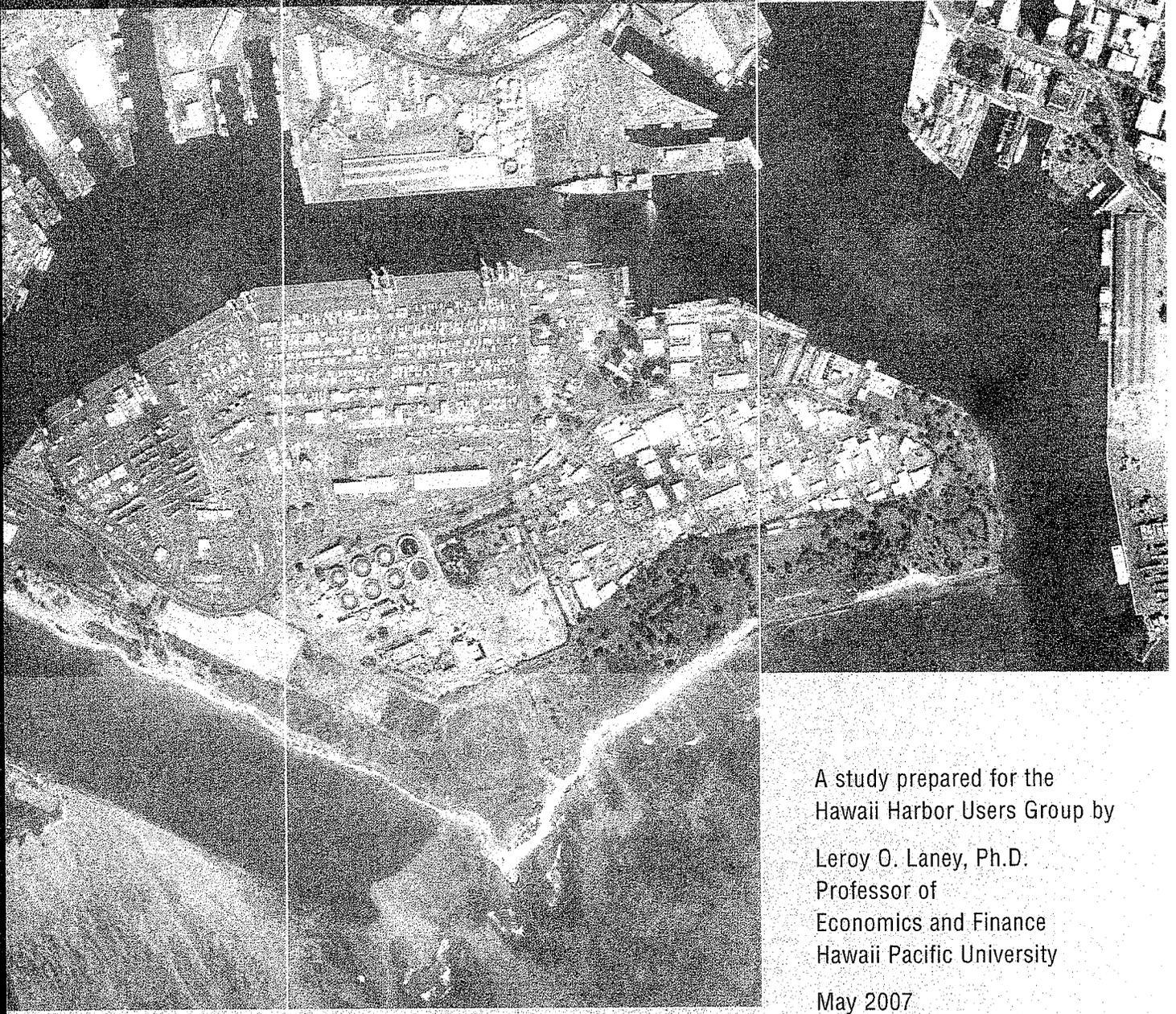


## **The Impact of Hawaii's Harbors on the Local Economy**



A study prepared for the  
Hawaii Harbor Users Group by

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May 2007

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## Executive Summary

Hawaii's economy is far more dependent on commercial harbors than most residents realize. Our lifestyles and living standards are directly tied to ocean surface transportation and commercial harbors. In fact, more than 80% of all consumer goods – food, clothing, autos, building supplies, machinery, paper and allied products, medical supplies, and agricultural materials – are imported into the state. Of that 80%, nearly all – some 98% – enter Hawaii through commercial harbors on six islands. Given the critical role that harbors play in the state, it is surprising that the vast majority of residents are unaware of the economic impact of harbors and the growing urgency to upgrade the commercial harbor system.

**If Hawaii's harbors are not upgraded, the loss of real gross domestic product (in 2007 dollars) could amount to more than \$50 billion by 2030. This is especially large considering the fact that, to date, estimated costs of harbor improvements are under \$1 billion.**

This report is intended to educate residents about Hawaii's position as a maritime state and its heavy reliance on ocean surface transportation and the commercial harbors that service this sector.

Hawaii's economic dependence on ocean surface transportation began in the early 1800s with the sandalwood trade with China. As new industries emerged – whaling, sugar, military, and tourism – ocean transportation grew in importance.

Today, ocean surface transportation is our lifeline. It remains the only viable means to service the lion's share of Hawaii's economic needs. The fact that the state itself is separated into individual islands means that each island is also similarly dependent on ocean cargo shipping, even in today's age of advanced air transportation. If dependable and efficient ocean surface transportation were suddenly eliminated, Hawaii's economy would be devastated.

The commercial harbor system is just as important to our economic health. Cargo ships transporting goods and commodities enter the state through Honolulu Harbor, Kalaheo Barbers Point Harbor, Kahului Harbor, Kaunakakai Harbor, Hilo Harbor, Kawaihae Harbor, Nawiliwili Harbor, Port Allen Harbor, and Kaunapau Harbor. In 2004, total container volume was 1.54 million TEUs (twenty-foot equivalent unit container). Container volume is expected to increase as much as 27% in 2010, 66% by 2015 and 93% by 2020. In recent years, new demands have been placed on Hawaii harbors by the cruise industry and the upcoming introduction of the Hawaii Superferry. Although the state spends \$25-\$30 million in harbor improvements annually, it falls woefully short of the

estimated \$600 million in harbor upgrades that is needed to meet the increasing demand for harbor facilities.

Hawaii cannot afford to delay harbor improvements any longer. Based on modest assumptions about overall impacts, the slightest reduction (0.1%) in the growth of Hawaii's real gross domestic product (gross domestic product that has been adjusted for inflation) due to inadequate harbors will, by 2030, result in a reduction in the level of RGDP that almost equals estimated RGDP for 2007.

Moreover, if harbor problems are ignored, by 2030, Hawaii's standard of living will be reduced significantly and price levels will be substantially higher. The impact on everyday consumer goods will be especially pronounced. Inadequate harbor improvements will drive up the cost of food, household products, small appliances, and furniture an average of 18%. That means without harbor upgrades, a can of green beans in 2030 will go from \$2.88 to \$3.42, a case of cola from \$9.83 to \$11.67 and a queen-size mattress from \$1,094.48 to \$1,299.08.

The major thrust of this report is to drive home the importance of Hawaii's harbors to the state's very economic existence. As high as the costs of harbor upgrades may seem, these costs pale in comparison to the multi-billion dollar impact of doing nothing. If real progress is to be made to alleviate Hawaii's harbor problems, the average citizen, consumer, and voter must be made more aware of them. Continued inattention to this serious issue will have dire and far-reaching consequences.

## I. Introduction

The primary purpose of this report is to raise public awareness of an increasingly critical economic threat to the Hawaii economy — its lagging harbor infrastructure. Some of the aspects discussed in the document are already well known to a rather concentrated group of industries, firms and individuals who are involved daily in the use of the harbors. Yet ironically, it remains beneath the radar of the broader public and some policymakers elected by that public.

It is not uncommon for infrastructure to lag behind economic growth and development. In fact, that is usually the case. But Hawaii ignores its harbors at great peril to its standard of living, jobs, lifestyle, and overall quality of life. For reasons that will be discussed below, the general public seems to be much less aware of this threat than in the case of other such issues, especially today.

Economists are concerned with two basic kinds of inefficiency in transactions. Those are “allocative inefficiency” and so-called “X-inefficiency.” *Allocative inefficiency* occurs when valuable economic resources are diverted from their highest and best use in the economy by inappropriate price signals, which might derive from such things as misguided legislation. Trade protectionism is an often cited example. But *X-inefficiency* occurs when economic resources, though they may be allocated efficiently, are slowed down by inefficiencies in human decisions about how they are combined in production or by constraints on organizational operations. The latter might be characterized as a sort of “sand in the gears” phenomenon. Emerging harbor constraints in Hawaii are more the latter than the former.

In the sections that follow, several important aspects of this problem will be addressed. These include the reasons for the overriding importance of the harbors, why we tend to ignore the problem, and actions that have been taken to alleviate the problem in recent years. The major harbor capacity issues will be reviewed, development priorities will be identified, and potential funding sources will be discussed. Finally, in what is probably the most salient section of this study, an empirical analysis will be presented that attempts to measure the consequences for Hawaii’s economy if no action is taken to remedy the problem.

The last time a study in a vein similar to this was compiled and published was in 1997.<sup>1</sup> Because an entire decade has passed since then, and because several

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<sup>1</sup> See SMS Research, *Economic Impact Assessment of Hawaii’s Harbors*, prepared for the Harbors Division, Hawaii State Department of Transportation, September 1997. Many of the empirical results of this study were based on input-output analysis using the state’s input-output model. This is a commonly used tool in analyses that attempt to measure the impact of certain sectors of the economy on the whole system, but it does have some drawbacks. One of the main ones is that it is a purely static analysis, using fixed coefficients estimated to measure linkages in various components of the economy. These coefficients sometimes rapidly become outdated, especially when an economy goes through periods of major technological and structural change, such as today. The coefficients used in the SMS study were estimated

major new and increasing demands on the harbors have arisen, especially the dramatic growth in cruise ships and the impending advent of the inter-island Superferry, an update is needed. That earlier study was certainly a very credible effort, but the approach of this present study is somewhat different. The major thrust of this document remains one of determining how important Hawaii's harbors are to its very economic existence.

## II. Why are Hawaii's harbors so critical to its economy?

Hawaii's economy is far more dependent on its harbors than any other U.S. state. It is also far more dependent upon them than most other developed economies in the entire world. The reasons for this should be obvious. Geographically, Hawaii is an island archipelago that is 2,500 miles from the nearest land mass. Ocean surface transportation remains the only viable means to service the lion's share of its economic needs. Also, the fact that the state itself is separated into various individual islands means that each of those islands is also similarly dependent on the same mode of transportation. Island economies are universally dependent upon ocean cargo shipping, even in today's age of developed air transportation.

This situation might not be so acute if the Hawaii economy were more self-sufficient. But it is not. Hawaii is not well endowed with much in the way of natural resources, and its agricultural sector – never very diversified – is even less important today than it has been in the past. Most smaller islands anywhere in the world simply do not have the metallic ores, timber, fossil fuel energy resources such as oil or coal, or land adaptable for diversified agriculture to support a very high standard of living. In Hawaii's case, even fishing is limited to pelagic species, due to the absence of extended shallow banks that support other typical fish populations, which give rise to developed fishing industries elsewhere.

Yet despite all of this, Hawaii consumers are able to enjoy a standard of living that compares well with elsewhere in the United States, and very well, indeed, with other economies around the globe. This standard of living is unprecedented and unequalled especially when compared to other island economies, even more so if the comparison is only among those that are so geographically isolated. One has only to compare the economies of other Pacific islands, or even the closer-to-land ones in the Caribbean. Considering the other extreme, if dependable and efficient ocean surface transportation were suddenly eliminated, the Hawaii economy would abruptly and totally cease to function.<sup>2</sup> Hawaii

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in 1992, which made them somewhat dated even when that study was published. Even if such a study uses up-to-date coefficients, however, they can soon become less useful.

imports 80% of all of its consumed goods, with 98% of that entering the state through the commercial harbor system.

Hawaii is dependent upon ocean surface transportation for both its exports and its imports, but the latter have become much more important in recent years. (See Chart 1.) As Hawaii economic growth accelerated in the last half century — mainly from the 1960s forward — the demand for imports accelerated along with it. At the same time, rising costs of agricultural and manufacturing production, along with loss of comparative advantages in production to various competitor sources, have caused Hawaii's exports to lag in comparison.

More and more over time, services (e.g., invisible) exports have been what has dominated in Hawaii. Chief among these has been tourism, even though various other sources such as the defense sector have contributed. Of course, almost all visitors come by air. Yet this trend in itself further emphasizes how important ocean surface transportation is because the visitor experience could not even approach what it is today without being supported by the ocean shipping component.

Obscured by the scale in Chart 1 is the fact that this great excess of imports over exports was not always the case. In fact, Hawaii ran a sizable export balance of trade during its years as a plantation economy up until about World War II, when agricultural products were shipped out of the islands in great volumes. (See Chart 2.) Imports dominated during the war when Hawaii became a staging point for military operations in the Pacific. Hawaii had a few trade surpluses in some years after the war, but the consistency of that surplus never returned for long.

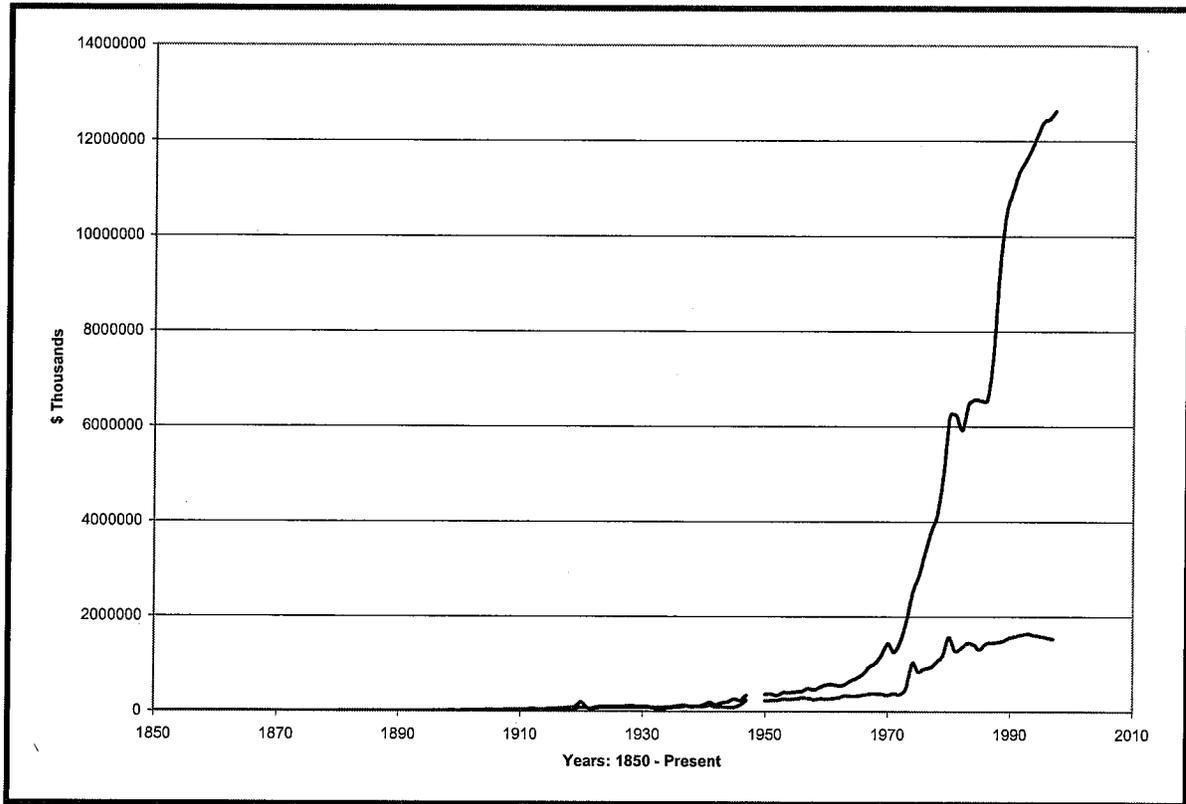
Yet returning to Chart 1, the very steepness with which Hawaii's imports have climbed in recent decades is in itself evidence of the accelerating pressures placed upon the harbors. That same period of time saw almost no significant upgrades of the harbor infrastructure.

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<sup>2</sup> This has been recognized in certain quarters for some time. One popular earlier study is that published by First Hawaiian Bank, *Hawaii, the Most Vulnerable State in the Nation* (First Hawaiian Bank Research Division, Thomas K. Hitch, Senior Vice President and Chairman, Honolulu, Hawaii, March 1973.) The emphasis in this document was on what might happen to the Hawaii economy in the event of a transportation strike, a threat most people were probably more aware of in those times than today, simply because of the greater frequency and length of such strikes. Even so, the consequences are very similar to failure to maintain and improve harbor infrastructure.

Chart 1.

## Hawaii Merchandise Imports and Exports (1850 - present)

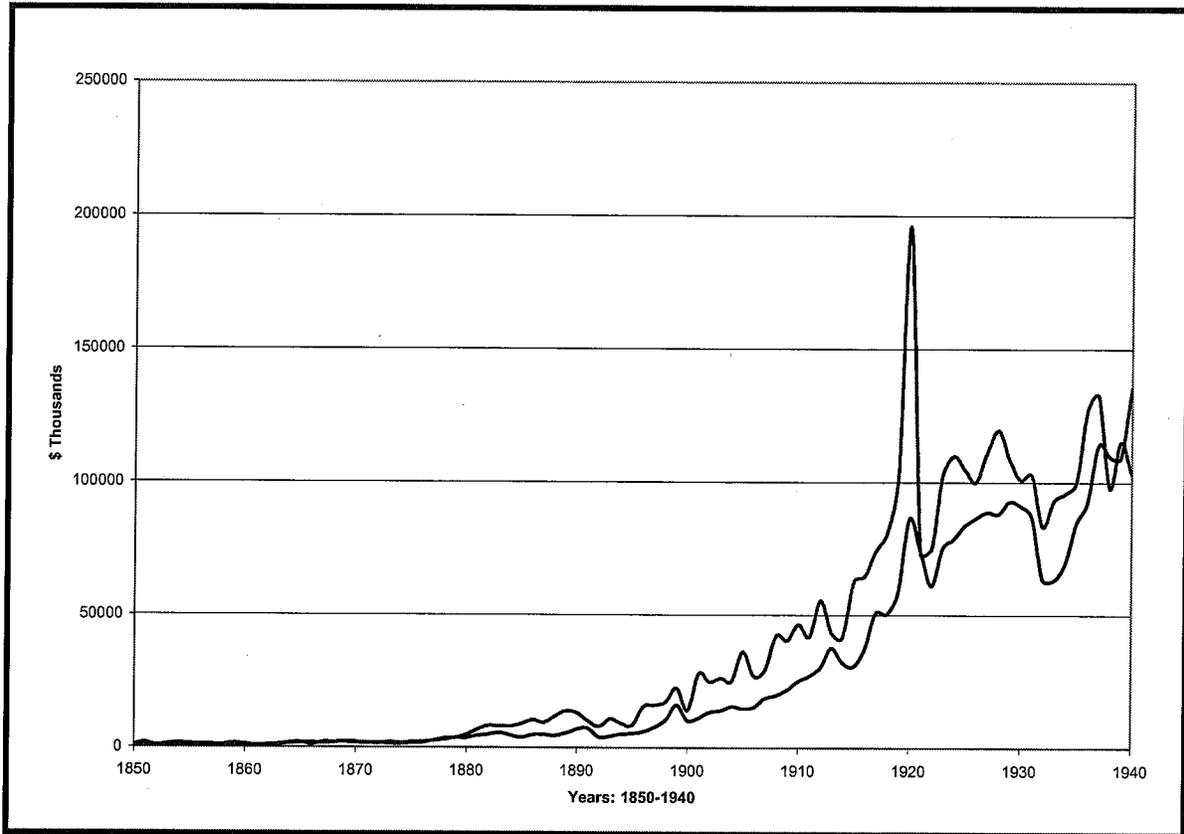


\_\_\_\_\_ **Imports**      \_\_\_\_\_ **Exports**

Source: *Hawaii State Data Book*, various issues, and Robert C. Schmitt, *Historical Statistics of Hawaii*, University of Hawaii Press, 1977.

Chart 2.

## Hawaii Merchandise Imports and Exports (1850 - 1940)



\_\_\_\_\_ **Imports**      \_\_\_\_\_ **Exports**

Source: *Ibid.*

The list of commodities and retail items consumed in Hawaii that are imported from outside the state hardly requires elaboration. It includes most food and clothing, practically all building materials, absolutely all autos, the overwhelming share of other transportation equipment and machinery, paper and related products, office supplies including computers and related items, and critical medical supplies. And even this list leaves out many items that Hawaii residents often take for granted, as if they were made next door. Meanwhile, the state's merchandise exports have dwindled. Sugar and pineapple production is now a mere shadow of what it once was. Flowers and nursery products, tropical fruits such as papaya, macadamia nuts, some clothing items, and waste products provide some support for exports. But under-capacity backhauls have been a serious and increasing problem for the major shipping companies that support the local economy.

One typical economic tool that is often applied in measuring the importance of any good or service is to assume that it does not exist, and that we would thus be forced to resort to the next best substitute. In other words, we focus on “opportunity cost.” In the case of Hawaii’s ocean harbors, that means air transportation. Air transport is often necessary for critical items needed within a short time frame, and it has grown in importance for Hawaii over time. But not only is this mode much more expensive, it is also absolutely incapable of satisfying Hawaii’s total demand. Thus, it remains an alternative only for a very small share of total shipments — cases in which cost is much less important and the time frame is much more important.

A brief economic history of Hawaii’s harbors and their relation to the economy is in order to illustrate their crucial role. Hawaii’s economy is not only critically dependent on its harbors, but over time the direction of its economic growth has been shaped by them. And from the other direction, as the nature of Hawaii’s economy has changed, so have the harbors. But even in today’s age of air transportation and much more efficient information transfer, the harbors are as important as ever. Let us start at the beginning:

- The *sandalwood trade* with China in the early 1800s was the first example of Hawaii economic dependence on ocean transportation. Ever since, Hawaii’s relatively small and undiversified economy has been dependent mostly on one major industry, and that industry was usually dependent upon the sea. It was the sandalwood trade that first gave Hawaii the idea that something could be gained by commerce with the outside world.
- Just after that, as sandalwood stands in the upper elevations were depleted, came *whaling*. Whaling was more important to the islands economically. Lahaina and Honolulu, mostly the former, were the main beneficiaries as ports, because they were the only alternative port towns at the time large enough to provide the needs of both the ships and the crew.

At its zenith in the 1840s, over 85% of the American whaling fleet was in the Pacific. This was supplemented by British and other foreign flag whalers. These whalers fished the equator in the winter and Alaskan waters in the summer, stopping in Hawaii in both the spring and the fall to re-provision and for rest and recreation. Because whalers stayed in port longer (several months each way) than ships in the sandalwood trade, they left more money in Hawaii.

Although the whaling industry had its ups and downs, it lasted a long time – from the 1820s into the 1870s. But like sandalwood, it also ended fairly abruptly. Later in the century, a bad arctic winter destroyed most of the fleet that remained too late in northern waters. The final nail in the coffin

was the discovery of crude oil in Pennsylvania, followed by development of other U.S. domestic oil fields.

- The next major Hawaii industry was *plantation agriculture*, and it was similarly dependent upon ocean transportation. First sugar and then pineapple dominated the Hawaii economy from the late 1800s until World War II. Even though Polynesians had grown sugarcane in Hawaii for centuries, the first commercial sugar mill in Hawaii was built at Koloa, Kauai, in 1835.

The Hawaii sugar industry received several boosts early in its life. Hawaii sugar exports benefited from the U.S. Civil War, when the North was cut off from Louisiana sugar. A bigger factor was the Reciprocity Treaty with the United States in 1876, which granted duty-free status to several Hawaii exports. The biggest beneficiary was raw sugar, even though pineapple, rice, molasses, coffee, and salt also grew in importance. The 1898 annexation of Hawaii as a territory sealed duty-free status.

World War II and the rising role of the military was the beginning of the end for plantation agriculture's dominant role, but its earlier dominance left marks on the Hawaii economy that are still present today. These include the state's diverse ethnic population, whose ancestors were brought in to farm the plantation crops. And only in recent decades has the market structure of Hawaii begun to drift away from that established in sugar's heyday. (Alexander & Baldwin is the only remaining member of the original "Big Five" to have held on to financial health, but all got their start in the plantation era at least partly as sugar factors.)

Needless to say, the existence of the plantation economy could never have occurred without the ships to take commodities to distant markets. And the ships could not have been there without harbors to accommodate them.

- The next major player in the Hawaii economy was the *military*, and this got its biggest start in the 1941-1945 World War II years. By any standard economic growth measure, the Hawaii economy grew faster during the war than before or since. From 1940 to the peak of the war effort in 1944, Hawaii's inflation-adjusted personal income growth totaled 36%. (That compares to the nation's growth of 12% over the same period, and today's Hawaii real growth in the 2% to 4% range, which is considered quite healthy.) From December 1942 to October 1945, not one person on Oahu drew unemployment benefits. Today, the military's *share* of the economy is smaller, because other components have grown faster, but it remains quite important.

But how did the military sector get its start in Hawaii? It came from the development of another port, this time a military one – Pearl Harbor. That start can be traced to a 1900 appropriation by the U.S. Congress to fund the dredging of Pearl Harbor, making it available first as a coaling station and then as a homeport for U.S. Naval ships. Other military installations followed, but Pearl Harbor remains the mainstay even today.

- *Tourism* owed its dramatic rise that began in the 1960s to the advent of relatively inexpensive and quicker air transportation. But, as mentioned above, the Hawaii visitor experience could not have developed as it did if it were not supported by the supplies that continued to arrive by sea. And today's extensive visitor plant could never have been constructed without the materials that continued to be made available by the same mode of transportation.
- The newest demands on Hawaii harbors have been the dramatic explosion in recent years of the *cruise industry* and the upcoming advent of the *Hawaii Superferry*. These two factors have taken pressure on Hawaii's harbors to a new level, a situation that will surely continue. They are also important to the overall economy — the first as a form of diversification in Hawaii's most important industry of tourism, and the second as an alternative means of transporting both people and goods among the various islands.

It is only natural that a tourism economy like Hawaii would have its share of what has been one of the most popular recent trends in the industry. Many port of call towns across the world, especially the smaller ones, have had their economies transformed almost beyond recognition by developments in this tourism component. In Hawaii, especially at the Hilo and Nawiliwili harbors, when all 2,000+ cruise passengers disembark, nearby retail outlets are often overrun. And sometimes other visitors can be displaced from various island activities by the cruise passengers if they have not booked in advance.

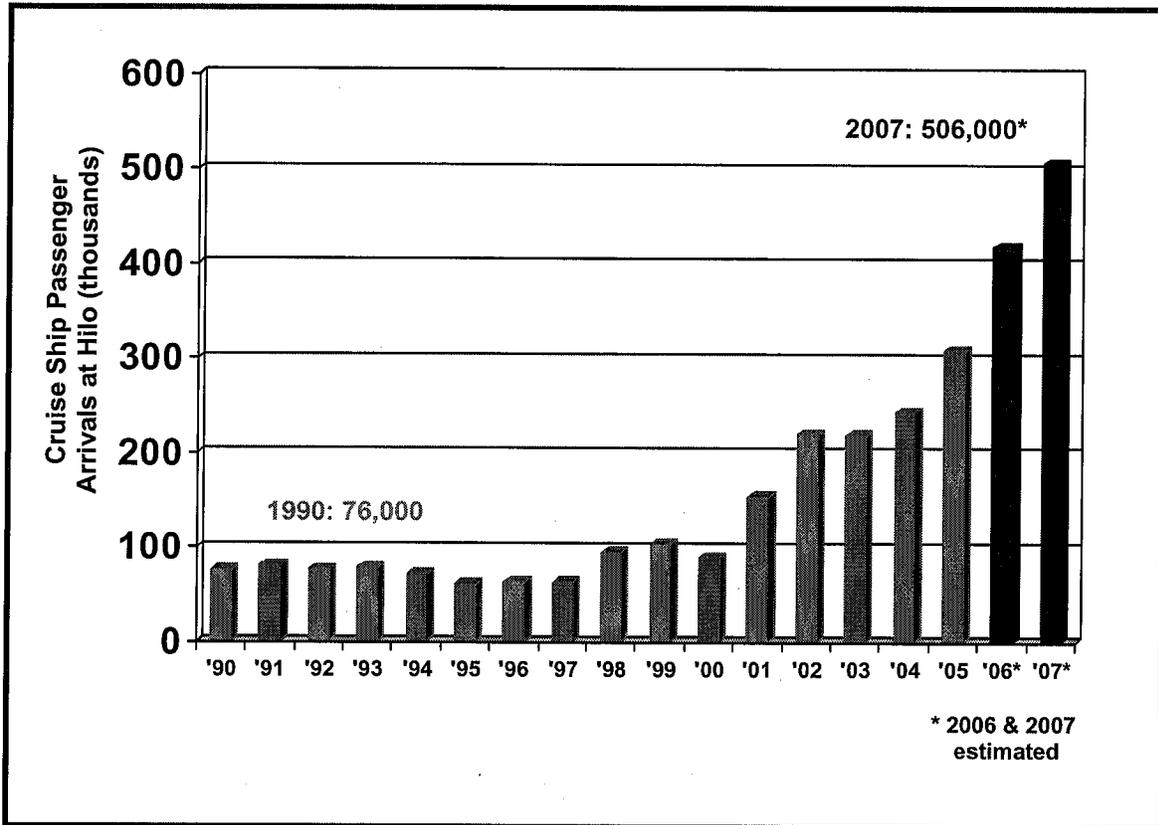
Recent growth in Hawaii's cruise industry has been truly phenomenal. That growth can be traced by several measures. One is disembarking passengers at Hawaii ports of call. That is shown in Chart 3 for the Port of Hilo, even though a similar path would be traced for any of the other major Hawaii harbors.<sup>3</sup>

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<sup>3</sup> Hilo is not singled out here for any reason other than the fact that a longer time series on passenger disembarkations/embarkations is available for that harbor than for the others.

Chart 3.

### Cruise Ship Passengers at Hilo Harbor



Source: Harbormaster, Port of Hilo.

Total cruise visitors at Hilo Harbor passed the 100,000 mark in 1999, broke 200,000 in 2002, exceeded 300,000 in 2005, and rose above 400,000 in 2006. In 2007, the 500,000 barrier will be broken. (Yet Hilo now can take only one large and one smaller ship at the same time. The last pier constructed at Hilo Harbor was in 1927.)

As this report is written, there are four mega-cruise vessels in operation on the Hawaii inter-island circuit. All are affiliated with Norwegian Cruise Line (NCL). Of these, three are U.S. flagged vessels operated by NCL America – the *Pride of Aloha*, *Pride of America* and *Pride of Hawaii*. These three operate on a seven-day circuit around the islands, and under a special dispensation from the Passenger Vessel Services Act of 1886

they can sail directly between two U.S. ports.<sup>4</sup> The fourth NCL ship, *Norwegian Wind*, alternates a 10-day and 11-day cruise – longer because it must visit the international waters of Fanning Island in its route.

Now that a vessel is docked in some of the harbors every night of the week, Hawaii has more or less reached its capacity for accommodating such ships. NCL America's recent announcement that it would shift the *Pride of Hawaii*, the largest of its three U.S.-flagged Hawaii ships, to European waters in February 2008 will not diminish the capacity needs of cruise lines because foreign cruise ships will fill the void.

The other new component, the Hawaii Superferry, is slated to begin operation in July 2007 for service between Oahu and both Maui and Kauai. (When this report was written in January 2007, the first vessel has already been launched at Mobile, Alabama. A second vessel is now under construction for completion in 2009.) The harbors accommodating the ferry on Maui and Kauai will be Kahului and Nawiliwili. In early 2009, ferry service to the Big Island is scheduled to start. There the ferry will dock at Kawaihae Harbor rather than Hilo or Kona.

The projected average load of one of the vessels is 110 vehicles of various sizes and about 400 passengers. Fewer than an estimated 15% of passengers will travel without vehicles. Arrival and departure traffic flow will be managed on adjacent roadways.<sup>5</sup>

So much for the economic role that Hawaii's harbors have played in the history of these islands over the long haul. Ironically, the public's awareness of the economic importance of Hawaii's harbors was probably more widespread in earlier historic episodes than it is today. As the local economy becomes more complex and specialized, too many entities who play a role in it forget where critical imported items come from, or how we get most of our exports to offshore markets.

It should be noted that what has been termed "the port economy" in its own right is quite extensive and thus very important to the local economy. This sector includes ocean transportation itself (that is, shipping, both cargo and passenger lines); services supporting that sector (a long list such as stevedores, bulk loaders, tug boats and harbor pilots, diving and salvage companies, fuel bunkering and petroleum storage, shipping agencies, marine construction and surveyors, barge, terminal and container freight station operations, water taxis,

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<sup>4</sup> This legislation is often confused with the Jones Act of 1920. The spirit of both is to sustain the U.S. shipping industry; the only essential difference is that the Jones Act applies to goods and the Passenger Services Act applies to people.

<sup>5</sup> A summary of the various aspects of the Superferry can be found in "An Affordable Interisland Transportation Alternative," a presentation by the Hawaii Superferry.

chandlery and ship supplies, ocean freight forwarders, and marine environmental clean-up operations); ship building and repair; commercial fishing; ocean recreation; as well as the government sector, such as the state Harbors Division, which serves as the landlord for the port economy.<sup>6</sup> If one adds up all of the economic contributions of this entire sector in its broadest sense, and then factors in multiplier or ripple effects throughout the local economy, it can easily be appreciated that a sizeable hole would be left in its absence.

The size, and thus the economic contribution, of this sector is also very dependent on the adequate expansion of harbor capacity. Yet that is not the primary focus of this analysis. Rather, the main focus here is on the role of the harbors in the train that drives the *rest* of the Hawaii economy. Without the sector, in other words, the entire economy would be dealt a fatal blow – as if the human body were to lose a vital organ.

If the harbors did not exist, or even if their operations were curtailed or they ceased to grow in step along with the economy, the first sector to be affected would be local businesses, both large and small. The construction industry would be denied or would have to wait longer for building materials, which would add significantly to construction costs. The same would apply to retailers of all sorts, as well as wholesalers. Agricultural operations would be denied chemicals and feeds.

One business defense against such shortages is to stockpile larger inventories, but this adds greatly to operating costs, both in rents and in financing these inventories. The resort to airlift of critical supplies such as medical items and fresh produce is much more expensive. Even the threat of ocean transportation slowdowns can add to incentives to build larger inventories.

Inflation thus accelerates, and Hawaii consumers are the next to feel the effects. At the same time, the drag caused by transportation slowdowns can cause an economic slowdown — even a recession or a contraction in economic activity. The upshot is a slowdown or contraction in job growth and an increase in unemployment. Wage growth slows concomitantly, and incomes fall even as prices rise.

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<sup>6</sup> In FY 2005, the total operating revenue of the Harbors Division of the State of Hawaii Transportation Division was \$74.5 million, about the same as the previous year. (Net income was \$14.6 million, down from \$25.0 million in the previous year; the biggest source of the drop was increased maintenance expense charges.) It is worth noting that the annual budget of the Harbors Division is far less than the other components of the state Department of Transportation, the Airports and Highways Divisions. In FY 2005, the total operating expenses before depreciation of the Airports Division was \$152.1 million, and that for the Highways Division was \$139.1 million. The Harbors Division number was a much smaller \$11.5 million.

### III. What is the relative economic importance of Hawaii's harbors?

This section presents a brief comparison of each of Hawaii's harbors, with some commentary on current plans and concerns. The total system of commercial harbors now consists of nine harbors on six islands. Two are located on Oahu, one on Maui, two on the Big Island, two on Kauai, one on Molokai, and one on Lanai.

- **Honolulu Harbor.** This the hub of the state harbor system, and most of Hawaii's cargo passes through it. Major attention there is now being devoted to accommodating the cruise ships and their passengers, as well as special maintenance projects. Honolulu Harbor uniquely services both Oahu's much larger economy and population, and it also plays a vital transshipment role to the Neighbor Island economies. Its growing pains have been enormous. Inter-island barge departures from Honolulu Harbor have increased 22% in the last three years and 33% since 2001.

As the state's port of entry for nearly all of its imported goods, Honolulu Harbor handles over 11 million tons of cargo annually. Because of space constraints, the harbor's port density is higher than any other West Coast port. The number of mainline vessel TEUs (twenty-foot equivalent unit containers) handled per terminal acre annually in 2005 was over 7,000. This compared with around 4,000 for Seattle, Tacoma, and Oakland, and around 5,000 for Los Angeles and Long Beach. In fact, Honolulu Harbor compares well with other ports generally with respect to the pace at which cargo moves through it, its efficiency of land use, and its productivity relative to investments in it.<sup>7</sup>

Physically, the extent of Honolulu Harbor begins just Ewa of Ala Moana Center, and then stretches around to Kapalama and the Sand Island industrial district. Within the area are fishing, excursion and dinner cruise vessel facilities, cargo and passenger terminals, bunkering facilities, marine repair docks, vessel moorings and lay berths, and the Aloha Tower Marketplace. Just inland lies the central business district, Kakaako and Iwilei. Thus, ships, cargo and crew in the harbor have easy access to land-based services and conveniences. The addition of Aloha Tower Marketplace in 1994 made Honolulu Harbor rather unique by including visitor attractions, retail and restaurant activities within a working commercial harbor.

- **Kalaeloa (Barbers Point) Harbor.** This is the second busiest harbor in the state, constructed in 1961. It serves more of a niche market because it has several specialized cargo handling capabilities (such as

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<sup>7</sup> See SMS, *op. cit.*, Section 4.0, for comparisons.

a coal bulk unloader and a pneumatic cement pump system). Its main channel entrance is 3,100 feet long, 450 feet wide and 45 feet deep. Its main basin is 2,300 by 1,800 feet and 38 feet deep. This main basin was recently expanded to the northeast by excavating a rectangular section 600 by 1,100 feet. To improve its capacity, attention is being given to deepening the turning basin and widening and deepening the entrance channel.

- **Kahului Harbor.** The third busiest harbor in the state and the first busiest on the Neighbor Islands, this is Maui's only commercial harbor. It was dredged from the naturally formed Kahului Bay, and its basin is 2,050 feet wide, 2,400 feet long and 35 feet deep. The entrance channel is 660 feet wide and 40 feet deep.

The harbor's solitary role on Maui is increasingly ironic given the relative size and growth that has been taking place in the Maui economy in recent years. Maui's population has grown 32.6% in the last 15 years. The Big Island's population growth over the same period was not far behind with a 31.5% increase, but at least that island has more geographic space and more than one harbor. In comparison, Kauai's population grew 17.1% and Oahu's population grew 6.4% over that interval.<sup>8</sup>

So even though population growth is outstripping harbor infrastructure growth everywhere, especially on the Neighbor Islands, it is on Maui where the problem is most acute. Kahului Harbor is a modest three-pier facility built years ago for a plantation economy, not for an island that is frequently dubbed the number one vacation destination in the world and whose indigenous population has grown so fast.

Cruise ships and the coming Hawaii Superferry have exacerbated the situation. In 2006, a crisis was narrowly averted when Young Brothers, which will lose 23% of its Kahului pier space to the Superferry in 2007, threatened to discontinue its service to customers with less than a container load to ship. Naturally, this especially concerned small businesses and residents of places like Molokai. Fortunately the state finally agreed to find replacement for most of the acreage.

- **Kaunakakai Harbor.** Molokai's only commercial harbor services the island's relatively much smaller economy. It was originally built by the Territory of Hawaii in 1927. The turning basin is 1,500 feet long and 600 feet wide, and its wharf provides a mere 689 feet of berth space at a depth of only 23 feet. A 1,700 foot causeway connects the 6.44 acre pier to the town of Kaunakakai. The harbor does contain facilities for an inter-island cargo barge operation, a liquid bulk cargo operation and

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<sup>8</sup> These growth numbers include military personnel but exclude visitors.

an inter-island passenger ferry terminal. Maintenance projects to repair the pier deck and maintain the fendering system and causeway have been underway.

- **Hilo Harbor.** This is the Big Island's busiest port. It ranks behind only Honolulu as a port of call for cruise vessels. Its basin is 1,400 feet wide and 2,300 feet long, protected by a 10,000 foot breakwater. The depth of the entrance channel is 35 feet. Berth space consists of 1,265 feet at Pier 1, 703 feet at Pier 2 and 637 feet at Pier 3. Alongside depth at each pier is between 33 and 35 feet. The combined cargo handling and storage area is over 595,000 square feet. Its facilities can be characterized as old and woefully inadequate.
- **Kawaihae Harbor.** Located on the northwest side of the Big Island, this harbor has been identified as the port for upcoming Superferry service. Its basin measures 1,450 feet by 1,500 feet and is 35 feet deep. It is protected by a 2,650 foot breakwater. The entrance channel is 3,270 feet long, 500 feet wide and 40 feet deep. Its main pier and Pier 2 provide 1,150 feet of berthing space with a 35 foot depth. It is currently served by Matson and Young Brothers and bulk barges. In the past it has been used, among other things, as a shipment point for Big Island cattle. The harbor sustained moderate damage from the October 2006 earthquake just off the west side of the island.
- **Nawiliwili Harbor.** Kauai's main harbor, close to Lihue, also ranks high in its accommodation of cruise ships. It was dredged from the natural Nawiliwili Bay. The harbor basin is 1,540 feet wide and 1,950 feet long, protected by a rock jetty and a 2,150 foot breakwater. The entrance channel is 2,400 feet long, 600 feet wide and has a controlling depth of 40 feet. Its Piers 1 and 2 provide a total of 1,214 feet of berthing space, with an alongside depth of 35 feet. Its Pier 3, completed in 1994, is 634 feet long and contains over 16 acres of paved yard. Building structure repairs and modifications as well as harbor security enhancements have been underway there recently.
- **Port Allen Harbor.** Kauai's smaller second harbor is located on the south shore of the island, about 11 miles from both Nawiliwili Harbor and the Lihue Airport. Its greater isolation and smaller capacity make it less important to the Kauai economy.
- **Kaumalapau Harbor.** Formerly a private harbor on the southwest side of Lanai and the island's only commercial harbor, this is the newest addition to the state harbor system. There is a 600 foot wide harbor entrance to a 800 foot by 500 foot turning basin that has a depth of 30 to 50 feet. A 250 foot breakwater protects the barge wharf on the south side of the harbor. A major U.S. Army Corps of Engineers project has

been underway there to rebuild and repair the existing breakwater. This is necessary to reduce wave action and thereby increase harbor safety and usability.

To provide some idea of the relative economic importance of the local harbors, Table 1 shows, for a recent year, total container volume in TEUs (twenty-foot equivalent units), the share of the total container volume shipped and percent growth in that volume over the previous 10 years. (There are, of course, other measures of cargo — such as dry and break bulk, liquid bulk, and vehicles shipped — but this chosen measure is perhaps the most representative. The other measures do vary more with the nature of the harbor.)

The shares are not surprising, broadly comparable to the size of the various island economies and their population. For instance, that same year Oahu's population was 71.3% of the total state population, and the Honolulu cargo share is larger simply because its numbers include both linehaul and inter-island amounts (where inter-island volume is assumed to be the sum of Neighbor Island container volumes). Likewise, Neighbor Island volume includes some partial containers and materials that may have entered Honolulu Harbor in containers that were subsequently broken up. Thus, Maui's 10.9% population share is somewhat higher than its 7.6% container share, the Big Island's 12.9% population share is a little bigger than its 8.8% container share, and Kauai's 4.9% population share is marginally larger than its 4.0% container share. The "Other" category is so very minor because full containers do not go to the smaller harbors. Overall, however, this does provide some support for forecasting future container volume growth based on projected state population growth.

But attention should be drawn especially to the growth number in the last column of the table. Ten-year growth in container volume is enormous, especially for the Neighbor Island harbors. Kahului leads. The much higher Kawaihae Harbor growth and lower Hilo Harbor growth is likely attributable partly to a shift toward the former in container shipments to the Big Island. And all of this growth came with only relatively minor additions and improvements in harbor infrastructure.

#### Table I.

### Harbor TEU Volume, Share, and Growth

	TEUs (2004)	Share (%)	Total Growth (1995 – 2004)
<b>Honolulu</b>	1,222,196	79.2	56.8%
<b>Kahului</b>	117,101	7.6	91.7%
<b>Hilo</b>	65,506	4.2	46.5%
<b>Kawaihae</b>	73,260	4.8	245.2%
<b>Nawiliwili</b>	61,171	4.0	82.5%
<b>Other</b>	3,058	0.2	191.2%
<b>Total</b>	1,542,312	100.0	

(TEU = Twenty foot Equivalent Unit Container)

Source: Mercator Transport Group, 2005.

The numbers in Table I are merely intended to give some rough measure of the overall importance of various harbors to the state economy. Obviously, if one is a consumer on Molokai, then Kaunakakai Harbor might be considered just as critical as Kahului Harbor is for a Maui consumer.

The numbers in Table 1 bear out a general trend that has been occurring, and that will continue to occur, in future decades. That is simply that the Neighbor Island economies are growing faster than the Oahu economy. This is only logical. The Neighbor Island economies have more room to grow. Their combined population is now about 30% of Oahu's, but that share is likely to increase gradually in coming decades. Neighbor Island jobs, incomes, and visitors will also grow in their relative shares. Only an often more vocal anti-growth sentiment on the Neighbor Isles will retard this trend. The implications for the harbors are clear. More needs to be done to enable the Neighbor Island harbors to cope with that higher economic growth.

#### IV. Why do we not give adequate attention to the importance of the harbors?

If Hawaii's harbors are so critically important to its economy and the lifestyle of its consumers, the next question might be: Why do we not recognize that fact? And why has the importance of the harbors slipped increasingly out of the awareness of the general populace in recent years?

The basic answer is really quite simple. Other problems and negative manifestations of economic growth are more palpable in our daily lives. Average citizens and consumers see congestion problems much more clearly on the highways and in the airports than they do in the harbors. Pollution and other erosions of the environment are also easier to see. The harbors are out of sight, and thus out of mind – even in a relatively small island economy.

Let us take traffic congestion as an example. Drivers spend frustrating time fighting increasing traffic at least twice a day in their daily commute to work, and sometimes on weekend drives. So what happens? As for Oahu, its County Council voted recently by a 7-2 vote to proceed with urban mass transit. Ironically, this project was approved over the strenuous objection of a number of mainstream economists and transportation engineers.

Why do many economists oppose urban mass transit? One often stated concern is the fact that those who pay for it may not be those who ultimately use it, and that is inefficient public finance. This is not an inter-generational objection; that is, older taxpayers may have passed on long before the system is in operation. Rather, it has more to do with the fact that everyone on Oahu must foot the bill by paying 0.5% more in State General Excise Tax, potential future riders and non-riders alike. Ewa residents may eventually ride, but some Hawaii Kai and Windward residents may never do so. This is why economists lean more toward traffic solutions like road toll pricing, which exacts the costs only from users of that specific public infrastructure. Of course, if only users of rail transit were burdened with operation costs, and fares were set at a break-even point with respect to costs of operation, no one would ride because it would be too expensive. (And this argument applies only to operation costs; financing costs and the amount of potential federal subsidy are other matters. But even with respect to operating costs alone, it has been estimated that fares will pay less than a 30% share of them.<sup>9</sup>)

While this is no economics textbook, it is worth stating that economists usually bring two requirements to the definition of a true *public good*, including various kinds of infrastructure: (1) It must be a good or service that may be consumed by more than one person at the same time, with little or no extra cost of providing that good or service, and (2) It is expensive or impossible to exclude those who do not pay. Examples are things like national defense, police and fire protection, or lighthouses.

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<sup>9</sup> There are, of course, a number of other objections that have been raised to urban mass transit. These include: (1) The system will not alleviate and may actually increase congestion, because drivers will continue to use cars anyway; (2) Rail is not as fast as many believe, because stops are so frequent; (3) The General Excise Tax Increase will raise costs and prices, and because of “pyramiding” of the tax in transaction chains, the *level* of overall prices as well as the tax on them will rise; (4) Honolulu as a city is not big enough and thus does not have the abilities to capture the economies of scale that have made rail transit more successful in larger cities. But these objections cannot be elaborated upon here.

Rail transit really satisfies only one of these two requirements, maybe the first but certainly not the second. But the point of all this is not to digress on the economic wisdom of Oahu's recent rail transit decision. *Its relevance here is the harbors do satisfy both of those conditions for a public good.* Hawaii consumers all benefit from the harbors at the same time, and there is no greater cost if one more person buys some item that is imported via the commercial harbors. As for the second point, there is no practical way to exclude someone from consuming such an item. (This logic does not necessarily constitute an argument for raising any kind of tax to pay for harbor upgrades, but good things do cost more, and not that many things worth having are free in some sense.)

If real progress is to be made in alleviating Hawaii's harbor problems, the average citizen, consumer and voter must be made more aware of them. That is the primary motivation for this report, but raising this awareness is more easily said than done. The government process is always slow, and Hawaii's track record is not very good on tackling large projects that have not quite reached a very dramatic crisis stage.

At least part of the problem derives from the fact that most of Hawaii's economic growth over the past decade was unanticipated beforehand. As 2007 begins, the Hawaii economy is starting 11 years of expansion. The last expansion — which came to an end in the early 1990s when the bursting of the Japanese speculative bubble, the first Gulf War, national recession and an even more prolonged California one, and finally Hurricane Iniki on Kauai all combined to bring the Hawaii economy down — lasted only nine years. This current expansion, though it has been good news, has brought growing pains that are always evident, especially in a confined island environment. No one foresaw this in the mid-1990s, when the economy was in the doldrums and we had begun to think we would never emerge into a stronger growth mode.

The absence of public awareness of problems at the harbors is serious in and of itself, but this situation seems to be getting worse. Why? One reason is quite likely to be the fact that interruptions in the flow of goods through the harbors in recent experience have been less frequent and of shorter duration.<sup>10</sup> Hawaii has not had to cope with severe disruptions in shipping services to and from the islands since the early 1970s.

The 1949 Hawaii dockworkers strike, or what later came to be known as "The Great Hawaiian Dock Strike," remains the standard for comparison. It was not only the longest interruption, lasting 177 days, but also the most severe. (The next longest strike was the 96-day West Coast shipboard union strike of 1948.) In the 1949 episode, approximately 2,000 ILWU longshoremen struck for wages on par with those on the West Coast. An estimated \$1 million daily was lost in

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<sup>10</sup> One summary of the transportation strikes that have occurred and their duration, at least through the time that document was published, can be found in Hitch, *op. cit.*, pp. 38-39.

September of that year. The ranks of the unemployed on Oahu rose by a third, and these unemployment effects lasted well into 1950. All Hawaii docks were closed to all but military traffic, so that virtually all ocean surface traffic was completely stopped. (Nothing so concentrates the mind of consumers on the role of the harbors than being forced to look around the house and decide what one is going to substitute for toilet paper.)

Such interruptions are not mere inconveniences for Hawaii businesses and consumers. The economic losses throughout the state can be severe. The impact of the strikes in the late 1940s was made more dramatic by the fact that they coincided with perhaps the worst overall economic downturn that Hawaii has ever had. The withdrawal of the military after World War II caused a severe recession in the entire 1945-1949 interval.<sup>11</sup>

We have not had so dramatic an impact recently. And memories of the inconveniences that must be endured while they unfold quickly fade.

## V. What has been done in recent years?

Those closer to the harbors do not need to be reminded of harbor capacity constraints like average consumers and voters do. In March 2005, port users formed a self-funding, incorporated but non-profit maritime transportation industry group called HHUG (Hawaii Harbors Users Group) to raise awareness of the issues involved in maintaining, expanding and improving the harbors. Member organizations are: Matson Navigation Company, Horizon Lines, Young Brothers/Hawaiian Tug and Barge, Sause Brothers, Aloha Cargo Transport (ACT), McCabe Hamilton & Renny, Hawaii Stevedores, Norwegian Cruise Line, Hawaii Superferry, Tesoro Hawaii Corporation, The Gas Company, Ameron Hawaii, and Hawaiian Cement.

HHUG has brought the maritime industry together to work with the State Department of Transportation, while also focusing on raising awareness of harbor problems by eliciting the support of other organizations – like the Hawaii Business Roundtable, Retail Merchants of Hawaii, the Chamber of Commerce, and the Economic Momentum Commission.

HHUG has done several things specifically. It has been instrumental in helping the recent passage of Act 165 to protect and preserve cargo land at Piers 1 and 2 in Honolulu Harbor, for example. It has also commissioned several studies.

One such study was that by Mercator Transport Group (MTG), which defined the needs and priorities of harbor users and outlined plans for promoting

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<sup>11</sup> For a description of this episode, both the strike and the overall recession, again see Hitch, *op. cit.*, pp. 175-177.

development.<sup>12</sup> This study provided an overview of port operations by location, outlined new activities placing demands on the harbors system, identified key harbor capacity issues, reviewed harbor improvement spending in recent years, and enumerated development priorities.<sup>13</sup>

Another such report was the Martin Associates study.<sup>14</sup> This work focused on funding. It reviewed funding needs for three sample port development projects identified by HHUG. Thus, it assessed financial feasibility on a project-specific rather than a system-wide basis. The Martin study also described examples of lease structures in place at Mainland ports for specific terminals and documented funding sources at other state port authorities. One major conclusion was that, given Hawaii's projected harbor infrastructure needs, current methods of project funding must be revised.

The document you read here, to be made public in mid-2007, is also written at the behest of HHUG. Its aforementioned but rather different purpose is to raise awareness of the overall problem in the eyes of consumers and the general public.

The next two sections of this report will focus on some conclusions of both of the earlier studies commissioned by HHUG. First, let us turn to a summary of some of the key operating and capacity issues identified at Hawaii's harbors.

## VI. What are the main harbor capacity issues?

All of Hawaii's harbors have serious issues. Some are the same, and some are different. For example, one of the biggest issues at Honolulu Harbor is space constraints. It simply has no place to expand, and this makes for inefficient port operations, which drive up costs for both port users and their customers. (The addition of Aloha Tower Marketplace 12 years ago may have been innovative and a diversification of the harbor, but it actually reduced deep water ship berths.) At Hilo Harbor, a looming problem is the mixing of disembarking and

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<sup>12</sup> See *Hawaii Harbor Users Group Report on Port Facilities and Development Priorities*, Mercator Transport Group, Bellevue, Washington, December 2005.

<sup>13</sup> In its review of Harbors Division spending on the harbors over the five year period from 1999 to 2003, the MTG Study tallied a grand total of \$172 million. Of that, \$74.4 million was for Honolulu, \$42.6 million was for Kalaeloa, \$29.5 million was for Kahului, \$7.4 million was for Hilo, \$5.8 million was for Kewalo, \$5.2 million was for Nawiliwili, \$4.3 million was for Kawaihae, \$0.9 million was for Port Allen, \$0.5 million was for Kaunakakai, and \$1.4 million was for multiple harbors. Excluding maintenance and repair, the total was \$143 million, or an average of \$28.6 million per year. (Most of that was for Oahu, with Honolulu and Kalaeloa getting \$61.3 and \$2.1 million respectively. Kahului got \$26.4 million, and the remaining \$13.2 million was divided among the other harbors.)

<sup>14</sup> See *Review of Pricing Structures to Fund Future Port Development Projects*, Martin Associates, 941 Wheatland Avenue, Suite 203, Lancaster, Pennsylvania 17603.

embarking cruise passengers with cargo operations, so that safety is a concern. At Honolulu Harbor, cruise passengers exit at another level, but in Hilo they disembark on the same level as cargo and exit onto the same roads. At Kahului Harbor, universally judged to be the most seriously afflicted port, both problems exist together.

The following discussion is a brief summary of the MTG study's findings on harbor capacity, based on input from HHUG members. It is organized by individual harbor. This summary is included here only to give some idea of the magnitude and variety of existing problems. The reader is referred to the study itself for greater detail.

## Honolulu

***Reduction of Pier 1 Capacity.*** Thoughts in favor of adding commercial, retail or public access and recreational space development should be abandoned. These reductions could leave the terminal unable to accommodate continued growth of international container shipments. Pier 1, with a 40-foot berth depth that is one of the deepest in the harbor, is a unique resource that should be preserved for handling breakbulk and containerized cargo. The impacts of reductions could fall hardest on the construction industry and Keahole water exports.

***Lack of Bulk Barge Unloading Facility.*** Such a facility is needed in Honolulu Harbor. Bulk sand shipments, which have increased with the construction boom, were displaced from Pier 34 to Pier 20 recently, and yet another displacement has come with the advent of the Superferry. Talk of shifting this cargo to Kalaeloa is impractical, because of limited berth availability and its more remote location away from where the sand is needed.

***Improved Inter-Island Terminal.*** Young Brothers inter-island barge traffic has increased dramatically in recent years, but their operating area has not increased since they moved to the current location in 1998. YB needs added land area, another barge berth and loading position suited to heavy lifting equipment.

***Container Handling Capacity.*** Both Matson and Horizon are incurring excess costs due to land constraints at their Sand Island terminals. Increased land area is a top priority. Throughput per acre at Sand Island is higher than any terminal in North America. High density levels require costly ground-stacking and multiple handling of containers. Both carriers would prefer a purely wheeled operation. Growth in both domestic and international volumes will lead to container handling capacity shortfalls in coming years.

***Sand Island Access Road Improvements.*** There is no space on the Sand Island Access Road for trucks to queue up while waiting to enter the container terminals. They must queue up on the terminal property, interfering with operations and creating security and safety concerns.

## **Kalaeloa**

***Berths and Shore Connections.*** The only available pipeline connections for loading oil products are behind Pier 5B, which is directly in front of the paved storage area and adjacent to the berth that Sause Bros. must use for unloading Mainland cargo into the warehouse and the stacking that it uses. The berth length is too short for Sause to bring both of its tandem barges alongside at once, so that they have to be shifted during the call – which adds to costs and delays cargo. Because fuel barges are in port nearly every day, Sause must work around them when it calls every three weeks. Another issue for Sause, even when operating at Pier 5A, is that the distance to the warehouse is 400 feet (compared to only 30 feet at Pier 2 in Honolulu). This requires a shuttle truck, which slows the process and increases costs.

***Berth Availability.*** Bulk cargo activity (including cement, coal, aggregates, petroleum products, steel products, and scrap) has increased to the point that berth availability is a limiting factor. Scheduling calls is very difficult, and for fuel barges scheduling berths is complicated by having to coordinate with limited berth windows on the Neighbor Islands. The lack of a prioritized statewide berth scheduling system that addresses current market conditions leads to inefficiencies. In the past, some foreign vessels had to wait offshore for a berth to clear at a cost of over \$20,000 per day.

***Ocean Swell.*** Surge within the basin (as much as 8 feet of vertical movement) is sometimes a problem. This has damaged fixed bulk unloading equipment due to contact with vessels.

***Access Channel Limitations.*** Depth, width and protection from cross currents in the approach and entrance, in combination with the lack of sufficient navigational aids, restrict certain vessels from entering. This is particularly a problem for a carrier wishing to operate a liner service with fixed sailing schedules. Even with improved lighting in the last several years, arrival and departure is still limited to daylight hours. Improvements to the channel to address the crosscurrents as well as improved navigational aids should alleviate concerns that currently do not allow for 24-hour harbor access for the larger vessels. Additional deepening of the channel and harbor will allow for full utilization of larger vessels that currently arrive partially loaded due to the limited depth.

## **Kahului**

***Hawaii Superferry Terminal.*** The currently planned location for the Hawaii Superferry terminal at Pier 2B will significantly affect Young Brothers operations unless a number of other adjustments are made at the port. The main Superferry-related issues include access to Pier 2 for ferry users and berth availability for existing users once Pier 2B is no longer available. Pier 2A is now the only berth at which propane and cement can be delivered to Maui. YB has been given priority at Pier 2A only for its three PUC barge calls, requiring the use

of Pier 2B occasionally. Due to the fact that YB averages five weekly barge calls to Kahului, YB will lose this flexibility when the offshore end of Pier 2 is developed for the Superferry. The short-term solution for cargo operations is more use of Pier 2A and Pier 3, including a requirement that propane, cement and perhaps fuel oil be handled only at night.

The longer-term solution calls for more berthing capacity at the port. It will be critical for both the Superferry and YB that separate access into Pier 2 is available for each, in order not to have the Superferry shut down YB operations and not to have YB prevent efficient ferry operations. The current Superferry improvement plan includes enhancement of roads servicing the port, including new and separate access to Pier 2B for ferry traffic to keep it from co-mingling with YB stevedoring and customer pickup and delivery activity.

A new landside access route prior to commencement of ferry operations is essential. Access to the ferry terminal has been routed through Puunene Road keeping the ferry traffic separate from the Young Brothers traffic that uses Wharf Street. Young Brothers barges will use Pier 2A and the ferry will use Pier 2B. The barge used for ferry loading will occupy Pier 2C. The increased use of these piers will put additional pressure on port calls for all users (general cargo, cement as well as propane), and will reduce the available layberth space in Kahului.

***Expanded Operation Areas.*** In addition to the need for landside areas to replace cargo areas dislocated by ferry operations at Pier 2B and cruise ship operations at Pier 1, existing container and cargo operations are growing and need more space. Both cargo vessel calls and cargo volumes are growing. (TEUs have doubled in the last 10 years and will continue to grow.) Despite recent projects, including Puunene, Ota and Pier 2 Yard improvements as well as demolition of the Pier 2 shed, available landside space is shrinking to provide security zones and access routes to cruise ships.

***Cement Storage.*** YB uses Pier 2/3 landside areas intensively, with barge calls almost every day of the week. The presence of cement storage tanks and the truck traffic they bring through the YB operations are disruptive, so that the current location of the cement storage tanks within the YB operations area is not conducive to safe and efficient cargo operations. Cement storage should be relocated away from the pier to eliminate traffic conflicts involving cement trucks, container trucks, and container handling equipment within the terminal. The cement operations will be relocated within the harbor within five years.

***Berth Shortage from Increased Cruise Vessel Calls.*** Cruise ship presence day and night at Pier 1 has significantly increased overall berth utilization in the Harbor. In particular, this blocks the only location other than draft-limited Pier 3 for fuel delivery to Maui and it blocks the only berth served by the bulk sugar loading conveyor.

***Cruise Passenger / Cargo Separation.*** Passenger and cargo operations share Pier 1 and create safety, security and operational problems for each other. This a problem shared by other harbors.

***Inability to Handle Fully Laden Fuel Oil Barges.*** Pier 3 water depth, at just 18 feet, is significantly less than that required by the existing fuel barge. This means operating fuel barges only partly loaded, or discharging cargo at the Big Island prior to arrival in Kahului. Either of these solutions is more costly because it means sub-optimal use of vessels, a reduction in operator flexibility due to scheduling and cargo logistics problems, and more vessel calls within a tight berthing schedule.

***Vessel Traffic Management.*** The number and size of vessels calling at Kahului has increased to the point that a formal Vessel Traffic System may be necessary. So far the present system, in which vessel captains work out among themselves their arrivals and departures through the harbor entrance, has been sufficient. But unsafe incidents have been mentioned, and cruise lines especially desire better traffic management.

It was mentioned earlier in this report that Kahului Harbor's problems are worse than any of the other state harbors. The language of the MTG report is quite blunt in its assessment of the Kahului Harbor outlook. To quote:

*The harbor capacity situation on Maui is considered the most critical of all the neighbor islands. The combination of rising cargo volumes and increased passenger activity is bringing the island closer and closer to the point at which service breakdowns and delivery disruptions can be expected. Although the time when major disruptions will occur cannot be predicted precisely, small scale negative impacts of congestion involving increased costs and cargo delays at the port are probably already happening.*

*When major service disruptions occur, which could come sometime in the next several years if timely improvements are not made, the impact on the economic life of the island will likely be significant. These impacts may include shortages of gasoline and/or higher costs, a lack of coal and fuel oil for power generation; loss of off-island markets due to the inability to get local products to market in a timely and efficient manner, and disruption in the supply of construction material and resulting impact to the construction sector, shortages of basic necessities and the loss of cruise ship calls. The severity of the problem and magnitude of the consequences make creation of new port capacity on Maui one of the top strategic priorities of Hawaiian port development.<sup>15</sup>*

## **Hilo**

***Cruise Passenger / Cargo Separation.*** Cruise ships at Pier 1 share a single port access gate with Matson's commercial freight traffic working at Pier 1,

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<sup>15</sup> See Mercator Transport Group, *op. cit.*, p. 36.

Young Brothers working at Pier 2, and others. This mixing of cruise passenger arrival and departure traffic with on-terminal tractors, lifting equipment, and road trucks creates major security and safety concerns. The two should be separated as much as possible.

***Landside Access to Port.*** Because mixed cruise passenger and cargo traffic entering and leaving the port via the main gate onto Kuhio Street causes delays and unsafe conditions, the alternative exit onto Kaimanalo Street behind Pier 1 and east of the Harbormaster's office is preferable.

***Pier Strength for YB Operations.*** Strength of the deck in the YB container yard limits the size and capacity of lifting equipment that can be used. Thus, YB is limited to three or four high container stacks, which reduces yard capacity and stacking flexibility.

### **Kawaihae**

**Earthquake Damage. Repairs must be made to the damaged Pier 1 and portions of Pier 2 damaged in the 2006 earthquake.**

***Paving.*** Some of the cargo terminal area is unpaved, limiting the machines that can be used and creating dust and drainage problems.

***Ocean Swell.*** The arrangement of the breakwater causes the harbor to have poor protection from Northwest ocean swells. The problem is worst at Pier 1, closest to the entrance, which is the designated location of the Superferry terminal.

***Mixing of Pleasure Boats and Commercial Vessels in the Harbor.*** The harbor basin is used by both commercial vessels and pleasure boats because an adjacent small boat harbor has not been finished. Collisions between the two have occurred on multiple occasions. Operating large commercial vessels and barges close to pleasure craft under adverse wind and swell conditions should be avoided. Completion of the small boat harbor would solve this problem.

### **Nawiliwili**

***Hawaii Superferry / Matson Berthing Conflict at Pier 1.*** The Hawaii Superferry is slated to call at Nawiliwili's Pier 1 every day. This is the same berth used by Matson and schedules must be coordinated.

***Cruise Ship / Fuel Vessel Conflict at Pier 2.*** The frequency of NCL ships and other cruise lines at Pier 2 creates conflicts with fuel delivery to Kauai. Fuel barge delivery is further complicated by the fact that, due to the arrangement of landside piping connections of specific receivers, delivery must be made to both Piers 1 and 2. With increased use of Pier 2 by cruise ships, fuel delivery barges have very limited opportunities to make deliveries. The cumulative effect could be a significant reduction in Kauai's ability to maintain fuel supplies.

## VII. What are the existing development priorities?

The MTG report also identified development priorities, dividing them into three categories. These were (I) short term or “do now” projects with limited costs and high returns; (II) medium term projects requiring larger spending and sometimes longer lead times (even though some of these, such as ferry terminal improvements, had already been programmed for the next year); and (III) long term or strategic projects.

These projects, as of December 2005, along with the estimated costs, were summarized in the Mercator report as follows:

### I. Short Term

#### Honolulu

- Pier 1 warehouse demolition
- Develop Sand Island DLNR land
- Pier 1 lighting improvements
- Sand Island container yard deck hardening

#### Hilo

- Open Pier 1 container gate

#### Kawaihae

- Complete small boat harbor
- Paving

#### Nawiliwili

- Pier 3 Dolphin

**Total Estimated Cost = \$9 – \$13 million**

### II. Medium Term

#### Honolulu

- Re-route Sand Island access road
- Pier 40 improvements

- Pier 19 Ferry Terminal

#### **Kalaelo**

- Fuel pipeline system expansion

#### **Kahului**

- Inter-island terminal expansion
- Pier 3 deepening
- Pier 2B Ferry Terminal

#### **Hilo**

- Pier 4 Inter-island Terminal
- Pier 2-3 passenger improvements

#### **Kawaihae**

- Ferry Terminal development

#### **Nawiliwili**

- Ferry Terminal development

#### **Lanai**

- Pier rebuilding

#### **Port Allen**

- Pier rebuilding

**Total Estimated Cost = \$110 – \$125 million**

### III. Long Term

#### **Honolulu**

- Kapalama Terminal development
- Preserve container handling capacity at Pier 1

#### **Kahului**

- West Harbor development

## Kalaeloa

- Pier 8 construction

Total Estimated Cost = \$500+ million

GRAND TOTAL ESTIMATED COST = \$619 – \$638 million

## VIII. What are the funding sources?

The MTG study concluded that, because the total cost of the priority projects summarized in the above section exceeded \$600 million, it would take 25 years or more to complete if spending continued at the recent pace, and during that time more priorities would arise.

Several kinds of fees are paid to state government by Hawaii's harbor users. These include:

- **Port entry fee** – a charge per vessel for entry into a port.
- **Dockage** – a fee per vessel for use of berth space.
- **Wharfage** – a charge per commodity on-loaded or off-loaded.
- **Storage/Demurrage** – penalty charged per day to shippers or receivers of freight for time beyond the free time provided for removing cargo from the pier either by truck for incoming cargo or by vessel for outgoing cargo. (This essentially becomes an added floating warehouse charge if the vessel cannot off-load within a given period of time because it cannot gain access to the dock or because the off-loading process involves various inefficiencies.)
- **Rent** – lease rent for state land.

The proceeds of these fees are earmarked for harbor improvements by the state Harbors Division. But it is much harder to itemize added costs that come from delays and inefficiencies in the process. These costs must also be passed along to customers and ultimately to end-use consumers. Often harbor users must fund improvements via their own private investment in things like new technology that facilitates the movement of cargo. But these costs also must be passed along.

Clearly, the existing levels and structures for the above fees are not sufficient for funding the kind of harbor improvements that are necessary. Funding was beyond the scope of the MTG study, but it did contain a few comments on that subject. These included:

- ***Increasing rates for cargo wharfage and passenger embarkation / disembarkation.*** Users indicate a willingness to support increases if funds are channeled back to critical projects. A re-structuring of fees to relate payments to land area occupied would also provide a means to reward operators that most intensively use limited available land.
- ***Pursuing mixed use development to spread development costs.*** Development in addition to maritime uses can provide added sources of revenue, but options must be clearly defined. Given scarcity of land available for maritime use, it may be best to preserve it.
- ***Introduction of private equity.*** Private equity has been used elsewhere in the U.S. and around the world. Private investors could provide capital for infrastructure development and would manage the created assets in exchange for payments from users of the assets.

The Martin Associates study did focus specifically on funding, taking three sample projects selected by HHUG. Those three represented the three key port sectors – containers, bulk and passengers. But as part of that study, Martin also concluded that current sources of harbor revenue would need to be augmented. It recommended not only revising existing tariff structures but also reviewing terminal lease options at Mainland ports. As for tariff increases alone, there is some evidence that this does not add significantly to end-use consumer costs and the overall inflation rate in the Hawaii economy.<sup>16</sup>

The three chosen projects were, with very rough (order-of-magnitude) cost estimates:

- (1) **Kapalama Terminal Development** (\$300 million for 80 acres of container development).
- (2) **Kahului West Harbor Development** (\$150 million to relieve passenger and cargo congestion and scheduling conflicts).
- (3) **Kalaeloa Harbor Pier 8 construction** (\$50 million).

It was estimated that a total of \$36.3 million annually in debt service would be required for these projects, assuming a 30-year, 6% bond for each project. (This was new debt, over and above existing requirements, and it did not take into account assumptions about project timing.) But that represented more than 50% of the total annual revenue of the Harbors Division, and it amounted to about 60% of its annual net income. Nor did current revenue cover annual debt service for any of the three projects individually.

The Martin study concluded that, under current cargo projections and wharfage structure, the new annual debt service could not be covered until 2020. That estimate did not include revenue that would be required to meet existing debt, nor operating and maintenance costs associated with the projects.

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<sup>16</sup> See SMS, *op. cit.*, Section 5.0, for discussion.

## IX. What are the consequences of doing nothing?

It was mentioned in the above discussion that Hawaii often does not react to growing crises without some major event or series of events that make ignoring the problem impossible. In that, it is like many other places. Even though there is unanimous agreement in the Hawaii maritime industry that the harbors are approaching capacity, there remains great skepticism that problems will be addressed adequately and on time. But what will happen to the Hawaii economy if we do deny the crisis and do not take prompt measures to alleviate it?

This section is an attempt to answer that question. It is only one of a number of scenarios that might be used to illustrate the economic impacts, and conservative assumptions are made intentionally in order to emphasize how critical the situation is.

Let us therefore construct a hypothetical sketch of what might happen to the Hawaii economy if we do not take actions to solve the harbor problems reviewed in the preceding sections of this document. One way to approach this is to assume there will be absolutely no capacity to accommodate any growth at all beyond a certain finite point. Thus — when Hawaii's harbors "hit the wall" — economic growth will just suddenly come to a halt.

But to be more conservative, let us assume the process would not be quite that draconian. Container traffic does seem to grow at a faster rate than an aggregate inflation-adjusted measure of the economy like Real Gross Domestic Product (RGDP). Over the 10-year period from 1995 to 2004, TEU volume rose 56.8%.<sup>17</sup> This might likely be somewhat of an unbiased measure because that interval contained some good and some bad years. In the mid-1990s, for example, the Hawaii economy was still suffering from the economic malaise that had its onset several years earlier. But about 1998 the economy started a more healthy growth track, and that accelerated into the next decade and continues today, so that higher growth years do seem to outweigh lower growth years in the sample. Over that same 10-year period, however, RGDP grew only 9.6%. That works out to a 5.9% higher average growth rate in container volume than in average RGDP growth.<sup>18</sup>

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<sup>17</sup> TEU volume data over the 1994-2004 interval is contained in the MTG Study, *op. cit.*, Appendix 2a.

<sup>18</sup> This higher growth rate is borne out by more formal investigation. If one performs a linear regression, with TEU volume as the dependent variable and RGDP as the independent variable, over the 1994-2004 interval according to the specification:

$$\ln(\text{TEU}) = \text{constant} + \ln(\text{RGDP}) + \ln(\text{RGDP}(-1))$$

then the following outcomes are obtained:

This same phenomenon seems to be borne out in forecasts of both of these variables. Forecasts for container traffic volume have been cited to be as high as 27% by 2010, 66% by 2015, and 93% by 2020.<sup>19</sup> But if RGDP grows at an average rate of 2.4% annually, which is the state's own most recent forecast for 2007 through 2009, it will be 10.1% higher in 2010, 23.9% higher in 2015, and 39.5% higher in 2020. Thus, it might be advisable not to forecast of what will happen to the overall economy if the harbors do not keep up strictly on container growth projections, at least not in any directly one-to-one fashion.

Rather, let us look at a more modest scenario, which should be quite sufficient to show how critical it is not to ignore the harbor situation. Recall that it is merely one scenario, but any of several modifications in the assumptions would illustrate the same thing.

This scenario runs as follows. Assume that the Hawaii economy is unaffected by harbor capacity constraints until 2011, and that between 2007 and 2010 the economy continues to grow at the current state forecast of 2.4% a year.<sup>20</sup> This is a reasonable number, and it is in line with most private forecasts. (Choice of this baseline number also tends to avoid extrapolating recent experience to the longer term future. This is always a danger just on the heels of a period when the economy has been enjoying quite good performance, such as the present.)

During 2011 and after that, however, let us then assume that the harbor situation will make itself felt by reducing RGDP growth by 0.1% annually compared to what it would be otherwise — that is, 2.3% in 2011, 2.2% in 2012, and so forth on

$$\ln(\text{TEU}) = 14.0 + 5.90 \ln(\text{RGDP}) - 5.91 (\text{RGDP}(-1))$$

(0.98)    (4.45)                    (-2.56)

Where t-statistics are in parentheses and:

$$\text{R-square (adj.)} = 0.73 ; F = 13.05 ; D-W = 3.44$$

With specification in natural logarithm form, coefficients can be interpreted directly as elasticities. That is, for a one percent change in RGDP, TEU volume will change by the same percent as the value of the coefficient. And the value of that coefficient on the concurrent RGDP term is exactly the same as implied in the text above. Unfortunately, this specification is hampered by few degrees of freedom, due to lack of available data on TEUs over time. Judging from the D-W statistic and the value of the coefficient on the lagged RGDP term (included not just to capture lagged effects but also in an attempt to correct for apparent serial correlation of residuals) which is the same as that on the contemporaneous term, there is obviously significant negative autocorrelation present. The best cure for this would be to include other explanatory variables, but unfortunately degrees of freedom are limited even as is.

<sup>19</sup> Hawaii Harbors Users Group, "Port Facilities & Development Priorities Report," *Hawaii Business*, October 2006, p. 77.

<sup>20</sup> That current state forecast actually goes only to 2009, but let us extend the 2.4% growth out one more year to 2010. The forecast is available on line at Department of Business, Economic Development, and Tourism website, [www.hawaii.gov/dbet/info/economic/data\\_reports/qser/outlook-economy](http://www.hawaii.gov/dbet/info/economic/data_reports/qser/outlook-economy).

out through a forecast horizon of 20 years afterwards to 2030. It can be appreciated that this is a very modest assumed impact on real economic growth, especially given the critical role of the harbors in fostering that growth.

Constraints on the supply of all kinds of goods to fuel the economy will also have supply side effects on the inflation rate. Again for simplicity, let us make the further assumption that Hawaii's inflation rate will rise by 0.1% annually, from 2011 forward. This, too, is a very modest assumption, and it probably underestimates the inflationary effects just as much as the same magnitude of reduction in RGDP growth underestimates the real growth effects. As a result of these two assumptions combined, however, nominal or current dollar RGDP remains unchanged. It is just that as time goes on, Hawaii's jobs and overall standard of living will be lower than otherwise, and its prices will be higher than otherwise.

If, for each year, we calculate the difference in the level of RGDP that continues to grow at 2.4% a year and that which would result from reducing that growth by 0.1% annually, then calculate the present value in 2007 of that difference using a 5% discount rate, we get results that are summarized in Table 2 below.<sup>21</sup> (This calculation also required converting 2000 dollars to 2007 dollars, because RGDP levels used as a base were originally in 2000 dollars. This was done using the actual and projected RGDP deflator rates between 2000 and 2007.)

Table 2.

ECONOMIC CONSEQUENCES OF IGNORING HARBOR UPGRADES

Reduced value of Hawaii Real Gross Domestic Product in 2007 dollars	
<b>(Assuming RGDP growth is lowered 0.1% annually from a baseline                  forecast of 2.4% annual growth, due to harbor constraints)</b>	
Through 2015	\$ 1.7 billion
Through 2020	\$ 9.8 billion
Through 2025	\$ 27.3 billion
Through 2030	\$ 53.9 billion

<sup>21</sup> A 5% discount rate was chosen because in early 2007 when this document was written long term Treasury yields were all below that point. Using a higher discount rate would alter results somewhat, but not in a major way and this certainly would not change the overall conclusions here.

Results in Table 2 dwarf the estimated costs of harbor upgrades of around \$600 million mentioned in MTG report and summarized in Section IX above. That threshold is neared in 2013, when cumulative costs in RGDP are \$517 million, and it is well exceeded in 2014 when they sum to \$1,013 million. Thus, even if harbor upgrades do cost more than that \$600 million figure, which when all is said and done they are likely to, this cost will be recouped very soon considering alternatives for the overall economy. By the end of the forecast horizon used here, in 2030, the assumed cost will have come close to exceeding the entire amount of Hawaii currently projected RGDP in 2007 (using 2007 dollars) of \$60.8 billion.

Chart 4.

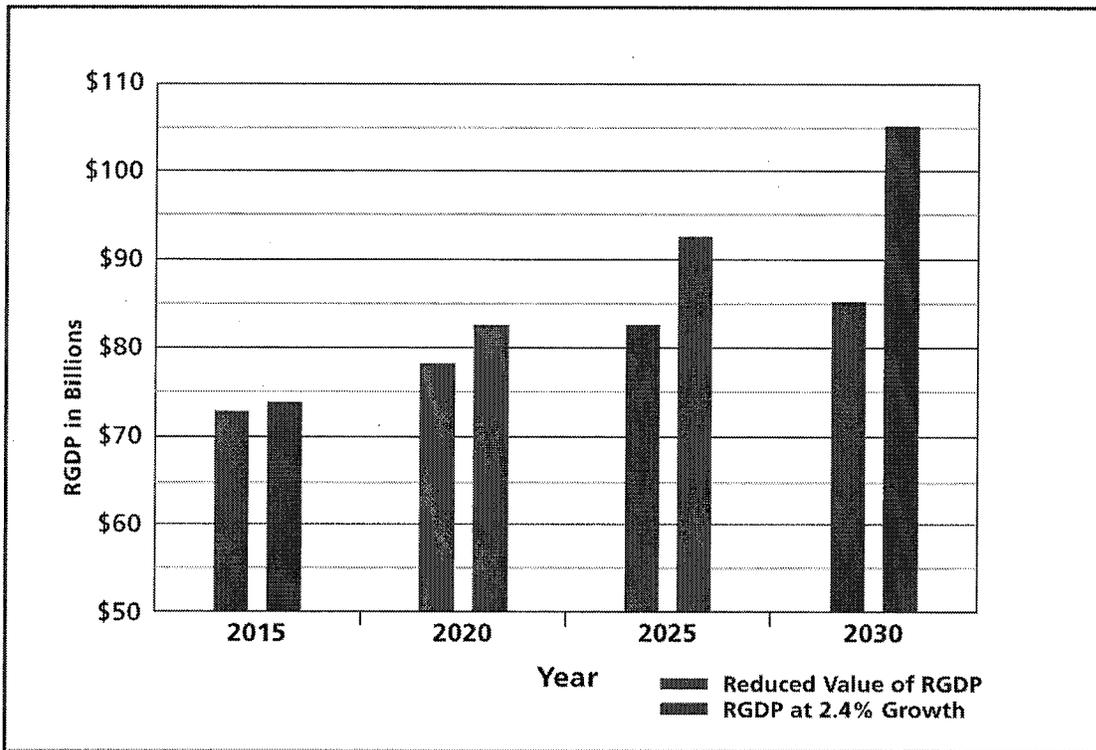


Chart 4 compares the 0.1% reduction in RGDP that would result from ignoring harbor upgrades to the estimated 2.4% annual growth in RGDP that would be realized with harbor improvements.

If more serious assumptions projecting greater than 0.1% annual reductions in RGDP growth were used, outcomes arguing for harbor upgrades would be more overwhelming. But even given these used here, the results shown in Table 3 and

Chart 5 for Hawaii's standard of living and price level would apply, and that is convincing enough.

The same assumptions as above were used in Table 3 and Chart 5 for RGDP growth, and reasonable estimates of population growth were applied to calculate per capita RGDP as a measure of Hawaii's standard of living. The 0.1% higher inflation rate was applied beginning in 2011 to a baseline 2.5% increase in the Honolulu Consumer Price Index. The effect start slow, because of the assumption that no effects will occur until 2011, but they accumulate because of compounding. By the time 20 years have passed from 2011, in 2030, Hawaii's per capita RGDP would be over 20% lower, and its price level almost 20% higher. The reader might only contemplate the impacts if larger negative impacts were assumed in this scenario – or if they started sooner, as may already be happening.

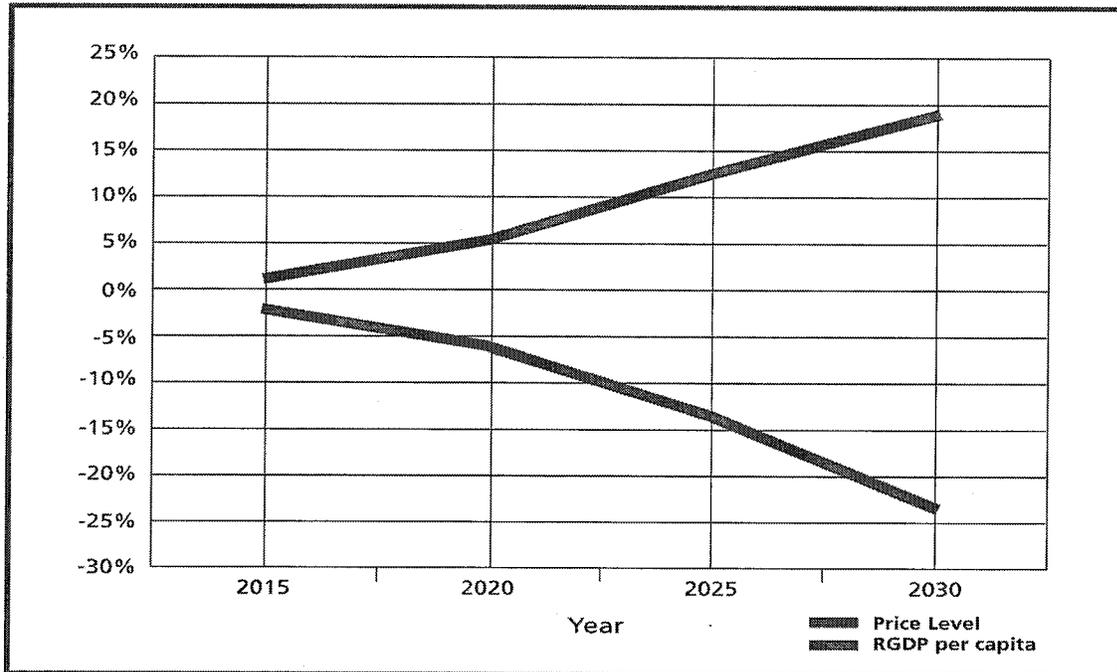
Once again, this example chose modest assumptions intentionally to illustrate the points above. If more serious assumptions projecting greater than 0.1% annual reductions in RGDP growth were used, outcomes arguing for harbor upgrades would be more overwhelming. But even given these used here, the results shown in Table 3 and Chart 5 for Hawaii's standard of living and price level would apply, and that is convincing enough.

Table 3.

WITHOUT HARBOR UPGRADES, PRICE LEVELS INCREASE

Effects on Hawaii RGDP Per Capita And the Price Level		
<b>(Assuming reasonable projections of the population, 0.1% lower annual RGDP growth than a baseline 2.4%, and 0.1% higher CPI inflation than a baseline 2.5%, with inaction on harbors)</b>		
	<u>RGDP per capita</u>	<u>Price Level</u>
<b>2015</b>	<b>1.6% lower</b>	<b>1.5% higher</b>
<b>2020</b>	<b>5.6% lower</b>	<b>5.5% higher</b>
<b>2025</b>	<b>12.6% lower</b>	<b>12.4% higher</b>
<b>2030</b>	<b>23.0% lower</b>	<b>18.6% higher</b>

Chart 5.



To test the sensitivity of the assumptions underlying the results presented in Tables 2 and 3, two alternative scenarios were calculated. The results are presented in the Appendix. The first alternative assumes a 0.05% reduction in RGDP annually rather than 0.1% beginning in 2011, and a concomitant increase in inflation of the same magnitude beginning in that year. Outcomes are less severe but still significant. Through 2030, for example, RGDP is reduced \$27.7 billion rather than \$53.9 billion, and RGDP per capita is 9.8% lower rather than 23.0% lower. But a 0.05% reduction in RGDP growth is almost negligible.

The other alternative raises the RGDP growth reduction to 0.15% annually, the same magnitude by which it was reduced in the first alternative scenario. In that outcome, through 2030 RGDP is reduced by \$78.7 billion. This is well above the level of 2007 current dollar RGDP, and it actually causes an ongoing annual contraction in RGDP, or recession, after 2026. RGDP per capita is 26.7% lower rather than 23.0% lower. Yet it should be noted that a 0.15% annual growth reduction still falls in the range of very small assumed changes.

One other sensitivity analysis is presented in the Appendix, in which the discount rate changes from 5% to 6%. As can be seen in Table 2C, that changes outcomes only in a minor way.

## X. The impact of inadequate harbors on consumer goods

If harbor problems are ignored, by 2030, Hawaii's standard of living will be reduced significantly and price levels will be substantially higher. The impact on everyday consumer goods will be especially pronounced. As illustrated in Table 4, inadequate harbor improvements will drive up the cost of food, household products, small appliances, and furniture an average of 18%.

Table 4.

**(Assuming RGDP growth is lowered 0.1% annually from a baseline forecast of 2.4% annual growth, due to harbor constraints)**

Consumer Good	Unit Price (2005)	2030 Price WITH Harbor Upgrades	2030 Price WITHOUT Harbor Upgrades
Green Beans (14.5 oz. can)	\$1.45	\$2.88	\$3.42
Chicken Noodle Soup (10.75 oz. can)	\$1.29	\$2.56	\$3.04
Case of Coca-Cola (24 cans)	\$4.99	\$9.83	\$11.67
Macaroni & Cheese (Kraft, 7.25 oz. box)	\$1.53	\$3.04	\$3.61
Paper Towels (Bounty, 90 sheets)	\$2.16	\$4.29	\$5.10
Latex Paint (Benj. Moore, 1 gallon, flat finish)	\$28.99	\$57.69	\$68.47
Case of Beer (Budweiser, 24 cans)	\$15.89	\$31.82	\$37.77
Ice Cream (Breyers, half gallon)	\$6.99	\$13.91	\$16.51
Mattress (Sealy Posturepedic Emerald Queen)	\$549.99	\$1,094.48	\$1,299.08
Microwave Oven (GE Spacemaker 1.4 cu. ft.)	\$299.99	\$596.98	\$708.58
Motor Oil (Valvoline, 1 qt.)	\$1.99	\$3.96	\$4.70
Liquid Detergent (Tide, 100 fl. oz. container)	\$10.39	\$20.68	\$24.54

## XI. Conclusions

As this report is written, Hawaii consumers may be particularly blind to any set of developments that could cause the return of hard times. We are simply at a point in the economic cycle when such possibilities are farthest from our minds. As mentioned earlier in Section V, if the Hawaii economy continues to expand in 2007 – as all local forecasters project that it will, albeit at a slower pace – the state will have experienced 11 straight years of economic growth. That exceeds the length of the last such expansion, which came to an end in the early 1990s after nine years.

Eleven years is a very good run as economic expansions go, regionally or nationally. At the national level, in the 1990s the economy broke the all-time historical record for such expansions by growing for 120 consecutive months, or 10 years. (The previous national record was set in the 1960s, with a 106-month expansion.)

So times for Hawaii have been good. Since 1998, on balance, Hawaii personal income growth has been strong, inflation until recently has been benign, and local unemployment rates have fallen to the lowest in the nation. Construction has been robust, and home prices have skyrocketed. Both have been boosted by interest rates lower than those seen in the adult lifetimes of most of those active in the economy today. Higher home values have made consumers feel wealthier, even if they themselves are not buying or selling a home. The current expansion was very welcome after the anemic years of the mid-1990s. But at times like this, it is harder to convince consumers that these good times may not last forever.

Yet the evidence in this report suggests strongly that a return of more difficult economic times might be hastened and deepened significantly if Hawaii does not pay adequate attention to maintaining and updating its harbor infrastructure. One example presented here suggests that, if increasing harbor constraints do not even begin until 2011 and then they only lower Real Gross Domestic Product growth by 0.1% annually from a conventional baseline scenario, the cost (in 2007 dollars) to RGDP could amount to over \$50 billion by 2030. This is especially large considering the fact that, to date, estimated costs of harbor upgrades are below \$1 billion. Moreover, if harbor problems are ignored, over the same time frame Hawaii's standard of living will be reduced significantly, and its price level will be substantially higher.

It is appropriate to conclude this report by reiterating a point made at several junctures throughout it. That is, the general Hawaii consumer seems to be unaware of the economic role played by the harbors in the local economy and the urgency of addressing growing harbor constraints. Unfortunately, until this awareness is raised sufficient progress is not likely to be made on the issue. It is hoped that this report will help do that.

## Appendix

### Alternative scenario Sensitivity Analysis

Table 2A.

#### IF HARBORS ARE NOT UPGRADED

Reduced value of Hawaii Real Gross Domestic Product  
in 2007 dollars

**(Assuming RGDP growth is lowered 0.05% annually from a baseline  
forecast of 2.4% annual growth, due to harbor constraints)**

Through 2015	\$ 0.9 billion
Through 2020	\$ 5.0 billion
Through 2025	\$ 13.9 billion
Through 2030	\$ 27.7 billion

Table 2B.

#### IF HARBORS ARE NOT UPGRADED

Reduced value of Hawaii Real Gross Domestic Product  
in 2007 dollars\*

**(Assuming RGDP growth is lowered 0.15% annually from a baseline  
forecast of 2.4% annual growth, due to harbor constraints)**

Through 2015	\$ 2.6 billion
Through 2020	\$ 14.7 billion
Through 2025	\$ 40.3 billion
Through 2030	\$ 78.7 billion

*\* In this scenario, RGDP actually begins to contract after 2026.*

Table 2C.

IF HARBORS ARE NOT UPGRADED

Reduced value of Hawaii Real Gross Domestic Product  
in 2007 dollars

(Assuming RGDP growth is lowered 0.1% annually from a baseline  
forecast of 2.4% annual growth, due to harbor constraints, using a  
6.0% instead of a 5.0% discount rate)

Through 2015	\$	1.6 billion
Through 2020	\$	8.9 billion
Through 2025	\$	23.8 billion
Through 2030	\$	46.6 billion

Table 3A.

WITHOUT HARBOR UPGRADES, PRICE LEVELS INCREASE

Effects on Hawaii RGDP Per Capita  
And the Price Level

(Assuming reasonable projections of the population, 0.05% lower  
annual RGDP growth than a baseline 2.4%, and 0.05% higher CPI  
inflation than a baseline 2.5%, with inaction on harbors)

	<u>RGDP per capita</u>	<u>Price Level</u>
2015	0.7% lower	0.7% higher
2020	2.6% lower	2.7% higher
2025	5.7% lower	6.0% higher
2030	9.8% lower	10.7% higher

Table 3B.

WITHOUT HARBOR UPGRADES, PRICE LEVELS INCREASE

Effects on Hawaii RGDP Per Capita  
And the Price Level

(Assuming reasonable projections of the population, 0.15% lower annual RGDP growth than a baseline 2.4%, and 0.15% higher CPI inflation than a baseline 2.5%, with inaction on harbors)

	<u>RGDP per capita</u>	<u>Price Level</u>
2015	2.3% lower	2.2% higher
2020	7.7% lower	10.1% higher
2025	16.2% lower	19.0% higher
2030	26.7% lower	35.6% higher

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