.5	273,987	285,243	-3.9
West Subtotal	1,023,446	1,085,807	-5.7	150,386					

Source: BST Associates, AAR Weekly

Rail movements of grain primarily involve three commodities: wheat, corn and soybeans. As can be seen from the following table, grain shipment levels were quite volatile during the past decade. Detailed discussion of the three primary grains, as reviewed in the U.S.DOT document *Effects of Disclosure Requirements on Railroad Grain Transportation Contracts*, are included below.

Table 4.47

Ten-Year History of Farm Products Movements by Rail
(Farm Products are primarily grain)
(Millions of Tons Originated)

STCC Commodity	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1 Farm Products	139.9	133.5	142.2	151.1	127.0	136.4	162.9	169.6	154.4	147.4

Source: AAR - "Freight Commodity Statistics"

The grain transportation market in the United States grew at a rate of 3.5% per year during the 1980's. However, this figure overstates growth for most of the period. Much of the increase in grain handling, from 244 million tons in 1978 to 348 million tons in 1988, occurred only at the end of the decade in 1987 and 1988 when both export and domestic markets increased dramatically.

In spite of the new contracting freedom and active commercial experimentation resulting from the Staggers Act, the rail share of the total grain market actually fell from 49.1 % in 1980 to a low of 41.7% in 1985. Rail market share rose again in 1986 to 45.2% and further in 1987 to 47.7% before falling off again in 1988.

Grain markets are made up of two principal components - domestic consumption and export grain. During the past decade, domestic consumption increased steadily from 122 million tons in 1978 to 224 million tons in 1988. Indeed, in only the recession years of 1981 and 1982 did domestic consumption actually fall. During the same period, export grain volumes ebbed and surged from a high of 144 million tons in 1981 to a low of 87 million tons in 1986. During most of the decade, exports fell progressively, year after year. Only in 1987 and 1988 did export grain activity in the U.S. revive to levels comparable to those at the beginning of the decade.

The decade-long trends observed at the aggregate level - across grain markets - cloaks the even more intense competition that existed among modes and carriers within specific grain markets. This competition underlies the development of specific market strategies developed by individual rail carriers. The following discussion reviews the external and environmental factors, which affected demand for grain transportation services, in each of the largest grain market segments: 1) corn, 2) wheat, and 3) soybeans.

Among all grain markets, rail share declined most markedly in corn markets during the 1980's. Rail share, measured in terms of tons handled, declined from 47.4% in 1978 to 36.6% in 1988. During the same period, barge market share declined marginally, while truck direct share rose sharply. This shift suggests that fundamental logistics changes have taken place within this market and that corn processing facilities have moved closer to essential grain supplies.

Corn is the leading U.S. farm crop in terms of both value and volume, and is principally used for livestock and poultry feeding. Approximately one-third of U.S. corn production is fed to livestock and poultry on the farms where it is grown. The remainder enters the national marketing system. The largest share of transported corn moves in an unprocessed form to feed livestock. The processed feed manufacturing industry is the second largest user of corn. Corn sales to feed processors accounts for fully one-fourth of total use.

Food and food processing uses of corn represent a small but still significant proportion of total use. Food consumption, together with seed and industrial uses, accounts for approximately 20% of total domestic consumption. Principally as a result of expanding markets for corn sweeteners, the food processing market grew at a steady pace during the 1980's. Ethanol, made from corn, represents another expanding domestic use.

In the 1980's, the U.S. exported corn principally to Japan, the U.S.S.R., Mexico, Taiwan, Egypt, and South Korea. The volume of corn exported to the European Community declined sharply over the decade, from a relatively high level at the beginning. This fall-off was a direct result of EC farm support policies.

The wheat market was even more flat than the corn market in the 1980's. Wheat traffic increased only 23% between 1978 and 1988, and most of this increase occurred in 1987 and 1988.

Wheat is the principal food grain produced in the United States. It is also the nation's principal farm export. Typically, wheat exports exceed domestic use levels. However, this relationship was reversed in the mid1980's. Domestic wheat consumption grew slowly and steadily during the decade. In fact, domestic consumption grew every year until 1988 when volume fell off slightly. Export volume, on the other hand, declined for most of the decade. Export volume began at a 1981 peak and fell off sharply from this peak level. The years 1985 and 1986 represented low water marks for U.S. wheat exports. Export activity in 1988 only began to approach levels reached in 1983.

Rail's share of this market increased marginally from 72.3% in 1978 to 77.7% in 1988. Over the same period barge share declined marginally and truck direct share increased, albeit, from a low base level. Overall, rail volume increased by 33% during the decade from 44 million tons in 1978 to 58 million tons in 1988.

Wheat grown in the U.S. includes five distinct types: 1) hard red winter wheat; 2) soft red winter wheat; 3) hard red spring wheat; 4) white wheat; and 5) durum wheat. These distinct classes grow in different regions within the U.S. and make up several regional market segments and several distinct products.

All the classes of wheat produced in the U.S. are suitable for export, although specific importing countries tend to prefer specific types. For example, in the 1980's, the principal importers of hard red winter wheat were the U.S.S.R., China, Iraq, Japan, and Morocco, which is transported by rail to the Pacific Northwest. China, Egypt, and Morocco were the principal importers of spring red wheat. Japan, Central America, the Philippines, and the U.S.S.R. imported hard red spring wheat primarily, while South Korea and Japan imported primarily white wheat. Large volumes of U.S.-produced white wheat also move from year-to-year, depending on global market conditions and home market requirements, to India,

Pakistan, and Egypt. Durum wheat is used almost exclusively in the production of pasta for domestic consumption, and very little is exported.

Over the entire 1980's, the soybean market experienced essentially zero growth. Soybean traffic volume increased only 4.5% between 1978 and 1988. During this period, year-to-year domestic consumption was erratic. Export activity was similarly erratic but generally trended downward. Indeed, by the end of the decade soybean export volume had fallen off by more than 30% from the 1982 high. Still, the soybean market is a railroad success story. In spite of zero growth in the underlying commodity market, the rail share of this market increased markedly, from 18.2% in 1978 to 28.9% in 1988. At the same time, barge tonnage remained relatively constant, and truck tonnage declined sharply.

Two principal intermediate products are produced from soybeans: meal and oil. Soybean meal is the principal protein supply used to feed both livestock and poultry. It supplements other feed grains, as a nutritional source for livestock. However, it also competes directly with alternative feeds based on its nutritional value per dollar of delivered product. As a result, farm support policies affecting corn, wheat and other feed grains also affect the competitiveness of soybeans. Approximately 75% of U.S. soybean meal is consumed domestically. The remainder is exported.

In spite of the fact that the U.S. share of this global market has declined markedly in recent years, the U.S. remains the leading exporter of soybeans. Higher world market prices for soybeans in the 1970's encouraged the rapid entry of Brazil, and Argentina, and most recently China, into soybean production. In spite of increasing world demand for soybean meal and vegetable oil, U.S. exports have fallen off sharply from their 1981 /1982 peak. The rise of the U.S. dollar and increased competition from foreign producers are the principal causes of this export decline. The principal importers of soybeans and soybean derived products include the European Community, Japan, Taiwan, Mexico, and South Korea. Demand for soybeans in foreign countries is closely linked to rising real incomes and increased consumption of livestock products.

West Coast grain exports are expected to increase from 25.9 million tons in 1990 to 53.1 million tons in 2060. Rail traffic will increase from 21.4 million tons to 45.1 million tons during the same time period (i.e. 85% of total exports). This amounts to an average annual growth rate of approximately 1% per year.

Table 4.48

West Coast Grain Export Forecasts
(1,000 metric tons)

Total Exports

Year	Wheat	Corn	Soybeans	Sorghum	Total
1990	11,658	12,042	1,216	1,050	25,966
2020	17,873	20,481	1,788	1,925	42,221
2060	20,871	27,352	2,051	2,359	53,138

Rail Share of Exports

Year	Wheat	Corn	Soybeans	Sorghum	Total
1990	7,176	12,042	1,216	1,050	21,484
2020	11,001	20,481	1,788	1,925	35,350
2060	12,847	27,352	2,051	2,359	45,114

Percent Moving by Rail

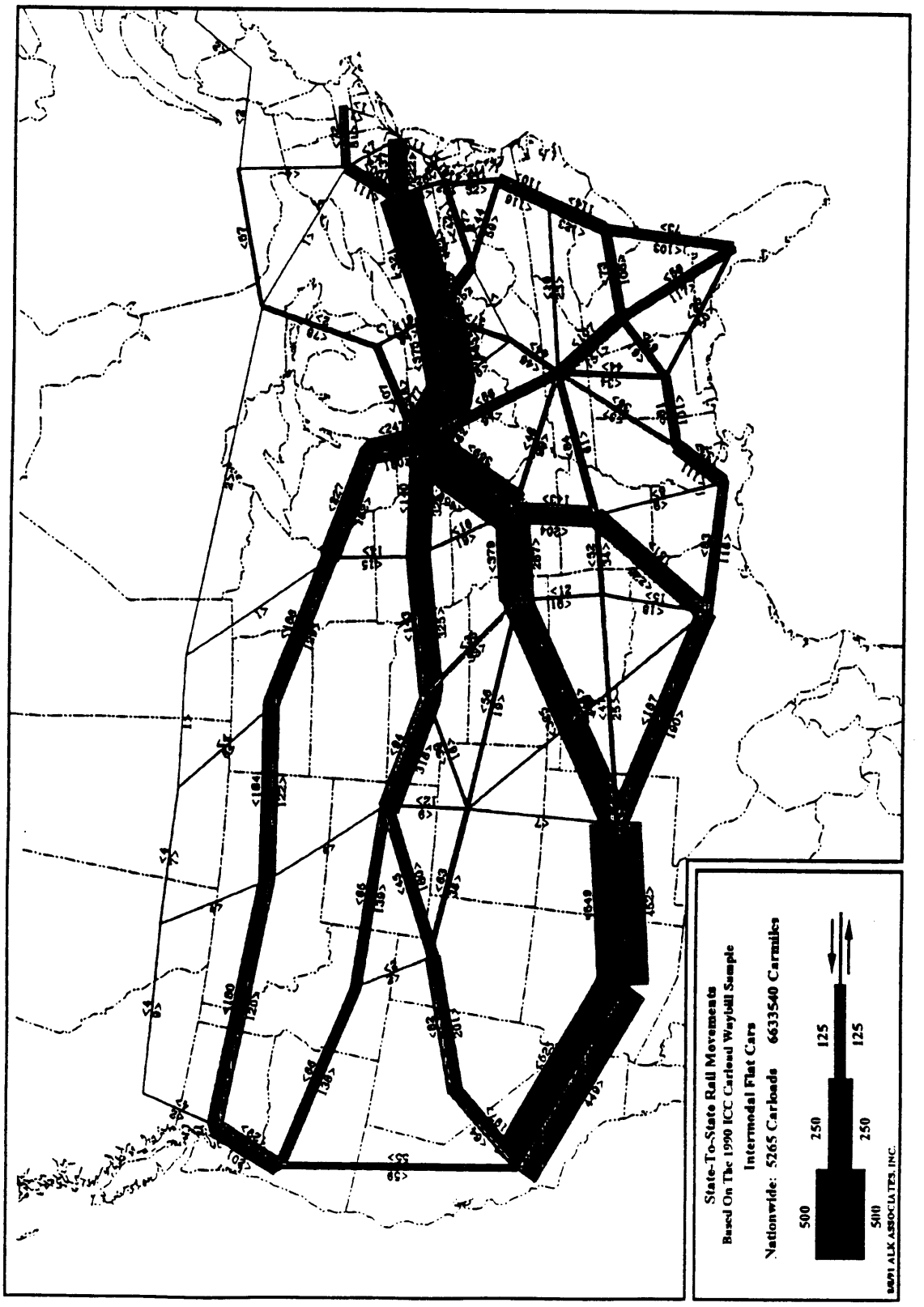
Year	Wheat	Corn	Soybeans	Sorghum	Total
1990	61.6%	100.0%	100.0%	100.0%	82.7%
2020	61.6%	100.0%	100.0%	100.0%	83.7%
2060	61.6%	100.0%	100.0%	100.0%	84.9%

Source: BST Associates, WEFA

This level of demand could lead to congestion on western railroads. Grain traffic may begin to interfere with container intermodal traffic.

Containers. The major flows of container traffic are concentrated between Chicago and the west coast ports in Southern California and Washington State. Also, large volumes of containers move through Chicago enroute to major cities in the eastern U.S. and from the west coast to the Lower Midwest, Southeast and Mid-Atlantic. While 20 years ago the hinterland for all-water moves from Asia to the East Coast extended to Chicago, seldom does any container travel more than 100 miles inland from the East Coast ports.

Intermodal flows often include a combination of domestic and international boxes on the same trains. Typically, eastbound imports from the west coast fill intermodal trains. However, on westbound moves a large number of international boxes are loaded with domestic goods from the east coast and Chicago for consumption in west coast population centers. These boxes are then restuffed with export freight or move empty across the Pacific Ocean. All parties benefit from improved equipment utilization, and prices reflect the resulting cost savings.


State-To-State Rail Movements
Based On The 1990 ICC Carload Waybill Sample
Intermodal Flat Cars
Nationwide: 5265 Carloads 6633540 Carmiles
500
250
125
125
250
500
BRPI ALK ASSOCIATES, INC.

As inventory costs rise and the value of goods rise increasing use of landbridge variants is expected. Rail costs for double-stack service are 25% to 30% less expensive than regular intermodal train service. Also, railroad management is aggressively attempting to reduce labor costs through new union agreements and which could cut operating costs even more. Major volume contracts for steamship lines contain round trip rates on double-stack service. Typical per container rates for such service are approximately $800 per loaded FEU from west coast ports to the Midwest (i.e. Chicago). Typical bridge rates between the west coast and New York are approximately $1,200.

As ships increase in both size and number, some port and terminal congestion can be expected. Port terminals will have to be improved and peak demand loads will require offpeak rates and service packages to manage demand.

As mentioned previously, western railroads have dominated the intermodal container business primarily due to the demand by Asian steamship lines serving U.S. customers via intermodal transportation systems. However, the composition of the intermodal market is undergoing a profound change. There is a rapid change from movement of trailers to movement of containers. Overall trailer usage fell 7% in 1991 while container traffic increased substantially. Consistently growth in container traffic has led all other railcar performance. SPRR is the largest carrier of intermodal with 601,000 containers carried in 1991.

Table 4.49

Comparison of Class I Rail Traffic Patterns
Intermodal Trailers

Rank	Intermodal Trailers Railroad	1990	Percent 1990	1991	Percent 1990	Percent Change
1	Atchison, Topeka & Santa Fe	571,070	29.4%	579,089	30.9%	1.4%
2	Conrail	532,402	27.4%	490,241	26.1%	-7.9%
3	Union Pacific	368,406	19.0%	417,879	22.3%	13.4%
4	Norfolk Southern	396,828	20.5%	394,203	21.0%	-0.7%
5	Burlington Northern	445,434	23.0%	329,406	17.6%	-26.0%
6	CSX Transportation	317,223	16.3%	289,172	15.4%	-8.8%
7	Florida East Coast	304,439	15.7%	268,636	14.3%	-11.8%
8	Southern Pacific	272,061	14.0%	240,022	12.8%	-11.8%
9	Chicago & North Western	49,239	2.5%	51,576	2.7%	4.7%
10	Illinois Central	49,444	2.5%	45,387	2.4%	-8.2%
11	Soo Line	50,294	2.6%	35,013	1.9%	-30.4%
12	Kansas City Southern	35,279	1.8%	28,793	1.5%	-18.4%
13	Grand Trunk Western	45,540	2.3%	20,038	1.1%	-56.0%
14	Wisconsin Central	14,294	0.7%	19,784	1.1%	38.4%
	Total	3,451,953		3,209,239		-7.0%

Source: Weekly Railroad Traffic Report, Association of American Railroads

Table 4.50

Comparison of Class I Rail Traffic Patterns
Intermodal Containers

Rank	Intermodal Containers Railroad	1990	Percent 1990	1991	Percent 1990	Percent Change
1	Southern Pacific	531,892	19.3%	601,845	19.8%	13.2%
2	Burlington Northern	491,753	17.9%	499,139	16.5%	1.5%
3	Union Pacific	341,886	12.4%	409,751	13.5%	19.9%
4	Atchison, Topeka & Santa Fe	266,708	9.7%	346,321	11.4%	29.9%
5	Conrail	312,672	11.3%	315,296	10.4%	0.8%
6	CSX Transportation	260,589	9.5%	258,828	8.5%	-0.7%
7	Norfolk Southern	228,489	8.3%	243,524	8.0%	6.6%
8	Chicago & North Western	190,245	6.9%	183,126	6.0%	-3.7%
9	Soo Line	71,627	2.6%	89,135	2.9%	24.4%
10	Illinois Central	34,731	1.3%	36,679	1.2%	5.6%
11	Florida East Coast	537	0.0%	19,202	0.6%	3475.8%
12	Kansas City Southern	11,650	0.4%	18,356	0.6%	57.6%
13	Grand Trunk Western	8,538	0.3%	8,906	0.3%	4.3%
14	Wisconsin Central	3,512	0.1%	4,100	0.1%	16.7%
	Total	2,754,829		3,034,208		10.1%

Source: Weekly Railroad Traffic Report, Association of American Railroads

Comparison of Class I Rail Traffic Patterns
Intermodal Containers & Trailers

Rank	Intermodal Containers & Trailers Railroad	1990	Percent 1990	1991	Percent 1990	Percent Change
1	Atchison, Topeka & Santa Fe	837,778	13.5%	925,410	14.8%	10.5%
2	Southern Pacific	803,953	13.0%	841,867	13.5%	4.7%
3	Burlington Northern	937,187	15.1%	828,545	13.3%	-11.6%
4	Union Pacific	710,292	11.4%	827,630	13.3%	16.5%
5	Conrail	845,074	13.6%	805,537	12.9%	-4.7%
6	Norfolk Southern	625,317	10.1%	637,727	10.2%	2.0%
7	CSX Transportation	577,812	9.3%	548,000	8.8%	-5.2%
8	Florida East Coast	304,976	4.9%	287,838	4.6%	-5.6%
9	Chicago & North Western	239,484	3.9%	234,702	3.8%	-2.0%
10	Soo Line	121,921	2.0%	124,148	2.0%	1.8%
11	Illinois Central	84,175	1.4%	82,066	1.3%	-2.5%
12	Kansas City Southern	46,929	0.8%	47,149	0.8%	0.5%
13	Grand Trunk Western	54,078	0.9%	28,944	0.5%	-46.5%
14	Wisconsin Central	17,806	0.3%	23,884	0.4%	34.1%
	Total	6,206,782		6,243,447		0.6%

Source: Weekly Railroad Traffic Report, Association of American Railroads

After SPRR, the Burlington Northern Railroad (BNRR) is the second largest carrier of containers - handling almost 500,000 boxes in 1991. UPRR was third with 409,751 boxes. Sante Fe handled 346,000 containers.

BNRR and UPRR provide service for all of the steamship lines utilizing the Ports of Seattle and Tacoma. UPRR, SPRR and Sante Fe provide intermodal service for steamship lines in California. Vancouver BC is served by the Canadian Pacific, the Canadian National and Burlington Northern. Individual rail system issues are discussed below.

International Container Traffic. U.S. shipping and railroad firms have been working to develop a double-stack train (DST) since the second half of the 1970s. During the first half of the 1970s, Southern Pacific began research to develop a DST, and in 1977, it started test runs between Los Angeles, Houston and Oakland. It soon concluded a contract with Sea-Land and began to operate 43 cars (430 FEUs) twice a week between Los Angeles and Chicago. But the double-stack idea failed to spread because there were problems reducing the weight of the flatcar and thereby increase the weight of the containerized traffic.

The rapid increase of double-stack train service (DST) was ultimately developed by American President Lines (APL) in the 1980s. APL abolished its worldwide service in 1977, completely dropping its all-water service to specialize in intermodal transportation. In 1981, APL began to operate a liner train, the first container train for exclusive use by a shipping company, between Seattle and New York. In April 1984, it improved its DST (i.e. reduced weight) and launched full-fledged DST operations.

DST service quickly spread after the Staggers Act was passed in October 1980 (see 2.2 above) which eased railway regulations. Piggyback transportation was completely deregulated in March 1981 (by abolishing the Antitrust Act exemption and banning unified tariffs). With the development of the DST, the economy of rail transportation improved substantially, so much so that for distances of 700 miles and longer, rail transportation became superior to marine transportation. Intermodal transportation networks linking major ports on North America's West Coast were established. In 1989 intermodal cargo's share of total cargo unloading on the West Coast eastbound runs came close to 50%.

The expansion of intermodal transportation meant that shippers ceased relying on Panama Canal (all-water service) to reach the Midwestern and Eastern U.S. and Canadian seaboards. In contrast, the volumes of containerized cargo at ports on the West Coast increased, as shown on the table on the following page. But the expansion of rail transportation necessitated a massive investment for such purposes including construction of railroad facilities and container terminals. The smooth operation of DSTs depended on the improvement made in the efficiency of terminal management by placing West Coast terminals on an independent

accounting basis. Railroad and shipping companies joined forces to set up railroad subsidiaries which would recycle flatcars and containers and take care of trainoperating schedules. In addition to DST programs by SeaLand and APL, the three major Japanese shipping companies have been fostering the growth of railroad subsidiaries that have their own terminals in Seattle (Tacoma), Oakland and Los Angeles (Long Beach) and that control the operation of DSTs. For door-to-door transportation, cargo depots to connect railroads to trucking services were built. At present, 16 shipping companies are operating DSTs at a frequency of 130 runs a week (an average of 18 per day). Major shipping companies are operating DSTs for their own exclusive use, while small and mediumsized users are operating block trains (loading other shipping companies' cargo on their trains) with the railroads in a lead position.

Table 4.51

Number of Days For Container Transportation From Japan
An Example of DST Operation Schedule
(Days per segment)

Destination	Marine Transportation	Connection	Rail	Total Days
Chicago	9	1	3	13
New York	9	1	5	15
Houston	9	1	3	13
Atlanta	9	1	5	15
Dallas	9	1	3	13

Source: Steamship Lines

The transit time between Japan and inland cities in the United States is approximately two weeks (i.e. 13 days to the midwest and 15 days to the Eastern seaboard). This is compared with all water service which averaged 30 to 48 days between last port of lading and first port of discharge (from North and South Asia) in the late 1980s. The time advantage in using intermodal mini- and micro-landbridge as compared with all water services averaged 15 to 22 days in the late 1980s according to the Federal Maritime Commission.

Such a short transit time has stimulated the growth of consumer goods shipments from Asia, and has made the transportation of just-in-time parts, including knocked down parts, a very common practice. The continued viability of this service is explored in greater detail below.

As a consequence of growth in intermodal container traffic, west coast U.S. ports came to dominate container traffic. Of the top six North American container ports, 5 are U.S. west coast ports. The combined totals of Los Angeles and Long Beach are twice the volumes handled by New York/New Jersey. In addition, Puget Sound container flows also exceed New York/New Jersey volumes by approximately 200,000 TEUs.

Table 4.52

North American Container Port Rankings - 1990

Rank	Port	1990TEU	Coast	Country/Region
1	Los Angeles	2,116,404	West	U.S.A
2	New York/New Jersey	1,898,436	East	U.S.A
3	Long Beach	1,598,078	West	U.S.A
4	Seattle	1,171,091	West	U.S.A
5	Oakland	1,124,123	West	U.S.A
6	Tacoma	937,691	West	U.S.A
7	Charleston	794,100	East	U.S.A
8	Hampton Roads	788,777	East	U.S.A
9	Honolulu	655,174	West	U.S.A
10	Montreal	568,103	East	Canada
11	Houston	504,854	East	U.S.A
12	Baltimore	474,301	East	U.S.A
13	Halifax	465,000	East	Canada
14	Savannah	422,635	East	U.S.A
15	Miami	373,850	East	U.S.A
16	New Orleans	352,469	East	U.S.A
17	Vancouver	322,569	West	Canada
18	Port Everglades	285,500	East	U.S.A
19	Jacksonville	278,084	East	U.S.A
20	Anchorage	272,558	West	U.S.A
		Total	15,403,797	

Source: BST Associates, Containerization International

The overall trends affecting intermodal container movements are :

- Advances in Refrigerated and Climate controlled technologies
- Continued diversion of breakbulk and neobulk cargoes as carriers act to fill surplus capacity
- Trade with newly industrialized countries will become containerized due to new terminal/system developments
- Growth of garbage, hazardous waste and other domestic traffic
- Increasing use of doublestack equipment through load centers
- Increasing control of international containers by the ocean carriers

- Continued attempts to reduce truck drayage from port terminals to intermodal railyards (i.e. more on-dock and near-dock facilities)

- More use of Electronic data interchange (EDI) and other paperwork improvements to facilitate flow of cargo.

Efficient and price sensitive intermodal rail service has become mandatory for container operations. In addition, existing load centers have service by two to three competitive railroads.

DST networks will increasingly rely on domestic traffic as discussed above to maintain load factors. The implications of future international forecasts are reviewed in the final Section.

Intermodal Container Forecasts. Containerized traffic is expected to grow at annual rates of approximately 3.0% to 3.8% for Asian imports and exports and approximately 2.6% to 3.1% for Asian imports and exports during the time period from 1990 to 2020. After that, volumes will slow to approximately 1% for both trade routes. International container trade is exhibiting S-curve growth. During the 1980s, rapid containerization occurred as DST systems were put into place. However, much of the previously breakbulk cargo has already been containerized.

Table 4.53

Asian Intermodal Traffic
North America *

Direction	Destination	1990	2020	2060
Imports				
DSTs **	Midwest	2.7	7.2	10.8
	East Coast	4.5	11.8	17.8
	Total	7.2	19.0	28.6
Exports				
DSTs **	Midwest	2.0	7.0	12.2
	East Coast	0.8	2.7	4.7
	Total	2.8	9.7	16.9
Total				
DSTs **	Midwest	4.7	14.2	23.0
	East Coast	5.3	14.5	22.5
	Total	10.0	28.7	55.5

* includes the U.S. and Canada
** average daily equivalent doublestack trains - 280 FEU capacity
Source: BST Associates, WEFA

Non constrained forecasts for Asian intermodal containerized cargo project an increase from 10.0 equivalent doublestack trains (fully utilized 280 FEU DSTs - includes both imports and exports) in 1990 growing to 28.7 DSTs in 2020 and 55.5 in 2060. On the export side, DSTs are forecast to grow from 6.7 in 1990 to 19.7 in 2020 to 28.6 in 2060.

European intermodal traffic grows from 3.9 DST equivalents in 1990 to 10.2 in 2020 and 19.7 in 2060.

Table 4.54

European Intermodal Traffic
North America

Direction	Destination	1990	2020	2060
Imports				
DSTs *	West Coast	0.8	1.8	2.4
	Midwest	1.9	4.3	5.7
	Total	2.7	6.1	8.1
Exports				
DSTs *	West Coast	0.7	1.9	2.6
	Midwest	2.4	6.5	9.0
	Total	3.1	8.4	11.6
Total				
DSTs *	West Coast	1.5	3.7	5.0
	Midwest	2.4	6.5	9.0
	Total	3.9	10.2	19.7

* average daily equivalent doublestack trains
Source: BST Associates, WEFA

Existing Problem Areas. Congestion problems occur at certain points, particularly in the western mountain areas and where two mainline routes meet, but these problems are for the most part not yet severe enough that the addition of a second mainline track is being planned. Carriers are instead focussing on improved electronic trackage systems to enhance productivity [See Appendix B for a review of individual Western railroad carriers]

Examples of existing bottlenecks include :

the Burlington Northern (BN) corridor between Spokane, Washington and Sandpoint, Idaho where two busy single-track mainline segments come together into one track, and

the Union Pacific (UP) line over the Blue Mountains of eastern Oregon, where steep grades are an impediment.

In California the major congestion occurs in the Los Angeles basin, where a joint effort between the railroads and the ports is now underway to allow for joint use of tracks via the Alameda corridor. The Southern Pacific (SP) has heavy traffic on the single-track mainline between Tucson, Arizona and El Paso, Texas but is not encountering major delays at this time. The Santa Fe mainline is double-tracked from Los Angeles to central New Mexico, where it splits into two single-track mains. The Santa Fe line is very under-utilized.

The Canadian carriers, Canadian National (CNR) and Canadian Pacific (CPR) have few capacity constraints. The CNR, primarily a natural resource carrier, has seen its business drop off with the decline of its client industries, and currently has traffic densities lower than any other western railroad. The CP recently completed the new Rogers Pass tunnel through the mountains of eastern British Columbia, which eliminated the major bottleneck in the CP system.

All carriers report they can handle substantially increased volumes even with the above reported problem areas. All railroads report capacity at between 30% and 75% overall including specific bottlenecks.

Sort Term Versus Long Term Rail Capacity Considerations. The capacity of a given section of single track rail line is the number of tonnes of freight that can be moved over that section in a given period of time at an acceptable service level while recognizing maintenance requirements.

The calculation of long term railway capacity depends primarily on three factors:

1) payload per train,

2) frequency of trains, and

3) line outages.

The payload per train is determined by multiplying the payload per car times the number of cars per train. Technological improvements will allow cars to hold more cargo and longer unit trains are being considered.

The frequency of trains involves additional factors, including train speeds, track configuration, traffic mix, and traffic control system. Train speed, in turn, is determined by track curvature and gradient, track condition, and motive power relative to weight.

The theoretical maximum single track capacity is seldom achieved in practice because of variations in demand (i.e., seasonal, daily peaking factors etc).

A rule of thumb estimate of single trackage capacity is approximately 60 million ton miles per mile of single track mainline. Double tracking is required when the limits of single track capacity are reached. A full double track configuration provides approximately four times the capacity of the best single track arrangement (i.e. 240 million ton miles).

The U.S. mainline systems are presented on the following map. As can be seen, most of the mainline in the U.S. is single-tracked. Notable exceptions are mainlines from Oakland and Los Angeles/Long Beach which are double tracked through the Mountain region. Typically, as additional sidings are built, new double track is established which reduces the overall costs of improving capacity and phases it in to correspond with increased traffic.

Capacity on the U.S. system is calculated in the following table including 1990 eastbound and westbound traffic volumes between relevant state pairs, system capacity based upon the above "rule of thumb" and percent utilization. For example, between Washington and Montana, 4.5 million tons moved eastbound and 18.5 million moved westbound; system capacity is 60 million tons based upon one single track mainline. Hence, this track is approximately 38.3% utilized (i.e., 23.0 tons divided by 60 million tons capacity).

All east-west state pairs are provided. As can be seen, overall capacity ranges from 10% to 50% on various components of east-west mainline corridors.

Table 4.55

US Railroad Traffic - 1990 System Volumes - Million Tons

Line 1		Eastbound	Westbound	Total	Capacity	% Utilization
Washington	Montana	4.5	18.5	23.0	60.0	38.3%
Montana	N Dakota	33.3	11.1	44.4	120.0	37.0%
N Dakota	Minnesota	51.1	9.1	60.2	300.0	20.1%
Minnesota	Wisconsin	65.0	8.4	73.4	180.0	40.8%
Wisconsin	Illinois	41.7	80.6	122.3	240.0	51.0%
Illinois	Indiana	86.4	33.3	119.7	240.0	49.9%
Indiana	Ohio	57.5	29.2	86.7	240.0	36.1%

Source: BST Associates, ICC data

Line 1 (continued)

Eastbound	Westbound	Total	Capacity	% Utilization		
Ohio	Pennsylvania	46.7	30.6	77.3	240.0	32.2%
Ohio	West Virginia	25.7	35.4	61.1	240.0	25.5%
West Virginia	Virginia	70.1	14.2	84.3	240.0	35.1%
Pennsylvania	New York	28.4	9.1	37.5	240.0	15.6%
Pennsylvania	New Jersey	11.1	3.3	14.4	120.0	12.0%
New York	Massachusetts	11.8	2.5	14.3	60.0	23.8%
New York	New Jersey	3.8	6.4	10.2	60.0	17.0%

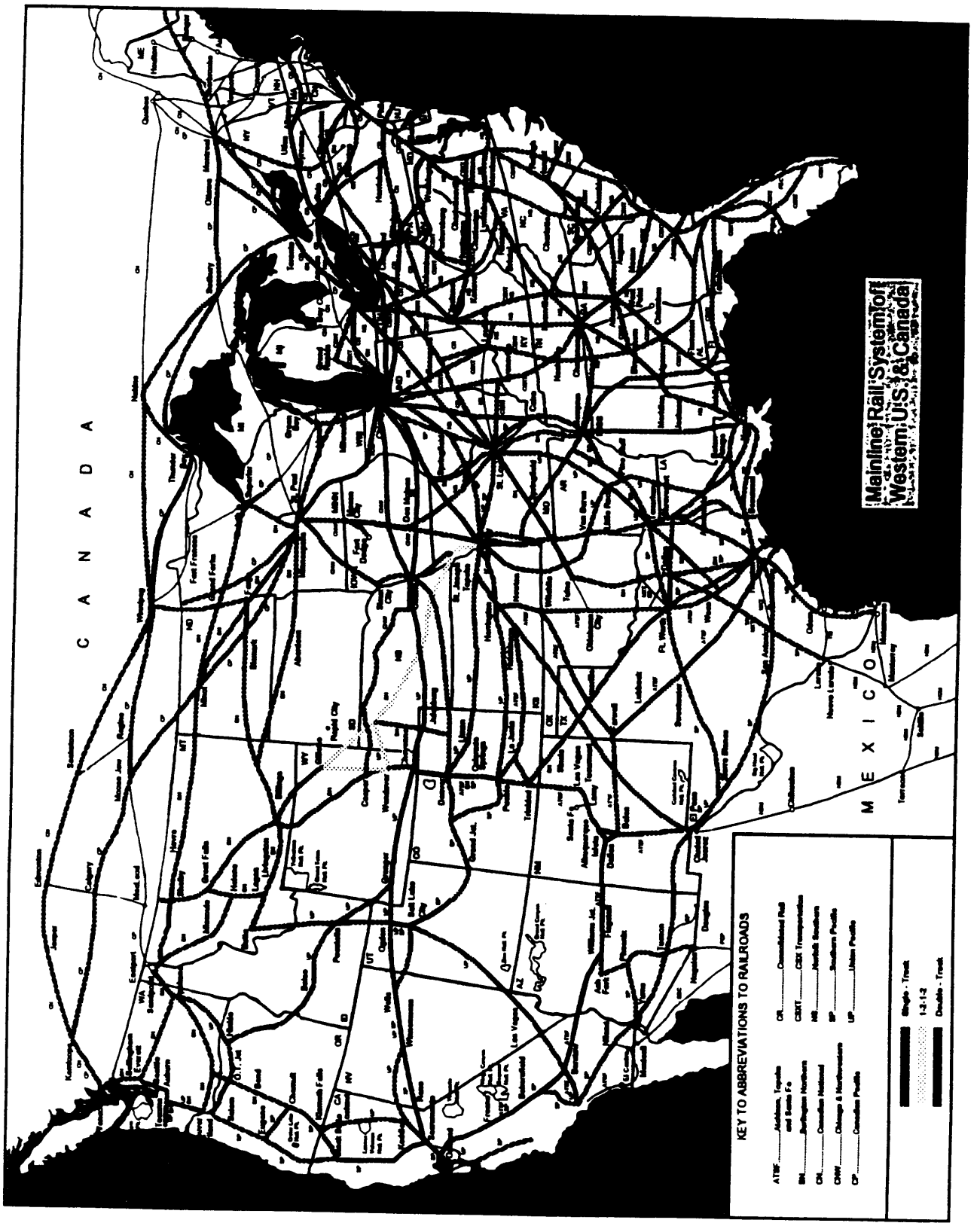
Line 2		Eastbound	Westbound	Total	Capacity	% Utilization
Oregon	Idaho	8.5	21.7	30.2	60.0	50.3%
Idaho	Wyoming	9.4	19.8	29.2	60.0	48.7%
Wyoming	Nebraska	146.7	22.2	168.9	360.0	46.9%
Nebraska	Iowa	65.6	12.6	78.2	240.0	32.6%
Iowa	Illinois	52.3	12.6	64.9	480.0	13.5%

Line 3		Eastbound	Westbound	Total	Capacity	% Utilization
California	Nevada	6.8	21.7	28.5	240.0	11.9%
Nevada	Utah	6.8	25.9	32.7	240.0	13.6%
Utah	Wyoming	3.8	10.9	14.7	240.0	6.1%

Line 4		Eastbound	Westbound	Total	Capacity	% Utilization
California	Arizona	19.1	30.1	49.2	300.0	16.4%
Arizona	New Mexico	19.1	41.3	60.4	300.0	20.1%
New Mexico	Kansas	10.0	15.3	25.3	60.0	42.2%
Kansas	Missouri	90.1	25.9	116.0	240.0	48.3%
Missouri	Illinois	34.7	38.5	73.2	300.0	24.4%

Line 5		Eastbound	Westbound	Total	Capacity	% Utilization
New Mexico	Texas	13.0	16.4	29.4	120.0	24.5%
Texas	Louisiana	17.7	19.9	37.6	180.0	20.9%
Louisiana	Mississippi	28.9	16.5	45.4	240.0	18.9%
Mississippi	Alabama	18.0	8.7	26.7	120.0	22.3%
Alabama	Georgia	24.1	7.7	31.8	120.0	26.5%
Georgia	S Carolina	25.6	14.4	40.0	120.0	33.3%
Georgia	Florida	19.3	4.6	23.9	120.0	19.9%

Source: BST Associates, ICC data


Mainline Rail System of Western U.S. & Canada
CANADA
MEXICO
KEY TO ABBREVIATIONS TO RAILROADS

Trade Forecasts Moving by Rail. The additional forecasted traffic for grain and container is very small in comparison to overall system capacity. Additional grain traffic is 23.6 million tons in 2060 over 1990 levels. Additional intermodal traffic is 48.1 million tons on West Coast to Midwest and 32.8 million tons on Midwest to East Coast corridors.

Table 4.56

Additional Tonnage in PNW Grain Rail Traffic (1,000 metric tons)

PNW Grain	WC/MW	EC/MW	TOTAL
1990	21,484		21,484
2020	35,350		35,350
2060	45,114		45,114
Additional Tonnage			
1990 to 2020	13,866		13,866
1990 to 2060	23,630		23,630

Source: BST Associates

Table 4.57

Additional Tonnage from International Trade Forecasts - Intermodal

Forecast Year	Tons (1,000) WC/MW	Tons (1,000) EC/MW	Trains/Day WC/MW	Trains/Day EC/MW
1990				
Europe	822	4,434	0.5	2.5
Asia	12,654	6,509	10.4	5.3
Total	13,476	10,943	10.8	7.8
2020				
Europe	2,011	11,241	1.1	6.3
Asia	36,795	18,547	30.2	15.2
Total	38,807	29,789	31.3	21.5
2060				
Europe	2,701	15,222	1.5	8.5
Asia	58,841	28,541	48.2	23.4
Total	61,542	43,763	49.7	31.9
Additional Tonnage				
2020	25,330	18,845	20.5	13.7
2060	48,065	32,820	38.9	24.1

Source: BST Associates

Overall System Capacity. As shown in the following table, the overall average system capacity is currently around 27% on the east-west mainlines.

Additional grain and intermodal traffic represent only 5.7% of 1990 loadings and 2.1% of excess system capacity in the year 2060. This additional traffic by itself will not cause any system constraints. However, these forecasts must be evaluated in conjunction with other domestic rail traffic to determine if a system capacity problem could arise.

Table 4.58

Summary of System Capacity
(Million Tons)

System Summary	West	East	Total
1990 loadings			
Eastbound	699.2	466.7	1,165.9
Westbound	462.5	218.6	681.1
Total	1,161.7	685.3	1,847.0
Capacity	4,320.0	2,460.0	6,780.0
% Utilization	26.9%	27.9%	27.2%
Excess Capacity	3,158.3	1,774.7	4,933.0
Additional Grain & Intermodal Traffic			
Million Tons			
1990 to 2060			
Intermodal	48.1	32.8	80.9
Grain	23.6	0.0	23.6
Total	71.7	32.8	104.5
% of 1990 Loading	6.2%	4.8%	5.7%
% of Excess Capacity	2.3%	1.8%	2.1%
Additional Traffic - Alternative Growth Rates			
@ 0.1%/year	84.2	49.7	133.9
@ 0.5%/year	485.4	286.3	771.7
@ 1%/year	1,169.6	689.9	1,859.5
@ 1.5%/year	2,132.2	1,257.8	3,390.1
@ 2%/year	3,484.6	2,055.6	5,540.2
Impact on Excess Capacity			
@ 0.1%/year	2.7%	2.8%	2.7%
@ 0.5%/year	15.4%	16.1%	15.6%
@ 1%/year	37.0%	38.9%	37.7%
@ 1.5%/year	67.5%	70.9%	68.7%
@ 2%/year	110.3%	115.8%	112.3%

Source: BST Associates

As noted earlier in this chapter, total originated tonnage on U.S. railroads increased at an average annual rate of only 0.1% per year system wide between 1929 and 1990. From 1981 to 1990, overall traffic actually declined at an average annual rate of (0.2%). While, it is beyond the scope of this study to prepare a forecast for domestic rail traffic, it is conservative to estimate that rail traffic as a whole will increase by less than 1% per year during the study period.

If traffic grows less than 1% per year overall through 2060, it will absorb slightly more than one-third of the existing excess capacity. Only if traffic grows at 2% or more per year will system capacity be exceeded, which is highly unlikely.

As a result, there is no unsolvable existing capacity constraint that would divert cargo from intermodal landbridge systems to all-water Panama Canal routes for average loadings on the system. As railroads begin to experience a capacity constraint, longer sidings are built to mainline standards. As the sidings are lengthened, they become a part of the doubletrack mainline system.

Peaking problems and relative transportation costs could potentially divert cargo from intermodal landbridge systems to all-water Panama Canal routes. These issues are discussed below.

Peaking Problems. The above estimates of capacity utilization assume average daily loadings. This is not the case in real life especially for container traffic. Steamship schedule arrivals currently peak from Thursday through Saturday at west coast ports. The level of throughput indicated above will strain peak day loadings on intermodal systems and mainlines. If the peaks are evened out, then doublestack systems will be able to handle the load. The consequence of this occurrence is additional delays in shipments which could begin to erode the advantage of faster transit times.

International intermodal trains exist because of the higher value of import eastbound Transpacific containers. The intermodal movement is a relatively complex process which involves the following steps :

- Vessel arrival schedules (and potential multiple vessel calls)
- Port berth and equipment availability
- Transit from vessel to upland storage point in port terminal
- Fast delivery from port terminal to rail intermodal yard (accelerated if on-dock or near dock rail is available)

- Train loading and departure schedules
- Rail line-haul schedules
- Destination terminal handling
- Destination drayage

Lack of reliability at any component of the intermodal will tear the fabric of the "seamless" intermodal movement. In order to provide reliability of 95% or better, each step must function at 99% or better reliability. If peak day loadings are not smoothed out as discussed above, the time advantage provided by mini-landbridge could begin to erode. This could shift cargo back to all water movements but only for Transpacific containers bound for the eastern seaboard or Transatlantic containers bound for the west coast. The volumes are much larger on Transpacific routes and the value of the cargo is also much higher than on Atlantic routes.

The value of containerized cargo moving intermodally to the East Coast ranges from $7,500 to $10,000 per ton as opposed to $4,500 to $6,600 per ton for all water traffic. All water cargo tends to be heavy and low valued. Intermodal cargo tends to be light and high valued.

Table 4.59

Average Value per Ton
Containerized Imports from Asia

Region	Mini- or Micro Landbridge	All Water
Northeast	$10,000	$5,000
Mid Atlantic	$7,500	$4,500
Southeast	$9,600	$6,600
Lower Midwest	$6,800	$4,000
Upper Midwest	$6,750	NA

Source: BST Associates using Department of Commerce data

Intermodal landbridge movements work as a direct result of reduced inventory carrying costs. As shown in the following table, a 20 day time advantage translates to a savings of $51.23 for cargo valued at $11,000. However, cargo worth only $3,000 per ton saves only $6.99 with a 10 day time advantage.

As the time advantage of landbridge movements becomes compromised (i.e.,, cargo waiting at a dock or intermodal yard due to peaking constraints) the savings associated with landbridge can be negatively impacted. For example, cargo valued at $11,000 per ton generates $51.23 per ton savings with a 20 day advantage but only $25.62 (one-half) at 10 days. This is especially relevant for those cargoes which are at the lower end of the value range.

Table 4.60

Calculation of Inventory Carrying Costs

# of Days Advantage	$3,000/ton	$5,000/ton	$7,000/ton	$9,000/ton	$11,000/ton
10	$6.99	$11.64	$16.30	$20.96	$25.62
12	$8.38	$13.97	$19.56	$25.15	$30.74
14	$9.78	$16.30	$22.82	$29.34	$35.86
16	$11.18	$18.63	$26.08	$33.53	$40.99
18	$12.58	$20.96	$29.34	$37.73	$46.11
20	$13.97	$23.29	$32.60	$41.92	$51.23

Source: BST Associates, assumes interest rate of 8.5%

Increased traffic with no adjustment for peaks could shift cargo back to all water service.

Transportation Cost Comparison. The following tables compare European landbridge movements to the West Coast and Midwest and Asian landbridge to the East Coast and Midwest with all water movements.

The first conclusion is that in no event does Asian all water service to the East Coast with transfer to the Midwest ever produce cost savings over landbridge via West Coast ports. Likewise, all water service from Europe to the West Coast with transfer to the Midwest does not offer any advantages. All water service via the Panama Canal is limited to serving the coast it lands on. Asian cargo stays near Eastern seaboard and European cargo stays on the West Coast.

The second conclusion is that European cargo moved all water appears to offer cost advantages over intermodal service from the East Coast for every vessel size. Shifting of cargo back to all water service could occur for European intermodal traffic. This appears to fly in the face of the decreases of service that the West Coast has experienced from European carriers. However, the cargo is relatively low valued (i.e.,, averages $3,484 per ton) and thus the inventory cost reduction is relatively small.

The third conclusion is that the relatively higher valued Asian cargo (i.e., $10,000 per ton) is better served by intermodal service than by all water service for all vessel types except the smallest vessels.

Table 4.61

Relative Landbridge costs - Europe to West Coast

Europe	DWT	TEU	USEC Total	USWC Total	w/out tolls Comp 1	USWC Total	w/ tolls Comp 2
2020	20700	2200	228.4	218.8	-9.6	224.0	-4.4
2060	20700	2200	236.7	221.3	-15.4	227.0	-9.7
2020	32700	2700	202.4	177.1	-25.3	182.3	-20.1
2060	36400	2800	207.1	175.5	-31.6	181.2	-25.9
2020	48080	3200	200.0	174.0	-26.1	179.2	-20.9
2060	56000	3200	202.0	168.1	-33.9	173.8	-28.2
2020	90000	6000	187.9	158.2	-29.8	163.4	-24.6
2060	90000	6000	193.4	156.9	-36.5	162.6	-30.8
2020	148000	9000	185.1	153.1	-32.0	158.3	-26.8
2060	148000	9000	189.3	152.3	-37.0	158.0	-31.3

Average value = $3,484/ton, 10 day advantage, 8.5%

Relative Landbridge costs - Europe to Midwest

Europe	DWT	TEU	USEC Total	USWC Total	Comp 1	Total	Comp 2
2020	20700	2200	180.4	262.2	81.8	267.4	87.0
2060	20700	2200	183.7	264.6	80.9	270.3	86.6
2020	32700	2700	154.4	220.5	66.1	225.7	71.3
2060	36400	2800	154.1	218.8	64.8	224.5	70.5
2020	48080	3200	152.0	217.4	65.4	222.6	70.6
2060	56000	3200	149.0	211.5	62.5	217.2	68.2
2020	90000	6000	139.9	201.6	61.7	206.8	66.9
2060	90000	6000	140.4	200.2	59.8	205.9	65.5
2020	148000	9000	137.1	196.5	59.4	201.7	64.6
2060	148000	9000	136.3	195.6	59.3	201.3	65.0

Average value = $3,484/ton, 13 day advantage, 8.5%
Source: BST/RLA

Table 4.62

Relative Landbridge costs
Asia to East Coast

Asia	DWT	TEU	USWC Total	USEC Total	w/out tolls Comp 1	Total	w/ tolls Comp 2
2020	20700	2200	269.5	291.1	21.6	296.3	26.8
2060	20700	2200	281.5	293.7	12.2	299.4	17.9
2020	32700	2700	233.1	240.8	7.7	246.0	12.9
2060	36400	2800	237.0	238.7	1.6	244.4	7.3
2020	48080	3200	229.5	236.2	6.7	241.4	11.9
2060	56000	3200	229.3	230.6	1.3	236.3	7.0
2020	90000	6000	213.8	217.3	3.5	222.5	8.7
2060	90000	6000	218.4	216.4	-2.0	222.1	3.7
2020	148000	9000	208.6	211.2	2.6	216.4	7.8
2060	148000	9000	210.0	209.9	-0.1	215.6	5.6

Average value = $10,000/ton, 17 day advantage, 8.5%
Source: BST/RLA

Relative Landbridge costs
Asia to Midwest

Asia	DWT	TEU	USWC Total	USEC Total	Comp 1	Total	Comp 2
2020	20700	2200	245.5	317.4	71.9	322.6	77.1
2060	20700	2200	252.5	319.9	67.4	325.6	73.1
2020	32700	2700	209.1	267.1	58.0	272.3	63.2
2060	36400	2800	208.0	264.9	56.9	270.6	62.6
2020	48080	3200	205.5	262.5	57.0	267.7	62.2
2060	56000	3200	200.3	256.8	56.5	262.5	62.2
2020	90000	6000	189.8	243.6	53.8	248.8	59.0
2060	90000	6000	189.4	242.6	53.2	248.3	58.9
2020	148000	9000	184.6	237.5	53.0	242.7	58.2
2060	148000	9000	181.0	236.1	55.1	241.8	60.8

Average value = $10,000/ton, 17 day advantage, 8.5%
Source: BST/RLA

However, the savings are fairly close for intermodal service without tolls (i.e.,, between $1.50 and $11.2 per ton). Erosion of the time advantage could divert some of this cargo back to all water service.

Conclusions on DST Capabilities. As a result of the above analysis, the following levels of container cargo have been shifted from landbridge to all water services :

Table 4.63

Diversion of Cargo from Landbridge to All Water (Million of Tons)

Trade Route/Year	Status Quo	Improved	Change	% of Mini-landbridge
Asia				
2020	26.1	29.0	2.9	16.0%
2060	29.8	34.8	5.0	17.0%
Europe				
2020	5.2	6.2	1.0	50.0%
2060	5.7	7.0	1.3	50.0%

Source: BST Associates, WEFA

5.1 ANALYSIS OF WORLD BILATERAL TRADE RELATIVE TO THE PANAMANIAN ISTHMUS

Introduction

The analysis of world bilateral trade relative to the Panamanian Isthmus is the pivotal exercise in this study. The purpose of this analysis is to determine the level of **Panama potential trade**, namely the flow of commodities that would transit the Isthmus of Panama in the absence of any physical, economic or other impediment.

The term **bilateral trade** refers to the total trade between two countries. **Potential trade**, in this study, refers to that part of bilateral trade that represents the maximum possible commodity flow through the Isthmus. Potential trade, therefore, is that part of the bilateral trade that might have gone or may, in the future, go through the Isthmus in the absence of any impediment.
The approach of this study has been to determine potential trade on a mileage basis. That is, we examined the historical 1990 bilateral trade in sufficient detail to make possible country-to-country and port-to-port mileage comparisons between each Panama Canal route and the shortest alternative route.

Beyond the scope of this study were estimates of changes that would occur in **bilateral trade** if there were no physical, economic or other impediment to maritime traffic across the Panamanian Isthmus. Both the historical and forecast bilateral trade, that is the total trade between pairs of countries, were estimated assuming the existing Panama Canal to be in place.

If we had taken it into consideration in the Potential Trade Analysis, the effect of removing the Isthmus as an impediment to world trade would be two-fold. First, the reduced cost of the Isthmus route and its availability to ships larger than can now transit the Panama Canal would shift patterns of bilateral trade. To name one example, the share of Colombian coal going to Asian markets would probably rise relative to the share going to European markets.

Secondly, the reduced overall costs of transportation would have the effect of increasing consumption, production, or, more probably, both. As we have noted, neither of these effects have been addressed in this study because they are judged to be small overall. However, for some trades, such as the Colombian example, they might not be.

Using the mileage basis alone ignores another factor in world trade. Most general cargo ships operate on regular routes, picking up cargo at any one port along the route and dropping it at another. The economics of this "liner trade" are such that shipping rates may not be a simple function of mileage. A relatively small cargo may cost less to ship on a longer route through the Canal than on a shorter route that is not regularly travelled.

For this reason, we observe a small amount of trade on routes whose mileage **is longer** through the Canal. This is shown in Table 5.1, where we summarize the results of the analysis by route table for the aggregate routes in the study (see Table A.9).

TABLE 5.1 BILATERAL AND POTENTIAL TRADE ANALYSIS FOR 1990, TOTALS EACH ROUTE, THOUSAND TONNES

ORIGIN	DESTINATION	BILATERAL TRADE	PANAMA CANAL TRADE	POTENTIAL TRADE	NON-POTENTIAL TRADE	RATIO: POTENTIAL TO BILATERAL
Routes for which all mileages through the Canal are greater						
AFRICA	ASIA	18,330	1	0	18,330	0.0%
AFRICA	OCEANIA	835	127	0	835	0.0%
ASIA	EUROPE	43,767	368	0	43,767	0.0%
EUROPE	ASIA	51,865	494	0	51,865	0.0%
TOTAL		114,797	990	0	114,797	0.0%
PERCENT OF GRAND TOTAL		28.7%	0.6%	0.0%	56.0%	
TOTAL NON-POTENTIAL AS A PERCENT OF GRAND TOTAL BILATERAL					28.7%	
Routes for which most mileages through the Canal are greater						
OCEANIA	EUROPE	45,590	758	729	44,862	1.6%
S. AMERICA E.C.	OCEANIA	768	4	87	681	11.3%
MIDDLE EAST	U.S. W.C., HAWAII	574	73	73	501	12.8%
OCEANIA	S. AMERICA E.C.	2,302	534	561	1,741	24.4%
EUROPE	OCEANIA	3,023	1,045	942	2,081	31.2%
S. AMERICA E.C.	ASIA	49,440	1,954	20,657	28,782	41.8%
TOTAL		101,697	4,367	23,049	78,648	22.7%
PERCENT OF GRAND TOTAL		25.4%	2.8%	11.8%	38.4%	
TOTAL NON-POTENTIAL AS A PERCENT OF GRAND TOTAL BILATERAL					19.6%	
Routes for which some mileages through the Canal are greater						
OCEANIA	U.S. EAST COAST	4,899	3,704	3,940	959	80.4%
ASIA	U.S. EAST COAST	16,387	12,894	13,304	3,084	81.2%
ASIA	S. AMERICA E.C.	270	252	229	42	84.6%
AFRICA	U.S. W.C., HAWAII	162	124	144	17	89.4%
U.S. EAST COAST	ASIA	73,474	53,976	66,247	7,227	90.2%
S. AMERICA E.C.	U.S. W.C., HAWAII	1,872	2,238	1,808	64	96.6%
U.S. EAST COAST	OCEANIA	3,140	2,790	3,107	33	98.9%
S. AMERICA E.C.	CANADA WEST COAST	111	158	110	1	99.0%
U.S. W.C., HAWAII	AFRICA	1,669	1,452	1,663	6	99.6%
TOTAL		101,983	77,587	90,550	11,433	88.8%
PERCENT OF GRAND TOTAL		25.5%	49.2%	46.3%	5.6%	
TOTAL NON-POTENTIAL AS A PERCENT OF GRAND TOTAL BILATERAL					2.9%	
Routes for which no mileages through the Canal are greater						
U.S. W.C., HAWAII	S. AMERICA E.C.	350	344	350	0	100.0%
AFRICA	C. AMERICA W.C.	239	239	239	0	100.0%
AFRICA	CANADA WEST COAST	811	788	811	0	100.0%
AFRICA	S. AMERICA W.C.	81	81	81	0	100.0%
ASIA	CANADA EAST COAST	510	534	510	0	100.0%
ASIA	CENTRAL AMERICA E.C.,	1,548	1,642	1,548	0	100.0%
C. AMERICA W.C.	AFRICA	107	107	107	0	100.0%
C. AMERICA W.C.	CENTRAL AMERICA E.C.,	705	705	705	0	100.0%

TABLE 5.1 BILATERAL AND POTENTIAL TRADE ANALYSIS FOR 1990, TOTALS EACH ROUTE, THOUSAND TONNES (Continued)

ORIGIN	DESTINATION	BILATERAL TRADE	PANAMA CANAL TRADE	POTENTIAL TRADE	NON-POTENTIAL TRADE	RATIO: POTENTIAL TO BILATERAL
C. AMERICA W.C.	EUROPE	1,057	1,057	1,057	0	100.0%
C. AMERICA W.C.	S. AMERICA E.C.	160	160	160	0	100.0%
C. AMERICA W.C.	U.S. EAST COAST	3,716	1,669	3,716	0	100.0%
CANADA EAST COAST	ASIA	4,969	1,718	4,969	0	100.0%
CANADA EAST COAST	C. AMERICA W.C.	31	32	31	0	100.0%
CANADA EAST COAST	OCEANIA	175	140	175	0	100.0%
CANADA EAST COAST	S. AMERICA W.C.	334	236	334	0	100.0%
CANADA EAST COAST	U.S. W.C., HAWAII	10	52	10	0	100.0%
CANADA WEST COAST	AFRICA	1,292	1,716	1,292	0	100.0%
CANADA WEST COAST	CENTRAL AMERICA E.C.,	83	96	83	0	100.0%
CANADA WEST COAST	EUROPE	8,658	7,260	8,658	0	100.0%
CANADA WEST COAST	MIDDLE EAST	263	263	263	0	100.0%
CANADA WEST COAST	S. AMERICA E.C.	1,302	552	1,302	0	100.0%
CANADA WEST COAST	U.S. EAST COAST	1,052	1,054	1,052	0	100.0%
CENTRAL AMERICA E.C.,	ASIA	1,825	2,071	1,825	0	100.0%
CENTRAL AMERICA E.C.,	C. AMERICA W.C.	1,004	1,004	1,004	0	100.0%
CENTRAL AMERICA E.C.,	OCEANIA	24	24	24	0	100.0%
CENTRAL AMERICA E.C.,	S. AMERICA W.C.	804	804	804	0	100.0%
CENTRAL AMERICA E.C.,	U.S. W.C., HAWAII	1,232	1,232	1,232	0	100.0%
EUROPE	CANADA WEST COAST	250	463	250	0	100.0%
EUROPE	S. AMERICA W.C.	1,176	1,973	1,176	0	100.0%
EUROPE	U.S. W.C., HAWAII	3,393	3,500	3,393	0	100.0%
EUROPE	C. AMERICA W.C.	756	848	756	0	100.0%
OCEANIA	CANADA EAST COAST	158	521	158	0	100.0%
OCEANIA	CENTRAL AMERICA E.C.,	311	312	311	0	100.0%
S. AMERICA E.C.	C. AMERICA W.C.	1,868	1,868	1,868	0	100.0%
S. AMERICA E.C.	S. AMERICA W.C.	2,098	2,098	2,098	0	100.0%
S. AMERICA W.C.	AFRICA	137	137	137	0	100.0%
S. AMERICA W.C.	CANADA EAST COAST	481	41	481	0	100.0%
S. AMERICA W.C.	CENTRAL AMERICA E.C.,	5,627	5,627	5,627	0	100.0%
S. AMERICA W.C.	EUROPE	7,443	6,383	7,443	0	100.0%
S. AMERICA W.C.	S. AMERICA E.C.	485	229	485	0	100.0%
S. AMERICA W.C.	U.S. EAST COAST	8,250	7,993	8,250	0	100.0%
U.S. EAST COAST	C. AMERICA W.C.	4,170	4,332	4,170	0	100.0%
U.S. EAST COAST	CANADA WEST COAST	121	210	121	0	100.0%
U.S. EAST COAST	S. AMERICA W.C.	4,378	4,053	4,378	0	100.0%
U.S. EAST COAST	U.S. W.C., HAWAII	1,422	1,422	1,422	0	100.0%
U.S. W.C., HAWAII	CANADA EAST COAST	212	190	212	0	100.0%
U.S. W.C., HAWAII	CENTRAL AMERICA E.C.,	392	392	392	0	100.0%
U.S. W.C., HAWAII	EUROPE	5,475	5,626	5,475	0	100.0%
U.S. W.C., HAWAII	U.S. EAST COAST	996	996	996	0	100.0%
TOTAL		81,941	74,795	81,941	0	100.0%
PERCENT OF GRAND TOTAL		20.5%	47.4%	41.9%	0.0%	
GRAND TOTAL		400,418	157,739	195,541	204,878	48.8%

In this study, the term **bilateral trade** normally refers to the trade on the Canal routes shown in Table 5.1, rather than the global total of bilateral trade. In the data used in this study, the global world trade total in 1990 was 2.59 billion tonnes, but this excludes non-OECD, non-OECD trade on non-Canal routes. According to OECD estimates (**Maritime Transport 1990**) total 1990 world seaborne trade was 4.06 billion tonnes.

As shown in Table 5.1, in 1990 that part of total bilateral trade that flows on the Canal routes amounts to 0.40 billion tonnes, just 10% of the world total, the potential Panama trade amounts to 0.20 billion tonnes or 5% of world trade, and the actual trade through the Canal is 3.9% of world trade. The potential trade for the Canal is relatively small in world terms because the Canal is not in an advantageous geographical location for the bulk of world trade.

In our measurement of total potential trade from the 1990 data, we obtained a figure less than half of the total bilateral trade over routes for which trade is observed through the Canal. As shown in Table 5.1, this is the result of the following situation.

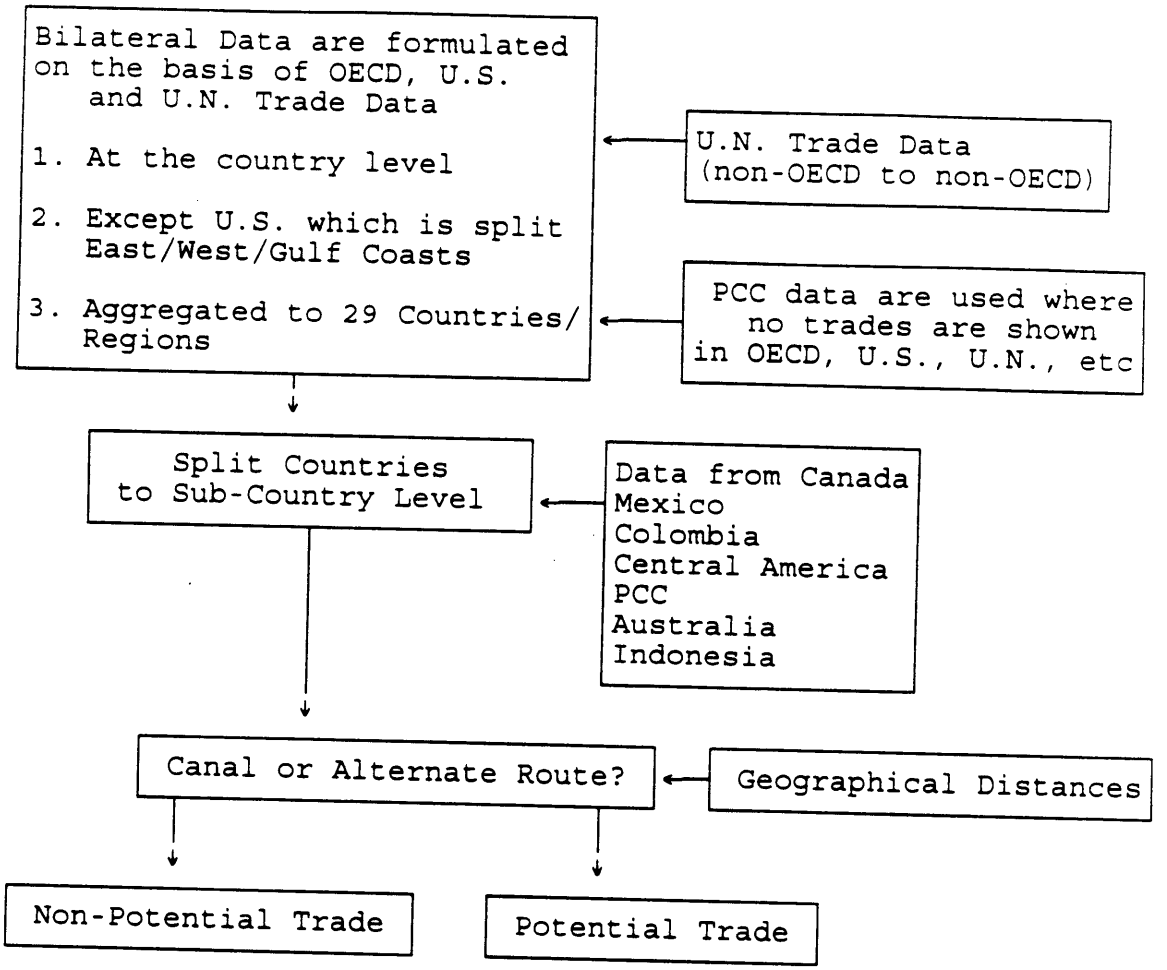
There are routes on which Canal commodity flows are observed, but for which the Canal is **not the shortest route**. A conspicuous example is trade between Europe and Asia. For no pair of countries or ports in the Europe-Asia trade is the mileage through the Canal shorter. In terms of bilateral trade, this is a very large number. In terms of potential trade it is zero. The trade between Europe and Asia alone accounts for 24% of the total of bilateral trade over all Canal routes.

A second factor is that bilateral trade is always reported on a country-to-country basis. To determine potential trade, bilateral trade for many countries must be split between coasts or ports of individual countries. For example, Canada, Mexico, Central America and Colombia all have east and west coasts with respect to the Canal. Canada is particularly important in this regard as nearly all trade between Canada and Asia is from the west coast of Canada, and nearly all to Europe from the east coast.

Analysis of the 1990 Historical Data

The approach that we have used in determining potential Panama Canal trade is outlined diagrammatically in Figure 1. We began with the data in the WEFA Trade Analysis Service, which contain nearly 20 years of annual data on bilateral trade between the OECD countries and the rest of the world. This is based on the OECD Series C Trade Data and the U.S. Waterborne Trade Data. These data were first aggregated to the 14 commodities of the study (see Appendix Table A.7) from the 150 commodities in the database (Tables A.2 and A.3). Further, they were aggregated from the 50 countries and regions in the database to the 21 countries and regions shown in Table A.4, plus Brazil, Argentina, Chile, Saudi Arabia, Japan, Australia, Singapore and Thailand.

FIGURE 5.1 APPROACH TO ANALYZING THE 1990 HISTORICAL DATA



To these data, we added United Nations data for bulk trades on Panama Canal routes and PCC data for the remaining non-OECD, non-OECD routes. We estimated the non-OECD, non-OECD trades in this way because only the bulk trades travel in ships which cannot pass the existing Canal. The PCC data are thus the best estimate of potential Canal trade for these other commodities.

To this point in our analysis, the bilateral trade was between countries. To determine potential Panama trade, the trade of countries of the Western Hemisphere had to be split between East and West Coasts, and splits of countries and regions in Asia and Oceania had also to be made. Further, Chile and Brazil had to be split by port.

Unlike other countries and regions, U.S. trade is already split between coasts in our data set. For Canada, we use port data from Statistics Canada, aggregated to the East and West Coasts. For Mexico, Central America and Columbia, we used a combination of data sources to split the data. For goods traded in ships that are much smaller than the current Canal, the best source was the PCC data. As before, for the bulk trades we used country and other source data. For Mexico through Colombia the distances of the alternate routes are so much longer that there is no question that the PCC data are an accurate representation of the total potential trade on these routes.

In Saudi Arabia, Indonesia (part of Southeast Asia NEC), and Australia, splits in bulk trades needed to be made for such trades as Bauxite/Alumina and Crude Oil. Most of this was done by inference, based on the size of the ships involved and the knowledge as to where the ports involved in these trades are located.

An example of this inferential approach is the Australia to East Coast United States trade in Alumina/Bauxite. From the East Coast of Australia to both New York and New Orleans, the Panama route is the shortest. From the West Coast of Australia to New York, the routes via both Cape of Good Hope and Suez are shorter than Panama. However, the choice of a route to be taken depends on the tolls charged for going through the Suez. For West Coast Australia to New Orleans, Panama is shorter.

Therefore, in this example, all trade from Australia to the U.S. Gulf coast would be potential trade through Panama Canal, but only that portion from the East Coast of Australia would be potential Panama trade for the U.S. East Coast. The data we needed to split this are proprietary, therefore unavailable, and thus we had to use inference.

Industry sources told us that all movements of Bauxite/Alumina are in ships from around 40,000 DWT up to Panamax and none in ships larger than can pass through the Panama Canal. The PCC data show that 1.6 million tonnes transited in 1990 on the route Australia to U.S. East Coast. The bilateral trade data show that 2.5 million tonnes total came from Australia to the U.S. East Coast. Since all of the Alumina/Bauxite trade was on ships that could transit the Canal and whose rates are based on mileage, we infer that the 1.6 million tonnes were from the East Coast of Australia, for which the mileage is shorter, and the remainder of the bilateral trade, 0.9 million tonnes, from the West Coast of Australia. The former is potential Panama trade and the latter is non-potential.

The detailed results of this analysis are presented in Volume III of this study. In Table 5.2, we give the aggregate results of the analysis by commodity. For all of those commodities that travel in ships that can transit the present Canal, potential trade and Panama Canal trade should be identical, except for the effects of liner trade. Unfortunately, this is not the case because of differences between the PCC data and the country, OECD, and U.N. sources that we have used.

TABLE 5.2 BYPASS TRADE ANALYSIS

	TOTAL BILATERAL TRADE			NON-POTENTIAL TRADE			POTENTIAL TRADE			PANAMA CANAL TRAD		
COMMODITY	1990	2020	2060	1990	2020	2060	1990	2020	2060	1990	2020	2060
IRON ORE	74,827	198,428	216,752	54,771	147,545	159,350	20,056	50,883	57,401	581	1,362	20
BAUXITE/ALUMINA	7,123	18,188	13,276	4,217	8,700	7,869	2,906	9,489	5,407	2,906	9,489	28
CRUDE PETROLEUM	12,540	25,244	24,692	2,918	6,236	8,144	9,621	19,008	16,548	9,621	5,008	45
COAL & COKE	66,990	144,336	190,271	40,233	80,539	107,527	26,757	63,796	82,743	10,978	5,507	3,41
BULK GRAINS	28,560	49,524	78,304	5,032	5,167	11,401	23,528	44,356	66,903	23,528	44,356	56,60
FERTILIZERS	19,801	20,431	41,906	6,360	12,734	23,172	13,440	7,697	18,735	13,009	8,229	8,59
BULK CHEMICALS	13,136	38,582	59,939	5,575	16,097	26,265	7,561	22,486	33,674	6,967	22,920	32,16
PETROLEUM PRODUCTS	24,122	32,429	30,023	7,980	15,109	20,808	16,142	17,320	9,215	12,490	16,995	4,14
OILS AND FATS	4,622	9,519	16,510	3,623	7,725	13,010	999	1,794	3,500	729	1,449	1,99
REFRIGERATED CARGO	7,805	18,607	29,674	2,091	4,753	7,477	5,713	13,854	22,197	5,389	13,614	18,49
VEHICLES	4,336	6,866	6,344	2,599	4,454	3,745	1,737	2,413	2,598	1,647	2,317	1,80
MINOR BULKS	77,341	120,147	199,917	33,712	50,442	85,243	43,628	69,705	114,674	36,806	57,404	49,80
CONTAINERIZED CARGO	56,795	134,673	218,295	35,201	86,401	148,981	21,594	48,272	69,314	20,840	46,835	54,31
GENERAL CARGO	3,084	7,351	13,742	564	1,364	2,315	2,520	5,987	11,426	11,980	30,477	44,25
TOTAL	401,080	829,520	1,139,644	204,877	447,267	625,307	196,203	377,060	514,337	157,472	265,962	276,529
MAJOR BULKS	190,039	435,720	523,295	107,171	248,187	294,289	82,868	187,533	229,003	47,615	65,722	60,968
CONTAINERS	56,795	134,673	218,295	35,201	86,401	148,981	21,594	48,272	69,314	20,840	46,835	54,313
OTHER	154,246	259,127	398,054	62,505	112,679	182,038	91,741	141,255	216,020	89,018	153,406	161,247

The difficulty is that as soon as one gets away from the bulk trades the PCC data show sharp differences from the international data used in the bilateral trade analysis. These differences have four sources:

1. Containerization - WEFA estimated the containerization of general cargo in the historical data based on surveys and other information. In general, containerization of internationally traded commodities is not given in the data. On the other hand, the PCC provides data on total tonnes containerized, without indicating what specific goods are in the containers.

2. Definitional differences - the PCC has its own unique definitions of commodities. Under the leadership of the United Nations, the country data that form the basis for the bilateral trade forecasts, have moved toward a "harmonized" commodity code. This allows trade data from one country to be compared in a unique way with those from any other. As the PCC has not shifted to an internationally accepted commodity coding basis, significant differences can be expected to arise for many of the commodities.

3. Assignment differences - We have assigned Panama cargoes to major categories based in large part on the type of ship in which the PCC shows the cargo being carried. In assigning the cargoes in the bilateral trade data, we have made every effort to be consistent with the PCC, but differences inevitably arise.

4. Differences in data sources - No two data sources ever agree, in part for the two reasons just noted, and differences always arise. The bilateral trade data are, at base, derived from customs data of the individual countries. The PCC is an entirely separate entity and cannot be expected to use the same definitions, etc., and the individual countries.

These issues are important for the forecasting process. The base data for the commodity forecasts have to be the PCC data to be consistent with data on cargoes and ship transits. However, the data show large differences in definition between the bilateral trade data and the PCC data. For this reason, we use growth rates rather than the levels of the potential trade forecasts for other than bulk trades.

5.2 Approach to the Development of Vessel Transits for 2020 and 2060

5.2.1 Commodity and Cargo Flows

The general approach which we have used in this study is outlined in Figure 1.2 "Panama Canal Vessel Transit and Commodity Flow Methodology". Our first step is a constant-share projection of Panama Canal Commodity Flows. To accomplish this, we first put the Panama Canal and world trade commodity flows on the same commodity and trade route basis. The commodity and route definitions are provided in Tables A.1 through A.10 of Appendix A. Because there are 7 origin/destinations to the east of the canal and 6 to the west in Table A.8, there are 42 combinations and thus 42 potential northbound and 42 southbound routes (see Table A.9).

To accomplish the constant-share projection, the growth rates for the world trade forecast were used to project Panama Canal trade for each commodity and route. This provides a first-cut projection of Panama Canal commodity flows for 2020 and 2060 before adjustment for bypass traffic.

This first-cut commodity flow forecast was then transformed to a cargo forecast by applying the commodity allocations derived from the analyses of actual PCC data for 1990 together with other data maintained by WEFA, RLA and BST relating commodity flows to ship types and sizes. This provides a forecast of cargo tonnage for each route by ship type.

5.2.2 Distribution of Ship Transits

The second part of this approach relies on the detailed analyses of actual 1990 Panama Canal transits to determine the average and total DWT in each size range. This provided two sets of parameters:

- average DWT by size range and ship type on each route, and
- percentage distribution of total DWT across size range for each ship type on each route.

The average DWT and the percentage distribution of tonnage were then shifted according to the world fleet forecast as described in Section 3.3.

5.2.3 Ship Utilization

Analysis of the 1990 commodity flow and ship transits through the Panama Canal also provided information on the utilization of vessel carrying capacity by ship type, size and route. The was measured simply by expressing the cargo tonnes carried by the deadweight of ships within each ship type, size and route. To avoid distortions in the development of forecast transits for 2020 and 2060 it has been assumed that these same utilization factors would apply in the future.

Where new vessel sizes are introduced into the transit forecasts for the 150,000 DWT, 200,000 DWT and 250,000 DWT maximum ship design cases, it has been assumed that the utilization factor will be the same as that observed currently for the largest vessel of the type already operating on the given route, provided that this is considered to be realistic. Generally the utilization factors derived from the analysis of 1990 Canal transits appear realistic. Where this has not been the case, or where data are sparse, utilization factors for new ship sizes have been determined with reference to the average utilization for all ship sizes for a given type within a route, the average for all ships of a similar type and size operating on other routes in the same direction or general industry experience.

The relationships established between cargo flows and transits by ship type, based on actual 1990 data, form the basis for future projections of laden transits for each time period and case. Modifications to these relationships which arise in future are due to potential changes in the average DWT of each vessel within a size range by ship type and in the percentage allocations of total DWT tons to each size range within a ship type. This is discussed in more detail in the section on "decisions rules" below. Modifications also arise due to the switching of cargo between general cargo ship types over time.

5.2.4 Ballast Transits

The approach that we have adopted is to project ballast transits on the basis of aggregate data by using actual PCC data to try and establish, through statistical techniques, a relationship between the numbers of laden and ballast transits.

Looking at the results of our statistical analyses of historical transit data, it is evident that, to the extent that any correlation exists, there is a closer relationship for any given ship type between laden transits in one direction and ballast transits in the opposite direction than there is taking laden and ballast movements in the same direction. However, with the exception of tankers northbound laden/southbound ballast, correlations are insufficiently robust for forecasting purposes and even in this case developments followed divergent trends during 1989-90.

For all ship types it is concluded that the 1990 PCC ratios of northbound ballast to southbound laden transits and southbound ballast to northbound laden transits should be used to project future ballast transits from forecasts of laden transits by ship type.

5.2.5 Decision Rules

We have developed a set of generalized "decision rules" in order to assess the extent to which numbers of vessel transits will be affected by changes in the size and composition both of the world fleet and those ships transiting the Canal. Potential changes in ship size are also a consideration when evaluating the future capacity of the Canal under different cases. These decision rules, which we describe below, have been applied to all ship types. In specific instances, the decision rules have been over-ridden where it is deemed appropriate because of the changing structure of individual shipping sectors. These instances are described in the discussion of individual ship types.

As befits a study involving long term forecasting but encompassing only one economic/technological scenario to describe global developments, moderately conservative, consensus views have been adopted.

Attention has been focussed on two issues:

- the potential changes in the average DWT of each vessel within a size range by ship type, and

- the potential changes in percentage allocations of total deadweight tons to each size range within a ship type.

Within both considerations, attention has been given to the information provided in the 1990 Panama Canal transit database, developments in the world fleet for each ship type and the context of the former within the latter.

Analyses have been carried out for all of the cargo-carrying ship types included in the Panama Canal FY1990 database. The results of these analyses, both in terms of the world fleet and vessels utilizing the Canal, are provided in Section 3.3. Anticipated trends in average deadweight and size distribution for the world fleet have been discussed also in Section 3.3. Below, we comment on the potential trends in average deadweight and vessel size distributions of ships transiting the Canal.

5.2.6 Potential Changes in the Average Deadweight Tons of each Vessel within a Size Range

A review of historical global trends in the average deadweight of a ship type within a size range was first carried out. Where a statistically significant time trend or correlation with historical shipping demand was found, this relationship was applied to provide average global deadweights for 2020. Results were utilized for the Panama Canal average "transit deadweight" both northbound and southbound in 2020. This approach ensures that Panama Canal trades and transit demand are viewed within the context of global developments.

It should be noted that, for some vessels significant historical trends were established that could not be used for future developments because of the extreme nature of results from the application of historical trends to long-term forecasts. In these instances, the trend was modified in the light of market research, the developing structure of individual trades and calculations of economies of scale for individual ship types and sizes. As discussed in Section 3, vessel size trends were discussed with a number of experts. This augmented in-house RLA information.

If no significant global trends could be established, we reviewed trends in recent vessel deliveries and current newbuildings. The global trend in current newbuildings and recent deliveries (if any) was substituted as the average for 1990. This broadly reflects our established methodology which takes the best current technological practice as a starting point for reviewing the average technological developments by ship type (hull form, speed and consumption, changes in automation).

The weighted average deadweight of northbound and southbound transits for each ship type within a given size range from the synthesized FY1990 transit database was calculated. If this average deadweight was in excess of the average deadweight from the current world fleet, then:

- either the trend analyses established globally were applied to the Panama Canal average deadweights or,

- the weighted average deadweights through the Panama Canal in 1990 were used for 2020.

The decision on which of these two approaches was taken depended upon the following.

- If trades through the Canal relevant to a specific ship type were major arterial routes compared to the global range of trades for the ship type, then any trend established globally was applied to the Panama Canal weighted average deadweight.

- If Panama Canal trades appeared to broadly reflect global trades, and no trend could be established for changes in average deadweight, then the weighted average deadweight from 1990 was used for 2020.

5.2.7 Potential Changes in the Percentage Allocation of Total Deadweight Tons to each Size Range within a Ship Type.

Historical trends in the proportion of the global fleet by ship type occupied by individual size ranges of vessel by ship type were reviewed. The development of ton-miles demand for ships of varying sizes globally to 2020 were also reviewed. Where a statistically significant time trend or correlation with historical shipping demand was found, the resulting relative changes globally were applied on a route-by-route basis to the 1990 transit database. Application of global trends was necessarily modified when the relative proportions of deadweight tonnage in each size category for Canal transits in 1990 did not uniformly reflect the size distribution of individual ship types globally in 1990, not least because of the existing Canal size constraints.

As with the development of trends in average deadweights, some trend data were established that could not be applied to calculate future developments because of unacceptably exaggerated results. In these instances, the trend was modified in the light of our market research[1] and the developing structure of individual trades.

If no significant trends could be established that could reasonably be applied to transit data for a ship type/size range, the relative proportion was left unchanged from the 1990 database.

[1] A list of the companies with whom these issues were discussed is referenced in Chapter 8.

5.3 Analysis for Shifted Cargoes for Each Alternative Maximum Design Ship Size: No Tolls Scenario

5.3.1 Introduction

For all ship types relevant to the Panama Canal other than dry bulk carriers, oil tankers and fully cellular container ships, the maximum size of vessel in the world fleet is less than the current Canal dimensions, and this is expected to remain the case throughout the period under study (see Section 3). Thus, for container/break bulk ships, conventional general cargo vessels, reefers, RO-ROs, vehicle carriers, chemical carriers and liquefied petroleum gas carriers, the question as to whether or not these vessels trade through the Canal is not therefore an issue of ship size. Rather, it is a function largely of mileage, and also, to some extent, of ship itineraries.

This is the case, for example, with regard to chemical carriers, where the liner type services offered by ship owners lead to cargoes which move between ports for which the Panama Canal is the longer route, since these cargoes are being shipped in combination with other cargoes which on a mileage basis do logically transit the Canal (Table 5.3). Thus, some bulk chemicals cargoes are shipped from Europe to the Far East via Panama even though the mileage going East via the Suez Canal is shorter. Cargo from Europe to the Far East is loaded together with cargo from Europe being discharged in the U.S. Gulf. In the U.S. Gulf, vessels reload additional cargo for discharge in the Far East. This combination of ship movements is in itself part of a larger global trading pattern in which owners operate in order to optimize their logistics to match shippers' requirements and available employment opportunities. Similar considerations apply to fully cellular container ships which are discussed further in Section 5.3.4 below.

TABLE 5.3

ANALYSIS OF POTENTIAL BYPASS TRADE
EXAMPLE: BULK CHEMICALS EUROPE-ASIA

TRADE (mill tonnes)	BILATERAL	PANAMA CANAL	POTENTIAL	NON-POTENTIAL
Europe - Asia	3.8	0.2	-	3.8

REPRESENTATIVE MILEAGES VIA:	PANAMA CANAL	SUEZ CANAL
Rotterdam - Singapore	15296	8354
Rotterdam - Yokohama	12488	11246
Genoa - Singapore	15667	6433
Genoa - Yokohama	12859	9325

- Use of Panama route not justified on mileage basis, therefore, all bilateral trade defined as non-potential
- Vessel size not a consideration as no chemical carrier in current world fleet exceeds Panamax
- Trade which does go through Panama results from liner type service: Europe-U.S. Gulf-Japan/S. Korea/Taiwan
- Change in size of Canal will not result in any shift to/from Panama
- Trade via Panama assumed to grow at same rate as bilateral trade
- Despite mileage consideration some Panama trade retained

It follows that the only instances in which transportation economics need to be developed in order to determine potential shifts in traffic back to the Canal under different scenarios are those where the mileage through Panama represents the shorter route and where -- currently, or in the future -- larger-than-Panamax vessels can be used to transport commodities at lower costs on alternative routes. A thorough review of all potential bypass trade that might fall within this definition has been undertaken, the result of which the following trades were identified for further detailed evaluation.

Ship Type/Commodity	Route
Dry Bulk Carriers	
Coal	Southbound US East Coast to Far East US Gulf Coast to Far East Columbia to Far East
Coal	Northbound Canada West Coast to Europe Canada West Coast to Brazil
Iron Ore	Southbound North Brazil to Far East Venezuela to Far East East Coast Canada to Far East
	Northbound Chile to Europe
Oil Tankers	
Orimulsion	Southbound Venezuela to Far East
Fully Cellular Container Ships	
Containerized (Landbridge)	Southbound US East Coast to Far East Europe to US West Coast
	Northbound Far East to US East Coast US West Coast to Europe

Each of these routes is discussed in more detail below. The methodology adopted here follows the same approach as that applied under Phase I, with the important exception that all potential Panama Canal tolls have been excluded from consideration. While this is in accordance with the TOR and meets the requirements of the Financing Scheme, Financial Analysis and Management Arrangement Components Contractor, the resulting forecasts of trade switched through the Canal for the various options considered will likely exceed actual projections of trade once tolls are taken into account. The results of this part of the study cannot, without consideration of tolls, be taken as representing the potential shifted demand for Canal transits. It follows that the total amount of shifted cargo shown under Phase II, notwithstanding changes in overall trade volumes, is significantly less than that indicated under Phase I when Panama Canal tolls were included in freight cost comparisons on the assumption that they would rise from 1990 levels in line with projected shipping cost increases.

Other changes to the calculation of freight costs under Phase II take into account revised assumptions on ship deadweights that result from the use of the actual PCC data for 1990 and the introduction of two new size ranges from: 1)150,000 to 199,999 DWT, and 2) from 200,000 to 250,000 DWT. In addition, "at sea" inventory costs have been included. This represents the interest paid on the value of the capital tied up in the cargo while it is in transit between load and discharge areas, that is, the opportunity cost. While this would normally be low for bulk cargoes relative to other freight costs, for all other commodities inclusion of inventory costs will favor the shorter route when comparing alternatives.

5.3.2 Dry Bulk Carriers

Tables 5.4 to 5.11 summarize the total potential bypass trade split for each of the dry bulk carrier trades considered, and for each of the maximum size cases: Status Quo; 150,000 DWT; 200,000 DWT; and 250,000 DWT. The amount of cargo moving via the Canal and alternative routes are indicated by vessel size range. Also included for reference are the relevant voyage mileages specific to the trades reviewed and the transportation costs which have been used to determine the routing of cargoes. Table 5.12 summarizes all of the calculations that have been undertaken in order to determine the optimum freight costs for both Panama Canal and alternative routes. In contrast to the comprehensive series of freight costs that have been developed for use in determining the constrained transit forecast for the 2060 Status Quo Canal, in which costs were based on single voyage mileages, estimates developed here for dry bulk carriers include an element of ballast trading to reflect actual ship trading patterns.

(a) Coal from the US East and Gulf Coasts to the Far East

Table 5.4

ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC
COMMODITY: COAL ROUTE: USEC-ASIA
MILEAGE VIA PANAMA: 9748 MILEAGE VIA ALTERNATIVE: 15126 (HAMPTON ROADS)
MILEAGE VIA PANAMA: 9750 MILEAGE VIA ALTERNATIVE: 15707 (MOBILE)

Vessel Size (Kdwt) Range	Freight Cost Excluding Canal Tolls ($/tonne) Via Panama		Alternative		CANAL MAXIMUM SIZE: Status Quo		150,000 DWT		200,000 DWT		250,000 DWT	
From:	USEC	USG	USEC	USG	000 tonnes	%	000 tonnes	%	000 tonnes	%	000 tonnes	%
Year 2020												
40-65	n.a.	n.a.	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	15.2	n.a.	14.6	n.a.	1112	2.0%	1112	2.0%	1112	2.0%	1112	2.0%
100-150	10.5	10.1	13.6	13.9	37731	66.2%	55855	98.0%	55855	98.0%	55855	98.0%
150-200	9.5	9.1	12.2	12.5	16643	29.2%	0	0.0%	0	0.0%	0	0.0%
200-250	8.2	7.8	10.5	10.8	1482	2.6%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	n.a.	9.3	9.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL					1112	2.0%	56967	100.0%	56967	100.0%	56967	100.0%
TOTAL ON BYPASS ROUTE					55855	98.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL					56967	100.0%	56967	100.0%	56967	100.0%	56967	100.0%
Year 2060												
40-65	n.a.	n.a.	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	17.0	n.a.	16.3	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
100-150	11.4	10.9	14.8	15.2	0	0.0%	75051	100.0%	0	0.0%	0	0.0%
150-200	10.4	10.0	13.4	13.7	75051	100.0%	0	0.0%	75051	100.0%	75051	100.0%
200-250	8.9	8.6	11.5	11.8	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	n.a.	10.3	10.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL					0	0.0%	75051	100.0%	75051	100.0%	75051	100.0%
TOTAL ON BYPASS ROUTE					75051	100.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL					75051	100.0%	75051	100.0%	75051	100.0%	75051	100.0%

These two trades have been evaluated separately, since in Phase I, different results were obtained for the 100,000 DWT case. For the cases under Phase II the conclusions regarding whether or not trade is shifted are identical, therefore the combined results are presented here.

In 2020, total coal trade between the U.S. East and Gulf Coasts and the Far East is estimated at 57 million tonnes of which, under Status Quo conditions, 55.9 million tonnes is expected to be shipped on the alternative route, as the decline in Canal trade, which has been apparent from the early 1980s, continues into the future. The economic disadvantage of using Panamax-size tonnage via the Canal versus larger ships on alternative routes will remain, and the tendency for shippers to increase parcel sizes to reduce transportation costs will continue.

In 2020, only 2% of coal trade is assumed to be shipped in Panamax ships with some 66% in the 100,000-150,000 DWT size range, 29% in the 150,000-200,000 DWT range, and 3% in vessels between 200,000 and 250,000 DWT. However, utilization of ships above 150,000 DWT

assumes that vessels will continue to only be partly loaded at Hampton Roads, and that the attraction of using large dry bulk carriers will still be dependent on "topping off" in South Africa prior to sailing for the Far East. Direct sailings from Hampton Roads to the Far East will be restricted to vessels below 150,000 DWT.

For the 150,000 DWT Canal, the freight cost for exports from the U.S. East Coast (Hampton Roads) for dry bulk carriers between 100,000 and 150,000 DWT, at $10.5/tonne, are less than or equal to the estimated costs of using ships up to 250,000 DWT on alternative routes. For supplies from the U.S. Gulf (Mobile), the economics via the Canal are even more favorable at $10.1/tonne versus $10.8/tonne for the largest size vessel employed on the alternative route. Therefore, all the 57 million tonnes of coal trade between the U.S. East and Gulf Coasts is assumed to transit the Canal in the 150,000 DWT case, with 98% in vessels between 100,000 and 150,000 DWT, and the remainder continuing to move in Panamax tonnage.

For the 200,000 and 250,000 DWT cases in 2020, the conclusions are the same as for the 150,000 DWT Canal, based on the assumption that the largest ship that can be loaded will be in the 100,000-150,000 DWT size range.

By 2060, under Status Quo conditions, it is expected that all of the U.S. East/Gulf coal trade will have been shifted away from the Canal. For the 150,000 DWT case, the relative economics of using the Canal versus the alternative are similar to those for 2020, and therefore, 100% of the 75 million tonnes of coal moving on this route transit the Canal. For the 200,000 DWT Canal, this cargo is assumed to be shipped 100% via the Canal in vessels of between 150,000 DWT and 200,000 DWT as it is expected by this time that ships of this size will be the maximum capable of being fully loaded in the U.S. East and Gulf Coasts. No further change in size distribution is assumed for the 250,000 DWT case due to assumed vessel size limitations at U.S. ports.

(b) Coal from Colombia (S America EC) to the Far East

Table 5.5

ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC
COMMODITY: COAL ROUTE: COLOMBIA-JAPAN
MILEAGE VIA PANAMA: 8041 MILEAGE VIA ALTERNATIVE: 13834

Vessel Size (Kdwt) Range	Freight Cost Excluding Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo 000 tonnes	%	150,000 DWT 000 tonnes	%	250,000 DWT 000 tonnes	%	250,000 DWT 000 tonnes	%
Year 2020										
40-65	n.a.	n.a.	118	28.9%	0	0.0%	0	0.0%	0	0.0%
65-100	13.2	n.a.	0	0.0%	118	28.9%	118	28.9%	118	28.9%
100-150	9.6	14.5	198	48.3%	291	71.1%	146	35.6%	146	35.6%
150-200	8.5	12.8	93	22.8%	0	0.0%	146	35.6%	146	35.6%
200-250	7.3	11.0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	9.8	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			118	28.9%	410	100.0%	410	100.0%	410	100.0%
TOTAL ON BYPASS ROUTE			291	71.1%	0	0.0%	0	0.0%	0	0.0%
TOTAL			410	100.0%	410	100.0%	410	100.0%	410	100.0%
Year 2060										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	14.8	n.a.	143	28.9%	143	28.9%	143	28.9%	143	28.9%
100-150	10.4	15.6	0	0.0%	352	71.1%	0	0.0%	0	0.0%
150-200	9.3	14.1	352	71.1%	0	0.0%	352	71.1%	352	71.1%
200-250	8.0	12.1	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	10.8	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			143	28.9%	495	100.0%	495	100.0%	495	100.0%
TOTAL ON BYPASS ROUTE			352	71.1%	0	0.0%	0	0.0%	0	0.0%
TOTAL			495	100.0%	495	100.0%	495	100.0%	495	100.0%

Under Status Quo conditions in 2020, 29% of the total 0.4 million tonnes of potential coal bypass trade from Colombia to the Far East is assumed to transit the Canal with the remainder shipped via alternative routes, 48% in vessels between 100,000 dwt and 150,000 dwt and 23% in dry bulk carriers of between 150,000 dwt and 200,000 dwt. In the 150,000 dwt case, 2020, the freight cost via the Canal for a 134,700 dwt ship is estimated to be $9.6/tonne compared with $12.8/tonne for a 172,110 dwt carrier trading via the alternative route. Therefore the 71% of trade which under the Status Quo case went on the alternative route is shifted in the 150,000 dwt case into the 100,000 - 150,000 dwt size range via the Canal. For both the 200,000 dwt and 250,000 dwt cases all trade remains via the Canal but the size distribution becomes 29% in 65,000 - 100,000 dwt and just under 36% each in the 100,000 - 150,000 dwt and 150,000 - 200,000 dwt size ranges.

In 2060 under unrestrained status quo conditions, 29% of the total 4.9 million tonnes of potential bypass trade is estimated to move through the Canal and 71% on the alternative route. For the 150,000 dwt Canal case, based on transportation economics, and allowing for some vessel size upgrading in the period 2020-2060, it is projected that 100% of coal moving from Colombia to the Far East will be via the Canal in ships of 100,000 - 150,000 dwt. In the 200,000 dwt and 250,000 dwt Canal cases it is assumed that 71% of this trade will move in dry bulk carriers of between 150,000 dwt and 200,000 dwt, the maximum size of vessel that is assumed can be supported by the level of trade envisaged.

(c) Coal from Canada West Coast to Europe

In 2020 there are 2.6 million tonnes of potential bypass trade of which under Status Quo conditions 1.2 million tonnes (48%) is estimated to transit the Canal in Panamax tonnage with the remainder shipped on the alternative route, 16% in vessels of between 100,000 dwt and 150,000 dwt and 37% in carriers of 150,000 - 200,000 dwt. For the 150,000 dwt case, the freight cost for a 134,700 dwt vessel via the Canal is $11.9/tonne compared with $13.3/tonne for a 172110 dwt carrier on the alternative route. Therefore it assumed that the whole of this trade is routed via the Canal, 100% in the 100,000 - 150,000 dwt size range. Since Roberts Bank is fully equipped to handle large dry bulk carriers and it is the Panama Canal which represents the real size constraint for some shippers, it is expected that with a larger Canal the employment of what currently are Panamax size ships would disappear. For the 200,000 dwt and 250,000 dwt cases it is assumed that 70% of the total trade would shift up into the 150,000 - 200,000 dwt size range.

Table 5.6

ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC
COMMODITY: COAL ROUTE: CANADA WEST COAST-EUROPE
MILEAGE VIA PANAMA: 9008 MILEAGE VIA ALTERNATIVE: 14475

Vessel Size (Kdwt) Range	Freight Cost Excluding Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo 000 tonnes	%	150,000 DWT 000 tonnes	%	200,000 DWT 000 tonnes	%	250,000 DWT 000 tonnes	%
Year 2020										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	17.1	n.a.	1235	47.6%	0	0.0%	0	0.0%	0	0.0%
100-150	11.9	15.0	407	15.7%	2594	100.0%	778	30.0%	778	30.0%
150-200	10.5	13.3	952	36.7%	0	0.0%	1816	70.0%	1816	70.0%
200-250	9.1	11.5	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	10.2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			1235	47.6%	2594	100.0%	2594	100.0%	2594	100.0%
TOTAL ON BYPASS ROUTE			1359	52.4%	0	0.0%	0	0.0%	0	0.0%
TOTAL			2594	100.0%	2594	100.0%	2594	100.0%	2594	100.0%
Year 2060										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	19.1	n.a.	871	47.4%	0	0.0%	0	0.0%	0	0.0%
100-150	12.6	16.2	0	0.0%	1839	100.0%	0	0.0%	0	0.0%
150-200	11.5	14.6	967	52.6%	0	0.0%	1839	100.0%	1839	100.0%
200-250	9.9	12.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	11.3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			871	47.4%	1839	100.0%	1839	100.0%	1839	100.0%
TOTAL ON BYPASS ROUTE			967	52.6%	0	0.0%	0	0.0%	0	0.0%
TOTAL			1839	100.0%	1839	100.0%	1839	100.0%	1839	100.0%

By 2060, when the total potential bypass trade declines to around 1.8 million tonnes, it is estimated that in the Status Quo case just over 0.8 million tonnes will move through the Canal in 65,000 - 100,000 dwt ships with the balance being transported in vessels of between 150,000 dwt and 200,000 dwt on the alternative route. In the 150,000 dwt case, 100% of the potential bypass trade is estimated to be shifted through the Canal in 100,000 - 150,000 dwt size vessels, as for 2020. This becomes 100% in the 150,000 - 200,000 dwt size ranges in the 200,000 dwt and 250,000 dwt Canal cases.

(d) Coal from West Coast Canada to Brazil

In 2020, for the Status Quo Canal, just 5% of the estimated 0.9 million tonnes of potential bypass trade is expected to transit the Canal. The other 95% of trade is estimated to move on the alternative route in vessels of between 100,000 DWT and 150,000 DWT. For the 150,000 DWT case therefore this portion of trade is shifted via the Canal. With maximum Canal sizes of 200,000 DWT and 250,000 DWT and given the capability of Roberts Bank to accommodate the larger dry bulk carriers, it is assumed that approximately 47.5% of the total trade will move through the Canal in ships in the 150,000 to 200,000 DWT size range.

For the Status Quo case in 2060, 5% of the total potential bypass trade of 0.9 million tonnes is still expected to transit the Canal in Panamax ships. However gradual vessels size upgrading in the period 2020 - 2060 is expected to result in a complete shift in the trade via the alternative route from the 100,000 - 150,000 DWT size range to the 150,000 - 200,000 DWT size range. With the maximum Canal size at 150,000 DWT all of this trade would be shifted through the Canal since the estimated freight cost for a dry bulk carrier on this route, at $6.6/tonne is less than the estimated $8.1/tonne cost for a 172,800 DWT ship. It follows that the 200,000 DWT and 250,000 DWT Canal cases the whole of the potential bypass trade is calculated to transit the Canal. However, for both cases, 95% of this trade is expected to revert to the 150,000 - 200,000 DWT size range.

Table 5.7

ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC
COMMODITY: COAL ROUTE: CANADA WEST COAST-SOUTH AMERICA EAST COAST
MILEAGE VIA PANAMA: 7395 MILEAGE VIA ALTERNATIVE: 10362

Vessel Size (Kdwt) Range	Freight Cost Excluding Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo 000 tonnes	%	150.000 DWT 000 tonnes	%	200.000 DWT 000 tonnes	%	250.000 DWT 000 tonnes	%
Year 2020										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	9.1	n.a.	46	5.4%	46	5.4%	46	5.4%	46	5.4%
100-150	6.5	8.2	805	94.6%	805	94.6%	402	47.3%	402	47.3%
150-200	6.1	7.5	0	0.0%	0	0.0%	402	47.3%	402	47.3%
200-250	5.2	6.4	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	5.7	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			46	5.4%	851	100.0%	851	100.0%	851	100.0%
TOTAL ON BYPASS ROUTE			805	94.6%	0	0.0%	0	0.0%	0	0.0%
TOTAL			851	100.0%	851	100.0%	851	100.0%	851	100.0%
Year 2060										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	10.1	n.a.	49	5.5%	49	5.5%	49	5.5%	49	5.5%
100-150	7.0	8.8	0	0.0%	849	94.5%	0	0.0%	0	0.0%
150-200	6.6	8.1	849	94.5%	0	0.0%	849	94.5%	849	94.5%
200-250	5.6	7.0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	6.3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			49	5.5%	898	100.0%	898	100.0%	898	100.0%
TOTAL ON BYPASS ROUTE			849	94.5%	0	0.0%	0	0.0%	0	0.0%
TOTAL			898	100.0%	898	100.0%	898	100.0%	898	100.0%

(e) Iron Ore from North Brazil to the Far East

Table 5.8

ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC
COMMODITY: IRON ORE ROUTE: NORTH BRAZIL-ASIA
MILEAGE VIA PANAMA: 10253 MILEAGE VIA ALTERNATIVE: 12657

Vessel Size (Kdwt) Range	Freight Cost Excluding Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo 000 tonnes	%	150,000 DWT 000 tonnes	%	200,000 DWT 000 tonnes	%	250,000 DWT 000 tonnes	%
Year 2020										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	17.8	n.a.	352	0.8%	352	0.8%	352	0.8%	352	0.8%
100-150	12.4	13.6	4304	9.9%	14864	34.2%	4247	9.8%	4247	9.8%
150-200	11.5	12.6	10781	24.8%	0	0.0%	10617	24.4%	10617	24.4%
200-250	9.9	10.8	6477	14.9%	6521	15.0%	6521	15.0%	6521	15.0%
250-300	n.a.	9.5	15085	34.7%	15217	35.0%	15217	35.0%	15217	35.0%
300+	n.a.	7.4	6477	14.9%	6521	15.0%	6521	15.0%	6521	15.0%
TOTAL VIA PANAMA CANAL			352	0.8%	15217	35.0%	15217	35.0%	21738	50.0%
TOTAL ON BYPASS ROUTE			43124	99.2%	28259	65.0%	28259	65.0%	21738	50.0%
TOTAL			43476	100.0%	43476	100.0%	43476	100.0%	43476	100.0%
Year 2060										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	20.0	n.a.	426	0.9%	426	0.9%	425	0.9%	426	0.9%
100-150	13.5	14.8	0	0.0%	6687	14.1%	0	0.0%	0	0.0%
150-200	12.6	13.9	7065	14.9%	0	0.0%	6687	14.1%	6687	14.1%
200-250	10.8	11.9	11760	24.8%	11854	25.0%	11854	25.0%	11854	25.0%
250-300	n.a.	10.6	18778	39.6%	18967	40.0%	18967	40.0%	18967	40.0%
300+	n.a.	8.2	9389	19.8%	9484	20.0%	9484	20.0%	9484	20.0%
TOTAL VIA PANAMA CANAL			426	0.9%	7113	15.0%	7113	15.0%	18967	40.0%
TOTAL ON BYPASS ROUTE			46992	99.1%	40305	85.0%	40305	85.0%	28451	60.0%
TOTAL			47418	100.0%	47418	100.0%	47418	100.0%	47418	100.0%

While discussed at length in the preparation and presentation of the Final Report on the Commodity and Traffic Projections Study under Phase I it is important to restate here that the only iron ore trade between Brazil and the Far East that can be considered to be potential bypass trade is that which is shipped from Itaqui in northern Brazil and which is estimated to account for about 33% of the total trade. Therefore in 2020, out of an estimated total of 132 million tonnes of iron ore trade between Brazil and the Far East only 43 million tonnes can be considered as potential bypass trade.

Under Status Quo conditions in 2020, less than 1% is likely to move through the Canal. The Brazilian iron ore trades currently employ some of the world's largest dry bulk carriers and this will continue to be the case in the future. As a result potential bypass trade on non Panama routes under this scenario is estimated to move 10% in the 100,000 - 150,000 DWT size range; 25% in 150,000 - 200,000 DWT ships; 15% in 200,000 - 250,000 DWT vessels; almost 35% in carriers of 250,000 - 300,000 DWT and just 15% in ships of over 300,000 DWT.
For the 150,000 DWT Canal in 2020, the freight cost for a 134,700 DWT vessel via the Canal is $0.2/tonne lower than a 172,110 DWT ship on the comparable alternative route but

$1.6/tonne more than for a 220,620 DWT ship. Therefore is estimated that 35% of the potential bypass trade (15.2 million tonnes) will be shifted through the Canal, with approximately 14.9 million tonnes moving in vessels of between 100,000 DWT and 150,000 DWT and just 0.3 million tonnes continuing to be transported in ships below 100,000 DWT. The remaining 43.5 million tonnes of potential bypass trade will continue to move on alternative routes in ships over 200,000 DWT in the same proportions as under Status Quo conditions.

Enlarging the Canal to accommodate 200,000 DWT vessels in 2020 would not cause any further shift in this trade. The estimated representative freight cost for a 172,110 DWT ship through the Canal is greater than that for a 220,620 DWT dry bulk carrier on alternative routes. The only change versus the 150,000 DWT case is that 10.6 million tonnes of cargo estimated to transit the Canal is shifted back to the 150,000 - 200,000 DWT size range.

In the 250,000 DWT Canal case in 2020 an additional 6.5 million tonnes of cargo is estimated to be shifted through the Canal in the 200,000 - 250,000 DWT size range. As a result 50% of the total potential bypass trade is expected to transit the Canal in this case. No further Shift is anticipated since the representative freight coast for a 220,620 DWT ship through the Canal is slightly greater than that for a 268,345 DWT vessel on alternative routes.

By 2060 total potential bypass trade is estimated at about 47.4 million tonnes out of a total 143.7 million tonnes of Brazilian iron ore trade to the Far East. As for 2020, under Status Quo conditions, less than 1% of this trade is expected to transit the Canal. However, due to an expected gradual increase in the size of dry bulk carrier on this route, resulting in a greater proportion of cargoes being shipped in vessels above 250,000 DWT (approximately 60% compared with 50% previously) the potential proportion of cargo that is likely to be shifted back to the Canal is less than that in 2020.

The relative shipping economics of transitting the Canal versus alternative routes in 2060 are similar to those in 2020. Similarly the only significant change in size distribution arises in the 150,000 DWT case where it is expected that cargo moving in 221,500 DWT ships on alternative routes would be shifted through the Canal in vessels of between 100,000 DWT and 150,000 DWT. Following is a summary of the estimated distribution of trade through the canal and on alternative bypass routes for each of the cases under review:

Case	Via Canal	million tonnes Via Alternative
Status Quo	0.4	47.0
150,000 DWT	7.1	40.3
200,000 DWT	7.1	40.3
250,000 DWT	19.0	28.4

(f) Iron Ore from Venezuela to the Far East

Table 5.9

ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC
COMMODITY: IRON ORE ROUTE: VENEZUELA-ASIA
MILEAGE VIA PANAMA: 9051 MILEAGE VIA ALTERNATIVE: 13787

Vessel Size (Kdwt) Range	Freight Cost Excluding Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo 000 tonnes	%	150,000 DWT 000 tonnes	%	200,000 DWT 000 tonnes	%	250,000 DWT 000 tonnes	%
Year 2020										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
100-150	11.7	14.3	1206	68.0%	1774	100.0%	0	0.0%	0	0.0%
150-200	10.4	12.7	568	32.0%	0	0.0%	1774	100.0%	1774	100.0%
200-250	8.9	10.9	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	9.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			0	0.0%	1774	100.0%	1774	100.0%	1774	100.0%
TOTAL ON BYPASS ROUTE			1774	100.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL			1774	100.0%	1774	100.0%	1774	100.0%	1774	100.0%
Year 2060										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
100-150	12.7	15.6	0	0.0%	615	50.0%	0	0.0%	0	0.0%
150-200	11.4	14.0	615	50.0%	0	0.0%	1231	100.0%	615	50.0%
200-250	9.8	12.0	615	50.0%	615	50.0%	0	0.0%	615	50.0%
250+	n.a.	10.7	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			0	0.0%	615	50.0%	1231	100.0%	1231	100.0%
TOTAL ON BYPASS ROUTE			1231	100.0%	615	50.0%	0	0.0%	0	0.0%
TOTAL			1231	100.0%	1231	100.0%	1231	100.0%	1231	100.0%

Currently no iron or from Venezuela to the Far East transits the Panama Canal. This is expected to remain the case in 2020 under Status Quo conditions when all of the 1.8 million tonnes of potential bypass trade is estimated to be shipped on alternative routes, 68% in vessels between 100,000 DWT and 150,000 DWT and 32% in ships in the 150,000 - 200,000 DWT size range. With the Canal expanded to accommodate ships up to 150,000 DWT, relative shipping economics indicate all potential bypass traffic would be shifted to the Canal, in this case in 100,000 - 150,000 DWT size vessels. For the 200,000 DWT and 250,000 DWT cases it is assumed that this 1.8 million tonnes of trade will move 100% via the Canal in ships of between 150,000 DWT and 200,000 DWT.

By 2060 the potential bypass trade is estimated to fall to around 1.2 million tonnes which under Status Quo conditions is expected to be transported via alternative routes, 50% in 200,000 - 250,000 DWT ships. As a result of this expected vessel size upgrading between 2020 and 2060, only 50% of this cargo is shifted to the Canal in the 150,000 DWT case. The estimated freight cost for a 140,475 DWT dry bulk carrier via the Canal is greater than that for a 220,620 DWT vessel on representative alternative routes. For the 200,000 DWT case, 100% of the potential bypass trade is shifted to the Canal, all of which is expected to be moved in vessels of between 150,000 DWT and 200,000 DWT. In the case of the 250,000 DWT Canal the size distribution

would revert to 50% in the 150,000 - 200,000 DWT size range and 50% int he 200,000 - 250,000 DWT group.

(g) Iron Ore from East Coast Canada to the Far East

Table 5.10

ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC
COMMODITY: IRON ORE ROUTE: CANADA EAST COAST-ASIA
MILEAGE VIA PANAMA: 10738 MILEAGE VIA ALTERNATIVE: 15480

Vessel Size (Kdwt) Range	Freight Cost Excluding Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo 000 tonnes	%	150,000 DWT 000 tonnes	%	200,000 DWT 000 tonnes	%	250,000 DWT 000 tonnes	%
Year 2020										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
100-150	10.7	13.3	465	27.0%	1256	73.0%	465	27.0%	465	27.0%
150-200	9.1	11.4	792	46.0%	0	0.0%	1256	73.0%	792	46.0%
200-250	7.9	9.8	465	27.0%	465	27.0%	0	0.0%	465	27.0%
250-300	n.a.	8.7	0	0.0%	0	0.0%	0	0.0%	0	0.0%
300+	n.a.	8.4	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			0	0.0%	1256	73.0%	1721	100.0%	1721	100.0%
TOTAL ON BYPASS ROUTE			1721	100.0%	465	27.0%	0	0.0%	0	0.0%
TOTAL			1721	100.0%	1721	100.0%	1721	100.0%	1721	100.0%
Year 2060										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
100-150	11.7	14.5	0	0.0%	1517	50.0%	0	0.0%	0	0.0%
150-200	10.0	12.6	1517	50.0%	0	0.0%	3034	100.0%	1517	50.0%
200-250	8.6	10.8	1517	50.0%	1517	50.0%	0	0.0%	1517	50.0%
250+	n.a.	9.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			0	0.0%	1517	50.0%	3034	100.0%	3034	100.0%
TOTAL ON BYPASS ROUTE			3034	100.0%	1517	50.0%	0	0.0%	0	0.0%
TOTAL			3034	100.0%	3034	100.0%	3034	100.0%	3034	100.0%

As in the case of Venezuelan iron ore, no cargoes currently transit the Canal from the East Coast of Canada to the Far East and this is expected to remain the case in 2020 under Status Quo conditions in 2020. As a result in 2020 for the Status Quo case, all of the 1.7 million tonnes of potential bypass trade is estimated to move on alternative routes, 27% in 100,000 - 150,000 DWT ships, 46% in 150,000 - 200,000 DWT vessels and the remainder in dry bulk carriers of 200,000 - 250,000 DWT. With the Canal at a maximum size of 150,000 DWT, trade in ships up to 200,000 DWT would be attracted to the Canal, resulting in a shift of about 1.3 million tonnes, or 73% of the potential bypass trade. For the 200,000 DWT Canal case all of the potential bypass trade would be shifted through the Canal, with 27% in the 100,000 - 150,000 DWT size range and 73% between 150,000 - 200,000 DWT. With the Canal maximum size at 250,000 DWT, the distribution of trade by vessel size would revert to that under the Status Quo case but with all cargoes shifted through the Canal.

By 2060 potential bypass trade is estimated to have grown to just over 3 million tonnes and with allowance for gradual ship size increases, it expected that this will be shipped on alternative routes with 50% of cargoes in 150,000 - 200,000 DWT vessels and 50% in 200,000 - 250,000 DWT ships. In the 150,000 DWT Canal case where shipping economics favor vessels of 140,475 via the Canal as opposed to larger ships of 172,800 DWT on alternative routes, it is estimated that 50% of this bypass trade would be shifted through the Canal. This becomes 100%, moving in ships of between 150,000 DWT and 200,000 DWT if the maximum Canal size is 200,000 DWT. With the Canal maximum size at 250,000 DWT and all trades transitting the Canal, the vessel size distribution refers to that under the Status Quo case.

(h) Iron Ore from Chile to Europe

Table 5.11

ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC
COMMODITY: IRON ORE ROUTE: CHILE-EUROPE
MILEAGE VIA PANAMA: 7197 MILEAGE VIA ALTERNATIVE: 9360

Vessel Size (Kdwt) Range	Freight Cost Excluding Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo 000 tonnes	%	150.000 DWT 000 tonnes	%	200.000 DWT 000 tonnes	%	250.000 DWT 000 tonnes	%
Year 2020										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
100-150	10.6	11.7	1045	36.0%	1045	36.0%	1045	36.0%	1045	36.0%
150-200	9.0	10.0	1857	64.0%	1857	64.0%	1857	64.0%	1857	64.0%
200-250	7.7	8.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
250+	n.a.	7.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			0	0.0%	1045	36.0%	2902	100.0%	2902	100.0%
TOTAL ON BYPASS ROUTE			2902	100.0%	1857	64.0%	0	0.0%	0	0.0%
TOTAL			2902	100.0%	2902	100.0%	2902	100.0%	2902	100.0%
Year 2060										
40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
100-150	11.5	12.7	0	0.0%	0	0.0%	0	0.0%	0	0.0%
150-200	9.9	10.9	1946	50.0%	1946	50.0%	1946	50.0%	1946	50.0%
200-250	8.4	9.4	1946	50.0%	1946	50.0%	1946	50.0%	1946	50.0%
250+	n.a.	8.3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TOTAL VIA PANAMA CANAL			0	0.0%	0	0.0%	1946	50.0%	3893	100.0%
TOTAL ON BYPASS ROUTE			3893	100.0%	3893	100.0%	1946	50.0%	0	0.0%
TOTAL			3893	100.0%	3893	100.0%	3893	100.0%	3893	100.0%

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES, EXCLUDING PANAMA CANAL TOLLS

Route	Year	DWT	$/tonne ($ 1990)
1. IRON ORE FROM NORTH BRAZIL TO JAPAN			
134700 DWT VIA PANAMA FROM ITAQUI, SINGLE VOYAGE	2020	134700.0	7.9
134700 DWT VIA PANAMA FROM ITAQUI, RETURN TO VANCOUVER	2020	134700.0	10.6
134700 DWT VIA PANAMA FROM ITAQUI, RETURN TO RICHARDS BAY	2020	134700.0	12.4
172110 DWT VIA PANAMA FROM ITAQUI, SINGLE VOYAGE	2020	172110.0	7.2
172110 DWT VIA PANAMA FROM ITAQUI, RETURN TO DAMPIER	2020	172110.0	9.0
172110 DWT VIA PANAMA FROM ITAQUI, RETURN TO SALDANHA BAY	2020	172110.0	11.5
220620 DWT VIA PANAMA FROM ITAQUI, SINGLE VOYAGE	2020	220620.0	6.2
220620 DWT VIA PANAMA FROM ITAQUI, RETURN TO DAMPIER	2020	220620.0	7.7
220620 DWT VIA PANAMA FROM ITAQUI, RETURN TO SALDANHA BAY	2020	220620.0	9.9
134700 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2020	134700.0	9.2
134700 DWT VIA CGH FROM ITAQUI, RETURN TO VANCOUVER	2020	134700.0	11.9
134700 DWT VIA CGH FROM ITAQUI, RETURN TO RICHARDS BAY	2020	134700.0	13.6
172110 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2020	172110.0	8.3
172110 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO DAMPIER	2020	172110.0	10.1
172110 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO SALDANHA BAY	2020	172110.0	12.6
220620 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2020	220620.0	7.1
220620 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO DAMPIER	2020	220620.0	8.7
220620 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO SALDANHA BAY	2020	220620.0	10.8
268345 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2020	268345.0	6.3
268345 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO DAMPIER	2020	268345.0	7.7
268345 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO SALDANHA BAY	2020	268345.0	9.5
318425 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2020	318425.0	6.1
318425 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO DAMPIER	2020	318425.0	7.4
140475 DWT VIA PANAMA FROM ITAQUI, SINGLE VOYAGE	2060	140475.0	8.6
140475 DWT VIA PANAMA FROM ITAQUI, RETURN TO VANCOUVER	2060	140475.0	11.5
140475 DWT VIA PANAMA FROM ITAQUI, RETURN TO RICHARDS BAY	2060	140475.0	13.5
172800 DWT VIA PANAMA FROM ITAQUI, SINGLE VOYAGE	2060	172800.0	7.9
172800 DWT VIA PANAMA FROM ITAQUI, RETURN TO DAMPIER	2060	172800.0	9.9
172800 DWT VIA PANAMA FROM ITAQUI, RETURN TO SALDANHA BAY	2060	172800.0	12.6
221500 DWT VIA PANAMA FROM ITAQUI, SINGLE VOYAGE	2060	221500.0	6.7
221500 DWT VIA PANAMA FROM ITAQUI, RETURN TO DAMPIER	2060	221500.0	8.5
221500 DWT VIA PANAMA FROM ITAQUI, RETURN TO SALDANHA BAY	2060	221500.0	10.8
140475 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2060	140475.0	10.0
140475 DWT VIA CGH FROM ITAQUI, RETURN TO VANCOUVER	2060	140475.0	12.9
140475 DWT VIA CGH FROM ITAQUI, RETURN TO RICHARDS BAY	2060	140475.0	14.8
172800 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2060	172800.0	9.1
172800 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO DAMPIER	2060	172800.0	11.1
172800 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO SALDANHA BAY	2060	172800.0	13.9
221500 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2060	221500.0	7.8
221500 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO DAMPIER	2060	221500.0	9.5
221500 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO SALDANHA BAY	2060	221500.0	11.9
269420 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2060	269420.0	6.9
269420 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO DAMPIER	2060	269420.0	8.5
269420 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO SALDANHA BAY	2060	269420.0	10.6
319705 DWT VIA CGH FROM ITAQUI, SINGLE VOYAGE	2060	319705.0	6.7
319705 DWT VIA CGH FROM ITAQUI, RETURN MILEAGE TO DAMPIER	2060	319705.0	8.2

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES. EXCLUDING PANAMA CANAL TOLLS (Continued)

Route	Year	DWT	$/tonne ($ 1990)
2. IRON ORE FROM Canada East Coast to JAPAN			
134700 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), SINGLE VOYAGE	2020	134700.0	8.0
134700 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO VANCOUVER	2020	134700.0	10.7
134700 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO RICHARDS BAY	2020	134700.0	12.5
172110 DWT VIA PANAMA, SINGLE VOYAGE	2020	172110.0	7.4
172110 DWT VIA PANAMA, RETURN TO DAMPIER	2020	172110.0	9.1
220620 DWT VIA PANAMA, SINGLE VOYAGE	2020	220620.0	6.3
220620 DWT VIA PANAMA, RETURN TO DAMPIER	2020	220620.0	7.9
134700 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), SINGLE VOYAGE	2020	134700.0	10.6
134700 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO VANCOUVER	2020	134700.0	13.3
134700 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO RICHARDS BAY	2020	134700.0	15.1
172110 DWT VIA CAPE FROM QUEBEC, SINGLE VOYAGE	2020	172110.0	9.7
172110 DWT VIA CAPE FROM QUEBEC, RETURN TO DAMPIER	2020	172110.0	11.4
172110 DWT VIA CAPE FROM QUEBEC, RETURN TO SALDANHA BAY	2020	172110.0	13.9
220620 DWT VIA CAPE FROM QUEBEC, SINGLE VOYAGE	2020	220620.0	8.3
220620 DWT VIA CAPE FROM QUEBEC, RETURN TO DAMPIER	2020	220620.0	9.8
220620 DWT VIA CAPE FROM QUEBEC, RETURN TO SALDANHA BAY	2020	220620.0	12.0
268344 DWT VIA CAPE FROM QUEBEC, SINGLE VOYAGE	2020	268345.0	7.3
268344 DWT VIA CAPE FROM QUEBEC RETURN TO DAMPIER	2020	268345.0	8.7
268344 DWT VIA CAPE FROM QUEBEC RETURN TO SALDANHA BAY	2020	268345.0	10.6
318425 DWT VIA CAPE, SINGLE VOYAGE	2020	318425.0	7.1
318425 DWT VIA CAPE, RETURN TO DAMPIER	2020	318425.0	8.4
140475 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES) SINGLE VOYAGE	2060	140475.0	8.7
140475 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO VANCOUVER	2060	140475.0	11.7
140475 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO RICHARDS BAY	2060	140475.0	13.6
140475 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), SINGLE VOYAGE	2060	140475.0	11.6
140475 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO VANCOUVER	2060	140475.0	14.5
140475 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO RICHARDS BAY	2060	140475.0	16.5
172800 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), SINGLE VOYAGE	2060	172800.0	8.0
172800 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO DAMPIER	2060	172800.0	10.0
172800 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO SALDANHA BAY	2060	172800.0	12.8
172800 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), SINGLE VOYAGE	2060	172800.0	10.6
172800 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO DAMPIER	2060	172800.0	12.6
172800 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO SALDANHA BAY	2060	172800.0	15.3
220620 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), SINGLE VOYAGE	2060	220620.0	6.9
220620 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO DAMPIER	2060	220620.0	8.6
220620 DWT VIA PANAMA FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO SALDANHA BAY	2060	220620.0	11.0
220620 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), SINGLE VOYAGE	2060	220620.0	9.1
220620 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO DAMPIER	2060	220620.0	10.8
220620 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO SALDANHA BAY	2060	220620.0	13.2
269420 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), SINGLE VOYAGE	2060	269420.0	8.1
269420 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO DAMPIER	2060	269420.0	9.6
269420 DWT VIA CAPE FROM QUEBEC (SEPT ISLES), RETURN MILEAGE TO RICHARDS BAY	2060	269420.0	11.7
319705 DWT VIA CAPE, SINGLE VOYAGE	2060	319705.0	7.8
319705 DWT VIA CAPE, RETURN TO DAMPIER	2060	319705.0	9.3

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES. EXCLUDING PANAMA CANAL TOLLS (Continued)

Route	Year	DWT	$/tonne ($ 1990)
3. IRON ORE VENEZUELA TO JAPAN			
134700 DWT VIA PANAMA, SINGLE VOYAGE	2020	134700.0	7.2
134700 DWT VIA PANAMA, RETURN TO VANCOUVER	2020	134700.0	9.9
134700 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2020	134700.0	11.7
172110 DWT VIA PANAMA, SINGLE VOYAGE	2020	172110.0	6.5
172110 DWT VIA PANAMA, RETURN TO VANCOUVER	2020	172110.0	8.8
172110 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2020	172110.0	10.4
220620 DWT VIA PANAMA, SINGLE VOYAGE	2020	220620.0	5.6
220620 DWT VIA PANAMA, RETURN TO VANCOUVER	2020	220620.0	7.6
220620 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2020	220620.0	8.9
134700 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2020	134700.0	9.8
134700 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2020	134700.0	12.5
134700 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2020	134700.0	14.3
172110 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2020	172110.0	8.8
172110 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2020	172110.0	11.1
172110 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2020	172110.0	12.7
220620 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2020	220620.0	7.5
220620 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2020	220620.0	9.6
220620 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2020	220620.0	10.9
268345 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2020	268345.0	6.6
268345 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2020	268345.0	8.4
268345 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2020	268345.0	9.6
318425 DWT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	318425.0	6.4
318425 DWT VIA CAPE OF GOOD HOPE, RETURN TO VANCOUVER	2020	318425.0	8.2
318425 DWT VIA CAPE OF GOOD HOPE, RETURN TO RICHARDS BAY	2020	318425.0	9.3
140475 DWT VIA PANAMA, SINGLE VOYAGE	2060	140475.0	7.8
140475 DWT VIA PANAMA, RETURN TO VANCOUVER	2060	140475.0	10.7
140475 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2060	140475.0	12.7
140475 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2060	140475.0	10.7
140475 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2060	140475.0	13.6
140475 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2060	140475.0	15.6
172800 DWT VIA PANAMA, SINGLE VOYAGE	2060	172800.0	7.1
172800 DWT VIA PANAMA, RETURN TO VANCOUVER	2060	172800.0	9.7
172800 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2060	172800.0	11.4
172800 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2060	172800.0	9.6
172800 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2060	172800.0	12.2
172800 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2060	172800.0	14.0
220620 DWT VIA PANAMA, SINGLE VOYAGE	2060	220620.0	6.1
220620 DWT VIA PANAMA, RETURN TO VANCOUVER	2060	220620.0	8.3
220620 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2060	220620.0	9.8
220620 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2060	220620.0	8.3
220620 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2060	220620.0	10.5
220620 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2060	220620.0	12.0
269420 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2060	269420.0	7.4
269420 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2060	269420.0	9.3
269420 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2060	269420.0	10.7
319705 DWT VIA CAPE GOOD HOPE, SINGLE VOYAGE	2060	319705.0	7.1
319705 DWT VIA CAPE GOOD HOPE, RETURN TO VANCOUVER	2060	319705.0	9.0
319705 DWT VIA CAPE GOOD HOPE, RETURN TO RICHARDS BAY	2060	319705.0	10.3

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES. EXCLUDING PANAMA CANAL TOLLS (Continued)

Route	Year	DWT	$/tonne ($ 1990)
4. SOUTH AMERICA WEST COAST (HUASCO BAY, CHILE) TO EUROPE, IRON ORE			
134700 DWT, PANAMA, SINGLE VOYAGE	1990	100000.0	15.0
134700 DWT, PANAMA, RETURN TO RICHARDS BAY, FROM HUASCO BAY	2020	134700.0	6.4
	2020	134700.0	10.6
172110 DWT PANAMA, SINGLE VOYAGE	2020	172110.0	5.8
172110 DWT PANAMA, RETURN TO SALDANHA BAY	2020	172110.0	9.0
220620 DWT PANAMA, SINGLE VOYAGE	2020	220620.0	4.9
220620 DWT PANAMA, RETURN TO SALDANHA BAY	2020	220620.0	7.7
134700 DWT VIA CAPE HORN, SINGLE VOYAGE	2020	134700.0	7.5
134700 DWT VIA CAPE HORN, RETURN TO RICHARDS BAY,	2020	134700.0	11.7
172110 DWT, CAPE HORN, SINGLE VOYAGE	2020	172110.0	6.7
172110 DWT, CAPE HORN RETURN TO SALDANHA BAY	2020	172110.0	10.0
220620 DWT, CAPE HORN, SINGLE VOYAGE	2020	220620.0	5.8
220620 DWT, CAPE HORN RETURN TO SALDANHA BAY	2020	220620.0	8.6
268345 DWT, CAPE HORN, SINGLE VOYAGE	2020	268345.0	5.1
268345 DWT, CAPE HORN RETURN TO SALDANHA BAY	2020	268345.0	7.6
318427 DWT, CAPE HORN, SINGLE VOYAGE	2020	318425.0	4.9
318427 DWT, CAPE HORN RETURN TO SALDANHA BAY	2020	318425.0	7.3
140475 DWT, PANAMA, SINGLE VOYAGE	2060	140475.0	6.9
140475 DWT, PANAMA, RETURN TO RICHARDS BAY	2060	140475.0	11.5
140475 DWT VIA CAPE HORN, SINGLE VOYAGE	2060	140475.0	8.1
140475 DWT VIA CAPE HORN, RETURN TO RICHARDS BAY	2060	140475.0	12.7
172800 DWT, PANAMA, SINGLE VOYAGE	2060	172800.0	6.3
172800 DWT, PANAMA, RETURN TO SALDANHA BAY	2060	172800.0	9.9
172800 DWT VIA CAPE HORN, SINGLE VOYAGE	2060	172800.0	7.3
172800 DWT VIA CAPE HORN, RETURN TO SALDANHA BAY	2060	172800.0	10.9
221500 DWT, PANAMA, SINGLE VOYAGE	2060	221500.0	5.3
221500 DWT, PANAMA, RETURN TO SALDANHA BAY	2060	221500.0	8.4
221500 DWT VIA CAPE HORN, SINGLE VOYAGE	2060	221500.0	6.3
221500 DWT VIA CAPE HORN, RETURN TO SALDANHA BAY	2060	221500.0	9.4
269420 DWT VIA CAPE HORN, SINGLE VOYAGE	2060	269420.0	5.5
269420 DWT VIA CAPE HORN, RETURN TO SALDANHA BAY	2060	269420.0	8.3
319705 DWT VIA CAPE HORN, SINGLE VOYAGE	2060	319705.0	5.3
319705 DWT VIA CAPE HORN, RETURN TO SALDANHA BAY	2060	319705.0	8.0

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES. EXCLUDING PANAMA CANAL TOLLS (Continued)

Route	Year	DWT	$/tonne ($ 1990)
5. COAL US EAST COAST (HAMPTON ROADS) TO JAPAN			
134700 DWT VIA PANAMA, SINGLE VOYAGE	2020	134700.0	7.7
134700 DWT VIA PANAMA, RETURN MILEAGE TO VANCOUVER	2020	134700.0	10.5
134700 DWT VIA PANAMA, RETURN MILEAGE TO RICHARDS BAY	2020	134700.0	12.3
172110 DWT VIA PANAMA, SINGLE VOYAGE	2020	172110.0	7.1
172110 DWT VIA PANAMA, RETURN TO VANCOUVER	2020	172110.0	9.5
172110 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2020	172110.0	11.1
220620 DWT VIA PANAMA, SINGLE VOYAGE	2020	220620.0	6.1
220620 DWT VIA PANAMA, RETURN TO VANCOUVER	2020	220620.0	8.2
220620 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2020	220620.0	9.6
134700 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	134700.0	10.8
134700 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2020	134700.0	13.6
134700 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2020	134700.0	15.4
172110 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	172110.0	9.8
172110 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2020	172110.0	12.2
172110 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2020	172110.0	13.8
220620 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	220620.0	8.4
220620 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2020	220620.0	10.5
220620 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2020	220620.0	11.9
268345 DWT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	268345.0	7.5
268345 DWT VIA CAPE OF GOOD HOPE, RETURN TO VANCOUVER	2020	268345.0	9.3
268345 DWT VIA CAPE OF GOOD HOPE, RETURN TO RICHARDS BAY	2020	268345.0	10.6
140475 DWT VIA PANAMA, SINGLE VOYAGE	2060	140475.0	8.4
140475 DWT VIA PANAMA, RETURN MILEAGE TO VANCOUVER	2060	140475.0	11.4
140475 DWT VIA PANAMA, RETURN MILEAGE TO RICHARDS BAY	2060	140475.0	13.4
140475 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2060	140475.0	11.8
140475 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN TO VANCOUVER	2060	140475.0	14.8
140475 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN TO RICHARDS BAY	2060	140475.0	16.8
172800 DWT VIA PANAMA, SINGLE VOYAGE	2060	172800.0	7.7
172800 DWT VIA PANAMA, RETURN MILEAGE TO VANCOUVER	2060	172800.0	10.4
172800 DWT VIA PANAMA, RETURN MILEAGE TO RICHARDS BAY	2060	172800.0	12.1
172800 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2060	172800.0	10.7
172800 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2060	172800.0	13.4
172800 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2060	172800.0	15.1
221500 DWT VIA PANAMA, SINGLE VOYAGE	2060	221500.0	6.6
221500 DWT VIA PANAMA, RETURN MILEAGE TO VANCOUVER	2060	221500.0	8.9
221500 DWT VIA PANAMA, RETURN MILEAGE TO RICHARDS BAY	2060	221500.0	10.5
221500 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2060	221500.0	9.2
221500 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2060	221500.0	11.5
221500 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2060	221500.0	13.1
269420 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2060	269420.0	8.2
269420 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2060	269420.0	10.3
269420 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2060	269420.0	11.7

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES. EXCLUDING PANAMA CANAL TOLLS (Continued)

Route

6. COAL US GULF (MOBILE) TO JAPAN

	Year	DWT	$/tonne ($ 1990)
134700 DWT VIA PANAMA, SINGLE VOYAGE	2020	134700.0	7.3
134700 DWT VIA PANAMA, RETURN MILEAGE TO VANCOUVER	2020	134700.0	10.1
134700 DWT VIA PANAMA, RETURN MILEAGE TO RICHARDS BAY	2020	134700.0	11.9
172110 DWT VIA PANAMA, SINGLE VOYAGE	2020	172110.0	6.7
172110 DWT VIA PANAMA RETURN TO VANCOUVER	2020	172110.0	9.1
172110 DWT VIA PANAMA RETURN TO RICHARDS BAY	2020	172110.0	10.7
220620 DWT VIA PANAMA, SINGLE VOYAGE	2020	220620.0	5.7
220620 DWT VIA PANAMA RETURN TO VANCOUVER	2020	220620.0	7.8
220620 DWT VIA PANAMA RETURN TO RICHARDS BAY	2020	220620.0	9.2
134700 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	134700.0	11.2
134700 DWT DIRECT, RETURN MILEAGE TO VANCOUVER	2020	134700.0	13.9
134700 DWT DIRECT, RETURN MILEAGE TO RICHARDS BAY	2020	134700.0	15.7
172110 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	172110.0	10.1
172110 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2020	172110.0	12.5
172110 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2020	172110.0	14.1
220620 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	220620.0	8.7
220620 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2020	220620.0	10.8
220620 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2020	220620.0	12.2
268345 DWT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2020	268345.0	7.7
268345 DWT VIA CAPE OF GOOD HOPE, RETURN TO VANCOUVER	2020	268345.0	9.6
268345 DWT VIA CAPE OF GOOD HOPE, RETURN TO RICHARDS BAY	2020	268345.0	10.8
140475 DWT VIA PANAMA, SINGLE VOYAGE	2060	140475.0	7.9
140475 DWT VIA PANAMA, RETURN MILEAGE TO VANCOUVER	2060	140475.0	10.9
140475 DWT VIA PANAMA, RETURN MILEAGE TO RICHARDS BAY	2060	140475.0	12.9
140475 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2060	140575.0	12.1
140475 DWT DIRECT, VIA CAPE OF GOOD HOPEGH RETURN MILEAGE TO VANCOUVER	2060	140575.0	15.2
140475 DWT DIRECT, VIA CAPE OF GOOD HOPE RETURN MILEAGE TO RICHARDS BAY	2060	140575.0	17.2
172800 DWT VIA PANAMA, SINGLE VOYAGE	2060	172800.0	7.3
172800 DWT VIA PANAMA, RETURN MILEAGE TO VANCOUVER	2060	172800.0	10.0
172800 DWT VIA PANAMA, RETURN MILEAGE TO RICHARDS BAY	2060	172800.0	11.7
172800 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2060	172800.0	11.0
172800 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2060	172800.0	13.7
172800 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2060	172800.0	15.5
221500 DWT VIA PANAMA, SINGLE VOYAGE	2060	221500.0	6.3
221500 DWT VIA PANAMA, RETURN MILEAGE TO VANCOUVER	2060	221500.0	8.6
221500 DWT VIA PANAMA, RETURN MILEAGE TO RICHARDS BAY	2060	221500.0	10.1
221500 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2060	221500.0	9.5
221500 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2060	221500.0	11.8
221500 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2060	221500.0	13.4
269420 DWT DIRECT VIA CAPE OF GOOD HOPE, SINGLE VOYAGE	2060	269420.0	8.5
269420 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO VANCOUVER	2060	269420.0	10.6
269420 DWT DIRECT VIA CAPE OF GOOD HOPE, RETURN MILEAGE TO RICHARDS BAY	2060	269420.0	11.9

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES. EXCLUDING PANAMA CANAL TOLLS (Continued)

Route	Year	DWT	$/tonne ($ 1990)
7. COLOMBIAN COAL TO JAPAN,			
134700 DWT, PANAMA, SINGLE VOYAGE	2020	134700.0	6.8
134700 DWT PANAMA, RETURN TO VANCOUVER	2020	134700.0	9.6
134700 DWT PANAMA, RETURN TO RICHARDS BAY	2020	134700.0	11.4
172110 DWT VIA PANAMA, SINGLE VOYAGE	2020	172110.0	6.1
172110 DWT VIA PANAMA, RETURN TO VANCOUVER	2020	172110.0	8.5
172110 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2020	172110.0	10.1
220620 DWT VIA PANAMA, SINGLE VOYAGE	2020	220620.0	5.2
220620 DWT VIA PANAMA, RETURN TO VANCOUVER	2020	220620.0	7.3
220620 DWT VIA PANAMA, RETURN TO RICHARDS BAY	2020	220620.0	8.7
134700 DWT VIA SUEZ, SINGLE VOYAGE	2020	134700.0	11.7
134700 DWT VIA SUEZ, RETURN TO VANCOUVER	2020	134700.0	14.5
134700 DWT VIA SUEZ, RETURN TO RICHARDS BAY	2020	134700.0	16.3
172110 DWT VIA SUEZ, SINGLE VOYAGE	2020	172110.0	10.4
172110 DWT VIA SUEZ, RETURN TO VANCOUVER	2020	172110.0	12.8
172110 DWT VIA SUEZ, RETURN TO RICHARDS BAY	2020	172110.0	14.4
220620 DWT VIA SUEZ, SINGLE VOYAGE	2020	220620.0	8.9
220620 DWT VIA SUEZ, RETURN TO VANCOUVER	2020	220620.0	11.0
220620 DWT VIA SUEZ, RETURN TO RICHARDS BAY	2020	220620.0	12.4
268344 DWT VIA SUEZ, SINGLE VOYAGE	2020	268345.0	7.9
268344 DWT VIA SUEZ, RETURN TO VANCOUVER	2020	268345.0	9.8
268344 DWT VIA SUEZ, RETURN TO RICHARDS BAY	2020	268345.0	11.0
140475 DWT, PANAMA, SINGLE VOYAGE	2060	140475.0	7.3
140475 DWT, PANAMA, RETURN TO VANCOUVER	2060	140475.0	10.4
140475 DWT, PANAMA, RETURN TO RICHARDS BAY	2060	140475.0	12.3
172800 DWT PANAMA, SINGLE VOYAGE	2060	172800.0	6.6
172800 DWT PANAMA, RETURN TO VANCOUVER.	2060	172800.0	9.3
172800 DWT PANAMA, RETURN TO RICHARDS BAY	2060	172800.0	11.1
221500 DWT PANAMA, SINGLE VOYAGE	2060	221500.0	5.7
221500 DWT PANAMA, RETURN TO VANCOUVER.	2060	221500.0	8.0
221500 DWT PANAMA, RETURN TO RICHARDS BAY	2060	221500.0	9.5
140475 DWT VIA SUEZ, SINGLE VOYAGE	2060	140475.0	12.6
140475 DWT VIA SUEZ, RETURN TO VANCOUVER	2060	140475.0	15.6
140475 DWT VIA SUEZ, RETURN TO RICHARDS BAY	2060	140475.0	17.6
172800 DWT VIA SUEZ, SINGLE VOYAGE	2060	172800.0	11.4
172800 DWT VIA SUEZ, RETURN TO VANCOUVER	2060	172800.0	14.1
172800 DWT VIA SUEZ, RETURN TO RICHARDS BAY	2060	172800.0	15.8
221500 DWT VIA SUEZ, SINGLE VOYAGE	2060	221500.0	9.8
221500 DWT VIA SUEZ, RETURN TO VANCOUVER	2060	221500.0	12.1
221500 DWT VIA SUEZ, RETURN TO RICHARDS BAY	2060	221500.0	13.7
269420 DWT VIA SUEZ, SINGLE VOYAGE	2060	269420.0	8.7
269420 DWT VIA SUEZ, RETURN TO VANCOUVER	2060	269420.0	10.8
269420 DWT VIA SUEZ, RETURN TO RICHARDS BAY	2060	269420.0	12.1

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES. EXCLUDING PANAMA CANAL TOLLS (Continued)

Route	Year	DWT	$/tonne ($ 1990)
8. CANADA WEST COAST TO BRAZIL, COAL			
134700 DWT, PANAMA SINGLE VOYAGE	2020	134700.0	6.5
172110 DWT, PANAMA SINGLE VOYAGE	2020	172110.0	6.1
220620 DWT, PANAMA SINGLE VOYAGE	2020	220620.0	5.2
134700 DWT, CAPE HORN, SINGLE VOYAGE	2020	134700.0	8.2
172110 DWT, CAPE HORN SINGLE VOYAGE	2020	172110.0	7.5
220620 DWT, CAPE HORN SINGLE VOYAGE	2020	220620.0	6.4
268345 DWT, CAPE HORN SINGLE VOYAGE	2020	268345.0	5.7
140475 DWT, PANAMA SINGLE VOYAGE	2060	140475.0	7.0
172800 DWT PANAMA, SINGLE VOYAGE	2060	172800.0	6.6
221500 DWT PANAMA, SINGLE VOYAGE	2060	221500.0	5.6
140475 DWT, CAPE HORN SINGLE VOYAGE	2060	140475.0	8.8
172800 DWT CAPE HORN, SINGLE VOYAGE	2060	172800.0	8.1
221500 DWT CAPE HORN SINGLE VOYAGE	2060	221500.0	7.0
269420 DWT CAPE HORN, SINGLE VOYAGE	2060	269420.0	6.3
9. CANADA WEST COAST TO EUROPE, COAL			
134700 DWT, PANAMA SINGLE VOYAGE	2020	134700.0	7.6
134700 DWT, PANAMA RETURN TO RICHARDS BAY	2020	134700.0	11.9
172110 DWT, PANAMA SINGLE VOYAGE	2020	172110.0	6.8
172110 DWT, PANAMA RETURN TO RICHARDS BAY	2020	172110.0	10.5
220620 DWT, PANAMA SINGLE VOYAGE	2020	220620.0	5.8
220620 DWT, PANAMA RETURN TO RICHARDS BAY	2020	220620.0	9.1
134700 DWT, CAPE HORN SINGLE VOYAGE	2020	134700.0	10.7
134700 DWT, CAPE HORN RETURN TO RICHARDS BAY	2020	134700.0	15.0
172110 DWT, CAPE HORN SINGLE VOYAGE	2020	172110.0	9.5
172110 DWT, CAPE HORN RETURN TO RICHARDS BAY	2020	172110.0	13.3
220620 DWT, CAPE HORN SINGLE VOYAGE	2020	220620.0	8.2
220620 DWT, CAPE HORN RETURN TO RICHARDS BAY	2020	220620.0	11.5
268345 DWT, CAPE HORN SINGLE VOYAGE	2020	268345.0	7.3
268345 DWT, CAPE HORN RETURN TO RICHARDS BAY	2020	268345.0	10.2
			($ 1990)
140475 DWT, PANAMA SINGLE VOYAGE	2060	140475.0	7.9
140475 DWT, PANAMA RETURN TO RICHARDS BAY	2060	140475.0	12.6
172800 DWT PANAMA, SINGLE VOYAGE	2060	172800.0	7.4
172800 DWT PANAMA, RETURN TO RICHARDS BAY	2060	172800.0	11.5
221500 DWT PANAMA, SINGLE VOYAGE	2060	221500.0	6.3
221500 DWT PANAMA, RETURN TO RICHARDS BAY	2060	221500.0	9.9
140475 DWT, CAPE HORN SINGLE VOYAGE	2060	140475.0	11.5
140475 DWT, CAPE HORN RETURN TO RICHARDS BAY	2060	140475.0	16.2

Table 5.12 DRY BULK CARRIER VOYAGE COST ESTIMATES FOR BYPASS ANALYSES, EXCLUDING PANAMA CANAL TOLLS (Continued)

Route	Year	DWT	$/tonne
10. CANADA WEST COAST TO BRAZIL, COAL (Continued)			
172800 DWT CAPE HORN , SINGLE VOYAGE	2060	172800.0	10.4
172800 DWT CAPE HORN RETURN TO RICHARDS BAY	2060	172800.0	14.6
221500 DWT CAPE HORN, SINGLE VOYAGE	2060	221500.0	9.0
221500 DWT CAPE HORN RETURN TO RICHARDS BAY	2060	221500.0	12.6
269420 DWT CAPE HORN, SINGLE VOYAGE	2060	269420.0	8.0
269420 DWT CAPE HORN , RETURN TO RICHARDS BAY	2060	269420.0	11.3

Under Status Quo conditions in 2020, as now, no trade is expected via the Panama Canal, with 36% of cargoes moving in vessels of 100,000 - 150,000 DWT and 64% between 150,000 and 200,000 DWT. With the Canal maximum size at 150,000 DWT, 36% (just over 1 million tonnes) of the total 2.9 million tonnes of potential bypass trade is estimated to shift through the Canal. The remaining 64% of cargoes would be shifted to the Canal under the 200,000 DWT and 250,000 DWT maximum Canal sizes.

By 2060, it is estimated that under Status Quo conditions all of the estimated 3.9 million tonnes of potential bypass trade would be shipped on alternative routes, 50% in 150,000 - 200,000 DWT vessels and 50% in 200,000 - 250,000 DWT ships. This would remain the case with the Canal maximum size at 150,000 DWT. With the Canal size at 200,000 DWT, 50% of the bypass trade would be shifted through the Canal with the remaining 50% only being shifted through the Canal when the maximum size is increased to 250,000 DWT.

The above eight trades are the only dry bulk shipments that can be considered as true potential bypass traffic. A thorough review of all other dry bulk trades has been undertaken. However, for all other dry bulk trades that could be seen as relevant to the Canal, the maximum vessel sizes employed fall below the current size limitations of the Canal and this is expected to remain the case through the period under study.

If trades which seemingly could transit the Canal, based on average mileages for trades at the 60 route level, currently do not, then this is because the actual port specific mileages for the commodities involved do not conform to the average rules and the mileages via Panama in these instances are greater than the alternatives. In practice where load and discharge areas are widely spread, such as in the case of Asia, it is apparent at the level of bilateral trade data that some cargoes qualify on a mileages basis while others to/from the same regions do not. In this way cargoes for a specific commodity group within a given route can be seen as moving both via the Canal and via the alternative route. The important point to recognize is that, since vessel size is not a constraint to the Panama Canal transits, the 1990 % distribution of cargoes on these other dry bulk trades between Panama and alternative routes can be assumed to continue in the future.

One of the bauxite/alumina trades provides a good illustration of this point (Table 5.13). Between Oceania and the U.S. East and Gulf Coasts, total trade in 1990 was 2.5 million tonnes of which 1.6 million tonnes (64%) was via the Panama Canal. By 2020 it is estimated that total trade will be 7.7 million tonnes of which 4.9 million tonnes (almost 64%) will be shipped through the Canal.

TABLE 5.13

ANALYSIS OF POTENTIAL BY PASS TRADE

EXAMPLE: ALUMINA/BAUXITE - OCEANIA - U.S. EAST COAST

TRADE (mill tonnes)	BILATERAL	PANAMA CANAL	POTENTIAL	NON-POTENTIAL
Oceania - U.S. East Coast	2.5	1.6	1.6	0.9
Australia - U.S. Gulf Coast	1.7	1.6	1.6	0.1
Australia - U.S. Atlantic Coast	0.8	-	-	0.8

- Alumina/bauxite exported from western Australia and Queensland (east)
- Representative mileages via:

	Panama Canal	Cape Horn	Cape of Good Hope	Suez Canal
Australia WC - New Orleans	11515	15607	12544	12670
Australia EC - New Orleans	9031	13161	13792	14734
Australia WC - New York	12084	15225	12039	11306
Australia EC - New York	9600	12779	13287	13370

- For U.S. Gulf Coast and Australia EC-U.S. Atlantic Coast, Panama is shorter
- For Australia WC-U.S. Atlantic Coast, both Cape of Good Hope and Suez are shorter
- Sailings data indicate no sailings in ships larger than Panamax
- Industry sources confirm movements of bauxite/alumina in ships around 40,000 DWT up to Panamax

CONCLUSIONS

- Trade at level of bilateral data gives better understanding
- No trade lost to Panama because of ship size
- Mileages are a key determinant (although where Cape of Good Hope and Suez are competitive, Suez tolls are a factor)
- No potential for shifting cargoes to enlarged Panama Canal

We have spoken with Alcoa Steamship who are major shippers of bauxite and alumina. They confirm that there is no way that this moves in vessels above current Panamax sizes. Specifically the product moving from Australia is alumina which often moves in vessels of around 40,000 DWT with Panamax sizes as the maximum. This is confirmed by our sailings data which show no vessel movements larger than Panamax from Australia into the U.S. East and Gulf Coasts.

On a mileage basis, for Australia East Coast to U.S. East Coast, the Panama Canal represents the shortest route. However, for Australia West Coast to U.S. East Coast the Canal does not represent the shortest route. Loading ports for alumina/bauxite are located in Western Australia and in the north east tip of Queensland. Therefore dependent on the loading port the Panama Canal may or may not represent the shortest route. Therefore if it is assumed that each export location will maintain constant market share in the future, the split between the Canal and alternative routes will remain the same as for 1990.

5.3.3 Oil Tankers

As described in detail in Section 7 of the Final Report prepared under Phase I of this study, Orimulsion cargoes from Venezuela to the Far East represent the only true potential bypass oil tanker trade. This relatively new trade is estimated to expand to around 14 million tonnes in both 2020 and 2060 and although currently the small volumes that are moved to do so in Panamax size ships, Bitor, the company that produces and ships the commodity is developing its export terminals and as trade increases it plans to utilize VLCC (very large crude carrier) tonnage on this route. The base case for which relative shipping economics have been evaluated is the employment of 269,000 DWT tankers on the alternative route and this has been compared with the use of smaller vessels via the Canal for each of the Canal configurations under study.

The estimated freight costs shown in Table 5.14 indicate that once the size of the Canal reaches a maximum of 150,000 DWT there is an incentive to shift the whole of this trade to the Canal. This is because estimated freight costs for a tanker of around 150,000 DWT via the Canal (equivalent in 2020 to $12.1/tonne on a round voyage basis) are less than those for a 269,000 DWT tanker on the alternative route ($12.9/tonne in 2020).

Table 5.14 ESTIMATED TANKER TRANSPORTATION ECONOMICS FOR PANAMA AND BYPASS ROUTES FOR 2020 AND 2060
COMMODITY: ORIMULSION. NO PANAMA CANAL TOLLS

Year	DWT	CARGO TONNES	Total Costs incl Inventory $/tonne ($1990)
1. ESTIMATES BASED ON ROUND VOYAGES			
PUERTO LA CRUZ-JAPAN			
VIA CAPE OF GOOD HOPE			
2020	89730	85243.5	24.14
2060	89730	85243.5	27.24
2020	150000	142500.0	18.00
2060	150000	142500.0	20.33
2020	195000	185250.0	16.55
2060	195000	185250.0	18.52
2020	238000	226100.0	14.05
2060	238000	226100.0	15.71
2020	269000	255550.0	12.86
2060	269000	255550.0	14.35
PUERTO LA CRUZ-JAPAN			
VIA PANAMA			
2020	89730	85243.5	16.17
2060	89730	85243.5	18.20
2020	150000	142500.0	12.13
2060	150000	142500.0	13.67
2020	195000	185250.0	11.17
2060	195000	185250.0	12.46
2020	238000	226100.0	9.51
2060	238000	226100.0	10.61
2020	269000	255550.0	8.73
2060	269000	255550.0	9.71

Table 5.14 ESTIMATED TANKER TRANSPORTATION ECONOMICS FOR PANAMA AND BYPASS ROUTES FOR 2020 AND 2060
COMMODITY: ORIMULSION. NO PANAMA CANAL TOLLS

Year	DWT	CARGO TONNES	Total Costs incl Inventory $/tonne ($1990)
2. ESTIMATES BASED ON SINGLE VOYAGES			
PUERTO LA CRUZ-JAPAN VIA CAPE OF GOOD HOPE			
2020	89730	85243.5	13.15
2060	89730	85243.5	14.75
2020	150000	142500.0	9.96
2060	150000	142500.0	11.16
2020	195000	185250.0	9.22
2060	195000	185250.0	10.24
2020	238000	226100.0	7.91
2060	238000	226100.0	8.77
2020	269000	255550.0	7.28
2060	269000	255550.0	8.05
PUERTO LA CRUZ-JAPAN VIA PANAMA			
2020	89730	85243.5	9.07
2060	89730	85243.5	10.14
2020	150000	142500.0	6.94
2060	150000	142500.0	7.75
2020	195000	185250.0	6.44
2060	195000	185250.0	7.12
2020	238000	226100.0	5.55
2060	238000	226100.0	6.13
2020	269000	255550.0	5.12
2060	269000	255550.0	5.64

5.3.4 Fully Cellular Container Ships

Table 5.15 Estimated Fully Cellular Container Ship Economics

Year	DWT	$/Cargo Tonne Without Tolls: Panama Route	Alternate Route
EUROPE-USWC			
2020	5,510	$358.48	$321.46
2060	NA	NA	NA
2020	20,700	$244.23	$242.46
2060	20,700	$246.62	$245.76
2020	32,700	$202.57	$216.51
2060	36,400	$200.88	$216.16
2020	48,080	$199.42	$214.11
2060	56,000	$193.50	$211.06
2020	90,000	$183.62	$202.01
2060	90,000	$182.27	$202.51
2020	148,000	$178.52	$199.16
2060	148,000	$177.62	$198.36
ASIA-USEC			
2020	5,510	$475.09	$420.15
2060	NA	NA	NA
2020	20,700	$340.02	$316.09
2060	20,700	$342.48	$323.09
2020	32,700	$289.67	$279.67
2060	36,400	$287.45	$278.58
2020	48,080	$285.07	$276.03
2060	56,000	$279.39	$270.86
2020	90,000	$266.18	$260.36
2060	90,000	$265.18	$259.93
2020	148,000	$260.14	$255.16
2060	148,000	$258.72	$251.59

1). Cost estimates are based on West Coast delivery for Europe to U.S. West Coast and New York delivery for Asia to U.S. East Coast.
2). Inland transportation costs include truck drayage to the destination.
3). Land opportunity costs assume 1 day (all water) and 5 days (intermodal).
4). Opportunity cost calculations are based on a carrying cost of 8.5% per annum and an average value per ton of $4,652 from Europe to the U.S. West Coast and $10,000 per ton from Asia to the U.S. East Coast.

The large majority of fully cellular container (FCC) ships in the current world fleet are sub Panamax size. There are a relatively small number of post Panamax vessels in operation plus several others on the existing world new construction order book. In Phase I the view was expressed that the logical development of FCC ship sizes would result in vessels of around 6,000 TEU, 90,000 DWT, in operation by 2020 and ships of up to 9,000 TEU, 148,000 DWT, by 2060. Since that time P&O, one of the major liner operators has publicly indicated that it is indeed considering 6,000 TEU ships as the next stage in the future. Therefore, no reason is seen for changing the Phase I assumptions.

Employment of these post Panamax ships will be confined to the top twenty global trade routes of which the only ones relevant to the Panama Canal are:

Asia to U.S. East Coast;
U.S. East Coast to Asia;
Europe to U.S. West Coast; and
U.S. West Coast to Europe,

that is, the major trades for which the U.S. landbridge represents the alternative route to the Panama Canal.

For all other trades relevant to the Panama Canal, it is expected that the size of the trade will be such that these will continue to be served by ships no larger than can be accommodated by the Status Quo canal. Therefore, for the same reasons as described for other general cargo ship types and for the minor bulks trade not moving via the Canal currently, such containerized trade will not shift to the Canal in the future simply because the Canal is enlarged. Similarly, as in the example described above for chemical carriers, where containerized cargoes currently transit the Canal because of vessel routing patterns, even though there is no justification on a mileage basis, it is assumed that this pattern of trade will continue and cargoes will not be shifted away from the Canal.

Transportation costs, including land-side costs, for those voyages associated with the evaluation of the economics of utilizing the Panama Canal versus the landbridge are shown in Table 3.2.11. The freight costs included in Table 3.2.11 are shown inclusive of inventory costs based on the estimated values of containerized cargoes specified to the individual trades.

Taking into account both seaborne and landbridge costs and the capacity constraints discussed in Section 2, containerized cargoes on FCC ships on the above four routes are expected to develop as follows:

Route	Year	Status Quo	million tonnes All Other Cases
Asia to USEC	2020	9.7	11.2
	2060	10.5	13.0
USEC to Asia	2020	16.4	17.8
	2060	19.3	21.8
Europe to USWC	2020	2.7	2.9
	2060	3.0	3.1
USWC to Europe	2020	2.6	3.4
	2060	2.7	3.8

5.4 The Constrained Forecast for the 2060 Status Quo Canal

Part of the purpose of Phase I of the CTP Study was to forecast the mix of transits by size and type for the purpose of determining the capacity of the Status Quo Canal and of the alternatives. In preparing the cargo and transit projections for Phase I of this study, therefore, the capacity of the Canal was not taken into account. The ship mix in each of these unconstrained projections was then used by the Operating Characteristics and Capacity Evaluation Component Contractor, TAMS Consultants, Inc., to determine capacity and delay times for the various alternatives. The only alternative for which the projections exceeded the capacity of the Canal was for Status Quo 2060.

The approach that we have used to determine 2060 transits under the capacity restrictions of the Status Quo Canal is as follows.

1) Estimate 2060 transits for the unconstrained Canal.

2) For each cargo flow by ship type, route and ship size calculate transportation costs via Panama and for the alternative route involving the least cost.

3) Using the overall relationships developed between laden and ballast transits by ship type, calculate the numbers of ballast transits associated with each number of laden transits by ship type, route and size.

4) Determine the transportation cost differentials for the alternative routes versus the Canal by route, ship type and size together with the associated numbers of laden and ballast transits.

5) Starting with the smallest freight differential accumulate laden and ballast transits until the total reaches the amount required to bring unrestricted Canal transits down to Canal capacity.

The results of this approach are that the vessels re-routed are concentrated where alternative routes represent least additional miles and in the larger size ranges. Some comments on this methodology.

In this approach, we have made no assumptions about the possibility that the size distribution of vessels diverted from the Canal may differ from that assumed to go through the Canal in the unrestricted case. To some extent, by diverting the larger ships on the longer routes we are focussing to a large extent on those trades which in any event would be the most likely to be amenable to 'bulking' up, thereby diminishing the economic impact of being forced onto alternative routes.

This approach does not consider the economics of ballast trading. In line with everything we have done to date we have assumed that historical relationships between laden and ballast transits will continue in the future. These are based implicitly on the current relationship between laden and ballast transit fees. This could change in the future as the result of the work of the Financing Scheme, Financial Analysis, and Management Arrangements Component Contractor, Nathan Associates, Inc. For this reason, we did not believe it was justified to attempt a more sophisticated approach involving detailed analyses of ballast ship itineraries.

5.5 Commodity Flow and Vessel Transit

Commodity and Transit Projections

Based on the foregoing analysis, the projections for a no-tolls scenario, taking into account capacity considerations for the North American landbridge and the Status Quo Canal, are as shown in the following tables. As expected, except for the constrained 2060 Status Quo canal, the results are not significantly different in total from Phase I.

However, there are significant differences in ship size distribution. These arise from the following considerations.

- The ship size distribution in the actual PCC data used in Phase II is different in many respects from that in the synthetic ship transit distribution developed in Phase I.

- The conclusions of our analysis for the constrained 2060 Status Quo Canal are that the vessels re-routed are concentrated where alternative routes represent least additional miles and in the larger size ranges.

- As already noted, the exclusion of Panama Canal tolls from consideration in Phase II leads to greater switching of bypass traffic carried in very large vessels on to the Canal.

Table 5.16 ANNUAL CARGO FLOWS BY COMMODITY AND ROUTE
NORTHBOUND AND SOUTHBOUND
THOUSAND TONNES

COMMODITY	1990	2020	2060	ANNUAL GROWTH RATE 1990-2020	2020-2060	1990-2060
IRON ORE	581	1,362	202	2.88%	-4.66%	-1.50%
BAUXITE/ALUMINA	2,906	9,489	281	4.02%	-8.42%	-3.28%
CRUDE PETROLEUM	9,621	5,008	459	-2.15%	-5.80%	-4.25%
COAL & COKE	10,978	5,507	3,419	-2.27%	-1.18%	-1.65%
BULK GRAINS	23,528	44,356	56,607	2.14%	0.61%	1.26%
FERTILIZERS	13,009	8,229	8,595	-1.52%	0.11%	-0.59%
BULK CHEMICALS	6,967	22,920	32,161	4.05%	0.85%	2.21%
PETROLEUM PRODUCTS	12,490	16,995	4,140	1.03%	-3.47%	-1.56%
OILS AND FATS	729	1,449	1,996	2.32%	0.80%	1.45%
REFRIGERATED CARGO	5,389	13,614	18,496	3.14%	0.77%	1.78%
VEHICLES	1,647	2,317	1,807	1.14%	-0.62%	0.13%
MINOR BULKS	36,806	57,404	49,802	1.49%	-0.35%	0.43%
CONTAINERIZED CARGO	20,840	46,835	54,313	2.74%	0.37%	1.38%
GENERAL CARGO	11,980	30,477	44,251	3.16%	0.94%	1.88%
TOTAL	157,472	265,962	276,529	1.76%	0.10%	0.81%
150,000 DWT						
IRON ORE	581	20,302	11,071	12.57%	-1.50%	4.30%
BAUXITE/ALUMINA	2,906	9,489	5,407	4.02%	-1.40%	0.89%
CRUDE PETROLEUM	9,621	19,008	16,548	2.30%	-0.35%	0.78%
COAL & COKE	10,978	63,818	82,772	6.04%	0.65%	2.93%
BULK GRAINS	23,528	44,356	66,902	2.14%	1.03%	1.50%
FERTILIZERS	13,009	8,229	19,674	-1.52%	2.20%	0.59%
BULK CHEMICALS	6,967	22,920	33,857	4.05%	0.98%	2.28%
PETROLEUM PRODUCTS	12,490	16,995	8,311	1.03%	-1.77%	-0.58%
OILS AND FATS	729	1,449	2,549	2.32%	1.42%	1.80%
REFRIGERATED CARGO	5,389	13,614	21,223	3.14%	1.12%	1.98%
VEHICLES	1,647	2,317	1,829	1.14%	-0.59%	0.15%
MINOR BULKS	36,806	57,404	96,078	1.49%	1.30%	1.38%
CONTAINERIZED CARGO	20,840	50,611	67,180	3.00%	0.71%	1.69%
GENERAL CARGO	11,980	30,477	57,245	3.16%	1.59%	2.26%
TOTAL	157,472	360,990	490,647	2.80%	0.77%	1.64%
200,000 DWT						
IRON ORE	581	22,624	15,150	12.98%	-1.00%	4.77%
BAUXITE/ALUMINA	2,906	9,489	5,407	4.02%	-1.40%	0.89%
CRUDE PETROLEUM	9,621	19,008	16,548	2.30%	-0.35%	0.78%
COAL & COKE	10,978	63,818	82,772	6.04%	0.65%	2.93%
BULK GRAINS	23,528	44,356	66,902	2.14%	1.03%	1.50%
FERTILIZERS	13,009	8,229	19,674	-1.52%	2.20%	0.59%
BULK CHEMICALS	6,967	22,920	33,857	4.05%	0.98%	2.28%
PETROLEUM PRODUCTS	12,490	16,995	8,311	1.03%	-1.77%	-0.58%
OILS AND FATS	729	1,449	2,549	2.32%	1.42%	1.80%
REFRIGERATED CARGO	5,389	13,614	21,223	3.14%	1.12%	1.98%
VEHICLES	1,647	2,317	1,829	1.14%	-0.59%	0.15%
MINOR BULKS	36,806	57,404	96,078	1.49%	1.30%	1.38%
CONTAINERIZED CARGO	20,840	50,611	67,180	3.00%	0.71%	1.69%
GENERAL CARGO	11,980	30,477	57,245	3.16%	1.59%	2.26%
TOTAL	157,472	363,312	494,726	2.83%	0.77%	1.65%

Table 5.16

ANNUAL CARGO FLOWS BY COMMODITY AND ROUTE
NORTHBOUND AND SOUTHBOUND
THOUSAND TONNES (Continued)

COMMODITY	1990	2020	2060	ANNUAL GROWTH RATE 1990-2020	2020-2060	1990-2060
250,000 DWT						
IRON ORE	581	29,145	28,951	13.94%	-0.02%	5.74%
BAUXITE/ALUMINA	2,906	9,489	5,407	4.02%	-1.40%	0.89%
CRUDE PETROLEUM	9,621	19,008	16,548	2.30%	-0.35%	0.78%
COAL & COKE	10,978	63,818	82,772	6.04%	0.65%	2.93%
BULK GRAINS	23,528	44,356	66,902	2.14%	1.03%	1.50%
FERTILIZERS	13,009	8,229	19,674	-1.52%	2.20%	0.59%
BULK CHEMICALS	6,967	22,920	33,857	4.05%	0.98%	2.28%
PETROLEUM PRODUCTS	12,490	16,995	8,311	1.03%	-1.77%	-0.58%
OILS AND FATS	729	1,449	2,549	2.32%	1.42%	1.80%
REFRIGERATED CARGO	5,389	13,614	21,223	3.14%	1.12%	1.98%
VEHICLES	1,647	2,317	1,829	1.14%	-0.59%	0.15%
MINOR BULKS	36,806	57,404	96,078	1.49%	1.30%	1.38%
CONTAINERIZED CARGO	20,840	50,611	67,180	3.00%	0.71%	1.69%
GENERAL CARGO	11,980	30,477	57,245	3.16%	1.59%	2.26%
TOTAL	157,472	369,833	508,527	2.89%	0.80%	1.69%

Table 5.17 SUMMARY OF BALLAST AND LADEN TRANSITS FOR ALL CASES

STATUS QUO CANAL

1990	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL
Container-Breakbulk	14	13	552	554	566	567	1,133
Dry Bulk Carriers	316	28	1,136	1,612	1,452	1,640	3,092
Chemical Tankers	36	4	143	301	179	305	484
Full Container Ships	3	2	553	517	556	519	1,075
General Cargo Ships	72	54	364	419	436	473	909
Liquid Gas Carriers	68	1	8	102	76	103	179
Refrigerated Ships	24	498	1,119	598	1,143	1,096	2,239
Roll-on Roll-off	16	4	90	96	106	100	206
Oil Tankers	158	148	292	369	450	517	967
Vehicle Carriers	1	279	325	125	326	404	730
Passenger Ships	1	3	49	99	50	102	152
Total Ships	708	1,031	4,631	4,792	5,339	5,823	11,162

2020	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2020
Container-Breakbulk	29	12	794	826	823	841	1,664	1.29%
Dry Bulk Carriers	363	13	1642	1964	2,011	2,005	4,016	0.88%
Chemical Tankers	77	4	266	795	343	799	1,142	2.90%
Full Container Ships	5	4	1160	1,220	1,165	1,224	2,390	2.70%
General Cargo Ships	79	61	420	473	499	534	1,033	0.43%
Liquid Gas Carriers	126	2	10	211	136	213	349	2.25%
Refrigerated Ships	24	909	2,200	882	2,224	1,792	4,016	1.97%
Roll-on Roll-off	27	4	106	157	132	162	294	1.19%
Oil Tankers	234	97	185	568	419	666	1,085	0.39%
Vehicle Carriers	2	381	443	197	445	578	1,023	1.13%
Passenger Ships	2	9	154	183	155	192	348	2.80%
Total Ships	967	1497	7379	7479	8,352	9,007	17,359	1.48%

2060	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2060
Container-Breakbulk	37	21	1289	1039	1,326	1,060	2,386	1.07%
Dry Bulk Carriers	314	4	629	1976	944	1,977	2,920	-0.08%
Chemical Tankers	89	5	298	906	387	912	1,299	1.42%
Full Container Ships	1	4	1091	1181	1,092	1,185	2,277	1.08%
General Cargo Ships	126	97	681	713	807	810	1,616	0.83%
Liquid Gas Carriers	60	5	14	91	74	96	169	-0.08%
Refrigerated Ships	20	933	2500	1438	2,520	2,371	4,891	1.12%
Roll-on Roll-off	47	8	182	223	229	231	460	1.15%
Oil Tankers	96	29	62	205	158	233	391	-1.29%
Vehicle Carriers	2	438	510	233	512	671	1,183	0.69%
Passenger Ships	39	12	197	238	236	250	485	1.67%
Total Ships	831	1556	7451	8243	8,283	9,795	18,078	0.69%

Table 5.17 SUMMARY OF BALLAST AND LADEN TRANSITS FOR ALL CASES (continued)

150,000 DWT

1990	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL
Container-Breakbulk	14	13	552	554	566	567	1,133
Dry Bulk Carriers	316	28	1,136	1,612	1,452	1,640	3,092
Chemical Tankers	36	4	143	301	179	305	484
Full Container Ships	3	2	553	517	556	519	1,075
General Cargo Ships	72	54	364	419	436	473	909
Liquid Gas Carriers	68	1	8	102	76	103	179
Refrigerated Ships	24	498	1,119	598	1,143	1,096	2,239
Roll-on Roll-off	16	4	90	96	106	100	206
Oil Tankers	158	148	292	369	450	517	967
Vehicle Carriers	1	279	325	125	326	404	730
Passenger Ships	1	3	49	99	50	102	152
Total Ships	708	1,031	4,631	4,792	5,339	5,823	11,162

2020	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2020
Container-Breakbulk	29	12	794	826	823	841	1,664	1.29%
Dry Bulk Carriers	389	12	1536	2581	1,930	2,620	4,549	1.30%
Chemical Tankers	77	4	266	795	343	799	1,142	2.90%
Full Container Ships	5	4	1127	1115	1,132	1,119	2,251	2.49%
General Cargo Ships	79	61	420	473	499	534	1,033	0.43%
Liquid Gas Carriers	126	2	10	211	136	213	349	2.25%
Refrigerated Ships	24	909	2199	882	2,223	1,792	4,015	1.97%
Roll-on Roll-off	27	4	106	157	132	162	294	1.19%
Oil Tankers	329	98	181	521	510	619	1,128	0.52%
Vehicle Carriers	2	381	443	197	445	578	1,023	1.13%
Passenger Ships	2	9	154	183	155	192	348	2.80%
Total Ships	1087	1495	7235	8043	8,327	9,469	17,796	1.57%

2060	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2060
Container-Breakbulk	47	21	1429	1481	1,476	1,502	2,978	1.39%
Dry Bulk Carriers	317	26	2105	3168	2,421	3,188	5,610	0.85%
Chemical Tankers	117	10	366	946	483	956	1,439	1.57%
Full Container Ships	2	4	1259	1314	1,261	1,318	2,579	1.26%
General Cargo Ships	156	119	794	906	950	1,025	1,975	1.11%
Liquid Gas Carriers	952	5	14	124	966	129	1,095	2.62%
Refrigerated Ships	23	1046	2783	1493	2,806	2,539	5,345	1.25%
Roll-on Roll-off	49	9	187	299	236	308	544	1.40%
Oil Tankers	247	58	135	485	382	543	926	-0.06%
Vehicle Carriers	2	439	511	234	513	673	1,186	0.70%
Passenger Ships	0	12	9	238	9	250	259	0.76%
Total Ships	1913	1749	9592	10686	11,504	12,431	23,934	1.10%

Table 5.17 SUMMARY OF BALLAST AND LADEN TRANSITS FOR ALL CASES (continued)

200,000 DWT

1990	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL
Container-Breakbulk	14	13	552	554	566	567	1,133
Dry Bulk Carriers	316	28	1,136	1,612	1,452	1,640	3,092
Chemical Tankers	36	4	143	301	179	305	484
Full Container Ships	3	2	553	517	556	519	1,075
General Cargo Ships	72	54	364	419	436	473	909
Liquid Gas Carriers	68	1	8	102	76	103	179
Refrigerated Ships	24	498	1,119	598	1,143	1,096	2,239
Roll-on Roll-off	16	4	90	96	106	100	206
Oil Tankers	158	148	292	369	450	517	967
Vehicle Carriers	1	279	325	125	326	404	730
Passenger Ships	1	3	49	99	50	102	152
Total Ships	708	1,031	4,631	4,792	5,339	5,823	11,162

2020	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2020
Container-Breakbulk	29	12	794	826	823	841	1,664	1.29%
Dry Bulk Carriers	398	20	1545	2559	1,948	2,605	4,553	1.30%
Chemical Tankers	77	4	266	795	343	799	1,142	2.90%
Full Container Ships	5	4	1127	1115	1,132	1,119	2,251	2.49%
General Cargo Ships	79	61	420	473	499	534	1,033	0.43%
Liquid Gas Carriers	126	2	10	211	136	213	349	2.25%
Refrigerated Ships	24	909	2199	882	2,223	1,792	4,015	1.97%
Roll-on Roll-off	27	4	106	157	132	162	294	1.19%
Oil Tankers	303	89	181	599	484	688	1,172	0.64%
Vehicle Carriers	2	381	443	197	445	578	1,023	1.13%
Passenger Ships	2	9	154	183	155	192	348	2.80%
Total Ships	1071	1495	7244	7998	8,320	9,524	17,844	1.58%

2060	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2060
Container-Breakbulk	47	21	1429	1481	1,476	1,502	2,978	1.39%
Dry Bulk Carriers	384	26	2114	3044	2,497	3,064	5,562	0.84%
Chemical Tankers	117	10	366	946	483	956	1,439	1.57%
Full Container Ships	2	4	1259	1314	1,261	1,318	2,579	1.26%
General Cargo Ships	156	119	794	906	950	1,025	1,975	1.11%
Liquid Gas Carriers	952	5	14	124	966	129	1,095	2.62%
Refrigerated Ships	23	1,046	2783	1493	2,806	2,539	5,345	1.25%
Roll-on Roll-off	49	9	187	299	236	308	544	1.40%
Oil Tankers	231	58	135	462	366	520	886	-0.12%
Vehicle Carriers	2	439	511	234	513	673	1,186	0.70%
Passenger Ships	39	12	197	238	236	250	486	1.67%
Total Ships	2003	1749	9789	10544	11,791	12,283	24,074	1.10%

Table 5.17 SUMMARY OF BALLAST AND LADEN TRANSITS FOR ALL CASES (continued)

250.000 DWT

1990	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL
Container-Breakbulk	14	13	552	554	566	567	1,133
Dry Bulk Carriers	316	28	1,136	1,612	1,452	1,640	3,092
Chemical Tankers	36	4	143	301	179	305	484
Full Container Ships	3	2	553	517	556	519	1,075
General Cargo Ships	72	54	364	419	436	473	909
Liquid Gas Carriers	68	1	8	102	76	103	179
Refrigerated Ships	24	498	1,119	598	1,143	1,096	2,239
Roll-on Roll-off	16	4	90	96	106	100	206
Oil Tankers	158	148	292	369	450	517	967
Vehicle Carriers	1	279	325	125	326	404	730
Passenger Ships	1	3	49	99	50	102	152
Total Ships	708	1,031	4,631	4,792	5,339	5,823	11,162

2020	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2020
Container-Breakbulk	29	12	794	826	823	841	1,664	1.29%
Dry Bulk Carriers	400	20	1545	2594	1,950	2,640	4,590	1.33%
Chemical Tankers	77	4	266	795	343	799	1,142	2.90%
Full Container Ships	5	4	1127	1115	1,132	1,119	2,251	2.49%
General Cargo Ships	79	61	420	473	499	534	1,033	0.43%
Liquid Gas Carriers	126	2	10	211	136	213	349	2.25%
Refrigerated Ships	24	909	2199	882	2,223	1,792	4,015	1.97%
Roll-on Roll-off	27	4	106	157	132	162	294	1.19%
Oil Tankers	293	89	181	585	474	674	1,148	0.57%
Vehicle Carriers	2	381	443	197	445	578	1,023	1.13%
Passenger Ships	2	9	154	183	155	192	348	2.80%
Total Ships	1063	1495	7244	8020	8,312	9,545	17,856	1.58%

2060	Ballast North	Ballast South	Laden North	Laden South	Total North	Total South	TOTAL	Annual Average Growth Rat 1990-2060
Container-Breakbulk	47	21	1429	1481	1,476	1,502	2,978	1.39%
Dry Bulk Carriers	317	26	2124	3103	2,440	3,124	5,564	0.84%
Chemical Tankers	117	10	366	946	483	956	1,439	1.57%
Full Container Ships	2	4	1259	1314	1,261	1,318	2,579	1.26%
General Cargo Ships	156	119	794	906	950	1,025	1,975	1.11%
Liquid Gas Carriers	952	5	14	124	966	129	1,095	2.62%
Refrigerated Ships	23	1,046	2783	1493	2,806	2,539	5,345	1.25%
Roll-on Roll-off	49	9	186	299	235	308	543	1.39%
Oil Tankers	221	58	135	449	356	507	863	-0.16%
Vehicle Carriers	2	439	511	234	513	673	1,186	0.70%
Passenger Ships	39	12	197	238	236	250	486	1.67%
Total Ships	1926	1749	9798	10587	11,723	12,330	24,053	1.10%

5.6 Analysis of Shifted Cargoes for Each Maximum Design Ship Size Based on a 'With-tolls' Scenario

5.6.1 Introduction

The commodity flow and transit forecasts presented in Section 5.5 are based on the assumption of no Panama Canal tolls as required for the work being undertaken by the Financing Scheme, Financial Analysis and Management Arrangements Component Contractor (Nathan Associates Inc.). Therefore, the forecasts shown in Section 5.5 cannot be taken as a measure of the demand for Canal transits.

To provide an indication of potential demand and also to provide a reference against which Nathan Associates can assess the results of their work, this section assesses the likely effect on future Canal traffic assuming that current Canal toll structures are maintained in the future, with an allowance for future escalation of tariffs in line with vessel operating costs. The basis for the future escalation of Canal tolls is the estimated development of operating costs for a current 'Panamax' size dry bulk carrier, as follows.

By relating the future escalation in Canal toll to vessel operating costs it ensures that, in relation to the current position, no bias is introduced into the analysis by changing the importance of tolls relative to ship costs. Because estimates of future ship operating costs have been built up from individual items of expense, increases vary slightly between ship types, reflecting the different weightings of component costs. Adoption of the 'Panamax' dry bulk carrier as the basis for future Canal toll increases reflects the importance of this sector when considering additional bypass traffic that could be attracted to the Canal for different maximum ship designs.

It is estimated that in real terms, 'Panamax' dry bulk carrier operating costs will increase by 11% between 1990 and 2020 and by 7% between 2020 and 2060. As a result, the formulae for projecting Panama Canal tolls in 2020 and 2060 are as follows:

2020: Laden only: (PCNT*2.01*1.2)*1.11; where $2.01/PCNT is the 1990 toll and the factor 1.2 takes into account additional charges such as handling and agency fees incurred when transitting the Canal, equivalent to 20% of the basic toll.

Laden+ballast: (PCNT*2.01*1.2+PCNT*1.6*1.2)*1.11; where $1.6/PCNT is the basic 1990 ballast toll.

2060: 2020 tolls*1.07.

Note that ballast only is not part of our calculus as transportation economics is not being used in the determination of ballast transits. On the other hand, we must determine laden+ballast for those ships for which the return trip figures into the determination of the least cost routing.

Estimates of Canal tolls based on the above were introduced into the comparisons of freight costs undertaken in the analyses of bypass trades for dry bulk carriers, tankers and fully cellular container ships as described in Section 5.3 to determine the extent to which potential trade switched through the Canal under a no-tolls scenario would be reduced by the impact of tolls. Where the introduction of Canal tolls resulted in any given instance in overall freight costs via the Canal equalling those on the alternative route, it has been assumed that this would not result in the relevant cargo flow being switched back to the alternative route. The results are described below.

5.6.2 Dry Bulk Carriers

The effect of including Canal tolls as described above is to add a total of $1.2/cargo tonne and $1.3/cargo tonne in 2020 and 2060 respectively to the transportation costs for those voyages that involve a laden transit of the Panama Canal. A summary of the estimated reductions in dry bulk cargo flows through the Canal resulting from the introduction of tolls for each of the maximum ship design cases is provided in Table 5.18.

Table 5.18 Summary of the Reductions in Major Bulk Cargoes Transitting the Canal as the Result of Introducing Canal Tolls

YEAR	CANAL SIZE	COMMODITY	ROUTE	VESSEL SIZE RANGE(KDWT) 100-150	150-200	200-250	TONNES TOTAL
2020	150,000 DWT	COAL	CANADA W COAST-S AMERICA E COAST	0	0	0	0
		IRON ORE	N BRAZIL-ASIA	10,617,313	0	0	10,617,313
		IRON ORE	VENEZUELA-ASIA	567,525	0	0	567,525
		IRON ORE	CANADA E COAST-ASIA	791,643	0	0	791,643
		IRON ORE	CHILE-EUROPE	1,044,833	0	0	1,044,833
		TOTAL		13,021,314	0	0	13,021,314
2020	200,000 DWT	COAL	CANADA W COAST-S AMERICA E COAST	0	0	0	0
		IRON ORE	N BRAZIL-ASIA	0	10,617,313	0	10,617,313
		IRON ORE	VENEZUELA-ASIA	0	0	0	0
		IRON ORE	CANADA E COAST-ASIA	0	464,659	0	464,659
		IRON ORE	CHILE-EUROPE	1,044,833	1,857,481	0	2,902,314
		TOTAL		1,044,833	12,939,453	0	13,984,286
2020	250,000 DWT	COAL	CANADA W COAST-S AMERICA E COAST	0	0	0	0
		IRON ORE	N BRAZIL-ASIA	0	10,617,313	6,521,377	17,138,690
		IRON ORE	VENEZUELA-ASIA	0	0	0	0
		IRON ORE	CANADA E COAST-ASIA	0	0	0	0
		IRON ORE	CHILE-EUROPE	1,044,833	1,857,481	0	2,902,314
		TOTAL		1,044,833	12,474,794	6,521,377	20,041,004
2060	150,000 DWT	COAL	CANADA W COAST-S AMERICA E COAST	849,041	0	0	849,041
		IRON ORE	N BRAZIL-ASIA	6,687,025	0	0	6,687,025
		IRON ORE	VENEZUELA-ASIA	0	0	0	0
		IRON ORE	CANADA E COAST-ASIA	1,516,828	0	0	1,516,828
		IRON ORE	CHILE-EUROPE	0	0	0	0
		TOTAL		9,052,894	0	0	9,052,894
2060	200,000 DWT	COAL	CANADA W COAST-S AMERICA E COAST	0	0	0	0
		IRON ORE	N BRAZIL-ASIA	0	0	0	0
		IRON ORE	VENEZUELA-ASIA	0	615,343	0	615,343
		IRON ORE	CANADA E COAST-ASIA	0	1,516,828	0	1,516,828
		IRON ORE	CHILE-EUROPE	0	1,946,402	0	1,946,402
		TOTAL		0	4,078,573	0	4,078,573
2060	250,000 DWT	COAL	CANADA W COAST-S AMERICA E COAST	0	0	0	0
		IRON ORE	N BRAZIL-ASIA	0	0	11,854,447	11,854,447
		IRON ORE	VENEZUELA-ASIA	0	0	0	0
		IRON ORE	CANADA E COAST-ASIA	0	0	0	0
		IRON ORE	CHILE-EUROPE	0	1,946,402	1,946,402	3,892,803
		TOTAL		0	1,946,402	13,800,849	15,747,250

The principal conclusions are that at these levels of tolls there is almost no change in the volumes of coal cargo that could be expected to be attracted through an enlarged Canal and that the almost all of the changes can be attributed to the iron ore trades in general and movements between northern Brazil and Asia in particular. In 2020, with the maximum ship design size at 150,000 DWT it is estimated that a total of 13 million tonnes of cargo would be diverted from the Canal with the introduction of tolls at the above level. For the 200,000 DWT and 250,000 DWT design ship cases, total cargo flows lost to the Canal would be equivalent to 14 million tonnes and 20 million tonnes respectively.

Under the no-tolls scenario (Section 5.3) it has already been shown that in general the potential for the Canal to capture bypass traffic diminishes as the mix of vessels on the alternative routes gradually moves towards the utilization of larger vessels in line with the evolution of the world dry bulk carrier fleet. As a result, the cargo flows lost to the Canal through the introduction of tolls in 2060 are less than those in 2020. In 2060, the total cargo flows lost to the Canal with the introduction of tolls are 9.1 million tonnes, 4.1 million tonnes and 15.7 million tonnes for the 150,000 DWT, 200,000 DWT and 250,000 DWT maximum ship design sizes respectively.

At the level of individual trades, no impact is envisaged in the coal trades between the U.S. East and Gulf Coasts and Asia, between Colombia and Asia, and between Canada West Coast and Europe. Revised comparisons of transportation costs for these trades together with the unchanged apportionment of trade between the Canal and alternative routes for each of the cases considered are provided in Tables 5.19 to 5.21. A brief discussion of the effect of introducing tolls for each of the remaining trades considered is provided below.

Table 5.19 ANALYSIS OF POTENTIAL DRY BULK CARRIER BY PASS TRAFFIC: WITH TOLLS SCENARIO

COMMODITY: COAL ROUTE: USEC- ASIA
MILEAGE VIA PANAMA: 9748 MILEAGE VIA ALTERNATIVE: 15126 (HAMPTON ROADS)
MILEAGE VIA PANAMA: 9750 MILEAGE VIA ALTERNATIVE: 15707 (MOBILE)

Year	Vessel Size (Kdwt)	Freight Cost Including Canal Tolls ($/tonne)				CANAL MAXIMUM SIZE: Status Quo		150,000 dwt		200,000 dwt		250,000 dwt	
		Via Panama		Alternative		tonnes	%	tonnes	%	tonnes	%	tonnes	%
	Range From:	USEC	USG	USEC	USG								
2020	40-65	n.a.	n.a.	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	n.a.	n.a.	1112100	2.0%	1112100	2.0%	1112100	2.0%	1112100	2.0%
	100-150	11.7	11.3	13.6	13.9	37730841	66.2%	55855323	98.0%	55855323	98.0%	55855323	98.0%
	150-200	10.7	10.3	12.2	12.5	16642606	29.2%	0	0.0%	0	0.0%	0	0.0%
	200-250	9.4	9.0	10.5	10.8	1481876	2.6%	0	0.0%	0	0.0%	0	0.0%
	250+	n.a.	n.a.	9.3	9.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL VIA PANAMA CANAL					1112100	2.0%	56967423	100.0%	56967423	100.0%	56967423	100.0%
	TOTAL ON BY PASS ROUTE					55855323	98.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL					56967423	100.0%	56967423	100.0%	56967423	100.0%	56967423	100.0%
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS					0	0.0%	0	0.0%	0	0.0%	0	0.0%
2060	40-65	n.a.	n.a.	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	100-150	12.7	12.2	14.8	15.2	0	0.0%	75051385	100.0%	0	0.0%	0	0.0%
	150-200	11.7	11.3	13.4	13.7	75051385	100.0%	0	0.0%	75051385	100.0%	75051385	100.0%
	200-250	10.2	9.9	11.5	11.8	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	250+	n.a.	n.a.	10.3	10.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL VIA PANAMA CANAL					0	0.0%	75051385	100.0%	75051385	100.0%	75051385	100.0%
	TOTAL ON BY PASS ROUTE					75051385	100.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL					75051385	100.0%	75051385	100.0%	75051385	100.0%	75051385	100.0%
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS					0	0.0%	0	0.0%	0	0.0%	0	0.0%

* Note: Mileages are on the basis of a single voyage.

Table 5.20 ANALYSIS OF POTENTIAL DRY BULK CARRIER BY PASS TRAFFIC : WITH TOLL SCENARIO

COMMODITY: COAL ROUTE: COLOMBIA - JAPAN
MILEAGE VIA PANAMA: 8041 MILEAGE VIA ALTERNATIVE: 13834

Year	Vessel Size (Kdwt) Range	Freight Cost Including Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo tonnes	%	150,000 dwt tonnes	%	200,000 dwt tonnes	%	250,000 dwt tonnes	%
2020	40-65	n.a.	n.a.	118288	28.9%	0	0.0%	0	0.0%	0	0.0
	65-100	n.a.	n.a.	0	0.0%	118288	28.9%	118288	28.9%	118288	28.9
	100-150	10.8	14.5	198044	48.3%	291338	71.1%	145669	35.6%	145669	35.6
	150-200	9.7	12.8	93294	22.8%	0	0.0%	145669	35.6%	145669	35.6
	200-250	8.5	11.0	0	0.0%	0	0.0%	0	0.0%	0	0.0
	250+	n.a.	9.8	0	0.0%	0	0.0%	0	0.0%	0	0.0
	TOTAL VIA PANAMA CANAL			118288	28.9%	409626	100.0%	409626	100.0%	409626	100.0
	TOTAL ON BY PASS ROUTE			291338	71.1%	0	0.0%	0	0.0%	0	0.0
	TOTAL			409626	100.0%	409626	100.0%	409626	100.0%	409626	100.0
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	0	0.0%	0	0.0%	0	0.0
2060	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0
	65-100	n.a.	n.a.	142911	28.9%	142911	28.9%	142911	28.9%	142911	28.9
	100-150	11.7	15.6	0	0.0%	351980	71.1%	0	0.0%	0	0.0
	150-200	10.6	14.1	351980	71.1%	0	0.0%	351980	71.1%	351980	71.1
	200-250	9.3	12.1	0	0.0%	0	0.0%	0	0.0%	0	0.0
	250+	n.a.	10.8	0	0.0%	0	0.0%	0	0.0%	0	0.0
	TOTAL VIA PANAMA CANAL			142911	28.9%	494891	100.0%	494891	100.0%	494891	100.0
	TOTAL ON BY PASS ROUTE			351980	71.1%	0	0.0%	0	0.0%	0	0.0
	TOTAL			494891	100.0%	494891	100.0%	494891	100.0%	494891	100.0
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	0	0.0%	0	0.0%	0	0.0

Note: Mileages are on the basis of a single voyage.

Table 5.21 ANALYSIS OF POTENTIAL DRY BULK CARRIER BY PASS TRAFFIC : WITH TOLLS SCENARIO

COMMODITY: COAL ROUTE: CANADA WEST COAST - EUROPE
MILEAGE VIA PANAMA: 9008 MILEAGE VIA ALTERNATIVE: 14475

Year	Vessel Size (Kdwt) Range	Freight Cost Including Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo tonnes	%	150,000 dwt tonnes	%	200,000 dwt tonnes	%	250,000 dwt tonnes	%
2020	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	1234886	47.6%	0	0.0%	0	0.0%	0	0.0%
	100-150	13.1	15.0	407171	15.7%	2593853	100.0%	778156	30.0%	778156	30.0%
	150-200	11.7	13.3	951796	36.7%	0	0.0%	1815697	70.0%	1815697	70.0%
	200-250	10.3	11.5	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	250+	n.a.	10.2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL VIA PANAMA CANAL			1234886	47.6%	2593853	100.0%	2593853	100.0%	2593853	100.0%
	TOTAL ON BY PASS ROUTE			1358967	52.4%	0	0.0%	0	0.0%	0	0.0%
	TOTAL			2593853	100.0%	2593853	100.0%	2593853	100.0%	2593853	100.0%
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	0	0.0%	0	0.0%	0	0.0%
2060	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	871469	47.4%	0	0.0%	0	0.0%	0	0.0%
	100-150	13.9	16.2	0	0.0%	1838862	100.0%	0	0.0%	0	0.0%
	150-200	12.8	14.6	967393	52.6%	0	0.0%	1838862	100.0%	1838862	100.0%
	200-250	11.2	12.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	250+	n.a.	11.3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL VIA PANAMA CANAL			871469	47.4%	1838862	100.0%	1838862	100.0%	1838862	100.0%
	TOTAL ON BY PASS ROUTE			967393	52.6%	0	0.0%	0	0.0%	0	0.0%
	TOTAL			1838862	100.0%	1838862	100.0%	1838862	100.0%	1838862	100.0%
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	0	0.0%	0	0.0%	0	0.0%

Note: Mileages are on the basis of a single voyage.

(a) Coal from West Coast Canada to Brazil

With the exception of the 150,000 DWT maximum design ship case in 2060, the introduction of tolls does not affect the amount of additional cargo attracted to the Canal (Table 5.22). In this one instance, the 0.8 million tonnes of coal assumed to move in ships of between 150,000 DWT and 200,000 DWT (equivalent to almost 95% of total trade) under status quo conditions would not be attracted through the Canal in vessels of between 100,000 DWT and 150,000 DWT. That said, the difference in estimated transportation costs is only $0.2/tonne ($8.1/tonne versus $8.3/tonne) and therefore little adjustment to the above Canal tolls would be required to retain this cargo flow through the Canal.

Table 5.22 ANALYSIS OF POTENTIAL DRY BULK CARRIER BYPASS TRAFFIC: WITH TOLL SCENARIO

COMMODITY: COAL ROUTE: CANADA WEST COAST - SOUTH AMERICA EAST COAST
MILEAGE VIA PANAMA: 7395 MILEAGE VIA ALTERNATIVE: 10362

Year	Vessel Size (Kdwt) Range	Freight Cost Including Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo tonnes	%	150,000 dwt tonnes	%	200,000 dwt tonnes	%	250,000 dwt tonnes	%
2020	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0
	65-100	n.a.	n.a.	46261	5.4%	46261	5.4%	46261	5.4%	46261	5.4
	100-150	7.7	8.2	804868	94.6%	804868	94.6%	402434	47.3%	402434	47.3
	150-200	7.3	7.5	0	0.0%	0	0.0%	402434	47.3%	402434	47.3
	200-250	6.4	6.4	0	0.0%	0	0.0%	0	0.0%	0	0.0
	250+	n.a.	5.7	0	0.0%	0	0.0%	0	0.0%	0	0.0
	TOTAL VIA PANAMA CANAL			46261	5.4%	851129	100.0%	851129	100.0%	851129	100.0
	TOTAL ON BY PASS ROUTE			804868	94.6%	0	0.0%	0	0.0%	0	0.0
	TOTAL			851129	100.0%	851129	100.0%	851129	100.0%	851129	100.0
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	0	0.0%	0	0.0%	0	0.0
2060	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0
	65-100	n.a.	n.a.	49010	5.5%	49010	5.5%	49010	5.5%	49010	5.5
	100-150	8.3	8.8	0	0.0%	0	0.0%	0	0.0%	0	0.0
	150-200	7.9	8.1	849041	94.5%	849041	94.5%	849041	94.5%	849041	94.5
	200-250	6.9	7.0	0	0.0%	0	0.0%	0	0.0%	0	0.0
	250+	n.a.	6.3	0	0.0%	0	0.0%	0	0.0%	0	0.0
	TOTAL VIA PANAMA CANAL			49010	5.5%	49010	5.5%	898051	100.0%	898051	100.0
	TOTAL ON BY PASS ROUTE			849041	94.5%	849041	94.5%	0	0.0%	0	0.0
	TOTAL			898051	100.0%	898051	100.0%	898051	100.0%	898051	100.0
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	-849041	-94.5%	0	0.0%	0	0.0%

Note: Mileages are on the basis of a single voyage.

(b) Iron Ore from North Brazil to the Far East

In comparison with the no-tolls scenario, the introduction of Canal tolls results in transportation costs via Panama which, within each of the size ranges, are equal to, or marginally greater than those via the alternative route (Table 5.23). As a result, in 2020, only those cargoes that are assumed to move in vessels of between 100,000 DWT and 150,000 DWT under status quo conditions are estimated to transit the Canal in each of the other three cases. The 10.6 million tonnes of cargo moving in ships of between 150,000 DWT and 200,000 DWT under status quo conditions, which in the absence of tolls would be switched through the Canal in the 150,000 DWT and 200,000 DWT maximum design ship cases, would be lost with the introduction of tolls. This applies also to the additional 6.5 million tonnes moving in vessels of between 200,000 DWT and 250,000 DWT which would not be retained by the Canal, even in the 250,000 DWT maximum design ship case.

Table 5.23 ANALYSIS OF POTENTIAL DRY BULK CARRIER BY PASS TRAFFIC: WITH TOLLS SCENARIO

COMMODITY: IRON ORE ROUTE: NORTH BRAZIL - ASIA
MILEAGE VIA PANAMA: 10253 MILEAGE VIA ALTERNATIVE: 12657

Year	Vessel Size (Kdwt) Range	Freight Cost Including Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo tonnes	%	150,000 dwt tonnes	%	200,000 dwt tonnes	%	250,000 dwt tonnes	%
2020	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	352308	0.8%	352308	0.8%	352308	0.8%	352308	0.8%
	100-150	13.6	13.6	4303660	9.9%	4246925	9.8%	4246925	9.8%	4246925	9.8%
	150-200	12.7	12.6	10780885	24.8%	10617313	24.4%	10617313	24.4%	10617313	24.4%
	200-250	11.1	10.8	6477225	14.9%	6521377	15.0%	6521377	15.0%	6521377	15.0%
	250-300	n.a.	9.5	15084544	34.7%	15216547	35.0%	15216547	35.0%	15216547	35.0%
	300+	n.a.	7.4	6477245	14.9%	6521377	15.0%	6521377	15.0%	6521377	15.0%
	TOTAL VIA PANAMA CANAL			352308	0.8%	4599233	10.6%	4599233	10.6%	4599233	10.6%
	TOTAL ON BY PASS ROUTE			43123539	99.2%	38876614	89.4%	38876614	89.4%	38876614	89.4%
	TOTAL			43475847	100.0%	43475847	100.0%	43475847	100.0%	43475847	100.0%
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	-10617313	-24.4%	-10617313	-24.4%	-17138690	-39.4%
2060	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	425643	0.9%	425643	0.9%	425643	0.9%	425643	0.9%
	100-150	14.8	14.8	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	150-200	13.9	13.9	7065418	14.9%	6687025	14.1%	6687025	14.1%	6687025	14.1%
	200-250	12.1	11.9	11759890	24.8%	11854447	25.0%	11854447	25.0%	11854447	25.0%
	250-300	n.a.	10.6	18777890	39.6%	18967114	40.0%	18967114	40.0%	18967114	40.0%
	300+	n.a.	8.2	9388945	19.8%	9483557	20.0%	9483557	20.0%	9483557	20.0%
	TOTAL VIA PANAMA CANAL			425643	0.9%	425643	0.9%	7112668	15.0%	7112668	15.0%
	TOTAL ON BY PASS ROUTE			46992143	99.1%	46992143	99.1%	40305118	85.0%	40305118	85.0%
	TOTAL			47417786	100.0%	47417786	100.0%	47417786	100.0%	47417786	100.0%
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	-6687025	-14.1%	0	0.0%	-11854447	-25.0%

Note: Mileages are based on a single voyage.

In 2060, under the 150,000 DWT maximum design ship case, 6.7 million tonnes of cargo would be lost from the Canal compared with the no-tolls case as the transportation costs for using a ship of between 150,000 DWT and 200,000 DWT via the alternative route would, with the effect of tolls, become $0.9/tonne less than that for a ship of between 100,000 DWT and 150,000 DWT using the Canal. In the 200,000 DWT design ship case no change is envisaged compared with the no-tolls scenario, although the transportation costs for ships in this maximum size range are estimated to be the same for the Canal and alternative routes. For the 250,000 DWT maximum design ship case, as for 2020, inclusion of Canal tolls removes the incentive to route ships of between 200,000 DWT and 250,000 DWT via the Canal and as a result almost 12 million tonnes are lost from the Canal compared with the no-tolls scenario.

Again, to place the potential changes from the no-tolls scenario in true perspective, it should be noted that the cargoes lost from the Canal under the 200,000 DWT and 250,000 DWT maximum design ship cases arise from transportation differentials of between just $0.1 and $0.3/tonne.

(c) Iron Ore from Venezuela to the Far East

As the result of introducing tolls only two changes are envisaged compared with the projections of Canal flows under the no-tolls scenario (Table 5.24). Both changes relate to situations where, under the no-tolls scenario, cargoes in ships from a larger size range on the alternative route were switched to smaller vessels trading through the Canal. In 2020, this applies to the 0.6 million tonnes assumed to be moving in ships of between 150,000 DWT and 200,000 DWT under status quo conditions which would no longer be attracted through the Canal in smaller ships in the 150,000 maximum design ship case. In 2060, this applies to the 0.6 million tonnes moving in ships of between 200,000 DWT and 250,000 DWT which would not be switched through the Canal in the 200,000 DWT maximum design ship case.

Table 5.24 ANALYSIS OF POTENTIAL DRY BULK CARRIER BY PASS TRAFFIC: WITH TOLI SCENARIO

COMMODITY: IRON ORE ROUTE: VENEZUELA - ASIA
MILEAGE VIA PANAMA: 9051 MILEAGE VIA ALTERNATIVE: 13787

Year	Vessel Size (Kdwt) Range	Freight Cost Including Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo tonnes	%	150,000 dwt tonnes	%	200,000 dwt tonnes	%	250,000 dwt tonnes	%
2020	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	100-150	12.9	14.3	1205992	68.0%	1205992	68.0%	0	0.0%	0	0.0%
	150-200	11.6	12.7	567525	32.0%	567525	32.0%	1773517	100.0%	1773517	100.0%
	200-250	10.1	10.9	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	250+	n.a.	9.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL VIA PANAMA CANAL			0	0.0%	1205992	68.0%	1773517	100.0%	1773517	100.0%
	TOTAL ON BY PASS ROUTE			1773517	100.0%	567525	32.0%	0	0.0%	0	0.0%
	TOTAL			1773517	100.0%	1773517	100.0%	1773517	100.0%	1773517	100.0%
	REDUCTION IN CANAL TRADE THROUGH REDUCTION OF TOLLS			0	0.0%	-567525	-32.0%	0	0.0%	0	0.0%
2060	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	100-150	14.0	15.6	0	0.0%	615343	50.0%	0	0.0%	0	0.0%
	150-200	12.7	14.0	615343	50.0%	0	0.0%	615343	50.0%	615343	50.0%
	200-250	11.1	12.0	615343	50.0%	615343	50.0%	615343	50.0%	615343	50.0%
	250+	n.a.	10.7	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL VIA PANAMA CANAL			0	0.0%	615343	50.0%	615343	50.0%	1230685	100.0%
	TOTAL ON BY PASS ROUTE			1230685	100.0%	615343	50.0%	615343	50.0%	0	0.0%
	TOTAL			1230685	100.0%	1230685	100.0%	1230685	100.0%	1230685	100.0%
	REDUCTION IN CANAL TRADE THROUGH REDUCTION OF TOLLS			0	0.0%	0	0.0%	-615343	-50.0%	0	0.0%

Note: Mileages are based on a single voyage.

(d) Iron Ore from East Coast Canada to the Far East

The potential loss of trade with the introduction of tolls in both 2020 and 2060 arises in the 150,000 DWT and 200,000 DWT maximum design ship cases as the incentive for switching cargoes from larger ships on the alternative route to smaller ships via the Canal is removed (Table 5.25). In 2020, this results in reductions of trade flows through the Canal of 0.8 million tonnes and 0.5 million tonnes respectively for the 150,000 DWT and 200,000 DWT maximum design ship cases. In 2060, the reduction in each case is equivalent to 1.5 million tonnes.

Table 5.25 ANALYSIS OF POTENTIAL DRY BULK CARRIER BY PASS TRAFFIC: WITH TOLLS SCENARIO

COMMODITY: IRON ORE ROUTE: CANADA EAST COAST - ASIA
MILEAGE VIA PANAMA: 10738 MILEAGE VIA ALTERNATIVE: 15480

Year	Vessel Size (Kdwt) Range	Freight Cost Including Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo tonnes	%	150,000 dwt tonnes	%	200,000 dwt tonnes	%	250,000 dwt tonnes	%
2020	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	100-150	11.9	13.3	464659	27.0%	464659	27.0%	464659	27.0%	464659	27.0%
	150-200	10.3	11.4	791643	46.0%	791643	46.0%	791643	46.0%	791643	46.0%
	200-250	9.1	9.8	464659	27.0%	464659	27.0%	464659	27.0%	464659	27.0%
	250-300	n.a.	8.7	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	300+	n.a.	8.4	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL VIA PANAMA CANAL			0	0.0%	464659	27.0%	1256302	73.0%	1720961	100.0%
	TOTAL ON BY PASS ROUTE			1720961	100.0%	1256302	73.0%	464659	27.0%	0	0.0%
	TOTAL			1720961	100.0%	1720961	100.0%	1720961	100.0%	1720961	100.0%
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	-791643	-0.46	-464659	-27.0%	0	0.0%
2060	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	100-150	13.0	14.5	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	150-200	11.3	12.6	1516828	50.0%	1516828	50.0%	1516828	50.0%	1516828	50.0%
	200-250	9.9	10.8	1516828	50.0%	1516828	50.0%	1516828	50.0%	1516828	50.0%
	250+	n.a.	9.6	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TOTAL VIA PANAMA CANAL			0	0.0%	0	0.0%	1516828	50.0%	3033656	100.0%
	TOTAL ON BY PASS ROUTE			3033656	100.0%	3033656	100.0%	1516828	50.0%	0	0.0%
	TOTAL			3033656	100.0%	3033656	100.0%	3033656	100.0%	3033656	100.0%
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	-1516828	-50.0%	-1516828	-50.0%	0	0.0%

Note: Mileages are based on a single voyage.

(e) Iron Ore from Chile to Europe

The result of introducing Canal tolls at the above levels is to remove all incentive to use the Canal for the shipment of Chilean iron ore to Europe, irrespective of the case considered (Table 5.26). Therefore, in 2020, cargo flows lost from the Canal for the 150,000 DWT maximum design ship case amount to 1.0 million tonnes and for the 200,000 DWT and 250,000 DWT design ship cases to 2.9 million tonnes. In 2060, with no cargoes assumed to be moving in ships

below 150,000 DWT, the losses are 1.9 million tonnes and 3.9 million tonnes respectively for the 200,000 DWT and 250,000 DWT maximum design ship cases.

Table 5.26 ANALYSIS OF POTENTIAL DRY BULK CARRIER BY PASS TRAFFIC: WITH TOLL SCENARIO

COMMODITY: IRON ORE ROUTE: CHILE - EUROPE
MILEAGE VIA PANAMA: 7197 MILEAGE VIA ALTERNATIVE: 9360

Year	Vessel Size (Kdwt) Range	Freight Cost Including Canal Tolls ($/tonne) Via Panama	Alternative	CANAL MAXIMUM SIZE: Status Quo tonnes	%	150,000 dwt tonnes	%	200,000 dwt tonnes	%	250,000 dwt tonnes	%
2020	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0
	65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0
	100-150	11.8	11.7	1044833	36.0%	1044833	36.0%	1044833	36.0%	1044833	36.0
	150-200	10.2	10.0	1857481	64.0%	1857481	64.0%	1857481	64.0%	1857481	64.0
	200-250	8.9	8.6	0	0.0%	0	0.0%	0	0.0%	0	0.0
	250+	n.a.	7.6	0	0.0%	0	0.0%	0	0.0%	0	0.0
	TOTAL VIA PANAMA CANAL			0	0.0%	0	0.0%	0	0.0%	0	0.0
	TOTAL ON BY PASS ROUTE			2902314	100.0%	2902314	100.0%	2902314	100.0%	2902314	100.0
	TOTAL			2902314	100.0%	2902314	100.0%	2902314	100.0%	2902314	100.0
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	-1044833	-36.0%	-2902314	-100.0%	-2902314	-100.0
2060	40-65	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0
	65-100	n.a.	n.a.	0	0.0%	0	0.0%	0	0.0%	0	0.0
	100-150	12.8	12.7	0	0.0%	0	0.0%	0	0.0%	0	0.0
	150-200	11.2	10.9	1946402	50.0%	1946402	50.0%	1946402	50.0%	1946402	50.0
	200-250	9.7	9.4	1946402	50.0%	1946402	50.0%	1946402	50.0%	1946402	50.0
	250+	n.a.	8.3	0	0.0%	0	0.0%	0	0.0%	0	0.0
	TOTAL VIA PANAMA CANAL			0	0.0%	0	0.0%	0	0.0%	0	0.0
	TOTAL ON BY PASS ROUTE			3892803	100.0%	3892803	100.0%	3892803	100.0%	3892803	100.0
	TOTAL			3892803	100.0%	3892803	100.0%	3892803	100.0%	3892803	100.0
	REDUCTION IN CANAL TRADE THROUGH INTRODUCTION OF TOLLS			0	0.0%	0	0.0%	-1946402	-50.0%	-3892803	-100.0

Note: Mileages are based on a single voyage.

5.6.3 Oil Tankers (Orimulsion from Venezuela to the Far East)

Table 5.27 summarizes the estimated freight costs for Orimulsion via the Panama Canal with the introduction of Canal tolls as discussed in Section 5.6.1 above. The calculation of Canal tolls is based on the assumption that, for tankers, PCNTs are equal to 50% of the deadweight. As a result, for a round trip, total laden plus ballast tolls are estimated at $2.5/tonne in 2020, rising to $2.7/tonne in 2060. Where transportation costs are based on single voyages, Canal charges for the laden passage only are calculated to be $1.4/tonne and $1.5/tonne respectively in 2020 and 2060.

Table 5.27 ESTIMATED TANKER TRANSPORTATION ECONOMICS FOR PANAMA CANAL BY PASS TRAFFIC: WITH TOLLS SCENARIO

COMMODITY: ORIMULSION

Route	Year	DWT	Can Tolinc $/to	Total Co Inven $/tonne
1. ESTIMATES BASED ON ROUND VOYAGES				
PUERTO LA CRUZ-JAPAN VIA PANAMA	2020	89730	2.53	18.70
	2060	89730	2.71	20.91
	2020	150000	2.53	14.66
	2060	150000	2.71	16.38
	2020	195000	2.53	13.70
	2060	195000	2.71	15.17
	2020	238000	2.53	12.04
	2060	238000	2.71	13.31
	2020	269000	2.53	11.26
	2060	269000	2.71	12.41
2. ESTIMATES BASED ON SINGLE VOYAGES				
PUERTO LA CRUZ-JAPAN VIA PANAMA	2020	89730	1.41	10.48
	2060	89730	1.51	11.65
	2020	150000	1.41	8.35
	2060	150000	1.51	9.25
	2020	195000	1.41	7.84
	2060	195000	1.51	8.63
	2020	238000	1.41	6.96
	2060	238000	1.51	7.64
	2020	269000	1.41	6.53
	2060	269000	1.51	7.15

As with the no-tolls scenario conclusions regarding the potential for the Canal to attract Orimulsion trade into the Far East are drawn on the basis of the comparison of round voyage freight costs as it is assumed that Bitor, the company marketing this commodity, will employ dedicated vessels. With the introduction of Canal tolls, tankers of 150,000 DWT would no longer be competitive with vessels of 269,000 DWT trading on the alternative route. The Canal does no represent the most attractive option until it reaches a maximum design ship size of 250,000 DWT. For this case, for example in 2020, the freight cost for a 238,000 DWT tanker trading via the Canal is $12.0/tonne compared with a freight cost of $12.9/tonne for a 269,000 DWT ship on the alternative route.

It is concluded therefore that the 14 million tonnes of Orimulsion projected in the no-tolls scenario to transit the Canal in 2020 and 2060 under the 150,000 DWT and 200,000 DWT design ship cases would be lost to the alternative route with the introduction of Canal tolls at the levels indicated. Only for the maximum design ship case of 250,000 DWT would this commodity flow be retained through the Canal.

Table 5.28 Projections of Dry Bulk Carrier Canal Transits in the With-Tolls Scenario

	000,000 TO 99,999	10,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,999	100,000 TO 149,999	150,000 TO 199,999	200,000 TO 250,000	TOTAL
Northbound 2020, 150,000 DWT Case								
TRANSITS	0	859	413	221	32			1525
CARGO TONS	0	21182447	17798829	13797500	3398721			57222330
Southbound 2020, 150,000 DWT Case								
TRANSITS	0	862	898	170	572			2502
CARGO TONS	0	22867649	40682507	10969711	62064237			136584104
Northbound 2060, 150,000 DWT Case								
TRANSITS	0	1059	699	316	16			2090
CARGO TONS	0	29480826	33054158	22186386	1838862			86560232
Southbound 2060, 150,000 DWT Case								
TRANSITS	0	986	851	579	674			3091
CARGO TONS	0	29947678	42845849	43049471	76018708			191861706
Northbound 2020, 200,000 DWT Case								
TRANSITS	0	859	413	221	11	16	0	1520
CARGO TONS	0	21182447	17798829	13797500	1180590	2218131	0	56177497
Southbound 2020, 200,000 DWT Case								
TRANSITS	0	862	898	170	560	23	0	2513
CARGO TONS	0	22867649	40682507	10969711	60712576	3129029	0	138361472
Northbound 2060, 200,000 DWT Case								
TRANSITS	0	1059	699	316	0	20	0	2094
CARGO TONS	0	29480826	33054158	22186386	0	2687903	0	87409273
Southbound 2060, 200,000 DWT Case								
TRANSITS	0	986	851	579	0	606	0	3022
CARGO TONS	0	29947678	42845849	43049471	0	84222561	0	200065559
Northbound 2020, 250,000 DWT Case								
TRANSITS	0	859	413	221	11	16	0	1520
CARGO TONS	0	21182447	17798829	13797500	1180590	2218131	0	56177497
Southbound 2020, 250,000 DWT Case								
TRANSITS	0	862	898	170	560	19	3	2513
CARGO TONS	0	22867649	40682507	10969711	60712576	2710828	464660	138407931
Northbound 2060, 250,000 DWT Case								
TRANSITS	0	1059	699	316	0	20	0	2094
CARGO TONS	0	29480826	33054158	22186386	0	2687903	0	87409273
Southbound 2060, 250,000 DWT Case								
TRANSITS	0	986	851	579	0	606	13	3035
CARGO TONS	0	29947678	42845849	43049471	0	84222561	2132170	202197729

5.6.4 Fully Cellular Container Ships

As shown in Table 5.29, as compared with Table 5.15 for fully cellular containerships without tolls, the advantage of the landbridge for smaller ships is about the same. For 5,510 DWT ships carrying containers from Asia to the U.S. East Coast, with tolls the advantage is about $60 per tonne with tolls as against $55 per tonne without tolls.

This approximately $5 per ton difference attributable to Panama Canal tolls becomes much more important in the case of the larger ships. However, it is not sufficient to make the landbridge attractive for containers transitting from Europe to the U.S. West Coast. Even with tolls, the larger ships have a $15 per tonne cost advantage on the all-water route as against the landbridge.

Table 5.29 Estimated Fully Cellular Containership Economics

$/Cargo Tonne With Tolls

Year	DWT	Panama Route	Alternate Route
EUROPE-USWC			
2020	5,510	$363.48	$321.46
2060	NA	NA	NA
2020	20,700	$249.23	$242.46
2060	20,700	$251.92	$245.76
2020	32,700	$207.47	$216.51
2060	36,400	$206.18	$216.16
2020	48,080	$204.72	$214.11
2060	56,000	$199.25	$211.06
2020	90,000	$189.02	$202.01
2060	90,000	$188.02	$202.51
2020	148,000	$184.52	$199.16
2060	148,000	$183.92	$198.36
ASIA-USEC			
2020	5,510	$480.09	$420.15
2060	NA	NA	NA
2020	20,700	$345.02	$316.09
2060	20,700	$347.78	$323.09
2020	32,700	$294.57	$279.67
2060	36,400	$292.75	$278.58
2020	48,080	$290.37	$276.03
2060	56,000	$285.14	$270.86
2020	90,000	$271.58	$260.36
2060	90,000	$270.93	$259.93
2020	148,000	$266.14	$255.16
2060	148,000	$265.02	$251.59

1). Cost estimates are based on West Coast delivery for Europe to U.S. West Coast and New York delivery for Asia to U.S. East Coast.
2). Inland transportation costs include truck drayage to the destination.
3). Land opportunity costs assume 1 day (all water) and 5 days (intermodal).
4). Opportunity cost calculations are based on a carrying cost of 8.5% per annum and an average value per ton of $4,652 from Europe to the U.S. West Coast and $10,000 per ton from Asia to the U.S. East Coast.

In the case of Asia to U.S. East Coast, the advantage of the landbridge nearly doubles for the larger ships. However, the advantage is extraordinarily sensitive to the opportunity cost of the extra days by sea. For the "test container" what we are considering, at $10,000 per tonne value, the opportunity cost is approximately $50 per tonne. Typical consumer electronics are at least twice this value.

Because we have no information concerning the distribution by value of the container traffic, we must use our best judgement in determining the consequence of tolls. The remarks in the last paragraph suggest that tolls are much less important than value per tonne in determining whether cargo will use the U.S. landbridge.

In our judgement about 10% of the cargoes and ships on the Asia-U.S. East Coast and return routes will shift to the landbridge as compared with the no-tolls scenario. Because of the disadvantage of the landbridge for cargoes from Europe to the U.S. West Coast and return, we do not see any change on those routes as a result of this level of Panama Canal tolls. These results are shown in the following table.

Table 5.30 Estimated Shifts in Fully Cellular Container Ships to the U.S. Landbridge from the No-Tolls Case

	Status Quo		Alternatives	
	No Tolls	With Tolls	No Tolls	With Tolls
2020 Transits				
Asia to U.S. East Coast	570	513	514	463
U.S.East Coast to Asia	688	619	607	546
Europe to U.S. West Coast	167	167	144	144
U.S. West Coast to Europe	171	171	194	194
2020 Transits				
Asia to U.S. East Coast	527	474	464	418
U.S.East Coast to Asia	694	625	585	527
Europe to U.S. West Coast	164	164	140	140
U.S. West Coast to Europe	163	163	196	196

APPENDIX A

STUDY DEFINITIONS

DEFINITIONS

The following tables (Tables A.1 and A.2) contain the country, U.S. coastal and commodity definitions available in the annual WEFA Short-Term Trade Analysis Forecasts. These forecasts are carried out once a year for a twenty-year time horizon. These definitions provide the basis from which all other definitions in the study were derived.

TABLE A.1

MASTER COUNTRY SCHEDULE FOR WEFA TRADE DATABASE

CODE	COUNTRY	CODE	COUNTRY
100	United States	497	Poland/East Germany
122	Canada	498	Eastern Europe NEC
201	Mexico	509	Near East NEC
299	Caribbean/Central America	517	Saudi Arabia
301	Colombia	519	Iran/Iraq/Kuwait
307	Venezuela	529	Arabian Gulf NEC
337	Chile	533	India
351	Brazil	535	Pakistan
357	Argentina	549	Thailand
397	Peru/Ecuador/Bolivia	557	Malaysia
398	Uruguay/Paraguay	559	Singapore
400	Iceland	560	Indonesia
401	Sweden	565	Philippines
403	Norway	568	Southern Asia NEC
405	Finland	570	China (PRC)
409	Denmark	580	Republic of Korea
412	United Kingdom	582	Hong Kong
419	Ireland	583	Taiwan
421	Netherlands	588	Japan
423	Belgium/Luxembourg	599	Far East Asia NEC
427	France	602	Australia
428	Federal Republic of Germany	614	New Zealand
433	Austria	699	Oceania NEC
441	Switzerland	701	North Africa NEC
461	Soviet Union	702	West Africa NEC
470	Spain	703	East Africa NEC
471	Portugal	729	Egypt
475	Italy	748	Ivory Coast
484	Greece	753	Nigeria
489	Turkey	791	South Africa

U.S. COASTAL CODES

0	Total for all Coasts (non-U.S countries)
1	North Atlantic
2	South Atlantic
3	Gulf
4	Great Lakes
5	South Pacific (California and Hawaii)
6	North Pacific (Oregon, Washington, and Alaska)

TABLE A.2

COMMODITIES COVERED BY TRADE ANALYSIS SERVICE

Code	Description
0010	Live Animals
0110	Meat, Reefer
0220	Dairy, Reefer
0300	Fish, Reefer
0390	Meat, Fish and Dairy, Dry
0410	Wheat
0420	Rice
0430	Barley, Rye, Oats, Meal and Flour
0440	Corn
0450	Sorghum and Unmilled Cereals NES
0480	Other Cereal Preparations
0540	Vegetables, Dry
0550	Vegetables, Reefer
0570	Fruits and Nuts, Reefer
0580	Fruits and Nuts, Dry
0600	Sugar and Molasses
0710	Coffee and Cocoa
0740	Tea and Spices
0830	Oilseed Cake
0890	Other Feedstuff for Animals
0970	Miscellaneous Edibles, Dry
1110	Non-Alcoholic Beverages
1130	Beer, Ale, Stout and Porter
1140	Wine and Distilled Spirits
1200	Tobacco
2100	Hides and Skins
2220	Soybeans
2290	Other Oilseeds
2300	Crude Rubber
2410	Softwood Lumber
2470	Hardwood Logs and Lumber
2490	Pulpwood, Softwood Logs, Other Wood
2510	Wastepaper
2590	Woodpulp
2630	Cotton
2660	Synthetic Fibers
2680	Other Textile Fibers
2710	Crude Fertilizers
2730	Gypsum
2740	Sulphur
2780	Other Crude Minerals

2810	Iron Ores and Concentrates
2820	Iron or Steel Waste and Scrap
2830	Bauxite and Alumina
2840	Bauxite
2850	Alumina
2860	Other Metal Ores and Concentrates
2880	Nonferrous Metal Waste and Scrap
2920	Cut Flowers & Nursery Stock, Reefer
2990	Other Crude Animal/Veg Materials
3200	Coal and Coke
3300	Crude Petroleum
3410	Gasoline and Other Light Oils
3420	Jet Fuel, Kerosene, Medium Oils
3430	Other Fuel Oil and Motor Fuel
3440	Heavy Fuel Oils
3450	Lubricating Oil
3540	Petroleum Coke
3580	Residual Petroleum Products NES
3600	Gas, Natural and Manufactured
4100	Animal Oils and Fats
4200	Vegetable Oils and Fats
4300	Processed Oils/Fats, and Waxes NES
5110	Hydrocarbons NES
5150	Nitr-Fctn, Organo-Inorg, Heterocyclic
5170	Specified Acyclic Organic Chemicals
5180	Other Organic Chemicals (Exc 515)
5190	Other Organic Chemicals (Exc 517)
5240	Radioactive and Assoc, Materials
5280	Other Inorganic Chemicals (Exc 524)
5400	Medicines and Drugs
5500	Paints, Dyes, Soaps, Perfumes
5630	Potash
5690	Other Manufactured Fertilizers
5800	Synthetic Resins, Plastics, Film
5990	Other Chemical Materials/Products
6100	Leather, Mfrs, Dressed Furskins
6200	Tires and Inner Tubes
6340	Plywood and Veneers
6390	Other Wood/Cork Mfrs, Exc Furniture
6410	Newsprint
6420	Kraftpaper and Paperboard
6490	Other Articles of Paper
6520	Cotton Woven Fabrics and Yarn
6540	Synthetic Woven Fabrics and Yarn
6560	Other Woven Textile Fabrics & Yarn
6590	Carpets, Other Fabrics, Textile Prods
6610	Cement

6650	Pottery and Glassware
6690	Other Nonmetallic Mineral Mfrs
6730	Iron & Steel Plates, Pipes, Shapes
6790	Other Iron and Steel Products
6820	Copper
6840	Aluminum
6890	Other Nonferrous Metals
6910	Structures NES of Iron, Steel, Alum
6930	Wire Products and Expanded Metal
6940	Nails, Screws, Nuts, Bolts & Rivets
6950	Metal Cont, Tools, Household Eqpt
6990	Other Mineral Manufactures
7140	Jet, Gas Turbine & Reaction Engines
7180	Power Generating Machinery/Eqpt
7210	Tractors, Harvesters, Rollers(RORO)
7230	Oversized/Heavy-Lift Equipment
7290	Other Specialized Indust. Machinery
7300	Metalworking Machinery
7430	Pumps
7440	Mechanical Handling Eqpt (RORO)
7490	Other Genl Indust. Machinery/Eqpt
7520	Computers, Peripheral Eqpt & Parts
7590	Other Office Machines and Parts
7610	Television Receivers
7620	Radio Broadcast Receivers
7630	Sound and Television Recorders
7640	Telecommunications Equipment
7710	Electrical Ind. Eqpt and Parts NES
7750	Household Elect. Appliances/Eqpt
7760	Integrated Circuits/Semiconductors
7770	Other Electronic Components
7780	Electrical Machinery/Apparatus NES
7810	Passenger Automobiles (RORO)
7820	Trucks, Except Tractors (RORO)
7830	Truck Tractors, Buses, Etc (RORO)
7840	Parts of Road Vehicles
7850	Motorcycles and Scooters
7920	Aircraft and Parts
7930	Ships and Boats
8120	Light Fixtures
8200	Furniture and Parts
8300	Travel Goods and Handbags
8420	Male Garments, Not Knit/Crocheted
8430	Female Garments, Not Knit/Crocheted
8450	Garments, Knitted or Crocheted
8460	Undergarments
8490	Other Articles of Apparel

8600	Footwear
8750	Instruments
8820	Photo Film, Papers, Chem, Reefer
8890	Cameras, Watches and Clocks
8910	Rubber and Plastic Articles
8920	Printed Matter
8940	Toys, Games and Decorations
8950	Sporting Goods
8960	Precious Stones, Jewelry, Artworks
8980	Musical Instruments, Tapes, Records
8990	Other Manufactured Articles
9100	Postal Packages
9500	Military Arms, Ammunition, Vehicles
9900	Commodities and Transactions NEC

The following key definitions have been developed for the purposes of this study. This is the level of detail of the final long-term forecasts, a level of detail greater than that of PCC data or of the final result. This commodity detail was carried out to support the work on the world vessel fleet and the transportation economics.

TABLE A.3

DEFINITION OF COMMODITIES IN WORLD COMMODITY LONG-TERM TRADE FORECAST CARRIED OUT FOR THIS STUDY

Bulk Grains

0410 Wheat
0440 Corn
0450 Sorghum and Unmilled Cereals NES

Iron Ores and Concentrates

2810 Iron Ores and Concentrates

Bauxite and Alumina

2840 Bauxite
2850 Alumina

Coal and Coke

3200 Coal and Coke
3540 Petroleum Coke

Sugar and Molasses

0600 Sugar and Molasses

Logs and Lumber

2410 Softwood Lumber
2470 Hardwood Logs and Lumber
2490 Pulpwood, Softwood Logs, Other Wood
6340 Plywood and Veneers

Minor Bulks

- o Other Grains
  - 0420 Rice
  - 0430 Barley, Rye, Oats, Meal and Flour
- o Food, SE Asia-Europe
- o Oilseed Cake
  - 0830 Oilseed Cake
- o Other Animal Feeds
  - 0890 Other Feedstuff for Animals
- o Oil Seeds
  - 2220 Soybeans
  - 2290 Other Oilseeds
- o Woodpulp
  - 2590 Woodpulp

- o Fertilizers, Crude/Mfgd
  - 2710 Crude Fertilizers
  - 5630 Potash
  - 5690 Other Manufactured Fertilizers
- o Other Crude Minerals
  - 2730 Gypsum
  - 2740 Sulphur
  - 2780 Other Crude Minerals
- o Metal Waste and Scrap
  - 2820 Iron or Steel Waste and Scrap
  - 2880 Nonferrous Metal Waste and Scrap
- o Paper and Paperboard
  - 6410 Newsprint
  - 6420 Kraftpaper and Paperboard
- o Cement
  - 6610 Cement
- o Iron and Steel Products
  - 6730 Iron & Steel Plates, Pipes, Shapes
  - 6790 Other Iron and Steel Products
  - 6910 Structures NES of Iron, Steel, Alum
- o Nonferrous Metals
  - 6820 Copper
  - 6840 Aluminum
  - 6890 Other Nonferrous Metals

Live Animals

- 0010 Live Animals

Refrigerated Cargo

- 0110 Meat, Reefer
- 0220 Dairy, Reefer
- 0300 Fish, Reefer
- 0550 Vegetables, Reefer
- 0570 Fruits and Nuts, Reefer
- 2920 Cut Flowers & Nursery Stock, Reefer
- 8820 Photo Film, Papers, Chem, Reefer

Vehicles

- 7210 Tractors, Harvesters, Rollers(RORO)
- 7440 Mechanical Handling Eqpt. (RORO)
- 7810 Passenger Automobiles (RORO)
- 7820 Trucks, Except Tractors (RORO)
- 7830 Truck Tractors, Buses, Etc. (RORO)

General Cargo, Foods

- o Other Grains
  - 0420 Rice
  - 0430 Barley, Rye, Oats, Meal and Flour
- o General Cargo, Foods
  - 0390 Meat, Fish and Dairy, Dry
  - 0480 Other Cereal Preparations
  - 0540 Vegetables, Dry
  - 0580 Fruits and Nuts, Dry
  - 0710 Coffee and Cocoa
  - 0740 Tea and Spices
  - 0970 Miscellaneous Edibles, Dry
  - 1110 Non-Alcoholic Beverages
  - 1130 Beer, Ale, Stout and Porter
  - 1140 Wine and Distilled Spirits

General Cargo, Crude Materials

- o Woodpulp
  - 2590 Woodpulp
- o General Cargo, Crude Materials
  - 2100 Hides and Skins
  - 2300 Crude Rubber
  - 2510 Wastepaper
  - 2630 Cotton
  - 2660 Synthetic Fibers
  - 2680 Other Textile Fibers
  - 2860 Other Metal Ores and Concentrates
  - 2990 Other Crude Animal/Veg. Materials

General Cargo, Chemical Products

- o Petroleum Products
  - 3410 Gasoline and Other Light Oils
  - 3420 Jet Fuel, Kerosene, Medium Oils
  - 3430 Other Fuel Oil and Motor Fuel
  - 3440 Heavy Fuel Oils
  - 3450 Lubricating Oil
  - 3580 Residual Petroleum Products NES
- o Bulk Chemicals
  - 5110 Hydrocarbons NES
  - 5150 Nitr-Fctn,Organo-Inorg,Heterocyclic
  - 5180 Other Organic Chemicals (Exc 515)
  - 5280 Other Inorganic Chemicals (Exc 524)
- o General Cargo, Chemicals
  - 5240 Radioactive and Assoc. Materials
  - 5400 Medicines and Drugs
  - 5500 Paints, Dyes, Soaps, Perfumes
  - 5800 Synthetic Resins, Plastics, Film
  - 5990 Other Chemical Materials/Products

General Cargo, Manufactures

- o Paper and Paperboard
  - 6410 Newsprint
  - 6420 Kraftpaper and Paperboard
- o Nonferrous Metals
  - 6820 Copper
  - 6840 Aluminum
  - 6890 Other Nonferrous Metals
- o General Cargo, Manufactures
  - 6100 Leather, Mfrs, Dressed Furskins
  - 6200 Tires and Inner Tubes
  - 6390 Other Wood/Cork Mfrs, Exc Furniture
  - 6490 Other Articles of Paper
  - 6520 Cotton Woven Fabrics and Yarn
  - 6540 Synthetic Woven Fabrics and Yarn
  - 6560 Other Woven Textile Fabrics & Yarn
  - 6590 Carpets,Other Fabrics,Textile Prods
  - 6650 Pottery and Glassware
  - 6690 Other Nonmetallic Mineral Mfrs.
  - 6930 Wire Products and Expanded Metal
  - 6940 Nails, Screws, Nuts, Bolts & Rivets
  - 6950 Metal Cont., Tools, Household Eqpt.
  - 6990 Other Metal Manufactures

General Cargo, Mechanical Equipment

- 7140 Jet, Gas Turbine & Reaction Engines
- 7180 Power Generating Machinery/Eqpt.
- 7290 Other Specialized Indust. Machinery
- 7300 Metalworking Machinery
- 7430 Pumps
- 7490 Other Genl Indust. Machinery/Eqpt.
- 7840 Parts of Road Vehicles
- 7850 Motorcycles and Scooters
- 9500 Military Arms, Ammunition, Vehicles

General Cargo, Electrical Equipment

- 7520 Computers, Peripheral Eqpt. & Parts
- 7590 Other Office Machines and Parts
- 7610 Television Receivers
- 7620 Radio Broadcast Receivers
- 7630 Sound and Television Recorders
- 7640 Telecommunications Equipment
- 7710 Electrical Ind. Eqpt. and Parts NES
- 7750 Household Elect. Appliances/Eqpt.
- 7760 Integrated Circuits/Semiconductors
- 7770 Other Electronic Components
- 7780 Electrical Machinery/Apparatus NES
- 8750 Instruments

General Cargo, Other

- o General Cargo, Other
  - 1200 Tobacco
  - 8120 Light Fixtures
  - 8200 Furniture and Parts
  - 8300 Travel Goods and Handbags
  - 8420 Male Garments, Not Knit/Crocheted
  - 8430 Female Garments, Not Knit/Crocheted
  - 8450 Garments, Knitted or Crocheted
  - 8460 Undergarments
  - 8490 Other Articles of Apparel
  - 8500 Footwear
  - 8890 Cameras, Watches and Clocks
  - 8910 Rubber and Plastic Articles
  - 8920 Printed Matter
  - 8940 Toys, Games, and Decorations
  - 8950 Sporting Goods
  - 8960 Precious Stones, Jewelry, Artworks
  - 8980 Musical Instruments, Tapes, Records
  - 8990 Other Manufactured Articles
- o Commodities NEC
  - 9100 Postal Packages
  - 9900 Commodities and Transactions NEC

General Cargo, Total Containerizable

- General Cargo, Foods
- General Cargo, Crude Materials
- General Cargo, Chemical Products
- General Cargo, Manufactures
- General Cargo, Mechanical Equipment
- General Cargo, Electrical Equipment
- General Cargo, Other

General Cargo, Non-Containerizable

- o Metal Waste and Scrap
  - 2820 Iron or Steel Waste and Scrap
  - 2880 Nonferrous Metal Waste and Scrap
- o Oversized/Heavy-Lift Equipment
  - 7230 Oversized/Heavy-Lift Equipment
- o Ships, Boats, Aircraft and Parts
  - 7920 Aircraft and Parts
  - 7930 Ships and Boats

Crude Petroleum

- 3300 Crude Petroleum

Petroleum Products

- 3410 Gasoline and Other Light Oils
- 3420 Jet Fuel, Kerosene, Medium Oils
- 3430 Other Fuel Oil and Motor Fuel
- 3440 Heavy Fuel Oils

3450 Lubricating Oil
3580 Residual Petroleum Products NES

Gas, Natural and Manufactured

3600 Gas, Natural and Manufactured

Bulk Chemicals

5110 Hydrocarbons NES
5150 Nitr-Fctn,Organo-Inorg,Heterocyclic
5180 Other Organic Chemicals (Exc 515)
5280 Other Inorganic Chemicals (Exc 524)

Oils and Fats

4100 Animal Oils and Fats
4200 Vegetable Oils and Fats
4300 Processed Oils/Fats, and Waxes NES

TABLE A.4

DEFINITION OF ORIGIN/DESTINATION REGIONS IN THE BASIC LONG-TERM WORLD TRADE FORECAST PREPARED FOR THIS STUDY

101 U.S. East Coast
- 1001 U.S. North Atlantic
- 1002 U.S. South Atlantic
- 1005 U.S. Great Lakes

102 U.S. Gulf Coast
- 1003 U.S. Gulf

103 U.S. West Coast
- 1006 U.S. South Pacific
- 1007 U.S. Pacific Northwest

122 Canada
- 122 Canada
- 161 St. Pierre And Miquelon
- 822 U.S. Grain Transshipped Through Canada

201 Mexico
- 201 Mexico

299 Carib./Cent.America
- 205 Guatemala
- 208 Belize
- 211 El Salvador
- 215 Honduras
- 219 Nicaragua
- 223 Costa Rica
- 225 Panama
- 227 Canal Zone
- 232 Bermuda
- 236 Bahamas
- 239 Cuba
- 241 Jamaica
- 243 Turks And Caicos Isl.
- 244 Cayman Islands
- 245 Haiti
- 247 Dominican Republic
- 248 Leeward And Windward Isl.
- 272 Barbados
- 274 Trinidad And Tobago
- 277 Netherlands Antilles
- 283 French West Indies
- 312 Guyana
- 315 Surinam
- 317 French Guiana
- 903 Puerto Rico
- 911 Virgin Islands

301 Colombia
- 301 Colombia

307 Venezuela
- 307 Venezuela

391 South America East Coast
- 351 Brazil
- 357 Argentina
- 353 Paraguay
- 355 Uruguay
- 372 Falkland Islands

392 South America West Coast
- 331 Ecuador
- 333 Peru
- 335 Bolivia
- 337 Chile

491 North Europe
- 101 Greenland
- 400 Iceland
- 401 Sweden
- 403 Norway
- 405 Finland
- 409 Denmark
- 412 United Kingdom
- 419 Ireland
- 421 Netherlands

423 Belgium/Luxembourg
427 France
428 Fed. Rep. Of Germany
429 German Dem. Republic
430 Monaco
447 Estonia
449 Latvia
451 Lithuania
455 Poland
461 Soviet Union

492 South Europe
433 Austria
435 Czechoslovakia
437 Hungary
441 Switzerland
467 Azores
470 Spain
471 Portugal
472 Gibraltar
475 Italy
479 Yugoslavia
481 Albania
484 Greece
485 Romania
487 Bulgaria
489 Turkey

510 Middle East
505 Iraq
507 Iran
513 Kuwait
517 Saudi Arabia
518 Qatar
520 United Arab Emirates
521 Yemen (Sana)
522 Yemen (Aden)
523 Oman
525 Bahrain

530 South Asia
531 Afghanistan
533 India
535 Pakistan
536 Nepal
538 Bangladesh
542 Sri Lanka (Ceylon)
546 Burma
561 Brunei
567 Timor & SSE Asia

550 Southeast Asia
549 Thailand
552 Vietnam
553 Laos
555 Cambodia
557 Malaysia
559 Singapore
560 Indonesia
565 Philippines
566 Macao
574 Mongolia
579 North Korea

590 Far East Asia
570 China (PRC)
580 Republic Of Korea
582 Hong Kong
583 Taiwan
588 Japan
590 Nansei Islands

600 Oceania
602 Australia
604 Papua New Guinea
614 New Zealand
615 Western Samoa
622 Southern Pacific Islands
631 Fiji
632 Togo
633 Tonga
634 Vanuatu
641 French Pacific Islands
684 Trust Pacific Islands
686 Other Pacific Isl. NEC
931 Midway Island
933 Wake Island
935 Guam

941 Canton And Enderbury Isl.
951 American Somoa

791 South Africa
791 South Africa

792 North Africa/East Med
473 Malta And Gozo
491 Cyprus
502 Syria
504 Lebanon
508 Israel
511 Jordan
512 Gaza Strip
714 Morocco
721 Algeria
723 Tunisia
725 Libya
729 Egypt

793 West Africa
733 Canary Islands
735 Spanish Africa NEC
737 Western Sahara
738 Equatorial Guinea
741 Mauritania
742 Cameroon
744 Senegal
745 Mali
746 Guinea
747 Sierra Leone
748 Ivory Coast
749 Ghana
750 Gambia
751 Niger
752 Togo
753 Nigeria
754 Central African Republic
755 Gabon
756 Chad
757 Western Africa NEC
758 St. Helena
759 Madeira Islands
760 Upper Volta
761 Benin
762 Angola
763 Congo (Brazziville)
764 Western Africa NEC
765 Liberia
766 Zaire
792 Namibia

794 East Africa
732 Sudan
767 Burundi
769 Rwanda
770 Somalia
774 Ethiopia
777 Djibouti
778 Uganda
779 Kenya
780 Seychelles
781 British Indian Ocean
783 Tanzania
785 Mauritius
787 Mozambique
788 Malagasy Republic
789 Comoros
790 French Indian Ocean
793 Botswana
794 Zambia
795 Swaziland
796 Zimbabwe
797 Malawi
799 Lesotho

The following concordance conveys our understanding of the relationship between the commodity groups in the PCC data and those we are using.

TABLE A.5

COMMODITY GROUP CONCORDANCE

PCC REPORTS TRADE FILE	CORRESP. WEFA
Canned Foods:	General Cargo, Foods
Canned Fish	General Cargo, Foods
Canned Fruit	General Cargo, Foods
Canned Mild	General Cargo, Foods
Canned Other	General Cargo, Foods
REFRIGERATED FOODS:	Reefer Cargo
Bananas	Reefer Cargo
Dairy Products	Reefer Cargo
Fish	Reefer Cargo
Other Fruit	Reefer Cargo
Meat	Reefer Cargo
Other	Reefer Cargo
CANNED AND REFRIGERATED FOODS, MISC.	Split between Reefer and General Cargo/Other
CHEMICALS AND PETROLEUM CHEMICALS:	
Caustic Soda	Bulk Chemicals
Benzene	Bulk Chemicals
Toluene	Bulk Chemicals
Chemicals Other	Bulk Chemicals; Gen Cargo
Crude Mats; Gas Natural & Manuf.	PL Chems; Gen Cargo Crude Mats; Gas Natural & Manuf.
Petroleum Chemicals Misc.	
COAL AND COKE (EXCL. PET. COKE)	Coal & Coke (Incl. Briquettes/Peat)
Coal	Coal & Coke (Incl. Briquettes/Peat)
GRAINS	
Barley	Minor Bulks/Other Grains
Corn	Bulk Grains
Oats	Minor Bulks/Other Grains
Sorghum	Bulk Grains
Soybeans	Minor Bulks/Oilseeds
Wheat	Bulk Grains
Other and Unclassified	Minor Bulks/Grains
LUMBER AND PRODUCTS	
Boards and Planks	Logs & Lumber
Plywood, Veneers, Composition Board	Logs & Lumber
Pulpwood	Minor Bulks/Woodpulp; Gen. Cargo Crude Materials
Other, Misc.	Logs & Lumber
MACHINERY & EQUIPMENT	
Agricultural Machinery & Implements	Gen. Cargo Mech Equipment
Autos, Trucks, Accessories and Parts	Gen. Cargo Mech Equipment
Construction Machinery & Implements	Vehicles (Excl Parts)
Electrical Machinery and Apparatus	Gen. Cargo Mech Equipment
Motorcycles, Bicycles and Parts	Gen. Cargo Electrical
Other	Gen. Cargo Mech Equipment
	Gen. Cargo Mech Equipment

MANUFACTURERS OF IRON & STEEL	
Angles, Shapes and Sections	Gen. Cargo Manufacturers
Nails, Tacks and Spikes	Gen. Cargo Manufacturers
Plates, Sheets and Coils	Gen. Cargo Manufacturers
Tubes, Pipes and Fittings	Gen. Cargo Manufacturers
Wire, Bars, and Rods	Gen. Cargo Manufacturers
Other and Unclassified	Gen. Cargo Manufacturers
MATERIALS, MISCELLANEOUS	
Asbestos	Minor Bulks/Other Crude Minerals
Borax	Minor Bulks/Other Crude Minerals
Infusorial Earth	Minor Bulks/Other Crude Minerals
Salt	Minor Bulks/Other Crude Minerals
Soda and Sodium Compounds	Minor Bulks/Other Crude Minerals
Sulfur	Minor Bulks/Other Crude Minerals
	Minor Bulks/Other Crude Minerals
NITRATES, PHOSPHATES, AND POTASH	
Ammonium Compounds	Minor Bulks/Fertilizers Crude & Manufactured
Fishmeal	Minor Bulks/Fertilizers Crude & Manufactured
Nitrate of Soda	Minor Bulks/Fertilizers Crude & Manufactured
Phosphates	Minor Bulks/Fertilizers Crude & Manufactured
Potash	Minor Bulks/Fertilizers Crude & Manufactured
Fertilizers, Unclassified	Minor Bulks/Fertilizers Crude & Manufactured
	Minor Bulks/Fertilizers Crude & Manufactured
ORES AND METALS	
Ores	
Alumina/Bauxite	Alumina/Bauxite
Chrome	Minor Bulks
Copper	Minor Bulks
Iron	Iron Ore and Concentrates
Lead	Minor Bulks
Manganese	Minor Bulks
Tin	Minor Bulks
Zinc	Minor Bulks
Others and Unclassified	Minor Bulks
	Minor Bulks
METALS	
Aluminum	Minor Bulks/Non Ferrous Metals: Gen. Cargo Man
Copper	Minor Bulks/Non Ferrous Metals: Gen. Cargo Man
Iron	Minor Bulks/Non Ferrous Metals: Gen. Cargo Man
Prods; Gen. Cargo Man Lead	Minor Bulks/Iron & Steel
Metals: Gen. Cargo Man	Minor Bulks/Non Ferrous
Scrap	
Tin, Incl. Tinplate	Minor Bulks/Metal Waste & Scrap; Gen. Cargo Man
Zinc	Minor Bulks/Non Ferrous Metals: Gen. Cargo Man
	Minor Bulks/Non Ferrous

Metals: Gen. Cargo Man	
Other and Unclassified	Minor Bulks/Non Ferrous Metals; Gen. Cargo Man
OTHER AGRICULTURAL COMMODITIES	
Beans, Edible	Gen Cargo Foods
Cocoa and Cocoa Beans	Gen Cargo Foods
Coffee, Raw and Processed	Gen Cargo Foods
Copra and Coconuts	Gen Cargo Foods&/Or Gen Cargo Crude Mats.
Cotton, Raw	Gen Cargo Crude Materials
Molasses	Sugar & Molasses
Oilseeds	Minor Bulks/Oilseeds
Peas, Dry	Gen Cargo Foods
Rubber, Raw	Gen Cargo Crude Materials
Skins and Hides	Gen Cargo Crude Materials
Wool, Raw	Gen Cargo Crude Materials
PETROLEUM AND PRODUCTS	
Asphalt	Petroleum
Crude Oil	Crude Petroleum
Diesel Oil	Petroleum Products
Fuel Oil, Residual	Petroleum Products
Gasoline	Petroleum Products
Jet Fuel	Petroleum Products
Kerosene	Petroleum Products
Liquified Gas	Gas, Natural & Manufactured
Lubricating Oil	Petroleum Products/Gen Cargo Chemical Prods
Petroleum Coke	Coal and Coke
Other and Unclassified	Petroleum Products
MISCELLANEOUS	
Bricks and Tile	Gen. Cargo/Other
Carbon Black	Gen. Cargo/Other
Cement	Minor Bulks/Cement
Clay, Fire and China	Gen. Cargo/Other
Fibers Plant	Gen Cargo Crude Materials
Flour, Wheat	Minor Bulks
Glass and Glassware	Gen Cargo Manufactures
Groceries, Miscellaneous	Gen Cargo Foods
Liquors and Wines	Gen Cargo Foods
Marble and Stone	Minor Bulks
Oil, Coconut	Oils & Fats
Oil, Fish	Oils & Fats
Oil, Vegetable	Oils & Fats
Paper and Paper Products	Minor Bulks/Paper & Paperboard; Gen Cargo Man
Porcelain ware	Gen Cargo Manufs
Resin	Gen Cargo/Other
Rubber, Manufactured	Gen Cargo/Other
Seeds, Excluding Oilseeds	Gen Cargo/Other
Slag, Clinkers, and Dross	Minor Bulks
Tallow	Oils & Fats
Textiles	Gen Cargo Manufactures
Tobacco and Manufactures	Gen Cargo Other
Wax, Paraffin	Petroleum Products
Container Cargo	Containerized Cargo
All Other and Unclassified	Gen Cargo/Other
Total	

PANAMA CANAL COMMISSION COMMODITY DATA
WEFA TRADE FLOW DATA

Notes:

1) The commodity categories in the PCC data do not generally correspond to terminology and product definitions generally in use in the public domain e.g. in OECD trade statistics, Eurostats etc. Certain data are idiosyncratically described. The concordance has been carried out using a combination of obvious relationships and our best judgement.

2) In producing the Panama Canal trade and traffic database a major aim is to provide the commodity flow data in groupings that can be used within the framework of the WEFA groupings/by ship types used in the project.

TABLE A.6

SHIP SIZE RANGES USED IN THE STUDY

In order to readily develop Panama Canal transit forecasts for each of the five cases under study, global demand and global supply databases for each cargo carrying ship type were reconstructed from existing databases into size ranges which were both relevant to this project and which reflect major market determinants.

For full container vessels, container breakbulk, refrigerated cargo ships, vehicle carriers and conventional general cargo ships:

DWT Size Range		
< 10,000 DWT		
10	-	25,000 DWT
25	-	40,000 DWT
40	-	65,000 DWT
65	-	100,000 DWT
100	-	150,000 DWT (if and as appropriate).

For purposes of presentation, the 10-25,000 DWT range and the 25-40,000 DWT range were combined into a 10-40,000 DWT range.

For other cargo carrying ships, that is oil tankers, chemical tankers, combined carriers, dry bulk carriers and gas ships, the following compatible size ranges were used:

DWT Size Range		
< 10,000 DWT		
10	-	40,000 DWT
40	-	65,000 DWT
65	-	100.000 DWT
100	-	150,000 DWT
150	-	200,000 DWT
200	-	250,000 DWT

In order to determine the constraints of a maximum design ship of 250,000 DWT, fleet forecasts include assessments of vessels above this size.

The final study TOR called for the categories shown in the preceding tables to be aggregated to the classifications of Tables A.6 - A.10.

TABLE A.7

FINAL SET OF COMMODITY CATEGORIES

Crude Oil	-	the major heading from Table A.3 "crude oil"
Petroleum Products	-	the major heading from Table A.3 "petroleum products"
Bulk Grains		
Iron Ore and Concentrates		
Bauxite and Alumina		
Coal and Coke		
Fertilizers		
Minor Bulks	-	includes from Table A.3 minor bulks plus sugar & molasses and logs & limber and excluding fertilizers
Bulk Chemicals	-	the major heading from Table A.3 "bulk chemicals"
Oils & Fats	-	the major heading from Table A.3 "oils and fats"
Refrigerated Cargoes		the major heading from Table A.3 "refrigerated cargoes"
Vehicles	-	the major heading from Table A.3 "vehicles"
General Cargo	-	the sum of all the "general cargo headings", except "containerizable"
Containerized	-	the major heading from Table A.3 "general cargo, total containerizable"

TABLE A.8

FINAL SET OF ORIGINS AND DESTINATIONS

U.S. East Coast - includes Great Lakes and Gulf Coast

U.S. West Coast - includes Alaska and Hawaii

Canada East Coast

Canada West Coast

Central America East Coast, including Caribbean

Central America West Coast

South America East Coast

South America West Coast

Europe - includes North and South Europe

Africa - includes North, South, East, and West Africa

Oceania

Asia - Far East Asia, Southeast Asia and South Asia

Middle East

TABLE A.9

FINAL SET OF PANAMA CANAL TRADE ROUTES

The route definitions in the study are the following:

Origin	Destination
Southbound	
U.S. East Coast	U.S. West Coast, Hawaii
U.S. East Coast	Canada West Coast
U.S. East Coast	Central America West Coast
U.S. East Coast	South America West Coast
U.S. East Coast	Oceania
U.S. East Coast	Asia
Canada East Coast	U.S. West Coast, Hawaii
Canada East Coast	Central America West Coast
Canada East Coast	South America West Coast
Canada East Coast	Oceania
Canada East Coast	Asia
C. America E.C.,W.Indies	U.S. West Coast, Hawaii
C. America E.C.,W.Indies	Central America West Coast
C. America E.C.,W.Indies	South America West Coast
C. America E.C.,W.Indies	Oceania
C. America E.C.,W.Indies	Asia
S.America E.C.	U.S. West Coast, Hawaii
S.America E.C.	Canada West Coast
S.America E.C.	Central America West Coast
S.America E.C.	South America West Coast
S.America E.C.	Oceania
S.America E.C.	Asia
Europe	U.S. West Coast, Hawaii
Europe	Canada West Coast
Europe	Central America West Coast
Europe	South America West Coast
Europe	Oceania
Europe	Asia
Africa	U.S. West Coast, Hawaii
Africa	Canada West Coast
Africa	Central America West Coast
Africa	South America West Coast
Africa	Oceania
Africa	Asia
Middle East	U.S. West Coast, Hawaii

Northbound

U.S. W.C., Hawaii	U.S. East Coast
U.S. W.C., Hawaii	Canada East Coast
U.S. W.C., Hawaii	Central America E.C., W. Indies
U.S. W.C., Hawaii	South America East Coast
U.S. W.C., Hawaii	Europe
U.S. W.C., Hawaii	Africa
Canada West Coast	U.S. East Coast
Canada West Coast	Canada East Coast
Canada West Coast	Central America E.C., W. Indies
Canada West Coast	South America East Coast
Canada West Coast	Europe
Canada West Coast	Africa
Canada West Coast	Middle East
C. America W.C.	U.S. East Coast
C. America W.C.	Central America E.C., W. Indies
C. America W.C.	South America East Coast
C. America W.C.	Europe
C. America W.C.	Africa
S. America W.C.	U.S. East Coast
S. America W.C.	Canada East Coast
S. America W.C.	Central America E.C., W. Indies
S. America W.C.	South America East Coast
S. America W.C.	Europe
S. America W.C.	Africa
Oceania	U.S. East Coast
Oceania	Canada East Coast
Oceania	Central America E.C., W. Indies
Oceania	South America East Coast
Oceania	Europe
Asia	U.S. East Coast
Asia	Canada East Coast
Asia	Central America E.C., W. Indies
Asia	South America East Coast
Asia	Europe

TABLE A.10

FINAL SET OF SHIP CATEGORIES

Container Breakbulk Ships (CB)

Full Container Ships (F)

Conventional General Cargo Ships (G)

Refrigerated Cargo Ships (R)

Roll-On Roll-Off Ships (RO)

Vehicle Carriers (V)

Passenger Ships (P)

Combined and Dry Bulk Carriers (CD)

Chemical Tankers (CT)

Liquified Propane Tankers (LP)

Oil Tankers (T)

APPENDIX B

ANALYSIS OF INDIVIDUAL WESTERN RAILROADS

Analysis of Individual Western Railroads

The capability of continued growth in intermodal traffic depends ultimately on the capacity and productivity of the western U.S. and Canadian transcontinental railroads.

The western North American mainline rail system that exists today is the result of numerous line abandonments and mergers that have taken place over the past two decades. The result is that in the western two-thirds of North America there are six Class I (major) railroads left:

1. Burlington Northern
2. Union Pacific
3. Southern Pacific
4. Atchison, Topeka and Santa Fe (Santa Fe)
5. Canadian National
6. Canadian Pacific

These western railroads are reviewed below with a focus on their traffic base and individual capacity concerns.

Burlington Northern

Transportation of coal is BN's largest source of rail freight revenues contributing almost a third of total income. In 1991 carryings increased by 11 million short tons to a new record for the railroad of 151.1 million short tons. Low-sulphur coal from the Powder River Basin of Montana and Wyoming accounted for 91 percent of the total. This is hauled to coalburning electricity generating stations chiefly in the north central, south central, mountain and Pacific regions of the U.S. However, hauls to power plants in the east are rising.

Nearly all the coal tonnage originated by BN is carried in unit trains and 99 percent of the business is run under contract. The trains typically consist of 108 cars and, depending on the difficulty of the grades encountered, from three to six locomotive units. On a typical working day BN has about 165 unit coal trains on the move; about three-quarters of them will be composed of customer-owned cars.

BN serves a significant area of the major grain producing regions located in the Midwest and Great Plains and transports large quantities of whole grains to domestic feed lots, major milling centers, and to the Pacific Northwest, Gulf and western Great Lakes ports for export. Grain generates about 16 percent of revenues. Boosted by strong demand for shipments to China and Russia, grain carryings in the fourth quarter of 1991 were the second highest in the railroad's history.

Table B.1
Burlington Northern Railroad
1990 Freight Traffic by Major Commodity Group

COMMODITY GROUP	ORIGINATED	RECEIVED	TOTAL
COAL	1,380,604	59,480	1,440,084
GRAIN	369,692	12,208	381,900
METALLIC ORES	160,251	6,573	166,824
CHEMICALS	88,351	76,589	164,940
FOOD & KINDRED PRODUCTS	111,093	17,914	129,007
PULP, PAPER & ALLIED PRODUCTS	60,422	56,888	117,310
LUMBER & WOOD PRODUCTS	79,102	32,184	111,286
MOTOR VEHICLES & EQUIPMENT	40,584	43,864	84,448
STONE, CLAY & GLASS PRODUCTS	54,324	25,093	79,417
GRAIN MILL PRODUCTS	63,050	7,707	70,757
CRUSHED STONE, SAND & GRAVEL	60,066	5,150	65,216
METALS & PRODUCTS	34,863	26,696	61,559
PRIMARY FOREST PRODUCTS	48,958	4,274	53,232
WASTE & SCRAP MATERIALS	34,027	8,938	42,965
PETROLEUM PRODUCTS	29,495	12,259	41,754
NONMETALLIC MINERALS	21,211	19,210	40,421
COKE	35,404	4,607	40,011
ALL OTHER CARLOADS	22,060	12,794	34,854
FARM PRODUCTS, EX. GRAIN	16,936	6,086	23,022
TOTAL CARLOADS	2,710,463	438,544	3,149,007

Source: BST Associates, AAR Weekly Railroad Traffic reports

BN also serves the timber-producing regions of the Pacific Northwest and the Southeast, hauling significant volumes of lumber, plywood and structural panels, wood chips, wood pulp, paper and paper products. Fluctuations in the level of forest products traffic results from general economic conditions as reflected in new housing and levels of industrial production, from competition with other modes, and export demand. Generally, the protection of owl habitat and other restrictions in the Pacific Northwest is decreasing loads in that region while traffic in the Gulf is increasing.

Intermodal traffic. Increasing domestic containerization has benefited BN's intermodal traffic, which generates 15 per cent of all revenue and is one of the railroad's fastest growing businesses. Starting from a small base in domestic container traffic in 1988, BN logged over 175,000 domestic container loads in 1991 and is expected to record well over 200,000 and possibly close to 300,000 in 1992.

An important development has been conclusion of agreements with labor unions for operation of short, fast, single locomotive-powered intermodal trains named 'Expediter' with a two-man crew and no caboose. This has enabled BN to make a special marketing play for trucking company TOFC traffic. In 1991 BN teamed up with road hauler J. B. Hunt to provide new intermodal service between the Midwest and Pacific Northwest. The road carrier's full

truckload traffic is now moved daily on BN intermodal trains between Chicago and Seattle, and between Chicago and Portland, Oregon.

To improve its service capability further, BN has embarked on a clearance improvement program to accommodate stack trains of high cube containers. Tunnel clearance improvements are made by track relocation or crown removal. Lowering the track through several tunnels to gain additional clearance was considered, but the typical large vertical correction needed made this procedure too disruptive to traffic and too costly. Clearance improvements between Seattle and Chicago via Vancouver, were completed in 1988. In 1990 improvements were completed on the Cascade route, which includes the 7.79-mile Cascade Tunnel, second longest in North America. The last major corridor needing treatment, Chicago-Denver, was cleared in 1991 after work on the 1.6 km bridge over the Mississippi River.

Lines and territories. Burlington Northern was formed in March 1970, by the merger of Chicago, Burlington & Quincy Railroad, Great Northern Railway, Northern Pacific Railway and Spokane, Portland and Seattle Railway. The territory it served covered 19 states and two Canadian provinces and reached from the Great Lakes and the Ohio river to California and the seaports of the Pacific Northwest. In addition, BN owned the Colorado and Southern Railway Co, and the Fort Worth and Denver Railway Co (now fully absorbed), which extended its territory via Denver to the Gulf of Mexico at Houston and Galveston, Texas.

The merger of the St Louis-San Francisco Railway Co (the Frisco) into Burlington Northern became effective in November 1980. The BN-Frisco merger created a rail system stretching from Washington and Oregon through the timber and mining regions of the Northern Tier States and the farming areas of the Midwest and as far south as Pensacola, Florida. The combined companies now operate in 25 states and two Canadian provinces. The Frisco has been integrated into BN's system and is not controlled separately, as has been the case in certain other recent railroad mergers.

Problem Areas . Cascade Tunnel, WA - The 7.79-mile Cascade Tunnel, second longest in North America, crosses Stevens Pass in the Cascade Mountains of Washington. While grades on both sides of the tunnel force trains to slow, the biggest problem is ventilating the tunnel. After each train passes, the tunnel must be ventilated, so any other train must wait while fresh air is pumped into the tunnel. While this is currently not a major constraint, a substantial increase in traffic may lead to longer delays. No changes are currently planned for the Cascade Tunnel, but if traffic increases justify the cost of improving the ventilation system, the resulting upgrade would shorten the time needed to pump clean air into the tunnel, thereby reducing delays. Ventilation improvements have been designed.

Pasco, WA to Spokane, WA - Delays on this section of mainline track are not uncommon, so the BN is currently upgrading signalling on this section of mainline. There are no plans to increase the number of tracks at the present time.

Spokane, WA to Sand Point, ID - The BN's two mainline tracks, from Vancouver, WA and Everett, WA, meet in Spokane, and share a single track from Spokane to Sand Point, Idaho. This stretch of track is congested. While plans do not currently call for double-tracking this stretch, a number of long sidings, up to five miles long, are in place, and more are being added. Eventually these sidings will meet, and because mainline sidings are built to mainline standards, this will form a new second mainline.

Donkey Creek, WY to Bridger Junction, WY and Donkey Creek, WY to Alliance, NE - Coal accounts for approximately 42% of all Burlington Northern carloads (in 1990) and these relatively new routes run from the source of the coal in the Powder River Basin. Currently these lines have stretches of both single and double track, alternating approximately every ten miles. Work is being carried out now to increase the length of double track until the entire stretch is parallel mainline.

Minot, ND to Cut Bank, MT - BN's mainline across the top of Montana can become congested but there are no plans for upgrades, and long sidings prevent severe delays.

Denver, CO to Pueblo, CO - This stretch of track is a paired double mainline, with one track owned by BN and one by the Southern Pacific. Both railroads use both lines, with Burlington accounting for the majority of the traffic. Upgrading this stretch will be difficult without an agreement between the two companies, and no plans currently exist for work on this line.

BN began in 1987 a six-year program to install 3.5 million concrete sleepers in curves of 2 degrees or more over its routes bearing in excess of 20 million sleepers. Because of curves and grades, this mileage traditionally has incurred some of the highest maintenance costs per mile with concrete ties, not only will these maintenance costs be reduced, but there also will be a drastic reduction in train delays from maintenance operations.

In March 1991 installation was completed between Hastings, Nebraska, and Denver, of radio code line. This provides for radio-based control of signals and points, and for transmission of reports from such lineside apparatus as hotbox detectors. BN has ordered equipment for further installations in South Dakota, Nebraska and Washington.

Union Pacific

The Union Pacific Railroad (UP) has grown from its origin as the first transcontinental railroad in the United States to now operate over 33,800 km of railroad in 19 states, connecting Pacific Coast and Gulf ports with key midwestern gateways such as Chicago, Kansas City, St. Louis, and Memphis. As with other Class I railroads, much of the UP's growth has resulted from mergers. For instance, in 1982 the Interstate Commerce Commission approved a merger of the Union Pacific and Missouri Pacific, and the acquisition of the Western Pacific by Union Pacific. Also, in May of 1985 the Union Pacific reached agreement for the purchase of the Missouri-Kansas-Texas Railroad, and in 1990 UP purchased a 25% share of the Chicago Northwestern.

Abandonments of less productive branchline allowed the Union Pacific to concentrate on the mainline rail service. Since 1987 UP has sold, leased out or abandoned some 4,800 km of lightly-used branch lines. In November 1991 a further 430 km of branch lines in western Idaho and eastern Oregon were offered for sale, and in early 1992 bids were invited from short line railroads for purchase or lease of 840 km of branch lines in western Missouri, north central Arkansas and southeastern Kansas.

Table B.2
Union Pacific Railroad
1990 Freight Traffic by Major Commodity Group

COMMODITY GROUP	ORIGINATED	RECEIVED	TOTAL
COAL	272,383	725,694	998,077
CHEMICALS	380,785	68,051	448,836
GRAIN	270,384	14,859	285,243
MOTOR VEHICLES & EQUIPMENT	78,430	158,274	236,704
CRUSHED STONE, SAND & GRAVEL	110,901	52,127	163,028
FOOD & KINDRED PRODUCTS	96,588	33,223	129,811
STONE, CLAY & GLASS PRODUCTS	95,250	30,492	125,742
ALL OTHER CARLOADS	62,929	39,107	102,036
PULP, PAPER & ALLIED PRODUCTS	34,840	53,535	88,375
GRAIN MILL PRODUCTS	59,570	23,511	83,081
LUMBER &I WOOD PRODUCTS	62,220	17,117	79,337
METALS & PRODUCTS	36,140	37,841	73,981
NONMETALLIC MINERALS	65,937	5,621	71,558
PETROLEUM PRODUCTS	49,309	21,824	71,133
METALLIC ORES	24,906	34,632	59,538
WASTE & SCRAP MATERIALS	38,546	13,079	51,625
FARM PRODUCTS, EX. GRAIN	32,343	5,517	37,860
COKE	17,590	14,453	32,043
PRIMARY FOREST PRODUCTS	21,869	8,785	30,654
TOTAL CARLOADS	1,810,920	1,357,742	3,168,662

Source: BST Associates, AAR Weekly Railroad Traffic reports

UPRR also carries substantial volumes of coal, chemicals and grain which combine to account for 55% of total commodity traffic.

Intermodal Traffic. The UP serves all major West Coast and all Gulf Coast ports, UP focuses its intermodal operations in 21 hub centers. In carload terms, UP's intermodal traffic rose 14 per cent in 1991, when 795,000 containers and 375,000 trailers were loaded. Only coal and chemicals now exceed merchandise (which is primarily intermodal) among UP's eight business groups.

UP has long been an advocate of intermodal traffic concentration into dedicated trains, and was the first railroad to operate a dedicated double-stack container train. Most COFC traffic runs between West Coast ports and Midwestern cities or New York, but regular double-stack

trains also run between Houston and New Orleans. The fastest Chicago - Los Angeles double-stack train schedule is now 52 hours.

In addition to these double-stack COFC trains, UP runs numerous dedicated COFC/TOFC trains daily between its major city and port hubs. Besides through services, competitive intercity connections are scheduled through the UP yard at North Platte, Nebraska.

American President Intermodal (API) is a major user of the UPRR system having a coastwise contract to operate from Seattle, Oakland and Los Angeles. API owns a large portion of its extensive double-stack car fleet, the remainder being leased from Trailer Train. Maersk, U.S. Lines and K-Line which also use UPRR lease all of their equipment. Union Pacific does not own or lease any double-stack COFC cars. Double-stack trains are geared towards vessel arrivals and destination market service factors, and operate on a one-week cycle between a U.S. West Coast port areas and Chicago. To a large extent capacity constraints that the Union Pacific double-stack trains are experiencing now are a function of scheduling, rather than physical plant. Because a large amount of traffic must leave port areas at the same time to arrive at markets in the east, rail lines can become very crowded for a certain block of time. Changes in ship arrival times or rail merchandise delivery schedules could alleviate much of this constraint.

In early 1991 UP, American President Lines and the Mexican national railway, FNM, combined to set up double-stack COFC train service with a five-day transit time between Chicago and Mexico City and Monterrey via Laredo, the border town where trains previously terminated. Agreement was reached for UP locomotives to run through and for customs processing to be done at destination. In addition, in 1992 UP went into partnership with the trucking firm J B Hunt to offer door-to-door intermodal service between the U.S. and Mexico.

Other Traffic. A contract with Ford Motor Company provides that UP delivers all Ford automobiles shipped into the Los Angeles market, the largest automobile market in the United States. A U.S.$27 million auto loading facility was completed at Mira Loma, 64 km east of Los Angeles, in December 1989, and a similar facility at nearby Montebello in April 1990. These two terminals are likely to handle more than 200,000 autos a year for the southern California market.

In 1990 UP unveiled a stack container system for auto movement branded Secured Modular Automotive Rail Transport (SMART). These containers have the dimensions similar to domestic containers (53 ft long, 8 ft 6 in wide and either 5 ft 3 in high for private autos, or 6 ft 3 in for utility and sport vehicles). To transport the containers an articulated, low-deck spine car with two 53 ft-long platforms has been designed.

Waste Disposal. In December 1990 UP concluded a multi-year contract to transport Seattle's municipal waste to a landfill in eastern Oregon, and further contracts of this nature were being sought.

Advanced Train Control. Like the other Class I railroads, the Union Pacific has been investing heavily in communications and control technology, rather than physical plant, to increase capacity. Some of the technology being implemented on the UP include Advanced Train Control Systems (ATCS), Automatic Equipment Identification (AEI), and Locomotive Management System (LMS).

Control of all UP trackage is handled through the new Omaha control center (Harriman Center). This center features a panoramic, video-projected territory display which show the entire UP system and location of all trains. While this wall display provides summary information, a computer display at each dispatcher's console offers a detailed view of operations at any of the 1,800 or so signal control points throughout the system.

The Harriman Center employs computer-aided dispatching (CADS). Using auto-routing, dispatchers assign an identity and priority to each train, then the computer takes over and routes trains according to priority, while also automatically determining meets and passes. CADS automatically updates and modifies its determinations based on actual train movements and changing track conditions. Although computers control the automatic mode, the system allows dispatchers to intervene and override the computer.

Automatic Equipment Identification is performed with the use of television cameras and monitors which incorporate a television system to monitor the traction and rolling stock of passing trains.

Optimization of locomotive use has been substantially advanced through a Locomotive Management System. This computerbased system is designed not only to ensure that all trains are punctually furnished with traction, but to ensure that the selected traction is most apt to a train's route and characteristics. From its historical data base of all trains run in the preceding five weeks, and comparison of that with the real-time traffic state obtained from TCS (see above), LMS produces a traffic forecast for the ensuing seven days. LMS simulates the following seven days' operations and allocates locomotives in an optimal manner.

Track. In the past few years daily coal train traffic has increased sixfold and been supplemented by several double-stack COFC trains on the main line between Omaha, Council Bluffs and Kansas City. As a result UP has been lengthening loops and installing new ones to an extent that virtually double-tracks the route. The five year, $250 million capacity expansion project on this coal haulage artery has included enlargement of the big North Platte yard with additional 'run-through' tracks for unit coal, grain and intermodal trains, plus some more sorting tracks.

Southern Pacific

The Southern Pacific Denver & Rio Grande Western railroad operates in the western, southwestern and midwestern sections of the United States Western lines run from San

Francisco north to Portland, Oregon, and east through Nevada, Utah, Colorado to Kansas City, Kansas, and St Louis, and south to Los Angeles.

From Los Angeles the line runs east, roughly parallel to the Mexican border through Tucson and El Paso, where it connects to a line northeast to Tucumcari, New Mexico, and on to Kansas City and St. Louis with rail connections to Chicago.

East from El Paso the line, known as the Sunset Route, continues to Houston, Dallas, New Orleans, Memphis and St. Louis, all important interchange points for traffic.

The Northwestern Pacific Railroad Company and the St. Louis Southwestern Railway Company (also known as the Cotton Belt) are subsidiaries of the new company. Southern Pacific Motor Trucking Company, a wholly-owned subsidiary, provides intermodal and other highway services nationwide.

Southern Pacific Denver & Rio Grande Western owns more than 300,000 acres of land in 15 states, most of which consists of railroad rights-of-way, yard and other facilities. Long-range plans call for the sale of property not needed for railroad operations. The money will be used to reduce debt and pay for improvements to equipment and facilities.

Immediately after consummation of the merger with D&RGW, plans were announced for property improvements and an upgrading of services on the Central and Southern transcontinental rail corridors. SP is operated in combination with D&RGW to form the nation's fifth largest rail network.

The combined rail system has single-line routes on both the Central and Southern corridors, with direct service to most major West Coast and Gulf Coast ports, and most Mexican and eastern gateways. This gives the new SP operating flexibility and a new edge in competition with trucks and other large rail lines in the United States.

SP's competitive stance has been strengthened by access to Chicago. In 1989 it had secured ICC approval for purchase of Soo's 532-mile Kansas City to Chicago route, for which it intended a three-year investment of some U$550 million to make the route fit for 112.5 km/h and to cut Kansas City to Chicago running time to about 2.5 hours. But opposition from other railroads and other threats of delay prompted SP to abandon that scheme. Instead it purchased the 282-mile St Louis-Chicago line of the financially defeated Chicago Missouri Western, on which it has been carrying out a U.S.$36 million upgrading program.

In 1990 SP gained a second route into Chicago. This materialized through BN's cession of trackage rights over its 466-mile Kansas City-Chicago line.

SPRR's major commodities include chemicals, and coal accounting for a third of commodity loads. In addition, metal products, pulp/paper, motor vehicles and lumber account for 90,000 or more carloads in 1990.

Table B.3
Southern Pacific Railroad
1990 Freight Traffic by Major Commodity Group

COMMODITY GROUP	ORIGINATED	RECEIVED	TOTAL
CHEMICALS	176,843	70,065	246,908
COAL	181,816	17,017	198,833
METALS & PRODUCTS	57,978	36,542	94,520
PULP, PAPER & ALLIED PRODUCTS	41,017	53,391	94,408
MOTOR VEHICLES & EQUIPMENT	24,070	66,738	90,808
LUMBER & WOOD PRODUCTS	74,278	16,131	90,409
GRAIN MILL PRODUCTS	25,282	20,808	46,090
CRUSHED STONE, SAND & GRAVEL	63,082	14,968	78,050
GRAIN	29,707	41,331	71,038
FOOD & KINDRED PRODUCTS	37,504	28,222	65,726
METALLIC ORES	26,884	3,998	30,882
ALL OTHER CARLOADS	39,760	12,931	52,691
PETROLEUM PRODUCTS	33,850	15,534	49,384
STONE, CLAY & GLASS PRODUCTS	30,980	14,253	45,233
WASTE & SCRAP MATERIALS	28,891	11,302	40,193
NONMETALLIC MINERALS	19,504	3,820	23,324
FARM PRODUCTS, EX. GRAIN	18,351	3,081	21,432
PRIMARY FOREST PRODUCTS	13,713	675	14,388
COKE	8,878	3,268	12,146
TOTAL CARLOADS	932,388	434,075	1,366,463

Source: BST Associates, AAR Weekly Railroad Traffic reports

SP is the largest U.S. railroad in terms of carriage of containers with 601,845 carried in 1991. Much of this total stems from California port imports and exports.

Intermodal container transfer facility. The Intermodal Container Transfer Facility in Long Beach, California, now covers 237 acres. An average of 75 trains a week move containers in and out of the terminal, mostly for Pacific Rim shippers. The U.S.$100 million facility, a joint venture of SP and the Ports of Los Angeles and Long Beach, is just 4 miles from the ports. It has 7 miles of track and can load and unload five double-stack trains simultaneously.

Double-stack COFC. SP's double-stack COFC train operations include a twice-weekly service from the Long Beach ICTF to Mexico City, interchanging with the Mexican railway, FNM, at El Paso/Juarez. SP has agreed with the Mexican national railway, FNM, that to avoid delay of traffic at the border some 20 SP locomotives daily can run through to Mexican terminals. This impacts double-stack COFC trains and traffic to and from Mexican auto plants.

Domestic intermodal services. SP's domestic intermodal service now handles over a million trailers and containers annually, and accounts for almost 30 per cent of SP's total carloads. Acquisition of a new Kansas City gateway to Chicago, thanks to trackage rights obtained from

BN, helped to sustain intermodal growth through 1991, when the container element of SP's intermodal traffic rose by over 13 per cent

New services. SP has instituted a new logistical approach to blocking trains called 'micro-blocking'. This is a system of identifying and consolidating blocks of time-sensitive shipments at origin to speed delivery to destinations, with significant improvements in transit time consistency. As an example, the San Joaquin Star from Central California is micro-blocked for Midwestern, Eastern and Pacific Northwest markets before it leaves Fresno. This enables direct, high priority connections without the need for further classification switching at California terminals.

An accelerated three times-weekly intermodal train service, the 'Pacific Coast Express', was established between Los Angeles and Portland, Ore, in July 1991, primarily for truckers' trailers. Employing articulated flatcars, the trains are tailored to carry 28.5, 45, 48 or 53 foot long trailers. Transit acceleration to 32 hours or less was achieved by cutting out some intermediate stops and controlling train length.

In 1990 SP inaugurated its first regular temperature controlled trans-continental container operation. The containers shipped in from the Pacific Rim by Mitsui OSK Lines, travel in the regular Mitsui chartered double-stack COFC trains from the Long Beach ICTF to St Louis, where Conrail takes over for the final stage to New York. The service was designed to exploit the developing market for chilled beef imports from Asia.

In 1992 SP acquired a minority interest in Ferropuertos SA de CV, a Mexican enterprise developing distribution centers for grain, food and consumer goods in Mexico. The terminals will also be equipped for handling mineral, industrial and agricultural exports.

Customer service. Southern Pacific now receives well over half of its bills of lading via Electronic Data Interchange. SP has about 1,800 customers using its various Liberator (EDI) packages. Liberator is a software program, provided to SP shippers, that links a customer's micro, mini or mainframe computer to SP's mainframe computer in San Francisco. Other Liberator programs allow customers to locate shipments, determine intermodal rates, request special customized reports, and specify car release data and time. The software program is available to any SP customer with an IBM compatible personal computer. The programs and the phone link are provided free by Southern Pacific.

The success of SP's Intermodal Container Transfer Facility in southern California is directly related to its broad application of advanced EDI to move international containers from the ports on to railcars, and on their way across country, with substantial cost savings to shippers and the railroad. The EDI system is a combination of the terminal's own sophisticated data flow and the Liberator software program.

Santa Fe

The Santa Fe Railway is a subsidiary of Santa Fe Pacific Corporation. Operating in 12 states, it extends from Chicago to the Gulf of Mexico and the Pacific coast.

In 1990 Santa Fe established a St. Louis gateway for the first time in its history by obtaining trackage rights over the former Chicago Missouri & Western line from Kansas City, now The Gateway Western Railway. This followed the break-up and sale in two parts of the financially ailing Chicago Missouri Western.

Line sales. Sales of line continued in 1991, when a further 1600 km approximately were disposed of. The principal components were the 'North Orient' line, the branch from Cadiz. California to Matthie, Arizona, and the 620 km 'South Orient' line; the last-mentioned would be operated by a new South Orient Railroad Co.

In May 1992 agreement was reached for disposal of a further 1335 km in Kansas and Oklahoma to Amerail Acquisition Corporation, subject to the latter's obtaining the required financing and to certain other conditions. The sale covered two collections of lines, known as the South Kansas branch lines and the other as the North Kansas branch lines. The completed sale would bring Santa Fe system route-length below 8,000 miles (12,872 km), and close to the core railroad identified by a study which showed that 65 per cent of Santa Fe's trackage was generating 97 per cent of its revenues. By the end of 1991, sales to regional and short-line operators had already reduced Santa Fe route by about 21 5 per cent.

In June 1992 agreement was reached on the terms for sale of 547 km of rail right-of-way to eight southern California transportation agencies involved in planned creation of a commuter rail system in the area. The Santa Fe properties comprise about twothirds of these agencies' proposed network. The sale was expected to be finalized within 12 months. Santa Fe will retain all necessary rights for continuation of its freight operations on the properties. The transportation agencies will fund more than U.S. $80 million of capital improvements needed initially to increase operating capacity.

Traffic. Coal, chemicals and grain are the SFRR's major commodities.

Compared with 1990, intermodal shipments were up 7 per cent, and coal and automotive vehicle and parts carloadings also improved. Minerals and ores, however, were down.

Intermodal Traffic. During 1990 Santa Fe had focussed on improving its financial margins on intermodal traffic. By differential pricing for varying service levels, closure of low volume terminals and renegotiation of contracts with terminal operators, the overall return from the service was more than doubled on an essentially unchanged volume.

In 1991 Santa Fe carried a record number of containers and trailers, moving approximately a million units. Accounting for nearly 40 per cent of railroad revenues in 1991, intermodal was the railroad's fastest-growing business segment.

Table B.4
Sante Fe Railroad
1990 Freight Traffic by Major Commodity Group

COMMODITY GROUP	ORIGINATED	RECEIVED	TOTAL
COAL	94,680	197,148	291,828
CHEMICALS	124,135	34,273	158,408
GRAIN	109,168	22,211	131,379
MOTOR VEHICLES & EQUIPMENT	19,968	53,490	73,458
FOOD & KINDRED PRODUCTS	25,484	28,707	54,191
PETROLEUM PRODUCTS	31,318	16,798	48,116
STONE, CLAY & GLASS PRODUCTS	30,779	4,882	35,661
PULP, PAPER & ALLIED PRODUCTS	19,523	15,508	35,031
METALS & PRODUCTS	17,232	16,315	33,547
GRAIN MILL PRODUCTS	25,743	6,749	32,492
ALL OTHER CARLOADS	19,609	10,742	30,351
CRUSHED STONE, SAND & GRAVEL	20,331	4,809	25,140
WASTE & SCRAP MATERIALS	17,687	7,233	24,920
NONMETALLIC MINERALS	18,419	1,438	19,857
LUMBER & WOOD PRODUCTS	4,680	11,859	16,539
PRIMARY FOREST PRODUCTS	12,972	1,670	14,642
FARM PRODUCTS, EX. GRAIN	8,251	1,223	9,474
COKE	8,591	549	9,140
METALLIC ORES	5,681	604	6,285
TOTAL CARLOADS	614,251	436,208	1,050,459

Source: BST Associates, AAR Weekly Railroad Traffic reports

At the start of 1991, Santa Fe's intermodal car fleet group purchased and leased a total of 1,333 five-pack and ten-pack articulated units and 386 double stack fivewell units. Santa Fe was the first U.S. railroad to make a major investment in containers for domestic traffic.

Santa Fe has 22 major intermodal hubs dispersed throughout its system, and in 1989-91 it invested U.S.$41 million in terminal improvements and expansion to handle its growing domestic and international business. The Los Angeles terminal has undergone significant redesign; and recently the San Diego facility has been expanded to offer Quality Stack Service (QSS) to Chicago and to selected eastern cities served by Conrail.

Santa Fe has close partnerships with selected intermodal marketing agents, other rail companies and trucking companies. A major component of its intermodal business is international container traffic between Californian ports and U.S. centers, Canada and Mexico. Daily double-stack COFC trains are run to most major markets, in some cases through special interchange arrangements with other railroads. New contracts with two major Pacific Rim shipping companies were signed in 1991, and several existing contracts renewed for expanded traffic. Santa Fe works with steamship companies on equipment management to capture customers for backhauls, to return empty containers at reduced cost, or to arrange storage.

Under an agreement with Rail-Bridge, a K-Line subsidiary, a double-stack COFC operation branded the 'Azteca Service' is run from the K-Line terminal at Long Beach, California, to the Mexican Railways' Pantaco terminal at Mexico City and to Monterrey, Mexico. Rail-Bridge provides the double-stack equipment.

An example of arrangements that have been made to extend the geographic scope of intermodal operations beyond Santa Fe lines is the Intermodal Market Extension (IMX) concept, under which specially contracted trucking firms provide a fast link between the IMX terminals and the railway. Customers drop off or pick up trailers or containers at IMX terminals and receive a single rate and service direct to destination. Santa Fe has four IMX terminals east of Chicago, with others located at Sacramento, California, Tucson, Nogales (Arizona) and Laredo, Texas.

The alliance forged with J B Hunt Transport to offer customized door-to door transportation under a single rate with a common communication system and billing under the Quantum brand-name, is building traffic at a significant pace. Targeted at highly service-sensitive traffic, Quantum initially operated between Los Angeles and northern California, between Kansas City, eastern Michigan and central Ohio, and between the central Gulf states. In January 1991 the service was expanded to embrace the Dallas-Los Angeles rail corridor, and from the following March the service incorporated J B Hunt's entire fleet of over-thehighway equipment, achieving a considerable extension of the drayage range.

Other Freight Traffic. Three prototype grain 'Super Hoppers' went into trial use by Kansas shippers in early 1991. Santa Fe collaborated with Thrall Car in the design and production of the vehicles, each of which articulates five closely-spaced aluminum-covered hoppers into a 167 foot-long unit. Thanks to its lighter tare weight, a train of 34 fivehopper units 5,491 feet long is reckoned to offer the same payload capacity as a 120-car train of standalone 'jumbo' grain hoppers with a length of 7200 feet.

The demand by public utilities for low-sulphur high BTU western coal has given Santa Fe the largest sustained eastward coal haul in its history. From October 1992 and for 15 years it would be hauling annually 2 million short tons of coal some 1,930 km from a mine complex near Raton, New Mexico, to the Wisconsin Electric Power Co near Milwaukee. Wisconsin.

In October 1990 Santa Fe began a Gulf Coast Express operation to expedite petrochemical shipments from Gulf Coast origins to California. This successful venture was complemented in 1992 by a similar service in the Houston-Chicago corridor.

Potential exists in numerous areas for rail haulage of urban waste. Santa Fe is developing a 'Rail Cycle' scheme, expected to start operation in 1993, with Waste Management in the Los Angeles basin.

System Operations Center. A computerized locomotive management system has been installed at the Systems Operation Center in Schaumburg, Ill. Logging an average of 250 train

starts daily, data from several sources produces a video projection on a 60-ft screen showing the current status of trains on Santa Fe, their motive power, and other available power in yards, mechanical shops and on foreign lines. On their own VDU terminals the System Operations Planners can call up projections of over 100 major stations showing in each case train arrival times, the status of each train's locomotives and the local availability of locomotives

Crew Reduction. In January 1992 labour agreement was ratified for two-man crewing of all through freight trains on the Coast and Texas lines. A similar agreement was sought for the eastern half of the system, where in early 1992 about 20 per of through trains were two-man-crewed .

Investment. Capital expenditures in 1992 totaled approximately U.S. $230 million, roughly the same as in 1991. The total included U.S. $24 million for new intermodal facilities.

Canadian National

The CNRR system extends east from Vancouver BC to the Maritime provinces, and south to New York. With the exception of extended sidings and short stretches of double track at stations, the Canadian National mainline consists of a single track, although across parts of Saskatchewan and Manitoba a secondary line runs parallel to the mainline approximately 100 miles to the north, from Saskatoon to Portage la Prairie. Despite having only one main track the CN has no capacity constraints, and does not forecast any in the foreseeable future. Due to its dependence on hauling natural resources, whose industries are not particularly healthy, the CN traffic density per mile is much lower than any of the comparable U.S. railroads. In fact, the total amount of cargo carried by Canadian National is less than the amount of coal carried by the Burlington Northern.

Canadian National is a major transportation distribution company owned by the Canadian government. From the start of 1992 the company integrated the marketing and operating functions of its three U.S. rail companies, Grand Trunk Western, Duluth Winnipeg & Pacific, and Central Vermont with those of its Canadian system, CN Rail. The new organization was titled CN North America, to emphasize its objective of seamless transborder access to commercial opportunities throughout North America.

Finance. After posting net income for 1989 of C5,189.6 million, CN Rail suffered a serious loss of C5,100.2 million in 1990. Results in 1991 were a great improvement, but still showed a pretax loss, of C519 million. Freight revenues improved by C$113 million on 1990, and revenue ton-km recovered significantly, chiefly thanks to a good grain crop. Coal, sulphur, potash, pulp and paper, and some intermodal segments also surpassed 1990 levels. The railway's costs were cut by almost C$100 million more than budgeted through rationalization and improved productivity, despite having to absorb management and staff separation costs of C$87 million.

The group's U.S. railroads posted a 1991 pre tax loss of U.S.$45 million. They were sharply hit by recessionary losses of automotive and other traffics, by costs of employee separation programmes and by the expense of an environmental cleanup.

In a 1991 year-end statement, then CN President and CEO Ron Lawless warned that as a result of depressed rates, earnings were not meeting the cost of borrowing the capital essential for renewal and growth. Canadian railways were under severe pressure both from lower-cost U.S. carriers, which now had access to Canada, and from a Canadian trucking industry which had captured 70 per cent of Canada's surface transportation revenues. For success in the 1990s, railways must concentrate on core mainline operations, rationalize duplicate trackage and sell off marginal lines to shortline operators. Little revenue growth could be expected from bulk traffics. The prospects of expansion lay in intermodal merchandise, but there capital investment was needed to seize the new opportunities.

Service Throughout North America. The present 400,000 annual carloads of transborder traffic generate up to a third of the company's revenue. Business includes forest products, intermodal and automotive traffic, petroleum and chemicals, ores, minerals and metals. Several initiatives have been launched to secure more traffic through the various Canadian-U.S. gateways. Further growth is in prospect from trade with Mexico.

Several marketing agreements were negotiated with U.S. railroads in 1991 and more were anticipated in 1992. Examples were alliances with Burlington Northern and Norfolk Southern available boxcar capacity international shipments currently moving over the highway. In partnership with Southern Pacific and others, a new CN Distribution door-to-door service was set up for the supply of Californian produce to stores in Detroit, Toronto, Montreal and New England,

Doublestack COFC Development. CN North America has firmly established doublestack COFC for both domestic and international traffic. At the start of 1992 it was running the only such services in Canada: via Halifax, Buffalo, New York and Vancouver for international traffic; and in the Moncton, New Brunswick, Edmonton corridors for domestic traffic.

In July 1989 Maersk Line inaugurated a weekly doublestack service for Far Eastern traffic between Tacoma, Washington, on the U.S. Pacific coast, and Toronto/Montreal via Union Pacific to Chicago, Norfolk Southern thence to Buffalo, NY, and CN Rail to the Toronto Brampton and Montreal Montport terminals. Similar services are now operated for Orient Overseas Container, Sealand and American President Lines.

With the opening of its new C$20 million domestic terminal in Vancouver and completion of a C$10 million clearance enlargement program west of Edmonton, doublestack service for domestic traffic was extended to the west coast in 1992.

Conversion of domestic intermodal traffic from trailers to containers was expedited in 1991 with delivery of 500 48 foot long highcube containers and more FivePak cars. Customer

response was better than expected and domestic business increased 10 per cent in 1991. Domestic and international traffic is now combined on doublestack trains. Further orders for 130 FivePak cars placed in November 1991 would bring the fleet total to 232: at the same time 100 domestic containers and 50 highway chassis were ordered .

The company currently operates six hubs for intermodal traffic, in Moncton, Montreal, Toronto, Winnipeg, Vancouver and Edmonton, with satellite terminals at Halifax, Windsor, Saskatoon and Calgary. The network would be completed with the 1992 commissioning of a new C$19 million intermodal terminal at Port Mann, near Vancouver. With completion of Port Mann, all the CN Rail intermodal hub terminals enumerated above will be equipped for top loading. CN Rail has taken the first steps to creation of a further toplift terminal for domestic traffic at Halifax, but progress has been slowed because of the recession.

Traffic. The Canadian National is primarily a natural resource carrier, specializing in forest products, grain, coal, minerals, and other relatively low-value cargo.

New Operations Management Center at Montreal. In March 1991 a C$7 million Operations Management Centre (OMC) was commissioned in the railway's Montreal headquarters. The OMC computer assimilates realtime data from other CN Rail computer systems, notably those concerned with yard inventory, car management and the REIS trackside interrogators of locomotive transponders (see below). It combines two interactive management systems: TOPC, which plans train movement; and MPS which assigns locomotives to trains. OMC operators can obtain both a current view of the state of traffic systemwide and a preview up to 48 hours ahead of the operating conditions that will ensue from their actions. The system predicts for operators the consequences of a train's running ahead of schedule, for example, on scheduled track maintenance or the effects of lateness on yard work. The computer is fully briefed on all operating rules and parameters, such as individual yard capacity limits and train weight-locomotive power ratios.

A feature of OMC is a seamless electronic display almost 25 meters long and 1.55 meters high which presents schematic CN mainline maps. On these, the location of each train is indicated by its number, the color of which is varied to denote its state of timekeeping. Also shown are the running numbers of each locomotive and the type of end-of-train unit, either caboose or electronic monitoring device. (CN Rail was permitted to begin cabooseless trains in 1990.) In addition, MPS staff have desktop terminals that report the status of locomotives on branch lines and in staging areas.

CN has been among the pioneers in the introduction of computer-based technology, both to streamline its operations and to enhance customer service. Many of these now feed the OMC and will also support dispatching under the Advanced Train Control System, or ATCS. Such systems include: TRACS, the company's online realtime Traffic Reporting and Control System; and YIS, the Yard Inventory System.

Table B.5
Commodities Carried

by Canadian National Railroad
Metric Tonnes

Commodity	CN	% Total	Total *
Bituminous coal	9,781,206	35.1%	27,897,655
Wheat	8,716,074	44.5%	19,593,541
Special types of traffic	6,417,376	51.6%	12,439,205
Muriate of potassium (potash)	6,397,706	56.8%	11,267,836
Other Commodities	3,878,336	73.2%	5,297,347
Gypsum	3,516,447	66.9%	5,256,732
Pulpwood chips	3,445,050	83.1%	4,146,631
Barley	3,363,493	66.4%	5,065,597
COFC piggyback-motor carrier	3,239,247	42.5%	7,617,528
Lumber	2,961,875	72.3%	4,095,441
Sulphur, n.e.s.	2,771,921	61.0%	4,541,977
Newsprint paper	2,641,122	66.4%	3,977,354
Woodpulp	2,614,383	53.2%	4,915,320
TOFC piggyback-motor common carrier trailers	2,287,943	66.3%	3,450,597
Limestone, crushed or broken, n.e.s.	1,818,571	93.2%	1,951,465
Inorganic bases and metallic oxides	1,816,706	65.8%	2,760,667
Rapeseed	1,638,940	72.0%	2,275,392
Refined and manufactured gases, fuel type (lpg)	1,476,692	75.1%	1,965,098
Plastic materials, not shaped and basic shapes and forms	1,089,795	89.5%	1,217,907
Diesel fuel	923,617	87.4%	1,057,080
Chemical specialtites, industrial, n.e.s.	921,538	93.2%	988,499
Phosphate rock	921,374	89.2%	1,032,636
Fertilizers and fertilizer materials, n.e.s.	888,775	43.6%	2,039,881
Hydrocarbons and their derivatives	877,231	59.8%	1,467,691
Freight forwarder & shipper association traffic	855,362	64.1%	1,333,834
Common salt, rock or bulk	834,515	91.1%	915,911
Portland cement, standard	797,859	57.4%	1,390,051
Iron and steel scrap	791,708	74.8%	1,059,071
Road motor vehicles, n.e.s.	735,365	79.9%	920,911
Fuel oil, n.e.s.	697,766	77.1%	905,113
Wood building boards, n.e.s.	671,088	92.9%	722,641
Pulpwood logs	663,934	77.5%	856,716
Aluminum and alloy fabricated material, n.e.s.	660,391	97.2%	679,139
Zinc ore and concentrates	639,295	73.3%	872,277
Total	86,309,112	54.0%	159,749,379

* Total consists of CN plus CP traffic

Source: BST Associates, Statistics Canada reports

Signalling and Telecommunications. As with the U.S. Class I carriers, CN is investing heavily in upgrading signalling and communications as the most cost-effective means of increasing capacity. CN is engaged in an Advanced Train Control Systems (ATCS) pilot project valued at more than C$15 million. In 1993, later than originally anticipated, this would culminate in commissioning of a pilot ATCS system over 301 km of the railway's

North Division between Harvey, British Columbia, (west of Jasper, Alberta and Prince George, British Columbia.)

The first phase involves automatic tracking of train location and reporting thereof to the locomotive cab, and remote control of track switches by computers fitted to 54 locomotives. In a second phase, track-occupancy authorities will be issued to trains via the data radio network and the onboard computers will enforce and automatically halt trains if there is non-compliance.

A Railway Electronic Identification System (REIS) is already operational systemwide. REIS is a monitor of train movements based on ground-sited interrogators working with transponders on locomotives. Some 1700 locomotives have been fitted with the transponders. Groups of interrogators are periodically scanned by microcomputer devices, which transmit the data they collect to displays in yard offices.

Automatic Equipment Identification (AEI) was made mandatory by the Association of American Railroads in September 1991. CN will apply tags to more than 60,000 freight cars by the start of 1995 at a cost of over C$13 million.

A pilot EDI project launched in February 1992 will help rail freight electronically at the Sarnia and Windsor gateways to the U.S. It is expected to eliminate 100 million Canadian Customs documents annually and cut hours from import traffic's total transit time.

Working with Pitney Bowes Facsimile Systems, a CN team has developed a cross Canada network of telefax machines that deliver daily operating bulletins to train crews.

Canadian Pacific

CP serves all Canadian provinces except Newfoundland and Prince Edward Island, with lines passing through the U.S. State of Maine and extending into the State of Vermont.

CP Rail, a unit of Canadian Pacific Limited, is also greatly oriented toward bulk cargoes.

Soo Line Takeover. In April 1990, Canadian Pacific completed the merger of Soo Line Corporation after acquiring the majority of outstanding interest in this U.S. railroad company.

Based in Minneapolis, U.S.A, Soo Line is the tenth largest U.S. railroad, operating in 12 Mid-Western states. The merger has enabled development of more competitive rail service for Canada-U.S. traffic that is expected to grow following the Free Trade agreement.

Delaware & Hudson Takeover. In January 1991 CP Rail completed the acquisition from Guilford Transportation of the Delaware & Hudson Railroad, which had been in the course of bankruptcy proceedings. The takeover was finalized after lengthy negotiations for trackage rights from Conrail for CP Rail access via the D & H to southern U.S. markets and connections. Agreement was reached for use of Conrail tracks between Buffalo and Niagara

Falls, NY, as a connection between CP Rail and the D & H, and on other disputed issues of D & H operating rights raised by the change of ownership.

Table B.6
Commodities Carried
by Canadian Pacific Railroad
Metric Tonnes

Commodity	CP	% Total	Total *
Bituminous coal	18,116,449	64.9%	27,897,655
Wheat	10,877,467	55.5%	19,593,541
Special types of traffic	6,021,829	48.4%	12,439,205
Muriate of potassium (potash)	4,870,130	43.2%	11,267,836
COFC piggyback-motor common carrier containers	4,378,281	57.5%	7,617,528
Nickel-copper ore and concentrates	3,215,785	98.6%	3,261,713
Woodpulp	2,300,937	46.8%	4,915,320
Sulphur, n.e.s.	1,770,056	39.0%	4,541,977
Gypsum	1,740,285	33.1%	5,256,732
Barley	1,702,104	33.6%	5,065,597
Lignite coal	1,641,762	93.5%	1,756,488
Other Commodities	1,419,011	26.8%	5,297,347
Newsprint paper	1,336,232	33.6%	3,977,354
TOFC piggyback-motor common carrier trailers	1,162,654	33.7%	3,450,597
Fertilizers and fertilizer materials, n.e.s.	1,151,106	56.4%	2,039,881
Lumber	1,133,566	27.7%	4,095,441
Inorganic bases and metallic oxides	943,961	34.2%	2,760,667
Alcohols and their derivatives	862,857	63.8%	1,351,864
Sulphuric acid	770,848	56.5%	1,365,532
Pulpwood chips	701,581	16.9%	4,146,631
Logs and bolts of wood	656,970	63.8%	1,030,433
Rapeseed	636,452	28.0%	2,275,392
Portland cement, standard	592,192	42.6%	1,390,051
Hydrocarbons and their derivatives	590,460	40.2%	1,467,691
Passenger automobiles and chassis	529,349	54.2%	977,462
Sheet and strip, steel	512,247	54.8%	934,903
Refined and manufactured gases, fuel type (lpg)	488,406	24.9%	1,965,098
Freight forwarder & shipper association traffic	478,472	35.9%	1,333,834
Copper ores and concentrates	423,717	46.9%	904,302
Total	73,440,267	46.0%	159,749,379

* Total consists of CN plus CP traffic

Source: BST Associates, Statistics Canada reports

Finance. In 1991 CP Rail's profit was drastically cut from a 1990 figure of C$316.1 million to C$24.5 million. Export grain was the major exception to a general decline in traffic levels, while costs rose and there was a substantial charge for staff reductions in the areas of administration and equipment maintenance.

Intermodal Services. CP Rail Intermodal Services (IMS) now moves within Canada more than 400,000 loaded containers. The largest Canadian terminals are at Montreal, Toronto, Winnipeg, Calgary, Edmonton and Vancouver. Since its absorption of the Soo Line and D & H railroads in the U.S., CP Rail corporately owns a total of 18 terminals in Canada and 12 in the U.S.

Developments in 1991 included completion of a C$30 million intermodal terminal at Vaughan, near Toronto. This is claimed to be the most advanced containerized freight facility in Canada, featuring four 609 meter-long working tracks, six storage and make-up tracks of similar length and three electrically-powered gantry cranes. A computer system selects the sequence of offloading, loading and storage of containers and piggyback trailers, directing all horizontal moves; only the vertical lifts are controlled by crane operators. The Vaughan terminal handles western Canadian domestic traffic as well as maritime containers to and from West Coast ports, and will improve links between Ontario and markets in western Canada and Pacific Rim countries. Another CP Rail Toronto area intermodal terminal, Obico, will continue to handle overseas container traffic to and from east coast ports, plus domestic business for eastern Canada and the U.S.

By the end of 1992 CP Rail expected to complete clearance enlargement in 40 key tunnels on its British Columbia main line so as to permit double-stacking of 9ft 6in-high maritime containers between Vancouver and the east. The change will also allow conveyance of light commercial vehicles on the top deck of trilevel autoracks. Maritime and domestic container handling is integrated at CP Rail's intermodal terminals. This leads to better utilization of cars and equipment, faster turnaround of containers, flatcars and highway chassis, and reduced costs.

Unit Train Operation. CP Rail secured impressive productivity in its coal train operation. Cars ferrying Japan-bound coal from mines in southeast British Columbia to the Roberts Bank terminal on the West Coast, for instance, achieve a 2240 km round trip in 132 hours for a calculated annual gross productivity of around 110,000 miles per car. The coal trains are also witness to CP Rail's achievement in train-crew productivity, since at no time are they worked by more than three men. In 1991 CP Rail Export coal movement grossed some 18 million short tons; eastbound movement for domestic consumption, or to U.S. steel plants, totalled close to 4 million short tons. The domestic traffic is now threatened by imports of U.S. coal with an equally low sulphur content.

Dedicated Train Service. Another test program, termed Dedicated Train Service, has also shown promise. It is focusing on limited-tonnage, siding-to-siding through train service for a single customer or commodity. Initial results have shown that the concept can significantly improve both transit times and equipment productivity.

Rogers Pass Tunnel. The Rogers Pass project was completed and formally inaugurated early in May 1989. Construction of a new single line for westbound trains has featured construction of the 14.66 km Mount Macdonald Tunnel in the Selkirk Mountains of British Columbia,

North America's longest tunnel and the centerpiece of massive grade reduction and double-tracking project. The scheme also included a 1.85 km tunnel (the Mount Shaughnessy tunnel) under the Trans-Canada Highway, the 1229 meter-long John Fox viaduct a 17.31 km of new surface route, for a total 33.82 km of new track.

The tunnel design includes a unique ventilation system that purges the tunnel of locomotive exhaust quickly, so that a train can pass through it every 30 minutes. In addition, the tunnel houses a 'Pact-Track' concrete roadbed which eliminates the need for sleepers and ballast. It is the first time this rail roadbed system has been used in North America. The most modern engineering techniques have been used in both design and construction, which allows for future electrification if required.

Completion of the Rogers Pass project has tripled, operating capacity in this area of the main line. The existing route through the Connaught tunnel, with its ruling 2.2 percent gradient, is used by eastbound trains. The heavily loaded westbound commodity trains, taking the new line with its 1 percent ruling grade, no longer need the aid of six banking locomotives. That saves approximately one hour previously required to attach the locomotives to each train, and also the C$18 million a year incurred by that operation and the local stationing of 12 locomotives purely for pusher service.

Towards Advanced Train Control (ATCS). As undertaken by the Canadian National and most other North American railroads, the CP is installing sophisticated tracking and control equipment, which increases the capacity of existing rail lines through better use of resources. CP Rail operates approximately 20,000 to 22,000 trains a month in Canada. A computer-assisted train dispatching system known as CMBS (Computerized Manual Block System) helps control traffic over more than 80 percent of CP Rail lines not covered by CTC. It provides dispatchers with computer verification to prevent issue of conflicting occupancy authorities. Radio communicates authorities to train crews and verifies that they have been correctly received.

Development of Advanced Train Control Systems (ATCS) continues. In 1989 specifications were completed and detailed design work begun, including negotiations with equipment suppliers. CP Rail plans carefully phased development of ATCS rather than the complete changeover of an operating area to the new system. Thus by the end of 1991 it expected to have fully operational a pilot scheme affecting only 14 locomotives that would embrace electronic transfer of movement authorities to locomotive cab display screens and automatic location of trains by means of pulse generator odometers, track-mounted transponders and locomotive-mounted interrogators.

CMBS computer programs are being used as a basis for the software design, with the communications used being Short Term versus Long Term Considerations. All present and future CP Rail signalling and traffic control development is being designed for compatibility with prospective achievement of ATCS. For instance, the connection of hot freight car axlebox detectors to the central computers has begun.

Port Terminal Characteristics

Table B.7
U.S. COAL LOADING TERMINALS - EAST COAST

PORT/TERMINAL	EXISTING Controlling Depth [1] (Feet)	FUTURE Vessel Size (000) (DWT)	Project Depth (Feet)	TERMINAL Vessel Size (000) (DWT)	(Million Short Tons) Existing	Underway	Planned
PHILADELPHIA, PA							
o Pier 124 Conrail	40	50			10.0		
o Port Richmond Conrail	35	40			0.5		
CAMDEN, NJ							
o Broadway Terminal	40	50			0.5		
BALTIMORE, MD							
o Curtis Bay Chessie System	42	60			12		
o Curtis Bay Co.	50	100			10.0		
o Consol Marine Terminal	50	100			10.0		
NORFOLK, VA							
o Pier 6	50	100	55 [2]	130	43.0		
NEWPORT NEWS, VA							
o Pier 9	50 [3]	100	55 [2]	130	12.0		
o Dominion Terminal	50	100	55 [2]	130	15.0	2.5	
MOREHEAD CITY, NC							
o NCSPA Bulk Facility	40	50		3.0			
CHARLESTON, SC							
o Massey Coal Terminal	43	65	43 [4]	90	2.5		
TOTAL (million short tons)					118.5	2.5	0.0

1/ Shallowest depth from alongside port terminal to main entrance ship channel.
2/ Authorized to 55 feet. Deferred for '94-'96 budget consideration.
3/ 45' north side of pier, 52' south side of pier, 50' channel.
4/ 5 to 7 year projection
Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - EAST COAST

PORT/TERMINAL	YEAR BUILT	LATEST MAJOR RENOVATION	STORAGE CAPACITY	SERVING RAILROADS
PHILADELPHIA PA				
o Pier 124 Conrail	1929	1983	800 railcars	CONRAIL
o Port Richmond Conrail	1915	1987	100,000 tons	CONRAIL
CAMDEN, NJ				
o Broadway Terminal	1969	1987	500,000 tons	CONRAIL
BALTIMORE, MD				
o Curtis Bay Chessie System	1914	1961	100 railcars	CSX
o Curtis Bay Co.	1982	none	350,000 tons	CSX
o Consol Marine Terminal	1983	1990	750,000 tons	CONRAIL, CSX
NORFOLK, VA				
o Pier 6	1962	1984	7000 railcars	Norfolk Southern
NEWPORT NEWS, VA				
o Pier 9	1983	1990	n/a	CSX
o Dominion Terminal	1984	1990	180 railcars 2.05 million tons	CSX
MOREHEAD CITY, NC				
o NCSPA Bulk Facility	1965	1990	n/a	Norfolk Southern
CHARLESTON, SC				
o Massey Coal Terminal	1983	none	300 railcars 275,000 tons	CSX; Norfolk Southern

Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - GULF COAST

PORT/TERMINAL	Controlling Depth (Feet)	EXISTING Vessel Size (000) (DWT)	FUTURE Project Depth (Feet)	Vessel Size (000) (DWT)	TERMINAL CAPACITY (Million Short Tons) Existing	Underway	Planned
MOBILE, AL							
o McDuffie Island	45	70	55 3/	130	23.0		
o Bulk Plant	40	50			2.0		
MISSISSIPPI RIVER							
o Public Bulk Terminal (MRGO) 2	36	40			5.0		1.0
o Electro-Coal	45	70	55 4/	130	25.0		
o Int'l Marine Terminal	45	70	55 4/	130	15.0		
o South Pass Terminal Plaquemines Parish			60	150			10.0
AT-SEA OPERATION	NA	NA	NA	NA	1.0		
BURNSIDE, LA							
o Burnside Terminal	45	70	55 4/	130	6.0		
MID-STREAM OPERATION							
o Delta Trans, Cooper T. Smith, Paulina, & Darrow	45	70	55 4/	130	56.5		
LAKE CHARLES, LA							
o Bulk Terminal #1	40	50	45 5/	70	4.5		10.0

1/ Shallowest depth from alongside port terminal to main entrance ship channel.
2/ Terminal is actually on the Mississippi River Gulf Outlet.
3/ Authorized to 55 feet. First phase, deepening to 45 feet, was completed in June, 1989.
4/ Authorized to 55 feet. First phase, deepening to 45 feet, was completed in July 1989.
5/ Authorized to 45 feet. Work has not started.
Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - GULF COAST (continued)

PORT/TERMINAL	EXISTING Controlling Depth (Feet)	EXISTING Vessel Size (OOO) (DWT)	FUTURE Project Depth (Feet)	FUTURE Vessel Size (000) (DWT)	TERMINAL CAPACITY (Million Short Tons) Existing	Underway	Planned
PORT ARTHUR. TX							
o PABTEX	40	50+			4.0		
HOUSTON, TX							
o Bulk Materials Handling Plant	40	50+	40	50+	3.0		
CORPUS CHRISTI, TX							
o Bulk Dock 1	34	40+			2.5		
o Bulk Dock 2	45	70+			5.0		
o BMD 3			45	70+			7.5
TOTAL (million short tons)					152.5	O.O	28.5

1/ Shallowest depth from alongside port terminal to main entrance ship channel

Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - GULF COAST

PORT/TERMINAL	YEAR BUILT	LATEST MAJOR RENOVATION	STORAGE CAPACITY	SERVING RAILROADS
MOBILE, AL				
o McDuffie Island	1927	1985	2000000 tons	Burlington Northern; CSX; Illinois Central; Norfolk Southern
o Bulk Plant	1925	1981	1200000 tons	Burlington Northern; CSX; Illinois Central Norfolk Southern
MISSISSIPPI RIVER				
o Public Bulk Terminal (MRGO) 2/	1965	none	750000 MT	CSX; Illinois Central; Kansas City Southern; Norfolk Southern; Public Belt; Southern Pacific; Union Pacific
o Electro-Coal	1984	none	4500000 tons	none
o Int'l Marine Terminal	1979	1990	1500000 tons	none
BURNSIDE, LA				
o Burnside Terminal	1958	1990	475000 MT	Illinois Central
LAKE CHARLES, LA				
o Bulk Terminal #1	1969	1990	325000 tons	Kansas City Southern; Southern Union Pacific Union Pacific
PORT ARTHUR, TX				
o Pabtex	1970	none	500,000 MT	Kansas City Southern
HOUSTON, TX				
o Bulk Materials Handling Plant	1961	1990	125 railcars	Atchison, Topeka and Santa Fe; Burlington Northern; Southern Pacific; Union Pacific

Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - GULF COAST

PORT/TERMINAL	YEAR BUILT	LATEST MAJOR RENOVATION	STORAGE CAPACITY	SERVING RAILROADS
CORPUS CHRISTI, TX				
o Bulk Dock 1	1960	1985	2000 railcars	Corpus Christi Terminal Assn; Southern Pacific; Texas Mexican; Union Pacific
o Bulk Dock 2	1985	none	2000 railcars	Corpus Christi Terminal Assn; Southern Pacific; Texas Mexican; Union Pacific

Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - WEST COAST

PORT/TERMINAL	EXISTING Controlling Depth 1/ (Feet)	EXISTING Vessel Size (000) (DWT)	FUTURE Project Depth (Feet)	FUTURE Vessel Size (000) (DWT)	TERMINAL CAPACITY (Million Short Tons) Existing	Underway	Planned
LOS ANGELES							
o Berth 49-50	51	100			5.5		
o Pier 300			72	250			11.0
LONG BEACH, CA							
o Pier G 214-215	40	50	50	100	1.0		Under
o Pier G 212-213	50	100	52	115	4.5		discussion
STOCKTON, CA							
o Bulk Terminal	35	40			2.2		
SEWARD, AK							
o Seward Coal Terminal	58	140			3.3		
TOTAL (million short tons)					16.5	0.0	11.0

1/ Shallowest depth from alongside port terminal to main entrance ship channel

Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - WEST COAST

PORT/TERMINAL	YEAR BUILT	LATEST MAJOR RENOVATION	STORAGE CAPACITY	SERVING RAILROADS
LOS ANGELES				
o Berth 49-50	1965	none	170,000 MT	Atchison Topeka and Santa Fe; Southern Pacific; Union Pacific
LONG BEACH, CA				
o Pier G 212-215	1962	1989	50,000 tons 168 railcars	Atchison Topeka and Santa Fe; Southern Pacific; Union Pacific
STOCKTON,				
o Bulk Terminal	1980	none	2,000,000 tons 300 railcars	Atchison Topeka and Santa Fe; Denver and Rio Grande Western; Southern Pacific; Union Pacific
SEWARD, AK				
o Seward Coal Terminal	1985	none	120,000 MT	Alaska Railroad

Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - GREAT LAKES 1990

Lake Erie Coal Terminals	Storage Capacity (Millions)	Vessel Loading Tons/Hour	Effective Capacity (Millions)	1990 Shipments (Millions) to U.S. & Canada U.S.	CANADA	Overseas	Total	Excess Available Capacity (Millions)
Con Rail Dock								
Ashtabula	1.50	7000	7.0	1.3	3.5	0.13	4.93	2.1
Pittsburgh & Conneaut Dock Co.								
Conneaut	6.00	7700	13.5	1.26	4.2	0.16	5.6	7.9
Codan Marine, Erie	0.10	1500	0.4	0.00	0.00	0.00	0.00	0.40
Lower Lake Dock Co.								
Sandusky	1.85	7000	7.5	1.1	3.2	0.00	4.3	3.2
Toledo Docks	0.40	6000	16.0	3.2	3.8	0.01	7.0	9.0
Toledo								
TOTAL LAKE ERIE TERMINALS			44.4	6.86	14.7	0.3	21.83	22.6
OTHER COAL TERMINALS								
KCBX								
South Chicago	0.95	2500	8.0	1.30	0.40	0.30	2.00	6.00
Superior Midwest Energy Terminal								
Superior	7.00	11500	18.0	11.30	0.30	0.00	11.60	6.40
TOTAL OTHER TERMINALS			26.0	12.60	0.70	0.30	13.60	12.40
GRAND TOTAL GREAT LAKES PORTS (ST)			70.4	19.46	15.40	0.60	35.43	35.00

Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

U.S. COAL LOADING TERMINALS - GREAT LAKES

PORT/TERMINAL	YEAR BUILT	LATEST MAJOR RENOVATION	STORAGE CAPACITY	SERVING RAILROADS
Con Rail Dock Ashtabula, OH	1968	none	1,500,000 tons	CONRAIL
Pittsburgh & Conneaut Dock Co. Conneaut,OH	1892	1965	6,000,000 tons	Bessemer & Lake Erie CONRAIL
Codan Marine Erie, PA	1967	1985	100,000 tons	
Lower Lake Dock Co. Sandusky,OH	1939	1967	1,000,000 tons	Norfolk Southern
Toledo Docks Toledo, OH	1933	1958	400,000 tons	CONRAIL; CSX
KCBX Terminal Chicago, IL	1946	none	450,000 tons	Belt Line Railway Co. of Chicago
Superior Midwest Energy Terminal Superior,IL	1976	none	7,000,000 tons	Burlington Northern

Source: Maritime Administration, Existing and Potential U.S. Coal Export Loading Facilities, January 1992

Table B.8
U.S. GRAIN EXPORT ELEVATORS

Page	#	Elevator Name	Export Location	State Region	Storage Capacity	Loading Capacity	Number of Bins	Capacity of Bins	Number of Spouts to Ships	Number of Belts to Ships
54	33	Elevator No. 4	Montreal	Canada	9.50	140,000	0	0	22	8
57	49	Les Silos Port Cartier	Port Cartier	Canada	10.00	110,200	0	0	6	2
52	5	Bunge of Canada Limited	Quebec City	Canada	8.30	240,000	0	0	3	2
55	47	Les Elevateurs de Sorel	Sorel	Canada	5.22	90,000	0	0	5	5
56	48	Les Elevateurs des Trois Rivieres Trois Rivieres		Canada	6.00	85,000	0	0	0	3
3				Montreal						
53	11	Cargill Elevator	Baie Comeau	Canada	16.20	100,000	0	0	13	2
27	2	Alabama State Docks, Public Grain Elevator	Mobile	AL Gulf	3.30	120,000	3	5,000	2	2
41	70	RIO AMERICA (Floating elevator)	Darrow	LA Gulf	0.00	27,000	0	0	1	0
28	7	BUSSCO I (Floating elevator)	Darrow	LA Gulf	0.00	20,000	0	0	1	1
20	36	GEMINI (Floating elevator)	Destrehan	LA Gulf	0.00	27,500	0	0	1	0
29	20	Cargill Terre Haute Elevator	Reserve	LA Gulf	7.74	100,000	0	0	4	2
21	71	St. Charles Grain Elevator	Destrehan	LA Gulf	6.27	80,000	9	25,000	7	2
43	81	Zen-Noh Grain Corporation	Convent	LA Gulf	4.00	120,000	12	30,000	4	2
36	50	LST (Floating elevator)	Darrow	LA Gulf	0.00	17,500	0	0	1	1
40	68	RGÖl (Floating elevator)	Darrow	LA Gulf	0.00	20,000	0	0	1	0
35	53	Louis Dreyfus Reserve Elevator	Reserve	LA Gulf	3.60	80,000	4	5,000	3	2
38	60	MR. BERT (Floating elevator)	Darrow	LA Gulf	0.00	12,500	0	0	1	1
34	45	K-2 BARGE (Floating elevator)	Convent	LA Gulf	0.00	60,000	0	0	1	0
18	1	ADM/GROWMARK	Ama	LA Gulf	5.00	80,000	16	30,000	4	2
19	4	Bunge Grain Elevator	Destrehan	LA Gulf	6.20	80,000	7	20,000	8	2
9	29	Continental U.K., LTD.	Westwego	LA Gulf	4.73	120,000	12	22,500	6	4
42	72	St. Elmo Terminal Elevator	Paulina	LA Gulf	2.00	60,000	0	0	1	1
31	31	DELTA CONVEYOR (Floating elevator)	Convent	LA Gulf	0.00	50,000	0	0	1	1
37	54	MARGARET G (Floating elevator)	Darrow	LA Gulf	0.00	?	0	0	1	0

Source: Export Elevator Directory, U.S. Department of Agriculture, Federal Grain Inspection Service, July 1991

Page	#	Elevator Name	Export Location	State	Region	Storage Capacity	Loading Capacity	Number of Bins	Capacity of Bins	Number of Spouts to Ships	Number of Belts to Ships
39	67	Port of Baton Rouge Grain Elevator	Port Allen	LA	Gulf	7.00	60,000	0	0	4	1
10	59	Mississippi River Grain	Myrtle Grove	LA	Gulf	6.00	90,000	0	0	4	1
8	46	Lake Charles Public Elevator	Lake Charles	LA	Gulf	0.75	25,000	3	12,000	2	1
33	44	Jackson County Terminal Elevator	Pascagoula	MS	Gulf	3.96	60,000	7	13,000	7	3
7	3	Beaumont Elevator	Beaumont	TX	Gulf	3.50	50,000	4	20,000	4	3
16	43	Interstate Grain Port Terminal	Corpus Christi	TX	Gulf	6.30	60,000	4	15,000	5	2
15	30	Corpus Christi Public Elevator	Corpus Christi	TX	Gulf	5.00	150,000	4	8,000	7	4
26	79	Union Equity Export Elevator	Deer Park	TX	Gulf	8.50	120,000	8	24,250	6	4
22	13	Cargill Houston Elevator	Channelview	TX	Gulf	6.00	190,000	0	0	12	2
25	78	Union Equity Cooperative Exchange	Galveston	TX	Gulf	2.80	120,000	9	20,000	4	2
23	34	Galveston Wharves Elevator B	Galveston	TX	Gulf	5.00	60,000	10	3,000	6	8
24	41	Houston Public Grain Elevator	Houston	TX	Gulf	6.00	75,000	9	12,000	13	4
17	64	Public Elevator	Brownsville	TX	Gulf	3.00	50,000	3	7,287	2	2
					Sub-total 31	106.66	2,184,500	124	272,037	124	60
62	35	Gateway Elevator	Chicago	IL	Lakes	7.00	90,000	8	12,500	8	5
63	69	Rialto Elevator	Chicago	IL	Lakes	2.50	20,000	1	6,600	1	2
60	23	Continental "B"	Chicago	IL	Lakes	10.50	18,000	5	18,000	5	2
59	12	Cargill Elevator	Chicago	IL	Lakes	23.00	60,000	3	0	5	1
61	24	Continental "C"	Chicago	IL	Lakes	6.50	40,000	8	12,500	8	4
58	9	Cargill Burns Harbor Elevator	Portage	IN	Lakes	5.00	90,000	0	0	1	1
68	55	MidStates Terminals	Carrollton	MI	Lakes	2.00	20,000	10	10,000	3	1
69	63	Peavey Elevator	Carrollton	MI	Lakes	2.70	20,000	2	14,000	1	1
45	32	Elevator "A"	Duluth	MN	Lakes	3.79	60,000	4	2,000	1	1
44	10	Cargill Duluth Elevator	Duluth	MN	Lakes	9.80	140,000	0	0	6	3
48	42	International Multifoods Elevator	Duluth	MN	Lakes	4.20	50,000	0	0	4	0
71	77	The Andersons	Toledo	OH	Lakes	7.00	50,000	7	10,285	7	0
70	76	The Andersons	Maumee	OH	Lakes	17.00	35,000	0	0	1	0
74	21	Cargill Toledo Elevator	Toledo	OH	Lakes	6.70	60,000	0	0	1	1
76	57	MidStates Terminals	Toledo	OH	Lakes	6.00	45,000	16	12,500	10	0
72	6	Burdick	Huron	OH	Lakes	2.20	30,000	0	0	1	1

Source: Export Elevator Directory, U.S. Department of Agriculture, Federal Grain Inspection Service, July 1991

Page	#	Elevator Name	Export Location	State	Region	Storage Capacity	Loading Capacity	Number of Bins	Capacity of Bins	Number of Spouts to Ships	Number of Belts to Ships
75	56	MidÖStates Terminals	Toledo	OH	Lakes	3.00	80,000	6	20,000	3	0
73	14	Cargill Maumee Elevator	Maumee	OH	Lakes	6.26	20,000	0	0	1	0
51	74	Section B General Mills	Superior	WI	Lakes	13.40	60,000	3	10,000	3	3
47	40	Harvest States Cooperatives #2	Superior	WI	Lakes	11.00	65,000	5	5,000	5	1
46	39	Harvest States Cooperatives #1	Superior	WI	Lakes	7.50	65,000	3	5,000	8	3
50	62	Peavey Connor's Point	Superior	WI	Lakes	9.00	75,000	0	0	6	4
49	58	Milwaukee "KK" Elevator	Milwaukee	WI	Lakes	3.25	40,000	12	2,500	6	6
					Sub-total 23	169.30	1,233,000	93	140,885	95	40
5	66	Port of Albany Elevator #1	Albany	NY	NAtl	13.50	50,000	0	0	1	1
32	37	Georgia Ports Authority	Brunswick	GA	SAtl	1.00	33,000	0	0	1	1
30	26	Continental Grain Company	Savannah	GA	SAtl	1.50	30,000	0	0	1	1
1	8	Canton Grain Elevator	Baltimore	MD	SAtl	3.50	70,000	0	0	11	7
4	51	Locust Point Grain Elevator	Baltimore	MD	SAtl	3.80	70,000	12	22,000	7	3
6	75	Sth Carolina Farm Bur Mark Assn	N. Charleston	SC	SAtl	1.60	30,000	0	0	5	1
2	15	Cargill North Elevator	Norfolk	VA	SAtl	3.30	40,000	0	0	3	2
3	18	Cargill South Elevator	Chesapeake	VA	SAtl	6.80	60,000	0	0	2	1
					Sub-total 7	21.50	333,000	12	22,000	30	16
12	25	Continental Grain Company	San Francisco	CA	West	2.00	50,000	0	0	6	2
11	17	Cargill Sacramento Elevator	W. Sacramento	CA	West	1.25	21,200	0	0	1	1
13	27	Continental Grain Company	Stockton	CA	West	6.50	40,000	0	0	2	2
14	73	San Diego Bulk Terminal	San Diego	CA	West	1.00	36,666	3	46,200	1	1
64	19	Cargill Terminal #4	Portland	OR	West	7.50	90,000	6	20,000	2	1
67	65	Portland Grain Terminal	Portland	OR	West	1.50	50,000	4	40,000	5	1
66	52	Louis Dreyfus Elevator	Portland	OR	West	1.80	45,000	2	2,167	6	2
65	22	Columbia Grain Terminal #5	Portland	OR	West	4.00	70,000	6	33,000	3	2
78	28	Continental Grain Company	Tacoma	WA	West	3.20	80,000	8	19,000	3	3
77	16	Cargill Pier 86 Elevator	Seattle	WA	West	4.20	100,000	8	39,600	5	2

Source: Export Elevator Directory, U.S. Department of Agriculture, Federal Grain Inspection Service, July 1991

Page	#	Elevator Name	Export Location	State	Region	Storage Capacity	Loading Capacity	Number of Bins	Capacity of Bins	Number of Spouts to Ships	Number of Belts to Ships
79	38	Harvest States Cooperatives	Kalama	WA	West	0.40	60,000	6	16,500	7	2
80	61	Peavey Company	Kalama	WA	West	2.00	100,000	4	40,000	4	1
81	80	United Grain Corporation	Vancouver	WA	West	4.70	80,000	5	42,000	1	1
					Sub-total 13	40.05	822,866	52	298,467	46	21

Source: Export Elevator Directory, U.S. Department of Agriculture, Federal Grain Inspection Service, July 1991

Table B.9
North American
Container Terminal Descriptions

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
North Atlantic Ports					
Baltimore	Dundalk Marine Terminal	38.1	11	575.0	5,528.5
	North Locust Point Marine Terminal	NA	2	9.8	1,200.8
	South Locust Point Marine Terminal	35.8	4	79.3	2,080.2
	Sealand	32.2	1	30.0	698.9
	Seagirt	42.0	7	280.0	3,126.8
Boston					
	Moran Container Terminal	40.0	2	65.0	1,099.1
	Conley Terminal	40.0	3	104.3	1,693.0
Chester			1	80.0	1,148.4
Halifax					
	Pier C	45.3	4	60.5	3,281.0
	Fairview Cove	49.9	3	53.8	2,178.6

Source: BST Associates using Containerization International data

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
Hampton Roads					
	Norfolk International	41.0	7	485.0	4,232.5
	Newport News	35.1	5	142.3	1,679.9
	Portsmouth Marine	38.1	6	177.5	2,490.3
	Lambert's Point Docks	31.8	2	123.5	1,200.8
Montreal					
	Cast Terminal	35.1	4	40.5	2,427.9
	Termont Terminal	35.1	4	44.8	2,683.9
	Boucherville Terminal	35.1	3	12.5	1,273.0
	Racine Terminal	35.1	4	52.0	2,427.9
	Bickerdike Terminal	28.9	2	24.0	1,171.3
New York & New Jersey					
	Marine Terminal	35.1	3	103.3	2,824.9
	Maersk Terminal	35.1	3	62.5	764.5
	Maher Terminals Tripoli St.	38.1	23	247.8	3,149.8
	Maher Fleet St.	38.1	7	202.5	4,875.6
	Sealand Services	40.0	7	232.5	4,521.2

Source: BST Associates using Containerization International data

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
	Universal Terminal	36.1	4	101.3	3,609.1
	Global Marine	43.3	4	100.3	1,800.0
	Howland Hook Marine	35.1	7	189.3	2,500.1
	Red Hook Marine	40.0	4	80.0	1,332.1
	South Brooklyn Marine	35.1	3	111.3	5,508.8
Philadelphia					
	Tioga Marine	40.0	2	62.5	1,446.9
	Parker Avenue	40.0	3	12.0	3,057.9
Portsmouth (NH)		35.1	4	462.5	
Richmond (VA)		26.2	3	122.5	1,246.8
St. John (NB)					
	Rodney Container	40.0	3	50.0	3,225.2
St. John's (NFLD)					
	Main Terminal	28.9	4	14.0	2,631.4
Wilmington (Del)					
	Port of Wilmington	38.4	2	245.0	1,558.5

Source: BST Associates using Containerization International data

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
South Atlantic Ports					
Charleston					
	Columbus St	33.1	6	124.5	3,871.6
	Nth Charleston	33.1	6	193.8	2,500.1
	Wando	33.1	6	151.3	2,398.4
Jacksonville					
	Blount Island	38.0	7	88.0	3,937.2
	Talleyrand	38.1	6	69.0	1,200.8
Miami					
	Dodge Island	24.9		607.3	9,039.2
	Lummus Island	38.1	6	0.0	3,609.1
Palm Beach	35.1	6	30.3	5,164.3	
Port Everglades	44.0	3	50.0	4,974.0	
Savannah					
	Containerport	38.1	9	273.3	5,499.0
Wilmington (NC)					
	North Carolina State Ports Authority	38.1	10	405.0	0.0

Source: BST Associates using Containerization International data

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
Gulf Coast Container Terminals					
Freeport					
	Berth 1-3	29.9		3.5	1,250.1
Galveston					
	East End Container Terminal	40.0	4	130.0	2,027.7
Gulfport					
	West Pier Container Terminal	29.9	2	10.0	5,003.5
	East Pier			0.0	656.2
Houston					
	Barbours Cut Terminal	42.0	8	149.8	3,999.5
	Care Shipping Terminal	38.1	1	51.3	498.7
Mobile	Alabama State Docks	32.0	1	11.0	892.4
New Orleans					
	France Road Terminal				
	(Berth 1)	31.8	2	35.3	830.1
	(Berth 4)	36.1	2	33.5	698.9
	(Berths 5, 6 & 6a)	36.1	3	65.8	2,085.7
	Henry Clay Ave Wharf	36.1		10.8	839.9
	Nashville Ave Wharf			46.0	1,414.1
	Jourdan Road Terminal	36.1		0.0	1,401.0
Tampa		34.1		6.0	5,400.5

Source: BST Associates using Containerization International data

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
North Pacific Container Terminals					
Portland (Oregon)					
	Terminal 2	40.0	4	55.5	2,450.9
	Terminal 4	40.0	2	44.8	2,444.3
	John M. Fulton (Terminal 6)	40.0	5	69.0	2,851.2
Seattle					
	APL Terminal 5	45.9	5	91.3	2,500.1
	Seattle International (Terminal 18)	49.2	7	125.0	6,050.2
	Terminal 25	39.4	3	28.3	1,581.4
	Terminal 30	39.4	3	29.3	1,397.7
	Terminal 37	44.9	2	30.3	885.9
	Terminal 42	44.9	2	30.0	951.5
	Terminal 46	49.2	2	100.0	1,102.4

Source: BST Associates using Containerization International data

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
Tacoma					
	Maersk Terminal (Terminal 3)	44.9	4	40.0	951.5
	Terminal 4	44.9	4	30.0	1,903.0
	Terminal 7	44.9	6	80.0	2,729.8
	Pierce County	44.9	1	150.0	1,420.7
	Sealand Terminal	40.0	5	100.0	1,607.7
	Tote Terminal	40.0		33.0	246.1
Vancouver					
	Centerm	40.0	3	50.0	4,275.1
	Vanterm	49.9	4	77.0	2,585.4
	Lynnterm	49.9		83.0	2,749.5

Source: BST Associates using Containerization International data

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
South Pacific Container Terminals					
Long Beach					
	California United Terminal	42.3	5	152.5	7,546.3
	Hanjin Shipping Terminal	42.3	3	55.5	1,788.1
	ITS Terminal	42.0	5	101.3	2,300.0
	Maersk Line	42.0	4	45.5	1,200.8
	Pacific Container	36.1	4	62.5	2,099.8
	Sea Land	42.7	6	108.8	2,601.8
	Long Beach Container Terminal	55.1	5	91.0	2,998.8
Los Angeles					
	APL Container Terminal	44.9	5	116.0	2,001.4
	Hanjin Terminal	39.4	2	37.5	1,601.1
	Public Container Terminal	35.1	2	18.3	800.6
	TraPac Terminal	44.9	4	70.0	1,771.7
	Matson Terminal	44.9	7	87.0	2,149.1
	Indies Terminal	44.9	6	141.8	5,905.8
	Evergreen Terminal	44.9	4	119.5	3,248.2

Source: BST Associates using Containerization International data

PORT	TERMINAL	MAX DRAFT (Feet)	NUMBER OF CRANES	ACRES	BERTH LENGTH (feet)
Oakland					
	Sea-Land Terminal	40.0	4	66.3	2,294.1
	TransBay Terminal	35.1	2	28.3	1,351.8
	Maersk Terminal	40.0	3	46.0	1,046.6
	Marine Container Terminal	40.0	2	40.5	899.0
	Matson Terminal	35.1	3	66.3	2,250.8
	Marine Container Terminal Berths 37 & 38	40.0	6	37.8	1,945.6
	Berth 40	35.1		3.3	607.0
	APL Terminal	38.1	6	76.3	2,723.2
	Charles P. Howard Terminal	40.0	3	49.5	2,280.3
	Trapac Terminal	37.1		13.0	1,079.4
San Francisco					
	North Container Terminal	42.7	4	60.0	5,092.1
	South Container Terminal	40.0	4	60.0	2,454.2

Source: BST Associates using Containerization International data

CENTRO DE INFORMACION

FINAL REPORT

COMMODITY AND TRAFFIC PROJECTIONS STUDY

VOLUME II

COST COMPARISON OF USING PANAMA CANAL AND ALTERNATIVE ROUTES

To:

The Commission for the Study of Alternatives

to the Panama Canal

Prepared by:

The WEFA Group

Richardson Lawrie Associates

BST Associates

., 1993

THE WEFA GROUP

May 7, 1993

Mr. Joseph A. Byrne
Executive Director
Commission for the Study of Alternatives to the Panama Canal
P. O. Box 2094
Balboa, Ancon Panama
Republic of Panama

Dear Mr. Byrne:

WEFA is pleased to submit this Final Report of the Commodity and Traffic Projections Component Study. The report is contained in four volumes.

- Volume 1 contains the main text of the report and is complete in itself, covering every element of the project and summarizing the results.
- Volume 2 contains the maritime transportation cost for each Panama route and the least cost alternative route and the approach that we used in determining these costs.
- Volume 3 presents the Panama Canal commodity flow projections. It includes the base-year (1990) bilateral and potential trade analysis, the world economic outlook, the forecasts of bilateral and potential trade, and the route by route commodity flows for each Panama Canal Alternative. Finally, this volume contains the tables for allocation of commodities to ship cargoes.
- Volume 4 provides the Panama Canal vessel transit projections by ship type and size range for each route and for each Canal Alternative.

Sincerely yours,

Bradley W. Perry, Ph.D.
Senior Vice President
Consulting Services

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1.0 Ship Operating Costs and Seaborne Freight Costs

In Sections 3 and 5 of Volume 1 of this study, we have described the approach and results, respectively, of the transportation cost method that is at the foundation of this study. The results of this work are used in the economic evaluations of shifted cargoes in Sections 5.3 and 5.6 of Volume 1.

In addition to the costs reported in Volume 1, calculated freight costs for 2020 and 2060 for Status Quo Panama and alternative routes for ship are used in the determination of the constrained 2060 Status Quo Canal commodity flows and transits and the FFMS and EAIU Component Contractors. These Status Quo costs, that is, costs for ships under 100,000 DWT, are reported in this volume.

For completeness, we summarize the cost approach here as well, as an introduction to the cost tables. The development of estimates of future seaborne freight costs on routes relevant to the Panama Canal serves a number of purposes:

- the determination of optimum routing patterns and ship sizes for trades relevant to the Canal;
- transportation costs;
- comparisons of costs for different competing ship types within certain trades;
- in combination with land based transportation costs, the determination of the economics of utilizing the Canal versus alternative landbridge options;
- to provide a basis from which to determine those commodity trade flows that would be switched from the Canal due to capacity constraints under status quo conditions;
- to provide the FFMS Contractor with the means to determine those commodity flows that would be progressively lost to the Canal as tolls are increased from a no tolls base.

Our approach is based on the fact that, where choice exists, decisions on whether or not to use the Canal are based on marginal economics - i.e. from the perspective of seaborne transportation costs they reflect market rates rather than owners' actual fully built up operating costs.

Therefore, the approach that has been adopted is based in the first instance on the estimation and projection of ship operating costs for the years 1990, 2020 and 2060. These estimates were adjusted to reflect 'market' rates.

In order to determine future costs on a unit basis, we adopted the traditional approach of calculating global vessel demand for the base year of 1990 using a matrix of commodity trade flows between major areas. This involved the conversion of annual flows to vessel demand, expressed in deadweight, by applying a series of factors which represent the deadweight tonnes required to transport 1 tonne of cargo on a given route.

These calculations were then aggregated by size range. However, experience, in particular for the tanker and dry bulk markets, has shown that demand derived in this way differs from 'observed' demand.

Within the limitations imposed by the practical and efficient use of resources, it is not possible to capture adequately every single trade. Even the use of ship movements data globally is resource intensive and still potentially misleading for those routes where trade may exist in both directions and where, for example, delineations between cargoes and ship types are not clear.

Although a significant proportion of the world fleet operates on the basis of round voyage trading, owners seek to optimize their operations by 'triangular trading' thereby reducing the length of time in which vessels are in ballast. This is particularly the case for combined carriers where owners have additional opportunities to optimize operations between the oil and dry bulk trades.

The forecasts of vessel demand and supply are the major input to the projection of shipping costs to shippers, in other words, freight rates. The other determinants of rates are owners' operating cost structures.

Capital costs are a function of shipbuilders costs and pressure on capacity created by demand from the shipping market. In periods of depressed shipping markets, capital prices may fall below shipbuilders costs and be subject to government subsidy. Conversely, in periods of buoyant shipping markets, prices may rise above shipbuilding costs. The approach to forecasting recognizes these issues and applies factors from the forecast supply and demand models to indicative new building price time series over the forecast period.

Because of pressures created by vessel surpluses, vessel operators have in recent years sought to reduce fixed direct costs such as manning (wages, allowances and subsistence), repairs and maintenance (stores, supplies, dry dockings and in-service maintenance), insurance and miscellaneous expenses. Depending upon vessel size we calculate that manning and repairs and maintenance constitute 80-90% of the total direct costs although insurance, in particular in the tanker sector, is becoming more expensive.

For manning cost reductions, this has been accomplished through combinations of:

- setting up of 'offshore' registries
- reduction of crew numbers
- switching to other lower cost operations whether by registry changes or where possible changing the nationality of on board personnel.

As a result there have been significant structural changes reacting with changes in wage and salary levels, as well as currency effects.

The result has been that, in some instances, manning costs have declined in real US$ terms over the period to 1985 to 1988 but, for some ship types, have increased thereafter in response to a number of factors including environmental and regulatory issues and perceptions of current and future shipping market conditions. A judgmental methodology, influenced by shipping market developments, environmental constraints and quality audits, the existing structures of vessel ownership and control and manning profiles together with general economic developments, was adopted in order to determine manning cost developments over the short and medium term. A more extrapolatory approach was used thereafter.

The other major element of fixed direct costs, repairs and maintenance, was also generally cut back in response to market pressures over the second half of the 1980s. However, in a period of sustained improved freight rates, there is pressure to improve performance through the technological life of a vessel which can result in significant upward movements in repair costs. Currently also ship repair prices are rising sharply as improving ship market conditions on some sectors encourage owners to prolong vessel lives and demand rises for

repair facilities. Forecasting costs is therefore an iterative process, combining repair costs worldwide with shipping industry developments as previously described. While repairs and maintenance are carried out both while the vessel is in service and during regular drydocks, it is a common practice to represent the repair and maintenance costs on a three to five year cycle basis. This represents the way in which many shipping companies account for repairs and maintenance, and it also avoids the presentation of large year on year fluctuations which can 'skew' resulting fixed operating costs and fully built up costs. The remaining elements of fixed direct costs, predominantly insurance but also elements such as communications charges, can also vary considerably depending upon individual operators' policies. However, within the context of this study, we propose to adopt an extrapolation approach based upon the data for a wide range of ship sizes, types and flags already on the computerized database.

Voyage costs, predominantly bunkers plus port and ancillary charges, are a function of the way in which an operator trades vessels and the vessel type, size and propulsion efficiency.

Over the longer term propulsion efficiency in particular is likely to change and will be an important factor in the comparison with freight costs.

Over the time periods relevant in this study, bunker prices were derived from forecasts of crude oil prices and consideration of the impact of refining developments and crude oil consumption trends. The relationships between bunker prices and crude oil prices are derived from a model using time series regressions.

Data on individual port charges are maintained by RLA and also readily available from port agents. Generally such charges form a relatively small proportion of total costs, and we forecast them on an extrapolatory basis in line with inflation.

In comparing freight costs for the Canal and alternative routes, we also took into account differential inventory costs where they were significant based on the differing lengths of time for which cargoes are at sea or being transported by competing modes. Where necessary, the calculations also took account of transhipment or lightering fees in importing areas although in most cases these were common to both Canal and alternative options.

There is interchangeability between size ranges of ships at the margin, effected by port cargo trading and vessels 'trading up' in response to local market circumstances. In addition, in some markets the barriers to entry between individual size ranges have been reduced as more flexible tonnage has been delivered. As a result, over the forecast time periods in this study, it was necessary to forecast hire equivalent rates for benchmark vessel sizes with respect to relative surpluses while recognizing that the overall surplus normally remains a function of varying scrapping and contracting profiles within size ranges.

In this study, we forecast a series of hire equivalent rates for each vessel type and size range, using models which are tested, for those vessel types where there are significant alternative routings (seaborne and overland/pipeline) to the Panama Canal, which were then utilized together with other voyage cost data in simulations developing trade flows and transits on a minimized cif basis.

The cost structure for each ship type was calculated for the 1990 base year from a sample of vessel sailings through the Canal, sailings of vessels utilized within intermodal systems and supporting data of fleet age profiles.

The calculation of these costs encompassed considerations of:

- the weighted ages of each relevant ship type by size and estimate of original delivered capital costs for these ships;

- a proper matching of weighted ages of each ship type with associated fixed direct (operating) costs and variable costs.

We verified the resulting data, converted into a hire equivalent format, through empirical market research with a sample of operators using the Canal.

Forecasts of these costs, by representative ship sizes, by size range, were undertaken as previously discussed. Global economic considerations not only impact upon unit costs for current ship types and sizes but will also directly impact upon the development of ship types and sizes.

For further information on our approach, please see Section 3 of Volume 1.

2.0 STATUS QUO COSTS FOR EACH CANAL ROUTE AND EACH LEAST COST ALTERNATIVE, 2020

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE / DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	ASIA	CB PC Mileage	13235				
AFRICA	ASIA	CB Alternative Mileage	12090				
AFRICA	ASIA	CB PC Cost	177	106	99	95	
AFRICA	ASIA	CB Alternative Cost	167	99	92	88	
AFRICA	ASIA	CB Cost Differential	-10	-8	-7	-7	
AFRICA	ASIA	F PC Mileage	13235				
AFRICA	ASIA	F Alternative Mileage	12090				
AFRICA	ASIA	F PC Cost	439	289	231	226	
AFRICA	ASIA	F Alternative Cost	405	267	214	208	
AFRICA	ASIA	F Cost Differential	-33	-21	-17	-18	
AFRICA	ASIA	G PC Mileage	11420				
AFRICA	ASIA	G Alternative Mileage	12090				
AFRICA	ASIA	G PC Cost	96	39	32		
AFRICA	ASIA	G Alternative Cost	101	40	33		
AFRICA	ASIA	G Cost Differential	5	1	1		
AFRICA	ASIA	R PC Mileage	11420				
AFRICA	ASIA	R Alternative Mileage	12090				
AFRICA	ASIA	R PC Cost	161	145			
AFRICA	ASIA	R Alternative Cost	164	148			
AFRICA	ASIA	R Cost Differential	3	3			
AFRICA	ASIA	RO PC Mileage	13235				
AFRICA	ASIA	RO Alternative Mileage	12090				
AFRICA	ASIA	RO PC Cost	374	289	256	235	
AFRICA	ASIA	RO Alternative Cost	345	268	237	218	
AFRICA	ASIA	RO Cost Differential	-29	-22	-19	-17	
AFRICA	ASIA	V PC Mileage	11420				
AFRICA	ASIA	V Alternative Mileage	12090				
AFRICA	ASIA	V PC Cost	458	405	358		
AFRICA	ASIA	V Alternative Cost	464	409	361		
AFRICA	ASIA	V Cost Differential	6	4	3		
AFRICA	ASIA	CD PC Mileage	11420				
AFRICA	ASIA	CD Alternative Mileage	12090				
AFRICA	ASIA	CD PC Cost			20	16	14
AFRICA	ASIA	CD Alternative Cost			21	17	15
AFRICA	ASIA	CD Cost Differential					

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	ASIA	CT	PC Mileage		11420				
AFRICA	ASIA	CT	Alternative Mileage		12090				
AFRICA	ASIA	CT	PC Cost		88		47	37	
AFRICA	ASIA	CT	Alternative Cost		90		48	38	
AFRICA	ASIA	CT	Cost Differential		2		1	1	
AFRICA	ASIA	LP	PC Mileage		11420				
AFRICA	ASIA	LP	Alternative Mileage		12090				
AFRICA	ASIA	LP	PC Cost		202	92		47	
AFRICA	ASIA	LP	Alternative Cost		208	95		48	
AFRICA	ASIA	LP	Cost Differential		7	3		1	
AFRICA	ASIA	T	PC Mileage		11420				
AFRICA	ASIA	T	Alternative Mileage		12090				
AFRICA	ASIA	T	PC Cost		57		24	18	15
AFRICA	ASIA	T	Alternative Cost		59		25	18	15
AFRICA	ASIA	T	Cost Differential		2		1		
AFRICA	CANADA WEST COAST	CB	PC Mileage		9792				
AFRICA	CANADA WEST COAST	CB	Alternative Mileage		12925				
AFRICA	CANADA WEST COAST	CB	PC Cost		143	88	82	79	
AFRICA	CANADA WEST COAST	CB	Alternative Cost		175	103	96	92	
AFRICA	CANADA WEST COAST	CB	Cost Differential		32	16	14	13	
AFRICA	CANADA WEST COAST	F	PC Mileage		9792				
AFRICA	CANADA WEST COAST	F	Alternative Mileage		12925				
AFRICA	CANADA WEST COAST	F	PC Cost		362	240	195	191	
AFRICA	CANADA WEST COAST	F	Alternative Cost		424	279	223	216	
AFRICA	CANADA WEST COAST	F	Cost Differential		62	39	28	25	
AFRICA	CANADA WEST COAST	G	PC Mileage		9792				
AFRICA	CANADA WEST COAST	G	Alternative Mileage		12925				
AFRICA	CANADA WEST COAST	G	PC Cost		80	35	29		
AFRICA	CANADA WEST COAST	G	Alternative Cost		109	42	35		
AFRICA	CANADA WEST COAST	G	Cost Differential		29	7	6		
AFRICA	CANADA WEST COAST	R	PC Mileage		9792				
AFRICA	CANADA WEST COAST	R	Alternative Mileage		12925				
AFRICA	CANADA WEST COAST	R	PC Cost		143	129			
AFRICA	CANADA WEST COAST	R	Alternative Cost		173	157			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	CANADA WEST COAST	R Cost Differential	30	28			
AFRICA	CANADA WEST COAST	RO PC Mileage	9792				
AFRICA	CANADA WEST COAST	RO Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	RO PC Cost	306	238	212	196	
AFRICA	CANADA WEST COAST	RO Alternative Cost	361	280	247	228	
AFRICA	CANADA WEST COAST	RO Cost Differential	56	42	36	32	
AFRICA	CANADA WEST COAST	V PC Mileage	9792				
AFRICA	CANADA WEST COAST	V Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	V PC Cost	420	373	332		
AFRICA	CANADA WEST COAST	V Alternative Cost	484	425	374		
AFRICA	CANADA WEST COAST	V Cost Differential	63	53	43		
AFRICA	CANADA WEST COAST	CD PC Mileage	9792				
AFRICA	CANADA WEST COAST	CD Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	CD PC Cost			18	14	13
AFRICA	CANADA WEST COAST	CD Alternative Cost			22	18	16
AFRICA	CANADA WEST COAST	CD Cost Differential			4	3	3
AFRICA	CANADA WEST COAST	CT PC Mileage	9792				
AFRICA	CANADA WEST COAST	CT Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	CT PC Cost	79		42	33	
AFRICA	CANADA WEST COAST	CT Alternative Cost	94		50	40	
AFRICA	CANADA WEST COAST	CT Cost Differential	15		8	6	
AFRICA	CANADA WEST COAST	LP PC Mileage	9792				
AFRICA	CANADA WEST COAST	LP Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	LP PC Cost	175	80		41	
AFRICA	CANADA WEST COAST	LP Alternative Cost	222	101		51	
AFRICA	CANADA WEST COAST	LP Cost Differential	47	20		10	
AFRICA	CANADA WEST COAST	T PC Mileage	9792				
AFRICA	CANADA WEST COAST	T Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	T PC Cost	50		21	15	13
AFRICA	CANADA WEST COAST	T Alternative Cost	63		27	19	16
AFRICA	CANADA WEST COAST	T Cost Differential	14		5	4	3
AFRICA	C. AMERICA W.C.	CB PC Mileage	6884				
AFRICA	C. AMERICA W.C.	CB Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	CB PC Cost	114	72	67	65	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	C. AMERICA W.C.	CB	Alternative Cost	210	122	114	109	
AFRICA	C. AMERICA W.C.	CB	Cost Differential	96	51	46	44	
AFRICA	C. AMERICA W.C.	F	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	F	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	F	PC Cost	297	200	164	161	
AFRICA	C. AMERICA W.C.	F	Alternative Cost	503	329	260	252	
AFRICA	C. AMERICA W.C.	F	Cost Differential	207	129	96	90	
AFRICA	C. AMERICA W.C.	G	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	G	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	G	PC Cost	52	27	23		
AFRICA	C. AMERICA W.C.	G	Alternative Cost	143	51	42		
AFRICA	C. AMERICA W.C.	G	Cost Differential	91	24	19		
AFRICA	C. AMERICA W.C.	R	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	R	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	R	PC Cost	112	100			
AFRICA	C. AMERICA W.C.	R	Alternative Cost	212	192			
AFRICA	C. AMERICA W.C.	R	Cost Differential	101	93			
AFRICA	C. AMERICA W.C.	RO	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	RO	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	RO	PC Cost	248	195	174	162	
AFRICA	C. AMERICA W.C.	RO	Alternative Cost	432	333	293	269	
AFRICA	C. AMERICA W.C.	RO	Cost Differential	184	137	119	107	
AFRICA	C. AMERICA W.C.	V	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	V	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	V	PC Cost	352	315	284		
AFRICA	C. AMERICA W.C.	V	Alternative Cost	567	495	432		
AFRICA	C. AMERICA W.C.	V	Cost Differential	215	180	148		
AFRICA	C. AMERICA W.C.	CD	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	CD	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	CD	PC Cost			14	11	10
AFRICA	C. AMERICA W.C.	CD	Alternative Cost			27	22	19
AFRICA	C. AMERICA W.C.	CD	Cost Differential			13	10	9
AFRICA	C. AMERICA W.C.	CT	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	CT	Alternative Mileage	16470				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
AFRICA	C. AMERICA W.C.	CT PC Cost	63		34	27	
AFRICA	C. AMERICA W.C.	CT Alternative Cost	113		60	47	
AFRICA	C. AMERICA W.C.	CT Cost Differential	50		26	20	
AFRICA	C. AMERICA W.C.	LP PC Mileage	6884				
AFRICA	C. AMERICA W.C.	LP Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	LP PC Cost	128	60		31	
AFRICA	C. AMERICA W.C.	LP Alternative Cost	280	126		64	
AFRICA	C. AMERICA W.C.	LP Cost Differential	152	67		33	
AFRICA	C. AMERICA W.C.	T PC Mileage	6884				
AFRICA	C. AMERICA W.C.	T Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	T PC Cost	36		16	11	10
AFRICA	C. AMERICA W.C.	T Alternative Cost	80		34	24	20
AFRICA	C. AMERICA W.C.	T Cost Differential	44		18	13	10
AFRICA	OCEANIA	CB PC Mileage	13681				
AFRICA	OCEANIA	CB Alternative Mileage	10100				
AFRICA	OCEANIA	CB PC Cost	182	109	101	97	
AFRICA	OCEANIA	CB Alternative Cost	148	88	82	79	
AFRICA	OCEANIA	CB Cost Differential	-34	-21	-19	-18	
AFRICA	OCEANIA	F PC Mileage	13681				
AFRICA	OCEANIA	F Alternative Mileage	10100				
AFRICA	OCEANIA	F PC Cost	449	295	235	230	
AFRICA	OCEANIA	F Alternative Cost	361	239	193	188	
AFRICA	OCEANIA	F Cost Differential	-88	-56	-42	-42	
AFRICA	OCEANIA	G PC Mileage	13681				
AFRICA	OCEANIA	G Alternative Mileage	10100				
AFRICA	OCEANIA	G PC Cost	117	45	37		
AFRICA	OCEANIA	G Alternative Cost	82	35	29		
AFRICA	OCEANIA	G Cost Differential	-36	-10	-8		
AFRICA	OCEANIA	R PC Mileage	13681				
AFRICA	OCEANIA	R Alternative Mileage	10100				
AFRICA	OCEANIA	R PC Cost	186	168			
AFRICA	OCEANIA	R Alternative Cost	143	128			
AFRICA	OCEANIA	R Cost Differential	-43	-40			
AFRICA	OCEANIA	RO PC Mileage	13681				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	OCEANIA	RO	Alternative Mileage		10100				
AFRICA	OCEANIA	RO	PC Cost		383	296	261	241	
AFRICA	OCEANIA	RO	Alternative Cost		305	238	211	195	
AFRICA	OCEANIA	RO	Cost Differential		-77	-58	-50	-45	
AFRICA	OCEANIA	V	PC Mileage		13681				
AFRICA	OCEANIA	V	Alternative Mileage		10100				
AFRICA	OCEANIA	V	PC Cost		511	449	395		
AFRICA	OCEANIA	V	Alternative Cost		417	369	328		
AFRICA	OCEANIA	V	Cost Differential		-94	-80	-67		
AFRICA	OCEANIA	CD	PC Mileage		11361				
AFRICA	OCEANIA	CD	Alternative Mileage		10100				
AFRICA	OCEANIA	CD	PC Cost				20	16	14
AFRICA	OCEANIA	CD	Alternative Cost				18	14	13
AFRICA	OCEANIA	CD	Cost Differential				-2	-2	-2
AFRICA	OCEANIA	CT	PC Mileage		11361				
AFRICA	OCEANIA	CT	Alternative Mileage		10100				
AFRICA	OCEANIA	CT	PC Cost		87		47	37	
AFRICA	OCEANIA	CT	Alternative Cost		79		43	34	
AFRICA	OCEANIA	CT	Cost Differential		-8		-4	-3	
AFRICA	OCEANIA	LP	PC Mileage		11361				
AFRICA	OCEANIA	LP	Alternative Mileage		10100				
AFRICA	OCEANIA	LP	PC Cost		201	92		47	
AFRICA	OCEANIA	LP	Alternative Cost		176	81		41	
AFRICA	OCEANIA	LP	Cost Differential		-25	-11		-6	
AFRICA	OCEANIA	T	PC Mileage		11361				
AFRICA	OCEANIA	T	Alternative Mileage		10100				
AFRICA	OCEANIA	T	PC Cost		57		24	18	15
AFRICA	OCEANIA	T	Alternative Cost		50		21	15	13
AFRICA	OCEANIA	T	Cost Differential		-7		-3	-2	-2
AFRICA	S. AMERICA W.C.	CB	PC Mileage		9145				
AFRICA	S. AMERICA W.C.	CB	Alternative Mileage		15835				
AFRICA	S. AMERICA W.C.	CB	PC Cost		137	84	79	76	
AFRICA	S. AMERICA W.C.	CB	Alternative Cost		204	119	110	106	
AFRICA	S. AMERICA W.C.	CB	Cost Differential		67	35	32	30	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	S. AMERICA W.C.	F	PC Mileage	9145				
AFRICA	S. AMERICA W.C.	F	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	F	PC Cost	347	231	188	184	
AFRICA	S. AMERICA W.C.	F	Alternative Cost	489	320	253	245	
AFRICA	S. AMERICA W.C.	F	Cost Differential	142	88	65	61	
AFRICA	S. AMERICA W.C.	G	PC Mileage	9145				
AFRICA	S. AMERICA W.C.	G	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	G	PC Cost	74	33	28		
AFRICA	S. AMERICA W.C.	G	Alternative Cost	137	50	41		
AFRICA	S. AMERICA W.C.	G	Cost Differential	63	16	13		
AFRICA	S. AMERICA W.C.	R	PC Mileage	9145				
AFRICA	S. AMERICA W.C.	R	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	R	PC Cost	136	122			
AFRICA	S. AMERICA W.C.	R	Alternative Cost	205	186			
AFRICA	S. AMERICA W.C.	R	Cost Differential	69	63			
AFRICA	S. AMERICA W.C.	RO	PC Mileage	9145				
AFRICA	S. AMERICA W.C.	RO	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	RO	PC Cost	293	229	203	188	
AFRICA	S. AMERICA W.C.	RO	Alternative Cost	419	323	285	262	
AFRICA	S. AMERICA W.C.	RO	Cost Differential	126	94	82	74	
AFRICA	S. AMERICA W.C.	V	PC Mileage	9145				
AFRICA	S. AMERICA W.C.	V	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	V	PC Cost	405	360	321		
AFRICA	S. AMERICA W.C.	V	Alternative Cost	552	483	422		
AFRICA	S. AMERICA W.C.	V	Cost Differential	147	123	101		
AFRICA	S. AMERICA W.C.	CD	PC Mileage	9145				
AFRICA	S. AMERICA W.C.	CD	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	CD	PC Cost			17	14	12
AFRICA	S. AMERICA W.C.	CD	Alternative Cost			26	21	18
AFRICA	S. AMERICA W.C.	CD	Cost Differential			9	7	6
AFRICA	S. AMERICA W.C.	CT	PC Mileage	9245				
AFRICA	S. AMERICA W.C.	CT	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	CT	PC Cost	76		41	32	
AFRICA	S. AMERICA W.C.	CT	Alternative Cost	110		58	46	
AFRICA	S. AMERICA W.C.	CT	Cost Differential	34		17	14	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	S. AMERICA W.C.	LP	PC Mileage	9245				
AFRICA	S. AMERICA W.C.	LP	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	LP	PC Cost	166	76		39	
AFRICA	S. AMERICA W.C.	LP	Alternative Cost	269	122		61	
AFRICA	S. AMERICA W.C.	LP	Cost Differential	103	45		22	
AFRICA	S. AMERICA W.C.	T	PC Mileage	9245				
AFRICA	S. AMERICA W.C.	T	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	T	PC Cost	47		20	15	13
AFRICA	S. AMERICA W.C.	T	Alternative Cost	77		32	23	20
AFRICA	S. AMERICA W.C.	T	Cost Differential	30		12	9	7
AFRICA	U.S. W.C., HAWAII	CB	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	CB	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	CB	PC Cost	145	89	83	80	
AFRICA	U.S. W.C., HAWAII	CB	Alternative Cost	178	105	97	94	
AFRICA	U.S. W.C., HAWAII	CB	Cost Differential	33	16	15	14	
AFRICA	U.S. W.C., HAWAII	F	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	F	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	F	PC Cost	366	243	197	192	
AFRICA	U.S. W.C., HAWAII	F	Alternative Cost	430	283	226	219	
AFRICA	U.S. W.C., HAWAII	F	Cost Differential	65	40	29	26	
AFRICA	U.S. W.C., HAWAII	G	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	G	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	G	PC Cost	82	35	29		
AFRICA	U.S. W.C., HAWAII	G	Alternative Cost	111	43	35		
AFRICA	U.S. W.C., HAWAII	G	Cost Differential	30	8	6		
AFRICA	U.S. W.C., HAWAII	R	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	R	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	R	PC Cost	145	131			
AFRICA	U.S. W.C., HAWAII	R	Alternative Cost	176	159			
AFRICA	U.S. W.C., HAWAII	R	Cost Differential	31	29			
AFRICA	U.S. W.C., HAWAII	RO	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	RO	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	RO	PC Cost	309	241	214	198	
AFRICA	U.S. W.C., HAWAII	RO	Alternative Cost	367	284	251	231	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	U.S. W.C., HAWAII	RO	Cost Differential	58	43	37	34	
AFRICA	U.S. W.C., HAWAII	V	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	V	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	V	PC Cost	402	357	319		
AFRICA	U.S. W.C., HAWAII	V	Alternative Cost	490	431	379		
AFRICA	U.S. W.C., HAWAII	V	Cost Differential	88	73	60		
AFRICA	U.S. W.C., HAWAII	CD	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	CD	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	CD	PC Cost			17	14	12
AFRICA	U.S. W.C., HAWAII	CD	Alternative Cost			22	18	16
AFRICA	U.S. W.C., HAWAII	CD	Cost Differential			5	4	4
AFRICA	U.S. W.C., HAWAII	CT	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	CT	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	CT	PC Cost	75		40	32	
AFRICA	U.S. W.C., HAWAII	CT	Alternative Cost	96		51	40	
AFRICA	U.S. W.C., HAWAII	CT	Cost Differential	21		11	8	
AFRICA	U.S. W.C., HAWAII	LP	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	LP	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	LP	PC Cost	163	75		38	
AFRICA	U.S. W.C., HAWAII	LP	Alternative Cost	227	103		52	
AFRICA	U.S. W.C., HAWAII	LP	Cost Differential	64	28		14	
AFRICA	U.S. W.C., HAWAII	T	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	T	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	T	PC Cost	46		20	14	12
AFRICA	U.S. W.C., HAWAII	T	Alternative Cost	65		27	20	17
AFRICA	U.S. W.C., HAWAII	T	Cost Differential	19		7	5	4
ASIA	CANADA EAST COAST	CB	PC Mileage	10738				
ASIA	CANADA EAST COAST	CB	Alternative Mileage	12925				
ASIA	CANADA EAST COAST	CB	PC Cost	152	93	86	83	
ASIA	CANADA EAST COAST	CB	Alternative Cost	175	103	96	92	
ASIA	CANADA EAST COAST	CB	Cost Differential	23	10	9	9	
ASIA	CANADA EAST COAST	F	PC Mileage	10738				
ASIA	CANADA EAST COAST	F	Alternative Mileage	12925				
ASIA	CANADA EAST COAST	F	PC Cost	383	254	205	200	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	CANADA EAST COAST	F	Alternative Cost	424	279	223	216	
ASIA	CANADA EAST COAST	F	Cost Differential	41	25	18	16	
ASIA	CANADA EAST COAST	G	PC Mileage	10738				
ASIA	CANADA EAST COAST	G	Alternative Mileage	12925				
ASIA	CANADA EAST COAST	G	PC Cost	89	37	31		
ASIA	CANADA EAST COAST	G	Alternative Cost	109	42	35		
ASIA	CANADA EAST COAST	G	Cost Differential	20	5	4		
ASIA	CANADA EAST COAST	R	PC Mileage	10738				
ASIA	CANADA EAST COAST	R	Alternative Mileage	12925				
ASIA	CANADA EAST COAST	R	PC Cost	154	138			
ASIA	CANADA EAST COAST	R	Alternative Cost	173	157			
ASIA	CANADA EAST COAST	R	Cost Differential	20	18			
ASIA	CANADA EAST COAST	RO	PC Mileage	10738				
ASIA	CANADA EAST COAST	RO	Alternative Mileage	12925				
ASIA	CANADA EAST COAST	RO	PC Cost	324	252	224	207	
ASIA	CANADA EAST COAST	RO	Alternative Cost	361	280	247	228	
ASIA	CANADA EAST COAST	RO	Cost Differential	37	28	24	22	
ASIA	CANADA EAST COAST	V	PC Mileage	10738				
ASIA	CANADA EAST COAST	V	Alternative Mileage	12925				
ASIA	CANADA EAST COAST	V	PC Cost	442	391	347		
ASIA	CANADA EAST COAST	V	Alternative Cost	484	425	374		
ASIA	CANADA EAST COAST	V	Cost Differential	41	34	27		
ASIA	CANADA EAST COAST	CD	PC Mileage	10738				
ASIA	CANADA EAST COAST	CD	Alternative Mileage	12860				
ASIA	CANADA EAST COAST	CD	PC Cost			19	15	14
ASIA	CANADA EAST COAST	CD	Alternative Cost			22	18	15
ASIA	CANADA EAST COAST	CD	Cost Differential			2	2	2
ASIA	CANADA EAST COAST	CT	PC Mileage	10738				
ASIA	CANADA EAST COAST	CT	Alternative Mileage	12860				
ASIA	CANADA EAST COAST	CT	PC Cost	84		45	35	
ASIA	CANADA EAST COAST	CT	Alternative Cost	94		50	40	
ASIA	CANADA EAST COAST	CT	Cost Differential	10		5	4	
ASIA	CANADA EAST COAST	LP	PC Mileage	10738				
ASIA	CANADA EAST COAST	LP	Alternative Mileage	12860				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	CANADA EAST COAST	LP	PC Cost		191	87		44	
ASIA	CANADA EAST COAST	LP	Alternative Cost		221	100		51	
ASIA	CANADA EAST COAST	LP	Cost Differential		30	13		6	
ASIA	CANADA EAST COAST	T	PC Mileage		10738				
ASIA	CANADA EAST COAST	T	Alternative Mileage		12860				
ASIA	CANADA EAST COAST	T	PC Cost		54		23	17	14
ASIA	CANADA EAST COAST	T	Alternative Cost		63		27	19	16
ASIA	CANADA EAST COAST	T	Cost Differential		9		4	2	2
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage		10688				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost		152	93	86	83	
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost		187	110	102	98	
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential		35	17	16	15	
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage						
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage						
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost		143	103	92	92	
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost		135	98	88	87	
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential		-8	-5	-5	-5	
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost		72	33	27		
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		120	45	37		
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		48	13	10		
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		134	120			
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		186	168			
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		53	48			
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		10688				
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		323	252	223	206	
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		385	297	263	242	
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		61	46	40	36	
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		8920				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage	14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost	400	355	317		
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost	511	448	393		
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential	111	93	76		
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage	8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage	14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost			17	13	12
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost			23	19	17
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential			7	5	5
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage	8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage	14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost	74		40	32	
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost	101		54	42	
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential	26		14	11	
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage	8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage	14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost	161	74		38	
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost	241	109		55	
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential	80	35		17	
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage	8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage	14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost	46		20	14	12
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost	69		29	21	18
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential	23		9	7	6
ASIA	EUROPE	CB	PC Mileage	14077				
ASIA	EUROPE	CB	Alternative Mileage	13122				
ASIA	EUROPE	CB	PC Cost	185	111	103	99	
ASIA	EUROPE	CB	Alternative Cost	177	104	97	93	
ASIA	EUROPE	CB	Cost Differential	-8	-7	-6	-6	
ASIA	EUROPE	F	PC Mileage	14077				
ASIA	EUROPE	F	Alternative Mileage	13122				
ASIA	EUROPE	F	PC Cost	457	300	240	234	
ASIA	EUROPE	F	Alternative Cost	428	282	225	218	
ASIA	EUROPE	F	Cost Differential	-29	-19	-15	-16	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	EUROPE	G	PC Mileage	14077				
ASIA	EUROPE	G	Alternative Mileage	13122				
ASIA	EUROPE	G	PC Cost	121	46	38		
ASIA	EUROPE	G	Alternative Cost	111	43	35		
ASIA	EUROPE	G	Cost Differential	-10	-3	-3		
ASIA	EUROPE	R	PC Mileage	14077				
ASIA	EUROPE	R	Alternative Mileage	13122				
ASIA	EUROPE	R	PC Cost	190	172			
ASIA	EUROPE	R	Alternative Cost	176	159			
ASIA	EUROPE	R	Cost Differential	-14	-14			
ASIA	EUROPE	RO	PC Mileage	14077				
ASIA	EUROPE	RO	Alternative Mileage	13122				
ASIA	EUROPE	RO	PC Cost	390	302	267	245	
ASIA	EUROPE	RO	Alternative Cost	365	283	250	230	
ASIA	EUROPE	RO	Cost Differential	-25	-19	-17	-15	
ASIA	EUROPE	V	PC Mileage	14077				
ASIA	EUROPE	V	Alternative Mileage	13122				
ASIA	EUROPE	V	PC Cost	521	457	401		
ASIA	EUROPE	V	Alternative Cost	488	429	378		
ASIA	EUROPE	V	Cost Differential	-33	-28	-24		
ASIA	EUROPE	CD	PC Mileage	14077				
ASIA	EUROPE	CD	Alternative Mileage	13122				
ASIA	EUROPE	CD	PC Cost			24	19	17
ASIA	EUROPE	CD	Alternative Cost			22	18	16
ASIA	EUROPE	CD	Cost Differential			-2	-1	-1
ASIA	EUROPE	CT	PC Mileage	14077				
ASIA	EUROPE	CT	Alternative Mileage	13122				
ASIA	EUROPE	CT	PC Cost	102		54	43	
ASIA	EUROPE	CT	Alternative Cost	95		51	40	
ASIA	EUROPE	CT	Cost Differential	-6		-3	-3	
ASIA	EUROPE	LP	PC Mileage	14077				
ASIA	EUROPE	LP	Alternative Mileage	13122				
ASIA	EUROPE	LP	PC Cost	245	111		56	
ASIA	EUROPE	LP	Alternative Cost	225	102		52	
ASIA	EUROPE	LP	Cost Differential	-20	-9		-5	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	EUROPE	T	PC Mileage	14077				
ASIA	EUROPE	T	Alternative Mileage	13122				
ASIA	EUROPE	T	PC Cost	70		30	21	18
ASIA	EUROPE	T	Alternative Cost	64		27	20	17
ASIA	EUROPE	T	Cost Differential	-6		-2	-2	-1
ASIA	S. AMERICA E.C.	CB	PC Mileage	11980				
ASIA	S. AMERICA E.C.	CB	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	CB	PC Cost	165	100	93	89	
ASIA	S. AMERICA E.C.	CB	Alternative Cost	176	104	96	93	
ASIA	S. AMERICA E.C.	CB	Cost Differential	12	4	4	4	
ASIA	S. AMERICA E.C.	F	PC Mileage	11980				
ASIA	S. AMERICA E.C.	F	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	F	PC Cost	411	271	218	213	
ASIA	S. AMERICA E.C.	F	Alternative Cost	426	280	224	217	
ASIA	S. AMERICA E.C.	F	Cost Differential	16	9	6	4	
ASIA	S. AMERICA E.C.	G	PC Mileage	11980				
ASIA	S. AMERICA E.C.	G	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	G	PC Cost	101	40	34		
ASIA	S. AMERICA E.C.	G	Alternative Cost	110	42	35		
ASIA	S. AMERICA E.C.	G	Cost Differential	9	2	2		
ASIA	S. AMERICA E.C.	R	PC Mileage	11980				
ASIA	S. AMERICA E.C.	R	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	R	PC Cost	167	151			
ASIA	S. AMERICA E.C.	R	Alternative Cost	175	158			
ASIA	S. AMERICA E.C.	R	Cost Differential	7	7			
ASIA	S. AMERICA E.C.	RO	PC Mileage	11980				
ASIA	S. AMERICA E.C.	RO	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	RO	PC Cost	349	271	240	221	
ASIA	S. AMERICA E.C.	RO	Alternative Cost	363	281	249	229	
ASIA	S. AMERICA E.C.	RO	Cost Differential	14	11	9	8	
ASIA	S. AMERICA E.C.	V	PC Mileage	11980				
ASIA	S. AMERICA E.C.	V	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	V	PC Cost	472	416	367		
ASIA	S. AMERICA E.C.	V	Alternative Cost	486	427	376		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	S. AMERICA E.C.	V	Cost Differential	14	11	9		
ASIA	S. AMERICA E.C.	CD	PC Mileage	11980				
ASIA	S. AMERICA E.C.	CD	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	CD	PC Cost			21	17	15
ASIA	S. AMERICA E.C.	CD	Alternative Cost			22	18	16
ASIA	S. AMERICA E.C.	CD	Cost Differential			1	1	1
ASIA	S. AMERICA E.C.	CT	PC Mileage	11980				
ASIA	S. AMERICA E.C.	CT	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	CT	PC Cost	91		48	38	
ASIA	S. AMERICA E.C.	CT	Alternative Cost	95		51	40	
ASIA	S. AMERICA E.C.	CT	Cost Differential	4		2	2	
ASIA	S. AMERICA E.C.	LP	PC Mileage	11980				
ASIA	S. AMERICA E.C.	LP	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	LP	PC Cost	211	96		49	
ASIA	S. AMERICA E.C.	LP	Alternative Cost	224	101		51	
ASIA	S. AMERICA E.C.	LP	Cost Differential	13	5		3	
ASIA	S. AMERICA E.C.	T	PC Mileage	11980				
ASIA	S. AMERICA E.C.	T	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	T	PC Cost	60		26	18	16
ASIA	S. AMERICA E.C.	T	Alternative Cost	64		27	19	16
ASIA	S. AMERICA E.C.	T	Cost Differential	4		1	1	1
ASIA	U.S. EAST COAST	CB	PC Mileage	11556				
ASIA	U.S. EAST COAST	CB	Alternative Mileage	16610				
ASIA	U.S. EAST COAST	CB	PC Cost	160	97	91	87	
ASIA	U.S. EAST COAST	CB	Alternative Cost	211	123	114	110	
ASIA	U.S. EAST COAST	CB	Cost Differential	51	26	24	23	
ASIA	U.S. EAST COAST	F	PC Mileage	11556				
ASIA	U.S. EAST COAST	F	Alternative Mileage	16610				
ASIA	U.S. EAST COAST	F	PC Cost	401	265	213	209	
ASIA	U.S. EAST COAST	F	Alternative Cost	506	331	262	253	
ASIA	U.S. EAST COAST	F	Cost Differential	105	65	48	44	
ASIA	U.S. EAST COAST	G	PC Mileage	9375				
ASIA	U.S. EAST COAST	G	Alternative Mileage	15525				
ASIA	U.S. EAST COAST	G	PC Cost	76	34	28		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	U.S. EAST COAST	G	Alternative Cost		134	49	40		
ASIA	U.S. EAST COAST	G	Cost Differential		58	15	12		
ASIA	U.S. EAST COAST	R	PC Mileage		9375				
ASIA	U.S. EAST COAST	R	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	R	PC Cost		139	125			
ASIA	U.S. EAST COAST	R	Alternative Cost		202	183			
ASIA	U.S. EAST COAST	R	Cost Differential		63	58			
ASIA	U.S. EAST COAST	RO	PC Mileage		11556				
ASIA	U.S. EAST COAST	RO	Alternative Mileage		16610				
ASIA	U.S. EAST COAST	RO	PC Cost		341	265	234	216	
ASIA	U.S. EAST COAST	RO	Alternative Cost		434	335	295	271	
ASIA	U.S. EAST COAST	RO	Cost Differential		94	70	61	55	
ASIA	U.S. EAST COAST	V	PC Mileage		10278				
ASIA	U.S. EAST COAST	V	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	V	PC Cost		432	382	340		
ASIA	U.S. EAST COAST	V	Alternative Cost		545	477	417		
ASIA	U.S. EAST COAST	V	Cost Differential		113	94	77		
ASIA	U.S. EAST COAST	CD	PC Mileage		9375				
ASIA	U.S. EAST COAST	CD	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	CD	PC Cost				17	14	12
ASIA	U.S. EAST COAST	CD	Alternative Cost				25	21	18
ASIA	U.S. EAST COAST	CD	Cost Differential				8	7	6
ASIA	U.S. EAST COAST	CT	PC Mileage		9375				
ASIA	U.S. EAST COAST	CT	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	CT	PC Cost		77		41	33	
ASIA	U.S. EAST COAST	CT	Alternative Cost		108		57	45	
ASIA	U.S. EAST COAST	CT	Cost Differential		32		16	13	
ASIA	U.S. EAST COAST	LP	PC Mileage		9375				
ASIA	U.S. EAST COAST	LP	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	LP	PC Cost		169	77		40	
ASIA	U.S. EAST COAST	LP	Alternative Cost		264	119		60	
ASIA	U.S. EAST COAST	LP	Cost Differential		96	42		21	
ASIA	U.S. EAST COAST	T	PC Mileage		9375				
ASIA	U.S. EAST COAST	T	Alternative Mileage		15525				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	U.S. EAST COAST	T	PC Cost	48		21	15	13
ASIA	U.S. EAST COAST	T	Alternative Cost	76		32	23	19
ASIA	U.S. EAST COAST	T	Cost Differential	28		11	8	7
CANADA EAST COAST	ASIA	CB	PC Mileage	11587				
CANADA EAST COAST	ASIA	CB	Alternative Mileage	12925				
CANADA EAST COAST	ASIA	CB	PC Cost	161	97	91	87	
CANADA EAST COAST	ASIA	CB	Alternative Cost	175	103	96	92	
CANADA EAST COAST	ASIA	CB	Cost Differential	15	6	5	5	
CANADA EAST COAST	ASIA	F	PC Mileage	11587				
CANADA EAST COAST	ASIA	F	Alternative Mileage	12925				
CANADA EAST COAST	ASIA	F	PC Cost	402	265	214	209	
CANADA EAST COAST	ASIA	F	Alternative Cost	424	279	223	216	
CANADA EAST COAST	ASIA	F	Cost Differential	22	13	9	7	
CANADA EAST COAST	ASIA	G	PC Mileage	10738				
CANADA EAST COAST	ASIA	G	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	G	PC Cost	89	37	31		
CANADA EAST COAST	ASIA	G	Alternative Cost	108	42	35		
CANADA EAST COAST	ASIA	G	Cost Differential	19	5	4		
CANADA EAST COAST	ASIA	R	PC Mileage	10738				
CANADA EAST COAST	ASIA	R	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	R	PC Cost	154	138			
CANADA EAST COAST	ASIA	R	Alternative Cost	173	156			
CANADA EAST COAST	ASIA	R	Cost Differential	19	17			
CANADA EAST COAST	ASIA	RO	PC Mileage	11587				
CANADA EAST COAST	ASIA	RO	Alternative Mileage	12925				
CANADA EAST COAST	ASIA	RO	PC Cost	341	265	235	216	
CANADA EAST COAST	ASIA	RO	Alternative Cost	361	280	247	228	
CANADA EAST COAST	ASIA	RO	Cost Differential	20	15	13	12	
CANADA EAST COAST	ASIA	V	PC Mileage	11587				
CANADA EAST COAST	ASIA	V	Alternative Mileage	12925				
CANADA EAST COAST	ASIA	V	PC Cost	462	408	361		
CANADA EAST COAST	ASIA	V	Alternative Cost	484	425	374		
CANADA EAST COAST	ASIA	V	Cost Differential	21	17	13		
CANADA EAST COAST	ASIA	CD	PC Mileage	10738				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	ASIA	CD	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	CD	PC Cost			19	15	14
CANADA EAST COAST	ASIA	CD	Alternative Cost			22	18	15
CANADA EAST COAST	ASIA	CD	Cost Differential			2	2	2
CANADA EAST COAST	ASIA	CT	PC Mileage	10738				
CANADA EAST COAST	ASIA	CT	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	CT	PC Cost	84		45	35	
CANADA EAST COAST	ASIA	CT	Alternative Cost	94		50	40	
CANADA EAST COAST	ASIA	CT	Cost Differential	10		5	4	
CANADA EAST COAST	ASIA	LP	PC Mileage	10738				
CANADA EAST COAST	ASIA	LP	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	LP	PC Cost	191	87		44	
CANADA EAST COAST	ASIA	LP	Alternative Cost	221	100		51	
CANADA EAST COAST	ASIA	LP	Cost Differential	30	13		6	
CANADA EAST COAST	ASIA	T	PC Mileage	10738				
CANADA EAST COAST	ASIA	T	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	T	PC Cost	54		23	17	14
CANADA EAST COAST	ASIA	T	Alternative Cost	63		27	19	16
CANADA EAST COAST	ASIA	T	Cost Differential	9		4	2	2
CANADA EAST COAST	C. AMERICA W.C.	CB	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	CB	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	CB	PC Cost	80	53	50	49	
CANADA EAST COAST	C. AMERICA W.C.	CB	Alternative Cost	159	94	88	85	
CANADA EAST COAST	C. AMERICA W.C.	CB	Cost Differential	80	41	38	36	
CANADA EAST COAST	C. AMERICA W.C.	F	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	F	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	F	PC Cost	219	151	128	126	
CANADA EAST COAST	C. AMERICA W.C.	F	Alternative Cost	387	256	206	199	
CANADA EAST COAST	C. AMERICA W.C.	F	Cost Differential	168	105	78	73	
CANADA EAST COAST	C. AMERICA W.C.	G	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	G	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	G	PC Cost	19	18	16		
CANADA EAST COAST	C. AMERICA W.C.	G	Alternative Cost	93	38	31		
CANADA EAST COAST	C. AMERICA W.C.	G	Cost Differential	74	19	16		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	C. AMERICA W.C.	R	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	R	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	R	PC Cost	74	65			
CANADA EAST COAST	C. AMERICA W.C.	R	Alternative Cost	155	140			
CANADA EAST COAST	C. AMERICA W.C.	R	Cost Differential	82	75			
CANADA EAST COAST	C. AMERICA W.C.	RO	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	RO	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	RO	PC Cost	179	143	129	122	
CANADA EAST COAST	C. AMERICA W.C.	RO	Alternative Cost	328	255	226	209	
CANADA EAST COAST	C. AMERICA W.C.	RO	Cost Differential	149	112	97	87	
CANADA EAST COAST	C. AMERICA W.C.	V	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	V	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	V	PC Cost	270	246	228		
CANADA EAST COAST	C. AMERICA W.C.	V	Alternative Cost	445	392	347		
CANADA EAST COAST	C. AMERICA W.C.	V	Cost Differential	174	146	120		
CANADA EAST COAST	C. AMERICA W.C.	CD	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	CD	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	CD	PC Cost			9	7	6
CANADA EAST COAST	C. AMERICA W.C.	CD	Alternative Cost			20	16	14
CANADA EAST COAST	C. AMERICA W.C.	CD	Cost Differential			11	8	8
CANADA EAST COAST	C. AMERICA W.C.	CT	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	CT	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	CT	PC Cost	45		25	20	
CANADA EAST COAST	C. AMERICA W.C.	CT	Alternative Cost	85		46	36	
CANADA EAST COAST	C. AMERICA W.C.	CT	Cost Differential	41		21	16	
CANADA EAST COAST	C. AMERICA W.C.	LP	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	LP	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	LP	PC Cost	71	35		18	
CANADA EAST COAST	C. AMERICA W.C.	LP	Alternative Cost	195	89		45	
CANADA EAST COAST	C. AMERICA W.C.	LP	Cost Differential	124	54		27	
CANADA EAST COAST	C. AMERICA W.C.	T	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	T	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	T	PC Cost	20		9	7	6
CANADA EAST COAST	C. AMERICA W.C.	T	Alternative Cost	55		24	17	14
CANADA EAST COAST	C. AMERICA W.C.	T	Cost Differential	36		14	10	9

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	OCEANIA	CB	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	CB	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	CB	PC Cost	170	103	95	92	
CANADA EAST COAST	OCEANIA	CB	Alternative Cost	179	105	98	94	
CANADA EAST COAST	OCEANIA	CB	Cost Differential	9	3	2	2	
CANADA EAST COAST	OCEANIA	F	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	F	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	F	PC Cost	423	279	223	218	
CANADA EAST COAST	OCEANIA	F	Alternative Cost	433	284	227	220	
CANADA EAST COAST	OCEANIA	F	Cost Differential	10	6	4	2	
CANADA EAST COAST	OCEANIA	G	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	G	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	G	PC Cost	106	42	35		
CANADA EAST COAST	OCEANIA	G	Alternative Cost	113	43	36		
CANADA EAST COAST	OCEANIA	G	Cost Differential	6	1	1		
CANADA EAST COAST	OCEANIA	R	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	R	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	R	PC Cost	173	157			
CANADA EAST COAST	OCEANIA	R	Alternative Cost	178	161			
CANADA EAST COAST	OCEANIA	R	Cost Differential	5	4			
CANADA EAST COAST	OCEANIA	RO	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	RO	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	RO	PC Cost	360	279	247	227	
CANADA EAST COAST	OCEANIA	RO	Alternative Cost	369	286	253	233	
CANADA EAST COAST	OCEANIA	RO	Cost Differential	9	7	6	5	
CANADA EAST COAST	OCEANIA	V	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	V	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	V	PC Cost	485	427	376		
CANADA EAST COAST	OCEANIA	V	Alternative Cost	493	433	381		
CANADA EAST COAST	OCEANIA	V	Cost Differential	8	6	4		
CANADA EAST COAST	OCEANIA	CD	PC Mileage	10766				
CANADA EAST COAST	OCEANIA	CD	Alternative Mileage	12870				
CANADA EAST COAST	OCEANIA	CD	PC Cost			19	15	14
CANADA EAST COAST	OCEANIA	CD	Alternative Cost			22	18	15

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	OCEANIA	CD Cost Differential			2	2	2
CANADA EAST COAST	OCEANIA	CT PC Mileage	10766				
CANADA EAST COAST	OCEANIA	CT Alternative Mileage	12870				
CANADA EAST COAST	OCEANIA	CT PC Cost	84		45	36	
CANADA EAST COAST	OCEANIA	CT Alternative Cost	94		50	40	
CANADA EAST COAST	OCEANIA	CT Cost Differential	10		5	4	
CANADA EAST COAST	OCEANIA	LP PC Mileage	10766				
CANADA EAST COAST	OCEANIA	LP Alternative Mileage	12870				
CANADA EAST COAST	OCEANIA	LP PC Cost	191	87		45	
CANADA EAST COAST	OCEANIA	LP Alternative Cost	221	100		51	
CANADA EAST COAST	OCEANIA	LP Cost Differential	30	13		6	
CANADA EAST COAST	OCEANIA	T PC Mileage	10766				
CANADA EAST COAST	OCEANIA	T Alternative Mileage	12870				
CANADA EAST COAST	OCEANIA	T PC Cost	54		23	17	14
CANADA EAST COAST	OCEANIA	T Alternative Cost	63		27	19	16
CANADA EAST COAST	OCEANIA	T Cost Differential	9		4	2	2
CANADA EAST COAST	S. AMERICA W.C.	CB PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	CB Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	CB PC Cost	102	65	61	60	
CANADA EAST COAST	S. AMERICA W.C.	CB Alternative Cost	137	82	76	74	
CANADA EAST COAST	S. AMERICA W.C.	CB Cost Differential	34	16	15	14	
CANADA EAST COAST	S. AMERICA W.C.	F PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	F Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	F PC Cost	271	183	152	149	
CANADA EAST COAST	S. AMERICA W.C.	F Alternative Cost	336	223	182	176	
CANADA EAST COAST	S. AMERICA W.C.	F Cost Differential	65	40	29	27	
CANADA EAST COAST	S. AMERICA W.C.	G PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	G Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	G PC Cost	41	24	20		
CANADA EAST COAST	S. AMERICA W.C.	G Alternative Cost	71	32	27		
CANADA EAST COAST	S. AMERICA W.C.	G Cost Differential	30	8	6		
CANADA EAST COAST	S. AMERICA W.C.	R PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	R Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	R PC Cost	99	88			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	S. AMERICA W.C.	R	Alternative Cost		130	117			
CANADA EAST COAST	S. AMERICA W.C.	R	Cost Differential		32	29			
CANADA EAST COAST	S. AMERICA W.C.	RO	PC Mileage		5710				
CANADA EAST COAST	S. AMERICA W.C.	RO	Alternative Mileage		8970				
CANADA EAST COAST	S. AMERICA W.C.	RO	PC Cost		225	178	159	149	
CANADA EAST COAST	S. AMERICA W.C.	RO	Alternative Cost		283	221	197	182	
CANADA EAST COAST	S. AMERICA W.C.	RO	Cost Differential		58	44	38	34	
CANADA EAST COAST	S. AMERICA W.C.	V	PC Mileage		5710				
CANADA EAST COAST	S. AMERICA W.C.	V	Alternative Mileage		8970				
CANADA EAST COAST	S. AMERICA W.C.	V	PC Cost		324	292	265		
CANADA EAST COAST	S. AMERICA W.C.	V	Alternative Cost		391	347	310		
CANADA EAST COAST	S. AMERICA W.C.	V	Cost Differential		66	55	45		
CANADA EAST COAST	S. AMERICA W.C.	CD	PC Mileage		5710				
CANADA EAST COAST	S. AMERICA W.C.	CD	Alternative Mileage		8970				
CANADA EAST COAST	S. AMERICA W.C.	CD	PC Cost				12	10	9
CANADA EAST COAST	S. AMERICA W.C.	CD	Alternative Cost				16	13	12
CANADA EAST COAST	S. AMERICA W.C.	CD	Cost Differential				4	3	3
CANADA EAST COAST	S. AMERICA W.C.	CT	PC Mileage		5710				
CANADA EAST COAST	S. AMERICA W.C.	CT	Alternative Mileage		8970				
CANADA EAST COAST	S. AMERICA W.C.	CT	PC Cost		57		31	25	
CANADA EAST COAST	S. AMERICA W.C.	CT	Alternative Cost		73		39	31	
CANADA EAST COAST	S. AMERICA W.C.	CT	Cost Differential		16		8	6	
CANADA EAST COAST	S. AMERICA W.C.	LP	PC Mileage		5710				
CANADA EAST COAST	S. AMERICA W.C.	LP	Alternative Mileage		8970				
CANADA EAST COAST	S. AMERICA W.C.	LP	PC Cost		109	51		27	
CANADA EAST COAST	S. AMERICA W.C.	LP	Alternative Cost		158	72		37	
CANADA EAST COAST	S. AMERICA W.C.	LP	Cost Differential		49	21		10	
CANADA EAST COAST	S. AMERICA W.C.	T	PC Mileage		5710				
CANADA EAST COAST	S. AMERICA W.C.	T	Alternative Mileage		8970				
CANADA EAST COAST	S. AMERICA W.C.	T	PC Cost		30		14	10	9
CANADA EAST COAST	S. AMERICA W.C.	T	Alternative Cost		45		19	14	12
CANADA EAST COAST	S. AMERICA W.C.	T	Cost Differential		14		6	4	3
CANADA EAST COAST	U.S. W.C., HAWAII	CB	PC Mileage		6341				
CANADA EAST COAST	U.S. W.C., HAWAII	CB	Alternative Mileage		13785				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	U.S. W.C., HAWAII	CB	PC Cost		109	69	65	63	
CANADA EAST COAST	U.S. W.C., HAWAII	CB	Alternative Cost		184	108	100	97	
CANADA EAST COAST	U.S. W.C., HAWAII	CB	Cost Differential		75	39	36	34	
CANADA EAST COAST	U.S. W.C., HAWAII	F	PC Mileage		6341				
CANADA EAST COAST	U.S. W.C., HAWAII	F	Alternative Mileage		13785				
CANADA EAST COAST	U.S. W.C., HAWAII	F	PC Cost		285	192	159	156	
CANADA EAST COAST	U.S. W.C., HAWAII	F	Alternative Cost		443	291	232	225	
CANADA EAST COAST	U.S. W.C., HAWAII	F	Cost Differential		159	99	73	69	
CANADA EAST COAST	U.S. W.C., HAWAII	G	PC Mileage		6341				
CANADA EAST COAST	U.S. W.C., HAWAII	G	Alternative Mileage		13785				
CANADA EAST COAST	U.S. W.C., HAWAII	G	PC Cost		47	26	22		
CANADA EAST COAST	U.S. W.C., HAWAII	G	Alternative Cost		117	44	37		
CANADA EAST COAST	U.S. W.C., HAWAII	G	Cost Differential		70	18	15		
CANADA EAST COAST	U.S. W.C., HAWAII	R	PC Mileage		6341				
CANADA EAST COAST	U.S. W.C., HAWAII	R	Alternative Mileage		13785				
CANADA EAST COAST	U.S. W.C., HAWAII	R	PC Cost		106	94			
CANADA EAST COAST	U.S. W.C., HAWAII	R	Alternative Cost		183	165			
CANADA EAST COAST	U.S. W.C., HAWAII	R	Cost Differential		77	71			
CANADA EAST COAST	U.S. W.C., HAWAII	RO	PC Mileage		6341				
CANADA EAST COAST	U.S. W.C., HAWAII	RO	Alternative Mileage		13785				
CANADA EAST COAST	U.S. W.C., HAWAII	RO	PC Cost		237	187	167	156	
CANADA EAST COAST	U.S. W.C., HAWAII	RO	Alternative Cost		378	293	259	238	
CANADA EAST COAST	U.S. W.C., HAWAII	RO	Cost Differential		141	106	91	82	
CANADA EAST COAST	U.S. W.C., HAWAII	V	PC Mileage		6341				
CANADA EAST COAST	U.S. W.C., HAWAII	V	Alternative Mileage		13785				
CANADA EAST COAST	U.S. W.C., HAWAII	V	PC Cost		339	304	275		
CANADA EAST COAST	U.S. W.C., HAWAII	V	Alternative Cost		504	442	388		
CANADA EAST COAST	U.S. W.C., HAWAII	V	Cost Differential		165	138	113		
CANADA EAST COAST	U.S. W.C., HAWAII	CD	PC Mileage		6341				
CANADA EAST COAST	U.S. W.C., HAWAII	CD	Alternative Mileage		13785				
CANADA EAST COAST	U.S. W.C., HAWAII	CD	PC Cost				13	11	9
CANADA EAST COAST	U.S. W.C., HAWAII	CD	Alternative Cost				23	19	16
CANADA EAST COAST	U.S. W.C., HAWAII	CD	Cost Differential				10	8	7
CANADA EAST COAST	U.S. W.C., HAWAII	CT	PC Mileage		6341				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	U.S. W.C., HAWAII	CT	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	CT	PC Cost	60		33	26	
CANADA EAST COAST	U.S. W.C., HAWAII	CT	Alternative Cost	99		53	41	
CANADA EAST COAST	U.S. W.C., HAWAII	CT	Cost Differential	39		20	15	
CANADA EAST COAST	U.S. W.C., HAWAII	LP	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	LP	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	LP	PC Cost	119	56		29	
CANADA EAST COAST	U.S. W.C., HAWAII	LP	Alternative Cost	236	107		54	
CANADA EAST COAST	U.S. W.C., HAWAII	LP	Cost Differential	117	51		25	
CANADA EAST COAST	U.S. W.C., HAWAII	T	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	T	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	T	PC Cost	33		15	11	9
CANADA EAST COAST	U.S. W.C., HAWAII	T	Alternative Cost	67		28	20	17
CANADA EAST COAST	U.S. W.C., HAWAII	T	Cost Differential	34		14	10	8
CANADA WEST COAST	AFRICA	CB	PC Mileage	10818				
CANADA WEST COAST	AFRICA	CB	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	CB	PC Cost	153	93	87	84	
CANADA WEST COAST	AFRICA	CB	Alternative Cost	185	109	101	97	
CANADA WEST COAST	AFRICA	CB	Cost Differential	32	16	14	13	
CANADA WEST COAST	AFRICA	F	PC Mileage	10818				
CANADA WEST COAST	AFRICA	F	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	F	PC Cost	385	255	205	201	
CANADA WEST COAST	AFRICA	F	Alternative Cost	447	293	234	226	
CANADA WEST COAST	AFRICA	F	Cost Differential	62	39	28	25	
CANADA WEST COAST	AFRICA	G	PC Mileage	10818				
CANADA WEST COAST	AFRICA	G	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	G	PC Cost	90	37	31		
CANADA WEST COAST	AFRICA	G	Alternative Cost	119	45	37		
CANADA WEST COAST	AFRICA	G	Cost Differential	29	7	6		
CANADA WEST COAST	AFRICA	R	PC Mileage	10818				
CANADA WEST COAST	AFRICA	R	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	R	PC Cost	154	139			
CANADA WEST COAST	AFRICA	R	Alternative Cost	185	167			
CANADA WEST COAST	AFRICA	R	Cost Differential	30	28			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	AFRICA	RO	PC Mileage	10818				
CANADA WEST COAST	AFRICA	RO	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	RO	PC Cost	326	254	225	208	
CANADA WEST COAST	AFRICA	RO	Alternative Cost	382	295	261	240	
CANADA WEST COAST	AFRICA	RO	Cost Differential	56	42	36	32	
CANADA WEST COAST	AFRICA	V	PC Mileage	10818				
CANADA WEST COAST	AFRICA	V	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	V	PC Cost	444	393	348		
CANADA WEST COAST	AFRICA	V	Alternative Cost	508	445	391		
CANADA WEST COAST	AFRICA	V	Cost Differential	63	53	43		
CANADA WEST COAST	AFRICA	CD	PC Mileage	9792				
CANADA WEST COAST	AFRICA	CD	Alternative Mileage	12925				
CANADA WEST COAST	AFRICA	CD	PC Cost			18	14	13
CANADA WEST COAST	AFRICA	CD	Alternative Cost			22	18	16
CANADA WEST COAST	AFRICA	CD	Cost Differential			4	3	3
CANADA WEST COAST	AFRICA	CT	PC Mileage	9792				
CANADA WEST COAST	AFRICA	CT	Alternative Mileage	12925				
CANADA WEST COAST	AFRICA	CT	PC Cost	79		42	33	
CANADA WEST COAST	AFRICA	CT	Alternative Cost	94		50	40	
CANADA WEST COAST	AFRICA	CT	Cost Differential	15		8	6	
CANADA WEST COAST	AFRICA	LP	PC Mileage	9792				
CANADA WEST COAST	AFRICA	LP	Alternative Mileage	12925				
CANADA WEST COAST	AFRICA	LP	PC Cost	175	80		41	
CANADA WEST COAST	AFRICA	LP	Alternative Cost	222	101		51	
CANADA WEST COAST	AFRICA	LP	Cost Differential	47	20		10	
CANADA WEST COAST	AFRICA	T	PC Mileage	9792				
CANADA WEST COAST	AFRICA	T	Alternative Mileage	12925				
CANADA WEST COAST	AFRICA	T	PC Cost	50		21	15	13
CANADA WEST COAST	AFRICA	T	Alternative Cost	63		27	19	16
CANADA WEST COAST	AFRICA	T	Cost Differential	14		5	4	3
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage	5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage	12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost	98	63	59	57	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost	176	103	96	93	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential	78	40	37	35	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost		260	177	147	145	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost		424	279	223	216	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential		164	102	76	71	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost		37	23	19		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		109	42	35		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		72	19	15		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		94	83			
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		174	157			
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		80	73			
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		216	171	153	143	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		362	280	248	228	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		146	109	94	85	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		314	283	258		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		484	425	375		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		170	143	117		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				12	9	8
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				22	18	16
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				10	8	7
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		55		30	24	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		94		50	40	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		40		20	16	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		101	48		25	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		222	101		51	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		121	53		26	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		28		13	9	8
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		63		27	19	16
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		35		14	10	8
CANADA WEST COAST	EUROPE	CB	PC Mileage		9052				
CANADA WEST COAST	EUROPE	CB	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	CB	PC Cost		136	84	78	75	
CANADA WEST COAST	EUROPE	CB	Alternative Cost		196	115	106	103	
CANADA WEST COAST	EUROPE	CB	Cost Differential		60	31	28	27	
CANADA WEST COAST	EUROPE	F	PC Mileage		9052				
CANADA WEST COAST	EUROPE	F	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	F	PC Cost		345	230	187	183	
CANADA WEST COAST	EUROPE	F	Alternative Cost		471	309	245	237	
CANADA WEST COAST	EUROPE	F	Cost Differential		126	79	58	54	
CANADA WEST COAST	EUROPE	G	PC Mileage		9052				
CANADA WEST COAST	EUROPE	G	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	G	PC Cost		73	33	27		
CANADA WEST COAST	EUROPE	G	Alternative Cost		129	48	39		
CANADA WEST COAST	EUROPE	G	Cost Differential		56	15	12		
CANADA WEST COAST	EUROPE	R	PC Mileage		9052				
CANADA WEST COAST	EUROPE	R	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	R	PC Cost		135	121			
CANADA WEST COAST	EUROPE	R	Alternative Cost		197	178			
CANADA WEST COAST	EUROPE	R	Cost Differential		61	56			
CANADA WEST COAST	EUROPE	RO	PC Mileage		9052				
CANADA WEST COAST	EUROPE	RO	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	RO	PC Cost		291	227	202	187	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	EUROPE	RO	Alternative Cost	403	311	275	253	
CANADA WEST COAST	EUROPE	RO	Cost Differential	112	84	73	66	
CANADA WEST COAST	EUROPE	V	PC Mileage	9051				
CANADA WEST COAST	EUROPE	V	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	V	PC Cost	403	358	320		
CANADA WEST COAST	EUROPE	V	Alternative Cost	526	461	404		
CANADA WEST COAST	EUROPE	V	Cost Differential	124	103	84		
CANADA WEST COAST	EUROPE	CD	PC Mileage	9051				
CANADA WEST COAST	EUROPE	CD	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	CD	PC Cost			17	14	12
CANADA WEST COAST	EUROPE	CD	Alternative Cost			24	20	17
CANADA WEST COAST	EUROPE	CD	Cost Differential			7	6	5
CANADA WEST COAST	EUROPE	CT	PC Mileage	9051				
CANADA WEST COAST	EUROPE	CT	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	CT	PC Cost	75		40	32	
CANADA WEST COAST	EUROPE	CT	Alternative Cost	104		55	44	
CANADA WEST COAST	EUROPE	CT	Cost Differential	29		15	12	
CANADA WEST COAST	EUROPE	LP	PC Mileage	9051				
CANADA WEST COAST	EUROPE	LP	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	LP	PC Cost	163	75		38	
CANADA WEST COAST	EUROPE	LP	Alternative Cost	252	114		58	
CANADA WEST COAST	EUROPE	LP	Cost Differential	88	39		19	
CANADA WEST COAST	EUROPE	T	PC Mileage	9051				
CANADA WEST COAST	EUROPE	T	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	T	PC Cost	46		20	14	12
CANADA WEST COAST	EUROPE	T	Alternative Cost	72		30	22	18
CANADA WEST COAST	EUROPE	T	Cost Differential	26		10	7	6
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	PC Mileage	10982				
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	Alternative Mileage	11399				
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	PC Cost			20	16	14
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	Alternative Cost			20	16	14
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	Cost Differential			0	0	0
CANADA WEST COAST	MIDDLE EAST (additional route)	G	PC Mileage	10982				
CANADA WEST COAST	MIDDLE EAST (additional route)	G	Alternative Mileage	11399				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	MIDDLE EAST (additional route)	G	PC Cost		92	38	31		
CANADA WEST COAST	MIDDLE EAST (additional route)	G	Alternative Cost		94	38	32		
CANADA WEST COAST	MIDDLE EAST (additional route)	G	Cost Differential		3	0	0		
CANADA WEST COAST	S. AMERICA E.C.	CB	PC Mileage		6563				
CANADA WEST COAST	S. AMERICA E.C.	CB	Alternative Mileage		14240				
CANADA WEST COAST	S. AMERICA E.C.	CB	PC Cost		111	70	66	64	
CANADA WEST COAST	S. AMERICA E.C.	CB	Alternative Cost		188	110	102	99	
CANADA WEST COAST	S. AMERICA E.C.	CB	Cost Differential		77	40	37	35	
CANADA WEST COAST	S. AMERICA E.C.	F	PC Mileage		6563				
CANADA WEST COAST	S. AMERICA E.C.	F	Alternative Mileage		14240				
CANADA WEST COAST	S. AMERICA E.C.	F	PC Cost		290	195	161	158	
CANADA WEST COAST	S. AMERICA E.C.	F	Alternative Cost		453	297	237	229	
CANADA WEST COAST	S. AMERICA E.C.	F	Cost Differential		164	102	76	71	
CANADA WEST COAST	S. AMERICA E.C.	G	PC Mileage		6563				
CANADA WEST COAST	S. AMERICA E.C.	G	Alternative Mileage		14240				
CANADA WEST COAST	S. AMERICA E.C.	G	PC Cost		49	27	22		
CANADA WEST COAST	S. AMERICA E.C.	G	Alternative Cost		121	45	38		
CANADA WEST COAST	S. AMERICA E.C.	G	Cost Differential		72	19	15		
CANADA WEST COAST	S. AMERICA E.C.	R	PC Mileage		6563				
CANADA WEST COAST	S. AMERICA E.C.	R	Alternative Mileage		14240				
CANADA WEST COAST	S. AMERICA E.C.	R	PC Cost		108	96			
CANADA WEST COAST	S. AMERICA E.C.	R	Alternative Cost		188	170			
CANADA WEST COAST	S. AMERICA E.C.	R	Cost Differential		80	73			
CANADA WEST COAST	S. AMERICA E.C.	RO	PC Mileage		6563				
CANADA WEST COAST	S. AMERICA E.C.	RO	Alternative Mileage		14240				
CANADA WEST COAST	S. AMERICA E.C.	RO	PC Cost		241	190	170	158	
CANADA WEST COAST	S. AMERICA E.C.	RO	Alternative Cost		387	299	264	243	
CANADA WEST COAST	S. AMERICA E.C.	RO	Cost Differential		146	109	94	85	
CANADA WEST COAST	S. AMERICA E.C.	V	PC Mileage		6563				
CANADA WEST COAST	S. AMERICA E.C.	V	Alternative Mileage		14240				
CANADA WEST COAST	S. AMERICA E.C.	V	PC Cost		344	309	279		
CANADA WEST COAST	S. AMERICA E.C.	V	Alternative Cost		515	451	396		
CANADA WEST COAST	S. AMERICA E.C.	V	Cost Differential		170	142	117		
CANADA WEST COAST	S. AMERICA E.C.	CD	PC Mileage		8311				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	S. AMERICA E.C.	CD	Alternative Mileage	10060				
CANADA WEST COAST	S. AMERICA E.C.	CD	PC Cost			16	13	11
CANADA WEST COAST	S. AMERICA E.C.	CD	Alternative Cost			18	14	13
CANADA WEST COAST	S. AMERICA E.C.	CD	Cost Differential			2	2	1
CANADA WEST COAST	S. AMERICA E.C.	CT	PC Mileage	8311				
CANADA WEST COAST	S. AMERICA E.C.	CT	Alternative Mileage	10060				
CANADA WEST COAST	S. AMERICA E.C.	CT	PC Cost	71		38	30	
CANADA WEST COAST	S. AMERICA E.C.	CT	Alternative Cost	79		42	34	
CANADA WEST COAST	S. AMERICA E.C.	CT	Cost Differential	8		4	3	
CANADA WEST COAST	S. AMERICA E.C.	LP	PC Mileage	8311				
CANADA WEST COAST	S. AMERICA E.C.	LP	Alternative Mileage	10060				
CANADA WEST COAST	S. AMERICA E.C.	LP	PC Cost	151	70		36	
CANADA WEST COAST	S. AMERICA E.C.	LP	Alternative Cost	175	80		41	
CANADA WEST COAST	S. AMERICA E.C.	LP	Cost Differential	24	10		5	
CANADA WEST COAST	S. AMERICA E.C.	T	PC Mileage	8311				
CANADA WEST COAST	S. AMERICA E.C.	T	Alternative Mileage	10060				
CANADA WEST COAST	S. AMERICA E.C.	T	PC Cost	43		19	13	11
CANADA WEST COAST	S. AMERICA E.C.	T	Alternative Cost	50		21	15	13
CANADA WEST COAST	S. AMERICA E.C.	T	Cost Differential	7		3	2	2
CANADA WEST COAST	U.S. EAST COAST	CB	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	CB	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	CB	PC Cost	106	67	63	61	
CANADA WEST COAST	U.S. EAST COAST	CB	Alternative Cost	188	110	102	99	
CANADA WEST COAST	U.S. EAST COAST	CB	Cost Differential	83	43	40	38	
CANADA WEST COAST	U.S. EAST COAST	F	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	F	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	F	PC Cost	278	188	156	153	
CANADA WEST COAST	U.S. EAST COAST	F	Alternative Cost	453	297	237	229	
CANADA WEST COAST	U.S. EAST COAST	F	Cost Differential	176	110	81	77	
CANADA WEST COAST	U.S. EAST COAST	G	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	G	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	G	PC Cost	44	25	21		
CANADA WEST COAST	U.S. EAST COAST	G	Alternative Cost	121	45	38		
CANADA WEST COAST	U.S. EAST COAST	G	Cost Differential	77	20	17		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	U.S. EAST COAST	R	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	R	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	R	PC Cost	102	91			
CANADA WEST COAST	U.S. EAST COAST	R	Alternative Cost	188	170			
CANADA WEST COAST	U.S. EAST COAST	R	Cost Differential	86	79			
CANADA WEST COAST	U.S. EAST COAST	RO	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	RO	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	RO	PC Cost	231	183	163	152	
CANADA WEST COAST	U.S. EAST COAST	RO	Alternative Cost	387	299	264	243	
CANADA WEST COAST	U.S. EAST COAST	RO	Cost Differential	156	117	101	91	
CANADA WEST COAST	U.S. EAST COAST	V	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	V	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	V	PC Cost	332	298	271		
CANADA WEST COAST	U.S. EAST COAST	V	Alternative Cost	515	451	396		
CANADA WEST COAST	U.S. EAST COAST	V	Cost Differential	182	153	125		
CANADA WEST COAST	U.S. EAST COAST	CD	PC Mileage	5753				
CANADA WEST COAST	U.S. EAST COAST	CD	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	CD	PC Cost			12	10	9
CANADA WEST COAST	U.S. EAST COAST	CD	Alternative Cost			24	19	17
CANADA WEST COAST	U.S. EAST COAST	CD	Cost Differential			11	9	8
CANADA WEST COAST	U.S. EAST COAST	CT	PC Mileage	5753				
CANADA WEST COAST	U.S. EAST COAST	CT	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	CT	PC Cost	57		31	25	
CANADA WEST COAST	U.S. EAST COAST	CT	Alternative Cost	101		54	42	
CANADA WEST COAST	U.S. EAST COAST	CT	Cost Differential	44		23	18	
CANADA WEST COAST	U.S. EAST COAST	LP	PC Mileage	5753				
CANADA WEST COAST	U.S. EAST COAST	LP	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	LP	PC Cost	110	51		27	
CANADA WEST COAST	U.S. EAST COAST	LP	Alternative Cost	243	110		56	
CANADA WEST COAST	U.S. EAST COAST	LP	Cost Differential	134	59		29	
CANADA WEST COAST	U.S. EAST COAST	T	PC Mileage	5753				
CANADA WEST COAST	U.S. EAST COAST	T	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	T	PC Cost	31		14	10	9
CANADA WEST COAST	U.S. EAST COAST	T	Alternative Cost	70		29	21	18
CANADA WEST COAST	U.S. EAST COAST	T	Cost Differential	39		16	11	9

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	PC Mileage	10688				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	PC Cost	152	93	86	83	
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	Alternative Cost	187	110	102	98	
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	Cost Differential	35	17	16	15	
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	PC Mileage	10688				
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	PC Cost	382	253	204	200	
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	Alternative Cost	450	295	235	228	
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	Cost Differential	69	42	31	28	
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	PC Cost	72	33	27		
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	Alternative Cost	120	45	37		
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	Cost Differential	48	13	10		
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	PC Cost	134	120			
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	Alternative Cost	186	168			
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	Cost Differential	53	48			
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	PC Cost	288	225	200	186	
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	Alternative Cost	385	297	263	242	
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	Cost Differential	96	72	62	56	
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	PC Cost	400	355	317		
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	Alternative Cost	511	448	393		
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	Cost Differential	111	93	76		
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	PC Cost			17	13	12
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	Alternative Cost			23	19	17

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	Cost Differential			7	5	5
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	PC Cost	74		40	32	
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	Alternative Cost	101		54	42	
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	Cost Differential	26		14	11	
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	PC Cost	161	74		38	
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	Alternative Cost	241	109		55	
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	Cost Differential	80	35		17	
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	PC Cost	46		20	14	12
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	Alternative Cost	69		29	21	18
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	Cost Differential	23		9	7	6
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	PC Cost	98	63	59	57	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	Alternative Cost	176	103	96	93	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	Cost Differential	78	40	37	35	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	PC Cost	260	177	147	145	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	Alternative Cost	424	279	223	216	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	Cost Differential	164	102	76	71	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	PC Cost	37	23	19		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	Alternative Cost	109	42	35		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	Cost Differential	72	19	15		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	PC Cost	94	83			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	Alternative Cost	174	157			
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	Cost Differential	80	73			
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	PC Cost	216	171	153	143	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	Alternative Cost	362	280	248	228	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	Cost Differential	146	109	94	85	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	PC Cost	314	283	258		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	Alternative Cost	484	425	375		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	Cost Differential	170	143	117		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	PC Cost			12	9	8
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	Alternative Cost			22	18	16
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	Cost Differential			10	8	7
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	PC Cost	55		30	24	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	Alternative Cost	94		50	40	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	Cost Differential	40		20	16	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	PC Cost	101	48		25	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	Alternative Cost	222	101		51	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	Cost Differential	121	53		26	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	PC Cost	28		13	9	8
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	Alternative Cost	63		27	19	16
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	Cost Differential	35		14	10	8
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	PC Mileage	2793				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	Alternative Mileage	10865				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	PC Cost	73	49	47	46	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	Alternative Cost	155	92	86	83	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	Cost Differential	82	43	39	37	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	PC Mileage	2793				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	Alternative Mileage	10865				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	PC Cost	205	142	122	120	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	Alternative Cost	378	250	201	195	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	Cost Differential	173	108	80	76	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	PC Cost	2	14	12		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	Alternative Cost	78	34	28		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	Cost Differential	76	20	16		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	PC Cost	54	47			
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	Alternative Cost	138	124			
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	Cost Differential	84	77			
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	PC Mileage	2793				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	Alternative Mileage	10865				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	PC Cost	167	134	122	115	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	Alternative Cost	320	249	221	204	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	Cost Differential	154	115	99	89	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	PC Mileage	2793				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	Alternative Mileage	10865				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	PC Cost	256	234	218		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	Alternative Cost	435	385	341		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	Cost Differential	179	150	123		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	PC Cost			7	5	5
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	Alternative Cost			17	14	12
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	Cost Differential			11	9	8
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	PC Mileage	1630				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	PC Cost	35		20	16	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	Alternative Cost	77		41	33	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	Cost Differential	42		21	17	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	PC Cost	42	22		12	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	Alternative Cost	170	78		40	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	Cost Differential	127	56		28	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	PC Cost	11		6	4	4
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	Alternative Cost	48		21	15	13
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	Cost Differential	37		15	11	9
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	PC Cost	147	90	84	81	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	Alternative Cost	187	110	102	98	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	Cost Differential	40	20	18	17	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	PC Cost	370	245	199	194	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	Alternative Cost	450	295	235	228	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	Cost Differential	80	50	37	33	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	PC Cost	84	36	30		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	Alternative Cost	120	45	37		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	Cost Differential	36	9	8		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	PC Cost	147	133			
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	Alternative Cost	186	168			
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	Cost Differential	39	36			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	PC Cost	313	244	216	200	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	Alternative Cost	385	297	263	242	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	Cost Differential	72	54	46	42	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	PC Cost	429	380	338		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	Alternative Cost	511	448	393		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	Cost Differential	82	69	56		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	PC Mileage	10260				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	Alternative Mileage	13735				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	PC Cost			19	15	13
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	Alternative Cost			23	19	16
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	Cost Differential			4	4	3
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	PC Mileage	10026				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	Alternative Mileage	13735				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	PC Cost	80		43	34	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	Alternative Cost	99		53	41	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	Cost Differential	19		10	7	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	PC Mileage	10026				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	Alternative Mileage	13735				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	PC Cost	179	82		42	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	Alternative Cost	235	107		54	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	Cost Differential	56	25		12	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	PC Mileage	10026				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	Alternative Mileage	13735				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	PC Cost	51		22	16	13
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	Alternative Cost	67		28	20	17
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	Cost Differential	16		7	5	4
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	PC Mileage	4934				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	Alternative Mileage	8210				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	PC Cost	95	61	57	56	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	Alternative Cost	129	78	72	70	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	Cost Differential	35	16	15	14	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	PC Mileage	4934				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	Alternative Mileage	8210				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	PC Cost	253	172	144	142	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	Alternative Cost	319	213	174	169	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	Cost Differential	66	41	30	27	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	PC Cost	22	19	16		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	Alternative Cost	56	28	23		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	Cost Differential	34	9	7		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	PC Cost	78	68			
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	Alternative Cost	113	101			
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	Cost Differential	36	33			
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	PC Mileage	4934				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	Alternative Mileage	8210				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	PC Cost	209	166	149	140	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	Alternative Cost	268	210	187	173	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	Cost Differential	59	44	38	34	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	PC Cost	279	254	234		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	Alternative Cost	354	316	284		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	Cost Differential	75	63	51		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	PC Cost			10	8	7
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	Alternative Cost			14	11	10
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	Cost Differential			5	4	3
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	PC Cost	47		26	21	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	Alternative Cost	65		35	28	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	Cost Differential		18		9	7	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	PC Mileage		3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	Alternative Mileage		7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	PC Cost		77	37		20	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	Alternative Cost		132	61		32	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	Cost Differential		55	24		12	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	PC Mileage		3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	Alternative Mileage		7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	PC Cost		21		10	7	6
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	Alternative Cost		37		16	12	10
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	Cost Differential		16		6	5	4
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	PC Mileage		5253				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	PC Cost		98	63	59	57	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	Alternative Cost		168	99	92	89	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	Cost Differential		70	36	33	31	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	PC Mileage		5253				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	PC Cost		260	177	147	145	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	Alternative Cost		407	268	215	208	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	Cost Differential		147	92	68	64	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	PC Mileage		4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	PC Cost		29	21	18		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	Alternative Cost		102	40	33		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	Cost Differential		72	19	15		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	PC Mileage		4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	PC Cost		85	75			
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	Alternative Cost		165	149			
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	Cost Differential		80	74			
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO	PC Mileage		5253				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO	PC Cost		215	171	153	143	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO Alternative Cost	346	269	238	219	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO Cost Differential	131	98	85	76	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V PC Mileage	4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V PC Cost	296	268	245		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V Alternative Cost	466	410	362		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V Cost Differential	170	143	117		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD PC Mileage	4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD PC Cost			11	8	7
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD Alternative Cost			21	17	15
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD Cost Differential			10	8	7
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT PC Mileage	4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT PC Cost	50		28	22	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT Alternative Cost	90		48	38	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT Cost Differential	40		20	16	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP PC Mileage	4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP PC Cost	89	42		22	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP Alternative Cost	210	95		48	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP Cost Differential	121	53		26	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T PC Mileage	4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T PC Cost	25		11	8	7
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T Alternative Cost	60		25	18	15
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T Cost Differential	35		14	10	8
C. AMERICA W.C.	AFRICA	CB PC Mileage	6884				
C. AMERICA W.C.	AFRICA	CB Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	CB PC Cost	114	72	67	65	
C. AMERICA W.C.	AFRICA	CB Alternative Cost	210	122	114	109	
C. AMERICA W.C.	AFRICA	CB Cost Differential	96	51	46	44	
C. AMERICA W.C.	AFRICA	F PC Mileage	6884				
C. AMERICA W.C.	AFRICA	F Alternative Mileage	16470				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	AFRICA	F	PC Cost	297	200	164	161	
C. AMERICA W.C.	AFRICA	F	Alternative Cost	503	329	260	252	
C. AMERICA W.C.	AFRICA	F	Cost Differential	207	129	96	90	
C. AMERICA W.C.	AFRICA	G	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	G	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	G	PC Cost	52	27	23		
C. AMERICA W.C.	AFRICA	G	Alternative Cost	143	51	42		
C. AMERICA W.C.	AFRICA	G	Cost Differential	91	24	19		
C. AMERICA W.C.	AFRICA	R	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	R	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	R	PC Cost	112	100			
C. AMERICA W.C.	AFRICA	R	Alternative Cost	212	192			
C. AMERICA W.C.	AFRICA	R	Cost Differential	101	93			
C. AMERICA W.C.	AFRICA	RO	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	RO	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	RO	PC Cost	248	195	174	162	
C. AMERICA W.C.	AFRICA	RO	Alternative Cost	432	333	293	269	
C. AMERICA W.C.	AFRICA	RO	Cost Differential	184	137	119	107	
C. AMERICA W.C.	AFRICA	V	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	V	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	V	PC Cost	352	315	284		
C. AMERICA W.C.	AFRICA	V	Alternative Cost	567	495	432		
C. AMERICA W.C.	AFRICA	V	Cost Differential	215	180	148		
C. AMERICA W.C.	AFRICA	CD	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	CD	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	CD	PC Cost			14	11	10
C. AMERICA W.C.	AFRICA	CD	Alternative Cost			27	22	19
C. AMERICA W.C.	AFRICA	CD	Cost Differential			13	10	9
C. AMERICA W.C.	AFRICA	CT	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	CT	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	CT	PC Cost	63		34	27	
C. AMERICA W.C.	AFRICA	CT	Alternative Cost	113		60	47	
C. AMERICA W.C.	AFRICA	CT	Cost Differential	50		26	20	
C. AMERICA W.C.	AFRICA	LP	PC Mileage	6884				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	AFRICA	LP	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	LP	PC Cost	128	60		31	
C. AMERICA W.C.	AFRICA	LP	Alternative Cost	280	126		64	
C. AMERICA W.C.	AFRICA	LP	Cost Differential	152	67		33	
C. AMERICA W.C.	AFRICA	T	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	T	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	T	PC Cost	36		16	11	10
C. AMERICA W.C.	AFRICA	T	Alternative Cost	80		34	24	20
C. AMERICA W.C.	AFRICA	T	Cost Differential	44		18	13	10
C. AMERICA W.C.	CANADA EAST COAST	CB	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	CB	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	CB	PC Cost	80	53	50	49	
C. AMERICA W.C.	CANADA EAST COAST	CB	Alternative Cost	159	94	88	85	
C. AMERICA W.C.	CANADA EAST COAST	CB	Cost Differential	80	41	38	36	
C. AMERICA W.C.	CANADA EAST COAST	F	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	F	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	F	PC Cost	219	151	128	126	
C. AMERICA W.C.	CANADA EAST COAST	F	Alternative Cost	387	256	206	199	
C. AMERICA W.C.	CANADA EAST COAST	F	Cost Differential	168	105	78	73	
C. AMERICA W.C.	CANADA EAST COAST	G	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	G	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	G	PC Cost	19	18	16		
C. AMERICA W.C.	CANADA EAST COAST	G	Alternative Cost	93	38	31		
C. AMERICA W.C.	CANADA EAST COAST	G	Cost Differential	74	19	16		
C. AMERICA W.C.	CANADA EAST COAST	R	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	R	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	R	PC Cost	74	65			
C. AMERICA W.C.	CANADA EAST COAST	R	Alternative Cost	155	140			
C. AMERICA W.C.	CANADA EAST COAST	R	Cost Differential	82	75			
C. AMERICA W.C.	CANADA EAST COAST	RO	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	RO	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	RO	PC Cost	179	143	129	122	
C. AMERICA W.C.	CANADA EAST COAST	RO	Alternative Cost	328	255	226	209	
C. AMERICA W.C.	CANADA EAST COAST	RO	Cost Differential	149	112	97	87	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	CANADA EAST COAST	V	PC Mileage		3405				
C. AMERICA W.C.	CANADA EAST COAST	V	Alternative Mileage		11265				
C. AMERICA W.C.	CANADA EAST COAST	V	PC Cost		270	246	228		
C. AMERICA W.C.	CANADA EAST COAST	V	Alternative Cost		445	392	347		
C. AMERICA W.C.	CANADA EAST COAST	V	Cost Differential		174	146	120		
C. AMERICA W.C.	CANADA EAST COAST	CD	PC Mileage		3405				
C. AMERICA W.C.	CANADA EAST COAST	CD	Alternative Mileage		11265				
C. AMERICA W.C.	CANADA EAST COAST	CD	PC Cost				9	7	6
C. AMERICA W.C.	CANADA EAST COAST	CD	Alternative Cost				20	16	14
C. AMERICA W.C.	CANADA EAST COAST	CD	Cost Differential				11	8	8
C. AMERICA W.C.	CANADA EAST COAST	CT	PC Mileage		3405				
C. AMERICA W.C.	CANADA EAST COAST	CT	Alternative Mileage		11265				
C. AMERICA W.C.	CANADA EAST COAST	CT	PC Cost		45		25	20	
C. AMERICA W.C.	CANADA EAST COAST	CT	Alternative Cost		85		46	36	
C. AMERICA W.C.	CANADA EAST COAST	CT	Cost Differential		41		21	16	
C. AMERICA W.C.	CANADA EAST COAST	LP	PC Mileage		3405				
C. AMERICA W.C.	CANADA EAST COAST	LP	Alternative Mileage		11265				
C. AMERICA W.C.	CANADA EAST COAST	LP	PC Cost		71	35		18	
C. AMERICA W.C.	CANADA EAST COAST	LP	Alternative Cost		195	89		45	
C. AMERICA W.C.	CANADA EAST COAST	LP	Cost Differential		124	54		27	
C. AMERICA W.C.	CANADA EAST COAST	T	PC Mileage		3405				
C. AMERICA W.C.	CANADA EAST COAST	T	Alternative Mileage		11265				
C. AMERICA W.C.	CANADA EAST COAST	T	PC Cost		20		9	7	6
C. AMERICA W.C.	CANADA EAST COAST	T	Alternative Cost		55		24	17	14
C. AMERICA W.C.	CANADA EAST COAST	T	Cost Differential		36		14	10	9
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage		2793				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage		10865				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost		73	49	47	46	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost		155	92	86	83	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential		82	43	39	37	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage		2793				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage		10865				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost		205	142	122	120	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost		378	250	201	195	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential		173	108	80	76	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost		2	14	12		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		78	34	28		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		76	20	16		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		54	47			
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		138	124			
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		84	77			
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		2793				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		10865				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		167	134	122	115	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		320	249	221	204	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		154	115	99	89	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		229	211	199		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		408	362	322		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		179	150	123		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				7	5	5
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				17	14	12
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				11	9	8
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		35		20	16	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		77		41	33	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		42		21	17	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		42	22		12	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		170	78		40	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		127	56		28	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		11		6	4	4
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		48		21	15	13
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		37		15	11	9
C. AMERICA W.C.	EUROPE	CB	PC Mileage		5385				
C. AMERICA W.C.	EUROPE	CB	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	CB	PC Cost		99	64	60	58	
C. AMERICA W.C.	EUROPE	CB	Alternative Cost		160	95	88	85	
C. AMERICA W.C.	EUROPE	CB	Cost Differential		61	31	28	27	
C. AMERICA W.C.	EUROPE	F	PC Mileage		5385				
C. AMERICA W.C.	EUROPE	F	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	F	PC Cost		263	179	149	146	
C. AMERICA W.C.	EUROPE	F	Alternative Cost		389	257	207	200	
C. AMERICA W.C.	EUROPE	F	Cost Differential		126	78	58	54	
C. AMERICA W.C.	EUROPE	G	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	G	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	G	PC Cost		37	23	20		
C. AMERICA W.C.	EUROPE	G	Alternative Cost		94	38	32		
C. AMERICA W.C.	EUROPE	G	Cost Differential		56	15	12		
C. AMERICA W.C.	EUROPE	R	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	R	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	R	PC Cost		95	84			
C. AMERICA W.C.	EUROPE	R	Alternative Cost		156	141			
C. AMERICA W.C.	EUROPE	R	Cost Differential		62	57			
C. AMERICA W.C.	EUROPE	RO	PC Mileage		5385				
C. AMERICA W.C.	EUROPE	RO	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	RO	PC Cost		218	173	155	145	
C. AMERICA W.C.	EUROPE	RO	Alternative Cost		330	257	227	210	
C. AMERICA W.C.	EUROPE	RO	Cost Differential		112	84	73	65	
C. AMERICA W.C.	EUROPE	V	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	V	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	V	PC Cost		316	285	259		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	EUROPE	V	Alternative Cost	447	394	349		
C. AMERICA W.C.	EUROPE	V	Cost Differential	131	110	90		
C. AMERICA W.C.	EUROPE	CD	PC Mileage	5340				
C. AMERICA W.C.	EUROPE	CD	Alternative Mileage	11365				
C. AMERICA W.C.	EUROPE	CD	PC Cost			12	9	8
C. AMERICA W.C.	EUROPE	CD	Alternative Cost			20	16	14
C. AMERICA W.C.	EUROPE	CD	Cost Differential			8	6	6
C. AMERICA W.C.	EUROPE	CT	PC Mileage	5340				
C. AMERICA W.C.	EUROPE	CT	Alternative Mileage	11365				
C. AMERICA W.C.	EUROPE	CT	PC Cost	55		30	24	
C. AMERICA W.C.	EUROPE	CT	Alternative Cost	86		46	36	
C. AMERICA W.C.	EUROPE	CT	Cost Differential	31		16	12	
C. AMERICA W.C.	EUROPE	LP	PC Mileage	5340				
C. AMERICA W.C.	EUROPE	LP	Alternative Mileage	11365				
C. AMERICA W.C.	EUROPE	LP	PC Cost	103	48		25	
C. AMERICA W.C.	EUROPE	LP	Alternative Cost	197	90		46	
C. AMERICA W.C.	EUROPE	LP	Cost Differential	94	41		20	
C. AMERICA W.C.	EUROPE	T	PC Mileage	5340				
C. AMERICA W.C.	EUROPE	T	Alternative Mileage	11365				
C. AMERICA W.C.	EUROPE	T	PC Cost	29		13	9	8
C. AMERICA W.C.	EUROPE	T	Alternative Cost	56		24	17	15
C. AMERICA W.C.	EUROPE	T	Cost Differential	27		11	8	6
C. AMERICA W.C.	S. AMERICA E.C.	CB	PC Mileage	6223				
C. AMERICA W.C.	S. AMERICA E.C.	CB	Alternative Mileage	7710				
C. AMERICA W.C.	S. AMERICA E.C.	CB	PC Cost	108	68	64	62	
C. AMERICA W.C.	S. AMERICA E.C.	CB	Alternative Cost	124	75	70	68	
C. AMERICA W.C.	S. AMERICA E.C.	CB	Cost Differential	17	7	6	6	
C. AMERICA W.C.	S. AMERICA E.C.	F	PC Mileage	6223				
C. AMERICA W.C.	S. AMERICA E.C.	F	Alternative Mileage	7710				
C. AMERICA W.C.	S. AMERICA E.C.	F	PC Cost	282	190	157	155	
C. AMERICA W.C.	S. AMERICA E.C.	F	Alternative Cost	308	206	168	164	
C. AMERICA W.C.	S. AMERICA E.C.	F	Cost Differential	26	16	11	9	
C. AMERICA W.C.	S. AMERICA E.C.	G	PC Mileage	4644				
C. AMERICA W.C.	S. AMERICA E.C.	G	Alternative Mileage	6133				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	S. AMERICA E.C.	G	PC Cost		31	22	18		
C. AMERICA W.C.	S. AMERICA E.C.	G	Alternative Cost		44	25	21		
C. AMERICA W.C.	S. AMERICA E.C.	G	Cost Differential		13	3	3		
C. AMERICA W.C.	S. AMERICA E.C.	R	PC Mileage		4644				
C. AMERICA W.C.	S. AMERICA E.C.	R	Alternative Mileage		6133				
C. AMERICA W.C.	S. AMERICA E.C.	R	PC Cost		87	77			
C. AMERICA W.C.	S. AMERICA E.C.	R	Alternative Cost		99	88			
C. AMERICA W.C.	S. AMERICA E.C.	R	Cost Differential		12	11			
C. AMERICA W.C.	S. AMERICA E.C.	RO	PC Mileage		6223				
C. AMERICA W.C.	S. AMERICA E.C.	RO	Alternative Mileage		7710				
C. AMERICA W.C.	S. AMERICA E.C.	RO	PC Cost		235	185	166	154	
C. AMERICA W.C.	S. AMERICA E.C.	RO	Alternative Cost		258	203	181	168	
C. AMERICA W.C.	S. AMERICA E.C.	RO	Cost Differential		23	17	15	13	
C. AMERICA W.C.	S. AMERICA E.C.	V	PC Mileage		4644				
C. AMERICA W.C.	S. AMERICA E.C.	V	Alternative Mileage		6133				
C. AMERICA W.C.	S. AMERICA E.C.	V	PC Cost		299	271	248		
C. AMERICA W.C.	S. AMERICA E.C.	V	Alternative Cost		324	291	264		
C. AMERICA W.C.	S. AMERICA E.C.	V	Cost Differential		25	20	16		
C. AMERICA W.C.	S. AMERICA E.C.	CD	PC Mileage		4644				
C. AMERICA W.C.	S. AMERICA E.C.	CD	Alternative Mileage		6133				
C. AMERICA W.C.	S. AMERICA E.C.	CD	PC Cost				11	9	8
C. AMERICA W.C.	S. AMERICA E.C.	CD	Alternative Cost				12	10	9
C. AMERICA W.C.	S. AMERICA E.C.	CD	Cost Differential				2	1	1
C. AMERICA W.C.	S. AMERICA E.C.	CT	PC Mileage		4644				
C. AMERICA W.C.	S. AMERICA E.C.	CT	Alternative Mileage		3771				
C. AMERICA W.C.	S. AMERICA E.C.	CT	PC Cost		51		28	22	
C. AMERICA W.C.	S. AMERICA E.C.	CT	Alternative Cost		45		25	20	
C. AMERICA W.C.	S. AMERICA E.C.	CT	Cost Differential		-6		-3	-2	
C. AMERICA W.C.	S. AMERICA E.C.	LP	PC Mileage		4644				
C. AMERICA W.C.	S. AMERICA E.C.	LP	Alternative Mileage		3771				
C. AMERICA W.C.	S. AMERICA E.C.	LP	PC Cost		92	43		23	
C. AMERICA W.C.	S. AMERICA E.C.	LP	Alternative Cost		73	35		19	
C. AMERICA W.C.	S. AMERICA E.C.	LP	Cost Differential		-18	-8		-4	
C. AMERICA W.C.	S. AMERICA E.C.	T	PC Mileage		4644				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	S. AMERICA E.C.	T	Alternative Mileage	3771				
C. AMERICA W.C.	S. AMERICA E.C.	T	PC Cost	25		12	8	7
C. AMERICA W.C.	S. AMERICA E.C.	T	Alternative Cost	20		9	7	6
C. AMERICA W.C.	S. AMERICA E.C.	T	Cost Differential	-5		-2	-2	-1
C. AMERICA W.C.	U.S. EAST COAST	CB	PC Mileage	3655				
C. AMERICA W.C.	U.S. EAST COAST	CB	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	CB	PC Cost	82	54	51	50	
C. AMERICA W.C.	U.S. EAST COAST	CB	Alternative Cost	157	93	86	83	
C. AMERICA W.C.	U.S. EAST COAST	CB	Cost Differential	75	39	35	33	
C. AMERICA W.C.	U.S. EAST COAST	F	PC Mileage	3655				
C. AMERICA W.C.	U.S. EAST COAST	F	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	F	PC Cost	225	154	131	129	
C. AMERICA W.C.	U.S. EAST COAST	F	Alternative Cost	381	252	203	197	
C. AMERICA W.C.	U.S. EAST COAST	F	Cost Differential	156	98	72	68	
C. AMERICA W.C.	U.S. EAST COAST	G	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	G	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	G	PC Cost	6	15	13		
C. AMERICA W.C.	U.S. EAST COAST	G	Alternative Cost	90	37	31		
C. AMERICA W.C.	U.S. EAST COAST	G	Cost Differential	84	22	18		
C. AMERICA W.C.	U.S. EAST COAST	R	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	R	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	R	PC Cost	59	51			
C. AMERICA W.C.	U.S. EAST COAST	R	Alternative Cost	153	137			
C. AMERICA W.C.	U.S. EAST COAST	R	Cost Differential	93	86			
C. AMERICA W.C.	U.S. EAST COAST	RO	PC Mileage	3655				
C. AMERICA W.C.	U.S. EAST COAST	RO	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	RO	PC Cost	184	147	133	125	
C. AMERICA W.C.	U.S. EAST COAST	RO	Alternative Cost	323	251	223	206	
C. AMERICA W.C.	U.S. EAST COAST	RO	Cost Differential	139	104	90	81	
C. AMERICA W.C.	U.S. EAST COAST	V	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	V	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	V	PC Cost	239	220	206		
C. AMERICA W.C.	U.S. EAST COAST	V	Alternative Cost	438	387	343		
C. AMERICA W.C.	U.S. EAST COAST	V	Cost Differential	199	167	137		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	U.S. EAST COAST	CD	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	CD	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	CD	PC Cost			7	6	5
C. AMERICA W.C.	U.S. EAST COAST	CD	Alternative Cost			19	15	14
C. AMERICA W.C.	U.S. EAST COAST	CD	Cost Differential			12	10	9
C. AMERICA W.C.	U.S. EAST COAST	CT	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	CT	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	CT	PC Cost	38		21	17	
C. AMERICA W.C.	U.S. EAST COAST	CT	Alternative Cost	84		45	36	
C. AMERICA W.C.	U.S. EAST COAST	CT	Cost Differential	46		24	19	
C. AMERICA W.C.	U.S. EAST COAST	LP	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	LP	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	LP	PC Cost	50	25		14	
C. AMERICA W.C.	U.S. EAST COAST	LP	Alternative Cost	191	87		44	
C. AMERICA W.C.	U.S. EAST COAST	LP	Cost Differential	141	62		31	
C. AMERICA W.C.	U.S. EAST COAST	T	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	T	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	T	PC Cost	13		7	5	4
C. AMERICA W.C.	U.S. EAST COAST	T	Alternative Cost	54		23	17	14
C. AMERICA W.C.	U.S. EAST COAST	T	Cost Differential	41		16	12	10
EUROPE	ASIA	CB	PC Mileage	14077				
EUROPE	ASIA	CB	Alternative Mileage	13122				
EUROPE	ASIA	CB	PC Cost	185	111	103	99	
EUROPE	ASIA	CB	Alternative Cost	177	104	97	93	
EUROPE	ASIA	CB	Cost Differential	-8	-7	-6	-6	
EUROPE	ASIA	F	PC Mileage	14077				
EUROPE	ASIA	F	Alternative Mileage	13122				
EUROPE	ASIA	F	PC Cost	457	300	240	234	
EUROPE	ASIA	F	Alternative Cost	428	282	225	218	
EUROPE	ASIA	F	Cost Differential	-29	-19	-15	-16	
EUROPE	ASIA	G	PC Mileage	14077				
EUROPE	ASIA	G	Alternative Mileage	13122				
EUROPE	ASIA	G	PC Cost	121	46	38		
EUROPE	ASIA	G	Alternative Cost	111	43	35		
EUROPE	ASIA	G	Cost Differential	-10	-3	-3		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	ASIA	R	PC Mileage		14077				
EUROPE	ASIA	R	Alternative Mileage		13122				
EUROPE	ASIA	R	PC Cost		190	172			
EUROPE	ASIA	R	Alternative Cost		176	159			
EUROPE	ASIA	R	Cost Differential		-14	-14			
EUROPE	ASIA	RO	PC Mileage		14077				
EUROPE	ASIA	RO	Alternative Mileage		13122				
EUROPE	ASIA	RO	PC Cost		390	302	267	245	
EUROPE	ASIA	RO	Alternative Cost		365	283	250	230	
EUROPE	ASIA	RO	Cost Differential		-25	-19	-17	-15	
EUROPE	ASIA	V	PC Mileage		14077				
EUROPE	ASIA	V	Alternative Mileage		13122				
EUROPE	ASIA	V	PC Cost		521	457	401		
EUROPE	ASIA	V	Alternative Cost		488	429	378		
EUROPE	ASIA	V	Cost Differential		-33	-28	-24		
EUROPE	ASIA	CD	PC Mileage		14077				
EUROPE	ASIA	CD	Alternative Mileage		13122				
EUROPE	ASIA	CD	PC Cost				24	19	17
EUROPE	ASIA	CD	Alternative Cost				22	18	16
EUROPE	ASIA	CD	Cost Differential				-2	-1	-1
EUROPE	ASIA	CT	PC Mileage		14077				
EUROPE	ASIA	CT	Alternative Mileage		13122				
EUROPE	ASIA	CT	PC Cost		102		54	43	
EUROPE	ASIA	CT	Alternative Cost		95		51	40	
EUROPE	ASIA	CT	Cost Differential		-6		-3	-3	
EUROPE	ASIA	LP	PC Mileage		14077				
EUROPE	ASIA	LP	Alternative Mileage		13122				
EUROPE	ASIA	LP	PC Cost		245	111		56	
EUROPE	ASIA	LP	Alternative Cost		225	102		52	
EUROPE	ASIA	LP	Cost Differential		-20	-9		-5	
EUROPE	ASIA	T	PC Mileage		14077				
EUROPE	ASIA	T	Alternative Mileage		13122				
EUROPE	ASIA	T	PC Cost		70		30	21	18
EUROPE	ASIA	T	Alternative Cost		64		27	20	17

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	ASIA	T	Cost Differential	-6		-2	-2	-1
EUROPE	CANADA WEST COAST	CB	PC Mileage	9619				
EUROPE	CANADA WEST COAST	CB	Alternative Mileage	15040				
EUROPE	CANADA WEST COAST	CB	PC Cost	141	87	81	78	
EUROPE	CANADA WEST COAST	CB	Alternative Cost	196	115	106	103	
EUROPE	CANADA WEST COAST	CB	Cost Differential	55	28	26	24	
EUROPE	CANADA WEST COAST	F	PC Mileage	9619				
EUROPE	CANADA WEST COAST	F	Alternative Mileage	15040				
EUROPE	CANADA WEST COAST	F	PC Cost	358	238	193	189	
EUROPE	CANADA WEST COAST	F	Alternative Cost	471	309	245	237	
EUROPE	CANADA WEST COAST	F	Cost Differential	114	71	52	48	
EUROPE	CANADA WEST COAST	G	PC Mileage	9051				
EUROPE	CANADA WEST COAST	G	Alternative Mileage	14745				
EUROPE	CANADA WEST COAST	G	PC Cost	73	33	27		
EUROPE	CANADA WEST COAST	G	Alternative Cost	126	47	39		
EUROPE	CANADA WEST COAST	G	Cost Differential	53	14	11		
EUROPE	CANADA WEST COAST	R	PC Mileage	9051				
EUROPE	CANADA WEST COAST	R	Alternative Mileage	14745				
EUROPE	CANADA WEST COAST	R	PC Cost	135	121			
EUROPE	CANADA WEST COAST	R	Alternative Cost	193	175			
EUROPE	CANADA WEST COAST	R	Cost Differential	58	53			
EUROPE	CANADA WEST COAST	RO	PC Mileage	9619				
EUROPE	CANADA WEST COAST	RO	Alternative Mileage	15040				
EUROPE	CANADA WEST COAST	RO	PC Cost	302	236	209	194	
EUROPE	CANADA WEST COAST	RO	Alternative Cost	403	311	275	253	
EUROPE	CANADA WEST COAST	RO	Cost Differential	101	76	65	59	
EUROPE	CANADA WEST COAST	V	PC Mileage	9051				
EUROPE	CANADA WEST COAST	V	Alternative Mileage	14745				
EUROPE	CANADA WEST COAST	V	PC Cost	403	358	320		
EUROPE	CANADA WEST COAST	V	Alternative Cost	526	461	404		
EUROPE	CANADA WEST COAST	V	Cost Differential	124	103	84		
EUROPE	CANADA WEST COAST	CD	PC Mileage	9051				
EUROPE	CANADA WEST COAST	CD	Alternative Mileage	14745				
EUROPE	CANADA WEST COAST	CD	PC Cost			17	14	12

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	CANADA WEST COAST	CD	Alternative Cost				24	20	17
EUROPE	CANADA WEST COAST	CD	Cost Differential				7	6	5
EUROPE	CANADA WEST COAST	CT	PC Mileage		9051				
EUROPE	CANADA WEST COAST	CT	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	CT	PC Cost		75		40	32	
EUROPE	CANADA WEST COAST	CT	Alternative Cost		104		55	44	
EUROPE	CANADA WEST COAST	CT	Cost Differential		29		15	12	
EUROPE	CANADA WEST COAST	LP	PC Mileage		9051				
EUROPE	CANADA WEST COAST	LP	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	LP	PC Cost		163	75		38	
EUROPE	CANADA WEST COAST	LP	Alternative Cost		252	114		58	
EUROPE	CANADA WEST COAST	LP	Cost Differential		88	39		19	
EUROPE	CANADA WEST COAST	T	PC Mileage		9051				
EUROPE	CANADA WEST COAST	T	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	T	PC Cost		46		20	14	12
EUROPE	CANADA WEST COAST	T	Alternative Cost		72		30	22	18
EUROPE	CANADA WEST COAST	T	Cost Differential		26		10	7	6
EUROPE	C. AMERICA W.C.	CB	PC Mileage		5385				
EUROPE	C. AMERICA W.C.	CB	Alternative Mileage		15040				
EUROPE	C. AMERICA W.C.	CB	PC Cost		99	64	60	58	
EUROPE	C. AMERICA W.C.	CB	Alternative Cost		196	115	106	103	
EUROPE	C. AMERICA W.C.	CB	Cost Differential		97	51	47	44	
EUROPE	C. AMERICA W.C.	F	PC Mileage		5385				
EUROPE	C. AMERICA W.C.	F	Alternative Mileage		15040				
EUROPE	C. AMERICA W.C.	F	PC Cost		263	179	149	146	
EUROPE	C. AMERICA W.C.	F	Alternative Cost		471	309	245	237	
EUROPE	C. AMERICA W.C.	F	Cost Differential		208	130	96	91	
EUROPE	C. AMERICA W.C.	G	PC Mileage		5340				
EUROPE	C. AMERICA W.C.	G	Alternative Mileage		14745				
EUROPE	C. AMERICA W.C.	G	PC Cost		37	23	20		
EUROPE	C. AMERICA W.C.	G	Alternative Cost		126	47	39		
EUROPE	C. AMERICA W.C.	G	Cost Differential		89	23	19		
EUROPE	C. AMERICA W.C.	R	PC Mileage		5340				
EUROPE	C. AMERICA W.C.	R	Alternative Mileage		14745				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	C. AMERICA W.C.	R	PC Cost	95	84			
EUROPE	C. AMERICA W.C.	R	Alternative Cost	193	175			
EUROPE	C. AMERICA W.C.	R	Cost Differential	99	91			
EUROPE	C. AMERICA W.C.	RO	PC Mileage	5385				
EUROPE	C. AMERICA W.C.	RO	Alternative Mileage	15040				
EUROPE	C. AMERICA W.C.	RO	PC Cost	218	173	155	145	
EUROPE	C. AMERICA W.C.	RO	Alternative Cost	403	311	275	253	
EUROPE	C. AMERICA W.C.	RO	Cost Differential	185	138	120	108	
EUROPE	C. AMERICA W.C.	V	PC Mileage	5340				
EUROPE	C. AMERICA W.C.	V	Alternative Mileage	14745				
EUROPE	C. AMERICA W.C.	V	PC Cost	316	285	259		
EUROPE	C. AMERICA W.C.	V	Alternative Cost	526	461	404		
EUROPE	C. AMERICA W.C.	V	Cost Differential	211	176	145		
EUROPE	C. AMERICA W.C.	CD	PC Mileage	5340				
EUROPE	C. AMERICA W.C.	CD	Alternative Mileage	13365				
EUROPE	C. AMERICA W.C.	CD	PC Cost			12	9	8
EUROPE	C. AMERICA W.C.	CD	Alternative Cost			22	18	16
EUROPE	C. AMERICA W.C.	CD	Cost Differential			11	9	8
EUROPE	C. AMERICA W.C.	CT	PC Mileage	5340				
EUROPE	C. AMERICA W.C.	CT	Alternative Mileage	11365				
EUROPE	C. AMERICA W.C.	CT	PC Cost	55		30	24	
EUROPE	C. AMERICA W.C.	CT	Alternative Cost	86		46	36	
EUROPE	C. AMERICA W.C.	CT	Cost Differential	31		16	12	
EUROPE	C. AMERICA W.C.	LP	PC Mileage	5340				
EUROPE	C. AMERICA W.C.	LP	Alternative Mileage	11365				
EUROPE	C. AMERICA W.C.	LP	PC Cost	103	48		25	
EUROPE	C. AMERICA W.C.	LP	Alternative Cost	197	90		46	
EUROPE	C. AMERICA W.C.	LP	Cost Differential	94	41		20	
EUROPE	C. AMERICA W.C.	T	PC Mileage	5340				
EUROPE	C. AMERICA W.C.	T	Alternative Mileage	11365				
EUROPE	C. AMERICA W.C.	T	PC Cost	29		13	9	8
EUROPE	C. AMERICA W.C.	T	Alternative Cost	56		24	17	15
EUROPE	C. AMERICA W.C.	T	Cost Differential	27		11	8	6
EUROPE	OCEANIA	CB	PC Mileage	13731				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	OCEANIA	CB	Alternative Mileage		12583				
EUROPE	OCEANIA	CB	PC Cost		182	109	101	98	
EUROPE	OCEANIA	CB	Alternative Cost		172	101	94	91	
EUROPE	OCEANIA	CB	Cost Differential		-10	-8	-7	-7	
EUROPE	OCEANIA	F	PC Mileage		13731				
EUROPE	OCEANIA	F	Alternative Mileage		13610				
EUROPE	OCEANIA	F	PC Cost		450	296	236	231	
EUROPE	OCEANIA	F	Alternative Cost		439	288	230	223	
EUROPE	OCEANIA	F	Cost Differential		-10	-7	-6	-8	
EUROPE	OCEANIA	G	PC Mileage		12702				
EUROPE	OCEANIA	G	Alternative Mileage		12583				
EUROPE	OCEANIA	G	PC Cost		108	42	35		
EUROPE	OCEANIA	G	Alternative Cost		106	41	34		
EUROPE	OCEANIA	G	Cost Differential		-2	-1	-1		
EUROPE	OCEANIA	R	PC Mileage		12702				
EUROPE	OCEANIA	R	Alternative Mileage		12583				
EUROPE	OCEANIA	R	PC Cost		175	158			
EUROPE	OCEANIA	R	Alternative Cost		170	153			
EUROPE	OCEANIA	R	Cost Differential		-5	-5			
EUROPE	OCEANIA	RO	PC Mileage		13731				
EUROPE	OCEANIA	RO	Alternative Mileage		13610				
EUROPE	OCEANIA	RO	PC Cost		384	297	262	241	
EUROPE	OCEANIA	RO	Alternative Cost		375	290	256	236	
EUROPE	OCEANIA	RO	Cost Differential		-9	-7	-6	-5	
EUROPE	OCEANIA	V	PC Mileage		12702				
EUROPE	OCEANIA	V	Alternative Mileage		12583				
EUROPE	OCEANIA	V	PC Cost		489	430	379		
EUROPE	OCEANIA	V	Alternative Cost		476	418	369		
EUROPE	OCEANIA	V	Cost Differential		-13	-11	-10		
EUROPE	OCEANIA	CD	PC Mileage		12702				
EUROPE	OCEANIA	CD	Alternative Mileage		12583				
EUROPE	OCEANIA	CD	PC Cost				22	18	16
EUROPE	OCEANIA	CD	Alternative Cost				21	17	15
EUROPE	OCEANIA	CD	Cost Differential				-1	-0	-1

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	OCEANIA	CT	PC Mileage	12702				
EUROPE	OCEANIA	CT	Alternative Mileage	12583				
EUROPE	OCEANIA	CT	PC Cost	94		50	40	
EUROPE	OCEANIA	CT	Alternative Cost	93		49	39	
EUROPE	OCEANIA	CT	Cost Differential	-2		-1	-1	
EUROPE	OCEANIA	LP	PC Mileage	12702				
EUROPE	OCEANIA	LP	Alternative Mileage	12583				
EUROPE	OCEANIA	LP	PC Cost	223	101		51	
EUROPE	OCEANIA	LP	Alternative Cost	217	98		50	
EUROPE	OCEANIA	LP	Cost Differential	-6	-3		-2	
EUROPE	OCEANIA	T	PC Mileage	12702				
EUROPE	OCEANIA	T	Alternative Mileage	12583				
EUROPE	OCEANIA	T	PC Cost	63		27	19	16
EUROPE	OCEANIA	T	Alternative Cost	62		26	19	16
EUROPE	OCEANIA	T	Cost Differential	-2		-1	-1	-0
EUROPE	S. AMERICA W.C.	CB	PC Mileage	9374				
EUROPE	S. AMERICA W.C.	CB	Alternative Mileage	12583				
EUROPE	S. AMERICA W.C.	CB	PC Cost	139	85	80	77	
EUROPE	S. AMERICA W.C.	CB	Alternative Cost	172	101	94	91	
EUROPE	S. AMERICA W.C.	CB	Cost Differential	33	16	15	14	
EUROPE	S. AMERICA W.C.	F	PC Mileage	9374				
EUROPE	S. AMERICA W.C.	F	Alternative Mileage	13000				
EUROPE	S. AMERICA W.C.	F	PC Cost	352	234	190	186	
EUROPE	S. AMERICA W.C.	F	Alternative Cost	426	280	224	217	
EUROPE	S. AMERICA W.C.	F	Cost Differential	73	45	33	30	
EUROPE	S. AMERICA W.C.	G	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	G	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	G	PC Cost	59	29	24		
EUROPE	S. AMERICA W.C.	G	Alternative Cost	71	32	27		
EUROPE	S. AMERICA W.C.	G	Cost Differential	12	3	2		
EUROPE	S. AMERICA W.C.	R	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	R	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	R	PC Cost	119	107			
EUROPE	S. AMERICA W.C.	R	Alternative Cost	130	116			
EUROPE	S. AMERICA W.C.	R	Cost Differential	11	10			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	S. AMERICA W.C.	RO	PC Mileage	9374				
EUROPE	S. AMERICA W.C.	RO	Alternative Mileage	12583				
EUROPE	S. AMERICA W.C.	RO	PC Cost	297	232	206	191	
EUROPE	S. AMERICA W.C.	RO	Alternative Cost	354	275	243	224	
EUROPE	S. AMERICA W.C.	RO	Cost Differential	57	43	37	33	
EUROPE	S. AMERICA W.C.	V	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	V	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	V	PC Cost	368	329	295		
EUROPE	S. AMERICA W.C.	V	Alternative Cost	390	346	309		
EUROPE	S. AMERICA W.C.	V	Cost Differential	22	18	14		
EUROPE	S. AMERICA W.C.	CD	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	CD	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	CD	PC Cost			15	12	11
EUROPE	S. AMERICA W.C.	CD	Alternative Cost			16	13	12
EUROPE	S. AMERICA W.C.	CD	Cost Differential			1	1	1
EUROPE	S. AMERICA W.C.	CT	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	CT	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	CT	PC Cost	67		36	29	
EUROPE	S. AMERICA W.C.	CT	Alternative Cost	73		39	31	
EUROPE	S. AMERICA W.C.	CT	Cost Differential	6		3	2	
EUROPE	S. AMERICA W.C.	LP	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	LP	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	LP	PC Cost	139	64		33	
EUROPE	S. AMERICA W.C.	LP	Alternative Cost	157	72		37	
EUROPE	S. AMERICA W.C.	LP	Cost Differential	18	8		4	
EUROPE	S. AMERICA W.C.	T	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	T	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	T	PC Cost	39		17	12	11
EUROPE	S. AMERICA W.C.	T	Alternative Cost	44		19	14	12
EUROPE	S. AMERICA W.C.	T	Cost Differential	5		2	1	1
EUROPE	U.S. W.C., HAWAII	CB	PC Mileage	9405				
EUROPE	U.S. W.C., HAWAII	CB	Alternative Mileage	15040				
EUROPE	U.S. W.C., HAWAII	CB	PC Cost	139	86	80	77	
EUROPE	U.S. W.C., HAWAII	CB	Alternative Cost	196	115	106	103	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	U.S. W.C., HAWAII	CB	Cost Differential	57	29	27	25	
EUROPE	U.S. W.C., HAWAII	F	PC Mileage	9405				
EUROPE	U.S. W.C., HAWAII	F	Alternative Mileage	14840				
EUROPE	U.S. W.C., HAWAII	F	PC Cost	353	235	191	187	
EUROPE	U.S. W.C., HAWAII	F	Alternative Cost	467	306	243	235	
EUROPE	U.S. W.C., HAWAII	F	Cost Differential	114	71	52	48	
EUROPE	U.S. W.C., HAWAII	G	PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	G	Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	G	PC Cost	65	31	26		
EUROPE	U.S. W.C., HAWAII	G	Alternative Cost	116	44	37		
EUROPE	U.S. W.C., HAWAII	G	Cost Differential	52	13	11		
EUROPE	U.S. W.C., HAWAII	R	PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	R	Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	R	PC Cost	125	113			
EUROPE	U.S. W.C., HAWAII	R	Alternative Cost	182	164			
EUROPE	U.S. W.C., HAWAII	R	Cost Differential	56	52			
EUROPE	U.S. W.C., HAWAII	RO	PC Mileage	9405				
EUROPE	U.S. W.C., HAWAII	RO	Alternative Mileage	15040				
EUROPE	U.S. W.C., HAWAII	RO	PC Cost	298	233	207	191	
EUROPE	U.S. W.C., HAWAII	RO	Alternative Cost	403	311	275	253	
EUROPE	U.S. W.C., HAWAII	RO	Cost Differential	105	79	68	61	
EUROPE	U.S. W.C., HAWAII	V	PC Mileage	9165				
EUROPE	U.S. W.C., HAWAII	V	Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	V	PC Cost	406	360	321		
EUROPE	U.S. W.C., HAWAII	V	Alternative Cost	502	441	387		
EUROPE	U.S. W.C., HAWAII	V	Cost Differential	96	80	66		
EUROPE	U.S. W.C., HAWAII	CD	PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	CD	Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	CD	PC Cost			16	13	11
EUROPE	U.S. W.C., HAWAII	CD	Alternative Cost			23	18	16
EUROPE	U.S. W.C., HAWAII	CD	Cost Differential			7	6	5
EUROPE	U.S. W.C., HAWAII	CT	PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	CT	Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	CT	PC Cost	70		38	30	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	U.S. W.C., HAWAII	CT	Alternative Cost	99		52	41	
EUROPE	U.S. W.C., HAWAII	CT	Cost Differential	28		15	11	
EUROPE	U.S. W.C., HAWAII	LP	PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	LP	Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	LP	PC Cost	149	69		35	
EUROPE	U.S. W.C., HAWAII	LP	Alternative Cost	235	106		54	
EUROPE	U.S. W.C., HAWAII	LP	Cost Differential	86	38		19	
EUROPE	U.S. W.C., HAWAII	T	PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	T	Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	T	PC Cost	42		18	13	11
EUROPE	U.S. W.C., HAWAII	T	Alternative Cost	67		28	20	17
EUROPE	U.S. W.C., HAWAII	T	Cost Differential	25		10	7	6
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	PC Mileage	8359				
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	Alternative Mileage	11428				
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	PC Cost			16	13	11
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	Alternative Cost			20	16	14
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	Cost Differential			4	3	3
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	PC Mileage	8359				
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	Alternative Mileage	11428				
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	PC Cost	66	31	26		
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	Alternative Cost	94	38	32		
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	Cost Differential	28	7	6		
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	PC Mileage	8359				
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	Alternative Mileage	11428				
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	PC Cost	128	114			
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	Alternative Cost	157	141			
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	Cost Differential	30	27			
MIDDLE EAST	U.S. W.C., HAWAII	CB	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	CB	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	CB	PC Cost	147	90	84	81	
MIDDLE EAST	U.S. W.C., HAWAII	CB	Alternative Cost	180	106	98	95	
MIDDLE EAST	U.S. W.C., HAWAII	CB	Cost Differential	32	15	14	13	
MIDDLE EAST	U.S. W.C., HAWAII	F	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	F	Alternative Mileage	13367				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
MIDDLE EAST	U.S. W.C., HAWAII	F	PC Cost	372	247	200	195	
MIDDLE EAST	U.S. W.C., HAWAII	F	Alternative Cost	434	285	228	220	
MIDDLE EAST	U.S. W.C., HAWAII	F	Cost Differential	62	38	28	25	
MIDDLE EAST	U.S. W.C., HAWAII	G	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	G	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	G	PC Cost	84	36	30		
MIDDLE EAST	U.S. W.C., HAWAII	G	Alternative Cost	113	43	36		
MIDDLE EAST	U.S. W.C., HAWAII	G	Cost Differential	29	7	6		
MIDDLE EAST	U.S. W.C., HAWAII	R	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	R	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	R	PC Cost	148	134			
MIDDLE EAST	U.S. W.C., HAWAII	R	Alternative Cost	178	161			
MIDDLE EAST	U.S. W.C., HAWAII	R	Cost Differential	30	27			
MIDDLE EAST	U.S. W.C., HAWAII	RO	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	RO	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	RO	PC Cost	315	245	217	201	
MIDDLE EAST	U.S. W.C., HAWAII	RO	Alternative Cost	370	287	253	233	
MIDDLE EAST	U.S. W.C., HAWAII	RO	Cost Differential	55	41	36	32	
MIDDLE EAST	U.S. W.C., HAWAII	V	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	V	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	V	PC Cost	431	382	339		
MIDDLE EAST	U.S. W.C., HAWAII	V	Alternative Cost	494	434	382		
MIDDLE EAST	U.S. W.C., HAWAII	V	Cost Differential	63	52	42		
MIDDLE EAST	U.S. W.C., HAWAII	CD	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	CD	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	CD	PC Cost			19	15	13
MIDDLE EAST	U.S. W.C., HAWAII	CD	Alternative Cost			22	18	16
MIDDLE EAST	U.S. W.C., HAWAII	CD	Cost Differential			4	3	3
MIDDLE EAST	U.S. W.C., HAWAII	CT	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	CT	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	CT	PC Cost	81		44	34	
MIDDLE EAST	U.S. W.C., HAWAII	CT	Alternative Cost	97		52	41	
MIDDLE EAST	U.S. W.C., HAWAII	CT	Cost Differential	15		8	6	
MIDDLE EAST	U.S. W.C., HAWAII	LP	PC Mileage	10250				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
MIDDLE EAST	U.S. W.C., HAWAII	LP	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	LP	PC Cost	183	84		43	
MIDDLE EAST	U.S. W.C., HAWAII	LP	Alternative Cost	229	104		53	
MIDDLE EAST	U.S. W.C., HAWAII	LP	Cost Differential	46	20		10	
MIDDLE EAST	U.S. W.C., HAWAII	T	PC Mileage	10250				
MIDDLE EAST	U.S. W.C., HAWAII	T	Alternative Mileage	13367				
MIDDLE EAST	U.S. W.C., HAWAII	T	PC Cost	52		22	16	14
MIDDLE EAST	U.S. W.C., HAWAII	T	Alternative Cost	65		28	20	17
MIDDLE EAST	U.S. W.C., HAWAII	T	Cost Differential	14		5	4	3
OCEANIA	CANADA EAST COAST	CB	PC Mileage	12539				
OCEANIA	CANADA EAST COAST	CB	Alternative Mileage	13320				
OCEANIA	CANADA EAST COAST	CB	PC Cost	170	103	95	92	
OCEANIA	CANADA EAST COAST	CB	Alternative Cost	179	105	98	94	
OCEANIA	CANADA EAST COAST	CB	Cost Differential	9	3	2	2	
OCEANIA	CANADA EAST COAST	F	PC Mileage	12539				
OCEANIA	CANADA EAST COAST	F	Alternative Mileage	12790				
OCEANIA	CANADA EAST COAST	F	PC Cost	423	279	223	218	
OCEANIA	CANADA EAST COAST	F	Alternative Cost	421	277	222	215	
OCEANIA	CANADA EAST COAST	F	Cost Differential	-2	-2	-2	-4	
OCEANIA	CANADA EAST COAST	G	PC Mileage	10766				
OCEANIA	CANADA EAST COAST	G	Alternative Mileage	12870				
OCEANIA	CANADA EAST COAST	G	PC Cost	89	37	31		
OCEANIA	CANADA EAST COAST	G	Alternative Cost	108	42	35		
OCEANIA	CANADA EAST COAST	G	Cost Differential	19	5	4		
OCEANIA	CANADA EAST COAST	R	PC Mileage	10766				
OCEANIA	CANADA EAST COAST	R	Alternative Mileage	12870				
OCEANIA	CANADA EAST COAST	R	PC Cost	154	139			
OCEANIA	CANADA EAST COAST	R	Alternative Cost	173	156			
OCEANIA	CANADA EAST COAST	R	Cost Differential	19	17			
OCEANIA	CANADA EAST COAST	RO	PC Mileage	12539				
OCEANIA	CANADA EAST COAST	RO	Alternative Mileage	13320				
OCEANIA	CANADA EAST COAST	RO	PC Cost	360	279	247	227	
OCEANIA	CANADA EAST COAST	RO	Alternative Cost	369	286	253	233	
OCEANIA	CANADA EAST COAST	RO	Cost Differential	9	7	6	5	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	CANADA EAST COAST	V	PC Mileage	10766				
OCEANIA	CANADA EAST COAST	V	Alternative Mileage	12870				
OCEANIA	CANADA EAST COAST	V	PC Cost	443	392	348		
OCEANIA	CANADA EAST COAST	V	Alternative Cost	482	424	373		
OCEANIA	CANADA EAST COAST	V	Cost Differential	39	32	26		
OCEANIA	CANADA EAST COAST	CD	PC Mileage	10766				
OCEANIA	CANADA EAST COAST	CD	Alternative Mileage	12870				
OCEANIA	CANADA EAST COAST	CD	PC Cost			19	15	14
OCEANIA	CANADA EAST COAST	CD	Alternative Cost			22	18	15
OCEANIA	CANADA EAST COAST	CD	Cost Differential			2	2	2
OCEANIA	CANADA EAST COAST	CT	PC Mileage	10766				
OCEANIA	CANADA EAST COAST	CT	Alternative Mileage	12870				
OCEANIA	CANADA EAST COAST	CT	PC Cost	84		45	36	
OCEANIA	CANADA EAST COAST	CT	Alternative Cost	94		50	40	
OCEANIA	CANADA EAST COAST	CT	Cost Differential	10		5	4	
OCEANIA	CANADA EAST COAST	LP	PC Mileage	10766				
OCEANIA	CANADA EAST COAST	LP	Alternative Mileage	12870				
OCEANIA	CANADA EAST COAST	LP	PC Cost	191	87		45	
OCEANIA	CANADA EAST COAST	LP	Alternative Cost	221	100		51	
OCEANIA	CANADA EAST COAST	LP	Cost Differential	30	13		6	
OCEANIA	CANADA EAST COAST	T	PC Mileage	10766				
OCEANIA	CANADA EAST COAST	T	Alternative Mileage	12870				
OCEANIA	CANADA EAST COAST	T	PC Cost	54		23	17	14
OCEANIA	CANADA EAST COAST	T	Alternative Cost	63		27	19	16
OCEANIA	CANADA EAST COAST	T	Cost Differential	9		4	2	2
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage	10157				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage	14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost	147	90	84	81	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost	187	110	102	98	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential	40	20	18	17	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage	10157				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage	14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost	370	245	199	194	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost	450	295	235	228	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential	80	50	37	33	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		10026				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost		82	35	29		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		120	45	37		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		38	10	8		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		10026				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		146	131			
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		186	168			
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		41	37			
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		10157				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		313	244	216	200	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		385	297	263	242	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		72	54	46	42	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		10026				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		426	377	335		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		511	448	393		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		86	71	58		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		10026				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		13735				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				18	15	13
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				23	19	16
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				5	4	3
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		9330				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		13735				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		76		41	32	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		99		53	41	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		22		11	9	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		9330				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		13735				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		168	77		39	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		235	107		54	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		67	30		15	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		9330				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		13735				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		47		21	15	13
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		67		28	20	17
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		20		8	6	5
OCEANIA	EUROPE	CB	PC Mileage		13731				
OCEANIA	EUROPE	CB	Alternative Mileage		13610				
OCEANIA	EUROPE	CB	PC Cost		182	109	101	98	
OCEANIA	EUROPE	CB	Alternative Cost		182	107	99	96	
OCEANIA	EUROPE	CB	Cost Differential			-2	-2	-2	
OCEANIA	EUROPE	F	PC Mileage		13731				
OCEANIA	EUROPE	F	Alternative Mileage		13610				
OCEANIA	EUROPE	F	PC Cost		450	296	236	231	
OCEANIA	EUROPE	F	Alternative Cost		439	288	230	223	
OCEANIA	EUROPE	F	Cost Differential		-10	-7	-6	-8	
OCEANIA	EUROPE	G	PC Mileage		12702				
OCEANIA	EUROPE	G	Alternative Mileage		12583				
OCEANIA	EUROPE	G	PC Cost		108	42	35		
OCEANIA	EUROPE	G	Alternative Cost		106	41	34		
OCEANIA	EUROPE	G	Cost Differential		-2	-1	-1		
OCEANIA	EUROPE	R	PC Mileage		12702				
OCEANIA	EUROPE	R	Alternative Mileage		12583				
OCEANIA	EUROPE	R	PC Cost		175	158			
OCEANIA	EUROPE	R	Alternative Cost		170	153			
OCEANIA	EUROPE	R	Cost Differential		-5	-5			
OCEANIA	EUROPE	RO	PC Mileage		13731				
OCEANIA	EUROPE	RO	Alternative Mileage		13610				
OCEANIA	EUROPE	RO	PC Cost		384	297	262	241	
OCEANIA	EUROPE	RO	Alternative Cost		375	290	256	236	
OCEANIA	EUROPE	RO	Cost Differential		-9	-7	-6	-5	
OCEANIA	EUROPE	V	PC Mileage		12702				
OCEANIA	EUROPE	V	Alternative Mileage		12583				
OCEANIA	EUROPE	V	PC Cost		489	430	379		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	EUROPE	V	Alternative Cost		476	418	369		
OCEANIA	EUROPE	V	Cost Differential		-13	-11	-10		
OCEANIA	EUROPE	CD	PC Mileage		12702				
OCEANIA	EUROPE	CD	Alternative Mileage		12583				
OCEANIA	EUROPE	CD	PC Cost				22	18	16
OCEANIA	EUROPE	CD	Alternative Cost				21	17	15
OCEANIA	EUROPE	CD	Cost Differential				-1	-0	-1
OCEANIA	EUROPE	CT	PC Mileage		12702				
OCEANIA	EUROPE	CT	Alternative Mileage		12583				
OCEANIA	EUROPE	CT	PC Cost		94		50	40	
OCEANIA	EUROPE	CT	Alternative Cost		93		49	39	
OCEANIA	EUROPE	CT	Cost Differential		-2		-1	-1	
OCEANIA	EUROPE	LP	PC Mileage		12702				
OCEANIA	EUROPE	LP	Alternative Mileage		12583				
OCEANIA	EUROPE	LP	PC Cost		223	101		51	
OCEANIA	EUROPE	LP	Alternative Cost		217	98		50	
OCEANIA	EUROPE	LP	Cost Differential		-6	-3		-2	
OCEANIA	EUROPE	T	PC Mileage		12702				
OCEANIA	EUROPE	T	Alternative Mileage		12583				
OCEANIA	EUROPE	T	PC Cost		63		27	19	16
OCEANIA	EUROPE	T	Alternative Cost		62		26	19	16
OCEANIA	EUROPE	T	Cost Differential		-2		-1	-1	-0
OCEANIA	S. AMERICA E.C.	CB	PC Mileage		9558				
OCEANIA	S. AMERICA E.C.	CB	Alternative Mileage		9940				
OCEANIA	S. AMERICA E.C.	CB	PC Cost		141	86	81	78	
OCEANIA	S. AMERICA E.C.	CB	Alternative Cost		146	87	81	78	
OCEANIA	S. AMERICA E.C.	CB	Cost Differential		6	1			
OCEANIA	S. AMERICA E.C.	F	PC Mileage		9558				
OCEANIA	S. AMERICA E.C.	F	Alternative Mileage		9940				
OCEANIA	S. AMERICA E.C.	F	PC Cost		356	237	192	188	
OCEANIA	S. AMERICA E.C.	F	Alternative Cost		357	237	192	186	
OCEANIA	S. AMERICA E.C.	F	Cost Differential		1		-1	-2	
OCEANIA	S. AMERICA E.C.	G	PC Mileage		9330				
OCEANIA	S. AMERICA E.C.	G	Alternative Mileage		9440				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	S. AMERICA E.C.	G	PC Cost	76	34	28		
OCEANIA	S. AMERICA E.C.	G	Alternative Cost	75	33	28		
OCEANIA	S. AMERICA E.C.	G	Cost Differential	-0	-0	-0		
OCEANIA	S. AMERICA E.C.	R	PC Mileage	9330				
OCEANIA	S. AMERICA E.C.	R	Alternative Mileage	9440				
OCEANIA	S. AMERICA E.C.	R	PC Cost	138	124			
OCEANIA	S. AMERICA E.C.	R	Alternative Cost	135	121			
OCEANIA	S. AMERICA E.C.	R	Cost Differential	-3	-3			
OCEANIA	S. AMERICA E.C.	RO	PC Mileage	9558				
OCEANIA	S. AMERICA E.C.	RO	Alternative Mileage	9940				
OCEANIA	S. AMERICA E.C.	RO	PC Cost	301	235	208	193	
OCEANIA	S. AMERICA E.C.	RO	Alternative Cost	302	236	209	193	
OCEANIA	S. AMERICA E.C.	RO	Cost Differential	1	1	1		
OCEANIA	S. AMERICA E.C.	V	PC Mileage	9330				
OCEANIA	S. AMERICA E.C.	V	Alternative Mileage	9440				
OCEANIA	S. AMERICA E.C.	V	PC Cost	409	363	324		
OCEANIA	S. AMERICA E.C.	V	Alternative Cost	402	356	318		
OCEANIA	S. AMERICA E.C.	V	Cost Differential	-8	-7	-7		
OCEANIA	S. AMERICA E.C.	CD	PC Mileage	9330				
OCEANIA	S. AMERICA E.C.	CD	Alternative Mileage	9440				
OCEANIA	S. AMERICA E.C.	CD	PC Cost			17	14	12
OCEANIA	S. AMERICA E.C.	CD	Alternative Cost			17	14	12
OCEANIA	S. AMERICA E.C.	CD	Cost Differential			-0	-0	-0
OCEANIA	S. AMERICA E.C.	CT	PC Mileage	9330				
OCEANIA	S. AMERICA E.C.	CT	Alternative Mileage	9440				
OCEANIA	S. AMERICA E.C.	CT	PC Cost	76		41	32	
OCEANIA	S. AMERICA E.C.	CT	Alternative Cost	76		41	32	
OCEANIA	S. AMERICA E.C.	CT	Cost Differential	-1		-0	-0	
OCEANIA	S. AMERICA E.C.	LP	PC Mileage	9330				
OCEANIA	S. AMERICA E.C.	LP	Alternative Mileage	9440				
OCEANIA	S. AMERICA E.C.	LP	PC Cost	168	77		39	
OCEANIA	S. AMERICA E.C.	LP	Alternative Cost	165	76		39	
OCEANIA	S. AMERICA E.C.	LP	Cost Differential	-2	-1		-1	
OCEANIA	S. AMERICA E.C.	T	PC Mileage	9330				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	S. AMERICA E.C.	T	Alternative Mileage	9440				
OCEANIA	S. AMERICA E.C.	T	PC Cost	47		21	15	13
OCEANIA	S. AMERICA E.C.	T	Alternative Cost	47		20	15	12
OCEANIA	S. AMERICA E.C.	T	Cost Differential	-1		-0	-0	-0
OCEANIA	U.S. EAST COAST	CB	PC Mileage	12708				
OCEANIA	U.S. EAST COAST	CB	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	CB	PC Cost	172	104	96	93	
OCEANIA	U.S. EAST COAST	CB	Alternative Cost	174	102	95	92	
OCEANIA	U.S. EAST COAST	CB	Cost Differential	2	-1	-1	-1	
OCEANIA	U.S. EAST COAST	F	PC Mileage	12708				
OCEANIA	U.S. EAST COAST	F	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	F	PC Cost	427	281	225	220	
OCEANIA	U.S. EAST COAST	F	Alternative Cost	421	277	222	215	
OCEANIA	U.S. EAST COAST	F	Cost Differential	-6	-4	-4	-5	
OCEANIA	U.S. EAST COAST	G	PC Mileage	10136				
OCEANIA	U.S. EAST COAST	G	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	G	PC Cost	83	36	30		
OCEANIA	U.S. EAST COAST	G	Alternative Cost	108	42	35		
OCEANIA	U.S. EAST COAST	G	Cost Differential	24	6	5		
OCEANIA	U.S. EAST COAST	R	PC Mileage	10136				
OCEANIA	U.S. EAST COAST	R	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	R	PC Cost	147	132			
OCEANIA	U.S. EAST COAST	R	Alternative Cost	172	155			
OCEANIA	U.S. EAST COAST	R	Cost Differential	25	23			
OCEANIA	U.S. EAST COAST	RO	PC Mileage	12708				
OCEANIA	U.S. EAST COAST	RO	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	RO	PC Cost	363	282	249	229	
OCEANIA	U.S. EAST COAST	RO	Alternative Cost	359	278	246	227	
OCEANIA	U.S. EAST COAST	RO	Cost Differential	-5	-4	-3	-3	
OCEANIA	U.S. EAST COAST	V	PC Mileage	10136				
OCEANIA	U.S. EAST COAST	V	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	V	PC Cost	428	379	337		
OCEANIA	U.S. EAST COAST	V	Alternative Cost	480	423	372		
OCEANIA	U.S. EAST COAST	V	Cost Differential	52	43	35		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	U.S. EAST COAST	CD	PC Mileage	10136				
OCEANIA	U.S. EAST COAST	CD	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	CD	PC Cost			18	15	13
OCEANIA	U.S. EAST COAST	CD	Alternative Cost			22	17	15
OCEANIA	U.S. EAST COAST	CD	Cost Differential			3	3	2
OCEANIA	U.S. EAST COAST	CT	PC Mileage	10136				
OCEANIA	U.S. EAST COAST	CT	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	CT	PC Cost	81		43	34	
OCEANIA	U.S. EAST COAST	CT	Alternative Cost	94		50	39	
OCEANIA	U.S. EAST COAST	CT	Cost Differential	13		7	5	
OCEANIA	U.S. EAST COAST	LP	PC Mileage	10136				
OCEANIA	U.S. EAST COAST	LP	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	LP	PC Cost	181	83		42	
OCEANIA	U.S. EAST COAST	LP	Alternative Cost	220	100		51	
OCEANIA	U.S. EAST COAST	LP	Cost Differential	39	17		8	
OCEANIA	U.S. EAST COAST	T	PC Mileage	10136				
OCEANIA	U.S. EAST COAST	T	Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	T	PC Cost	51		22	16	14
OCEANIA	U.S. EAST COAST	T	Alternative Cost	63		27	19	16
OCEANIA	U.S. EAST COAST	T	Cost Differential	11		5	3	3
S. AMERICA E.C.	ASIA	CB	PC Mileage	13328				
S. AMERICA E.C.	ASIA	CB	Alternative Mileage	13020				
S. AMERICA E.C.	ASIA	CB	PC Cost	178	107	99	96	
S. AMERICA E.C.	ASIA	CB	Alternative Cost	176	104	96	93	
S. AMERICA E.C.	ASIA	CB	Cost Differential	-2	-3	-3	-3	
S. AMERICA E.C.	ASIA	F	PC Mileage	13328				
S. AMERICA E.C.	ASIA	F	Alternative Mileage	13020				
S. AMERICA E.C.	ASIA	F	PC Cost	441	290	232	226	
S. AMERICA E.C.	ASIA	F	Alternative Cost	426	280	224	217	
S. AMERICA E.C.	ASIA	F	Cost Differential	-14	-10	-8	-9	
S. AMERICA E.C.	ASIA	G	PC Mileage	11980				
S. AMERICA E.C.	ASIA	G	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	G	PC Cost	101	40	34		
S. AMERICA E.C.	ASIA	G	Alternative Cost	100	40	33		
S. AMERICA E.C.	ASIA	G	Cost Differential	-1	-1	-1		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	ASIA	R	PC Mileage	9115				
S. AMERICA E.C.	ASIA	R	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	R	PC Cost	136	122			
S. AMERICA E.C.	ASIA	R	Alternative Cost	163	147			
S. AMERICA E.C.	ASIA	R	Cost Differential	27	25			
S. AMERICA E.C.	ASIA	RO	PC Mileage	13328				
S. AMERICA E.C.	ASIA	RO	Alternative Mileage	13020				
S. AMERICA E.C.	ASIA	RO	PC Cost	376	291	257	236	
S. AMERICA E.C.	ASIA	RO	Alternative Cost	363	281	249	229	
S. AMERICA E.C.	ASIA	RO	Cost Differential	-12	-9	-8	-7	
S. AMERICA E.C.	ASIA	V	PC Mileage	9115				
S. AMERICA E.C.	ASIA	V	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	V	PC Cost	404	359	321		
S. AMERICA E.C.	ASIA	V	Alternative Cost	461	407	359		
S. AMERICA E.C.	ASIA	V	Cost Differential	57	47	38		
S. AMERICA E.C.	ASIA	CD	PC Mileage	9115				
S. AMERICA E.C.	ASIA	CD	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	CD	PC Cost			17	14	12
S. AMERICA E.C.	ASIA	CD	Alternative Cost			21	17	15
S. AMERICA E.C.	ASIA	CD	Cost Differential			4	3	2
S. AMERICA E.C.	ASIA	CT	PC Mileage	9115				
S. AMERICA E.C.	ASIA	CT	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	CT	PC Cost	75		40	32	
S. AMERICA E.C.	ASIA	CT	Alternative Cost	89		48	38	
S. AMERICA E.C.	ASIA	CT	Cost Differential	14		7	6	
S. AMERICA E.C.	ASIA	LP	PC Mileage	9115				
S. AMERICA E.C.	ASIA	LP	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	LP	PC Cost	164	75		39	
S. AMERICA E.C.	ASIA	LP	Alternative Cost	207	94		48	
S. AMERICA E.C.	ASIA	LP	Cost Differential	42	18		9	
S. AMERICA E.C.	ASIA	T	PC Mileage	9115				
S. AMERICA E.C.	ASIA	T	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	T	PC Cost	46		20	15	12
S. AMERICA E.C.	ASIA	T	Alternative Cost	59		25	18	15

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	ASIA	T	Cost Differential		12		5	3	3
S. AMERICA E.C.	CANADA WEST COAST	CB	PC Mileage		9890				
S. AMERICA E.C.	CANADA WEST COAST	CB	Alternative Mileage		11640				
S. AMERICA E.C.	CANADA WEST COAST	CB	PC Cost		144	88	82	79	
S. AMERICA E.C.	CANADA WEST COAST	CB	Alternative Cost		163	96	90	86	
S. AMERICA E.C.	CANADA WEST COAST	CB	Cost Differential		19	8	7	7	
S. AMERICA E.C.	CANADA WEST COAST	F	PC Mileage		9890				
S. AMERICA E.C.	CANADA WEST COAST	F	Alternative Mileage		11640				
S. AMERICA E.C.	CANADA WEST COAST	F	PC Cost		364	242	196	192	
S. AMERICA E.C.	CANADA WEST COAST	F	Alternative Cost		395	261	210	203	
S. AMERICA E.C.	CANADA WEST COAST	F	Cost Differential		31	19	14	12	
S. AMERICA E.C.	CANADA WEST COAST	G	PC Mileage		8311				
S. AMERICA E.C.	CANADA WEST COAST	G	Alternative Mileage		10060				
S. AMERICA E.C.	CANADA WEST COAST	G	PC Cost		66	31	26		
S. AMERICA E.C.	CANADA WEST COAST	G	Alternative Cost		81	35	29		
S. AMERICA E.C.	CANADA WEST COAST	G	Cost Differential		15	4	3		
S. AMERICA E.C.	CANADA WEST COAST	R	PC Mileage		8311				
S. AMERICA E.C.	CANADA WEST COAST	R	Alternative Mileage		10060				
S. AMERICA E.C.	CANADA WEST COAST	R	PC Cost		127	114			
S. AMERICA E.C.	CANADA WEST COAST	R	Alternative Cost		142	128			
S. AMERICA E.C.	CANADA WEST COAST	R	Cost Differential		15	14			
S. AMERICA E.C.	CANADA WEST COAST	RO	PC Mileage		9890				
S. AMERICA E.C.	CANADA WEST COAST	RO	Alternative Mileage		11640				
S. AMERICA E.C.	CANADA WEST COAST	RO	PC Cost		307	240	213	197	
S. AMERICA E.C.	CANADA WEST COAST	RO	Alternative Cost		336	261	231	213	
S. AMERICA E.C.	CANADA WEST COAST	RO	Cost Differential		28	21	18	16	
S. AMERICA E.C.	CANADA WEST COAST	V	PC Mileage		8311				
S. AMERICA E.C.	CANADA WEST COAST	V	Alternative Mileage		10060				
S. AMERICA E.C.	CANADA WEST COAST	V	PC Cost		385	343	308		
S. AMERICA E.C.	CANADA WEST COAST	V	Alternative Cost		416	369	328		
S. AMERICA E.C.	CANADA WEST COAST	V	Cost Differential		31	25	20		
S. AMERICA E.C.	CANADA WEST COAST	CD	PC Mileage		8311				
S. AMERICA E.C.	CANADA WEST COAST	CD	Alternative Mileage		10060				
S. AMERICA E.C.	CANADA WEST COAST	CD	PC Cost				16	13	11

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	CANADA WEST COAST	CD	Alternative Cost				18	14	13
S. AMERICA E.C.	CANADA WEST COAST	CD	Cost Differential				2	2	1
S. AMERICA E.C.	CANADA WEST COAST	CT	PC Mileage		8311				
S. AMERICA E.C.	CANADA WEST COAST	CT	Alternative Mileage		10060				
S. AMERICA E.C.	CANADA WEST COAST	CT	PC Cost		71		38	30	
S. AMERICA E.C.	CANADA WEST COAST	CT	Alternative Cost		79		42	34	
S. AMERICA E.C.	CANADA WEST COAST	CT	Cost Differential		8		4	3	
S. AMERICA E.C.	CANADA WEST COAST	LP	PC Mileage		8311				
S. AMERICA E.C.	CANADA WEST COAST	LP	Alternative Mileage		10060				
S. AMERICA E.C.	CANADA WEST COAST	LP	PC Cost		151	70		36	
S. AMERICA E.C.	CANADA WEST COAST	LP	Alternative Cost		175	80		41	
S. AMERICA E.C.	CANADA WEST COAST	LP	Cost Differential		24	10		5	
S. AMERICA E.C.	CANADA WEST COAST	T	PC Mileage		8311				
S. AMERICA E.C.	CANADA WEST COAST	T	Alternative Mileage		10060				
S. AMERICA E.C.	CANADA WEST COAST	T	PC Cost		43		19	13	11
S. AMERICA E.C.	CANADA WEST COAST	T	Alternative Cost		50		21	15	13
S. AMERICA E.C.	CANADA WEST COAST	T	Cost Differential		7		3	2	2
S. AMERICA E.C.	C. AMERICA W.C.	CB	PC Mileage		6223				
S. AMERICA E.C.	C. AMERICA W.C.	CB	Alternative Mileage		7710				
S. AMERICA E.C.	C. AMERICA W.C.	CB	PC Cost		108	68	64	62	
S. AMERICA E.C.	C. AMERICA W.C.	CB	Alternative Cost		124	75	70	68	
S. AMERICA E.C.	C. AMERICA W.C.	CB	Cost Differential		17	7	6	6	
S. AMERICA E.C.	C. AMERICA W.C.	F	PC Mileage		6223				
S. AMERICA E.C.	C. AMERICA W.C.	F	Alternative Mileage		7710				
S. AMERICA E.C.	C. AMERICA W.C.	F	PC Cost		282	190	157	155	
S. AMERICA E.C.	C. AMERICA W.C.	F	Alternative Cost		308	206	168	164	
S. AMERICA E.C.	C. AMERICA W.C.	F	Cost Differential		26	16	11	9	
S. AMERICA E.C.	C. AMERICA W.C.	G	PC Mileage		4644				
S. AMERICA E.C.	C. AMERICA W.C.	G	Alternative Mileage		6133				
S. AMERICA E.C.	C. AMERICA W.C.	G	PC Cost		31	22	18		
S. AMERICA E.C.	C. AMERICA W.C.	G	Alternative Cost		44	25	21		
S. AMERICA E.C.	C. AMERICA W.C.	G	Cost Differential		13	3	3		
S. AMERICA E.C.	C. AMERICA W.C.	R	PC Mileage		4644				
S. AMERICA E.C.	C. AMERICA W.C.	R	Alternative Mileage		6133				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	C. AMERICA W.C.	R	PC Cost		87	77			
S. AMERICA E.C.	C. AMERICA W.C.	R	Alternative Cost		99	88			
S. AMERICA E.C.	C. AMERICA W.C.	R	Cost Differential		12	11			
S. AMERICA E.C.	C. AMERICA W.C.	RO	PC Mileage		6223				
S. AMERICA E.C.	C. AMERICA W.C.	RO	Alternative Mileage		7710				
S. AMERICA E.C.	C. AMERICA W.C.	RO	PC Cost		235	185	166	154	
S. AMERICA E.C.	C. AMERICA W.C.	RO	Alternative Cost		258	203	181	168	
S. AMERICA E.C.	C. AMERICA W.C.	RO	Cost Differential		23	17	15	13	
S. AMERICA E.C.	C. AMERICA W.C.	V	PC Mileage		4644				
S. AMERICA E.C.	C. AMERICA W.C.	V	Alternative Mileage		6133				
S. AMERICA E.C.	C. AMERICA W.C.	V	PC Cost		299	271	248		
S. AMERICA E.C.	C. AMERICA W.C.	V	Alternative Cost		324	291	264		
S. AMERICA E.C.	C. AMERICA W.C.	V	Cost Differential		25	20	16		
S. AMERICA E.C.	C. AMERICA W.C.	CD	PC Mileage		4644				
S. AMERICA E.C.	C. AMERICA W.C.	CD	Alternative Mileage		6133				
S. AMERICA E.C.	C. AMERICA W.C.	CD	PC Cost				11	9	8
S. AMERICA E.C.	C. AMERICA W.C.	CD	Alternative Cost				12	10	9
S. AMERICA E.C.	C. AMERICA W.C.	CD	Cost Differential				2	1	1
S. AMERICA E.C.	C. AMERICA W.C.	CT	PC Mileage		4644				
S. AMERICA E.C.	C. AMERICA W.C.	CT	Alternative Mileage		6133				
S. AMERICA E.C.	C. AMERICA W.C.	CT	PC Cost		51		28	22	
S. AMERICA E.C.	C. AMERICA W.C.	CT	Alternative Cost		58		32	25	
S. AMERICA E.C.	C. AMERICA W.C.	CT	Cost Differential		7		3	3	
S. AMERICA E.C.	C. AMERICA W.C.	LP	PC Mileage		4644				
S. AMERICA E.C.	C. AMERICA W.C.	LP	Alternative Mileage		6133				
S. AMERICA E.C.	C. AMERICA W.C.	LP	PC Cost		92	43		23	
S. AMERICA E.C.	C. AMERICA W.C.	LP	Alternative Cost		112	52		27	
S. AMERICA E.C.	C. AMERICA W.C.	LP	Cost Differential		20	9		4	
S. AMERICA E.C.	C. AMERICA W.C.	T	PC Mileage		4644				
S. AMERICA E.C.	C. AMERICA W.C.	T	Alternative Mileage		6133				
S. AMERICA E.C.	C. AMERICA W.C.	T	PC Cost		25		12	8	7
S. AMERICA E.C.	C. AMERICA W.C.	T	Alternative Cost		31		14	10	9
S. AMERICA E.C.	C. AMERICA W.C.	T	Cost Differential		6		2	2	1
S. AMERICA E.C.	OCEANIA	CB	PC Mileage		9588				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	OCEANIA	CB	Alternative Mileage		9940				
S. AMERICA E.C.	OCEANIA	CB	PC Cost		141	87	81	78	
S. AMERICA E.C.	OCEANIA	CB	Alternative Cost		146	87	81	78	
S. AMERICA E.C.	OCEANIA	CB	Cost Differential		5				
S. AMERICA E.C.	OCEANIA	F	PC Mileage		9588				
S. AMERICA E.C.	OCEANIA	F	Alternative Mileage		9940				
S. AMERICA E.C.	OCEANIA	F	PC Cost		357	237	193	189	
S. AMERICA E.C.	OCEANIA	F	Alternative Cost		357	237	192	186	
S. AMERICA E.C.	OCEANIA	F	Cost Differential			-0	-1	-2	
S. AMERICA E.C.	OCEANIA	G	PC Mileage		9239				
S. AMERICA E.C.	OCEANIA	G	Alternative Mileage		9940				
S. AMERICA E.C.	OCEANIA	G	PC Cost		75	33	28		
S. AMERICA E.C.	OCEANIA	G	Alternative Cost		80	34	29		
S. AMERICA E.C.	OCEANIA	G	Cost Differential		5	1	1		
S. AMERICA E.C.	OCEANIA	R	PC Mileage		9239				
S. AMERICA E.C.	OCEANIA	R	Alternative Mileage		9940				
S. AMERICA E.C.	OCEANIA	R	PC Cost		137	123			
S. AMERICA E.C.	OCEANIA	R	Alternative Cost		141	126			
S. AMERICA E.C.	OCEANIA	R	Cost Differential		4	3			
S. AMERICA E.C.	OCEANIA	RO	PC Mileage		9588				
S. AMERICA E.C.	OCEANIA	RO	Alternative Mileage		9940				
S. AMERICA E.C.	OCEANIA	RO	PC Cost		301	235	209	193	
S. AMERICA E.C.	OCEANIA	RO	Alternative Cost		302	236	209	193	
S. AMERICA E.C.	OCEANIA	RO	Cost Differential		1				
S. AMERICA E.C.	OCEANIA	V	PC Mileage		9239				
S. AMERICA E.C.	OCEANIA	V	Alternative Mileage		9940				
S. AMERICA E.C.	OCEANIA	V	PC Cost		407	362	323		
S. AMERICA E.C.	OCEANIA	V	Alternative Cost		413	366	326		
S. AMERICA E.C.	OCEANIA	V	Cost Differential		6	5	3		
S. AMERICA E.C.	OCEANIA	CD	PC Mileage		9239				
S. AMERICA E.C.	OCEANIA	CD	Alternative Mileage		9940				
S. AMERICA E.C.	OCEANIA	CD	PC Cost				17	14	12
S. AMERICA E.C.	OCEANIA	CD	Alternative Cost				18	14	13
S. AMERICA E.C.	OCEANIA	CD	Cost Differential						

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	OCEANIA	CT	PC Mileage	9330				
S. AMERICA E.C.	OCEANIA	CT	Alternative Mileage	13735				
S. AMERICA E.C.	OCEANIA	CT	PC Cost	76		41	32	
S. AMERICA E.C.	OCEANIA	CT	Alternative Cost	99		53	41	
S. AMERICA E.C.	OCEANIA	CT	Cost Differential	22		11	9	
S. AMERICA E.C.	OCEANIA	LP	PC Mileage	9330				
S. AMERICA E.C.	OCEANIA	LP	Alternative Mileage	13735				
S. AMERICA E.C.	OCEANIA	LP	PC Cost	168	77		39	
S. AMERICA E.C.	OCEANIA	LP	Alternative Cost	235	107		54	
S. AMERICA E.C.	OCEANIA	LP	Cost Differential	67	30		15	
S. AMERICA E.C.	OCEANIA	T	PC Mileage	9330				
S. AMERICA E.C.	OCEANIA	T	Alternative Mileage	13735				
S. AMERICA E.C.	OCEANIA	T	PC Cost	47		21	15	13
S. AMERICA E.C.	OCEANIA	T	Alternative Cost	67		28	20	17
S. AMERICA E.C.	OCEANIA	T	Cost Differential	20		8	6	5
S. AMERICA E.C.	S. AMERICA W.C.	CB	PC Mileage	6563				
S. AMERICA E.C.	S. AMERICA W.C.	CB	Alternative Mileage	6565				
S. AMERICA E.C.	S. AMERICA W.C.	CB	PC Cost	111	70	66	64	
S. AMERICA E.C.	S. AMERICA W.C.	CB	Alternative Cost	113	69	64	62	
S. AMERICA E.C.	S. AMERICA W.C.	CB	Cost Differential	2	-1	-1	-1	
S. AMERICA E.C.	S. AMERICA W.C.	F	PC Mileage	6563				
S. AMERICA E.C.	S. AMERICA W.C.	F	Alternative Mileage	6565				
S. AMERICA E.C.	S. AMERICA W.C.	F	PC Cost	290	195	161	158	
S. AMERICA E.C.	S. AMERICA W.C.	F	Alternative Cost	282	190	156	152	
S. AMERICA E.C.	S. AMERICA W.C.	F	Cost Differential	-8	-5	-5	-6	
S. AMERICA E.C.	S. AMERICA W.C.	G	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	G	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	G	PC Cost	23	20	17		
S. AMERICA E.C.	S. AMERICA W.C.	G	Alternative Cost	22	19	16		
S. AMERICA E.C.	S. AMERICA W.C.	G	Cost Differential	-1	-1	-1		
S. AMERICA E.C.	S. AMERICA W.C.	R	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	R	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	R	PC Cost	78	69			
S. AMERICA E.C.	S. AMERICA W.C.	R	Alternative Cost	74	65			
S. AMERICA E.C.	S. AMERICA W.C.	R	Cost Differential	-4	-4			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	S. AMERICA W.C.	RO	PC Mileage	6563				
S. AMERICA E.C.	S. AMERICA W.C.	RO	Alternative Mileage	6565				
S. AMERICA E.C.	S. AMERICA W.C.	RO	PC Cost	241	190	170	158	
S. AMERICA E.C.	S. AMERICA W.C.	RO	Alternative Cost	235	186	166	154	
S. AMERICA E.C.	S. AMERICA W.C.	RO	Cost Differential	-6	-5	-4	-4	
S. AMERICA E.C.	S. AMERICA W.C.	V	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	V	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	V	PC Cost	281	255	235		
S. AMERICA E.C.	S. AMERICA W.C.	V	Alternative Cost	270	246	226		
S. AMERICA E.C.	S. AMERICA W.C.	V	Cost Differential	-10	-9	-8		
S. AMERICA E.C.	S. AMERICA W.C.	CD	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	CD	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	CD	PC Cost			10	8	7
S. AMERICA E.C.	S. AMERICA W.C.	CD	Alternative Cost			9	7	6
S. AMERICA E.C.	S. AMERICA W.C.	CD	Cost Differential			-0	-0	-0
S. AMERICA E.C.	S. AMERICA W.C.	CT	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	CT	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	CT	PC Cost	47		26	21	
S. AMERICA E.C.	S. AMERICA W.C.	CT	Alternative Cost	46		25	20	
S. AMERICA E.C.	S. AMERICA W.C.	CT	Cost Differential	-1		-1	-1	
S. AMERICA E.C.	S. AMERICA W.C.	LP	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	LP	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	LP	PC Cost	78	38		20	
S. AMERICA E.C.	S. AMERICA W.C.	LP	Alternative Cost	74	36		19	
S. AMERICA E.C.	S. AMERICA W.C.	LP	Cost Differential	-4	-2		-1	
S. AMERICA E.C.	S. AMERICA W.C.	T	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	T	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	T	PC Cost	22		10	7	6
S. AMERICA E.C.	S. AMERICA W.C.	T	Alternative Cost	20		10	7	6
S. AMERICA E.C.	S. AMERICA W.C.	T	Cost Differential	-1		-0	-0	-0
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	PC Cost	121	75	70	68	
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	Alternative Cost	133	80	74	72	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	Cost Differential	13	4	4	4	
S. AMERICA E.C.	U.S. W.C., HAWAII	F	PC Mileage	5209				
S. AMERICA E.C.	U.S. W.C., HAWAII	F	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	F	PC Cost	259	176	147	144	
S. AMERICA E.C.	U.S. W.C., HAWAII	F	Alternative Cost	327	218	178	173	
S. AMERICA E.C.	U.S. W.C., HAWAII	F	Cost Differential	68	42	31	28	
S. AMERICA E.C.	U.S. W.C., HAWAII	G	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	G	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	G	PC Cost	58	29	24		
S. AMERICA E.C.	U.S. W.C., HAWAII	G	Alternative Cost	67	31	26		
S. AMERICA E.C.	U.S. W.C., HAWAII	G	Cost Differential	9	2	2		
S. AMERICA E.C.	U.S. W.C., HAWAII	R	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	R	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	R	PC Cost	119	106			
S. AMERICA E.C.	U.S. W.C., HAWAII	R	Alternative Cost	126	113			
S. AMERICA E.C.	U.S. W.C., HAWAII	R	Cost Differential	8	7			
S. AMERICA E.C.	U.S. W.C., HAWAII	RO	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	RO	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	RO	PC Cost	261	205	183	170	
S. AMERICA E.C.	U.S. W.C., HAWAII	RO	Alternative Cost	276	216	192	178	
S. AMERICA E.C.	U.S. W.C., HAWAII	RO	Cost Differential	15	11	9	8	
S. AMERICA E.C.	U.S. W.C., HAWAII	V	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	V	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	V	PC Cost	367	328	295		
S. AMERICA E.C.	U.S. W.C., HAWAII	V	Alternative Cost	382	340	304		
S. AMERICA E.C.	U.S. W.C., HAWAII	V	Cost Differential	15	12	9		
S. AMERICA E.C.	U.S. W.C., HAWAII	CD	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	CD	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	CD	PC Cost			15	12	10
S. AMERICA E.C.	U.S. W.C., HAWAII	CD	Alternative Cost			16	13	11
S. AMERICA E.C.	U.S. W.C., HAWAII	CD	Cost Differential			1	1	1
S. AMERICA E.C.	U.S. W.C., HAWAII	CT	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	CT	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	CT	PC Cost	67		36	29	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	U.S. W.C., HAWAII	CT	Alternative Cost	71		38	30	
S. AMERICA E.C.	U.S. W.C., HAWAII	CT	Cost Differential	4		2	2	
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	PC Cost	139	64		33	
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	Alternative Cost	152	70		36	
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	Cost Differential	13	6		3	
S. AMERICA E.C.	U.S. W.C., HAWAII	T	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	T	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	T	PC Cost	39		17	12	11
S. AMERICA E.C.	U.S. W.C., HAWAII	T	Alternative Cost	43		19	13	11
S. AMERICA E.C.	U.S. W.C., HAWAII	T	Cost Differential	4		2	1	1
S. AMERICA W.C.	AFRICA (additional route)	CB	PC Mileage	7982				
S. AMERICA W.C.	AFRICA (additional route)	CB	Alternative Mileage	15278				
S. AMERICA W.C.	AFRICA (additional route)	CB	PC Cost	125	78	73	70	
S. AMERICA W.C.	AFRICA (additional route)	CB	Alternative Cost	198	116	108	104	
S. AMERICA W.C.	AFRICA (additional route)	CB	Cost Differential	73	38	35	33	
S. AMERICA W.C.	AFRICA (additional route)	CD	PC Mileage	7982				
S. AMERICA W.C.	AFRICA (additional route)	CD	Alternative Mileage	15278				
S. AMERICA W.C.	AFRICA (additional route)	CD	PC Cost			15	12	11
S. AMERICA W.C.	AFRICA (additional route)	CD	Alternative Cost			25	20	18
S. AMERICA W.C.	AFRICA (additional route)	CD	Cost Differential			10	8	7
S. AMERICA W.C.	AFRICA (additional route)	G	PC Mileage	7982				
S. AMERICA W.C.	AFRICA (additional route)	G	Alternative Mileage	15278				
S. AMERICA W.C.	AFRICA (additional route)	G	PC Cost	63	30	25		
S. AMERICA W.C.	AFRICA (additional route)	G	Alternative Cost	131	48	40		
S. AMERICA W.C.	AFRICA (additional route)	G	Cost Differential	69	18	15		
S. AMERICA W.C.	AFRICA (additional route)	R	PC Mileage	7982				
S. AMERICA W.C.	AFRICA (additional route)	R	Alternative Mileage	15278				
S. AMERICA W.C.	AFRICA (additional route)	R	PC Cost	124	111			
S. AMERICA W.C.	AFRICA (additional route)	R	Alternative Cost	199	180			
S. AMERICA W.C.	AFRICA (additional route)	R	Cost Differential	76	70			
S. AMERICA W.C.	CANADA EAST COAST	CB	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	CB	Alternative Mileage	8970				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	CANADA EAST COAST	CB	PC Cost	102	65	61	60	
S. AMERICA W.C.	CANADA EAST COAST	CB	Alternative Cost	137	82	76	74	
S. AMERICA W.C.	CANADA EAST COAST	CB	Cost Differential	34	16	15	14	
S. AMERICA W.C.	CANADA EAST COAST	F	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	F	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	F	PC Cost	271	183	152	149	
S. AMERICA W.C.	CANADA EAST COAST	F	Alternative Cost	336	223	182	176	
S. AMERICA W.C.	CANADA EAST COAST	F	Cost Differential	65	40	29	27	
S. AMERICA W.C.	CANADA EAST COAST	G	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	G	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	G	PC Cost	41	24	20		
S. AMERICA W.C.	CANADA EAST COAST	G	Alternative Cost	71	32	27		
S. AMERICA W.C.	CANADA EAST COAST	G	Cost Differential	30	8	6		
S. AMERICA W.C.	CANADA EAST COAST	R	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	R	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	R	PC Cost	99	88			
S. AMERICA W.C.	CANADA EAST COAST	R	Alternative Cost	130	117			
S. AMERICA W.C.	CANADA EAST COAST	R	Cost Differential	32	29			
S. AMERICA W.C.	CANADA EAST COAST	RO	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	RO	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	RO	PC Cost	225	178	159	149	
S. AMERICA W.C.	CANADA EAST COAST	RO	Alternative Cost	283	221	197	182	
S. AMERICA W.C.	CANADA EAST COAST	RO	Cost Differential	58	44	38	34	
S. AMERICA W.C.	CANADA EAST COAST	V	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	V	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	V	PC Cost	324	292	265		
S. AMERICA W.C.	CANADA EAST COAST	V	Alternative Cost	391	347	310		
S. AMERICA W.C.	CANADA EAST COAST	V	Cost Differential	66	55	45		
S. AMERICA W.C.	CANADA EAST COAST	CD	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	CD	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	CD	PC Cost			12	10	9
S. AMERICA W.C.	CANADA EAST COAST	CD	Alternative Cost			16	13	12
S. AMERICA W.C.	CANADA EAST COAST	CD	Cost Differential			4	3	3
S. AMERICA W.C.	CANADA EAST COAST	CT	PC Mileage	5710				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	CANADA EAST COAST	CT	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	CT	PC Cost	57		31	25	
S. AMERICA W.C.	CANADA EAST COAST	CT	Alternative Cost	73		39	31	
S. AMERICA W.C.	CANADA EAST COAST	CT	Cost Differential	16		8	6	
S. AMERICA W.C.	CANADA EAST COAST	LP	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	LP	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	LP	PC Cost	109	51		27	
S. AMERICA W.C.	CANADA EAST COAST	LP	Alternative Cost	158	72		37	
S. AMERICA W.C.	CANADA EAST COAST	LP	Cost Differential	49	21		10	
S. AMERICA W.C.	CANADA EAST COAST	T	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	T	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	T	PC Cost	30		14	10	9
S. AMERICA W.C.	CANADA EAST COAST	T	Alternative Cost	45		19	14	12
S. AMERICA W.C.	CANADA EAST COAST	T	Cost Differential	14		6	4	3
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage	4934				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage	8210				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost	95	61	57	56	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost	129	78	72	70	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential	35	16	15	14	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage	4934				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage	8210				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost	253	172	144	142	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost	319	213	174	169	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential	66	41	30	27	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost	22	19	16		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost	56	28	23		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential	34	9	7		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost	78	68			
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost	113	101			
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential	36	33			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		4934				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		8210				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		209	166	149	140	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		268	210	187	173	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		59	44	38	34	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		279	254	234		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		354	316	284		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		75	63	51		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				10	8	7
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				14	11	10
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				5	4	3
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		47		26	21	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		65		35	28	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		18		9	7	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		77	37		20	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		132	61		32	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		55	24		12	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		21		10	7	6
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		37		16	12	10
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		16		6	5	4
S. AMERICA W.C.	EUROPE	CB	PC Mileage		9374				
S. AMERICA W.C.	EUROPE	CB	Alternative Mileage		13000				
S. AMERICA W.C.	EUROPE	CB	PC Cost		139	85	80	77	
S. AMERICA W.C.	EUROPE	CB	Alternative Cost		176	104	96	93	
S. AMERICA W.C.	EUROPE	CB	Cost Differential		37	18	17	16	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	EUROPE	F	PC Mileage	9374				
S. AMERICA W.C.	EUROPE	F	Alternative Mileage	13000				
S. AMERICA W.C.	EUROPE	F	PC Cost	352	234	190	186	
S. AMERICA W.C.	EUROPE	F	Alternative Cost	426	280	224	217	
S. AMERICA W.C.	EUROPE	F	Cost Differential	73	45	33	30	
S. AMERICA W.C.	EUROPE	G	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	G	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	G	PC Cost	59	29	24		
S. AMERICA W.C.	EUROPE	G	Alternative Cost	71	32	27		
S. AMERICA W.C.	EUROPE	G	Cost Differential	12	3	2		
S. AMERICA W.C.	EUROPE	R	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	R	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	R	PC Cost	119	107			
S. AMERICA W.C.	EUROPE	R	Alternative Cost	130	116			
S. AMERICA W.C.	EUROPE	R	Cost Differential	11	10			
S. AMERICA W.C.	EUROPE	RO	PC Mileage	9374				
S. AMERICA W.C.	EUROPE	RO	Alternative Mileage	13000				
S. AMERICA W.C.	EUROPE	RO	PC Cost	297	232	206	191	
S. AMERICA W.C.	EUROPE	RO	Alternative Cost	363	281	248	229	
S. AMERICA W.C.	EUROPE	RO	Cost Differential	66	49	42	38	
S. AMERICA W.C.	EUROPE	V	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	V	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	V	PC Cost	368	329	295		
S. AMERICA W.C.	EUROPE	V	Alternative Cost	390	346	309		
S. AMERICA W.C.	EUROPE	V	Cost Differential	22	18	14		
S. AMERICA W.C.	EUROPE	CD	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	CD	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	CD	PC Cost			15	12	11
S. AMERICA W.C.	EUROPE	CD	Alternative Cost			16	13	12
S. AMERICA W.C.	EUROPE	CD	Cost Differential			1	1	1
S. AMERICA W.C.	EUROPE	CT	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	CT	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	CT	PC Cost	67		36	29	
S. AMERICA W.C.	EUROPE	CT	Alternative Cost	73		39	31	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	EUROPE	CT Cost Differential	6		3	2	
S. AMERICA W.C.	EUROPE	LP PC Mileage	7570				
S. AMERICA W.C.	EUROPE	LP Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	LP PC Cost	139	64		33	
S. AMERICA W.C.	EUROPE	LP Alternative Cost	157	72		37	
S. AMERICA W.C.	EUROPE	LP Cost Differential	18	8		4	
S. AMERICA W.C.	EUROPE	T PC Mileage	7570				
S. AMERICA W.C.	EUROPE	T Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	T PC Cost	39		17	12	11
S. AMERICA W.C.	EUROPE	T Alternative Cost	44		19	14	12
S. AMERICA W.C.	EUROPE	T Cost Differential	5		2	1	1
S. AMERICA W.C.	MIDDLE EAST (additional route)	G PC Mileage	8359				
S. AMERICA W.C.	MIDDLE EAST (additional route)	G Alternative Mileage	11428				
S. AMERICA W.C.	MIDDLE EAST (additional route)	G PC Cost	66	31	26		
S. AMERICA W.C.	MIDDLE EAST (additional route)	G Alternative Cost	94	38	32		
S. AMERICA W.C.	MIDDLE EAST (additional route)	G Cost Differential	28	7	6		
S. AMERICA W.C.	MIDDLE EAST (additional route)	R PC Mileage	8359				
S. AMERICA W.C.	MIDDLE EAST (additional route)	R Alternative Mileage	11428				
S. AMERICA W.C.	MIDDLE EAST (additional route)	R PC Cost	128	114			
S. AMERICA W.C.	MIDDLE EAST (additional route)	R Alternative Cost	157	141			
S. AMERICA W.C.	MIDDLE EAST (additional route)	R Cost Differential	30	27			
S. AMERICA W.C.	S. AMERICA E.C.	CB PC Mileage	6563				
S. AMERICA W.C.	S. AMERICA E.C.	CB Alternative Mileage	6565				
S. AMERICA W.C.	S. AMERICA E.C.	CB PC Cost	111	70	66	64	
S. AMERICA W.C.	S. AMERICA E.C.	CB Alternative Cost	113	69	64	62	
S. AMERICA W.C.	S. AMERICA E.C.	CB Cost Differential	2	-1	-1	-1	
S. AMERICA W.C.	S. AMERICA E.C.	F PC Mileage	6563				
S. AMERICA W.C.	S. AMERICA E.C.	F Alternative Mileage	6565				
S. AMERICA W.C.	S. AMERICA E.C.	F PC Cost	290	195	161	158	
S. AMERICA W.C.	S. AMERICA E.C.	F Alternative Cost	282	190	156	152	
S. AMERICA W.C.	S. AMERICA E.C.	F Cost Differential	-8	-5	-5	-6	
S. AMERICA W.C.	S. AMERICA E.C.	G PC Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	G Alternative Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	G PC Cost	23	20	17		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION			DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE			A	B	C	D	E
S. AMERICA W.C.	S. AMERICA E.C.	G	Alternative Cost		22	19	16		
S. AMERICA W.C.	S. AMERICA E.C.	G	Cost Differential		-1	-1	-1		
S. AMERICA W.C.	S. AMERICA E.C.	R	PC Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	R	Alternative Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	R	PC Cost		78	69			
S. AMERICA W.C.	S. AMERICA E.C.	R	Alternative Cost		74	65			
S. AMERICA W.C.	S. AMERICA E.C.	R	Cost Differential		-4	-4			
S. AMERICA W.C.	S. AMERICA E.C.	RO	PC Mileage		6563				
S. AMERICA W.C.	S. AMERICA E.C.	RO	Alternative Mileage		6565				
S. AMERICA W.C.	S. AMERICA E.C.	RO	PC Cost		241	190	170	158	
S. AMERICA W.C.	S. AMERICA E.C.	RO	Alternative Cost		235	186	166	154	
S. AMERICA W.C.	S. AMERICA E.C.	RO	Cost Differential		-6	-5	-4	-4	
S. AMERICA W.C.	S. AMERICA E.C.	V	PC Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	V	Alternative Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	V	PC Cost		281	255	235		
S. AMERICA W.C.	S. AMERICA E.C.	V	Alternative Cost		270	246	226		
S. AMERICA W.C.	S. AMERICA E.C.	V	Cost Differential		-10	-9	-8		
S. AMERICA W.C.	S. AMERICA E.C.	CD	PC Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	CD	Alternative Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	CD	PC Cost				10	8	7
S. AMERICA W.C.	S. AMERICA E.C.	CD	Alternative Cost				9	7	6
S. AMERICA W.C.	S. AMERICA E.C.	CD	Cost Differential				-0	-0	-0
S. AMERICA W.C.	S. AMERICA E.C.	CT	PC Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	CT	Alternative Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	CT	PC Cost		47		26	21	
S. AMERICA W.C.	S. AMERICA E.C.	CT	Alternative Cost		46		25	20	
S. AMERICA W.C.	S. AMERICA E.C.	CT	Cost Differential		-1		-1	-1	
S. AMERICA W.C.	S. AMERICA E.C.	LP	PC Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	LP	Alternative Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	LP	PC Cost		78	38		20	
S. AMERICA W.C.	S. AMERICA E.C.	LP	Alternative Cost		74	36		19	
S. AMERICA W.C.	S. AMERICA E.C.	LP	Cost Differential		-4	-2		-1	
S. AMERICA W.C.	S. AMERICA E.C.	T	PC Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	T	Alternative Mileage		3840				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	S. AMERICA E.C.	T	PC Cost	22		10	7	6
S. AMERICA W.C.	S. AMERICA E.C.	T	Alternative Cost	20		10	7	6
S. AMERICA W.C.	S. AMERICA E.C.	T	Cost Differential	-1		-0	-0	-0
S. AMERICA W.C.	U.S. EAST COAST	CB	PC Mileage	4569				
S. AMERICA W.C.	U.S. EAST COAST	CB	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	CB	PC Cost	91	59	56	54	
S. AMERICA W.C.	U.S. EAST COAST	CB	Alternative Cost	134	80	75	72	
S. AMERICA W.C.	U.S. EAST COAST	CB	Cost Differential	43	21	19	18	
S. AMERICA W.C.	U.S. EAST COAST	F	PC Mileage	4569				
S. AMERICA W.C.	U.S. EAST COAST	F	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	F	PC Cost	245	167	140	138	
S. AMERICA W.C.	U.S. EAST COAST	F	Alternative Cost	330	220	179	174	
S. AMERICA W.C.	U.S. EAST COAST	F	Cost Differential	85	53	39	36	
S. AMERICA W.C.	U.S. EAST COAST	G	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	G	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	G	PC Cost	28	21	18		
S. AMERICA W.C.	U.S. EAST COAST	G	Alternative Cost	68	31	26		
S. AMERICA W.C.	U.S. EAST COAST	G	Cost Differential	40	10	8		
S. AMERICA W.C.	U.S. EAST COAST	R	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	R	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	R	PC Cost	84	74			
S. AMERICA W.C.	U.S. EAST COAST	R	Alternative Cost	127	114			
S. AMERICA W.C.	U.S. EAST COAST	R	Cost Differential	44	40			
S. AMERICA W.C.	U.S. EAST COAST	RO	PC Mileage	4569				
S. AMERICA W.C.	U.S. EAST COAST	RO	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	RO	PC Cost	202	161	144	135	
S. AMERICA W.C.	U.S. EAST COAST	RO	Alternative Cost	277	217	193	179	
S. AMERICA W.C.	U.S. EAST COAST	RO	Cost Differential	76	57	49	44	
S. AMERICA W.C.	U.S. EAST COAST	V	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	V	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	V	PC Cost	292	265	243		
S. AMERICA W.C.	U.S. EAST COAST	V	Alternative Cost	384	342	306		
S. AMERICA W.C.	U.S. EAST COAST	V	Cost Differential	92	77	63		
S. AMERICA W.C.	U.S. EAST COAST	CD	PC Mileage	4346				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	U.S. EAST COAST	CD	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	CD	PC Cost			10	8	7
S. AMERICA W.C.	U.S. EAST COAST	CD	Alternative Cost			16	13	11
S. AMERICA W.C.	U.S. EAST COAST	CD	Cost Differential			6	5	4
[illegible] EAST COAST								
S. AMERICA W.C.	U.S. EAST COAST	CT	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	CT	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	CT	PC Cost	50		27	22	
S. AMERICA W.C.	U.S. EAST COAST	CT	Alternative Cost	72		39	31	
S. AMERICA W.C.	U.S. EAST COAST	CT	Cost Differential	22		11	9	
U.S. EAST COAST								
S. AMERICA W.C.	U.S. EAST COAST	LP	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	LP	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	LP	PC Cost	87	41		22	
S. AMERICA W.C.	U.S. EAST COAST	LP	Alternative Cost	153	70		36	
S. AMERICA W.C.	U.S. EAST COAST	LP	Cost Differential	67	29		14	
U.S. EAST COAST								
S. AMERICA W.C.	U.S. EAST COAST	T	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	T	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	T	PC Cost	24		11	8	7
S. AMERICA W.C.	U.S. EAST COAST	T	Alternative Cost	43		19	14	12
S. AMERICA W.C.	U.S. EAST COAST	T	Cost Differential	19		8	6	5
[illegible]								
U.S. EAST COAST	ASIA	CB	PC Mileage	11556				
U.S. EAST COAST	ASIA	CB	Alternative Mileage	16610				
U.S. EAST COAST	ASIA	CB	PC Cost	160	97	91	87	
U.S. EAST COAST	ASIA	CB	Alternative Cost	211	123	114	110	
U.S. EAST COAST	ASIA	CB	Cost Differential	51	26	24	23	
[illegible]								
U.S. EAST COAST	ASIA	F	PC Mileage	11556				
U.S. EAST COAST	ASIA	F	Alternative Mileage	16610				
U.S. EAST COAST	ASIA	F	PC Cost	401	265	213	209	
U.S. EAST COAST	ASIA	F	Alternative Cost	506	331	262	253	
U.S. EAST COAST	ASIA	F	Cost Differential	105	65	48	44	
U.S. EAST COAST	ASIA	G	PC Mileage	9375				
U.S. EAST COAST	ASIA	G	Alternative Mileage	15525				
U.S. EAST COAST	ASIA	G	PC Cost	76	34	28		
U.S. EAST COAST	ASIA	G	Alternative Cost	134	49	40		
U.S. EAST COAST	ASIA	G	Cost Differential	58	15	12		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	ASIA	R	PC Mileage		9375				
U.S. EAST COAST	ASIA	R	Alternative Mileage		15525				
U.S. EAST COAST	ASIA	R	PC Cost		139	125			
U.S. EAST COAST	ASIA	R	Alternative Cost		202	183			
U.S. EAST COAST	ASIA	R	Cost Differential		63	58			
U.S. EAST COAST	ASIA	RO	PC Mileage		11556				
U.S. EAST COAST	ASIA	RO	Alternative Mileage		16610				
U.S. EAST COAST	ASIA	RO	PC Cost		341	265	234	216	
U.S. EAST COAST	ASIA	RO	Alternative Cost		434	335	295	271	
U.S. EAST COAST	ASIA	RO	Cost Differential		94	70	61	55	
U.S. EAST COAST	ASIA	V	PC Mileage		9375				
U.S. EAST COAST	ASIA	V	Alternative Mileage		15525				
U.S. EAST COAST	ASIA	V	PC Cost		410	364	325		
U.S. EAST COAST	ASIA	V	Alternative Cost		545	477	417		
U.S. EAST COAST	ASIA	V	Cost Differential		134	112	92		
U.S. EAST COAST	ASIA	CD	PC Mileage		9375				
U.S. EAST COAST	ASIA	CD	Alternative Mileage		15525				
U.S. EAST COAST	ASIA	CD	PC Cost				17	14	12
U.S. EAST COAST	ASIA	CD	Alternative Cost				25	21	18
U.S. EAST COAST	ASIA	CD	Cost Differential				8	7	6
U.S. EAST COAST	ASIA	CT	PC Mileage		9375				
U.S. EAST COAST	ASIA	CT	Alternative Mileage		15525				
U.S. EAST COAST	ASIA	CT	PC Cost		77		41	33	
U.S. EAST COAST	ASIA	CT	Alternative Cost		108		57	45	
U.S. EAST COAST	ASIA	CT	Cost Differential		32		16	13	
U.S. EAST COAST	ASIA	LP	PC Mileage		9375				
U.S. EAST COAST	ASIA	LP	Alternative Mileage		15525				
U.S. EAST COAST	ASIA	LP	PC Cost		169	77		40	
U.S. EAST COAST	ASIA	LP	Alternative Cost		264	119		60	
U.S. EAST COAST	ASIA	LP	Cost Differential		96	42		21	
U.S. EAST COAST	ASIA	T	PC Mileage		9375				
U.S. EAST COAST	ASIA	T	Alternative Mileage		15525				
U.S. EAST COAST	ASIA	T	PC Cost		48		21	15	13
U.S. EAST COAST	ASIA	T	Alternative Cost		76		32	23	19
U.S. EAST COAST	ASIA	T	Cost Differential		28		11	8	7

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	CANADA WEST COAST	CB	PC Mileage	6037				
U.S. EAST COAST	CANADA WEST COAST	CB	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	CB	PC Cost	106	67	63	61	
U.S. EAST COAST	CANADA WEST COAST	CB	Alternative Cost	188	110	102	99	
U.S. EAST COAST	CANADA WEST COAST	CB	Cost Differential	83	43	40	38	
U.S. EAST COAST	CANADA WEST COAST	F	PC Mileage	6037				
U.S. EAST COAST	CANADA WEST COAST	F	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	F	PC Cost	278	188	156	153	
U.S. EAST COAST	CANADA WEST COAST	F	Alternative Cost	453	297	237	229	
U.S. EAST COAST	CANADA WEST COAST	F	Cost Differential	176	110	81	77	
U.S. EAST COAST	CANADA WEST COAST	G	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	G	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	G	PC Cost	41	24	21		
U.S. EAST COAST	CANADA WEST COAST	G	Alternative Cost	121	45	38		
U.S. EAST COAST	CANADA WEST COAST	G	Cost Differential	80	21	17		
U.S. EAST COAST	CANADA WEST COAST	R	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	R	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	R	PC Cost	99	88			
U.S. EAST COAST	CANADA WEST COAST	R	Alternative Cost	188	170			
U.S. EAST COAST	CANADA WEST COAST	R	Cost Differential	89	82			
U.S. EAST COAST	CANADA WEST COAST	RO	PC Mileage	6037				
U.S. EAST COAST	CANADA WEST COAST	RO	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	RO	PC Cost	231	183	163	152	
U.S. EAST COAST	CANADA WEST COAST	RO	Alternative Cost	387	299	264	243	
U.S. EAST COAST	CANADA WEST COAST	RO	Cost Differential	156	117	101	91	
U.S. EAST COAST	CANADA WEST COAST	V	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	V	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	V	PC Cost	325	293	266		
U.S. EAST COAST	CANADA WEST COAST	V	Alternative Cost	515	451	396		
U.S. EAST COAST	CANADA WEST COAST	V	Cost Differential	189	158	130		
U.S. EAST COAST	CANADA WEST COAST	CD	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	CD	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	CD	PC Cost			12	10	9
U.S. EAST COAST	CANADA WEST COAST	CD	Alternative Cost			24	19	17

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
U.S. EAST COAST	CANADA WEST COAST	CD Cost Differential			11	9	8
U.S. EAST COAST	CANADA WEST COAST	CT PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	CT Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	CT PC Cost	57		31	25	
U.S. EAST COAST	CANADA WEST COAST	CT Alternative Cost	101		54	42	
U.S. EAST COAST	CANADA WEST COAST	CT Cost Differential	44		23	18	
U.S. EAST COAST	CANADA WEST COAST	LP PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	LP Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	LP PC Cost	110	51		27	
U.S. EAST COAST	CANADA WEST COAST	LP Alternative Cost	243	110		56	
U.S. EAST COAST	CANADA WEST COAST	LP Cost Differential	134	59		29	
U.S. EAST COAST	CANADA WEST COAST	T PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	T Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	T PC Cost	31		14	10	9
U.S. EAST COAST	CANADA WEST COAST	T Alternative Cost	70		29	21	18
U.S. EAST COAST	CANADA WEST COAST	T Cost Differential	39		16	11	9
U.S. EAST COAST	C. AMERICA W.C.	CB PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	CB Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	CB PC Cost	66	46	43	42	
U.S. EAST COAST	C. AMERICA W.C.	CB Alternative Cost	157	93	86	83	
U.S. EAST COAST	C. AMERICA W.C.	CB Cost Differential	90	47	43	41	
U.S. EAST COAST	C. AMERICA W.C.	F PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	F Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	F PC Cost	190	132	114	113	
U.S. EAST COAST	C. AMERICA W.C.	F Alternative Cost	381	252	203	197	
U.S. EAST COAST	C. AMERICA W.C.	F Cost Differential	192	120	89	84	
U.S. EAST COAST	C. AMERICA W.C.	G PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	G Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	G PC Cost	6	15	13		
U.S. EAST COAST	C. AMERICA W.C.	G Alternative Cost	90	37	31		
U.S. EAST COAST	C. AMERICA W.C.	G Cost Differential	84	22	18		
U.S. EAST COAST	C. AMERICA W.C.	R PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	R Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	R PC Cost	59	51			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	C. AMERICA W.C.	R	Alternative Cost	153	137			
U.S. EAST COAST	C. AMERICA W.C.	R	Cost Differential	93	86			
U.S. EAST COAST	C. AMERICA W.C.	RO	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	RO	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	RO	PC Cost	153	124	112	107	
U.S. EAST COAST	C. AMERICA W.C.	RO	Alternative Cost	323	251	223	206	
U.S. EAST COAST	C. AMERICA W.C.	RO	Cost Differential	170	128	110	99	
U.S. EAST COAST	C. AMERICA W.C.	V	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	V	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	V	PC Cost	239	220	206		
U.S. EAST COAST	C. AMERICA W.C.	V	Alternative Cost	438	387	343		
U.S. EAST COAST	C. AMERICA W.C.	V	Cost Differential	199	167	137		
U.S. EAST COAST	C. AMERICA W.C.	CD	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	CD	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	CD	PC Cost			7	6	5
U.S. EAST COAST	C. AMERICA W.C.	CD	Alternative Cost			19	15	14
U.S. EAST COAST	C. AMERICA W.C.	CD	Cost Differential			12	10	9
U.S. EAST COAST	C. AMERICA W.C.	CT	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	CT	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	CT	PC Cost	38		21	17	
U.S. EAST COAST	C. AMERICA W.C.	CT	Alternative Cost	84		45	36	
U.S. EAST COAST	C. AMERICA W.C.	CT	Cost Differential	46		24	19	
U.S. EAST COAST	C. AMERICA W.C.	LP	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	LP	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	LP	PC Cost	50	25		14	
U.S. EAST COAST	C. AMERICA W.C.	LP	Alternative Cost	191	87		44	
U.S. EAST COAST	C. AMERICA W.C.	LP	Cost Differential	141	62		31	
U.S. EAST COAST	C. AMERICA W.C.	T	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	T	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	T	PC Cost	13		7	5	4
U.S. EAST COAST	C. AMERICA W.C.	T	Alternative Cost	54		23	17	14
U.S. EAST COAST	C. AMERICA W.C.	T	Cost Differential	41		16	12	10
U.S. EAST COAST	OCEANIA	CB	PC Mileage	12708				
U.S. EAST COAST	OCEANIA	CB	Alternative Mileage	12790				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	OCEANIA	CB	PC Cost	172	104	96	93	
U.S. EAST COAST	OCEANIA	CB	Alternative Cost	174	102	95	92	
U.S. EAST COAST	OCEANIA	CB	Cost Differential	2	-1	-1	-1	
U.S. EAST COAST	OCEANIA	F	PC Mileage	12708				
U.S. EAST COAST	OCEANIA	F	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	F	PC Cost	427	281	225	220	
U.S. EAST COAST	OCEANIA	F	Alternative Cost	421	277	222	215	
U.S. EAST COAST	OCEANIA	F	Cost Differential	-6	-4	-4	-5	
U.S. EAST COAST	OCEANIA	G	PC Mileage	10136				
U.S. EAST COAST	OCEANIA	G	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	G	PC Cost	83	36	30		
U.S. EAST COAST	OCEANIA	G	Alternative Cost	108	42	35		
U.S. EAST COAST	OCEANIA	G	Cost Differential	24	6	5		
U.S. EAST COAST	OCEANIA	R	PC Mileage	10136				
U.S. EAST COAST	OCEANIA	R	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	R	PC Cost	147	132			
U.S. EAST COAST	OCEANIA	R	Alternative Cost	172	155			
U.S. EAST COAST	OCEANIA	R	Cost Differential	25	23			
U.S. EAST COAST	OCEANIA	RO	PC Mileage	12708				
U.S. EAST COAST	OCEANIA	RO	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	RO	PC Cost	363	282	249	229	
U.S. EAST COAST	OCEANIA	RO	Alternative Cost	359	278	246	227	
U.S. EAST COAST	OCEANIA	RO	Cost Differential	-5	-4	-3	-3	
U.S. EAST COAST	OCEANIA	V	PC Mileage	10136				
U.S. EAST COAST	OCEANIA	V	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	V	PC Cost	428	379	337		
U.S. EAST COAST	OCEANIA	V	Alternative Cost	480	423	372		
U.S. EAST COAST	OCEANIA	V	Cost Differential	52	43	35		
U.S. EAST COAST	OCEANIA	CD	PC Mileage	10136				
U.S. EAST COAST	OCEANIA	CD	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	CD	PC Cost			18	15	13
U.S. EAST COAST	OCEANIA	CD	Alternative Cost			22	17	15
U.S. EAST COAST	OCEANIA	CD	Cost Differential			3	3	2
U.S. EAST COAST	OCEANIA	CT	PC Mileage	10136				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	OCEANIA	CT	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	CT	PC Cost	81		43	34	
U.S. EAST COAST	OCEANIA	CT	Alternative Cost	94		50	39	
U.S. EAST COAST	OCEANIA	CT	Cost Differential	13		7	5	
U.S. EAST COAST	OCEANIA	LP	PC Mileage	10136				
U.S. EAST COAST	OCEANIA	LP	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	LP	PC Cost	181	83		42	
U.S. EAST COAST	OCEANIA	LP	Alternative Cost	220	100		51	
U.S. EAST COAST	OCEANIA	LP	Cost Differential	39	17		8	
U.S. EAST COAST	OCEANIA	T	PC Mileage	10136				
U.S. EAST COAST	OCEANIA	T	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	T	PC Cost	51		22	16	14
U.S. EAST COAST	OCEANIA	T	Alternative Cost	63		27	19	16
U.S. EAST COAST	OCEANIA	T	Cost Differential	11		5	3	3
U.S. EAST COAST	S. AMERICA W.C.	CB	PC Mileage	4569				
U.S. EAST COAST	S. AMERICA W.C.	CB	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	CB	PC Cost	91	59	56	54	
U.S. EAST COAST	S. AMERICA W.C.	CB	Alternative Cost	134	80	75	72	
U.S. EAST COAST	S. AMERICA W.C.	CB	Cost Differential	43	21	19	18	
U.S. EAST COAST	S. AMERICA W.C.	F	PC Mileage	4569				
U.S. EAST COAST	S. AMERICA W.C.	F	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	F	PC Cost	245	167	140	138	
U.S. EAST COAST	S. AMERICA W.C.	F	Alternative Cost	330	220	179	174	
U.S. EAST COAST	S. AMERICA W.C.	F	Cost Differential	85	53	39	36	
U.S. EAST COAST	S. AMERICA W.C.	G	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	G	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	G	PC Cost	28	21	18		
U.S. EAST COAST	S. AMERICA W.C.	G	Alternative Cost	68	31	26		
U.S. EAST COAST	S. AMERICA W.C.	G	Cost Differential	40	10	8		
U.S. EAST COAST	S. AMERICA W.C.	R	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	R	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	R	PC Cost	84	74			
U.S. EAST COAST	S. AMERICA W.C.	R	Alternative Cost	127	114			
U.S. EAST COAST	S. AMERICA W.C.	R	Cost Differential	44	40			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	S. AMERICA W.C.	RO	PC Mileage	4569				
U.S. EAST COAST	S. AMERICA W.C.	RO	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	RO	PC Cost	202	161	144	135	
U.S. EAST COAST	S. AMERICA W.C.	RO	Alternative Cost	277	217	193	179	
U.S. EAST COAST	S. AMERICA W.C.	RO	Cost Differential	76	57	49	44	
U.S. EAST COAST	S. AMERICA W.C.	V	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	V	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	V	PC Cost	292	265	243		
U.S. EAST COAST	S. AMERICA W.C.	V	Alternative Cost	384	342	306		
U.S. EAST COAST	S. AMERICA W.C.	V	Cost Differential	92	77	63		
U.S. EAST COAST	S. AMERICA W.C.	CD	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	CD	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	CD	PC Cost			10	8	7
U.S. EAST COAST	S. AMERICA W.C.	CD	Alternative Cost			16	13	11
U.S. EAST COAST	S. AMERICA W.C.	CD	Cost Differential			6	5	4
U.S. EAST COAST	S. AMERICA W.C.	CT	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	CT	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	CT	PC Cost	50		27	22	
U.S. EAST COAST	S. AMERICA W.C.	CT	Alternative Cost	72		39	31	
U.S. EAST COAST	S. AMERICA W.C.	CT	Cost Differential	22		11	9	
U.S. EAST COAST	S. AMERICA W.C.	LP	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	LP	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	LP	PC Cost	87	41		22	
U.S. EAST COAST	S. AMERICA W.C.	LP	Alternative Cost	153	70		36	
U.S. EAST COAST	S. AMERICA W.C.	LP	Cost Differential	67	29		14	
U.S. EAST COAST	S. AMERICA W.C.	T	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	T	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	T	PC Cost	24		11	8	7
U.S. EAST COAST	S. AMERICA W.C.	T	Alternative Cost	43		19	14	12
U.S. EAST COAST	S. AMERICA W.C.	T	Cost Differential	19		8	6	5
U.S. EAST COAST	U.S. W.C., HAWAII	CB	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	CB	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	CB	PC Cost	93	60	57	55	
U.S. EAST COAST	U.S. W.C., HAWAII	CB	Alternative Cost	179	105	98	94	
U.S. EAST COAST	U.S. W.C., HAWAII	CB	Cost Differential	86	45	41	39	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	U.S. W.C., HAWAII	F	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	F	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	F	PC Cost	249	170	142	140	
U.S. EAST COAST	U.S. W.C., HAWAII	F	Alternative Cost	433	285	227	220	
U.S. EAST COAST	U.S. W.C., HAWAII	F	Cost Differential	184	115	85	80	
U.S. EAST COAST	U.S. W.C., HAWAII	G	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	G	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	G	PC Cost	32	22	18		
U.S. EAST COAST	U.S. W.C., HAWAII	G	Alternative Cost	113	43	36		
U.S. EAST COAST	U.S. W.C., HAWAII	G	Cost Differential	81	21	17		
U.S. EAST COAST	U.S. W.C., HAWAII	R	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	R	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	R	PC Cost	88	78			
U.S. EAST COAST	U.S. W.C., HAWAII	R	Alternative Cost	178	161			
U.S. EAST COAST	U.S. W.C., HAWAII	R	Cost Differential	89	82			
U.S. EAST COAST	U.S. W.C., HAWAII	RO	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	RO	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	RO	PC Cost	206	164	147	138	
U.S. EAST COAST	U.S. W.C., HAWAII	RO	Alternative Cost	369	286	253	233	
U.S. EAST COAST	U.S. W.C., HAWAII	RO	Cost Differential	163	122	106	95	
U.S. EAST COAST	U.S. W.C., HAWAII	V	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	V	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	V	PC Cost	302	273	250		
U.S. EAST COAST	U.S. W.C., HAWAII	V	Alternative Cost	493	433	381		
U.S. EAST COAST	U.S. W.C., HAWAII	V	Cost Differential	191	160	131		
U.S. EAST COAST	U.S. W.C., HAWAII	CD	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	CD	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	CD	PC Cost			11	9	8
U.S. EAST COAST	U.S. W.C., HAWAII	CD	Alternative Cost			22	18	16
U.S. EAST COAST	U.S. W.C., HAWAII	CD	Cost Differential			11	9	8
U.S. EAST COAST	U.S. W.C., HAWAII	CT	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	CT	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	CT	PC Cost	52		29	23	
U.S. EAST COAST	U.S. W.C., HAWAII	CT	Alternative Cost	97		51	41	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE / DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	U.S. W.C., HAWAII	CT Cost Differential	45		23	18	
U.S. EAST COAST	U.S. W.C., HAWAII	LP PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	LP Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	LP PC Cost	94	44		23	
U.S. EAST COAST	U.S. W.C., HAWAII	LP Alternative Cost	229	104		53	
U.S. EAST COAST	U.S. W.C., HAWAII	LP Cost Differential	135	59		29	
U.S. EAST COAST	U.S. W.C., HAWAII	T PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	T Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	T PC Cost	26		12	9	7
U.S. EAST COAST	U.S. W.C., HAWAII	T Alternative Cost	65		28	20	17
U.S. EAST COAST	U.S. W.C., HAWAII	T Cost Differential	39		16	11	9
U.S. W.C., HAWAII	AFRICA	CB PC Mileage	9969				
U.S. W.C., HAWAII	AFRICA	CB Alternative Mileage	14150				
U.S. W.C., HAWAII	AFRICA	CB PC Cost	145	89	83	80	
U.S. W.C., HAWAII	AFRICA	CB Alternative Cost	187	110	102	98	
U.S. W.C., HAWAII	AFRICA	CB Cost Differential	43	21	19	18	
U.S. W.C., HAWAII	AFRICA	F PC Mileage	9969				
U.S. W.C., HAWAII	AFRICA	F Alternative Mileage	14150				
U.S. W.C., HAWAII	AFRICA	F PC Cost	366	243	197	192	
U.S. W.C., HAWAII	AFRICA	F Alternative Cost	451	296	236	228	
U.S. W.C., HAWAII	AFRICA	F Cost Differential	86	53	39	36	
U.S. W.C., HAWAII	AFRICA	G PC Mileage	9017				
U.S. W.C., HAWAII	AFRICA	G Alternative Mileage	13200				
U.S. W.C., HAWAII	AFRICA	G PC Cost	73	33	27		
U.S. W.C., HAWAII	AFRICA	G Alternative Cost	111	43	35		
U.S. W.C., HAWAII	AFRICA	G Cost Differential	39	10	8		
U.S. W.C., HAWAII	AFRICA	R PC Mileage	9017				
U.S. W.C., HAWAII	AFRICA	R Alternative Mileage	13200				
U.S. W.C., HAWAII	AFRICA	R PC Cost	135	121			
U.S. W.C., HAWAII	AFRICA	R Alternative Cost	176	159			
U.S. W.C., HAWAII	AFRICA	R Cost Differential	42	38			
U.S. W.C., HAWAII	AFRICA	RO PC Mileage	9969				
U.S. W.C., HAWAII	AFRICA	RO Alternative Mileage	14150				
U.S. W.C., HAWAII	AFRICA	RO PC Cost	309	241	214	198	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	AFRICA	RO	Alternative Cost		386	298	263	242	
U.S. W.C., HAWAII	AFRICA	RO	Cost Differential		77	57	49	45	
U.S. W.C., HAWAII	AFRICA	V	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	V	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	V	PC Cost		402	357	319		
U.S. W.C., HAWAII	AFRICA	V	Alternative Cost		490	431	379		
U.S. W.C., HAWAII	AFRICA	V	Cost Differential		88	73	60		
U.S. W.C., HAWAII	AFRICA	CD	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	CD	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	CD	PC Cost				17	14	12
U.S. W.C., HAWAII	AFRICA	CD	Alternative Cost				22	18	16
U.S. W.C., HAWAII	AFRICA	CD	Cost Differential				5	4	4
U.S. W.C., HAWAII	AFRICA	CT	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	CT	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	CT	PC Cost		75		40	32	
U.S. W.C., HAWAII	AFRICA	CT	Alternative Cost		96		51	40	
U.S. W.C., HAWAII	AFRICA	CT	Cost Differential		21		11	8	
U.S. W.C., HAWAII	AFRICA	LP	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	LP	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	LP	PC Cost		163	75		38	
U.S. W.C., HAWAII	AFRICA	LP	Alternative Cost		227	103		52	
U.S. W.C., HAWAII	AFRICA	LP	Cost Differential		64	28		14	
U.S. W.C., HAWAII	AFRICA	T	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	T	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	T	PC Cost		46		20	14	12
U.S. W.C., HAWAII	AFRICA	T	Alternative Cost		65		27	20	17
U.S. W.C., HAWAII	AFRICA	T	Cost Differential		19		7	5	4
U.S. W.C., HAWAII	CANADA EAST COAST	CB	PC Mileage		6341				
U.S. W.C., HAWAII	CANADA EAST COAST	CB	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	CB	PC Cost		109	69	65	63	
U.S. W.C., HAWAII	CANADA EAST COAST	CB	Alternative Cost		184	108	100	97	
U.S. W.C., HAWAII	CANADA EAST COAST	CB	Cost Differential		75	39	36	34	
U.S. W.C., HAWAII	CANADA EAST COAST	F	PC Mileage		6341				
U.S. W.C., HAWAII	CANADA EAST COAST	F	Alternative Mileage		13785				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	CANADA EAST COAST	F	PC Cost		285	192	159	156	
U.S. W.C., HAWAII	CANADA EAST COAST	F	Alternative Cost		443	291	232	225	
U.S. W.C., HAWAII	CANADA EAST COAST	F	Cost Differential		159	99	73	69	
U.S. W.C., HAWAII	CANADA EAST COAST	G	PC Mileage		6340				
U.S. W.C., HAWAII	CANADA EAST COAST	G	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	G	PC Cost		47	26	22		
U.S. W.C., HAWAII	CANADA EAST COAST	G	Alternative Cost		117	44	37		
U.S. W.C., HAWAII	CANADA EAST COAST	G	Cost Differential		70	18	15		
U.S. W.C., HAWAII	CANADA EAST COAST	R	PC Mileage		6340				
U.S. W.C., HAWAII	CANADA EAST COAST	R	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	R	PC Cost		106	94			
U.S. W.C., HAWAII	CANADA EAST COAST	R	Alternative Cost		183	165			
U.S. W.C., HAWAII	CANADA EAST COAST	R	Cost Differential		77	71			
U.S. W.C., HAWAII	CANADA EAST COAST	RO	PC Mileage		6341				
U.S. W.C., HAWAII	CANADA EAST COAST	RO	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	RO	PC Cost		237	187	167	156	
U.S. W.C., HAWAII	CANADA EAST COAST	RO	Alternative Cost		378	293	259	238	
U.S. W.C., HAWAII	CANADA EAST COAST	RO	Cost Differential		141	106	91	82	
U.S. W.C., HAWAII	CANADA EAST COAST	V	PC Mileage		6340				
U.S. W.C., HAWAII	CANADA EAST COAST	V	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	V	PC Cost		339	304	275		
U.S. W.C., HAWAII	CANADA EAST COAST	V	Alternative Cost		504	442	388		
U.S. W.C., HAWAII	CANADA EAST COAST	V	Cost Differential		165	138	113		
U.S. W.C., HAWAII	CANADA EAST COAST	CD	PC Mileage		6340				
U.S. W.C., HAWAII	CANADA EAST COAST	CD	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	CD	PC Cost				13	11	9
U.S. W.C., HAWAII	CANADA EAST COAST	CD	Alternative Cost				23	19	16
U.S. W.C., HAWAII	CANADA EAST COAST	CD	Cost Differential				10	8	7
U.S. W.C., HAWAII	CANADA EAST COAST	CT	PC Mileage		6340				
U.S. W.C., HAWAII	CANADA EAST COAST	CT	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	CT	PC Cost		60		33	26	
U.S. W.C., HAWAII	CANADA EAST COAST	CT	Alternative Cost		99		53	41	
U.S. W.C., HAWAII	CANADA EAST COAST	CT	Cost Differential		39		20	15	
U.S. W.C., HAWAII	CANADA EAST COAST	LP	PC Mileage		6340				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	CANADA EAST COAST	LP	Alternative Mileage	13785				
U.S. W.C., HAWAII	CANADA EAST COAST	LP	PC Cost	119	56		29	
U.S. W.C., HAWAII	CANADA EAST COAST	LP	Alternative Cost	236	107		54	
U.S. W.C., HAWAII	CANADA EAST COAST	LP	Cost Differential	117	51		25	
U.S. W.C., HAWAII	CANADA EAST COAST	T	PC Mileage	6340				
U.S. W.C., HAWAII	CANADA EAST COAST	T	Alternative Mileage	13785				
U.S. W.C., HAWAII	CANADA EAST COAST	T	PC Cost	33		15	11	9
U.S. W.C., HAWAII	CANADA EAST COAST	T	Alternative Cost	67		28	20	17
U.S. W.C., HAWAII	CANADA EAST COAST	T	Cost Differential	34		14	10	8
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage	5253				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage	12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost	98	63	59	57	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost	168	99	92	89	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential	70	36	33	31	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage	5253				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage	12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost	260	177	147	145	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost	407	268	215	208	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential	147	92	68	64	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage	4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage	12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost	29	21	18		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost	102	40	33		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential	72	19	15		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage	4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage	12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost	85	75			
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost	165	149			
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential	80	74			
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage	5253				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage	12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost	215	171	153	143	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost	346	269	238	219	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential	131	98	85	76	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		296	268	245		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		466	410	362		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		170	143	117		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				11	8	7
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				21	17	15
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				10	8	7
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		50		28	22	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		90		48	38	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		40		20	16	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		89	42		22	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		210	95		48	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		121	53		26	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		25		11	8	7
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		60		25	18	15
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		35		14	10	8
U.S. W.C., HAWAII	EUROPE	CB	PC Mileage		9405				
U.S. W.C., HAWAII	EUROPE	CB	Alternative Mileage		14940				
U.S. W.C., HAWAII	EUROPE	CB	PC Cost		139	86	80	77	
U.S. W.C., HAWAII	EUROPE	CB	Alternative Cost		195	114	106	102	
U.S. W.C., HAWAII	EUROPE	CB	Cost Differential		56	29	26	25	
U.S. W.C., HAWAII	EUROPE	F	PC Mileage		9405				
U.S. W.C., HAWAII	EUROPE	F	Alternative Mileage		14940				
U.S. W.C., HAWAII	EUROPE	F	PC Cost		353	235	191	187	
U.S. W.C., HAWAII	EUROPE	F	Alternative Cost		469	307	244	236	
U.S. W.C., HAWAII	EUROPE	F	Cost Differential		116	72	53	49	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	EUROPE	G	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	G	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	G	PC Cost	65	31	26		
U.S. W.C., HAWAII	EUROPE	G	Alternative Cost	116	44	37		
U.S. W.C., HAWAII	EUROPE	G	Cost Differential	52	13	11		
U.S. W.C., HAWAII	EUROPE	R	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	R	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	R	PC Cost	125	113			
U.S. W.C., HAWAII	EUROPE	R	Alternative Cost	182	164			
U.S. W.C., HAWAII	EUROPE	R	Cost Differential	56	52			
U.S. W.C., HAWAII	EUROPE	RO	PC Mileage	9405				
U.S. W.C., HAWAII	EUROPE	RO	Alternative Mileage	14840				
U.S. W.C., HAWAII	EUROPE	RO	PC Cost	298	233	207	191	
U.S. W.C., HAWAII	EUROPE	RO	Alternative Cost	399	308	272	250	
U.S. W.C., HAWAII	EUROPE	RO	Cost Differential	101	76	66	59	
U.S. W.C., HAWAII	EUROPE	V	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	V	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	V	PC Cost	382	340	305		
U.S. W.C., HAWAII	EUROPE	V	Alternative Cost	502	441	387		
U.S. W.C., HAWAII	EUROPE	V	Cost Differential	120	100	82		
U.S. W.C., HAWAII	EUROPE	CD	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	CD	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	CD	PC Cost			16	13	11
U.S. W.C., HAWAII	EUROPE	CD	Alternative Cost			23	18	16
U.S. W.C., HAWAII	EUROPE	CD	Cost Differential			7	6	5
U.S. W.C., HAWAII	EUROPE	CT	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	CT	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	CT	PC Cost	70		38	30	
U.S. W.C., HAWAII	EUROPE	CT	Alternative Cost	99		52	41	
U.S. W.C., HAWAII	EUROPE	CT	Cost Differential	28		15	11	
U.S. W.C., HAWAII	EUROPE	LP	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	LP	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	LP	PC Cost	149	69		35	
U.S. W.C., HAWAII	EUROPE	LP	Alternative Cost	235	106		54	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	EUROPE	LP	Cost Differential		86	38		19	
U.S. W.C., HAWAII	EUROPE	T	PC Mileage		8165				
U.S. W.C., HAWAII	EUROPE	T	Alternative Mileage		13702				
U.S. W.C., HAWAII	EUROPE	T	PC Cost		42		18	13	11
U.S. W.C., HAWAII	EUROPE	T	Alternative Cost		67		28	20	17
U.S. W.C., HAWAII	EUROPE	T	Cost Differential		25		10	7	6
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	PC Mileage		10207				
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	Alternative Mileage		11677				
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	PC Cost		371	246	199	195	
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	Alternative Cost		396	261	210	204	
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	Cost Differential		25	15	11	9	
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	PC Mileage		7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	Alternative Mileage		8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	PC Cost		121	75	70	68	
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	Alternative Cost		133	80	74	72	
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	Cost Differential		13	4	4	4	
U.S. W.C., HAWAII	S. AMERICA E.C.	F	PC Mileage		7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	F	Alternative Mileage		8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	F	PC Cost		311	209	171	168	
U.S. W.C., HAWAII	S. AMERICA E.C.	F	Alternative Cost		327	218	178	173	
U.S. W.C., HAWAII	S. AMERICA E.C.	F	Cost Differential		16	10	7	5	
U.S. W.C., HAWAII	S. AMERICA E.C.	G	PC Mileage		7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	G	Alternative Mileage		8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	G	PC Cost		58	29	24		
U.S. W.C., HAWAII	S. AMERICA E.C.	G	Alternative Cost		67	31	26		
U.S. W.C., HAWAII	S. AMERICA E.C.	G	Cost Differential		9	2	2		
U.S. W.C., HAWAII	S. AMERICA E.C.	R	PC Mileage		7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	R	Alternative Mileage		8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	R	PC Cost		119	106			
U.S. W.C., HAWAII	S. AMERICA E.C.	R	Alternative Cost		126	113			
U.S. W.C., HAWAII	S. AMERICA E.C.	R	Cost Differential		8	7			
U.S. W.C., HAWAII	S. AMERICA E.C.	RO	PC Mileage		7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	RO	Alternative Mileage		8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	RO	PC Cost		261	205	183	170	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	S. AMERICA E.C.	RO	Alternative Cost	276	216	192	178	
U.S. W.C., HAWAII	S. AMERICA E.C.	RO	Cost Differential	15	11	9	8	
U.S. W.C., HAWAII	S. AMERICA E.C.	V	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	V	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	V	PC Cost	367	328	295		
U.S. W.C., HAWAII	S. AMERICA E.C.	V	Alternative Cost	382	340	304		
U.S. W.C., HAWAII	S. AMERICA E.C.	V	Cost Differential	15	12	9		
U.S. W.C., HAWAII	S. AMERICA E.C.	CD	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	CD	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	CD	PC Cost			15	12	10
U.S. W.C., HAWAII	S. AMERICA E.C.	CD	Alternative Cost			16	13	11
U.S. W.C., HAWAII	S. AMERICA E.C.	CD	Cost Differential			1	1	1
U.S. W.C., HAWAII	S. AMERICA E.C.	CT	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	CT	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	CT	PC Cost	67		36	29	
U.S. W.C., HAWAII	S. AMERICA E.C.	CT	Alternative Cost	71		38	30	
U.S. W.C., HAWAII	S. AMERICA E.C.	CT	Cost Differential	4		2	2	
U.S. W.C., HAWAII	S. AMERICA E.C.	LP	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	LP	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	LP	PC Cost	139	64		33	
U.S. W.C., HAWAII	S. AMERICA E.C.	LP	Alternative Cost	152	70		36	
U.S. W.C., HAWAII	S. AMERICA E.C.	LP	Cost Differential	13	6		3	
U.S. W.C., HAWAII	S. AMERICA E.C.	T	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	T	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	T	PC Cost	39		17	12	11
U.S. W.C., HAWAII	S. AMERICA E.C.	T	Alternative Cost	43		19	13	11
U.S. W.C., HAWAII	S. AMERICA E.C.	T	Cost Differential	4		2	1	1
U.S. W.C., HAWAII	U.S. EAST COAST	CB	PC Mileage	4767				
U.S. W.C., HAWAII	U.S. EAST COAST	CB	Alternative Mileage	13331				
U.S. W.C., HAWAII	U.S. EAST COAST	CB	PC Cost	93	60	57	55	
U.S. W.C., HAWAII	U.S. EAST COAST	CB	Alternative Cost	179	105	98	94	
U.S. W.C., HAWAII	U.S. EAST COAST	CB	Cost Differential	86	45	41	39	
U.S. W.C., HAWAII	U.S. EAST COAST	F	PC Mileage	4767				
U.S. W.C., HAWAII	U.S. EAST COAST	F	Alternative Mileage	13331				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	U.S. EAST COAST	F	PC Cost		249	170	142	140	
U.S. W.C., HAWAII	U.S. EAST COAST	F	Alternative Cost		433	285	227	220	
U.S. W.C., HAWAII	U.S. EAST COAST	F	Cost Differential		184	115	85	80	
U.S. W.C., HAWAII	U.S. EAST COAST	G	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	G	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	G	PC Cost		32	22	18		
U.S. W.C., HAWAII	U.S. EAST COAST	G	Alternative Cost		113	43	36		
U.S. W.C., HAWAII	U.S. EAST COAST	G	Cost Differential		81	21	17		
U.S. W.C., HAWAII	U.S. EAST COAST	R	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	R	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	R	PC Cost		88	78			
U.S. W.C., HAWAII	U.S. EAST COAST	R	Alternative Cost		178	161			
U.S. W.C., HAWAII	U.S. EAST COAST	R	Cost Differential		89	82			
U.S. W.C., HAWAII	U.S. EAST COAST	RO	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	RO	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	RO	PC Cost		206	164	147	138	
U.S. W.C., HAWAII	U.S. EAST COAST	RO	Alternative Cost		369	286	253	233	
U.S. W.C., HAWAII	U.S. EAST COAST	RO	Cost Differential		163	122	106	95	
U.S. W.C., HAWAII	U.S. EAST COAST	V	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	V	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	V	PC Cost		302	273	250		
U.S. W.C., HAWAII	U.S. EAST COAST	V	Alternative Cost		493	433	381		
U.S. W.C., HAWAII	U.S. EAST COAST	V	Cost Differential		191	160	131		
U.S. W.C., HAWAII	U.S. EAST COAST	CD	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	CD	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	CD	PC Cost				11	9	8
U.S. W.C., HAWAII	U.S. EAST COAST	CD	Alternative Cost				22	18	16
U.S. W.C., HAWAII	U.S. EAST COAST	CD	Cost Differential				11	9	8
U.S. W.C., HAWAII	U.S. EAST COAST	CT	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	CT	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	CT	PC Cost		52		29	23	
U.S. W.C., HAWAII	U.S. EAST COAST	CT	Alternative Cost		97		51	41	
U.S. W.C., HAWAII	U.S. EAST COAST	CT	Cost Differential		45		23	18	
U.S. W.C., HAWAII	U.S. EAST COAST	LP	PC Mileage		4767				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2020

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	U.S. EAST COAST	LP	Alternative Mileage	13331				
U.S. W.C., HAWAII	U.S. EAST COAST	LP	PC Cost	94	44		23	
U.S. W.C., HAWAII	U.S. EAST COAST	LP	Alternative Cost	229	104		53	
U.S. W.C., HAWAII	U.S. EAST COAST	LP	Cost Differential	135	59		29	
U.S. W.C., HAWAII	U.S. EAST COAST	T	PC Mileage	4767				
U.S. W.C., HAWAII	U.S. EAST COAST	T	Alternative Mileage	13331				
U.S. W.C., HAWAII	U.S. EAST COAST	T	PC Cost	26		12	9	7
U.S. W.C., HAWAII	U.S. EAST COAST	T	Alternative Cost	65		28	20	17
U.S. W.C., HAWAII	U.S. EAST COAST	T	Cost Differential	39		16	11	9

3.0 STATUS QUO COSTS FOR EACH CANAL ROUTE AND EACH LEAST COST ALTERNATIVE, 2060

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	ASIA	CB	PC Mileage	13235				
AFRICA	ASIA	CB	Alternative Mileage	12090				
AFRICA	ASIA	CB	PC Cost	194	112	105	99	
AFRICA	ASIA	CB	Alternative Cost	179	104	97	92	
AFRICA	ASIA	CB	Cost Differential	-15	-8	-8	-7	
AFRICA	ASIA	F	PC Mileage	13235				
AFRICA	ASIA	F	Alternative Mileage	12090				
AFRICA	ASIA	F	PC Cost		290	225	224	
AFRICA	ASIA	F	Alternative Cost		271	212	210	
AFRICA	ASIA	F	Cost Differential		-19	-12	-14	
AFRICA	ASIA	G	PC Mileage	11420				
AFRICA	ASIA	G	Alternative Mileage	12090				
AFRICA	ASIA	G	PC Cost	110	43	33		
AFRICA	ASIA	G	Alternative Cost	116	45	34		
AFRICA	ASIA	G	Cost Differential	6	1	1		
AFRICA	ASIA	R	PC Mileage	11420				
AFRICA	ASIA	R	Alternative Mileage	12090				
AFRICA	ASIA	R	PC Cost	179	155			
AFRICA	ASIA	R	Alternative Cost	183	158			
AFRICA	ASIA	R	Cost Differential	4	3			
AFRICA	ASIA	RO	PC Mileage	13235				
AFRICA	ASIA	RO	Alternative Mileage	12090				
AFRICA	ASIA	RO	PC Cost	406	316	269	245	
AFRICA	ASIA	RO	Alternative Cost	376	294	248	226	
AFRICA	ASIA	RO	Cost Differential	-30	-22	-21	-18	
AFRICA	ASIA	V	PC Mileage	11420				
AFRICA	ASIA	V	Alternative Mileage	12090				
AFRICA	ASIA	V	PC Cost	499	433	375		
AFRICA	ASIA	V	Alternative Cost	505	437	378		
AFRICA	ASIA	V	Cost Differential	7	5	3		
AFRICA	ASIA	CD	PC Mileage	11420				
AFRICA	ASIA	CD	Alternative Mileage	12090				
AFRICA	ASIA	CD	PC Cost			22	17	16
AFRICA	ASIA	CD	Alternative Cost			22	17	16
AFRICA	ASIA	CD	Cost Differential					

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	ASIA	CT	PC Mileage	11420				
AFRICA	ASIA	CT	Alternative Mileage	12090				
AFRICA	ASIA	CT	PC Cost	98		48	38	
AFRICA	ASIA	CT	Alternative Cost	100		49	38	
AFRICA	ASIA	CT	Cost Differential	3		1	1	
AFRICA	ASIA	LP	PC Mileage	11420				
AFRICA	ASIA	LP	Alternative Mileage	12090				
AFRICA	ASIA	LP	PC Cost	240	105		54	
AFRICA	ASIA	LP	Alternative Cost	248	108		55	
AFRICA	ASIA	LP	Cost Differential	8	3		1	
AFRICA	ASIA	T	PC Mileage	11420				
AFRICA	ASIA	T	Alternative Mileage	12090				
AFRICA	ASIA	T	PC Cost	71		30	21	18
AFRICA	ASIA	T	Alternative Cost	74		31	22	19
AFRICA	ASIA	T	Cost Differential	3			1	1
AFRICA	CANADA WEST COAST	CB	PC Mileage	9792				
AFRICA	CANADA WEST COAST	CB	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	CB	PC Cost	157	92	86	82	
AFRICA	CANADA WEST COAST	CB	Alternative Cost	188	109	101	96	
AFRICA	CANADA WEST COAST	CB	Cost Differential	31	17	15	14	
AFRICA	CANADA WEST COAST	F	PC Mileage	9792				
AFRICA	CANADA WEST COAST	F	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	F	PC Cost		243	191	187	
AFRICA	CANADA WEST COAST	F	Alternative Cost		282	221	220	
AFRICA	CANADA WEST COAST	F	Cost Differential		40	30	32	
AFRICA	CANADA WEST COAST	G	PC Mileage	9792				
AFRICA	CANADA WEST COAST	G	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	G	PC Cost	92	39	30		
AFRICA	CANADA WEST COAST	G	Alternative Cost	125	47	36		
AFRICA	CANADA WEST COAST	G	Cost Differential	34	8	6		
AFRICA	CANADA WEST COAST	R	PC Mileage	9792				
AFRICA	CANADA WEST COAST	R	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	R	PC Cost	159	137			
AFRICA	CANADA WEST COAST	R	Alternative Cost	193	167			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	CANADA WEST COAST	R	Cost Differential	34	30			
AFRICA	CANADA WEST COAST	RO	PC Mileage	9792				
AFRICA	CANADA WEST COAST	RO	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	RO	PC Cost	330	261	223	204	
AFRICA	CANADA WEST COAST	RO	Alternative Cost	396	310	259	237	
AFRICA	CANADA WEST COAST	RO	Cost Differential	66	49	37	33	
AFRICA	CANADA WEST COAST	V	PC Mileage	9792				
AFRICA	CANADA WEST COAST	V	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	V	PC Cost	455	397	347		
AFRICA	CANADA WEST COAST	V	Alternative Cost	528	456	393		
AFRICA	CANADA WEST COAST	V	Cost Differential	72	59	46		
AFRICA	CANADA WEST COAST	CD	PC Mileage	9792				
AFRICA	CANADA WEST COAST	CD	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	CD	PC Cost			19	15	14
AFRICA	CANADA WEST COAST	CD	Alternative Cost			23	18	17
AFRICA	CANADA WEST COAST	CD	Cost Differential			4	3	3
AFRICA	CANADA WEST COAST	CT	PC Mileage	9792				
AFRICA	CANADA WEST COAST	CT	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	CT	PC Cost	88		43	34	
AFRICA	CANADA WEST COAST	CT	Alternative Cost	105		51	40	
AFRICA	CANADA WEST COAST	CT	Cost Differential	18		8	6	
AFRICA	CANADA WEST COAST	LP	PC Mileage	9792				
AFRICA	CANADA WEST COAST	LP	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	LP	PC Cost	208	91		47	
AFRICA	CANADA WEST COAST	LP	Alternative Cost	264	115		59	
AFRICA	CANADA WEST COAST	LP	Cost Differential	56	23		12	
AFRICA	CANADA WEST COAST	T	PC Mileage	9792				
AFRICA	CANADA WEST COAST	T	Alternative Mileage	12925				
AFRICA	CANADA WEST COAST	T	PC Cost	62		27	18	16
AFRICA	CANADA WEST COAST	T	Alternative Cost	79		33	23	20
AFRICA	CANADA WEST COAST	T	Cost Differential	17		6	5	4
AFRICA	C. AMERICA W.C.	CB	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	CB	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	CB	PC Cost	126	75	71	67	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	C. AMERICA W.C.	CB	Alternative Cost	227	129	120	114	
AFRICA	C. AMERICA W.C.	CB	Cost Differential	101	54	50	46	
AFRICA	C. AMERICA W.C.	F	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	F	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	F	PC Cost		203	162	156	
AFRICA	C. AMERICA W.C.	F	Alternative Cost		333	258	259	
AFRICA	C. AMERICA W.C.	F	Cost Differential		130	95	103	
AFRICA	C. AMERICA W.C.	G	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	G	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	G	PC Cost	59	30	23		
AFRICA	C. AMERICA W.C.	G	Alternative Cost	165	57	44		
AFRICA	C. AMERICA W.C.	G	Cost Differential	106	27	20		
AFRICA	C. AMERICA W.C.	R	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	R	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	R	PC Cost	123	106			
AFRICA	C. AMERICA W.C.	R	Alternative Cost	237	206			
AFRICA	C. AMERICA W.C.	R	Cost Differential	114	100			
AFRICA	C. AMERICA W.C.	RO	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	RO	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	RO	PC Cost	266	214	184	170	
AFRICA	C. AMERICA W.C.	RO	Alternative Cost	482	377	308	280	
AFRICA	C. AMERICA W.C.	RO	Cost Differential	216	163	124	110	
AFRICA	C. AMERICA W.C.	V	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	V	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	V	PC Cost	378	333	295		
AFRICA	C. AMERICA W.C.	V	Alternative Cost	622	534	456		
AFRICA	C. AMERICA W.C.	V	Cost Differential	244	201	161		
AFRICA	C. AMERICA W.C.	CD	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	CD	Alternative Mileage	16470				
AFRICA	C. AMERICA W.C.	CD	PC Cost			15	11	11
AFRICA	C. AMERICA W.C.	CD	Alternative Cost			29	22	21
AFRICA	C. AMERICA W.C.	CD	Cost Differential			14	11	10
AFRICA	C. AMERICA W.C.	CT	PC Mileage	6884				
AFRICA	C. AMERICA W.C.	CT	Alternative Mileage	16470				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	C. AMERICA W.C.	CT	PC Cost		70		35	28	
AFRICA	C. AMERICA W.C.	CT	Alternative Cost		127		61	48	
AFRICA	C. AMERICA W.C.	CT	Cost Differential		56		26	20	
AFRICA	C. AMERICA W.C.	LP	PC Mileage		6884				
AFRICA	C. AMERICA W.C.	LP	Alternative Mileage		16470				
AFRICA	C. AMERICA W.C.	LP	PC Cost		152	68		35	
AFRICA	C. AMERICA W.C.	LP	Alternative Cost		333	144		73	
AFRICA	C. AMERICA W.C.	LP	Cost Differential		181	76		38	
AFRICA	C. AMERICA W.C.	T	PC Mileage		6884				
AFRICA	C. AMERICA W.C.	T	Alternative Mileage		16470				
AFRICA	C. AMERICA W.C.	T	PC Cost		45		20	14	12
AFRICA	C. AMERICA W.C.	T	Alternative Cost		100		41	29	25
AFRICA	C. AMERICA W.C.	T	Cost Differential		55		22	15	13
AFRICA	OCEANIA	CB	PC Mileage		13681				
AFRICA	OCEANIA	CB	Alternative Mileage		10100				
AFRICA	OCEANIA	CB	PC Cost		199	115	107	101	
AFRICA	OCEANIA	CB	Alternative Cost		158	92	86	82	
AFRICA	OCEANIA	CB	Cost Differential		-41	-23	-21	-19	
AFRICA	OCEANIA	F	PC Mileage		13681				
AFRICA	OCEANIA	F	Alternative Mileage		10100				
AFRICA	OCEANIA	F	PC Cost			296	229	229	
AFRICA	OCEANIA	F	Alternative Cost			242	191	188	
AFRICA	OCEANIA	F	Cost Differential			-53	-37	-40	
AFRICA	OCEANIA	G	PC Mileage		13681				
AFRICA	OCEANIA	G	Alternative Mileage		10100				
AFRICA	OCEANIA	G	PC Cost		135	50	38		
AFRICA	OCEANIA	G	Alternative Cost		94	39	30		
AFRICA	OCEANIA	G	Cost Differential		-41	-11	-8		
AFRICA	OCEANIA	R	PC Mileage		13681				
AFRICA	OCEANIA	R	Alternative Mileage		10100				
AFRICA	OCEANIA	R	PC Cost		207	180			
AFRICA	OCEANIA	R	Alternative Cost		159	137			
AFRICA	OCEANIA	R	Cost Differential		-49	-43			
AFRICA	OCEANIA	RO	PC Mileage		13681				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	OCEANIA	RO	Alternative Mileage	10100				
AFRICA	OCEANIA	RO	PC Cost	416	323	274	250	
AFRICA	OCEANIA	RO	Alternative Cost	328	256	221	202	
AFRICA	OCEANIA	RO	Cost Differential	-88	-67	-54	-48	
AFRICA	OCEANIA	V	PC Mileage	13681				
AFRICA	OCEANIA	V	Alternative Mileage	10100				
AFRICA	OCEANIA	V	PC Cost	559	482	416		
AFRICA	OCEANIA	V	Alternative Cost	452	394	343		
AFRICA	OCEANIA	V	Cost Differential	-107	-89	-72		
AFRICA	OCEANIA	CD	PC Mileage	11361				
AFRICA	OCEANIA	CD	Alternative Mileage	10100				
AFRICA	OCEANIA	CD	PC Cost			21	17	16
AFRICA	OCEANIA	CD	Alternative Cost			19	15	14
AFRICA	OCEANIA	CD	Cost Differential			-2	-2	-2
AFRICA	OCEANIA	CT	PC Mileage	11361				
AFRICA	OCEANIA	CT	Alternative Mileage	10100				
AFRICA	OCEANIA	CT	PC Cost	97		48	37	
AFRICA	OCEANIA	CT	Alternative Cost	88		43	34	
AFRICA	OCEANIA	CT	Cost Differential	-9		-4	-3	
AFRICA	OCEANIA	LP	PC Mileage	11361				
AFRICA	OCEANIA	LP	Alternative Mileage	10100				
AFRICA	OCEANIA	LP	PC Cost	239	104		54	
AFRICA	OCEANIA	LP	Alternative Cost	209	92		47	
AFRICA	OCEANIA	LP	Cost Differential	-30	-13		-6	
AFRICA	OCEANIA	T	PC Mileage	11361				
AFRICA	OCEANIA	T	Alternative Mileage	10100				
AFRICA	OCEANIA	T	PC Cost	71		30	21	18
AFRICA	OCEANIA	T	Alternative Cost	62		26	18	16
AFRICA	OCEANIA	T	Cost Differential	-9		-4	-2	-2
AFRICA	S. AMERICA W.C.	CB	PC Mileage	9145				
AFRICA	S. AMERICA W.C.	CB	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	CB	PC Cost	150	88	83	79	
AFRICA	S. AMERICA W.C.	CB	Alternative Cost	220	126	117	111	
AFRICA	S. AMERICA W.C.	CB	Cost Differential	69	37	34	32	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	S. AMERICA W.C.	F	PC Mileage		9145				
AFRICA	S. AMERICA W.C.	F	Alternative Mileage		15835				
AFRICA	S. AMERICA W.C.	F	PC Cost			234	185	180	
AFRICA	S. AMERICA W.C.	F	Alternative Cost			324	251	252	
AFRICA	S. AMERICA W.C.	F	Cost Differential			90	66	72	
AFRICA	S. AMERICA W.C.	G	PC Mileage		9145				
AFRICA	S. AMERICA W.C.	G	Alternative Mileage		15835				
AFRICA	S. AMERICA W.C.	G	PC Cost		84	37	28		
AFRICA	S. AMERICA W.C.	G	Alternative Cost		158	55	42		
AFRICA	S. AMERICA W.C.	G	Cost Differential		73	18	14		
AFRICA	S. AMERICA W.C.	R	PC Mileage		9145				
AFRICA	S. AMERICA W.C.	R	Alternative Mileage		15835				
AFRICA	S. AMERICA W.C.	R	PC Cost		151	130			
AFRICA	S. AMERICA W.C.	R	Alternative Cost		229	199			
AFRICA	S. AMERICA W.C.	R	Cost Differential		78	68			
AFRICA	S. AMERICA W.C.	RO	PC Mileage		9145				
AFRICA	S. AMERICA W.C.	RO	Alternative Mileage		15835				
AFRICA	S. AMERICA W.C.	RO	PC Cost		316	250	214	196	
AFRICA	S. AMERICA W.C.	RO	Alternative Cost		467	365	299	272	
AFRICA	S. AMERICA W.C.	RO	Cost Differential		151	115	85	76	
AFRICA	S. AMERICA W.C.	V	PC Mileage		9145				
AFRICA	S. AMERICA W.C.	V	Alternative Mileage		15835				
AFRICA	S. AMERICA W.C.	V	PC Cost		438	383	335		
AFRICA	S. AMERICA W.C.	V	Alternative Cost		605	520	444		
AFRICA	S. AMERICA W.C.	V	Cost Differential		167	137	109		
AFRICA	S. AMERICA W.C.	CD	PC Mileage		9145				
AFRICA	S. AMERICA W.C.	CD	Alternative Mileage		15835				
AFRICA	S. AMERICA W.C.	CD	PC Cost				18	14	13
AFRICA	S. AMERICA W.C.	CD	Alternative Cost				28	22	20
AFRICA	S. AMERICA W.C.	CD	Cost Differential				10	8	7
AFRICA	S. AMERICA W.C.	CT	PC Mileage		9245				
AFRICA	S. AMERICA W.C.	CT	Alternative Mileage		15835				
AFRICA	S. AMERICA W.C.	CT	PC Cost		85		42	33	
AFRICA	S. AMERICA W.C.	CT	Alternative Cost		123		60	47	
AFRICA	S. AMERICA W.C.	CT	Cost Differential		38		18	14	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	S. AMERICA W.C.	LP	PC Mileage	9245				
AFRICA	S. AMERICA W.C.	LP	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	LP	PC Cost	197	87		45	
AFRICA	S. AMERICA W.C.	LP	Alternative Cost	320	139		71	
AFRICA	S. AMERICA W.C.	LP	Cost Differential	123	52		26	
AFRICA	S. AMERICA W.C.	T	PC Mileage	9245				
AFRICA	S. AMERICA W.C.	T	Alternative Mileage	15835				
AFRICA	S. AMERICA W.C.	T	PC Cost	59		25	18	15
AFRICA	S. AMERICA W.C.	T	Alternative Cost	96		40	28	24
AFRICA	S. AMERICA W.C.	T	Cost Differential	37		14	10	9
AFRICA	U.S. W.C., HAWAII	CB	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	CB	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	CB	PC Cost	159	93	87	83	
AFRICA	U.S. W.C., HAWAII	CB	Alternative Cost	191	110	103	98	
AFRICA	U.S. W.C., HAWAII	CB	Cost Differential	32	17	16	15	
AFRICA	U.S. W.C., HAWAII	F	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	F	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	F	PC Cost		245	193	189	
AFRICA	U.S. W.C., HAWAII	F	Alternative Cost		286	224	223	
AFRICA	U.S. W.C., HAWAII	F	Cost Differential		41	31	34	
AFRICA	U.S. W.C., HAWAII	G	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	G	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	G	PC Cost	94	39	30		
AFRICA	U.S. W.C., HAWAII	G	Alternative Cost	128	48	37		
AFRICA	U.S. W.C., HAWAII	G	Cost Differential	35	9	6		
AFRICA	U.S. W.C., HAWAII	R	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	R	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	R	PC Cost	162	139			
AFRICA	U.S. W.C., HAWAII	R	Alternative Cost	197	170			
AFRICA	U.S. W.C., HAWAII	R	Cost Differential	35	31			
AFRICA	U.S. W.C., HAWAII	RO	PC Mileage	9969				
AFRICA	U.S. W.C., HAWAII	RO	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	RO	PC Cost	334	264	225	206	
AFRICA	U.S. W.C., HAWAII	RO	Alternative Cost	403	315	263	240	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
AFRICA	U.S. W.C., HAWAII	RO	Cost Differential	69	51	38	34	
AFRICA	U.S. W.C., HAWAII	V	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	V	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	V	PC Cost	435	380	333		
AFRICA	U.S. W.C., HAWAII	V	Alternative Cost	535	462	398		
AFRICA	U.S. W.C., HAWAII	V	Cost Differential	100	82	65		
AFRICA	U.S. W.C., HAWAII	CD	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	CD	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	CD	PC Cost			18	14	13
AFRICA	U.S. W.C., HAWAII	CD	Alternative Cost			24	19	17
AFRICA	U.S. W.C., HAWAII	CD	Cost Differential			6	5	4
AFRICA	U.S. W.C., HAWAII	CT	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	CT	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	CT	PC Cost	83		41	32	
AFRICA	U.S. W.C., HAWAII	CT	Alternative Cost	107		52	41	
AFRICA	U.S. W.C., HAWAII	CT	Cost Differential	24		11	9	
AFRICA	U.S. W.C., HAWAII	LP	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	LP	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	LP	PC Cost	193	85		44	
AFRICA	U.S. W.C., HAWAII	LP	Alternative Cost	269	117		60	
AFRICA	U.S. W.C., HAWAII	LP	Cost Differential	76	32		16	
AFRICA	U.S. W.C., HAWAII	T	PC Mileage	9017				
AFRICA	U.S. W.C., HAWAII	T	Alternative Mileage	13200				
AFRICA	U.S. W.C., HAWAII	T	PC Cost	57		25	17	15
AFRICA	U.S. W.C., HAWAII	T	Alternative Cost	80		33	24	20
AFRICA	U.S. W.C., HAWAII	T	Cost Differential	23		9	6	5
ASIA	CANADA EAST COAST	CB	PC Mileage	10738				
ASIA	CANADA EAST COAST	CB	Alternative Mileage	12925				
ASIA	CANADA EAST COAST	CB	PC Cost	167	98	91	87	
ASIA	CANADA EAST COAST	CB	Alternative Cost	188	109	101	96	
ASIA	CANADA EAST COAST	CB	Cost Differential	21	11	10	9	
ASIA	CANADA EAST COAST	F	PC Mileage	10738				
ASIA	CANADA EAST COAST	F	Alternative Mileage	12925				
ASIA	CANADA EAST COAST	F	PC Cost		255	200	197	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	CANADA EAST COAST	F	Alternative Cost			282	221	220	
ASIA	CANADA EAST COAST	F	Cost Differential			27	21	22	
ASIA	CANADA EAST COAST	G	PC Mileage		10738				
ASIA	CANADA EAST COAST	G	Alternative Mileage		12925				
ASIA	CANADA EAST COAST	G	PC Cost		102	41	32		
ASIA	CANADA EAST COAST	G	Alternative Cost		125	47	36		
ASIA	CANADA EAST COAST	G	Cost Differential		23	5	4		
ASIA	CANADA EAST COAST	R	PC Mileage		10738				
ASIA	CANADA EAST COAST	R	Alternative Mileage		12925				
ASIA	CANADA EAST COAST	R	PC Cost		171	148			
ASIA	CANADA EAST COAST	R	Alternative Cost		193	167			
ASIA	CANADA EAST COAST	R	Cost Differential		22	20			
ASIA	CANADA EAST COAST	RO	PC Mileage		10738				
ASIA	CANADA EAST COAST	RO	Alternative Mileage		12925				
ASIA	CANADA EAST COAST	RO	PC Cost		351	276	235	215	
ASIA	CANADA EAST COAST	RO	Alternative Cost		396	310	259	237	
ASIA	CANADA EAST COAST	RO	Cost Differential		45	34	24	21	
ASIA	CANADA EAST COAST	V	PC Mileage		10738				
ASIA	CANADA EAST COAST	V	Alternative Mileage		12925				
ASIA	CANADA EAST COAST	V	PC Cost		481	418	363		
ASIA	CANADA EAST COAST	V	Alternative Cost		528	456	393		
ASIA	CANADA EAST COAST	V	Cost Differential		47	38	30		
ASIA	CANADA EAST COAST	CD	PC Mileage		10738				
ASIA	CANADA EAST COAST	CD	Alternative Mileage		12860				
ASIA	CANADA EAST COAST	CD	PC Cost				20	16	15
ASIA	CANADA EAST COAST	CD	Alternative Cost				23	18	17
ASIA	CANADA EAST COAST	CD	Cost Differential				3	2	2
ASIA	CANADA EAST COAST	CT	PC Mileage		10738				
ASIA	CANADA EAST COAST	CT	Alternative Mileage		12860				
ASIA	CANADA EAST COAST	CT	PC Cost		94		46	36	
ASIA	CANADA EAST COAST	CT	Alternative Cost		105		51	40	
ASIA	CANADA EAST COAST	CT	Cost Differential		11		5	4	
ASIA	CANADA EAST COAST	LP	PC Mileage		10738				
ASIA	CANADA EAST COAST	LP	Alternative Mileage		12860				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	CANADA EAST COAST	LP	PC Cost		226	99		51	
ASIA	CANADA EAST COAST	LP	Alternative Cost		263	114		58	
ASIA	CANADA EAST COAST	LP	Cost Differential		36	15		7	
ASIA	CANADA EAST COAST	T	PC Mileage		10738				
ASIA	CANADA EAST COAST	T	Alternative Mileage		12860				
ASIA	CANADA EAST COAST	T	PC Cost		67		29	20	17
ASIA	CANADA EAST COAST	T	Alternative Cost		78		33	23	20
ASIA	CANADA EAST COAST	T	Cost Differential		11		4	3	3
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage		10688				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost		167	97	91	86	
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost		201	115	108	102	
ASIA	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential		34	18	17	16	
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage						
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage						
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost			108	95	83	
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost			99	87	75	
ASIA	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential			-9	-8	-8	
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost		82	36	28		
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		138	50	39		
ASIA	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		56	14	11		
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		149	128			
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		208	180			
ASIA	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		59	52			
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		10688				
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		350	275	235	215	
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		425	332	275	251	
ASIA	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		75	57	41	36	
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		8920				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		432	378	331		
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		559	482	414		
ASIA	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		127	104	83		
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				18	14	13
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				25	20	18
ASIA	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				7	6	5
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		83		41	32	
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		112		55	43	
ASIA	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		30		14	11	
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		191	84		44	
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		287	124		63	
ASIA	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		95	40		20	
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		8920				
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		14100				
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		57		24	17	15
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		86		36	25	22
ASIA	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		29		11	8	7
ASIA	EUROPE	CB	PC Mileage		14077				
ASIA	EUROPE	CB	Alternative Mileage		13122				
ASIA	EUROPE	CB	PC Cost		203	117	109	103	
ASIA	EUROPE	CB	Alternative Cost		190	110	102	97	
ASIA	EUROPE	CB	Cost Differential		-13	-7	-7	-6	
ASIA	EUROPE	F	PC Mileage		14077				
ASIA	EUROPE	F	Alternative Mileage		13122				
ASIA	EUROPE	F	PC Cost			301	233	233	
ASIA	EUROPE	F	Alternative Cost			285	223	222	
ASIA	EUROPE	F	Cost Differential			-16	-10	-11	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	EUROPE	G	PC Mileage		14077				
ASIA	EUROPE	G	Alternative Mileage		13122				
ASIA	EUROPE	G	PC Cost		139	51	39		
ASIA	EUROPE	G	Alternative Cost		127	47	37		
ASIA	EUROPE	G	Cost Differential		-12	-4	-3		
ASIA	EUROPE	R	PC Mileage		14077				
ASIA	EUROPE	R	Alternative Mileage		13122				
ASIA	EUROPE	R	PC Cost		212	184			
ASIA	EUROPE	R	Alternative Cost		196	169			
ASIA	EUROPE	R	Cost Differential		-16	-15			
ASIA	EUROPE	RO	PC Mileage		14077				
ASIA	EUROPE	RO	Alternative Mileage		13122				
ASIA	EUROPE	RO	PC Cost		424	330	280	255	
ASIA	EUROPE	RO	Alternative Cost		401	314	262	239	
ASIA	EUROPE	RO	Cost Differential		-23	-16	-18	-16	
ASIA	EUROPE	V	PC Mileage		14077				
ASIA	EUROPE	V	Alternative Mileage		13122				
ASIA	EUROPE	V	PC Cost		569	491	423		
ASIA	EUROPE	V	Alternative Cost		533	460	397		
ASIA	EUROPE	V	Cost Differential		-37	-31	-26		
ASIA	EUROPE	CD	PC Mileage		14077				
ASIA	EUROPE	CD	Alternative Mileage		13122				
ASIA	EUROPE	CD	PC Cost				26	20	19
ASIA	EUROPE	CD	Alternative Cost				24	18	17
ASIA	EUROPE	CD	Cost Differential				-2	-1	-2
ASIA	EUROPE	CT	PC Mileage		14077				
ASIA	EUROPE	CT	Alternative Mileage		13122				
ASIA	EUROPE	CT	PC Cost		114		55	43	
ASIA	EUROPE	CT	Alternative Cost		107		52	41	
ASIA	EUROPE	CT	Cost Differential		-7		-3	-3	
ASIA	EUROPE	LP	PC Mileage		14077				
ASIA	EUROPE	LP	Alternative Mileage		13122				
ASIA	EUROPE	LP	PC Cost		291	126		65	
ASIA	EUROPE	LP	Alternative Cost		268	116		59	
ASIA	EUROPE	LP	Cost Differential		-24	-10		-5	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	EUROPE	T	PC Mileage		14077				
ASIA	EUROPE	T	Alternative Mileage		13122				
ASIA	EUROPE	T	PC Cost		87		37	25	22
ASIA	EUROPE	T	Alternative Cost		80		33	23	20
ASIA	EUROPE	T	Cost Differential		-7		-3	-2	-2
ASIA	S. AMERICA E.C.	CB	PC Mileage		11980				
ASIA	S. AMERICA E.C.	CB	Alternative Mileage		13020				
ASIA	S. AMERICA E.C.	CB	PC Cost		181	105	98	93	
ASIA	S. AMERICA E.C.	CB	Alternative Cost		189	109	102	97	
ASIA	S. AMERICA E.C.	CB	Cost Differential		9	4	4	4	
ASIA	S. AMERICA E.C.	F	PC Mileage		11980				
ASIA	S. AMERICA E.C.	F	Alternative Mileage		13020				
ASIA	S. AMERICA E.C.	F	PC Cost			272	212	211	
ASIA	S. AMERICA E.C.	F	Alternative Cost			284	222	221	
ASIA	S. AMERICA E.C.	F	Cost Differential			11	10	10	
ASIA	S. AMERICA E.C.	G	PC Mileage		11980				
ASIA	S. AMERICA E.C.	G	Alternative Mileage		13020				
ASIA	S. AMERICA E.C.	G	PC Cost		116	45	35		
ASIA	S. AMERICA E.C.	G	Alternative Cost		126	47	36		
ASIA	S. AMERICA E.C.	G	Cost Differential		10	2	2		
ASIA	S. AMERICA E.C.	R	PC Mileage		11980				
ASIA	S. AMERICA E.C.	R	Alternative Mileage		13020				
ASIA	S. AMERICA E.C.	R	PC Cost		186	161			
ASIA	S. AMERICA E.C.	R	Alternative Cost		195	168			
ASIA	S. AMERICA E.C.	R	Cost Differential		8	7			
ASIA	S. AMERICA E.C.	RO	PC Mileage		11980				
ASIA	S. AMERICA E.C.	RO	Alternative Mileage		13020				
ASIA	S. AMERICA E.C.	RO	PC Cost		378	296	252	230	
ASIA	S. AMERICA E.C.	RO	Alternative Cost		399	312	261	238	
ASIA	S. AMERICA E.C.	RO	Cost Differential		20	16	9	8	
ASIA	S. AMERICA E.C.	V	PC Mileage		11980				
ASIA	S. AMERICA E.C.	V	Alternative Mileage		13020				
ASIA	S. AMERICA E.C.	V	PC Cost		514	445	385		
ASIA	S. AMERICA E.C.	V	Alternative Cost		530	458	395		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	S. AMERICA E.C.	V	Cost Differential	17	13	9		
ASIA	S. AMERICA E.C.	CD	PC Mileage	11980				
ASIA	S. AMERICA E.C.	CD	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	CD	PC Cost			22	17	16
ASIA	S. AMERICA E.C.	CD	Alternative Cost			23	18	17
ASIA	S. AMERICA E.C.	CD	Cost Differential			1	1	1
ASIA	S. AMERICA E.C.	CT	PC Mileage	11980				
ASIA	S. AMERICA E.C.	CT	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	CT	PC Cost	101		49	39	
ASIA	S. AMERICA E.C.	CT	Alternative Cost	106		52	40	
ASIA	S. AMERICA E.C.	CT	Cost Differential	5		2	2	
ASIA	S. AMERICA E.C.	LP	PC Mileage	11980				
ASIA	S. AMERICA E.C.	LP	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	LP	PC Cost	251	109		56	
ASIA	S. AMERICA E.C.	LP	Alternative Cost	266	116		59	
ASIA	S. AMERICA E.C.	LP	Cost Differential	15	6		3	
ASIA	S. AMERICA E.C.	T	PC Mileage	11980				
ASIA	S. AMERICA E.C.	T	Alternative Mileage	13020				
ASIA	S. AMERICA E.C.	T	PC Cost	75		32	22	19
ASIA	S. AMERICA E.C.	T	Alternative Cost	79		33	23	20
ASIA	S. AMERICA E.C.	T	Cost Differential	5		1	1	1
ASIA	U.S. EAST COAST	CB	PC Mileage	11556				
ASIA	U.S. EAST COAST	CB	Alternative Mileage	16610				
ASIA	U.S. EAST COAST	CB	PC Cost	176	102	96	91	
ASIA	U.S. EAST COAST	CB	Alternative Cost	228	130	121	115	
ASIA	U.S. EAST COAST	CB	Cost Differential	52	28	25	24	
ASIA	U.S. EAST COAST	F	PC Mileage	11556				
ASIA	U.S. EAST COAST	F	Alternative Mileage	16610				
ASIA	U.S. EAST COAST	F	PC Cost		267	208	206	
ASIA	U.S. EAST COAST	F	Alternative Cost		335	259	261	
ASIA	U.S. EAST COAST	F	Cost Differential		68	51	55	
ASIA	U.S. EAST COAST	G	PC Mileage	9375				
ASIA	U.S. EAST COAST	G	Alternative Mileage	15525				
ASIA	U.S. EAST COAST	G	PC Cost	87	38	29		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	U.S. EAST COAST	G	Alternative Cost		154	54	42		
ASIA	U.S. EAST COAST	G	Cost Differential		67	17	13		
ASIA	U.S. EAST COAST	R	PC Mileage		9375				
ASIA	U.S. EAST COAST	R	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	R	PC Cost		154	133			
ASIA	U.S. EAST COAST	R	Alternative Cost		226	195			
ASIA	U.S. EAST COAST	R	Cost Differential		71	63			
ASIA	U.S. EAST COAST	RO	PC Mileage		11556				
ASIA	U.S. EAST COAST	RO	Alternative Mileage		16610				
ASIA	U.S. EAST COAST	RO	PC Cost		369	289	246	225	
ASIA	U.S. EAST COAST	RO	Alternative Cost		485	379	310	282	
ASIA	U.S. EAST COAST	RO	Cost Differential		116	90	64	57	
ASIA	U.S. EAST COAST	V	PC Mileage		10278				
ASIA	U.S. EAST COAST	V	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	V	PC Cost		468	408	355		
ASIA	U.S. EAST COAST	V	Alternative Cost		597	513	439		
ASIA	U.S. EAST COAST	V	Cost Differential		129	106	84		
ASIA	U.S. EAST COAST	CD	PC Mileage		9375				
ASIA	U.S. EAST COAST	CD	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	CD	PC Cost				18	14	13
ASIA	U.S. EAST COAST	CD	Alternative Cost				27	21	20
ASIA	U.S. EAST COAST	CD	Cost Differential				9	7	6
ASIA	U.S. EAST COAST	CT	PC Mileage		9375				
ASIA	U.S. EAST COAST	CT	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	CT	PC Cost		85		42	33	
ASIA	U.S. EAST COAST	CT	Alternative Cost		121		59	46	
ASIA	U.S. EAST COAST	CT	Cost Differential		36		17	13	
ASIA	U.S. EAST COAST	LP	PC Mileage		9375				
ASIA	U.S. EAST COAST	LP	Alternative Mileage		15525				
ASIA	U.S. EAST COAST	LP	PC Cost		200	88		45	
ASIA	U.S. EAST COAST	LP	Alternative Cost		314	136		69	
ASIA	U.S. EAST COAST	LP	Cost Differential		114	48		24	
ASIA	U.S. EAST COAST	T	PC Mileage		9375				
ASIA	U.S. EAST COAST	T	Alternative Mileage		15525				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
ASIA	U.S. EAST COAST	T	PC Cost	59		25	18	15
ASIA	U.S. EAST COAST	T	Alternative Cost	94		39	27	24
ASIA	U.S. EAST COAST	T	Cost Differential	35		13	10	8
CANADA EAST COAST	ASIA	CB	PC Mileage	11587				
CANADA EAST COAST	ASIA	CB	Alternative Mileage	12925				
CANADA EAST COAST	ASIA	CB	PC Cost	177	103	96	91	
CANADA EAST COAST	ASIA	CB	Alternative Cost	188	109	101	96	
CANADA EAST COAST	ASIA	CB	Cost Differential	12	6	6	5	
CANADA EAST COAST	ASIA	F	PC Mileage	11587				
CANADA EAST COAST	ASIA	F	Alternative Mileage	12925				
CANADA EAST COAST	ASIA	F	PC Cost		267	208	206	
CANADA EAST COAST	ASIA	F	Alternative Cost		282	221	220	
CANADA EAST COAST	ASIA	F	Cost Differential		15	12	13	
CANADA EAST COAST	ASIA	G	PC Mileage	10738				
CANADA EAST COAST	ASIA	G	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	G	PC Cost	102	41	32		
CANADA EAST COAST	ASIA	G	Alternative Cost	124	47	36		
CANADA EAST COAST	ASIA	G	Cost Differential	22	5	4		
CANADA EAST COAST	ASIA	R	PC Mileage	10738				
CANADA EAST COAST	ASIA	R	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	R	PC Cost	171	148			
CANADA EAST COAST	ASIA	R	Alternative Cost	193	167			
CANADA EAST COAST	ASIA	R	Cost Differential	22	19			
CANADA EAST COAST	ASIA	RO	PC Mileage	11587				
CANADA EAST COAST	ASIA	RO	Alternative Mileage	12925				
CANADA EAST COAST	ASIA	RO	PC Cost	370	290	247	225	
CANADA EAST COAST	ASIA	RO	Alternative Cost	396	310	259	237	
CANADA EAST COAST	ASIA	RO	Cost Differential	27	20	13	11	
CANADA EAST COAST	ASIA	V	PC Mileage	11587				
CANADA EAST COAST	ASIA	V	Alternative Mileage	12925				
CANADA EAST COAST	ASIA	V	PC Cost	503	436	378		
CANADA EAST COAST	ASIA	V	Alternative Cost	528	456	393		
CANADA EAST COAST	ASIA	V	Cost Differential	24	20	15		
CANADA EAST COAST	ASIA	CD	PC Mileage	10738				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	ASIA	CD	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	CD	PC Cost			20	16	15
CANADA EAST COAST	ASIA	CD	Alternative Cost			23	18	17
CANADA EAST COAST	ASIA	CD	Cost Differential			3	2	2
CANADA EAST COAST	ASIA	CT	PC Mileage	10738				
CANADA EAST COAST	ASIA	CT	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	CT	PC Cost	94		46	36	
CANADA EAST COAST	ASIA	CT	Alternative Cost	105		51	40	
CANADA EAST COAST	ASIA	CT	Cost Differential	11		5	4	
CANADA EAST COAST	ASIA	LP	PC Mileage	10738				
CANADA EAST COAST	ASIA	LP	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	LP	PC Cost	226	99		51	
CANADA EAST COAST	ASIA	LP	Alternative Cost	263	114		58	
CANADA EAST COAST	ASIA	LP	Cost Differential	36	15		7	
CANADA EAST COAST	ASIA	T	PC Mileage	10738				
CANADA EAST COAST	ASIA	T	Alternative Mileage	12860				
CANADA EAST COAST	ASIA	T	PC Cost	67		29	20	17
CANADA EAST COAST	ASIA	T	Alternative Cost	78		33	23	20
CANADA EAST COAST	ASIA	T	Cost Differential	11		4	3	3
CANADA EAST COAST	C. AMERICA W.C.	CB	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	CB	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	CB	PC Cost	88	55	52	50	
CANADA EAST COAST	C. AMERICA W.C.	CB	Alternative Cost	171	99	93	88	
CANADA EAST COAST	C. AMERICA W.C.	CB	Cost Differential	82	44	41	38	
CANADA EAST COAST	C. AMERICA W.C.	F	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	F	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	F	PC Cost		155	128	119	
CANADA EAST COAST	C. AMERICA W.C.	F	Alternative Cost		259	204	201	
CANADA EAST COAST	C. AMERICA W.C.	F	Cost Differential		104	75	82	
CANADA EAST COAST	C. AMERICA W.C.	G	PC Mileage	3405				
CANADA EAST COAST	C. AMERICA W.C.	G	Alternative Mileage	11265				
CANADA EAST COAST	C. AMERICA W.C.	G	PC Cost	20	20	16		
CANADA EAST COAST	C. AMERICA W.C.	G	Alternative Cost	107	42	32		
CANADA EAST COAST	C. AMERICA W.C.	G	Cost Differential	86	22	17		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	C. AMERICA W.C.	R	PC Mileage		3405				
CANADA EAST COAST	C. AMERICA W.C.	R	Alternative Mileage		11265				
CANADA EAST COAST	C. AMERICA W.C.	R	PC Cost		80	68			
CANADA EAST COAST	C. AMERICA W.C.	R	Alternative Cost		173	149			
CANADA EAST COAST	C. AMERICA W.C.	R	Cost Differential		93	81			
CANADA EAST COAST	C. AMERICA W.C.	RO	PC Mileage		3405				
CANADA EAST COAST	C. AMERICA W.C.	RO	Alternative Mileage		11265				
CANADA EAST COAST	C. AMERICA W.C.	RO	PC Cost		190	158	138	128	
CANADA EAST COAST	C. AMERICA W.C.	RO	Alternative Cost		356	278	237	216	
CANADA EAST COAST	C. AMERICA W.C.	RO	Cost Differential		166	121	99	88	
CANADA EAST COAST	C. AMERICA W.C.	V	PC Mileage		3405				
CANADA EAST COAST	C. AMERICA W.C.	V	Alternative Mileage		11265				
CANADA EAST COAST	C. AMERICA W.C.	V	PC Cost		285	257	234		
CANADA EAST COAST	C. AMERICA W.C.	V	Alternative Cost		483	419	364		
CANADA EAST COAST	C. AMERICA W.C.	V	Cost Differential		198	163	130		
CANADA EAST COAST	C. AMERICA W.C.	CD	PC Mileage		3405				
CANADA EAST COAST	C. AMERICA W.C.	CD	Alternative Mileage		11265				
CANADA EAST COAST	C. AMERICA W.C.	CD	PC Cost				9	7	7
CANADA EAST COAST	C. AMERICA W.C.	CD	Alternative Cost				21	16	15
CANADA EAST COAST	C. AMERICA W.C.	CD	Cost Differential				11	9	8
CANADA EAST COAST	C. AMERICA W.C.	CT	PC Mileage		3405				
CANADA EAST COAST	C. AMERICA W.C.	CT	Alternative Mileage		11265				
CANADA EAST COAST	C. AMERICA W.C.	CT	PC Cost		49		25	20	
CANADA EAST COAST	C. AMERICA W.C.	CT	Alternative Cost		95		47	37	
CANADA EAST COAST	C. AMERICA W.C.	CT	Cost Differential		46		22	17	
CANADA EAST COAST	C. AMERICA W.C.	LP	PC Mileage		3405				
CANADA EAST COAST	C. AMERICA W.C.	LP	Alternative Mileage		11265				
CANADA EAST COAST	C. AMERICA W.C.	LP	PC Cost		84	39		21	
CANADA EAST COAST	C. AMERICA W.C.	LP	Alternative Cost		232	101		52	
CANADA EAST COAST	C. AMERICA W.C.	LP	Cost Differential		147	62		31	
CANADA EAST COAST	C. AMERICA W.C.	T	PC Mileage		3405				
CANADA EAST COAST	C. AMERICA W.C.	T	Alternative Mileage		11265				
CANADA EAST COAST	C. AMERICA W.C.	T	PC Cost		24		11	8	7
CANADA EAST COAST	C. AMERICA W.C.	T	Alternative Cost		69		29	20	18
CANADA EAST COAST	C. AMERICA W.C.	T	Cost Differential		45		18	12	10

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	OCEANIA	CB	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	CB	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	CB	PC Cost	187	108	101	96	
CANADA EAST COAST	OCEANIA	CB	Alternative Cost	193	111	104	98	
CANADA EAST COAST	OCEANIA	CB	Cost Differential	6	3	3	2	
CANADA EAST COAST	OCEANIA	F	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	F	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	F	PC Cost		280	218	216	
CANADA EAST COAST	OCEANIA	F	Alternative Cost		288	225	224	
CANADA EAST COAST	OCEANIA	F	Cost Differential		8	7	8	
CANADA EAST COAST	OCEANIA	G	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	G	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	G	PC Cost	122	47	36		
CANADA EAST COAST	OCEANIA	G	Alternative Cost	130	48	37		
CANADA EAST COAST	OCEANIA	G	Cost Differential	7	1	1		
CANADA EAST COAST	OCEANIA	R	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	R	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	R	PC Cost	193	167			
CANADA EAST COAST	OCEANIA	R	Alternative Cost	198	172			
CANADA EAST COAST	OCEANIA	R	Cost Differential	5	4			
CANADA EAST COAST	OCEANIA	RO	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	RO	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	RO	PC Cost	391	305	259	237	
CANADA EAST COAST	OCEANIA	RO	Alternative Cost	406	317	265	242	
CANADA EAST COAST	OCEANIA	RO	Cost Differential	15	12	5	5	
CANADA EAST COAST	OCEANIA	V	PC Mileage	12539				
CANADA EAST COAST	OCEANIA	V	Alternative Mileage	13320				
CANADA EAST COAST	OCEANIA	V	PC Cost	528	457	395		
CANADA EAST COAST	OCEANIA	V	Alternative Cost	538	465	400		
CANADA EAST COAST	OCEANIA	V	Cost Differential	10	7	5		
CANADA EAST COAST	OCEANIA	CD	PC Mileage	10766				
CANADA EAST COAST	OCEANIA	CD	Alternative Mileage	12870				
CANADA EAST COAST	OCEANIA	CD	PC Cost			21	16	15
CANADA EAST COAST	OCEANIA	CD	Alternative Cost			23	18	17

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	OCEANIA	CD Cost Differential			3	2	2
CANADA EAST COAST	OCEANIA	CT PC Mileage	10766				
CANADA EAST COAST	OCEANIA	CT Alternative Mileage	12870				
CANADA EAST COAST	OCEANIA	CT PC Cost	94		46	36	
CANADA EAST COAST	OCEANIA	CT Alternative Cost	105		51	40	
CANADA EAST COAST	OCEANIA	CT Cost Differential	11		5	4	
CANADA EAST COAST	OCEANIA	LP PC Mileage	10766				
CANADA EAST COAST	OCEANIA	LP Alternative Mileage	12870				
CANADA EAST COAST	OCEANIA	LP PC Cost	227	99		51	
CANADA EAST COAST	OCEANIA	LP Alternative Cost	263	114		58	
CANADA EAST COAST	OCEANIA	LP Cost Differential	36	15		7	
CANADA EAST COAST	OCEANIA	T PC Mileage	10766				
CANADA EAST COAST	OCEANIA	T Alternative Mileage	12870				
CANADA EAST COAST	OCEANIA	T PC Cost	67		29	20	17
CANADA EAST COAST	OCEANIA	T Alternative Cost	78		33	23	20
CANADA EAST COAST	OCEANIA	T Cost Differential	11		4	3	3
CANADA EAST COAST	S. AMERICA W.C.	CB PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	CB Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	CB PC Cost	113	68	64	62	
CANADA EAST COAST	S. AMERICA W.C.	CB Alternative Cost	146	86	80	76	
CANADA EAST COAST	S. AMERICA W.C.	CB Cost Differential	33	17	16	15	
CANADA EAST COAST	S. AMERICA W.C.	F PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	F Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	F PC Cost		187	151	144	
CANADA EAST COAST	S. AMERICA W.C.	F Alternative Cost		226	180	176	
CANADA EAST COAST	S. AMERICA W.C.	F Cost Differential		40	29	32	
CANADA EAST COAST	S. AMERICA W.C.	G PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	G Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	G PC Cost	46	27	21		
CANADA EAST COAST	S. AMERICA W.C.	G Alternative Cost	81	36	27		
CANADA EAST COAST	S. AMERICA W.C.	G Cost Differential	35	9	7		
CANADA EAST COAST	S. AMERICA W.C.	R PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	R Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	R PC Cost	109	93			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	S. AMERICA W.C.	R	Alternative Cost	145	124			
CANADA EAST COAST	S. AMERICA W.C.	R	Cost Differential	36	31			
CANADA EAST COAST	S. AMERICA W.C.	RO	PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	RO	Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	RO	PC Cost	241	195	168	156	
CANADA EAST COAST	S. AMERICA W.C.	RO	Alternative Cost	300	235	205	188	
CANADA EAST COAST	S. AMERICA W.C.	RO	Cost Differential	60	40	37	33	
CANADA EAST COAST	S. AMERICA W.C.	V	PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	V	Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	V	PC Cost	347	307	274		
CANADA EAST COAST	S. AMERICA W.C.	V	Alternative Cost	422	369	323		
CANADA EAST COAST	S. AMERICA W.C.	V	Cost Differential	75	62	49		
CANADA EAST COAST	S. AMERICA W.C.	CD	PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	CD	Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	CD	PC Cost			13	10	9
CANADA EAST COAST	S. AMERICA W.C.	CD	Alternative Cost			17	14	13
CANADA EAST COAST	S. AMERICA W.C.	CD	Cost Differential			4	4	3
CANADA EAST COAST	S. AMERICA W.C.	CT	PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	CT	Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	CT	PC Cost	63		32	25	
CANADA EAST COAST	S. AMERICA W.C.	CT	Alternative Cost	81		40	32	
CANADA EAST COAST	S. AMERICA W.C.	CT	Cost Differential	18		9	7	
CANADA EAST COAST	S. AMERICA W.C.	LP	PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	LP	Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	LP	PC Cost	129	58		30	
CANADA EAST COAST	S. AMERICA W.C.	LP	Alternative Cost	187	82		42	
CANADA EAST COAST	S. AMERICA W.C.	LP	Cost Differential	58	24		12	
CANADA EAST COAST	S. AMERICA W.C.	T	PC Mileage	5710				
CANADA EAST COAST	S. AMERICA W.C.	T	Alternative Mileage	8970				
CANADA EAST COAST	S. AMERICA W.C.	T	PC Cost	38		17	12	10
CANADA EAST COAST	S. AMERICA W.C.	T	Alternative Cost	55		24	17	15
CANADA EAST COAST	S. AMERICA W.C.	T	Cost Differential	18		7	5	4
CANADA EAST COAST	U.S. W.C., HAWAII	CB	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	CB	Alternative Mileage	13785				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	U.S. W.C., HAWAII	CB	PC Cost	120	72	68	65	
CANADA EAST COAST	U.S. W.C., HAWAII	CB	Alternative Cost	198	114	106	100	
CANADA EAST COAST	U.S. W.C., HAWAII	CB	Cost Differential	78	42	38	36	
CANADA EAST COAST	U.S. W.C., HAWAII	F	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	F	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	F	PC Cost		195	157	150	
CANADA EAST COAST	U.S. W.C., HAWAII	F	Alternative Cost		295	230	229	
CANADA EAST COAST	U.S. W.C., HAWAII	F	Cost Differential		100	73	79	
CANADA EAST COAST	U.S. W.C., HAWAII	G	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	G	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	G	PC Cost	53	29	22		
CANADA EAST COAST	U.S. W.C., HAWAII	G	Alternative Cost	135	49	38		
CANADA EAST COAST	U.S. W.C., HAWAII	G	Cost Differential	82	21	16		
CANADA EAST COAST	U.S. W.C., HAWAII	R	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	R	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	R	PC Cost	117	100			
CANADA EAST COAST	U.S. W.C., HAWAII	R	Alternative Cost	204	177			
CANADA EAST COAST	U.S. W.C., HAWAII	R	Cost Differential	87	77			
CANADA EAST COAST	U.S. W.C., HAWAII	RO	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	RO	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	RO	PC Cost	255	205	177	163	
CANADA EAST COAST	U.S. W.C., HAWAII	RO	Alternative Cost	417	326	271	247	
CANADA EAST COAST	U.S. W.C., HAWAII	RO	Cost Differential	163	121	94	84	
CANADA EAST COAST	U.S. W.C., HAWAII	V	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	V	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	V	PC Cost	363	321	286		
CANADA EAST COAST	U.S. W.C., HAWAII	V	Alternative Cost	551	475	408		
CANADA EAST COAST	U.S. W.C., HAWAII	V	Cost Differential	187	154	123		
CANADA EAST COAST	U.S. W.C., HAWAII	CD	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	CD	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	CD	PC Cost			14	11	10
CANADA EAST COAST	U.S. W.C., HAWAII	CD	Alternative Cost			25	19	18
CANADA EAST COAST	U.S. W.C., HAWAII	CD	Cost Differential			11	8	8
CANADA EAST COAST	U.S. W.C., HAWAII	CT	PC Mileage	6341				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA EAST COAST	U.S. W.C., HAWAII	CT	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	CT	PC Cost	67		33	26	
CANADA EAST COAST	U.S. W.C., HAWAII	CT	Alternative Cost	111		54	42	
CANADA EAST COAST	U.S. W.C., HAWAII	CT	Cost Differential	44		20	16	
CANADA EAST COAST	U.S. W.C., HAWAII	LP	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	LP	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	LP	PC Cost	141	63		33	
CANADA EAST COAST	U.S. W.C., HAWAII	LP	Alternative Cost	280	122		62	
CANADA EAST COAST	U.S. W.C., HAWAII	LP	Cost Differential	139	59		29	
CANADA EAST COAST	U.S. W.C., HAWAII	T	PC Mileage	6341				
CANADA EAST COAST	U.S. W.C., HAWAII	T	Alternative Mileage	13785				
CANADA EAST COAST	U.S. W.C., HAWAII	T	PC Cost	41		18	13	11
CANADA EAST COAST	U.S. W.C., HAWAII	T	Alternative Cost	84		35	25	21
CANADA EAST COAST	U.S. W.C., HAWAII	T	Cost Differential	42		17	12	10
CANADA WEST COAST	AFRICA	CB	PC Mileage	10818				
CANADA WEST COAST	AFRICA	CB	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	CB	PC Cost	168	98	92	87	
CANADA WEST COAST	AFRICA	CB	Alternative Cost	199	115	107	101	
CANADA WEST COAST	AFRICA	CB	Cost Differential	31	17	15	14	
CANADA WEST COAST	AFRICA	F	PC Mileage	10818				
CANADA WEST COAST	AFRICA	F	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	F	PC Cost		257	201	198	
CANADA WEST COAST	AFRICA	F	Alternative Cost		297	231	231	
CANADA WEST COAST	AFRICA	F	Cost Differential		40	31	33	
CANADA WEST COAST	AFRICA	G	PC Mileage	10818				
CANADA WEST COAST	AFRICA	G	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	G	PC Cost	103	42	32		
CANADA WEST COAST	AFRICA	G	Alternative Cost	137	50	38		
CANADA WEST COAST	AFRICA	G	Cost Differential	34	8	6		
CANADA WEST COAST	AFRICA	R	PC Mileage	10818				
CANADA WEST COAST	AFRICA	R	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	R	PC Cost	172	149			
CANADA WEST COAST	AFRICA	R	Alternative Cost	206	178			
CANADA WEST COAST	AFRICA	R	Cost Differential	34	30			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	AFRICA	RO	PC Mileage	10818				
CANADA WEST COAST	AFRICA	RO	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	RO	PC Cost	353	277	236	216	
CANADA WEST COAST	AFRICA	RO	Alternative Cost	421	329	273	249	
CANADA WEST COAST	AFRICA	RO	Cost Differential	68	52	37	33	
CANADA WEST COAST	AFRICA	V	PC Mileage	10818				
CANADA WEST COAST	AFRICA	V	Alternative Mileage	13950				
CANADA WEST COAST	AFRICA	V	PC Cost	483	419	365		
CANADA WEST COAST	AFRICA	V	Alternative Cost	555	478	411		
CANADA WEST COAST	AFRICA	V	Cost Differential	72	59	46		
CANADA WEST COAST	AFRICA	CD	PC Mileage	9792				
CANADA WEST COAST	AFRICA	CD	Alternative Mileage	12925				
CANADA WEST COAST	AFRICA	CD	PC Cost			19	15	14
CANADA WEST COAST	AFRICA	CD	Alternative Cost			23	18	17
CANADA WEST COAST	AFRICA	CD	Cost Differential			4	3	3
CANADA WEST COAST	AFRICA	CT	PC Mileage	9792				
CANADA WEST COAST	AFRICA	CT	Alternative Mileage	12925				
CANADA WEST COAST	AFRICA	CT	PC Cost	88		43	34	
CANADA WEST COAST	AFRICA	CT	Alternative Cost	105		51	40	
CANADA WEST COAST	AFRICA	CT	Cost Differential	18		8	6	
CANADA WEST COAST	AFRICA	LP	PC Mileage	9792				
CANADA WEST COAST	AFRICA	LP	Alternative Mileage	12925				
CANADA WEST COAST	AFRICA	LP	PC Cost	208	91		47	
CANADA WEST COAST	AFRICA	LP	Alternative Cost	264	115		59	
CANADA WEST COAST	AFRICA	LP	Cost Differential	56	23		12	
CANADA WEST COAST	AFRICA	T	PC Mileage	9792				
CANADA WEST COAST	AFRICA	T	Alternative Mileage	12925				
CANADA WEST COAST	AFRICA	T	PC Cost	62		27	18	16
CANADA WEST COAST	AFRICA	T	Alternative Cost	79		33	23	20
CANADA WEST COAST	AFRICA	T	Cost Differential	17		6	5	4
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage	5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage	12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost	108	66	62	59	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost	189	109	101	96	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential	80	43	40	37	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost			180	146	139	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost			283	221	220	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential			102	75	81	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost		41	26	20		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		125	47	36		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		84	21	16		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		103	88			
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		194	167			
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		90	79			
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		231	187	162	150	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		397	310	260	237	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		166	123	97	87	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		335	297	266		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		528	456	393		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		193	159	127		
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				12	10	9
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				23	18	17
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				11	9	8
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		60		30	24	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		105		51	40	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		45		21	16	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		120	54		29	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		264	115		59	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		144	61		30	
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		5254				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		12940				
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		35		16	11	10
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		79		33	23	20
CANADA WEST COAST	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		44		17	12	10
CANADA WEST COAST	EUROPE	CB	PC Mileage		9052				
CANADA WEST COAST	EUROPE	CB	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	CB	PC Cost		149	88	82	78	
CANADA WEST COAST	EUROPE	CB	Alternative Cost		211	121	113	107	
CANADA WEST COAST	EUROPE	CB	Cost Differential		62	33	30	28	
CANADA WEST COAST	EUROPE	F	PC Mileage		9052				
CANADA WEST COAST	EUROPE	F	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	F	PC Cost			232	184	179	
CANADA WEST COAST	EUROPE	F	Alternative Cost			312	243	243	
CANADA WEST COAST	EUROPE	F	Cost Differential			80	59	64	
CANADA WEST COAST	EUROPE	G	PC Mileage		9052				
CANADA WEST COAST	EUROPE	G	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	G	PC Cost		83	37	28		
CANADA WEST COAST	EUROPE	G	Alternative Cost		149	53	41		
CANADA WEST COAST	EUROPE	G	Cost Differential		65	16	13		
CANADA WEST COAST	EUROPE	R	PC Mileage		9052				
CANADA WEST COAST	EUROPE	R	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	R	PC Cost		150	129			
CANADA WEST COAST	EUROPE	R	Alternative Cost		220	190			
CANADA WEST COAST	EUROPE	R	Cost Differential		69	61			
CANADA WEST COAST	EUROPE	RO	PC Mileage		9052				
CANADA WEST COAST	EUROPE	RO	Alternative Mileage		15040				
CANADA WEST COAST	EUROPE	RO	PC Cost		314	249	213	195	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	EUROPE	RO	Alternative Cost	447	350	288	263	
CANADA WEST COAST	EUROPE	RO	Cost Differential	133	101	76	67	
CANADA WEST COAST	EUROPE	V	PC Mileage	9051				
CANADA WEST COAST	EUROPE	V	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	V	PC Cost	436	381	334		
CANADA WEST COAST	EUROPE	V	Alternative Cost	576	496	425		
CANADA WEST COAST	EUROPE	V	Cost Differential	141	115	92		
CANADA WEST COAST	EUROPE	CD	PC Mileage	9051				
CANADA WEST COAST	EUROPE	CD	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	CD	PC Cost			18	14	13
CANADA WEST COAST	EUROPE	CD	Alternative Cost			26	20	19
CANADA WEST COAST	EUROPE	CD	Cost Differential			8	6	6
CANADA WEST COAST	EUROPE	CT	PC Mileage	9051				
CANADA WEST COAST	EUROPE	CT	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	CT	PC Cost	83		41	32	
CANADA WEST COAST	EUROPE	CT	Alternative Cost	116		57	44	
CANADA WEST COAST	EUROPE	CT	Cost Differential	33		15	12	
CANADA WEST COAST	EUROPE	LP	PC Mileage	9051				
CANADA WEST COAST	EUROPE	LP	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	LP	PC Cost	194	85		44	
CANADA WEST COAST	EUROPE	LP	Alternative Cost	299	130		66	
CANADA WEST COAST	EUROPE	LP	Cost Differential	105	44		22	
CANADA WEST COAST	EUROPE	T	PC Mileage	9051				
CANADA WEST COAST	EUROPE	T	Alternative Mileage	14745				
CANADA WEST COAST	EUROPE	T	PC Cost	57		25	17	15
CANADA WEST COAST	EUROPE	T	Alternative Cost	89		37	26	22
CANADA WEST COAST	EUROPE	T	Cost Differential	32		12	9	7
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	PC Mileage	10982				
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	Alternative Mileage	11399				
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	PC Cost			21	16	15
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	Alternative Cost			21	16	15
CANADA WEST COAST	MIDDLE EAST (additional route)	CD	Cost Differential			0	0	0
CANADA WEST COAST	MIDDLE EAST (additional route)	G	PC Mileage	10982				
CANADA WEST COAST	MIDDLE EAST (additional route)	G	Alternative Mileage	11399				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	MIDDLE EAST (additional route)	G	PC Cost	105	42	32		
CANADA WEST COAST	MIDDLE EAST (additional route)	G	Alternative Cost	108	43	33		
CANADA WEST COAST	MIDDLE EAST (additional route)	G	Cost Differential	3	0	0		
CANADA WEST COAST	S. AMERICA E.C.	CB	PC Mileage	6563				
CANADA WEST COAST	S. AMERICA E.C.	CB	Alternative Mileage	14240				
CANADA WEST COAST	S. AMERICA E.C.	CB	PC Cost	122	73	69	66	
CANADA WEST COAST	S. AMERICA E.C.	CB	Alternative Cost	203	116	108	103	
CANADA WEST COAST	S. AMERICA E.C.	CB	Cost Differential	80	43	40	37	
CANADA WEST COAST	S. AMERICA E.C.	F	PC Mileage	6563				
CANADA WEST COAST	S. AMERICA E.C.	F	Alternative Mileage	14240				
CANADA WEST COAST	S. AMERICA E.C.	F	PC Cost		198	159	153	
CANADA WEST COAST	S. AMERICA E.C.	F	Alternative Cost		301	234	234	
CANADA WEST COAST	S. AMERICA E.C.	F	Cost Differential		103	75	82	
CANADA WEST COAST	S. AMERICA E.C.	G	PC Mileage	6563				
CANADA WEST COAST	S. AMERICA E.C.	G	Alternative Mileage	14240				
CANADA WEST COAST	S. AMERICA E.C.	G	PC Cost	56	29	23		
CANADA WEST COAST	S. AMERICA E.C.	G	Alternative Cost	140	51	39		
CANADA WEST COAST	S. AMERICA E.C.	G	Cost Differential	84	21	16		
CANADA WEST COAST	S. AMERICA E.C.	R	PC Mileage	6563				
CANADA WEST COAST	S. AMERICA E.C.	R	Alternative Mileage	14240				
CANADA WEST COAST	S. AMERICA E.C.	R	PC Cost	119	102			
CANADA WEST COAST	S. AMERICA E.C.	R	Alternative Cost	210	182			
CANADA WEST COAST	S. AMERICA E.C.	R	Cost Differential	90	79			
CANADA WEST COAST	S. AMERICA E.C.	RO	PC Mileage	6563				
CANADA WEST COAST	S. AMERICA E.C.	RO	Alternative Mileage	14240				
CANADA WEST COAST	S. AMERICA E.C.	RO	PC Cost	259	209	180	166	
CANADA WEST COAST	S. AMERICA E.C.	RO	Alternative Cost	428	335	277	253	
CANADA WEST COAST	S. AMERICA E.C.	RO	Cost Differential	169	126	98	87	
CANADA WEST COAST	S. AMERICA E.C.	V	PC Mileage	6563				
CANADA WEST COAST	S. AMERICA E.C.	V	Alternative Mileage	14240				
CANADA WEST COAST	S. AMERICA E.C.	V	PC Cost	369	326	289		
CANADA WEST COAST	S. AMERICA E.C.	V	Alternative Cost	563	485	416		
CANADA WEST COAST	S. AMERICA E.C.	V	Cost Differential	193	159	127		
CANADA WEST COAST	S. AMERICA E.C.	CD	PC Mileage	8311				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	S. AMERICA E.C.	CD	Alternative Mileage	10060				
CANADA WEST COAST	S. AMERICA E.C.	CD	PC Cost			17	13	12
CANADA WEST COAST	S. AMERICA E.C.	CD	Alternative Cost			19	15	14
CANADA WEST COAST	S. AMERICA E.C.	CD	Cost Differential			2	2	2
CANADA WEST COAST	S. AMERICA E.C.	CT	PC Mileage	8311				
CANADA WEST COAST	S. AMERICA E.C.	CT	Alternative Mileage	10060				
CANADA WEST COAST	S. AMERICA E.C.	CT	PC Cost	79		39	31	
CANADA WEST COAST	S. AMERICA E.C.	CT	Alternative Cost	88		43	34	
CANADA WEST COAST	S. AMERICA E.C.	CT	Cost Differential	9		4	3	
CANADA WEST COAST	S. AMERICA E.C.	LP	PC Mileage	8311				
CANADA WEST COAST	S. AMERICA E.C.	LP	Alternative Mileage	10060				
CANADA WEST COAST	S. AMERICA E.C.	LP	PC Cost	179	79		41	
CANADA WEST COAST	S. AMERICA E.C.	LP	Alternative Cost	208	91		47	
CANADA WEST COAST	S. AMERICA E.C.	LP	Cost Differential	29	12		6	
CANADA WEST COAST	S. AMERICA E.C.	T	PC Mileage	8311				
CANADA WEST COAST	S. AMERICA E.C.	T	Alternative Mileage	10060				
CANADA WEST COAST	S. AMERICA E.C.	T	PC Cost	53		23	16	14
CANADA WEST COAST	S. AMERICA E.C.	T	Alternative Cost	62		26	18	16
CANADA WEST COAST	S. AMERICA E.C.	T	Cost Differential	9		3	2	2
CANADA WEST COAST	U.S. EAST COAST	CB	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	CB	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	CB	PC Cost	117	70	66	63	
CANADA WEST COAST	U.S. EAST COAST	CB	Alternative Cost	203	116	108	103	
CANADA WEST COAST	U.S. EAST COAST	CB	Cost Differential	86	46	42	39	
CANADA WEST COAST	U.S. EAST COAST	F	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	F	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	F	PC Cost		191	154	147	
CANADA WEST COAST	U.S. EAST COAST	F	Alternative Cost		301	234	234	
CANADA WEST COAST	U.S. EAST COAST	F	Cost Differential		110	80	87	
CANADA WEST COAST	U.S. EAST COAST	G	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	G	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	G	PC Cost	50	28	22		
CANADA WEST COAST	U.S. EAST COAST	G	Alternative Cost	140	51	39		
CANADA WEST COAST	U.S. EAST COAST	G	Cost Differential	90	23	17		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CANADA WEST COAST	U.S. EAST COAST	R	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	R	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	R	PC Cost	113	97			
CANADA WEST COAST	U.S. EAST COAST	R	Alternative Cost	210	182			
CANADA WEST COAST	U.S. EAST COAST	R	Cost Differential	97	85			
CANADA WEST COAST	U.S. EAST COAST	RO	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	RO	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	RO	PC Cost	248	200	173	160	
CANADA WEST COAST	U.S. EAST COAST	RO	Alternative Cost	428	335	277	253	
CANADA WEST COAST	U.S. EAST COAST	RO	Cost Differential	180	135	105	93	
CANADA WEST COAST	U.S. EAST COAST	V	PC Mileage	6037				
CANADA WEST COAST	U.S. EAST COAST	V	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	V	PC Cost	355	314	280		
CANADA WEST COAST	U.S. EAST COAST	V	Alternative Cost	563	485	416		
CANADA WEST COAST	U.S. EAST COAST	V	Cost Differential	207	170	136		
CANADA WEST COAST	U.S. EAST COAST	CD	PC Mileage	5753				
CANADA WEST COAST	U.S. EAST COAST	CD	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	CD	PC Cost			13	10	9
CANADA WEST COAST	U.S. EAST COAST	CD	Alternative Cost			25	20	18
CANADA WEST COAST	U.S. EAST COAST	CD	Cost Differential			12	10	9
CANADA WEST COAST	U.S. EAST COAST	CT	PC Mileage	5753				
CANADA WEST COAST	U.S. EAST COAST	CT	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	CT	PC Cost	63		32	25	
CANADA WEST COAST	U.S. EAST COAST	CT	Alternative Cost	113		55	43	
CANADA WEST COAST	U.S. EAST COAST	CT	Cost Differential	50		23	18	
CANADA WEST COAST	U.S. EAST COAST	LP	PC Mileage	5753				
CANADA WEST COAST	U.S. EAST COAST	LP	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	LP	PC Cost	130	58		31	
CANADA WEST COAST	U.S. EAST COAST	LP	Alternative Cost	289	126		64	
CANADA WEST COAST	U.S. EAST COAST	LP	Cost Differential	160	67		33	
CANADA WEST COAST	U.S. EAST COAST	T	PC Mileage	5753				
CANADA WEST COAST	U.S. EAST COAST	T	Alternative Mileage	14240				
CANADA WEST COAST	U.S. EAST COAST	T	PC Cost	38		17	12	10
CANADA WEST COAST	U.S. EAST COAST	T	Alternative Cost	86		36	25	22
CANADA WEST COAST	U.S. EAST COAST	T	Cost Differential	48		19	13	11

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	PC Mileage	10688				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	PC Cost	167	97	91	86	
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	Alternative Cost	201	115	108	102	
CENTRAL AMERICA E.C., W. INDIES	ASIA	CB	Cost Differential	34	18	17	16	
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	PC Mileage	10688				
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	PC Cost		255	200	197	
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	Alternative Cost		299	233	233	
CENTRAL AMERICA E.C., W. INDIES	ASIA	F	Cost Differential		44	33	36	
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	PC Cost	82	36	28		
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	Alternative Cost	138	50	39		
CENTRAL AMERICA E.C., W. INDIES	ASIA	G	Cost Differential	56	14	11		
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	PC Cost	149	128			
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	Alternative Cost	208	180			
CENTRAL AMERICA E.C., W. INDIES	ASIA	R	Cost Differential	59	52			
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	PC Cost	311	247	211	194	
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	Alternative Cost	425	332	275	251	
CENTRAL AMERICA E.C., W. INDIES	ASIA	RO	Cost Differential	114	85	64	57	
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	PC Cost	432	378	331		
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	Alternative Cost	559	482	414		
CENTRAL AMERICA E.C., W. INDIES	ASIA	V	Cost Differential	127	104	83		
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	PC Cost			18	14	13
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	Alternative Cost			25	20	18

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	ASIA	CD	Cost Differential			7	6	5
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	PC Cost	83		41	32	
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	Alternative Cost	112		55	43	
CENTRAL AMERICA E.C., W. INDIES	ASIA	CT	Cost Differential	30		14	11	
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	PC Cost	191	84		44	
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	Alternative Cost	287	124		63	
CENTRAL AMERICA E.C., W. INDIES	ASIA	LP	Cost Differential	95	40		20	
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	PC Mileage	8920				
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	PC Cost	57		24	17	15
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	Alternative Cost	86		36	25	22
CENTRAL AMERICA E.C., W. INDIES	ASIA	T	Cost Differential	29		11	8	7
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	PC Cost	108	66	62	59	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	Alternative Cost	189	109	101	96	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CB	Cost Differential	80	43	40	37	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	PC Cost		180	146	139	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	Alternative Cost		283	221	220	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	F	Cost Differential		102	75	81	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	PC Cost	41	26	20		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	Alternative Cost	125	47	36		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	G	Cost Differential	84	21	16		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	PC Mileage	5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	Alternative Mileage	12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	PC Cost	103	88			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	Alternative Cost		194	167			
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	R	Cost Differential		90	79			
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	PC Mileage		5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	Alternative Mileage		12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	PC Cost		231	187	162	150	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	Alternative Cost		397	310	260	237	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	RO	Cost Differential		166	123	97	87	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	PC Mileage		5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	Alternative Mileage		12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	PC Cost		335	297	266		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	Alternative Cost		528	456	393		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	V	Cost Differential		193	159	127		
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	PC Mileage		5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	Alternative Mileage		12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	PC Cost				12	10	9
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	Alternative Cost				23	18	17
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CD	Cost Differential				11	9	8
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	PC Mileage		5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	Alternative Mileage		12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	PC Cost		60		30	24	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	Alternative Cost		105		51	40	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	CT	Cost Differential		45		21	16	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	PC Mileage		5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	Alternative Mileage		12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	PC Cost		120	54		29	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	Alternative Cost		264	115		59	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	LP	Cost Differential		144	61		30	
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	PC Mileage		5254				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	Alternative Mileage		12940				
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	PC Cost		35		16	11	10
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	Alternative Cost		79		33	23	20
CENTRAL AMERICA E.C., W. INDIES	CANADA WEST COAST	T	Cost Differential		44		17	12	10
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	PC Mileage		2793				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	Alternative Mileage		10865				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	PC Cost	82	51	49	47	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	Alternative Cost	166	97	90	86	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CB	Cost Differential	84	45	42	39	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	PC Mileage	2793				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	Alternative Mileage	10865				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	PC Cost		147	122	113	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	Alternative Cost		253	199	197	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	F	Cost Differential		107	77	84	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	PC Cost		15	12		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	Alternative Cost	89	38	29		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	G	Cost Differential	89	22	17		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	PC Cost	58	49			
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	Alternative Cost	154	132			
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	R	Cost Differential	95	83			
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	PC Mileage	2793				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	Alternative Mileage	10865				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	PC Cost	177	148	129	121	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	Alternative Cost	346	271	231	212	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	RO	Cost Differential	170	123	102	90	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	PC Mileage	2793				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	Alternative Mileage	10865				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	PC Cost	269	243	223		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	Alternative Cost	473	411	357		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	V	Cost Differential	204	167	134		
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	PC Cost			7	5	5
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	Alternative Cost			18	14	13
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CD	Cost Differential			12	9	9
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	PC Mileage	1630				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	PC Cost	39		20	16	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	Alternative Cost	86		42	33	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	CT	Cost Differential	47		22	17	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	PC Cost	50	25		14	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	Alternative Cost	201	88		45	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	LP	Cost Differential	151	64		32	
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	PC Mileage	1630				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	Alternative Mileage	9700				
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	PC Cost	14		7	5	5
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	Alternative Cost	60		25	18	16
CENTRAL AMERICA E.C., W. INDIES	C. AMERICA W.C.	T	Cost Differential	46		18	13	11
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	PC Cost	161	94	88	84	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	Alternative Cost	201	115	108	102	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CB	Cost Differential	40	21	20	18	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	PC Cost		248	194	191	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	Alternative Cost		299	233	233	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	F	Cost Differential		52	39	42	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	PC Cost	96	40	31		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	Alternative Cost	138	50	39		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	G	Cost Differential	43	11	8		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	PC Cost	164	141			
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	Alternative Cost	208	180			
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	R	Cost Differential	44	39			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	PC Cost	338	267	228	208	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	Alternative Cost	425	332	275	251	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	RO	Cost Differential	86	65	48	43	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	PC Mileage	10157				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	Alternative Mileage	14100				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	PC Cost	465	405	353		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	Alternative Cost	559	482	414		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	V	Cost Differential	94	77	61		
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	PC Mileage	10260				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	Alternative Mileage	13735				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	PC Cost			20	15	14
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	Alternative Cost			24	19	18
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CD	Cost Differential			5	4	3
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	PC Mileage	10026				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	Alternative Mileage	13735				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	PC Cost	89		44	34	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	Alternative Cost	110		54	42	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	CT	Cost Differential	21		10	8	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	PC Mileage	10026				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	Alternative Mileage	13735				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	PC Cost	213	93		48	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	Alternative Cost	279	121		62	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	LP	Cost Differential	67	28		14	
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	PC Mileage	10026				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	Alternative Mileage	13735				
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	PC Cost	63		27	19	16
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	Alternative Cost	84		35	24	21
CENTRAL AMERICA E.C., W. INDIES	OCEANIA	T	Cost Differential	20		8	6	5
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	PC Mileage	4934				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	Alternative Mileage	8210				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	PC Cost	105	64	60	58	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	Alternative Cost	138	81	76	73	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CB	Cost Differential	33	17	16	15	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	PC Mileage	4934				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	Alternative Mileage	8210				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	PC Cost		176	143	136	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	Alternative Cost		216	172	167	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	F	Cost Differential		40	29	32	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	PC Cost	24	21	17		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	Alternative Cost	64	31	24		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	G	Cost Differential	39	10	7		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	PC Cost	85	72			
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	Alternative Cost	125	107			
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	R	Cost Differential	40	35			
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	PC Mileage	4934				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	Alternative Mileage	8210				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	PC Cost	224	182	158	147	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	Alternative Cost	282	221	195	179	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	RO	Cost Differential	58	38	37	33	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	PC Cost	295	265	240		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	Alternative Cost	380	334	295		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	V	Cost Differential	85	70	55		
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	PC Cost			10	8	7
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	Alternative Cost			15	12	11
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CD	Cost Differential			5	4	4
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	PC Cost	51		26	21	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	Alternative Cost	72		36	28	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	CT	Cost Differential	21		10	7	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	PC Cost	91	42		23	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	Alternative Cost	157	70		36	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	LP	Cost Differential	65	27		14	
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	PC Mileage	3771				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	Alternative Mileage	7405				
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	PC Cost	26		12	9	8
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	Alternative Cost	46		20	14	12
CENTRAL AMERICA E.C., W. INDIES	S. AMERICA W.C.	T	Cost Differential	20		8	6	5
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	PC Mileage	5253				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	PC Cost	108	66	62	59	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	Alternative Cost	180	104	97	92	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CB	Cost Differential	72	39	35	33	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	PC Mileage	5253				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	PC Cost		180	146	139	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	Alternative Cost		272	213	211	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	F	Cost Differential		92	67	72	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	PC Mileage	4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	PC Cost	32	23	18		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	Alternative Cost	117	45	34		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	G	Cost Differential	84	21	16		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	PC Mileage	4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	PC Cost	94	80			
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	Alternative Cost	184	159			
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	R	Cost Differential	91	79			
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO	PC Mileage	5253				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO	Alternative Mileage	12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO	PC Cost	231	187	162	150	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO	Alternative Cost		378	296	249	227	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	RO	Cost Differential		147	108	87	77	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V	PC Mileage		4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V	PC Cost		314	280	253		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V	Alternative Cost		507	439	380		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	V	Cost Differential		194	159	127		
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD	PC Mileage		4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD	PC Cost				11	9	8
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD	Alternative Cost				22	17	16
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CD	Cost Differential				11	9	8
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT	PC Mileage		4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT	PC Cost		56		28	22	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT	Alternative Cost		101		49	39	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	CT	Cost Differential		45		21	16	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP	PC Mileage		4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP	PC Cost		105	48		25	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP	Alternative Cost		249	109		56	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	LP	Cost Differential		144	61		30	
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T	PC Mileage		4479				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T	Alternative Mileage		12170				
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T	PC Cost		31		14	10	9
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T	Alternative Cost		74		31	22	19
CENTRAL AMERICA E.C., W. INDIES	U.S. W.C., HAWAII	T	Cost Differential		44		17	12	10
C. AMERICA W.C.	AFRICA	CB	PC Mileage		6884				
C. AMERICA W.C.	AFRICA	CB	Alternative Mileage		16470				
C. AMERICA W.C.	AFRICA	CB	PC Cost		126	75	71	67	
C. AMERICA W.C.	AFRICA	CB	Alternative Cost		227	129	120	114	
C. AMERICA W.C.	AFRICA	CB	Cost Differential		101	54	50	46	
C. AMERICA W.C.	AFRICA	F	PC Mileage		6884				
C. AMERICA W.C.	AFRICA	F	Alternative Mileage		16470				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	AFRICA	F	PC Cost		203	162	156	
C. AMERICA W.C.	AFRICA	F	Alternative Cost		333	258	259	
C. AMERICA W.C.	AFRICA	F	Cost Differential		130	95	103	
C. AMERICA W.C.	AFRICA	G	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	G	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	G	PC Cost	59	30	23		
C. AMERICA W.C.	AFRICA	G	Alternative Cost	165	57	44		
C. AMERICA W.C.	AFRICA	G	Cost Differential	106	27	20		
C. AMERICA W.C.	AFRICA	R	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	R	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	R	PC Cost	123	106			
C. AMERICA W.C.	AFRICA	R	Alternative Cost	237	206			
C. AMERICA W.C.	AFRICA	R	Cost Differential	114	100			
C. AMERICA W.C.	AFRICA	RO	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	RO	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	RO	PC Cost	266	214	184	170	
C. AMERICA W.C.	AFRICA	RO	Alternative Cost	482	377	308	280	
C. AMERICA W.C.	AFRICA	RO	Cost Differential	216	163	124	110	
C. AMERICA W.C.	AFRICA	V	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	V	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	V	PC Cost	378	333	295		
C. AMERICA W.C.	AFRICA	V	Alternative Cost	622	534	456		
C. AMERICA W.C.	AFRICA	V	Cost Differential	244	201	161		
C. AMERICA W.C.	AFRICA	CD	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	CD	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	CD	PC Cost			15	11	11
C. AMERICA W.C.	AFRICA	CD	Alternative Cost			29	22	21
C. AMERICA W.C.	AFRICA	CD	Cost Differential			14	11	10
C. AMERICA W.C.	AFRICA	CT	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	CT	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	CT	PC Cost	70		35	28	
C. AMERICA W.C.	AFRICA	CT	Alternative Cost	127		61	48	
C AMERICA W.C.	AFRICA	CT	Cost Differential	56		26	20	
C. AMERICA W.C.	AFRICA	LP	PC Mileage	6884				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	AFRICA	LP	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	LP	PC Cost	152	68		35	
C. AMERICA W.C.	AFRICA	LP	Alternative Cost	333	144		73	
C. AMERICA W.C.	AFRICA	LP	Cost Differential	181	76		38	
C. AMERICA W.C.	AFRICA	T	PC Mileage	6884				
C. AMERICA W.C.	AFRICA	T	Alternative Mileage	16470				
C. AMERICA W.C.	AFRICA	T	PC Cost	45		20	14	12
C. AMERICA W.C.	AFRICA	T	Alternative Cost	100		41	29	25
C. AMERICA W.C.	AFRICA	T	Cost Differential	55		22	15	13
C. AMERICA W.C.	CANADA EAST COAST	CB	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	CB	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	CB	PC Cost	88	55	52	50	
C. AMERICA W.C.	CANADA EAST COAST	CB	Alternative Cost	171	99	93	88	
C. AMERICA W.C.	CANADA EAST COAST	CB	Cost Differential	82	44	41	38	
C. AMERICA W.C.	CANADA EAST COAST	F	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	F	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	F	PC Cost		155	128	119	
C. AMERICA W.C.	CANADA EAST COAST	F	Alternative Cost		259	204	201	
C. AMERICA W.C.	CANADA EAST COAST	F	Cost Differential		104	75	82	
C. AMERICA W.C.	CANADA EAST COAST	G	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	G	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	G	PC Cost	20	20	16		
C. AMERICA W.C.	CANADA EAST COAST	G	Alternative Cost	107	42	32		
C. AMERICA W.C.	CANADA EAST COAST	G	Cost Differential	86	22	17		
C. AMERICA W.C.	CANADA EAST COAST	R	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	R	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	R	PC Cost	80	68			
C. AMERICA W.C.	CANADA EAST COAST	R	Alternative Cost	173	149			
C. AMERICA W.C.	CANADA EAST COAST	R	Cost Differential	93	81			
C. AMERICA W.C.	CANADA EAST COAST	RO	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	RO	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	RO	PC Cost	190	158	138	128	
C. AMERICA W.C.	CANADA EAST COAST	RO	Alternative Cost	356	278	237	216	
C. AMERICA W.C.	CANADA EAST COAST	RO	Cost Differential	166	121	99	88	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	CANADA EAST COAST	V	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	V	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	V	PC Cost	285	257	234		
C. AMERICA W.C.	CANADA EAST COAST	V	Alternative Cost	483	419	364		
C. AMERICA W.C.	CANADA EAST COAST	V	Cost Differential	198	163	130		
C. AMERICA W.C.	CANADA EAST COAST	CD	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	CD	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	CD	PC Cost			9	7	7
C. AMERICA W.C.	CANADA EAST COAST	CD	Alternative Cost			21	16	15
C. AMERICA W.C.	CANADA EAST COAST	CD	Cost Differential			11	9	8
C. AMERICA W.C.	CANADA EAST COAST	CT	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	CT	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	CT	PC Cost	49		25	20	
C. AMERICA W.C.	CANADA EAST COAST	CT	Alternative Cost	95		47	37	
C. AMERICA W.C.	CANADA EAST COAST	CT	Cost Differential	46		22	17	
C. AMERICA W.C.	CANADA EAST COAST	LP	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	LP	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	LP	PC Cost	84	39		21	
C. AMERICA W.C.	CANADA EAST COAST	LP	Alternative Cost	232	101		52	
C. AMERICA W.C.	CANADA EAST COAST	LP	Cost Differential	147	62		31	
C. AMERICA W.C.	CANADA EAST COAST	T	PC Mileage	3405				
C. AMERICA W.C.	CANADA EAST COAST	T	Alternative Mileage	11265				
C. AMERICA W.C.	CANADA EAST COAST	T	PC Cost	24		11	8	7
C. AMERICA W.C.	CANADA EAST COAST	T	Alternative Cost	69		29	20	18
C. AMERICA W.C.	CANADA EAST COAST	T	Cost Differential	45		18	12	10
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage	2793				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage	10865				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost	82	51	49	47	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost	166	97	90	86	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential	84	45	42	39	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage	2793				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage	10865				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost		147	122	113	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost		253	199	197	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential		107	77	84	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost			15	12		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		89	38	29		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		89	22	17		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		58	49			
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		154	132			
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		95	83			
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		2793				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		10865				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		177	148	129	121	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		346	271	231	212	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		170	123	102	90	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		238	218	202		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		442	385	336		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		203	167	134		
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				7	5	5
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				18	14	13
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				12	9	9
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		39		20	16	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		86		42	33	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		47		22	17	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		50	25		14	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		201	88		45	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		151	64		32	
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		1630				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		9700				
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		14		7	5	5
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		60		25	18	16
C. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		46		18	13	11
C. AMERICA W.C.	EUROPE	CB	PC Mileage		5385				
C. AMERICA W.C.	EUROPE	CB	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	CB	PC Cost		110	66	63	60	
C. AMERICA W.C.	EUROPE	CB	Alternative Cost		172	100	93	88	
C. AMERICA W.C.	EUROPE	CB	Cost Differential		62	33	30	28	
C. AMERICA W.C.	EUROPE	F	PC Mileage		5385				
C. AMERICA W.C.	EUROPE	F	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	F	PC Cost			182	148	140	
C. AMERICA W.C.	EUROPE	F	Alternative Cost			260	205	202	
C. AMERICA W.C.	EUROPE	F	Cost Differential			78	57	62	
C. AMERICA W.C.	EUROPE	G	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	G	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	G	PC Cost		42	26	20		
C. AMERICA W.C.	EUROPE	G	Alternative Cost		108	42	33		
C. AMERICA W.C.	EUROPE	G	Cost Differential		66	17	13		
C. AMERICA W.C.	EUROPE	R	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	R	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	R	PC Cost		104	89			
C. AMERICA W.C.	EUROPE	R	Alternative Cost		174	150			
C. AMERICA W.C.	EUROPE	R	Cost Differential		70	61			
C. AMERICA W.C.	EUROPE	RO	PC Mileage		5385				
C. AMERICA W.C.	EUROPE	RO	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	RO	PC Cost		234	190	164	152	
C. AMERICA W.C.	EUROPE	RO	Alternative Cost		358	280	238	218	
C. AMERICA W.C.	EUROPE	RO	Cost Differential		125	91	74	66	
C. AMERICA W.C.	EUROPE	V	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	V	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	V	PC Cost		337	299	268		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	EUROPE	V	Alternative Cost		486	422	365		
C. AMERICA W.C.	EUROPE	V	Cost Differential		149	122	98		
C. AMERICA W.C.	EUROPE	CD	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	CD	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	CD	PC Cost				12	10	9
C. AMERICA W.C.	EUROPE	CD	Alternative Cost				21	16	15
C. AMERICA W.C.	EUROPE	CD	Cost Differential				9	7	6
C. AMERICA W.C.	EUROPE	CT	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	CT	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	CT	PC Cost		61		31	24	
C. AMERICA W.C.	EUROPE	CT	Alternative Cost		96		47	37	
C. AMERICA W.C.	EUROPE	CT	Cost Differential		35		16	13	
C. AMERICA W.C.	EUROPE	LP	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	LP	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	LP	PC Cost		122	55		29	
C. AMERICA W.C.	EUROPE	LP	Alternative Cost		234	102		52	
C. AMERICA W.C.	EUROPE	LP	Cost Differential		112	47		23	
C. AMERICA W.C.	EUROPE	T	PC Mileage		5340				
C. AMERICA W.C.	EUROPE	T	Alternative Mileage		11365				
C. AMERICA W.C.	EUROPE	T	PC Cost		36		16	11	10
C. AMERICA W.C.	EUROPE	T	Alternative Cost		70		29	21	18
C. AMERICA W.C.	EUROPE	T	Cost Differential		34		13	9	8
C. AMERICA W.C.	S. AMERICA E.C.	CB	PC Mileage		6223				
C. AMERICA W.C.	S. AMERICA E.C.	CB	Alternative Mileage		7710				
C. AMERICA W.C.	S. AMERICA E.C.	CB	PC Cost		119	71	67	64	
C. AMERICA W.C.	S. AMERICA E.C.	CB	Alternative Cost		132	78	73	70	
C. AMERICA W.C.	S. AMERICA E.C.	CB	Cost Differential		14	7	6	6	
C. AMERICA W.C.	S. AMERICA E.C.	F	PC Mileage		6223				
C. AMERICA W.C.	S. AMERICA E.C.	F	Alternative Mileage		7710				
C. AMERICA W.C.	S. AMERICA E.C.	F	PC Cost			194	156	149	
C. AMERICA W.C.	S. AMERICA E.C.	F	Alternative Cost			208	167	161	
C. AMERICA W.C.	S. AMERICA E.C.	F	Cost Differential			15	11	12	
C. AMERICA W.C.	S. AMERICA E.C.	G	PC Mileage		4644				
C. AMERICA W.C.	S. AMERICA E.C.	G	Alternative Mileage		6133				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	S. AMERICA E.C.	G	PC Cost	34	24	19		
C. AMERICA W.C.	S. AMERICA E.C.	G	Alternative Cost	49	27	21		
C. AMERICA W.C.	S. AMERICA E.C.	G	Cost Differential	15	3	3		
C. AMERICA W.C.	S. AMERICA E.C.	R	PC Mileage	4644				
C. AMERICA W.C.	S. AMERICA E.C.	R	Alternative Mileage	6133				
C. AMERICA W.C.	S. AMERICA E.C.	R	PC Cost	96	82			
C. AMERICA W.C.	S. AMERICA E.C.	R	Alternative Cost	109	94			
C. AMERICA W.C.	S. AMERICA E.C.	R	Cost Differential	14	12			
C. AMERICA W.C.	S. AMERICA E.C.	RO	PC Mileage	6223				
C. AMERICA W.C.	S. AMERICA E.C.	RO	Alternative Mileage	7710				
C. AMERICA W.C.	S. AMERICA E.C.	RO	PC Cost	252	203	175	162	
C. AMERICA W.C.	S. AMERICA E.C.	RO	Alternative Cost	270	211	188	173	
C. AMERICA W.C.	S. AMERICA E.C.	RO	Cost Differential	18	8	13	11	
C. AMERICA W.C.	S. AMERICA E.C.	V	PC Mileage	4644				
C. AMERICA W.C.	S. AMERICA E.C.	V	Alternative Mileage	6133				
C. AMERICA W.C.	S. AMERICA E.C.	V	PC Cost	318	284	255		
C. AMERICA W.C.	S. AMERICA E.C.	V	Alternative Cost	346	306	273		
C. AMERICA W.C.	S. AMERICA E.C.	V	Cost Differential	28	22	18		
C. AMERICA W.C.	S. AMERICA E.C.	CD	PC Mileage	4644				
C. AMERICA W.C.	S. AMERICA E.C.	CD	Alternative Mileage	6133				
C. AMERICA W.C.	S. AMERICA E.C.	CD	PC Cost			11	9	8
C. AMERICA W.C.	S. AMERICA E.C.	CD	Alternative Cost			13	10	9
C. AMERICA W.C.	S. AMERICA E.C.	CD	Cost Differential			2	1	1
C. AMERICA W.C.	S. AMERICA E.C.	CT	PC Mileage	4644				
C. AMERICA W.C.	S. AMERICA E.C.	CT	Alternative Mileage	3771				
C. AMERICA W.C.	S. AMERICA E.C.	CT	PC Cost	57		29	23	
C. AMERICA W.C.	S. AMERICA E.C.	CT	Alternative Cost	50		25	20	
C. AMERICA W.C.	S. AMERICA E.C.	CT	Cost Differential	-7		-3	-3	
C. AMERICA W.C.	S. AMERICA E.C.	LP	PC Mileage	4644				
C. AMERICA W.C.	S. AMERICA E.C.	LP	Alternative Mileage	3771				
C. AMERICA W.C.	S. AMERICA E.C.	LP	PC Cost	108	49		26	
C. AMERICA W.C.	S. AMERICA E.C.	LP	Alternative Cost	86	40		21	
C. AMERICA W.C.	S. AMERICA E.C.	LP	Cost Differential	-22	-9		-5	
C. AMERICA W.C.	S. AMERICA E.C.	T	PC Mileage	4644				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	S. AMERICA E.C.	T	Alternative Mileage	3771				
C. AMERICA W.C.	S. AMERICA E.C.	T	PC Cost	31		14	10	9
C. AMERICA W.C.	S. AMERICA E.C.	T	Alternative Cost	25		11	8	7
C. AMERICA W.C.	S. AMERICA E.C.	T	Cost Differential	-7		-3	-2	-2
C. AMERICA W.C.	U.S. EAST COAST	CB	PC Mileage	3655				
C. AMERICA W.C.	U.S. EAST COAST	CB	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	CB	PC Cost	91	56	53	51	
C. AMERICA W.C.	U.S. EAST COAST	CB	Alternative Cost	168	97	91	87	
C. AMERICA W.C.	U.S. EAST COAST	CB	Cost Differential	77	41	38	35	
C. AMERICA W.C.	U.S. EAST COAST	F	PC Mileage	3655				
C. AMERICA W.C.	U.S. EAST COAST	F	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	F	PC Cost		158	131	122	
C. AMERICA W.C.	U.S. EAST COAST	F	Alternative Cost		255	201	198	
C. AMERICA W.C.	U.S. EAST COAST	F	Cost Differential		97	70	76	
C. AMERICA W.C.	U.S. EAST COAST	G	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	G	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	G	PC Cost	6	17	13		
C. AMERICA W.C.	U.S. EAST COAST	G	Alternative Cost	104	41	32		
C. AMERICA W.C.	U.S. EAST COAST	G	Cost Differential	98	25	19		
C. AMERICA W.C.	U.S. EAST COAST	R	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	R	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	R	PC Cost	64	54			
C. AMERICA W.C.	U.S. EAST COAST	R	Alternative Cost	170	146			
C. AMERICA W.C.	U.S. EAST COAST	R	Cost Differential	106	93			
C. AMERICA W.C.	U.S. EAST COAST	RO	PC Mileage	3655				
C. AMERICA W.C.	U.S. EAST COAST	RO	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	RO	PC Cost	196	162	141	131	
C. AMERICA W.C.	U.S. EAST COAST	RO	Alternative Cost	350	273	233	213	
C. AMERICA W.C.	U.S. EAST COAST	RO	Cost Differential	154	112	92	82	
C. AMERICA W.C.	U.S. EAST COAST	V	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	V	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	V	PC Cost	250	228	210		
C. AMERICA W.C.	U.S. EAST COAST	V	Alternative Cost	476	413	359		
C. AMERICA W.C.	U.S. EAST COAST	V	Cost Differential	226	186	149		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
C. AMERICA W.C.	U.S. EAST COAST	CD	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	CD	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	CD	PC Cost			7	6	5
C. AMERICA W.C.	U.S. EAST COAST	CD	Alternative Cost			20	16	15
C. AMERICA W.C.	U.S. EAST COAST	CD	Cost Differential			13	10	9
C. AMERICA W.C.	U.S. EAST COAST	CT	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	CT	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	CT	PC Cost	41		21	17	
C. AMERICA W.C.	U.S. EAST COAST	CT	Alternative Cost	94		46	36	
C. AMERICA W.C.	U.S. EAST COAST	CT	Cost Differential	52		25	19	
C. AMERICA W.C.	U.S. EAST COAST	LP	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	LP	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	LP	PC Cost	59	28		16	
C. AMERICA W.C.	U.S. EAST COAST	LP	Alternative Cost	226	99		51	
C. AMERICA W.C.	U.S. EAST COAST	LP	Cost Differential	168	71		35	
C. AMERICA W.C.	U.S. EAST COAST	T	PC Mileage	2085				
C. AMERICA W.C.	U.S. EAST COAST	T	Alternative Mileage	11000				
C. AMERICA W.C.	U.S. EAST COAST	T	PC Cost	16		8	6	5
C. AMERICA W.C.	U.S. EAST COAST	T	Alternative Cost	67		28	20	17
C. AMERICA W.C.	U.S. EAST COAST	T	Cost Differential	51		20	14	12
EUROPE	ASIA	CB	PC Mileage	14077				
EUROPE	ASIA	CB	Alternative Mileage	13122				
EUROPE	ASIA	CB	PC Cost	203	117	109	103	
EUROPE	ASIA	CB	Alternative Cost	190	110	102	97	
EUROPE	ASIA	CB	Cost Differential	-13	-7	-7	-6	
EUROPE	ASIA	F	PC Mileage	14077				
EUROPE	ASIA	F	Alternative Mileage	13122				
EUROPE	ASIA	F	PC Cost		301	233	233	
EUROPE	ASIA	F	Alternative Cost		285	223	222	
EUROPE	ASIA	F	Cost Differential		-16	-10	-11	
EUROPE	ASIA	G	PC Mileage	14077				
EUROPE	ASIA	G	Alternative Mileage	13122				
EUROPE	ASIA	G	PC Cost	139	51	39		
EUROPE	ASIA	G	Alternative Cost	127	47	37		
EUROPE	ASIA	G	Cost Differential	-12	-4	-3		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	ASIA	R	PC Mileage		14077				
EUROPE	ASIA	R	Alternative Mileage		13122				
EUROPE	ASIA	R	PC Cost		212	184			
EUROPE	ASIA	R	Alternative Cost		196	169			
EUROPE	ASIA	R	Cost Differential		-16	-15			
EUROPE	ASIA	RO	PC Mileage		14077				
EUROPE	ASIA	RO	Alternative Mileage		13122				
EUROPE	ASIA	RO	PC Cost		424	330	280	255	
EUROPE	ASIA	RO	Alternative Cost		401	314	262	239	
EUROPE	ASIA	RO	Cost Differential		-23	-16	-18	-16	
EUROPE	ASIA	V	PC Mileage		14077				
EUROPE	ASIA	V	Alternative Mileage		13122				
EUROPE	ASIA	V	PC Cost		569	491	423		
EUROPE	ASIA	V	Alternative Cost		533	460	397		
EUROPE	ASIA	V	Cost Differential		-37	-31	-26		
EUROPE	ASIA	CD	PC Mileage		14077				
EUROPE	ASIA	CD	Alternative Mileage		13122				
EUROPE	ASIA	CD	PC Cost				26	20	19
EUROPE	ASIA	CD	Alternative Cost				24	18	17
EUROPE	ASIA	CD	Cost Differential				-2	-1	-2
EUROPE	ASIA	CT	PC Mileage		14077				
EUROPE	ASIA	CT	Alternative Mileage		13122				
EUROPE	ASIA	CT	PC Cost		114		55	43	
EUROPE	ASIA	CT	Alternative Cost		107		52	41	
EUROPE	ASIA	CT	Cost Differential		-7		-3	-3	
EUROPE	ASIA	LP	PC Mileage		14077				
EUROPE	ASIA	LP	Alternative Mileage		13122				
EUROPE	ASIA	LP	PC Cost		291	126		65	
EUROPE	ASIA	LP	Alternative Cost		268	116		59	
EUROPE	ASIA	LP	Cost Differential		-24	-10		-5	
EUROPE	ASIA	T	PC Mileage		14077				
EUROPE	ASIA	T	Alternative Mileage		13122				
EUROPE	ASIA	T	PC Cost		87		37	25	22
EUROPE	ASIA	T	Alternative Cost		80		33	23	20

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	ASIA	T	Cost Differential		-7		-3	-2	2
EUROPE	CANADA WEST COAST	CB	PC Mileage		9619				
EUROPE	CANADA WEST COAST	CB	Alternative Mileage		15040				
EUROPE	CANADA WEST COAST	CB	PC Cost		155	91	85	81	
EUROPE	CANADA WEST COAST	CB	Alternative Cost		211	121	113	107	
EUROPE	CANADA WEST COAST	CB	Cost Differential		56	30	27	26	
EUROPE	CANADA WEST COAST	F	PC Mileage		9619				
EUROPE	CANADA WEST COAST	F	Alternative Mileage		15040				
EUROPE	CANADA WEST COAST	F	PC Cost			240	189	185	
EUROPE	CANADA WEST COAST	F	Alternative Cost			312	243	243	
EUROPE	CANADA WEST COAST	F	Cost Differential			72	54	58	
EUROPE	CANADA WEST COAST	G	PC Mileage		9051				
EUROPE	CANADA WEST COAST	G	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	G	PC Cost		83	37	28		
EUROPE	CANADA WEST COAST	G	Alternative Cost		145	52	40		
EUROPE	CANADA WEST COAST	G	Cost Differential		62	16	12		
EUROPE	CANADA WEST COAST	R	PC Mileage		9051				
EUROPE	CANADA WEST COAST	R	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	R	PC Cost		150	129			
EUROPE	CANADA WEST COAST	R	Alternative Cost		216	187			
EUROPE	CANADA WEST COAST	R	Cost Differential		66	58			
EUROPE	CANADA WEST COAST	RO	PC Mileage		9619				
EUROPE	CANADA WEST COAST	RO	Alternative Mileage		15040				
EUROPE	CANADA WEST COAST	RO	PC Cost		326	258	220	202	
EUROPE	CANADA WEST COAST	RO	Alternative Cost		447	350	288	263	
EUROPE	CANADA WEST COAST	RO	Cost Differential		121	92	68	60	
EUROPE	CANADA WEST COAST	V	PC Mileage		9051				
EUROPE	CANADA WEST COAST	V	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	V	PC Cost		436	381	334		
EUROPE	CANADA WEST COAST	V	Alternative Cost		576	496	425		
EUROPE	CANADA WEST COAST	V	Cost Differential		141	115	92		
EUROPE	CANADA WEST COAST	CD	PC Mileage		9051				
EUROPE	CANADA WEST COAST	CD	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	CD	PC Cost				18	14	13

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	CANADA WEST COAST	CD	Alternative Cost				26	20	19
EUROPE	CANADA WEST COAST	CD	Cost Differential				8	6	6
EUROPE	CANADA WEST COAST	CT	PC Mileage		9051				
EUROPE	CANADA WEST COAST	CT	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	CT	PC Cost		83		41	32	
EUROPE	CANADA WEST COAST	CT	Alternative Cost		116		57	44	
EUROPE	CANADA WEST COAST	CT	Cost Differential		33		15	12	
EUROPE	CANADA WEST COAST	LP	PC Mileage		9051				
EUROPE	CANADA WEST COAST	LP	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	LP	PC Cost		194	85		44	
EUROPE	CANADA WEST COAST	LP	Alternative Cost		299	130		66	
EUROPE	CANADA WEST COAST	LP	Cost Differential		105	44		22	
EUROPE	CANADA WEST COAST	T	PC Mileage		9051				
EUROPE	CANADA WEST COAST	T	Alternative Mileage		14745				
EUROPE	CANADA WEST COAST	T	PC Cost		57		25	17	15
EUROPE	CANADA WEST COAST	T	Alternative Cost		89		37	26	22
EUROPE	CANADA WEST COAST	T	Cost Differential		32		12	9	7
EUROPE	C. AMERICA W.C.	CB	PC Mileage		5385				
EUROPE	C. AMERICA W.C.	CB	Alternative Mileage		15040				
EUROPE	C. AMERICA W.C.	CB	PC Cost		110	66	63	60	
EUROPE	C. AMERICA W.C.	CB	Alternative Cost		211	121	113	107	
EUROPE	C. AMERICA W.C.	CB	Cost Differential		101	55	50	47	
EUROPE	C. AMERICA W.C.	F	PC Mileage		5385				
EUROPE	C. AMERICA W.C.	F	Alternative Mileage		15040				
EUROPE	C. AMERICA W.C.	F	PC Cost			182	148	140	
EUROPE	C. AMERICA W.C.	F	Alternative Cost			312	243	243	
EUROPE	C. AMERICA W.C.	F	Cost Differential			130	95	103	
EUROPE	C. AMERICA W.C.	G	PC Mileage		5340				
EUROPE	C. AMERICA W.C.	G	Alternative Mileage		14745				
EUROPE	C. AMERICA W.C.	G	PC Cost		42	26	20		
EUROPE	C. AMERICA W.C.	G	Alternative Cost		145	52	40		
EUROPE	C. AMERICA W.C.	G	Cost Differential		104	26	20		
EUROPE	C. AMERICA W.C.	R	PC Mileage		5340				
EUROPE	C. AMERICA W.C.	R	Alternative Mileage		14745				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
EUROPE	C. AMERICA W.C.	R PC Cost	104	89			
EUROPE	C. AMERICA W.C.	R Alternative Cost	216	187			
EUROPE	C. AMERICA W.C.	R Cost Differential	112	98			
EUROPE	C. AMERICA W.C.	RO PC Mileage	5385				
EUROPE	C. AMERICA W.C.	RO Alternative Mileage	15040				
EUROPE	C. AMERICA W.C.	RO PC Cost	234	190	164	152	
EUROPE	C. AMERICA W.C.	RO Alternative Cost	447	350	288	263	
EUROPE	C. AMERICA W.C.	RO Cost Differential	214	160	124	111	
EUROPE	C. AMERICA W.C.	V PC Mileage	5340				
EUROPE	C. AMERICA W.C.	V Alternative Mileage	14745				
EUROPE	C. AMERICA W.C.	V PC Cost	337	299	268		
EUROPE	C. AMERICA W.C.	V Alternative Cost	576	496	425		
EUROPE	C. AMERICA W.C.	V Cost Differential	239	197	157		
EUROPE	C. AMERICA W.C.	CD PC Mileage	5340				
EUROPE	C. AMERICA W.C.	CD Alternative Mileage	13365				
EUROPE	C. AMERICA W.C.	CD PC Cost			12	10	9
EUROPE	C. AMERICA W.C.	CD Alternative Cost			24	19	17
EUROPE	C. AMERICA W.C.	CD Cost Differential			12	9	8
EUROPE	C. AMERICA W.C.	CT PC Mileage	5340				
EUROPE	C. AMERICA W.C.	CT Alternative Mileage	11365				
EUROPE	C. AMERICA W.C.	CT PC Cost	61		31	24	
EUROPE	C. AMERICA W.C.	CT Alternative Cost	96		47	37	
EUROPE	C. AMERICA W.C.	CT Cost Differential	35		16	13	
EUROPE	C. AMERICA W.C.	LP PC Mileage	5340				
EUROPE	C. AMERICA W.C.	LP Alternative Mileage	11365				
EUROPE	C. AMERICA W.C.	LP PC Cost	122	55		29	
EUROPE	C. AMERICA W.C.	LP Alternative Cost	234	102		52	
EUROPE	C. AMERICA W.C.	LP Cost Differential	112	47		23	
EUROPE	C. AMERICA W.C.	T PC Mileage	5340				
EUROPE	C. AMERICA W.C.	T Alternative Mileage	11365				
EUROPE	C. AMERICA W.C.	T PC Cost	36		16	11	10
EUROPE	C. AMERICA W.C.	T Alternative Cost	70		29	21	18
EUROPE	C. AMERICA W.C.	T Cost Differential	34		13	9	8
EUROPE	OCEANIA	CB PC Mileage	13731				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	OCEANIA	CB	Alternative Mileage		12583				
EUROPE	OCEANIA	CB	PC Cost		200	115	107	102	
EUROPE	OCEANIA	CB	Alternative Cost		185	107	100	94	
EUROPE	OCEANIA	CB	Cost Differential		-15	-8	-8	-7	
EUROPE	OCEANIA	F	PC Mileage		13731				
EUROPE	OCEANIA	F	Alternative Mileage		13610				
EUROPE	OCEANIA	F	PC Cost			297	229	229	
EUROPE	OCEANIA	F	Alternative Cost			292	228	227	
EUROPE	OCEANIA	F	Cost Differential			-4	-1	-2	
EUROPE	OCEANIA	G	PC Mileage		12702				
EUROPE	OCEANIA	G	Alternative Mileage		12583				
EUROPE	OCEANIA	G	PC Cost		124	47	36		
EUROPE	OCEANIA	G	Alternative Cost		121	46	35		
EUROPE	OCEANIA	G	Cost Differential		-3	-1	-1		
EUROPE	OCEANIA	R	PC Mileage		12702				
EUROPE	OCEANIA	R	Alternative Mileage		12583				
EUROPE	OCEANIA	R	PC Cost		195	169			
EUROPE	OCEANIA	R	Alternative Cost		189	164			
EUROPE	OCEANIA	R	Cost Differential		-6	-5			
EUROPE	OCEANIA	RO	PC Mileage		13731				
EUROPE	OCEANIA	RO	Alternative Mileage		13610				
EUROPE	OCEANIA	RO	PC Cost		417	324	275	251	
EUROPE	OCEANIA	RO	Alternative Cost		413	323	269	245	
EUROPE	OCEANIA	RO	Cost Differential		-4	-2	-6	-6	
EUROPE	OCEANIA	V	PC Mileage		12702				
EUROPE	OCEANIA	V	Alternative Mileage		12583				
EUROPE	OCEANIA	V	PC Cost		533	461	398		
EUROPE	OCEANIA	V	Alternative Cost		518	448	387		
EUROPE	OCEANIA	V	Cost Differential		-14	-12	-11		
EUROPE	OCEANIA	CD	PC Mileage		12702				
EUROPE	OCEANIA	CD	Alternative Mileage		12583				
EUROPE	OCEANIA	CD	PC Cost				23	18	17
EUROPE	OCEANIA	CD	Alternative Cost				23	18	17
EUROPE	OCEANIA	CD	Cost Differential				-1	-0	-1

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	OCEANIA	CT	PC Mileage	12702				
EUROPE	OCEANIA	CT	Alternative Mileage	12583				
EUROPE	OCEANIA	CT	PC Cost	105		51	40	
EUROPE	OCEANIA	CT	Alternative Cost	103		50	39	
EUROPE	OCEANIA	CT	Cost Differential	-2		-1	-1	
EUROPE	OCEANIA	LP	PC Mileage	12702				
EUROPE	OCEANIA	LP	Alternative Mileage	12583				
EUROPE	OCEANIA	LP	PC Cost	265	115		59	
EUROPE	OCEANIA	LP	Alternative Cost	257	112		57	
EUROPE	OCEANIA	LP	Cost Differential	-7	-3		-2	
EUROPE	OCEANIA	T	PC Mileage	12702				
EUROPE	OCEANIA	T	Alternative Mileage	12583				
EUROPE	OCEANIA	T	PC Cost	79		33	23	20
EUROPE	OCEANIA	T	Alternative Cost	77		32	23	20
EUROPE	OCEANIA	T	Cost Differential	-2		-1	-1	1
EUROPE	S. AMERICA W.C.	CB	PC Mileage	9374				
EUROPE	S. AMERICA W.C.	CB	Alternative Mileage	12583				
EUROPE	S. AMERICA W.C.	CB	PC Cost	153	90	84	80	
EUROPE	S. AMERICA W.C.	CB	Alternative Cost	185	107	100	94	
EUROPE	S. AMERICA W.C.	CB	Cost Differential	32	17	16	15	
EUROPE	S. AMERICA W.C.	F	PC Mileage	9374				
EUROPE	S. AMERICA W.C.	F	Alternative Mileage	13000				
EUROPE	S. AMERICA W.C.	F	PC Cost		237	187	183	
EUROPE	S. AMERICA W.C.	F	Alternative Cost		284	222	221	
EUROPE	S. AMERICA W.C.	F	Cost Differential		47	35	38	
EUROPE	S. AMERICA W.C.	G	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	G	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	G	PC Cost	67	32	25		
EUROPE	S. AMERICA W.C.	G	Alternative Cost	81	35	27		
EUROPE	S. AMERICA W.C.	G	Cost Differential	14	3	2		
EUROPE	S. AMERICA W.C.	R	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	R	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	R	PC Cost	132	113			
EUROPE	S. AMERICA W.C.	R	Alternative Cost	144	124			
EUROPE	S. AMERICA W.C.	R	Cost Differential	12	11			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	S. AMERICA W.C.	RO	PC Mileage	9374				
EUROPE	S. AMERICA W.C.	RO	Alternative Mileage	12583				
EUROPE	S. AMERICA W.C.	RO	PC Cost	321	254	217	199	
EUROPE	S. AMERICA W.C.	RO	Alternative Cost	388	303	255	233	
EUROPE	S. AMERICA W.C.	RO	Cost Differential	67	49	38	33	
EUROPE	S. AMERICA W.C.	V	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	V	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	V	PC Cost	396	348	307		
EUROPE	S. AMERICA W.C.	V	Alternative Cost	421	368	323		
EUROPE	S. AMERICA W.C.	V	Cost Differential	25	20	15		
EUROPE	S. AMERICA W.C.	CD	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	CD	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	CD	PC Cost			16	12	11
EUROPE	S. AMERICA W.C.	CD	Alternative Cost			17	14	13
EUROPE	S. AMERICA W.C.	CD	Cost Differential			2	1	1
EUROPE	S. AMERICA W.C.	CT	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	CT	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	CT	PC Cost	74		37	29	
EUROPE	S. AMERICA W.C.	CT	Alternative Cost	81		40	31	
EUROPE	S. AMERICA W.C.	CT	Cost Differential	7		3	2	
EUROPE	S. AMERICA W.C.	LP	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	LP	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	LP	PC Cost	165	73		38	
EUROPE	S. AMERICA W.C.	LP	Alternative Cost	186	82		42	
EUROPE	S. AMERICA W.C.	LP	Cost Differential	21	9		4	
EUROPE	S. AMERICA W.C.	T	PC Mileage	7570				
EUROPE	S. AMERICA W.C.	T	Alternative Mileage	8935				
EUROPE	S. AMERICA W.C.	T	PC Cost	49		21	15	13
EUROPE	S. AMERICA W.C.	T	Alternative Cost	55		24	17	14
EUROPE	S. AMERICA W.C.	T	Cost Differential	7		2	2	2
EUROPE	U.S. W.C., HAWAII	CB	PC Mileage	9405				
EUROPE	U.S. W.C., HAWAII	CB	Alternative Mileage	15040				
EUROPE	U.S. W.C., HAWAII	CB	PC Cost	153	90	84	80	
EUROPE	U.S. W.C., HAWAII	CB	Alternative Cost	211	121	113	107	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
EUROPE	U.S. W.C., HAWAII	CB Cost Differential	58	31	29	27	
EUROPE	U.S. W.C., HAWAII	F PC Mileage	9405				
EUROPE	U.S. W.C., HAWAII	F Alternative Mileage	14840				
EUROPE	U.S. W.C., HAWAII	F PC Cost		237	187	183	
EUROPE	U.S. W.C., HAWAII	F Alternative Cost		310	241	241	
EUROPE	U.S. W.C., HAWAII	F Cost Differential		72	54	58	
EUROPE	U.S. W.C., HAWAII	G PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	G Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	G PC Cost	73	34	26		
EUROPE	U.S. W.C., HAWAII	G Alternative Cost	134	49	38		
EUROPE	U.S. W.C., HAWAII	G Cost Differential	60	15	12		
EUROPE	U.S. W.C., HAWAII	R PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	R Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	R PC Cost	139	120			
EUROPE	U.S. W.C., HAWAII	R Alternative Cost	203	176			
EUROPE	U.S. W.C., HAWAII	R Cost Differential	64	56			
EUROPE	U.S. W.C., HAWAII	RO PC Mileage	9405				
EUROPE	U.S. W.C., HAWAII	RO Alternative Mileage	15040				
EUROPE	U.S. W.C., HAWAII	RO PC Cost	322	254	217	200	
EUROPE	U.S. W.C., HAWAII	RO Alternative Cost	447	350	288	263	
EUROPE	U.S. W.C., HAWAII	RO Cost Differential	126	95	71	63	
EUROPE	U.S. W.C., HAWAII	V PC Mileage	9165				
EUROPE	U.S. W.C., HAWAII	V Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	V PC Cost	439	383	336		
EUROPE	U.S. W.C., HAWAII	V Alternative Cost	548	473	407		
EUROPE	U.S. W.C., HAWAII	V Cost Differential	110	90	71		
EUROPE	U.S. W.C., HAWAII	CD PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	CD Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	CD PC Cost			17	13	12
EUROPE	U.S. W.C., HAWAII	CD Alternative Cost			24	19	18
EUROPE	U.S. W.C., HAWAII	CD Cost Differential			8	6	6
EUROPE	U.S. W.C., HAWAII	CT PC Mileage	8165				
EUROPE	U.S. W.C., HAWAII	CT Alternative Mileage	13702				
EUROPE	U.S. W.C., HAWAII	CT PC Cost	78		39	30	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
EUROPE	U.S. W.C., HAWAII	CT	Alternative Cost		110		54	42	
EUROPE	U.S. W.C., HAWAII	CT	Cost Differential		32		15	12	
EUROPE	U.S. W.C., HAWAII	LP	PC Mileage		8165				
EUROPE	U.S. W.C., HAWAII	LP	Alternative Mileage		13702				
EUROPE	U.S. W.C., HAWAII	LP	PC Cost		177	78		40	
EUROPE	U.S. W.C., HAWAII	LP	Alternative Cost		279	121		62	
EUROPE	U.S. W.C., HAWAII	LP	Cost Differential		102	43		21	
EUROPE	U.S. W.C., HAWAII	T	PC Mileage		8165				
EUROPE	U.S. W.C., HAWAII	T	Alternative Mileage		13702				
EUROPE	U.S. W.C., HAWAII	T	PC Cost		52		23	16	14
EUROPE	U.S. W.C., HAWAII	T	Alternative Cost		83		35	24	21
EUROPE	U.S. W.C., HAWAII	T	Cost Differential		31		12	9	7
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	PC Mileage		8359				
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	Alternative Mileage		11428				
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	PC Cost				17	13	12
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	Alternative Cost				21	16	15
MIDDLE EAST	S. AMERICA W.C. (additional route)	CD	Cost Differential				4	3	3
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	PC Mileage		8359				
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	Alternative Mileage		11428				
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	PC Cost		76	35	27		
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	Alternative Cost		108	43	33		
MIDDLE EAST	S. AMERICA W.C. (additional route)	G	Cost Differential		33	8	6		
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	PC Mileage		8359				
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	Alternative Mileage		11428				
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	PC Cost		142	122			
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	Alternative Cost		175	151			
MIDDLE EAST	S. AMERICA W.C. (additional route)	R	Cost Differential		33	29			
MIDDLE EAST	U.S. W.C., HAWAII	CB	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	CB	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	CB	PC Cost		162	95	89	84	
MIDDLE EAST	U.S. W.C., HAWAII	CB	Alternative Cost		193	111	104	98	
MIDDLE EAST	U.S. W.C., HAWAII	CB	Cost Differential		31	16	15	14	
MIDDLE EAST	U.S. W.C., HAWAII	F	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	F	Alternative Mileage		13367				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
MIDDLE EAST	U.S. W.C., HAWAII	F	PC Cost			249	195	192	
MIDDLE EAST	U.S. W.C., HAWAII	F	Alternative Cost			289	225	225	
MIDDLE EAST	U.S. W.C., HAWAII	F	Cost Differential			40	30	33	
MIDDLE EAST	U.S. W.C., HAWAII	G	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	G	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	G	PC Cost		97	40	31		
MIDDLE EAST	U.S. W.C., HAWAII	G	Alternative Cost		130	48	37		
MIDDLE EAST	U.S. W.C., HAWAII	G	Cost Differential		33	8	6		
MIDDLE EAST	U.S. W.C., HAWAII	R	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	R	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	R	PC Cost		165	142			
MIDDLE EAST	U.S. W.C., HAWAII	R	Alternative Cost		199	172			
MIDDLE EAST	U.S. W.C., HAWAII	R	Cost Differential		34	30			
MIDDLE EAST	U.S. W.C., HAWAII	RO	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	RO	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	RO	PC Cost		340	268	229	210	
MIDDLE EAST	U.S. W.C., HAWAII	RO	Alternative Cost		407	318	265	242	
MIDDLE EAST	U.S. W.C., HAWAII	RO	Cost Differential		67	50	37	33	
MIDDLE EAST	U.S. W.C., HAWAII	V	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	V	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	V	PC Cost		468	407	355		
MIDDLE EAST	U.S. W.C., HAWAII	V	Alternative Cost		539	466	401		
MIDDLE EAST	U.S. W.C., HAWAII	V	Cost Differential		72	59	46		
MIDDLE EAST	U.S. W.C., HAWAII	CD	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	CD	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	CD	PC Cost				20	15	14
MIDDLE EAST	U.S. W.C., HAWAII	CD	Alternative Cost				24	19	17
MIDDLE EAST	U.S. W.C., HAWAII	CD	Cost Differential				4	3	3
MIDDLE EAST	U.S. W.C., HAWAII	CT	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	CT	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	CT	PC Cost		91		45	35	
MIDDLE EAST	U.S. W.C., HAWAII	CT	Alternative Cost		108		53	41	
MIDDLE EAST	U.S. W.C., HAWAII	CT	Cost Differential		17		8	6	
MIDDLE EAST	U.S. W.C., HAWAII	LP	PC Mileage		10250				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
MIDDLE EAST	U.S. W.C., HAWAII	LP	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	LP	PC Cost		217	95		49	
MIDDLE EAST	U.S. W.C., HAWAII	LP	Alternative Cost		272	118		60	
MIDDLE EAST	U.S. W.C., HAWAII	LP	Cost Differential		55	23		11	
MIDDLE EAST	U.S. W.C., HAWAII	T	PC Mileage		10250				
MIDDLE EAST	U.S. W.C., HAWAII	T	Alternative Mileage		13367				
MIDDLE EAST	U.S. W.C., HAWAII	T	PC Cost		64		28	19	17
MIDDLE EAST	U.S. W.C., HAWAII	T	Alternative Cost		81		34	24	21
MIDDLE EAST	U.S. W.C., HAWAII	T	Cost Differential		17		6	5	4
OCEANIA	CANADA EAST COAST	CB	PC Mileage		12539				
OCEANIA	CANADA EAST COAST	CB	Alternative Mileage		13320				
OCEANIA	CANADA EAST COAST	CB	PC Cost		187	108	101	96	
OCEANIA	CANADA EAST COAST	CB	Alternative Cost		193	111	104	98	
OCEANIA	CANADA EAST COAST	CB	Cost Differential		6	3	3	2	
OCEANIA	CANADA EAST COAST	F	PC Mileage		12539				
OCEANIA	CANADA EAST COAST	F	Alternative Mileage		12790				
OCEANIA	CANADA EAST COAST	F	PC Cost			280	218	216	
OCEANIA	CANADA EAST COAST	F	Alternative Cost			281	219	218	
OCEANIA	CANADA EAST COAST	F	Cost Differential				2	2	
OCEANIA	CANADA EAST COAST	G	PC Mileage		10766				
OCEANIA	CANADA EAST COAST	G	Alternative Mileage		12870				
OCEANIA	CANADA EAST COAST	G	PC Cost		102	42	32		
OCEANIA	CANADA EAST COAST	G	Alternative Cost		125	47	36		
OCEANIA	CANADA EAST COAST	G	Cost Differential		22	5	4		
OCEANIA	CANADA EAST COAST	R	PC Mileage		10766				
OCEANIA	CANADA EAST COAST	R	Alternative Mileage		12870				
OCEANIA	CANADA EAST COAST	R	PC Cost		171	148			
OCEANIA	CANADA EAST COAST	R	Alternative Cost		193	167			
OCEANIA	CANADA EAST COAST	R	Cost Differential		21	19			
OCEANIA	CANADA EAST COAST	RO	PC Mileage		12539				
OCEANIA	CANADA EAST COAST	RO	Alternative Mileage		13320				
OCEANIA	CANADA EAST COAST	RO	PC Cost		391	305	259	237	
OCEANIA	CANADA EAST COAST	RO	Alternative Cost		406	317	265	242	
OCEANIA	CANADA EAST COAST	RO	Cost Differential		15	12	5	5	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	CANADA EAST COAST	V	PC Mileage		10766				
OCEANIA	CANADA EAST COAST	V	Alternative Mileage		12870				
OCEANIA	CANADA EAST COAST	V	PC Cost		481	418	364		
OCEANIA	CANADA EAST COAST	V	Alternative Cost		526	455	392		
OCEANIA	CANADA EAST COAST	V	Cost Differential		45	36	28		
OCEANIA	CANADA EAST COAST	CD	PC Mileage		10766				
OCEANIA	CANADA EAST COAST	CD	Alternative Mileage		12870				
OCEANIA	CANADA EAST COAST	CD	PC Cost				21	16	15
OCEANIA	CANADA EAST COAST	CD	Alternative Cost				23	18	17
OCEANIA	CANADA EAST COAST	CD	Cost Differential				3	2	2
OCEANIA	CANADA EAST COAST	CT	PC Mileage		10766				
OCEANIA	CANADA EAST COAST	CT	Alternative Mileage		12870				
OCEANIA	CANADA EAST COAST	CT	PC Cost		94		46	36	
OCEANIA	CANADA EAST COAST	CT	Alternative Cost		105		51	40	
OCEANIA	CANADA EAST COAST	CT	Cost Differential		11		5	4	
OCEANIA	CANADA EAST COAST	LP	PC Mileage		10766				
OCEANIA	CANADA EAST COAST	LP	Alternative Mileage		12870				
OCEANIA	CANADA EAST COAST	LP	PC Cost		227	99		51	
OCEANIA	CANADA EAST COAST	LP	Alternative Cost		263	114		58	
OCEANIA	CANADA EAST COAST	LP	Cost Differential		36	15		7	
OCEANIA	CANADA EAST COAST	T	PC Mileage		10766				
OCEANIA	CANADA EAST COAST	T	Alternative Mileage		12870				
OCEANIA	CANADA EAST COAST	T	PC Cost		67		29	20	17
OCEANIA	CANADA EAST COAST	T	Alternative Cost		78		33	23	20
OCEANIA	CANADA EAST COAST	T	Cost Differential		11		4	3	3
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage		10157				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost		161	94	88	84	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost		201	115	108	102	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential		40	21	20	18	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage		10157				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost			248	194	191	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost			299	233	233	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential			52	39	42	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		10026				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost		94	39	30		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		138	50	39		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		44	11	8		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		10026				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		162	140			
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		208	180			
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		46	40			
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		10157				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		338	267	228	208	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		425	332	275	251	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		86	65	48	43	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		10026				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		14100				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		462	402	351		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		559	482	414		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		97	80	63		
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		10026				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		13735				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				19	15	14
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				24	19	18
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				5	4	4
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		9330				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		13735				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		85		42	33	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		110		54	42	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		25		12	9	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		9330				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		13735				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		199	88		45	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		279	121		62	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		80	34		17	
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		9330				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		13735				
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		59		25	18	15
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		84		35	24	21
OCEANIA	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		24		9	7	6
OCEANIA	EUROPE	CB	PC Mileage		13731				
OCEANIA	EUROPE	CB	Alternative Mileage		13610				
OCEANIA	EUROPE	CB	PC Cost		200	115	107	102	
OCEANIA	EUROPE	CB	Alternative Cost		196	113	105	100	
OCEANIA	EUROPE	CB	Cost Differential		-4	-2	-2	-2	
OCEANIA	EUROPE	F	PC Mileage		13731				
OCEANIA	EUROPE	F	Alternative Mileage		13610				
OCEANIA	EUROPE	F	PC Cost			297	229	229	
OCEANIA	EUROPE	F	Alternative Cost			292	228	227	
OCEANIA	EUROPE	F	Cost Differential			-4	-1	-2	
OCEANIA	EUROPE	G	PC Mileage		12702				
OCEANIA	EUROPE	G	Alternative Mileage		12583				
OCEANIA	EUROPE	G	PC Cost		124	47	36		
OCEANIA	EUROPE	G	Alternative Cost		121	46	35		
OCEANIA	EUROPE	G	Cost Differential		-3	-1	-1		
OCEANIA	EUROPE	R	PC Mileage		12702				
OCEANIA	EUROPE	R	Alternative Mileage		12583				
OCEANIA	EUROPE	R	PC Cost		195	169			
OCEANIA	EUROPE	R	Alternative Cost		189	164			
OCEANIA	EUROPE	R	Cost Differential		-6	-5			
OCEANIA	EUROPE	RO	PC Mileage		13731				
OCEANIA	EUROPE	RO	Alternative Mileage		13610				
OCEANIA	EUROPE	RO	PC Cost		417	324	275	251	
OCEANIA	EUROPE	RO	Alternative Cost		413	323	269	245	
OCEANIA	EUROPE	RO	Cost Differential		-4	-2	-6	-6	
OCEANIA	EUROPE	V	PC Mileage		12702				
OCEANIA	EUROPE	V	Alternative Mileage		12583				
OCEANIA	EUROPE	V	PC Cost		533	461	398		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	EUROPE	V	Alternative Cost	518	448	387		
OCEANIA	EUROPE	V	Cost Differential	-14	-12	-11		
OCEANIA	EUROPE	CD	PC Mileage	12702				
OCEANIA	EUROPE	CD	Alternative Mileage	12583				
OCEANIA	EUROPE	CD	PC Cost			23	18	17
OCEANIA	EUROPE	CD	Alternative Cost			23	18	17
OCEANIA	EUROPE	CD	Cost Differential			-1	-0	-1
OCEANIA	EUROPE	CT	PC Mileage	12702				
OCEANIA	EUROPE	CT	Alternative Mileage	12583				
OCEANIA	EUROPE	CT	PC Cost	105		51	40	
OCEANIA	EUROPE	CT	Alternative Cost	103		50	39	
OCEANIA	EUROPE	CT	Cost Differential	-2		-1	-1	
OCEANIA	EUROPE	LP	PC Mileage	12702				
OCEANIA	EUROPE	LP	Alternative Mileage	12583				
OCEANIA	EUROPE	LP	PC Cost	265	115		59	
OCEANIA	EUROPE	LP	Alternative Cost	257	112		57	
OCEANIA	EUROPE	LP	Cost Differential	-7	-3		-2	
OCEANIA	EUROPE	T	PC Mileage	12702				
OCEANIA	EUROPE	T	Alternative Mileage	12583				
OCEANIA	EUROPE	T	PC Cost	79		33	23	20
OCEANIA	EUROPE	T	Alternative Cost	77		32	23	20
OCEANIA	EUROPE	T	Cost Differential	-2		-1	-1	-1
OCEANIA	S. AMERICA E.C.	CB	PC Mileage	9558				
OCEANIA	S. AMERICA E.C.	CB	Alternative Mileage	9940				
OCEANIA	S. AMERICA E.C.	CB	PC Cost	155	91	85	81	
OCEANIA	S. AMERICA E.C.	CB	Alternative Cost	156	91	85	81	
OCEANIA	S. AMERICA E.C.	CB	Cost Differential	2	1			
OCEANIA	S. AMERICA E.C.	F	PC Mileage	9558				
OCEANIA	S. AMERICA E.C.	F	Alternative Mileage	9940				
OCEANIA	S. AMERICA E.C.	F	PC Cost		239	189	185	
OCEANIA	S. AMERICA E.C.	F	Alternative Cost		240	190	186	
OCEANIA	S. AMERICA E.C.	F	Cost Differential		1	1	2	
OCEANIA	S. AMERICA E.C.	G	PC Mileage	9330				
OCEANIA	S. AMERICA E.C.	G	Alternative Mileage	9440				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	S. AMERICA E.C.	G	PC Cost		86	37	29		
OCEANIA	S. AMERICA E.C.	G	Alternative Cost		86	37	28		
OCEANIA	S. AMERICA E.C.	G	Cost Differential		-0	-0	-0		
OCEANIA	S. AMERICA E.C.	R	PC Mileage		9330				
OCEANIA	S. AMERICA E.C.	R	Alternative Mileage		9440				
OCEANIA	S. AMERICA E.C.	R	PC Cost		154	132			
OCEANIA	S. AMERICA E.C.	R	Alternative Cost		150	129			
OCEANIA	S. AMERICA E.C.	R	Cost Differential		-3	-3			
OCEANIA	S. AMERICA E.C.	RO	PC Mileage		9558				
OCEANIA	S. AMERICA E.C.	RO	Alternative Mileage		9940				
OCEANIA	S. AMERICA E.C.	RO	PC Cost		325	257	220	201	
OCEANIA	S. AMERICA E.C.	RO	Alternative Cost		324	253	218	200	
OCEANIA	S. AMERICA E.C.	RO	Cost Differential		-1	-4	-1	-1	
OCEANIA	S. AMERICA E.C.	V	PC Mileage		9330				
OCEANIA	S. AMERICA E.C.	V	Alternative Mileage		9440				
OCEANIA	S. AMERICA E.C.	V	PC Cost		443	387	338		
OCEANIA	S. AMERICA E.C.	V	Alternative Cost		435	379	331		
OCEANIA	S. AMERICA E.C.	V	Cost Differential		-8	-8	-7		
OCEANIA	S. AMERICA E.C.	CD	PC Mileage		9330				
OCEANIA	S. AMERICA E.C.	CD	Alternative Mileage		9440				
OCEANIA	S. AMERICA E.C.	CD	PC Cost				18	14	13
OCEANIA	S. AMERICA E.C.	CD	Alternative Cost				18	14	13
OCEANIA	S. AMERICA E.C.	CD	Cost Differential				-0	-0	0
OCEANIA	S. AMERICA E.C.	CT	PC Mileage		9330				
OCEANIA	S. AMERICA E.C.	CT	Alternative Mileage		9440				
OCEANIA	S. AMERICA E.C.	CT	PC Cost		85		42	33	
OCEANIA	S. AMERICA E.C.	CT	Alternative Cost		84		42	33	
OCEANIA	S. AMERICA E.C.	CT	Cost Differential		-1		-0	-0	
OCEANIA	S. AMERICA E.C.	LP	PC Mileage		9330				
OCEANIA	S. AMERICA E.C.	LP	Alternative Mileage		9440				
OCEANIA	S. AMERICA E.C.	LP	PC Cost		199	88		45	
OCEANIA	S. AMERICA E.C.	LP	Alternative Cost		196	86		44	
OCEANIA	S. AMERICA E.C.	LP	Cost Differential		-3	-1		-1	
OCEANIA	S. AMERICA E.C.	T	PC Mileage		9330				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	S. AMERICA E.C.	T		Alternative Mileage	9440				
OCEANIA	S. AMERICA E.C.	T		PC Cost	59		25	18	15
OCEANIA	S. AMERICA E.C.	T		Alternative Cost	58		25	17	15
OCEANIA	S. AMERICA E.C.	T		Cost Differential	-1		-1	-0	-0
OCEANIA	U.S. EAST COAST	CB		PC Mileage	12708				
OCEANIA	U.S. EAST COAST	CB		Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	CB		PC Cost	189	109	102	97	
OCEANIA	U.S. EAST COAST	CB		Alternative Cost	187	108	101	96	
OCEANIA	U.S. EAST COAST	CB		Cost Differential	-2	-1	-1	-1	
OCEANIA	U.S. EAST COAST	F		PC Mileage	12708				
OCEANIA	U.S. EAST COAST	F		Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	F		PC Cost		282	219	218	
OCEANIA	U.S. EAST COAST	F		Alternative Cost		281	219	218	
OCEANIA	U.S. EAST COAST	F		Cost Differential		-2		-0	
OCEANIA	U.S. EAST COAST	G		PC Mileage	10136				
OCEANIA	U.S. EAST COAST	G		Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	G		PC Cost	95	40	31		
OCEANIA	U.S. EAST COAST	G		Alternative Cost	124	47	36		
OCEANIA	U.S. EAST COAST	G		Cost Differential	28	7	5		
OCEANIA	U.S. EAST COAST	R		PC Mileage	10136				
OCEANIA	U.S. EAST COAST	R		Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	R		PC Cost	164	141			
OCEANIA	U.S. EAST COAST	R		Alternative Cost	192	166			
OCEANIA	U.S. EAST COAST	R		Cost Differential	28	25			
OCEANIA	U.S. EAST COAST	RO		PC Mileage	12708				
OCEANIA	U.S. EAST COAST	RO		Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	RO		PC Cost	394	308	261	239	
OCEANIA	U.S. EAST COAST	RO		Alternative Cost	393	307	257	235	
OCEANIA	U.S. EAST COAST	RO		Cost Differential	-1	-1	-4	-4	
OCEANIA	U.S. EAST COAST	V		PC Mileage	10136				
OCEANIA	U.S. EAST COAST	V		Alternative Mileage	12790				
OCEANIA	U.S. EAST COAST	V		PC Cost	465	404	353		
OCEANIA	U.S. EAST COAST	V		Alternative Cost	524	453	391		
OCEANIA	U.S. EAST COAST	V		Cost Differential	59	48	38		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
OCEANIA	U.S. EAST COAST	CD	PC Mileage		10136				
OCEANIA	U.S. EAST COAST	CD	Alternative Mileage		12790				
OCEANIA	U.S. EAST COAST	CD	PC Cost				20	15	14
OCEANIA	U.S. EAST COAST	CD	Alternative Cost				23	18	17
OCEANIA	U.S. EAST COAST	CD	Cost Differential				3	3	3
OCEANIA	U.S. EAST COAST	CT	PC Mileage		10136				
OCEANIA	U.S. EAST COAST	CT	Alternative Mileage		12790				
OCEANIA	U.S. EAST COAST	CT	PC Cost		90		44	35	
OCEANIA	U.S. EAST COAST	CT	Alternative Cost		105		51	40	
OCEANIA	U.S. EAST COAST	CT	Cost Differential		15		7	5	
OCEANIA	U.S. EAST COAST	LP	PC Mileage		10136				
OCEANIA	U.S. EAST COAST	LP	Alternative Mileage		12790				
OCEANIA	U.S. EAST COAST	LP	PC Cost		215	94		49	
OCEANIA	U.S. EAST COAST	LP	Alternative Cost		261	114		58	
OCEANIA	U.S. EAST COAST	LP	Cost Differential		46	19		10	
OCEANIA	U.S. EAST COAST	T	PC Mileage		10136				
OCEANIA	U.S. EAST COAST	T	Alternative Mileage		12790				
OCEANIA	U.S. EAST COAST	T	PC Cost		64		27	19	16
OCEANIA	U.S. EAST COAST	T	Alternative Cost		78		33	23	20
OCEANIA	U.S. EAST COAST	T	Cost Differential		14		5	4	3
S. AMERICA E.C.	ASIA	CB	PC Mileage		13328				
S. AMERICA E.C.	ASIA	CB	Alternative Mileage		13020				
S. AMERICA E.C.	ASIA	CB	PC Cost		195	113	105	100	
S. AMERICA E.C.	ASIA	CB	Alternative Cost		189	109	102	97	
S. AMERICA E.C.	ASIA	CB	Cost Differential		-6	-3	-3	-3	
S. AMERICA E.C.	ASIA	F	PC Mileage		13328				
S. AMERICA E.C.	ASIA	F	Alternative Mileage		13020				
S. AMERICA E.C.	ASIA	F	PC Cost			291	225	225	
S. AMERICA E.C.	ASIA	F	Alternative Cost			284	222	221	
S. AMERICA E.C.	ASIA	F	Cost Differential			-7	-4	-4	
S. AMERICA E.C.	ASIA	G	PC Mileage		11980				
S. AMERICA E.C.	ASIA	G	Alternative Mileage		11980				
S. AMERICA E.C.	ASIA	G	PC Cost		116	45	35		
S. AMERICA E.C.	ASIA	G	Alternative Cost		115	44	34		
S. AMERICA E.C.	ASIA	G	Cost Differential		-1	-1	-1		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	ASIA	R	PC Mileage	9115				
S. AMERICA E.C.	ASIA	R	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	R	PC Cost	151	130			
S. AMERICA E.C.	ASIA	R	Alternative Cost	182	157			
S. AMERICA E.C.	ASIA	R	Cost Differential	31	27			
S. AMERICA E.C.	ASIA	RO	PC Mileage	13328				
S. AMERICA E.C.	ASIA	RO	Alternative Mileage	13020				
S. AMERICA E.C.	ASIA	RO	PC Cost	408	318	270	246	
S. AMERICA E.C.	ASIA	RO	Alternative Cost	399	312	261	238	
S. AMERICA E.C.	ASIA	RO	Cost Differential	-9	-6	-9	-8	
S. AMERICA E.C.	ASIA	V	PC Mileage	9115				
S. AMERICA E.C.	ASIA	V	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	V	PC Cost	437	382	335		
S. AMERICA E.C.	ASIA	V	Alternative Cost	502	435	376		
S. AMERICA E.C.	ASIA	V	Cost Differential	65	53	42		
S. AMERICA E.C.	ASIA	CD	PC Mileage	9115				
S. AMERICA E.C.	ASIA	CD	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	CD	PC Cost			18	14	13
S. AMERICA E.C.	ASIA	CD	Alternative Cost			22	17	16
S. AMERICA E.C.	ASIA	CD	Cost Differential			4	3	3
S. AMERICA E.C.	ASIA	CT	PC Mileage	9115				
S. AMERICA E.C.	ASIA	CT	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	CT	PC Cost	84		41	32	
S. AMERICA E.C.	ASIA	CT	Alternative Cost	100		49	38	
S. AMERICA E.C.	ASIA	CT	Cost Differential	16		7	6	
S. AMERICA E.C.	ASIA	LP	PC Mileage	9115				
S. AMERICA E.C.	ASIA	LP	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	LP	PC Cost	195	86		44	
S. AMERICA E.C.	ASIA	LP	Alternative Cost	245	107		55	
S. AMERICA E.C.	ASIA	LP	Cost Differential	51	21		10	
S. AMERICA E.C.	ASIA	T	PC Mileage	9115				
S. AMERICA E.C.	ASIA	T	Alternative Mileage	11980				
S. AMERICA E.C.	ASIA	T	PC Cost	58		25	17	15
S. AMERICA E.C.	ASIA	T	Alternative Cost	73		31	22	19

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	ASIA	T	Cost Differential	15		6	4	4
S. AMERICA E.C.	CANADA WEST COAST	CB	PC Mileage	9890				
S. AMERICA E.C.	CANADA WEST COAST	CB	Alternative Mileage	11640				
S. AMERICA E.C.	CANADA WEST COAST	CB	PC Cost	158	93	87	83	
S. AMERICA E.C.	CANADA WEST COAST	CB	Alternative Cost	175	101	95	90	
S. AMERICA E.C.	CANADA WEST COAST	CB	Cost Differential	16	9	8	7	
S. AMERICA E.C.	CANADA WEST COAST	F	PC Mileage	9890				
S. AMERICA E.C.	CANADA WEST COAST	F	Alternative Mileage	11640				
S. AMERICA E.C.	CANADA WEST COAST	F	PC Cost		244	192	188	
S. AMERICA E.C.	CANADA WEST COAST	F	Alternative Cost		264	207	205	
S. AMERICA E.C.	CANADA WEST COAST	F	Cost Differential		20	16	17	
S. AMERICA E.C.	CANADA WEST COAST	G	PC Mileage	8311				
S. AMERICA E.C.	CANADA WEST COAST	G	Alternative Mileage	10060				
S. AMERICA E.C.	CANADA WEST COAST	G	PC Cost	75	34	27		
S. AMERICA E.C.	CANADA WEST COAST	G	Alternative Cost	93	39	30		
S. AMERICA E.C.	CANADA WEST COAST	G	Cost Differential	18	4	3		
S. AMERICA E.C.	CANADA WEST COAST	R	PC Mileage	8311				
S. AMERICA E.C.	CANADA WEST COAST	R	Alternative Mileage	10060				
S. AMERICA E.C.	CANADA WEST COAST	R	PC Cost	141	121			
S. AMERICA E.C.	CANADA WEST COAST	R	Alternative Cost	158	136			
S. AMERICA E.C.	CANADA WEST COAST	R	Cost Differential	17	15			
S. AMERICA E.C.	CANADA WEST COAST	RO	PC Mileage	9890				
S. AMERICA E.C.	CANADA WEST COAST	RO	Alternative Mileage	11640				
S. AMERICA E.C.	CANADA WEST COAST	RO	PC Cost	332	262	224	205	
S. AMERICA E.C.	CANADA WEST COAST	RO	Alternative Cost	365	286	242	221	
S. AMERICA E.C.	CANADA WEST COAST	RO	Cost Differential	33	23	18	16	
S. AMERICA E.C.	CANADA WEST COAST	V	PC Mileage	8311				
S. AMERICA E.C.	CANADA WEST COAST	V	Alternative Mileage	10060				
S. AMERICA E.C.	CANADA WEST COAST	V	PC Cost	416	364	320		
S. AMERICA E.C.	CANADA WEST COAST	V	Alternative Cost	451	393	342		
S. AMERICA E.C.	CANADA WEST COAST	V	Cost Differential	35	28	22		
S. AMERICA E.C.	CANADA WEST COAST	CD	PC Mileage	8311				
S. AMERICA E.C.	CANADA WEST COAST	CD	Alternative Mileage	10060				
S. AMERICA E.C.	CANADA WEST COAST	CD	PC Cost			17	13	1

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	CANADA WEST COAST	CD	Alternative Cost			19	15	14
S. AMERICA E.C.	CANADA WEST COAST	CD	Cost Differential			2	2	2
S. AMERICA E.C.	CANADA WEST COAST	CT	PC Mileage	8311				
S. AMERICA E.C.	CANADA WEST COAST	CT	Alternative Mileage	10060				
S. AMERICA E.C.	CANADA WEST COAST	CT	PC Cost	79		39	31	
S. AMERICA E.C.	CANADA WEST COAST	CT	Alternative Cost	88		43	34	
S. AMERICA E.C.	CANADA WEST COAST	CT	Cost Differential	9		4	3	
S. AMERICA E.C.	CANADA WEST COAST	LP	PC Mileage	8311				
S. AMERICA E.C.	CANADA WEST COAST	LP	Alternative Mileage	10060				
S. AMERICA E.C.	CANADA WEST COAST	LP	PC Cost	179	79		41	
S. AMERICA E.C.	CANADA WEST COAST	LP	Alternative Cost	208	91		47	
S. AMERICA E.C.	CANADA WEST COAST	LP	Cost Differential	29	12		6	
S. AMERICA E.C.	CANADA WEST COAST	T	PC Mileage	8311				
S. AMERICA E.C.	CANADA WEST COAST	T	Alternative Mileage	10060				
S. AMERICA E.C.	CANADA WEST COAST	T	PC Cost	53		23	16	14
S. AMERICA E.C.	CANADA WEST COAST	T	Alternative Cost	62		26	18	16
S. AMERICA E.C.	CANADA WEST COAST	T	Cost Differential	9		3	2	2
S. AMERICA E.C.	C. AMERICA W.C.	CB	PC Mileage	6223				
S. AMERICA E.C.	C. AMERICA W.C.	CB	Alternative Mileage	7710				
S. AMERICA E.C.	C. AMERICA W.C.	CB	PC Cost	119	71	67	64	
S. AMERICA E.C.	C. AMERICA W.C.	CB	Alternative Cost	132	78	73	70	
S. AMERICA E.C.	C. AMERICA W.C.	CB	Cost Differential	14	7	6	6	
S. AMERICA E.C.	C. AMERICA W.C.	F	PC Mileage	6223				
S. AMERICA E.C.	C. AMERICA W.C.	F	Alternative Mileage	7710				
S. AMERICA E.C.	C. AMERICA W.C.	F	PC Cost		194	156	149	
S. AMERICA E.C.	C. AMERICA W.C.	F	Alternative Cost		208	167	161	
S. AMERICA E.C.	C. AMERICA W.C.	F	Cost Differential		15	11	12	
S. AMERICA E.C.	C. AMERICA W.C.	G	PC Mileage	4644				
S. AMERICA E.C.	C. AMERICA W.C.	G	Alternative Mileage	6133				
S. AMERICA E.C.	C. AMERICA W.C.	G	PC Cost	34	24	19		
S. AMERICA E.C.	C. AMERICA W.C.	G	Alternative Cost	49	27	21		
S. AMERICA E.C.	C. AMERICA W.C.	G	Cost Differential	15	3	3		
S. AMERICA E.C.	C. AMERICA W.C.	R	PC Mileage	4644				
S. AMERICA E.C.	C. AMERICA W.C.	R	Alternative Mileage	6133				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	C. AMERICA W.C.	R	PC Cost	96	82			
S. AMERICA E.C.	C. AMERICA W.C.	R	Alternative Cost	109	94			
S. AMERICA E.C.	C. AMERICA W.C.	R	Cost Differential	14	12			
S. AMERICA E.C.	C. AMERICA W.C.	RO	PC Mileage	6223				
S. AMERICA E.C.	C. AMERICA W.C.	RO	Alternative Mileage	7710				
S. AMERICA E.C.	C. AMERICA W.C.	RO	PC Cost	252	203	175	162	
S. AMERICA E.C.	C. AMERICA W.C.	RO	Alternative Cost	270	211	188	173	
S. AMERICA E.C.	C. AMERICA W.C.	RO	Cost Differential	18	8	13	11	
S. AMERICA E.C.	C. AMERICA W.C.	V	PC Mileage	4644				
S. AMERICA E.C.	C. AMERICA W.C.	V	Alternative Mileage	6133				
S. AMERICA E.C.	C. AMERICA W.C.	V	PC Cost	318	284	255		
S. AMERICA E.C.	C. AMERICA W.C.	V	Alternative Cost	346	306	273		
S. AMERICA E.C.	C. AMERICA W.C.	V	Cost Differential	28	22	18		
S. AMERICA E.C.	C. AMERICA W.C.	CD	PC Mileage	4644				
S. AMERICA E.C.	C. AMERICA W.C.	CD	Alternative Mileage	6133				
S. AMERICA E.C.	C. AMERICA W.C.	CD	PC Cost			11	9	8
S. AMERICA E.C.	C. AMERICA W.C.	CD	Alternative Cost			13	10	9
S. AMERICA E.C.	C. AMERICA W.C.	CD	Cost Differential			2	1	1
S. AMERICA E.C.	C. AMERICA W.C.	CT	PC Mileage	4644				
S. AMERICA E.C.	C. AMERICA W.C.	CT	Alternative Mileage	6133				
S. AMERICA E.C.	C. AMERICA W.C.	CT	PC Cost	57		29	23	
S. AMERICA E.C.	C. AMERICA W.C.	CT	Alternative Cost	64		32	25	
S. AMERICA E.C.	C. AMERICA W.C.	CT	Cost Differential	8		4	3	
S. AMERICA E.C.	C. AMERICA W.C.	LP	PC Mileage	4644				
S. AMERICA E.C.	C. AMERICA W.C.	LP	Alternative Mileage	6133				
S. AMERICA E.C.	C. AMERICA W.C.	LP	PC Cost	108	49		26	
S. AMERICA E.C.	C. AMERICA W.C.	LP	Alternative Cost	132	59		31	
S. AMERICA E.C.	C. AMERICA W.C.	LP	Cost Differential	24	10		5	
S. AMERICA E.C.	C. AMERICA W.C.	T	PC Mileage	4644				
S. AMERICA E.C.	C. AMERICA W.C.	T	Alternative Mileage	6133				
S. AMERICA E.C.	C. AMERICA W.C.	T	PC Cost	31		14	10	9
S. AMERICA E.C.	C. AMERICA W.C.	T	Alternative Cost	39		17	12	11
S. AMERICA E.C.	C. AMERICA W.C.	T	Cost Differential	7		3	2	2
S. AMERICA E.C.	OCEANIA	CB	PC Mileage	9588				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	OCEANIA	CB	Alternative Mileage	9940				
S. AMERICA E.C.	OCEANIA	CB	PC Cost	155	91	85	81	
S. AMERICA E.C.	OCEANIA	CB	Alternative Cost	156	91	85	81	
S. AMERICA E.C.	OCEANIA	CB	Cost Differential	1				
S. AMERICA E.C.	OCEANIA	F	PC Mileage	9588				
S. AMERICA E.C.	OCEANIA	F	Alternative Mileage	9940				
S. AMERICA E.C.	OCEANIA	F	PC Cost		240	189	185	
S. AMERICA E.C.	OCEANIA	F	Alternative Cost		240	190	186	
S. AMERICA E.C.	OCEANIA	F	Cost Differential			1	1	
S. AMERICA E.C.	OCEANIA	G	PC Mileage	9239				
S. AMERICA E.C.	OCEANIA	G	Alternative Mileage	9940				
S. AMERICA E.C.	OCEANIA	G	PC Cost	85	37	29		
S. AMERICA E.C.	OCEANIA	G	Alternative Cost	92	38	30		
S. AMERICA E.C.	OCEANIA	G	Cost Differential	6	1	1		
S. AMERICA E.C.	OCEANIA	R	PC Mileage	9239				
S. AMERICA E.C.	OCEANIA	R	Alternative Mileage	9940				
S. AMERICA E.C.	OCEANIA	R	PC Cost	152	131			
S. AMERICA E.C.	OCEANIA	R	Alternative Cost	157	135			
S. AMERICA E.C.	OCEANIA	R	Cost Differential	4	3			
S. AMERICA E.C.	OCEANIA	RO	PC Mileage	9588				
S. AMERICA E.C.	OCEANIA	RO	Alternative Mileage	9940				
S. AMERICA E.C.	OCEANIA	RO	PC Cost	326	257	220	202	
S. AMERICA E.C.	OCEANIA	RO	Alternative Cost	324	253	218	200	
S. AMERICA E.C.	OCEANIA	RO	Cost Differential	-2	-4	-2	-1	
S. AMERICA E.C.	OCEANIA	V	PC Mileage	9239				
S. AMERICA E.C.	OCEANIA	V	Alternative Mileage	9940				
S. AMERICA E.C.	OCEANIA	V	PC Cost	441	385	337		
S. AMERICA E.C.	OCEANIA	V	Alternative Cost	448	390	340		
S. AMERICA E.C.	OCEANIA	V	Cost Differential	7	5	3		
S. AMERICA E.C.	OCEANIA	CD	PC Mileage	9239				
S. AMERICA E.C.	OCEANIA	CD	Alternative Mileage	9940				
S. AMERICA E.C.	OCEANIA	CD	PC Cost			18	14	13
S. AMERICA E.C.	OCEANIA	CD	Alternative Cost			19	15	14
S. AMERICA E.C.	OCEANIA	CD	Cost Differential			1		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
S. AMERICA E.C.	OCEANIA	CT PC Mileage	9330				
S. AMERICA E.C.	OCEANIA	CT Alternative Mileage	13735				
S. AMERICA E.C.	OCEANIA	CT PC Cost	85		42	33	
S. AMERICA E.C.	OCEANIA	CT Alternative Cost	110		54	42	
S. AMERICA E.C.	OCEANIA	CT Cost Differential	25		12	9	
S. AMERICA E.C.	OCEANIA	LP PC Mileage	9330				
S. AMERICA E.C.	OCEANIA	LP Alternative Mileage	13735				
S. AMERICA E.C.	OCEANIA	LP PC Cost	199	88		45	
S. AMERICA E.C.	OCEANIA	LP Alternative Cost	279	121		62	
S. AMERICA E.C.	OCEANIA	LP Cost Differential	80	34		17	
S. AMERICA E.C.	OCEANIA	T PC Mileage	9330				
S. AMERICA E.C.	OCEANIA	T Alternative Mileage	13735				
S. AMERICA E.C.	OCEANIA	T PC Cost	59		25	18	15
S. AMERICA E.C.	OCEANIA	T Alternative Cost	84		35	24	21
S. AMERICA E.C.	OCEANIA	T Cost Differential	24		9	7	6
S. AMERICA E.C.	S. AMERICA W.C.	CB PC Mileage	6563				
S. AMERICA E.C.	S. AMERICA W.C.	CB Alternative Mileage	6565				
S. AMERICA E.C.	S. AMERICA W.C.	CB PC Cost	122	73	69	66	
S. AMERICA E.C.	S. AMERICA W.C.	CB Alternative Cost	120	72	67	64	
S. AMERICA E.C.	S. AMERICA W.C.	CB Cost Differential	-2	-2	-2	-1	
S. AMERICA E.C.	S. AMERICA W.C.	F PC Mileage	6563				
S. AMERICA E.C.	S. AMERICA W.C.	F Alternative Mileage	6565				
S. AMERICA E.C.	S. AMERICA W.C.	F PC Cost		198	159	153	
S. AMERICA E.C.	S. AMERICA W.C.	F Alternative Cost		192	155	149	
S. AMERICA E.C.	S. AMERICA W.C.	F Cost Differential		-6	-4	-4	
S. AMERICA E.C.	S. AMERICA W.C.	G PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	G Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	G PC Cost	25	22	17		
S. AMERICA E.C.	S. AMERICA W.C.	G Alternative Cost	24	21	16		
S. AMERICA E.C.	S. AMERICA W.C.	G Cost Differential	-1	-1	-1		
S. AMERICA E.C.	S. AMERICA W.C.	R PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	R Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	R PC Cost	86	73			
S. AMERICA E.C.	S. AMERICA W.C.	R Alternative Cost	81	69			
S. AMERICA E.C.	S. AMERICA W.C.	R Cost Differential	-5	-4			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	S. AMERICA W.C.	RO	PC Mileage	6563				
S. AMERICA E.C.	S. AMERICA W.C.	RO	Alternative Mileage	6565				
S. AMERICA E.C.	S. AMERICA W.C.	RO	PC Cost	259	209	180	166	
S. AMERICA E.C.	S. AMERICA W.C.	RO	Alternative Cost	242	190	172	159	
S. AMERICA E.C.	S. AMERICA W.C.	RO	Cost Differential	-17	-19	-7	-7	
S. AMERICA E.C.	S. AMERICA W.C.	V	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	V	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	V	PC Cost	297	266	241		
S. AMERICA E.C.	S. AMERICA W.C.	V	Alternative Cost	285	256	232		
S. AMERICA E.C.	S. AMERICA W.C.	V	Cost Differential	-12	-10	-9		
S. AMERICA E.C.	S. AMERICA W.C.	CD	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	CD	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	CD	PC Cost			10	8	7
S. AMERICA E.C.	S. AMERICA W.C.	CD	Alternative Cost			10	8	7
S. AMERICA E.C.	S. AMERICA W.C.	CD	Cost Differential			-0	-0	-0
S. AMERICA E.C.	S. AMERICA W.C.	CT	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	CT	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	CT	PC Cost	52		26	21	
S. AMERICA E.C.	S. AMERICA W.C.	CT	Alternative Cost	50		26	20	
S. AMERICA E.C.	S. AMERICA W.C.	CT	Cost Differential	-1		-1	-1	
S. AMERICA E.C.	S. AMERICA W.C.	LP	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	LP	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	LP	PC Cost	93	43		23	
S. AMERICA E.C.	S. AMERICA W.C.	LP	Alternative Cost	88	40		22	
S. AMERICA E.C.	S. AMERICA W.C.	LP	Cost Differential	-5	-2		-1	
S. AMERICA E.C.	S. AMERICA W.C.	T	PC Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	T	Alternative Mileage	3840				
S. AMERICA E.C.	S. AMERICA W.C.	T	PC Cost	27		12	9	8
S. AMERICA E.C.	S. AMERICA W.C.	T	Alternative Cost	25		12	8	7
S. AMERICA E.C.	S. AMERICA W.C.	T	Cost Differential	-1		-1	-0	-0
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	PC Cost	133	79	74	71	
S. AMERICA E.C.	U.S. W.C., HAWAII	CB	Alternative Cost	142	84	78	75	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
S. AMERICA E.C.	U.S. W.C., HAWAII	CB Cost Differential	9	5	4	4	
S. AMERICA E.C.	U.S. W.C., HAWAII	F PC Mileage	5209				
S. AMERICA E.C.	U.S. W.C., HAWAII	F Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	F PC Cost		180	146	138	
S. AMERICA E.C.	U.S. W.C., HAWAII	F Alternative Cost		221	176	171	
		F Cost Differential		42	30	33	
S. AMERICA E.C.	U.S. W.C., HAWAII	G PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	G Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	G PC Cost	66	32	25		
S. AMERICA E.C.	U.S. W.C., HAWAII	G Alternative Cost	77	34	27		
S. AMERICA E.C.	U.S. W.C., HAWAII	G Cost Differential	11	2	2		
S. AMERICA E.C.	U.S. W.C., HAWAII	R PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	R Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	R PC Cost	131	113			
S. AMERICA E.C.	U.S. W.C., HAWAII	R Alternative Cost	140	120			
S. AMERICA E.C.	U.S. W.C., HAWAII	R Cost Differential	9	7			
S. AMERICA E.C.	U.S. W.C., HAWAII	RO PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	RO Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	RO PC Cost	281	224	193	177	
S. AMERICA E.C.	U.S. W.C., HAWAII	RO Alternative Cost	292	228	200	184	
S. AMERICA E.C.	U.S. W.C., HAWAII	RO Cost Differential	11	4	8	7	
S. AMERICA E.C.	U.S. W.C., HAWAII	V PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	V Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	V PC Cost	395	347	307		
S. AMERICA E.C.	U.S. W.C., HAWAII	V Alternative Cost	412	361	317		
S. AMERICA E.C.	U.S. W.C., HAWAII	V Cost Differential	17	13	10		
S. AMERICA E.C.	U.S. W.C., HAWAII	CD PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	CD Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	CD PC Cost			16	12	11
S. AMERICA E.C.	U.S. W.C., HAWAII	CD Alternative Cost			17	13	12
		CD Cost Differential			1	1	1
S. AMERICA E.C.	U.S. W.C., HAWAII	CT PC Mileage	7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	CT Alternative Mileage	8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	CT PC Cost	74		37	29	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA E.C.	U.S. W.C., HAWAII	CT	Alternative Cost		79		39	31	
S. AMERICA E.C.	U.S. W.C., HAWAII	CT	Cost Differential		5		2	2	
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	PC Mileage		7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	Alternative Mileage		8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	PC Cost		164	73		38	
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	Alternative Cost		180	79		41	
S. AMERICA E.C.	U.S. W.C., HAWAII	LP	Cost Differential		16	6		3	
S. AMERICA E.C.	U.S. W.C., HAWAII	T	PC Mileage		7536				
S. AMERICA E.C.	U.S. W.C., HAWAII	T	Alternative Mileage		8604				
S. AMERICA E.C.	U.S. W.C., HAWAII	T	PC Cost		48		21	15	13
S. AMERICA E.C.	U.S. W.C., HAWAII	T	Alternative Cost		53		23	16	14
S. AMERICA E.C.	U.S. W.C., HAWAII	T	Cost Differential		5		2	1	1
S. AMERICA W.C.	AFRICA (additional route)	CB	PC Mileage		7982				
S. AMERICA W.C.	AFRICA (additional route)	CB	Alternative Mileage		15278				
S. AMERICA W.C.	AFRICA (additional route)	CB	PC Cost		138	82	77	73	
S. AMERICA W.C.	AFRICA (additional route)	CB	Alternative Cost		214	122	114	108	
S. AMERICA W.C.	AFRICA (additional route)	CB	Cost Differential		76	41	37	35	
S. AMERICA W.C.	AFRICA (additional route)	CD	PC Mileage		7982				
S. AMERICA W.C.	AFRICA (additional route)	CD	Alternative Mileage		15278				
S. AMERICA W.C.	AFRICA (additional route)	CD	PC Cost				16	13	12
S. AMERICA W.C.	AFRICA (additional route)	CD	Alternative Cost				27	21	20
S. AMERICA W.C.	AFRICA (additional route)	CD	Cost Differential				11	8	8
S. AMERICA W.C.	AFRICA (additional route)	G	PC Mileage		7982				
S. AMERICA W.C.	AFRICA (additional route)	G	Alternative Mileage		15278				
S. AMERICA W.C.	AFRICA (additional route)	G	PC Cost		71	33	26		
S. AMERICA W.C.	AFRICA (additional route)	G	Alternative Cost		151	54	41		
S. AMERICA W.C.	AFRICA (additional route)	G	Cost Differential		80	20	15		
S. AMERICA W.C.	AFRICA (additional route)	R	PC Mileage		7982				
S. AMERICA W.C.	AFRICA (additional route)	R	Alternative Mileage		15278				
S. AMERICA W.C.	AFRICA (additional route)	R	PC Cost		137	118			
S. AMERICA W.C.	AFRICA (additional route)	R	Alternative Cost		223	193			
S. AMERICA W.C.	AFRICA (additional route)	R	Cost Differential		86	75			
S. AMERICA W.C.	CANADA EAST COAST	CB	PC Mileage		5710				
S. AMERICA W.C.	CANADA EAST COAST	CB	Alternative Mileage		8970				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	CANADA EAST COAST	CB	PC Cost		113	68	64	62	
S. AMERICA W.C.	CANADA EAST COAST	CB	Alternative Cost		146	86	80	76	
S. AMERICA W.C.	CANADA EAST COAST	CB	Cost Differential		33	17	16	15	
S. AMERICA W.C.	CANADA EAST COAST	F	PC Mileage		5710				
S. AMERICA W.C.	CANADA EAST COAST	F	Alternative Mileage		8970				
S. AMERICA W.C.	CANADA EAST COAST	F	PC Cost			187	151	144	
S. AMERICA W.C.	CANADA EAST COAST	F	Alternative Cost			226	180	176	
S. AMERICA W.C.	CANADA EAST COAST	F	Cost Differential			40	29	32	
S. AMERICA W.C.	CANADA EAST COAST	G	PC Mileage		5710				
S. AMERICA W.C.	CANADA EAST COAST	G	Alternative Mileage		8970				
S. AMERICA W.C.	CANADA EAST COAST	G	PC Cost		46	27	21		
S. AMERICA W.C.	CANADA EAST COAST	G	Alternative Cost		81	36	27		
S. AMERICA W.C.	CANADA EAST COAST	G	Cost Differential		35	9	7		
S. AMERICA W.C.	CANADA EAST COAST	R	PC Mileage		5710				
S. AMERICA W.C.	CANADA EAST COAST	R	Alternative Mileage		8970				
S. AMERICA W.C.	CANADA EAST COAST	R	PC Cost		109	93			
S. AMERICA W.C.	CANADA EAST COAST	R	Alternative Cost		145	124			
S. AMERICA W.C.	CANADA EAST COAST	R	Cost Differential		36	31			
S. AMERICA W.C.	CANADA EAST COAST	RO	PC Mileage		5710				
S. AMERICA W.C.	CANADA EAST COAST	RO	Alternative Mileage		8970				
S. AMERICA W.C.	CANADA EAST COAST	RO	PC Cost		241	195	168	156	
S. AMERICA W.C.	CANADA EAST COAST	RO	Alternative Cost		300	235	205	188	
S. AMERICA W.C.	CANADA EAST COAST	RO	Cost Differential		60	40	37	33	
S. AMERICA W.C.	CANADA EAST COAST	V	PC Mileage		5710				
S. AMERICA W.C.	CANADA EAST COAST	V	Alternative Mileage		8970				
S. AMERICA W.C.	CANADA EAST COAST	V	PC Cost		347	307	274		
S. AMERICA W.C.	CANADA EAST COAST	V	Alternative Cost		422	369	323		
S. AMERICA W.C.	CANADA EAST COAST	V	Cost Differential		75	62	49		
S. AMERICA W.C.	CANADA EAST COAST	CD	PC Mileage		5710				
S. AMERICA W.C.	CANADA EAST COAST	CD	Alternative Mileage		8970				
S. AMERICA W.C.	CANADA EAST COAST	CD	PC Cost				13	10	9
S. AMERICA W.C.	CANADA EAST COAST	CD	Alternative Cost				17	14	13
S. AMERICA W.C.	CANADA EAST COAST	CD	Cost Differential				4	4	3
S. AMERICA W.C.	CANADA EAST COAST	CT	PC Mileage		5710				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	CANADA EAST COAST	CT	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	CT	PC Cost	63		32	25	
S. AMERICA W.C.	CANADA EAST COAST	CT	Alternative Cost	81		40	32	
S. AMERICA W.C.	CANADA EAST COAST	CT	Cost Differential	18		9	7	
S. AMERICA W.C.	CANADA EAST COAST	LP	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	LP	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	LP	PC Cost	129	58		30	
S. AMERICA W.C.	CANADA EAST COAST	LP	Alternative Cost	187	82		42	
S. AMERICA W.C.	CANADA EAST COAST	LP	Cost Differential	58	24		12	
S. AMERICA W.C.	CANADA EAST COAST	T	PC Mileage	5710				
S. AMERICA W.C.	CANADA EAST COAST	T	Alternative Mileage	8970				
S. AMERICA W.C.	CANADA EAST COAST	T	PC Cost	38		17	12	10
S. AMERICA W.C.	CANADA EAST COAST	T	Alternative Cost	55		24	17	15
S. AMERICA W.C.	CANADA EAST COAST	T	Cost Differential	18		7	5	4
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage	4934				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage	8210				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost	105	64	60	58	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost	138	81	76	73	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential	33	17	16	15	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage	4934				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage	8210				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost		176	143	136	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost		216	172	167	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential		40	29	32	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost	24	21	17		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost	64	31	24		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential	39	10	7		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost	85	72			
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost	125	107			
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential	40	35			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage	4934				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage	8210				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost	224	182	158	147	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost	282	221	195	179	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential	58	38	37	33	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost	295	265	240		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost	380	334	295		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential	85	70	55		
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost			10	8	7
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost			15	12	11
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential			5	4	4
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost	51		26	21	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost	72		36	28	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential	21		10	7	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost	91	42		23	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost	157	70		36	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential	65	27		14	
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage	3771				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage	7405				
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost	26		12	9	8
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost	46		20	14	12
S. AMERICA W.C.	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential	20		8	6	5
S. AMERICA W.C.	EUROPE	CB	PC Mileage	9374				
S. AMERICA W.C.	EUROPE	CB	Alternative Mileage	13000				
S. AMERICA W.C.	EUROPE	CB	PC Cost	153	90	84	80	
S. AMERICA W.C.	EUROPE	CB	Alternative Cost	189	109	102	97	
S. AMERICA W.C.	EUROPE	CB	Cost Differential	36	19	18	17	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	EUROPE	F	PC Mileage	9374				
S. AMERICA W.C.	EUROPE	F	Alternative Mileage	13000				
S. AMERICA W.C.	EUROPE	F	PC Cost		237	187	183	
S. AMERICA W.C.	EUROPE	F	Alternative Cost		284	222	221	
S. AMERICA W.C.	EUROPE	F	Cost Differential		47	35	38	
S. AMERICA W.C.	EUROPE	G	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	G	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	G	PC Cost	67	32	25		
S. AMERICA W.C.	EUROPE	G	Alternative Cost	81	35	27		
S. AMERICA W.C.	EUROPE	G	Cost Differential	14	3	2		
S. AMERICA W.C.	EUROPE	R	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	R	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	R	PC Cost	132	113			
S. AMERICA W.C.	EUROPE	R	Alternative Cost	144	124			
S. AMERICA W.C.	EUROPE	R	Cost Differential	12	11			
S. AMERICA W.C.	EUROPE	RO	PC Mileage	9374				
S. AMERICA W.C.	EUROPE	RO	Alternative Mileage	13000				
S. AMERICA W.C.	EUROPE	RO	PC Cost	321	254	217	199	
S. AMERICA W.C.	EUROPE	RO	Alternative Cost	398	311	260	238	
S. AMERICA W.C.	EUROPE	RO	Cost Differential	77	57	43	38	
S. AMERICA W.C.	EUROPE	V	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	V	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	V	PC Cost	396	348	307		
S. AMERICA W.C.	EUROPE	V	Alternative Cost	421	368	323		
S. AMERICA W.C.	EUROPE	V	Cost Differential	25	20	15		
S. AMERICA W.C.	EUROPE	CD	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	CD	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	CD	PC Cost			16	12	11
S. AMERICA W.C.	EUROPE	CD	Alternative Cost			17	14	13
S. AMERICA W.C.	EUROPE	CD	Cost Differential			2	1	1
S. AMERICA W.C.	EUROPE	CT	PC Mileage	7570				
S. AMERICA W.C.	EUROPE	CT	Alternative Mileage	8935				
S. AMERICA W.C.	EUROPE	CT	PC Cost	74		37	29	
S. AMERICA W.C.	EUROPE	CT	Alternative Cost	81		40	31	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	EUROPE	CT	Cost Differential		7		3	2	
S. AMERICA W.C.	EUROPE	LP	PC Mileage		7570				
S. AMERICA W.C.	EUROPE	LP	Alternative Mileage		8935				
S. AMERICA W.C.	EUROPE	LP	PC Cost		165	73		38	
S. AMERICA W.C.	EUROPE	LP	Alternative Cost		186	82		42	
S. AMERICA W.C.	EUROPE	LP	Cost Differential		21	9		4	
S. AMERICA W.C.	EUROPE	T	PC Mileage		7570				
S. AMERICA W.C.	EUROPE	T	Alternative Mileage		8935				
S. AMERICA W.C.	EUROPE	T	PC Cost		49		21	15	13
S. AMERICA W.C.	EUROPE	T	Alternative Cost		55		24	17	14
S. AMERICA W.C.	EUROPE	T	Cost Differential		7		2	2	2
S. AMERICA W.C.	MIDDLE EAST (additional route)	G	PC Mileage		8359				
S. AMERICA W.C.	MIDDLE EAST (additional route)	G	Alternative Mileage		11428				
S. AMERICA W.C.	MIDDLE EAST (additional route)	G	PC Cost		76	35	27		
S. AMERICA W.C.	MIDDLE EAST (additional route)	G	Alternative Cost		108	43	33		
S. AMERICA W.C.	MIDDLE EAST (additional route)	G	Cost Differential		33	8	6		
S. AMERICA W.C.	MIDDLE EAST (additional route)	R	PC Mileage		8359				
S. AMERICA W.C.	MIDDLE EAST (additional route)	R	Alternative Mileage		11428				
S. AMERICA W.C.	MIDDLE EAST (additional route)	R	PC Cost		142	122			
S. AMERICA W.C.	MIDDLE EAST (additional route)	R	Alternative Cost		175	151			
S. AMERICA W.C.	MIDDLE EAST (additional route)	R	Cost Differential		33	29			
S. AMERICA W.C.	S. AMERICA E.C.	CB	PC Mileage		6563				
S. AMERICA W.C.	S. AMERICA E.C.	CB	Alternative Mileage		6565				
S. AMERICA W.C.	S. AMERICA E.C.	CB	PC Cost		122	73	69	66	
S. AMERICA W.C.	S. AMERICA E.C.	CB	Alternative Cost		120	72	67	64	
S. AMERICA W.C.	S. AMERICA E.C.	CB	Cost Differential		-2	-2	-2	-1	
S. AMERICA W.C.	S. AMERICA E.C.	F	PC Mileage		6563				
S. AMERICA W.C.	S. AMERICA E.C.	F	Alternative Mileage		6565				
S. AMERICA W.C.	S. AMERICA E.C.	F	PC Cost			198	159	153	
S. AMERICA W.C.	S. AMERICA E.C.	F	Alternative Cost			192	155	149	
S. AMERICA W.C.	S. AMERICA E.C.	F	Cost Differential			-6	-4	-4	
S. AMERICA W.C.	S. AMERICA E.C.	G	PC Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	G	Alternative Mileage		3840				
S. AMERICA W.C.	S. AMERICA E.C.	G	PC Cost		25	22	17		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	S. AMERICA E.C.	G	Alternative Cost	24	21	16		
S. AMERICA W.C.	S. AMERICA E.C.	G	Cost Differential	-1	-1	-1		
S. AMERICA W.C.	S. AMERICA E.C.	R	PC Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	R	Alternative Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	R	PC Cost	86	73			
S. AMERICA W.C.	S. AMERICA E.C.	R	Alternative Cost	81	69			
S. AMERICA W.C.	S. AMERICA E.C.	R	Cost Differential	-5	-4			
S. AMERICA W.C.	S. AMERICA E.C.	RO	PC Mileage	6563				
S. AMERICA W.C.	S. AMERICA E.C.	RO	Alternative Mileage	6565				
S. AMERICA W.C.	S. AMERICA E.C.	RO	PC Cost	259	209	180	166	
S. AMERICA W.C.	S. AMERICA E.C.	RO	Alternative Cost	242	190	172	159	
S. AMERICA W.C.	S. AMERICA E.C.	RO	Cost Differential	-17	-19	-7	-7	
S. AMERICA W.C.	S. AMERICA E.C.	V	PC Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	V	Alternative Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	V	PC Cost	297	266	241		
S. AMERICA W.C.	S. AMERICA E.C.	V	Alternative Cost	285	256	232		
S. AMERICA W.C.	S. AMERICA E.C.	V	Cost Differential	-12	-10	-9		
S. AMERICA W.C.	S. AMERICA E.C.	CD	PC Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	CD	Alternative Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	CD	PC Cost			10	8	7
S. AMERICA W.C.	S. AMERICA E.C.	CD	Alternative Cost			10	8	7
S. AMERICA W.C.	S. AMERICA E.C.	CD	Cost Differential			-0	-0	-0
S. AMERICA W.C.	S. AMERICA E.C.	CT	PC Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	CT	Alternative Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	CT	PC Cost	52		26	21	
S. AMERICA W.C.	S. AMERICA E.C.	CT	Alternative Cost	50		26	20	
S. AMERICA W.C.	S. AMERICA E.C.	CT	Cost Differential	-1		-1	-1	
S. AMERICA W.C.	S. AMERICA E.C.	LP	PC Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	LP	Alternative Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	LP	PC Cost	93	43		23	
S. AMERICA W.C.	S. AMERICA E.C.	LP	Alternative Cost	88	40		22	
S. AMERICA W.C.	S. AMERICA E.C.	LP	Cost Differential	-5	-2		-1	
S. AMERICA W.C.	S. AMERICA E.C.	T	PC Mileage	3840				
S. AMERICA W.C.	S. AMERICA E.C.	T	Alternative Mileage	3840				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	S. AMERICA E.C.	T	PC Cost		27		12	9	8
S. AMERICA W.C.	S. AMERICA E.C.	T	Alternative Cost		25		12	8	7
S. AMERICA W.C.	S. AMERICA E.C.	T	Cost Differential		-1		-1	-0	-0
S. AMERICA W.C.	U.S. EAST COAST	CB	PC Mileage		4569				
S. AMERICA W.C.	U.S. EAST COAST	CB	Alternative Mileage		8700				
S. AMERICA W.C.	U.S. EAST COAST	CB	PC Cost		101	62	58	56	
S. AMERICA W.C.	U.S. EAST COAST	CB	Alternative Cost		143	84	79	75	
S. AMERICA W.C.	U.S. EAST COAST	CB	Cost Differential		42	22	21	19	
S. AMERICA W.C.	U.S. EAST COAST	F	PC Mileage		4569				
S. AMERICA W.C.	U.S. EAST COAST	F	Alternative Mileage		8700				
S. AMERICA W.C.	U.S. EAST COAST	F	PC Cost			171	140	132	
S. AMERICA W.C.	U.S. EAST COAST	F	Alternative Cost			223	177	173	
S. AMERICA W.C.	U.S. EAST COAST	F	Cost Differential			52	37	41	
S. AMERICA W.C.	U.S. EAST COAST	G	PC Mileage		4346				
S. AMERICA W.C.	U.S. EAST COAST	G	Alternative Mileage		8700				
S. AMERICA W.C.	U.S. EAST COAST	G	PC Cost		31	23	18		
S. AMERICA W.C.	U.S. EAST COAST	G	Alternative Cost		78	35	27		
S. AMERICA W.C.	U.S. EAST COAST	G	Cost Differential		47	12	9		
S. AMERICA W.C.	U.S. EAST COAST	R	PC Mileage		4346				
S. AMERICA W.C.	U.S. EAST COAST	R	Alternative Mileage		8700				
S. AMERICA W.C.	U.S. EAST COAST	R	PC Cost		92	78			
S. AMERICA W.C.	U.S. EAST COAST	R	Alternative Cost		141	121			
S. AMERICA W.C.	U.S. EAST COAST	R	Cost Differential		49	43			
S. AMERICA W.C.	U.S. EAST COAST	RO	PC Mileage		4569				
S. AMERICA W.C.	U.S. EAST COAST	RO	Alternative Mileage		8700				
S. AMERICA W.C.	U.S. EAST COAST	RO	PC Cost		216	176	153	142	
S. AMERICA W.C.	U.S. EAST COAST	RO	Alternative Cost		294	230	201	185	
S. AMERICA W.C.	U.S. EAST COAST	RO	Cost Differential		78	54	48	43	
S. AMERICA W.C.	U.S. EAST COAST	V	PC Mileage		4346				
S. AMERICA W.C.	U.S. EAST COAST	V	Alternative Mileage		8700				
S. AMERICA W.C.	U.S. EAST COAST	V	PC Cost		310	277	250		
S. AMERICA W.C.	U.S. EAST COAST	V	Alternative Cost		415	363	318		
S. AMERICA W.C.	U.S. EAST COAST	V	Cost Differential		105	86	68		
S. AMERICA W.C.	U.S. EAST COAST	CD	PC Mileage		4346				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
S. AMERICA W.C.	U.S. EAST COAST	CD	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	CD	PC Cost			11	8	8
S. AMERICA W.C.	U.S. EAST COAST	CD	Alternative Cost			17	13	12
S. AMERICA W.C.	U.S. EAST COAST	CD	Cost Differential			6	5	4
S. AMERICA W.C.	U.S. EAST COAST	CT	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	CT	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	CT	PC Cost	55		28	22	
S. AMERICA W.C.	U.S. EAST COAST	CT	Alternative Cost	80		39	31	
S. AMERICA W.C.	U.S. EAST COAST	CT	Cost Differential	25		12	9	
S. AMERICA W.C.	U.S. EAST COAST	LP	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	LP	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	LP	PC Cost	102	47		25	
S. AMERICA W.C.	U.S. EAST COAST	LP	Alternative Cost	182	80		41	
S. AMERICA W.C.	U.S. EAST COAST	LP	Cost Differential	79	33		17	
S. AMERICA W.C.	U.S. EAST COAST	T	PC Mileage	4346				
S. AMERICA W.C.	U.S. EAST COAST	T	Alternative Mileage	8700				
S. AMERICA W.C.	U.S. EAST COAST	T	PC Cost	30		13	9	8
S. AMERICA W.C.	U.S. EAST COAST	T	Alternative Cost	54		23	16	14
S. AMERICA W.C.	U.S. EAST COAST	T	Cost Differential	24		10	7	6
U.S. EAST COAST	ASIA	CB	PC Mileage	11556				
U.S. EAST COAST	ASIA	CB	Alternative Mileage	16610				
U.S. EAST COAST	ASIA	CB	PC Cost	176	102	96	91	
U.S. EAST COAST	ASIA	CB	Alternative Cost	228	130	121	115	
U.S. EAST COAST	ASIA	CB	Cost Differential	52	28	25	24	
U.S. EAST COAST	ASIA	F	PC Mileage	11556				
U.S. EAST COAST	ASIA	F	Alternative Mileage	16610				
U.S. EAST COAST	ASIA	F	PC Cost		267	208	206	
U.S. EAST COAST	ASIA	F	Alternative Cost		335	259	261	
U.S. EAST COAST	ASIA	F	Cost Differential		68	51	55	
U.S. EAST COAST	ASIA	G	PC Mileage	9375				
U.S. EAST COAST	ASIA	G	Alternative Mileage	15525				
U.S. EAST COAST	ASIA	G	PC Cost	87	38	29		
U.S. EAST COAST	ASIA	G	Alternative Cost	154	54	42		
U.S. EAST COAST	ASIA	G	Cost Differential	67	17	13		

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	ASIA	R	PC Mileage	9375				
U.S. EAST COAST	ASIA	R	Alternative Mileage	15525				
U.S. EAST COAST	ASIA	R	PC Cost	154	133			
U.S. EAST COAST	ASIA	R	Alternative Cost	226	195			
U.S. EAST COAST	ASIA	R	Cost Differential	71	63			
U.S. EAST COAST	ASIA	RO	PC Mileage	11556				
U.S. EAST COAST	ASIA	RO	Alternative Mileage	16610				
U.S. EAST COAST	ASIA	RO	PC Cost	369	289	246	225	
U.S. EAST COAST	ASIA	RO	Alternative Cost	485	379	310	282	
U.S. EAST COAST	ASIA	RO	Cost Differential	116	90	64	57	
U.S. EAST COAST	ASIA	V	PC Mileage	9375				
U.S. EAST COAST	ASIA	V	Alternative Mileage	15525				
U.S. EAST COAST	ASIA	V	PC Cost	444	388	339		
U.S. EAST COAST	ASIA	V	Alternative Cost	597	513	439		
U.S. EAST COAST	ASIA	V	Cost Differential	153	125	100		
U.S. EAST COAST	ASIA	CD	PC Mileage	9375				
U.S. EAST COAST	ASIA	CD	Alternative Mileage	15525				
U.S. EAST COAST	ASIA	CD	PC Cost			18	14	13
U.S. EAST COAST	ASIA	CD	Alternative Cost			27	21	20
U.S. EAST COAST	ASIA	CD	Cost Differential			9	7	6
U.S. EAST COAST	ASIA	CT	PC Mileage	9375				
U.S. EAST COAST	ASIA	CT	Alternative Mileage	15525				
U.S. EAST COAST	ASIA	CT	PC Cost	85		42	33	
U.S. EAST COAST	ASIA	CT	Alternative Cost	121		59	46	
U.S. EAST COAST	ASIA	CT	Cost Differential	36		17	13	
U.S. EAST COAST	ASIA	LP	PC Mileage	9375				
U.S. EAST COAST	ASIA	LP	Alternative Mileage	15525				
U.S. EAST COAST	ASIA	LP	PC Cost	200	88		45	
U.S. EAST COAST	ASIA	LP	Alternative Cost	314	136		69	
U.S. EAST COAST	ASIA	LP	Cost Differential	114	48		24	
U.S. EAST COAST	ASIA	T	PC Mileage	9375				
U.S. EAST COAST	ASIA	T	Alternative Mileage	15525				
U.S. EAST COAST	ASIA	T	PC Cost	59		25	18	15
U.S. EAST COAST	ASIA	T	Alternative Cost	94		39	27	24
U.S. EAST COAST	ASIA	T	Cost Differential	35		13	10	8

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	CANADA WEST COAST	CB	PC Mileage	6037				
U.S. EAST COAST	CANADA WEST COAST	CB	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	CB	PC Cost	117	70	66	63	
U.S. EAST COAST	CANADA WEST COAST	CB	Alternative Cost	203	116	108	103	
U.S. EAST COAST	CANADA WEST COAST	CB	Cost Differential	86	46	42	39	
U.S. EAST COAST	CANADA WEST COAST	F	PC Mileage	6037				
U.S. EAST COAST	CANADA WEST COAST	F	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	F	PC Cost		191	154	147	
U.S. EAST COAST	CANADA WEST COAST	F	Alternative Cost		301	234	234	
U.S. EAST COAST	CANADA WEST COAST	F	Cost Differential		110	80	87	
U.S. EAST COAST	CANADA WEST COAST	G	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	G	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	G	PC Cost	47	27	21		
U.S. EAST COAST	CANADA WEST COAST	G	Alternative Cost	140	51	39		
U.S. EAST COAST	CANADA WEST COAST	G	Cost Differential	93	24	18		
U.S. EAST COAST	CANADA WEST COAST	R	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	R	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	R	PC Cost	109	94			
U.S. EAST COAST	CANADA WEST COAST	R	Alternative Cost	210	182			
U.S. EAST COAST	CANADA WEST COAST	R	Cost Differential	100	88			
U.S. EAST COAST	CANADA WEST COAST	RO	PC Mileage	6037				
U.S. EAST COAST	CANADA WEST COAST	RO	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	RO	PC Cost	248	200	173	160	
U.S. EAST COAST	CANADA WEST COAST	RO	Alternative Cost	428	335	277	253	
U.S. EAST COAST	CANADA WEST COAST	RO	Cost Differential	180	135	105	93	
U.S. EAST COAST	CANADA WEST COAST	V	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	V	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	V	PC Cost	348	308	275		
U.S. EAST COAST	CANADA WEST COAST	V	Alternative Cost	563	485	416		
U.S. EAST COAST	CANADA WEST COAST	V	Cost Differential	215	177	141		
U.S. EAST COAST	CANADA WEST COAST	CD	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	CD	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	CD	PC Cost			13	10	9
U.S. EAST COAST	CANADA WEST COAST	CD	Alternative Cost			25	20	18

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	CANADA WEST COAST	CD	Cost Differential			12	10	9
U.S. EAST COAST	CANADA WEST COAST	CT	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	CT	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	CT	PC Cost	63		32	25	
U.S. EAST COAST	CANADA WEST COAST	CT	Alternative Cost	113		55	43	
U.S. EAST COAST	CANADA WEST COAST	CT	Cost Differential	50		23	18	
U.S. EAST COAST	CANADA WEST COAST	LP	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	LP	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	LP	PC Cost	130	58		31	
U.S. EAST COAST	CANADA WEST COAST	LP	Alternative Cost	289	126		64	
U.S. EAST COAST	CANADA WEST COAST	LP	Cost Differential	160	67		33	
U.S. EAST COAST	CANADA WEST COAST	T	PC Mileage	5753				
U.S. EAST COAST	CANADA WEST COAST	T	Alternative Mileage	14240				
U.S. EAST COAST	CANADA WEST COAST	T	PC Cost	38		17	12	10
U.S. EAST COAST	CANADA WEST COAST	T	Alternative Cost	86		36	25	22
U.S. EAST COAST	CANADA WEST COAST	T	Cost Differential	48		19	13	11
U.S. EAST COAST	C. AMERICA W.C.	CB	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	CB	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	CB	PC Cost	74	47	45	44	
U.S. EAST COAST	C. AMERICA W.C.	CB	Alternative Cost	168	97	91	87	
U.S. EAST COAST	C. AMERICA W.C.	CB	Cost Differential	94	50	46	43	
U.S. EAST COAST	C. AMERICA W.C.	F	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	F	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	F	PC Cost		137	115	105	
U.S. EAST COAST	C. AMERICA W.C.	F	Alternative Cost		255	201	198	
U.S. EAST COAST	C. AMERICA W.C.	F	Cost Differential		118	85	93	
U.S. EAST COAST	C. AMERICA W.C.	G	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	G	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	G	PC Cost	6	17	13		
U.S. EAST COAST	C. AMERICA W.C.	G	Alternative Cost	104	41	32		
U.S. EAST COAST	C. AMERICA W.C.	G	Cost Differential	98	25	19		
U.S. EAST COAST	C. AMERICA W.C.	R	PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	R	Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	R	PC Cost	64	54			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
U.S. EAST COAST	C. AMERICA W.C.	R Alternative Cost	170	146			
U.S. EAST COAST	C. AMERICA W.C.	R Cost Differential	106	93			
U.S. EAST COAST	C. AMERICA W.C.	RO PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	RO Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	RO PC Cost	161	136	120	113	
U.S. EAST COAST	C. AMERICA W.C.	RO Alternative Cost	350	273	233	213	
U.S. EAST COAST	C. AMERICA W.C.	RO Cost Differential	188	137	113	100	
U.S. EAST COAST	C. AMERICA W.C.	V PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	V Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	V PC Cost	250	228	210		
U.S. EAST COAST	C. AMERICA W.C.	V Alternative Cost	476	413	359		
U.S. EAST COAST	C. AMERICA W.C.	V Cost Differential	226	186	149		
U.S. EAST COAST	C. AMERICA W.C.	CD PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	CD Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	CD PC Cost			7	6	5
U.S. EAST COAST	C. AMERICA W.C.	CD Alternative Cost			20	16	15
U.S. EAST COAST	C. AMERICA W.C.	CD Cost Differential			13	10	9
U.S. EAST COAST	C. AMERICA W.C.	CT PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	CT Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	CT PC Cost	41		21	17	
U.S. EAST COAST	C. AMERICA W.C.	CT Alternative Cost	94		46	36	
U.S. EAST COAST	C. AMERICA W.C.	CT Cost Differential	52		25	19	
U.S. EAST COAST	C. AMERICA W.C.	LP PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	LP Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	LP PC Cost	59	28		16	
U.S. EAST COAST	C. AMERICA W.C.	LP Alternative Cost	226	99		51	
U.S. EAST COAST	C. AMERICA W.C.	LP Cost Differential	168	71		35	
U.S. EAST COAST	C. AMERICA W.C.	T PC Mileage	2085				
U.S. EAST COAST	C. AMERICA W.C.	T Alternative Mileage	11000				
U.S. EAST COAST	C. AMERICA W.C.	T PC Cost	16		8	6	5
U.S. EAST COAST	C. AMERICA W.C.	T Alternative Cost	67		28	20	17
U.S. EAST COAST	C. AMERICA W.C.	T Cost Differential	51		20	14	12
U.S. EAST COAST	OCEANIA	CB PC Mileage	12708				
U.S. EAST COAST	OCEANIA	CB Alternative Mileage	12790				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	OCEANIA	CB	PC Cost		189	109	102	97	
U.S. EAST COAST	OCEANIA	CB	Alternative Cost		187	108	101	96	
U.S. EAST COAST	OCEANIA	CB	Cost Differential		-2	-1	-1	-1	
U.S. EAST COAST	OCEANIA	F	PC Mileage		12708				
U.S. EAST COAST	OCEANIA	F	Alternative Mileage		12790				
U.S. EAST COAST	OCEANIA	F	PC Cost			282	219	218	
U.S. EAST COAST	OCEANIA	F	Alternative Cost			281	219	218	
U.S. EAST COAST	OCEANIA	F	Cost Differential			-2		-0	
U.S. EAST COAST	OCEANIA	G	PC Mileage		10136				
U.S. EAST COAST	OCEANIA	G	Alternative Mileage		12790				
U.S. EAST COAST	OCEANIA	G	PC Cost		95	40	31		
U.S. EAST COAST	OCEANIA	G	Alternative Cost		124	47	36		
U.S. EAST COAST	OCEANIA	G	Cost Differential		28	7	5		
U.S. EAST COAST	OCEANIA	R	PC Mileage		10136				
U.S. EAST COAST	OCEANIA	R	Alternative Mileage		12790				
U.S. EAST COAST	OCEANIA	R	PC Cost		164	141			
U.S. EAST COAST	OCEANIA	R	Alternative Cost		192	166			
U.S. EAST COAST	OCEANIA	R	Cost Differential		28	25			
U.S. EAST COAST	OCEANIA	RO	PC Mileage		12708				
U.S. EAST COAST	OCEANIA	RO	Alternative Mileage		12790				
U.S. EAST COAST	OCEANIA	RO	PC Cost		394	308	261	239	
U.S. EAST COAST	OCEANIA	RO	Alternative Cost		393	307	257	235	
U.S. EAST COAST	OCEANIA	RO	Cost Differential		-1	-1	-4	-4	
U.S. EAST COAST	OCEANIA	V	PC Mileage		10136				
U.S. EAST COAST	OCEANIA	V	Alternative Mileage		12790				
U.S. EAST COAST	OCEANIA	V	PC Cost		465	404	353		
U.S. EAST COAST	OCEANIA	V	Alternative Cost		524	453	391		
U.S. EAST COAST	OCEANIA	V	Cost Differential		59	48	38		
U.S. EAST COAST	OCEANIA	CD	PC Mileage		10136				
U.S. EAST COAST	OCEANIA	CD	Alternative Mileage		12790				
U.S. EAST COAST	OCEANIA	CD	PC Cost				20	15	14
U.S. EAST COAST	OCEANIA	CD	Alternative Cost				23	18	17
U.S. EAST COAST	OCEANIA	CD	Cost Differential				3	3	3
U.S. EAST COAST	OCEANIA	CT	PC Mileage		10136				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	OCEANIA	CT	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	CT	PC Cost	90		44	35	
U.S. EAST COAST	OCEANIA	CT	Alternative Cost	105		51	40	
U.S. EAST COAST	OCEANIA	CT	Cost Differential	15		7	5	
U.S. EAST COAST	OCEANIA	LP	PC Mileage	10136				
U.S. EAST COAST	OCEANIA	LP	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	LP	PC Cost	215	94		49	
U.S. EAST COAST	OCEANIA	LP	Alternative Cost	261	114		58	
U.S. EAST COAST	OCEANIA	LP	Cost Differential	46	19		10	
U.S. EAST COAST	OCEANIA	T	PC Mileage	10136				
U.S. EAST COAST	OCEANIA	T	Alternative Mileage	12790				
U.S. EAST COAST	OCEANIA	T	PC Cost	64		27	19	16
U.S. EAST COAST	OCEANIA	T	Alternative Cost	78		33	23	20
U.S. EAST COAST	OCEANIA	T	Cost Differential	14		5	4	3
U.S. EAST COAST	S. AMERICA W.C.	CB	PC Mileage	4569				
U.S. EAST COAST	S. AMERICA W.C.	CB	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	CB	PC Cost	101	62	58	56	
U.S. EAST COAST	S. AMERICA W.C.	CB	Alternative Cost	143	84	79	75	
U.S. EAST COAST	S. AMERICA W.C.	CB	Cost Differential	42	22	21	19	
U.S. EAST COAST	S. AMERICA W.C.	F	PC Mileage	4569				
U.S. EAST COAST	S. AMERICA W.C.	F	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	F	PC Cost		171	140	132	
U.S. EAST COAST	S. AMERICA W.C.	F	Alternative Cost		223	177	173	
U.S. EAST COAST	S. AMERICA W.C.	F	Cost Differential		52	37	41	
U.S. EAST COAST	S. AMERICA W.C.	G	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	G	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	G	PC Cost	31	23	18		
U.S. EAST COAST	S. AMERICA W.C.	G	Alternative Cost	78	35	27		
U.S. EAST COAST	S. AMERICA W.C.	G	Cost Differential	47	12	9		
U.S. EAST COAST	S. AMERICA W.C.	R	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	R	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	R	PC Cost	92	78			
U.S. EAST COAST	S. AMERICA W.C.	R	Alternative Cost	141	121			
U.S. EAST COAST	S. AMERICA W.C.	R	Cost Differential	49	43			

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES / SHIP TYPE		0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	S. AMERICA W.C.	RO	PC Mileage	4569				
U.S. EAST COAST	S. AMERICA W.C.	RO	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	RO	PC Cost	216	176	153	142	
U.S. EAST COAST	S. AMERICA W.C.	RO	Alternative Cost	294	230	201	185	
U.S. EAST COAST	S. AMERICA W.C.	RO	Cost Differential	78	54	48	43	
U.S. EAST COAST	S. AMERICA W.C.	V	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	V	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	V	PC Cost	310	277	250		
U.S. EAST COAST	S. AMERICA W.C.	V	Alternative Cost	415	363	318		
U.S. EAST COAST	S. AMERICA W.C.	V	Cost Differential	105	86	68		
U.S. EAST COAST	S. AMERICA W.C.	CD	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	CD	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	CD	PC Cost			11	8	8
U.S. EAST COAST	S. AMERICA W.C.	CD	Alternative Cost			17	13	12
U.S. EAST COAST	S. AMERICA W.C.	CD	Cost Differential			6	5	4
U.S. EAST COAST	S. AMERICA W.C.	CT	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	CT	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	CT	PC Cost	55		28	22	
U.S. EAST COAST	S. AMERICA W.C.	CT	Alternative Cost	80		39	31	
U.S. EAST COAST	S. AMERICA W.C.	CT	Cost Differential	25		12	9	
U.S. EAST COAST	S. AMERICA W.C.	LP	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	LP	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	LP	PC Cost	102	47		25	
U.S. EAST COAST	S. AMERICA W.C.	LP	Alternative Cost	182	80		41	
U.S. EAST COAST	S. AMERICA W.C.	LP	Cost Differential	79	33		17	
U.S. EAST COAST	S. AMERICA W.C.	T	PC Mileage	4346				
U.S. EAST COAST	S. AMERICA W.C.	T	Alternative Mileage	8700				
U.S. EAST COAST	S. AMERICA W.C.	T	PC Cost	30		13	9	8
U.S. EAST COAST	S. AMERICA W.C.	T	Alternative Cost	54		23	16	14
U.S. EAST COAST	S. AMERICA W.C.	T	Cost Differential	24		10	7	6
U.S. EAST COAST	U.S. W.C., HAWAII	CB	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	CB	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	CB	PC Cost	103	63	59	57	
U.S. EAST COAST	U.S. W.C., HAWAII	CB	Alternative Cost	193	111	104	98	
U.S. EAST COAST	U.S. W.C., HAWAII	CB	Cost Differential	90	48	44	41	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. EAST COAST	U.S. W.C., HAWAII	F	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	F	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	F	PC Cost		174	142	134	
U.S. EAST COAST	U.S. W.C., HAWAII	F	Alternative Cost		288	225	224	
U.S. EAST COAST	U.S. W.C., HAWAII	F	Cost Differential		115	83	90	
U.S. EAST COAST	U.S. W.C., HAWAII	G	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	G	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	G	PC Cost	35	24	19		
U.S. EAST COAST	U.S. W.C., HAWAII	G	Alternative Cost	130	48	37		
U.S. EAST COAST	U.S. W.C., HAWAII	G	Cost Differential	94	24	18		
U.S. EAST COAST	U.S. W.C., HAWAII	R	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	R	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	R	PC Cost	97	83			
U.S. EAST COAST	U.S. W.C., HAWAII	R	Alternative Cost	199	172			
U.S. EAST COAST	U.S. W.C., HAWAII	R	Cost Differential	101	89			
U.S. EAST COAST	U.S. W.C., HAWAII	RO	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	RO	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	RO	PC Cost	220	180	156	145	
U.S. EAST COAST	U.S. W.C., HAWAII	RO	Alternative Cost	406	317	265	242	
U.S. EAST COAST	U.S. W.C., HAWAII	RO	Cost Differential	186	138	109	97	
U.S. EAST COAST	U.S. W.C., HAWAII	V	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	V	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	V	PC Cost	322	287	258		
U.S. EAST COAST	U.S. W.C., HAWAII	V	Alternative Cost	538	465	400		
U.S. EAST COAST	U.S. W.C., HAWAII	V	Cost Differential	217	178	143		
U.S. EAST COAST	U.S. W.C., HAWAII	CD	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	CD	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	CD	PC Cost			11	9	8
U.S. EAST COAST	U.S. W.C., HAWAII	CD	Alternative Cost			24	19	17
U.S. EAST COAST	U.S. W.C., HAWAII	CD	Cost Differential			12	10	9
U.S. EAST COAST	U.S. W.C., HAWAII	CT	PC Mileage	4767				
U.S. EAST COAST	U.S. W.C., HAWAII	CT	Alternative Mileage	13331				
U.S. EAST COAST	U.S. W.C., HAWAII	CT	PC Cost	57		29	23	
U.S. EAST COAST	U.S. W.C., HAWAII	CT	Alternative Cost	108		53	41	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION			DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE			A	B	C	D	E
U.S. EAST COAST	U.S. W.C., HAWAII	CT	Cost Differential		50		24	18	
U.S. EAST COAST	U.S. W.C., HAWAII	LP	PC Mileage		4767				
U.S. EAST COAST	U.S. W.C., HAWAII	LP	Alternative Mileage		13331				
U.S. EAST COAST	U.S. W.C., HAWAII	LP	PC Cost		111	50		27	
U.S. EAST COAST	U.S. W.C., HAWAII	LP	Alternative Cost		272	118		60	
U.S. EAST COAST	U.S. W.C., HAWAII	LP	Cost Differential		161	68		34	
U.S. EAST COAST	U.S. W.C., HAWAII	T	PC Mileage		4767				
U.S. EAST COAST	U.S. W.C., HAWAII	T	Alternative Mileage		13331				
U.S. EAST COAST	U.S. W.C., HAWAII	T	PC Cost		32		14	10	9
U.S. EAST COAST	U.S. W.C., HAWAII	T	Alternative Cost		81		34	24	21
U.S. EAST COAST	U.S. W.C., HAWAII	T	Cost Differential		49		19	14	11
U.S. W.C., HAWAII	AFRICA	CB	PC Mileage		9969				
U.S. W.C., HAWAII	AFRICA	CB	Alternative Mileage		14150				
U.S. W.C., HAWAII	AFRICA	CB	PC Cost		159	93	87	83	
U.S. W.C., HAWAII	AFRICA	CB	Alternative Cost		202	116	108	102	
U.S. W.C., HAWAII	AFRICA	CB	Cost Differential		42	23	21	19	
U.S. W.C., HAWAII	AFRICA	F	PC Mileage		9969				
U.S. W.C., HAWAII	AFRICA	F	Alternative Mileage		14150				
U.S. W.C., HAWAII	AFRICA	F	PC Cost			245	193	189	
U.S. W.C., HAWAII	AFRICA	F	Alternative Cost			300	234	233	
U.S. W.C., HAWAII	AFRICA	F	Cost Differential			55	41	44	
U.S. W.C., HAWAII	AFRICA	G	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	G	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	G	PC Cost		83	36	28		
U.S. W.C., HAWAII	AFRICA	G	Alternative Cost		128	48	37		
U.S. W.C., HAWAII	AFRICA	G	Cost Differential		45	11	9		
U.S. W.C., HAWAII	AFRICA	R	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	R	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	R	PC Cost		150	129			
U.S. W.C., HAWAII	AFRICA	R	Alternative Cost		197	170			
U.S. W.C., HAWAII	AFRICA	R	Cost Differential		47	41			
U.S. W.C., HAWAII	AFRICA	RO	PC Mileage		9969				
U.S. W.C., HAWAII	AFRICA	RO	Alternative Mileage		14150				
U.S. W.C., HAWAII	AFRICA	RO	PC Cost		334	264	225	206	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	AFRICA	RO	Alternative Cost		426	333	276	252	
U.S. W.C., HAWAII	AFRICA	RO	Cost Differential		92	69	51	45	
U.S. W.C., HAWAII	AFRICA	V	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	V	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	V	PC Cost		435	380	333		
U.S. W.C., HAWAII	AFRICA	V	Alternative Cost		535	462	398		
U.S. W.C., HAWAII	AFRICA	V	Cost Differential		100	82	65		
U.S. W.C., HAWAII	AFRICA	CD	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	CD	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	CD	PC Cost				18	14	13
U.S. W.C., HAWAII	AFRICA	CD	Alternative Cost				24	19	17
U.S. W.C., HAWAII	AFRICA	CD	Cost Differential				6	5	4
U.S. W.C., HAWAII	AFRICA	CT	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	CT	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	CT	PC Cost		83		41	32	
U.S. W.C., HAWAII	AFRICA	CT	Alternative Cost		107		52	41	
U.S. W.C., HAWAII	AFRICA	CT	Cost Differential		24		11	9	
U.S. W.C., HAWAII	AFRICA	LP	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	LP	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	LP	PC Cost		193	85		44	
U.S. W.C., HAWAII	AFRICA	LP	Alternative Cost		269	117		60	
U.S. W.C., HAWAII	AFRICA	LP	Cost Differential		76	32		16	
U.S. W.C., HAWAII	AFRICA	T	PC Mileage		9017				
U.S. W.C., HAWAII	AFRICA	T	Alternative Mileage		13200				
U.S. W.C., HAWAII	AFRICA	T	PC Cost		57		25	17	15
U.S. W.C., HAWAII	AFRICA	T	Alternative Cost		80		33	24	20
U.S. W.C., HAWAII	AFRICA	T	Cost Differential		23		9	6	5
U.S. W.C., HAWAII	CANADA EAST COAST	CB	PC Mileage		6341				
U.S. W.C., HAWAII	CANADA EAST COAST	CB	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	CB	PC Cost		120	72	68	65	
U.S. W.C., HAWAII	CANADA EAST COAST	CB	Alternative Cost		198	114	106	100	
U.S. W.C., HAWAII	CANADA EAST COAST	CB	Cost Differential		78	42	38	36	
U.S. W.C., HAWAII	CANADA EAST COAST	F	PC Mileage		6341				
U.S. W.C., HAWAII	CANADA EAST COAST	F	Alternative Mileage		13785				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	CANADA EAST COAST	F	PC Cost		195	157	150	
U.S. W.C., HAWAII	CANADA EAST COAST	F	Alternative Cost		295	230	229	
U.S. W.C., HAWAII	CANADA EAST COAST	F	Cost Differential		100	73	79	
U.S. W.C., HAWAII	CANADA EAST COAST	G	PC Mileage	6340				
U.S. W.C., HAWAII	CANADA EAST COAST	G	Alternative Mileage	13785				
U.S. W.C., HAWAII	CANADA EAST COAST	G	PC Cost	53	29	22		
U.S. W.C., HAWAII	CANADA EAST COAST	G	Alternative Cost	135	49	38		
U.S. W.C., HAWAII	CANADA EAST COAST	G	Cost Differential	82	21	16		
U.S. W.C., HAWAII	CANADA EAST COAST	R	PC Mileage	6340				
U.S. W.C., HAWAII	CANADA EAST COAST	R	Alternative Mileage	13785				
U.S. W.C., HAWAII	CANADA EAST COAST	R	PC Cost	117	100			
U.S. W.C., HAWAII	CANADA EAST COAST	R	Alternative Cost	204	177			
U.S. W.C., HAWAII	CANADA EAST COAST	R	Cost Differential	87	77			
U.S. W.C., HAWAII	CANADA EAST COAST	RO	PC Mileage	6341				
U.S. W.C., HAWAII	CANADA EAST COAST	RO	Alternative Mileage	13785				
U.S. W.C., HAWAII	CANADA EAST COAST	RO	PC Cost	255	205	177	163	
U.S. W.C., HAWAII	CANADA EAST COAST	RO	Alternative Cost	417	326	271	247	
U.S. W.C., HAWAII	CANADA EAST COAST	RO	Cost Differential	163	121	94	84	
U.S. W.C., HAWAII	CANADA EAST COAST	V	PC Mileage	6340				
U.S. W.C., HAWAII	CANADA EAST COAST	V	Alternative Mileage	13785				
U.S. W.C., HAWAII	CANADA EAST COAST	V	PC Cost	363	321	286		
U.S. W.C., HAWAII	CANADA EAST COAST	V	Alternative Cost	551	475	408		
U.S. W.C., HAWAII	CANADA EAST COAST	V	Cost Differential	187	154	123		
U.S. W.C., HAWAII	CANADA EAST COAST	CD	PC Mileage	6340				
U.S. W.C., HAWAII	CANADA EAST COAST	CD	Alternative Mileage	13785				
U.S. W.C., HAWAII	CANADA EAST COAST	CD	PC Cost			14	11	10
U.S. W.C., HAWAII	CANADA EAST COAST	CD	Alternative Cost			25	19	18
U.S. W.C., HAWAII	CANADA EAST COAST	CD	Cost Differential			11	8	8
U.S. W.C., HAWAII	CANADA EAST COAST	CT	PC Mileage	6340				
U.S. W.C., HAWAII	CANADA EAST COAST	CT	Alternative Mileage	13785				
U.S. W.C., HAWAII	CANADA EAST COAST	CT	PC Cost	67		33	26	
U.S. W.C., HAWAII	CANADA EAST COAST	CT	Alternative Cost	111		54	42	
U.S. W.C., HAWAII	CANADA EAST COAST	CT	Cost Differential	44		20	16	
U.S. W.C., HAWAII	CANADA EAST COAST	LP	PC Mileage	6340				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	CANADA EAST COAST	LP	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	LP	PC Cost		141	63		33	
U.S. W.C., HAWAII	CANADA EAST COAST	LP	Alternative Cost		280	122		62	
U.S. W.C., HAWAII	CANADA EAST COAST	LP	Cost Differential		139	59		29	
U.S. W.C., HAWAII	CANADA EAST COAST	T	PC Mileage		6340				
U.S. W.C., HAWAII	CANADA EAST COAST	T	Alternative Mileage		13785				
U.S. W.C., HAWAII	CANADA EAST COAST	T	PC Cost		41		18	13	11
U.S. W.C., HAWAII	CANADA EAST COAST	T	Alternative Cost		84		35	25	21
U.S. W.C., HAWAII	CANADA EAST COAST	T	Cost Differential		42		17	12	10
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	PC Mileage		5253				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	PC Cost		108	66	62	59	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	Alternative Cost		180	104	97	92	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CB	Cost Differential		72	39	35	33	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	PC Mileage		5253				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	PC Cost			180	146	139	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	Alternative Cost			272	213	211	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	F	Cost Differential			92	67	72	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	PC Cost		32	23	18		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	Alternative Cost		117	45	34		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	G	Cost Differential		84	21	16		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	PC Cost		94	80			
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	Alternative Cost		184	159			
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	R	Cost Differential		91	79			
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	PC Mileage		5253				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	PC Cost		231	187	162	150	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	Alternative Cost		378	296	249	227	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	RO	Cost Differential		147	108	87	77	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	PC Cost		314	280	253		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	Alternative Cost		507	439	380		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	V	Cost Differential		194	159	127		
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	PC Cost				11	9	8
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	Alternative Cost				22	17	16
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CD	Cost Differential				11	9	8
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	PC Cost		56		28	22	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	Alternative Cost		101		49	39	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	CT	Cost Differential		45		21	16	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	PC Cost		105	48		25	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	Alternative Cost		249	109		56	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	LP	Cost Differential		144	61		30	
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	PC Mileage		4479				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Mileage		12170				
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	PC Cost		31		14	10	9
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	Alternative Cost		74		31	22	19
U.S. W.C., HAWAII	CENTRAL AMERICA E.C., W. INDIES	T	Cost Differential		44		17	12	10
U.S. W.C., HAWAII	EUROPE	CB	PC Mileage		9405				
U.S. W.C., HAWAII	EUROPE	CB	Alternative Mileage		14940				
U.S. W.C., HAWAII	EUROPE	CB	PC Cost		153	90	84	80	
U.S. W.C., HAWAII	EUROPE	CB	Alternative Cost		210	120	112	106	
U.S. W.C., HAWAII	EUROPE	CB	Cost Differential		57	31	28	26	
U.S. W.C., HAWAII	EUROPE	F	PC Mileage		9405				
U.S. W.C., HAWAII	EUROPE	F	Alternative Mileage		14940				
U.S. W.C., HAWAII	EUROPE	F	PC Cost			237	187	183	
U.S. W.C., HAWAII	EUROPE	F	Alternative Cost			311	242	242	
U.S. W.C., HAWAII	EUROPE	F	Cost Differential			74	55	59	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE	DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	EUROPE	G	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	G	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	G	PC Cost	73	34	26		
U.S. W.C., HAWAII	EUROPE	G	Alternative Cost	134	49	38		
U.S. W.C., HAWAII	EUROPE	G	Cost Differential	60	15	12		
U.S. W.C., HAWAII	EUROPE	R	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	R	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	R	PC Cost	139	120			
U.S. W.C., HAWAII	EUROPE	R	Alternative Cost	203	176			
U.S. W.C., HAWAII	EUROPE	R	Cost Differential	64	56			
U.S. W.C., HAWAII	EUROPE	RO	PC Mileage	9405				
U.S. W.C., HAWAII	EUROPE	RO	Alternative Mileage	14840				
U.S. W.C., HAWAII	EUROPE	RO	PC Cost	322	254	217	200	
U.S. W.C., HAWAII	EUROPE	RO	Alternative Cost	443	346	286	260	
U.S. W.C., HAWAII	EUROPE	RO	Cost Differential	121	92	68	61	
U.S. W.C., HAWAII	EUROPE	V	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	V	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	V	PC Cost	412	361	318		
U.S. W.C., HAWAII	EUROPE	V	Alternative Cost	548	473	407		
U.S. W.C., HAWAII	EUROPE	V	Cost Differential	136	112	89		
U.S. W.C., HAWAII	EUROPE	CD	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	CD	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	CD	PC Cost			17	13	12
U.S. W.C., HAWAII	EUROPE	CD	Alternative Cost			24	19	18
U.S. W.C., HAWAII	EUROPE	CD	Cost Differential			8	6	6
U.S. W.C., HAWAII	EUROPE	CT	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	CT	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	CT	PC Cost	78		39	30	
U.S. W.C., HAWAII	EUROPE	CT	Alternative Cost	110		54	42	
U.S. W.C., HAWAII	EUROPE	CT	Cost Differential	32		15	12	
U.S. W.C., HAWAII	EUROPE	LP	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	LP	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	LP	PC Cost	177	78		40	
U.S. W.C., HAWAII	EUROPE	LP	Alternative Cost	279	121		62	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES 0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	EUROPE	LP	Cost Differential	102	43		21	
U.S. W.C., HAWAII	EUROPE	T	PC Mileage	8165				
U.S. W.C., HAWAII	EUROPE	T	Alternative Mileage	13702				
U.S. W.C., HAWAII	EUROPE	T	PC Cost	52		23	16	14
U.S. W.C., HAWAII	EUROPE	T	Alternative Cost	83		35	24	21
U.S. W.C., HAWAII	EUROPE	T	Cost Differential	31		12	9	7
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	PC Mileage	10207				
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	Alternative Mileage	11677				
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	PC Cost		248	195	192	
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	Alternative Cost		265	208	206	
U.S. W.C., HAWAII	MIDDLE EAST (additional route)	F	Cost Differential		17	13	14	
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	PC Cost	133	79	74	71	
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	Alternative Cost	142	84	78	75	
U.S. W.C., HAWAII	S. AMERICA E.C.	CB	Cost Differential	9	5	4	4	
U.S. W.C., HAWAII	S. AMERICA E.C.	F	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	F	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	F	PC Cost		212	169	163	
U.S. W.C., HAWAII	S. AMERICA E.C.	F	Alternative Cost		221	176	171	
U.S. W.C., HAWAII	S. AMERICA E.C.	F	Cost Differential		10	7	8	
U.S. W.C., HAWAII	S. AMERICA E.C.	G	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	G	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	G	PC Cost	66	32	25		
U.S. W.C., HAWAII	S. AMERICA E.C.	G	Alternative Cost	77	34	27		
U.S. W.C., HAWAII	S. AMERICA E.C.	G	Cost Differential	11	2	2		
U.S. W.C., HAWAII	S. AMERICA E.C.	R	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	R	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	R	PC Cost	131	113			
U.S. W.C., HAWAII	S. AMERICA E.C.	R	Alternative Cost	140	120			
U.S. W.C., HAWAII	S. AMERICA E.C.	R	Cost Differential	9	7			
U.S. W.C., HAWAII	S. AMERICA E.C.	RO	PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	RO	Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	RO	PC Cost	281	224	193	177	

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	DWT RANGES	0 TO 9,999	10,000 TO 24,999	25,000 TO 39,999	40,000 TO 64,999	65,000 TO 99,9999
		SHIP TYPE	A	B	C	D	E
U.S. W.C., HAWAII	S. AMERICA E.C.	RO Alternative Cost	292	228	200	184	
U.S. W.C., HAWAII	S. AMERICA E.C.	RO Cost Differential	11	4	8	7	
U.S. W.C., HAWAII	S. AMERICA E.C.	V PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	V Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	V PC Cost	395	347	307		
U.S. W.C., HAWAII	S. AMERICA E.C.	V Alternative Cost	412	361	317		
U.S. W.C., HAWAII	S. AMERICA E.C.	V Cost Differential	17	13	10		
U.S. W.C., HAWAII	S. AMERICA E.C.	CD PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	CD Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	CD PC Cost			16	12	11
U.S. W.C., HAWAII	S. AMERICA E.C.	CD Alternative Cost			17	13	12
U.S. W.C., HAWAII	S. AMERICA E.C.	CD Cost Differential			1	1	1
U.S. W.C., HAWAII	S. AMERICA E.C.	CT PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	CT Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	CT PC Cost	74		37	29	
U.S. W.C., HAWAII	S. AMERICA E.C.	CT Alternative Cost	79		39	31	
U.S. W.C., HAWAII	S. AMERICA E.C.	CT Cost Differential	5		2	2	
U.S. W.C., HAWAII	S. AMERICA E.C.	LP PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	LP Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	LP PC Cost	164	73		38	
U.S. W.C., HAWAII	S. AMERICA E.C.	LP Alternative Cost	180	79		41	
U.S. W.C., HAWAII	S. AMERICA E.C.	LP Cost Differential	16	6		3	
U.S. W.C., HAWAII	S. AMERICA E.C.	T PC Mileage	7536				
U.S. W.C., HAWAII	S. AMERICA E.C.	T Alternative Mileage	8604				
U.S. W.C., HAWAII	S. AMERICA E.C.	T PC Cost	48		21	15	13
U.S. W.C., HAWAII	S. AMERICA E.C.	T Alternative Cost	53		23	16	14
U.S. W.C., HAWAII	S. AMERICA E.C.	T Cost Differential	5		2	1	1
U.S. W.C., HAWAII	U.S. EAST COAST	CB PC Mileage	4767				
U.S. W.C., HAWAII	U.S. EAST COAST	CB Alternative Mileage	13331				
U.S. W.C., HAWAII	U.S. EAST COAST	CB PC Cost	103	63	59	57	
U.S. W.C., HAWAII	U.S. EAST COAST	CB Alternative Cost	193	111	104	98	
U.S. W.C., HAWAII	U.S. EAST COAST	CB Cost Differential	90	48	44	41	
U.S. W.C., HAWAII	U.S. EAST COAST	F PC Mileage	4767				
U.S. W.C., HAWAII	U.S. EAST COAST	F Alternative Mileage	13331				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	U.S. EAST COAST	F	PC Cost			174	142	134	
U.S. W.C., HAWAII	U.S. EAST COAST	F	Alternative Cost			288	225	224	
U.S. W.C., HAWAII	U.S. EAST COAST	F	Cost Differential			115	83	90	
U.S. W.C., HAWAII	U.S. EAST COAST	G	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	G	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	G	PC Cost		35	24	19		
U.S. W.C., HAWAII	U.S. EAST COAST	G	Alternative Cost		130	48	37		
U.S. W.C., HAWAII	U.S. EAST COAST	G	Cost Differential		94	24	18		
U.S. W.C., HAWAII	U.S. EAST COAST	R	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	R	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	R	PC Cost		97	83			
U.S. W.C., HAWAII	U.S. EAST COAST	R	Alternative Cost		199	172			
U.S. W.C., HAWAII	U.S. EAST COAST	R	Cost Differential		101	89			
U.S. W.C., HAWAII	U.S. EAST COAST	RO	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	RO	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	RO	PC Cost		220	180	156	145	
U.S. W.C., HAWAII	U.S. EAST COAST	RO	Alternative Cost		406	317	265	242	
U.S. W.C., HAWAII	U.S. EAST COAST	RO	Cost Differential		186	138	109	97	
U.S. W.C., HAWAII	U.S. EAST COAST	V	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	V	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	V	PC Cost		322	287	258		
U.S. W.C., HAWAII	U.S. EAST COAST	V	Alternative Cost		538	465	400		
U.S. W.C., HAWAII	U.S. EAST COAST	V	Cost Differential		217	178	143		
U.S. W.C., HAWAII	U.S. EAST COAST	CD	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	CD	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	CD	PC Cost				11	9	8
U.S. W.C., HAWAII	U.S. EAST COAST	CD	Alternative Cost				24	19	17
U.S. W.C., HAWAII	U.S. EAST COAST	CD	Cost Differential				12	10	9
U.S. W.C., HAWAII	U.S. EAST COAST	CT	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	CT	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	CT	PC Cost		57		29	23	
U.S. W.C., HAWAII	U.S. EAST COAST	CT	Alternative Cost		108		53	41	
U.S. W.C., HAWAII	U.S. EAST COAST	CT	Cost Differential		50		24	18	
U.S. W.C., HAWAII	U.S. EAST COAST	LP	PC Mileage		4767				

Cost Comparisons of Using Panama Canal and Alternative Routes, 2060

ORIGIN	DESTINATION	SHIP TYPE		DWT RANGES	0 TO 9,999 A	10,000 TO 24,999 B	25,000 TO 39,999 C	40,000 TO 64,999 D	65,000 TO 99,9999 E
U.S. W.C., HAWAII	U.S. EAST COAST	LP	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	LP	PC Cost		111	50		27	
U.S. W.C., HAWAII	U.S. EAST COAST	LP	Alternative Cost		272	118		60	
U.S. W.C., HAWAII	U.S. EAST COAST	LP	Cost Differential		161	68		34	
U.S. W.C., HAWAII	U.S. EAST COAST	T	PC Mileage		4767				
U.S. W.C., HAWAII	U.S. EAST COAST	T	Alternative Mileage		13331				
U.S. W.C., HAWAII	U.S. EAST COAST	T	PC Cost		32		14	10	9
U.S. W.C., HAWAII	U.S. EAST COAST	T	Alternative Cost		81		34	24	21
U.S. W.C., HAWAII	U.S. EAST COAST	T	Cost Differential		49		19	14	11